CASE IH
AGRICULTURE

SERVICE MANUAL



PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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Safety rules

IMPORTANT NOTICE

All maintenance and repair operations described in this manual should be carried out exclusively by authorised workshops. All instructions should be carefully observed and special equipment where indicated should be used.
Anyone who carries out service operations described without carefully observing these instructions will be directly responsible for any damage caused.

NOTES FOR EQUIPMENT

Equipment shown in this manual is:

- designed expressly for use on these tractors;
- necessary to make a reliable repair;
- accurately built and strictly tested to offer efficient and long-lasting working life.

NOTICES

The words “front”, “rear”, “right hand”, and “left hand” refer to the different parts as seen from the operator’s seat oriented to the normal direction of movement of the tractor.

SAFETY RULES

PAY ATTENTION TO THIS SYMBOL



This warning symbol points out important messages involving personal safety. Carefully read the safety rules contained herein and follow advised precautions to avoid potential hazards and safeguard your safety.
In this manual you will find this symbol together with the following key-words:
WARNING -it gives warning about improper repair operations and potential consequences affecting the service technician’s personal safety.
DANGER - it gives specific warning about potential dangers for personal safety of the operator or other persons directly or indirectly involved in the operation.



TO PREVENT ACCIDENTS

Most accidents and personal injuries taking place in workshops are due from non-observance of some essential rules and safety precautions.

The possibility that an accident might occur with any type of machines should not be disregarded, no matter how well the machine in question was designed and built.

A wise and careful service technician is the best precautions against accidents.

Careful observance of this basic precaution would be enough to avoid many severe accidents.

⚠ DANGER ⚠

Never carry out any cleaning, lubrication or maintenance operations when the engine is running.

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SAFETY RULES

Generalities

- Carefully follow specified repair and maintenance procedures.

- Do not wear rings, wristwatches, jewels, unbuttoned or flapping clothing such as ties, torn clothes, scarves, open jackets or shirts with open zips which could get caught on moving parts. Use approved safety clothing such as anti-slipping footwear, gloves, safety goggles, helmets, etc.
- Wear safety glasses with side guards when cleaning parts using compressed air.
- Damaged or frayed wires and chains are unreliable. Do not use them for lifting or towing.
- Wear suitable protection such as approved eye protection, helmets, special clothing, gloves and footwear whenever welding. All persons standing in the vicinity of the welding process should wear approved eye protection. NEVER LOOK AT THE WELDING ARC IF YOUR EYES ARE NOT SUITABLY PROTECTED.
- Never carry out any repair on the machine if someone is sitting on the operator's seat, except if they are qualified operators assisting in the operation to be carried out.
- Never operate the machine or use attachments from a place other than sitting at the operator's seat or at the side of the machine when operating the fender switches.
- Never carry out any operation on the machine when the engine is running, except when specifically indicated. Stop the engine and ensure that all pressure is relieved from hydraulic circuits before removing caps, covers, valves, etc.
- All repair and maintenance operations should be carried out with the greatest care and attention.
- Disconnect the batteries and label all controls to warn that the tractor is being serviced. Block the machine and all equipment which should be raised.
- Never check or fill fuel tanks or batteries, nor use starting liquid if you are smoking or near open flames as such fluids are flammable.
- The fuel filling gun should always remain in contact with the filler neck. Maintain this contact until the fuel stops flowing into the tank to avoid possible sparks due to static electricity build-up.
- To transfer a failed tractor, use a trailer or a low loading platform trolley if available.
- To load and unload the machine from the transportation means, select a flat area providing a firm support to the trailer or truck wheels. Firmly tie the machine to the truck or trailer platform and block wheels as required by the transporter.
- Always use lifting equipment of appropriate capacity to lift or move heavy components.
- Chains should always be safely fastened. Ensure that fastening device is strong enough to hold the load foreseen. No persons should stand near the fastening point.
- The working area should be always kept CLEAN and DRY. Immediately clean any spillage of water or oil.
- Never use gasoline, diesel oil or other flammable liquids as cleaning agents. Use non-flammable non-toxic proprietary solvents.
- Do not pile up grease or oil soaked rags, as they constitute a great fire hazard. Always place them into a metal container.

START UP

- Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction.
- Never bring your head, body, arms, legs, feet, hands, fingers near fans or rotating belts.

ENGINE

- Always loosen the radiator cap very slowly before removing it to allow pressure in the system to dissipate. Coolant should be topped up only when the engine is stopped.
- Do not fill up fuel tank when the engine is running.
- Never adjust the fuel injection pump when the tractor is moving.
- Never lubricate the tractor when the engine is running.

ELECTRICAL SYSTEMS

- If it is necessary to use auxiliary batteries, cables must be connected at both sides as follows: (+) to (+) and (-) to (-). Avoid short-circuiting the terminals. GAS RELEASED FROM BATTERIES IS HIGHLY FLAMMABLE. During

charging, leave the battery compartment uncovered to improve ventilation. Avoid sparks or flames near the battery area. Do no smoke.

- Do not charge batteries in confined spaces.
- Always disconnect the batteries before performing any type of service on the electrical system.

HYDRAULIC SYSTEMS

- Some fluid coming out from a very small port can be almost invisible and be strong enough to penetrate the skin. For this reason, NEVER USE YOUR HANDS TO CHECK FOR LEAKS, but use a piece of cardboard or a piece of wood for this purpose. If any fluid is injected into the skin, seek medical aid immediately. Lack of immediate medical attention may result in serious infections or dermatitis.
- Always take system pressure readings using the appropriate gauges.

WHEELS AND TYRES

- Check that the tyres are correctly inflated at the pressure specified by the manufacturer. Periodically check for possible damage to the rims and tyres.
- Stay at the tyre side when inflating.
- Check the pressure only when the tractor is unloaded and tyres are cold to avoid wrong readings due to over-pressure.
- Never cut, nor weld a rim with the inflated tyre assembled.
- To remove the wheels, block both front and rear tractor wheels. Raise the tractor and install safe and stable supports under the tractor in accordance with regulations in force.
- Deflate the tyre before removing any object caught into the tyre tread.
- Never inflate tyres using flammable gases as they may generate explosions and cause injuries to bystanders.

REMOVAL AND INSTALLATION

- Lift and handle all heavy components using lifting equipment of adequate capacity. Ensure that parts are supported by appropriate slings and hooks. Use lifting eyes provided to this purpose. Take care of the persons near the loads to be lifted.

HEALTH AND SAFETY

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HEALTH AND SAFETY PRECAUTIONS

Many of the procedures associated with vehicle maintenance and repair involve physical hazards or other risks to health. This section lists, alphabetically, some of these hazardous operations and the materials and equipment associated with them. The precautions necessary to avoid these hazards are identified.
The list is not exhaustive and all operations and procedures and the handling of materials, should be carried out with health and safety in mind.

ACIDS AND ALKALIS

see Battery acids, e.g. caustic soda, sulphuric acid.
Used in batteries and cleaning materials.

Irritant and corrosive to the skin, eyes, nose and throat. Causes burns.

Avoid splashes to the skin, eyes and clothing. Wear suitable protective gloves and goggles. Can destroy ordinary protective clothing. Do not breathe mists.
Ensure access to water and soap is readily available for splashing accidents.

ADHESIVES AND SEALERS

see Fire
Highly Flammable, Flammable, combustible.
Generally should be stored in “No Smoking” areas; cleanliness and tidiness in use should be observed, e.g. disposable paper covering benches; should be dispensed from applicators where possible; containers, including secondary containers, should be labelled.

Solvent based Adhesives/Sealers

See Solvents.
Follow manufacturers instructions.

Water based Adhesives/Sealers

Those based on polymer emulsions and rubber lattices may contain small amounts of volatile toxic and harmful chemicals. Skin and eye contact should be avoided and adequate ventilation provided during use.
Follow manufacturers instructions.

Resin based Adhesives/Sealers

e.g. epoxide and formaldehyde resin based.
Mixing should only be carried out in well ventilated areas as harmful or toxic volatile chemicals may be released.
Skin contact with uncured resins and hardeners can result in irritation; dermatitis and absorption of toxic or harmful chemicals through the skin. Splashes can damage the eyes.
Provide adequate ventilation and avoid skin and eye contact. Follow manufacturers instructions.

Anaerobic, Cyanoacrylate and other Acrylic Adhesives

Many are irritant, sensitizing or harmful to the skin. Some are eye irritants.

Skin and eye contact should be avoided and the manufacturers instructions followed.
Cyanoacrylate adhesives (super-glues) must not contact the skin or eyes. If skin or eye tissue is bonded cover with a clean moist pad and get medical attention. do not attempt to pull tissue apart. Use in well ventilated areas as vapours can cause irritation of the nose and eyes.
For two-pack systems see Resin based adhesives/sealers.

Isocyanate (Polyurethane) Adhesives/ Sealers

see Resin based Adhesives.
Individuals suffering from asthma or respiratory allergies should not work with or near these materials as sensitivity reactions can occur.
Any spraying should preferably be carried out in exhaust ventilated booths removing vapours and spray droplets from the breathing zone. Individuals working with spray applications should wear supplied air respirators.

ANTIFREEZE

see Fire, Solvents e.g. Isopropanol, Ethylene Glycol, Methanol.
Highly Flammable, Flammable, Combustible.
Used in vehicle coolant systems, brake air pressure systems, screenwash solutions.
Vapours given off from coolant antifreeze (glycol) arise only when heated.
Antifreeze may be absorbed through the skin in toxic or harmful quantities. Antifreeze if swallowed is fatal and medical attention must be found immediately.

ARC WELDING

see Welding.

BATTERY ACIDS

see Acids and Alkalis.
Gases released during charging are explosive.
Never use naked flames or allow sparks near charging or recently charged batteries.

BRAKE AND CLUTCH FLUIDS (Polyalkylene Glycols)

see Fire.
Combustible.
Splashes to the skin and eyes are slightly irritating.
Avoid skin and eye contact as far as possible.
Inhalation of vapour hazards do not arise at ambient temperatures because of the very low vapour pressure.

BRAZING

see Welding.

CHEMICAL MATERIALS - GENERAL

see Legal Aspects.
Chemical materials such as solvents, sealers, adhesives, paints, resin foams, battery acids, antifreeze, brake fluids, oils and grease should always be used with caution and stored and handled with care. They may be toxic, harmful, corrosive, irritant or highly inflammable and give rise to hazardous fumes and dusts.
The effects of excessive exposure to chemicals may be immediate or delayed; briefly experienced or permanent; cumulative; superficial; life threatening; or may reduce life-expectancy.

DO'S

Do remove chemical materials from the skin and clothing as soon as practicable after soiling. Change heavily soiled clothing and have it cleaned.
Do carefully read and observe hazard and precaution warnings given on material containers (labels) and in any accompanying leaflets, poster or other instructions. Material health and safety data sheets can be obtained from Manufacturers.

Do organise work practices and protective clothing to avoid soiling of the skin and eyes; breathing vapours/aerosols/ dusts/fumes; inadequate container labelling; fire and explosion hazards.
Do wash before job breaks; before eating, smoking, drinking or using toilet facilities when handling chemical materials.
Do keep work areas clean, uncluttered and free of spills.
Do store according to national and local regulations.
Do keep chemical materials out of reach of children.

DO NOTS

Do Not mix chemical materials except under the manufacturers instructions; some chemicals can form other toxic or harmful chemicals; give off toxic or harmful fumes; be explosive when mixed together.
Do Not spray chemical materials, particularly those based on solvents, in confined spaces e.g. when people are inside a vehicle.
Do Not apply heat or flame to chemical materials except under the manufacturers' instructions. Some are highly inflammable and some may release toxic or harmful fumes.
Do Not leave containers open. Fumes given off can build up to toxic, harmful or explosive concentrations. Some fumes are heavier than air and will accumulate in confined areas, pits etc.
Do Not transfer chemical materials to unlabeled containers.
Do Not clean hands or clothing with chemical materials. Chemicals, particularly solvents and fuels will dry the skin and may cause irritation with dermatitis. Some can be absorbed through the skin in toxic or harmful quantities.
Do Not use emptied containers for other materials, except when they have been cleaned under supervised conditions.
Do Not sniff or smell chemical materials. Brief exposure to high concentrations of fumes can be toxic or harmful.

Clutch Fluids

see Brake and Clutch Fluids.

Clutch Linings and Pads

see Brake and Clutch Linings and Pads.

CORROSION PROTECTION MATERIALS

see Solvents, Fire.
Highly flammable, flammable.
These materials are varied and the manufacturers instructions should be followed. They may contain solvents, resins, petroleum products etc. Skin and eye contact should be avoided. They should only be sprayed in conditions of adequate ventilation and not in confined spaces.

Cutting

see Welding.

De-Waxing

see Solvents and Fuels (Kerosene).

DUSTS

Powder, dusts or clouds may be irritant, harmful or toxic. Avoid breathing dusts from powdery chemical materials or those arising from dry abrasion operations. Wear respiratory protection if ventilation is inadequate.

ELECTRIC SHOCK

Electric shocks can result from the use of faulty electrical equipment or from the misuse of equipment even in good condition.
Ensure that electrical equipment is maintained in good condition and frequently tested.
Ensure that flexes, cables, plugs and sockets are not frayed, kinked, cut, cracked or otherwise damaged.
Ensure that electric equipment is protected by the correct rated fuse.
Never misuse electrical equipment and never use equipment which is in any way faulty. The results could be fatal.
Use reduced voltage equipment (**110 volt**) for inspection and working lights where possible.

Ensure that the cables of mobile electrical equipment cannot get trapped and damaged, such as in a vehicle hoist.
Use air operated mobile equipment where possible in preference to electrical equipment.

In cases of electrocution:-

- switch off electricity before approaching victim
- if this is not possible, push or drag victim from source of electricity using dry non-conductive material
- commence resuscitation if trained to do so
- SUMMON MEDICAL ASSISTANCE

EXHAUST FUMES

These contain asphyxiating, harmful and toxic chemicals and particles such as carbon oxides, nitrogen oxides, aldehydes, lead and aromatic hydrocarbons. Engines should only be run under conditions of adequate extraction or general ventilation and not in confined spaces.

Gasolene (Petrol) Engine

There may not be adequate warning properties of odour or irritation before immediate and delayed toxic or harmful effects arise.

Diesel Engine

Soot, discomfort and irritation usually give adequate warning of hazardous fume concentrations.

FIBRE INSULATION

see Dusts.
Used in noise and sound insulation.
The fibrous nature of surfaces and cut edges can cause skin irritation. This is usually a physical and not a chemical effect.
Precautions should be taken to avoid excessive skin contact through careful organisation of work practices and the use of gloves.

FIRE

see Welding, Foams, Legal Aspects.
Many of the materials found on or associated with the repair of vehicles are highly flammable. Some give off toxic or harmful fumes if burnt.
Observe strict fire safety when storing and handling flammable materials or solvents, particularly near electrical equipment or welding processes.
Ensure before using electrical or welding equipment but that there is no fire hazard present.
Have a suitable fire extinguisher available when using welding or heating equipment.

FIRST AID

Apart from meeting any legal requirements it is desirable for someone in the workshop to be trained in first aid procedures.
Splashes in the eye should be flushed with clean water for at least ten minutes.
Soiled skin should be washed with soap and water.
Inhalation affected individuals should be removed to fresh air immediately.
If swallowed or if effects persist consult a doctor with information (label) on material used.
Do not induce vomiting (unless indicated by manufacturer).

FOAMS - Polyurethane

see Fire.
Used in sound and noise insulation. Cured foams used in seat and trim cushioning.
Follow manufacturers instructions.
Unreacted components are irritating and may be harmful to the skin and eyes. Wear gloves and goggles.

Individuals with chronic respiratory diseases, asthma, bronchial medical problems or histories of allergic diseases should not work with or near uncured materials.
The components, vapours, spray mists can cause direct irritation, sensitivity reactions and may be toxic or harmful.
Vapours and spray mists must not be breathed. These materials must be applied with adequate ventilation and respiratory protection. Do not remove respirator immediately after spraying, wait until vapour/ mists have cleared.
Burning of the uncured components and the cured foams can generate toxic and harmful fumes.
Smoking, open flames or the use of electrical equipment during foaming operations and until vapours/mists have cleared should not be allowed.
Any heat cutting of cured foams or partially cured foams should be conducted with extraction ventilation (see Body Section 44 Legal and Safety Aspects).

FUELS

see Fire, Legal Aspects, Chemicals - General, Solvents.
Used as fuels and cleaning agents.

Gasolene (Petrol).

Highly flammable.
Swallowing can result in mouth and throat irritation and absorption from the stomach can result in drowsiness and unconsciousness. Small amounts can be fatal to children. Aspiration of liquid into the lungs, e.g. through vomiting, is a very serious hazard.
Gasolene dries the skin and can cause irritation and dermatitis on prolonged or repeated contact. Liquid in the eye causes severe smarting.
Motor gasolene may contain appreciable quantities of benzene, which is toxic upon inhalation and the concentrations of gasolene vapours must be kept very low. High concentrations will cause eye, nose and throat irritation, nausea, headache, depression and symptoms of drunkenness. Very high concentrations will result in rapid loss of consciousness.
Ensure there is adequate ventilation when handling and using gasolene. Great care must be taken to avoid the serious consequences of inhalation in the event of vapour build up arising from spillages in confined spaces.
Special precautions apply to cleaning and maintenance operations on gasolene storage tanks.
Gasolene should not be used as a cleaning agent. It must not be siphoned by mouth.

Kerosene (Paraffin)

Used also as heating fuel, solvent and cleaning agent.
Flammable.
Irritation of the mouth and throat may result from swallowing. The main hazard from swallowing arises if liquid aspiration into the lungs occurs. Liquid contact dries the skin and can cause irritation or dermatitis. Splashes in the eye may be slightly irritating.
In normal circumstances the low volatility does not give rise to harmful vapours. Exposure to mists and vapours from kerosene at elevated temperatures should be avoided (mists may arise in de-waxing).
Avoid skin and eye contact and ensure there is adequate ventilation.

Gas-Oil (Diesel Fuel)

see Fuels (Kerosene).
Combustible.
Gross or prolonged skin contact with high boiling gas oils may also cause serious skin disorders including skin cancer.

GAS CYLINDERS

see Fire.
Gases such as oxygen, acetylene, carbon dioxide, argon and propane are normally stored in cylinders at pressures of up to **140 bar**(**2000 lb/in2**) and great care should be taken in handling these cylinders to avoid mechanical damage to them or to the valve gear attached. The contents of each cylinder should be clearly identified by appropriate markings.
Cylinders should be stored in well ventilated enclosures, and protected from ice and snow, or direct sunlight. Fuel gases (e.g. acetylene and propane) should not be stored in close proximity to oxygen cylinders.
Care should be exercised to prevent leaks from gas cylinders and lines, and to avoid sources of ignition.
Only trained personnel should undertake work involving gas cylinders.

Gases

see Gas Cylinders.

Gas Shielded Welding

see Welding.

Gas Welding

see Welding.

GENERAL WORKSHOP TOOLS AND EQUIPMENT

It is essential that all tools and equipment are maintained in good condition and the correct safety equipment used where required.
Never use tools or equipment for any purpose other than that for which they were designed.
Never overload equipment such as hoists, jacks, axle and chassis stands or lifting slings. Damage caused by overloading is not always immediately apparent and may result in a fatal failure the next time that the equipment is used.
Do not use damaged or defective tools or equipment, particularly high speed equipment such as grinding wheels. A damaged grinding wheel can disintegrate without warning and cause serious injury.
Wear suitable eye protection when using grinding, chiselling or sand blasting equipment.
Wear a suitable breathing mask when using sand blasting equipment, working with asbestos based materials or using spraying equipment.

Glues

see Adhesives and Sealers.

High Pressure Air, Lubrication and Oil Test Equipment accordance with local regulations

see Lubricants and Greases.
Always keep high pressure equipment in good condition and regularly maintained, particularly at joints and unions.
Never direct a high pressure nozzle at the skin as the fluid may penetrate to the underlying tissue etc. and cause serious injury.

LEGAL ASPECTS

Many laws and regulations make requirements relating to health and safety in the use of materials and equipment in workshops. Always conform to the laws and regulations applicable to the country in which you are working.
Workshops should be familiar, in detail, with the associated laws and regulations. Consult the local factory inspectorate or appropriate authority if in any doubt.

LUBRICANTS AND GREASES

Avoid all prolonged and repeated contact with mineral oils, especially used oils. Used oils contaminated during service (e.g. routine service change sump oils) are more irritating and more likely to cause serious effects including skin cancer in the event of gross and prolonged skin contact.
Wash skin thoroughly after work involving oil. Proprietary hand cleaners may be of value provided they can be removed from the skin with water. Do not use petrol, paraffin or other solvents to remove oil from the skin.
Lubricants and greases may be slightly irritating to the eyes.
Repeated or prolonged skin contact should be avoided by wearing protective clothing if necessary. Particular care should be taken with used oils and greases containing lead. Do not allow work clothing to be contaminated with oil. Dry clean or launder such clothing at regular intervals. Discard oil soaked shoes.
Do not employ used engine oils as lubricants or for any application where appreciable skin contact is likely to occur.
Used oils may only be disposed of in accordance with local regulations.

Noise Insulation Materials

see Foams, Fibre Insulation.

PAINTS

see Solvents and Chemical Materials - General.
Highly Flammable, Flammable.
One Pack. Can contain harmful or toxic pigments, driers and other components as well as solvents. Spraying should only be carried out with adequate ventilation.
Two Pack. Can also contain harmful and toxic unreacted resins and resin hardening agents. The manufacturers instructions should be followed and the section of page 5 on resin based adhesives, isocyanate containing Adhesives and Foams should be consulted.
Spraying should preferably be carried out in exhausted ventilated booths removing vapour and spray mists from the breathing zone. Individuals working in booths should wear respiratory protection. Those doing small scale repair work in the open shop should wear supplied air respirators.

Paint Thinners

see Solvents.

Petrol

see Fuels (Gasolene).

Pressurised Equipment

see High Pressure Air, Lubrication and Oil Test Equipment.

Resistance Welding

see Welding.

Sealers

see Adhesives and Sealers.

SOLDER

see Welding.
Solders are mixtures of metals such that the melting point of the mixture is below that of the constituent metals (normally lead and tin). Solder application does not normally give rise to toxic lead fumes, provided a gas/air flame is used. Oxy-acetylene flames should not be used, as they are much hotter and will cause lead fumes to be evolved.
Some fumes may be produced by the application of any flame to surfaces coated with grease etc. and inhalation of these should be avoided.
Removal of excess solder should be undertaken with care, to ensure that fine lead dust is not produced, which can give toxic effects if inhaled. Respiratory protection may be necessary.
Solder spillage and filing should be collected and removed promptly to prevent general air contamination by lead.
High standards of personal hygiene are necessary in order to avoid indigestion of lead or inhalation of solder dust from clothing.

SOLVENTS

see Chemical Materials - General Fuels (Kerosene), Fire.
e.g. Acetone, white spirit, toluene, xylene, trichlorethane.
Used in cleaning materials, de-waxing, paints, plastics, resins, thinners etc.
Highly Inflammable, Flammable.
Skin contact will degrease the skin and may result in irritation and dermatitis following repeated or prolonged contact. Some can be absorbed through the skin in toxic or harmful quantities.
Splashes in the eye may cause severe irritation and could lead to loss of vision.
Brief exposure to high concentrations of vapours or mists will cause eye and throat irritation, drowsiness, dizziness, headaches and in the worst circumstances, unconsciousness.
Repeated or prolonged exposures to excessive but lower concentrations of vapours or mists, for which there might not be adequate warning indications, can cause more serious toxic or harmful effects.
Aspiration into the lungs (e.g. through vomiting) is the most serious consequence of swallowing.

Avoid splashes to the skin, eyes and clothing. Wear protective gloves, goggles and clothing if necessary.
Ensure good ventilation when in use, avoid breathing fumes, vapours and spray mists and keep containers tightly sealed. Do not use in confined spaces.
When the spraying material contains solvents, e.g. paints, adhesives, coatings, use extraction ventilation or personal respiratory protection in the absence of adequate general ventilation.
Do not apply heat or flame except under specific and detailed manufacturers instructions.

Sound Insulation

see Fibre Insulation, Foams.

Spot Welding

see Welding.

SUSPENDED LOADS

There is always a danger when loads are lifted or suspended. Never work under an unsupported suspended or raised load, e.g. jacked up vehicle, suspended engine, etc.
Always ensure that lifting equipment such as jacks, hoists, axle stands, slings, etc. are adequate and suitable for the job, in good condition and regularly maintained.
Never improvise lifting tackle.

Underseal

see Corrosion Protection.

WELDING

see Fire, Electric Shock, Gas Cylinders.
Welding processes include Resistance Welding (Spot Welding), Arc Welding and Gas Welding.

Resistance Welding

This process may cause particles of molten metal to be emitted at high velocity and the eyes and skin must be protected.

Arc Welding

This process emits a high level of ultraviolet radiation which may cause eye and skin burns to the welder and to other persons nearby. Gas-shielded welding processes are particularly hazardous in this respect. Personal protection must be worn, and screens used to shield other people.
Metal spatter will also occur and appropriate eye and skin protection is necessary.
The heat of the welding arc will produce fumes and gases from the metals being welded and from any applied coatings or contamination on the surfaces being worked on. These gases and fumes may be toxic and inhalation should always be avoided. The use of extraction ventilation to remove the fumes from the working area may be necessary, particularly in cases where the general ventilation is poor, or where considerable welding work is anticipated. In extreme cases where adequate ventilation cannot be provided, supplied air respirators may be necessary.

Gas Welding

Oxy-acetylene torches may be used for welding and cutting and special care must be taken to prevent leakage of these gases, with consequent risk of fire and explosion.
The process will produce metal spatter and eye and skin protection is necessary.
The flame is bright and eye protection should be used, but the ultra-violet emission is much less than that from arc welding, and lighter filters may be used.
The process itself produces few toxic fumes, but such fumes and gases may be produced from coatings on the work, particularly during cutting away of damaged body parts and inhalation of the fumes should be avoided.
In brazing, toxic fumes may be evolved from the metals in the brazing rod, and a severe hazard may arise if brazing rods containing cadmium are used. In this event particular care must be taken to avoid inhalation of fumes and expert advice may be required.

SPECIAL PRECAUTIONS MUST BE TAKEN BEFORE ANY WELDING OR CUTTING TAKES PLACE ON VESSELS WHICH HAVE CONTAINED COMBUSTIBLE MATERIALS, E.G. BOILING OR STEAMING OUT OF FUEL TANKS.

White Spirit

see Solvents.

ECOLOGY AND THE ENVIRONMENT

Soil, air and water are vital factors of agriculture and life in general. Where legislation does not yet rule the treatment of some of the substances which are required by advanced technology, common sense should govern the use and disposal of products of a chemical and petrochemical nature.

The following are recommendations which may be of assistance:

- Become acquainted with and ensure that you understand the relative legislation applicable to your country.
- Where no legislation exists, obtain information from suppliers of oils, filters, batteries, fuels, anti freeze, cleaning agents, etc., with regard to their effect on man and nature and how to safely store, use and dispose of these substances. Agricultural consultants will, in many cases, be able to help you as well.

HELPFUL HINTS

1. Avoid filling tanks using unsuitable containers or inappropriate pressurised fuel delivery systems which may cause considerable spillage.
2. In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of them contain substances which can be harmful to your health.
3. Modern oils contain additives. Do not burn contaminated fuels and/or waste oils in ordinary heating systems.
4. Avoid spillage when draining off used engine coolant mixtures, engine, gearbox and hydraulic oils, brake fluids, etc. Do not mix drained brake fluids or fuels with lubricants. Store them safely until they can be disposed of in a proper way to comply with local legislation and available resources.
5. Modern coolant mixtures, i.e. antifreeze and other additives, should be replaced every two years. They should not be allowed to get into the soil but should be collected and disposed of safely.
6. Do not open the air-conditioning system yourself. It contains gases which should not be released into the atmosphere. Your dealer or air conditioning specialist has a special extractor for this purpose and will have to recharge the system anyway.
7. Repair any leaks or defects in the engine cooling or hydraulic system immediately.
8. Do not increase the pressure in a pressurised circuit as this may lead to the components exploding.
9. Protect hoses during welding as penetrating weld splatter may burn a hole or weaken them, causing the loss of oils, coolant, etc.

SERVICE MANUAL

DISTRIBUTION SYSTEMS



PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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DISTRIBUTION SYSTEMS - A

PRIMARY HYDRAULIC POWER SYSTEM - 10.A

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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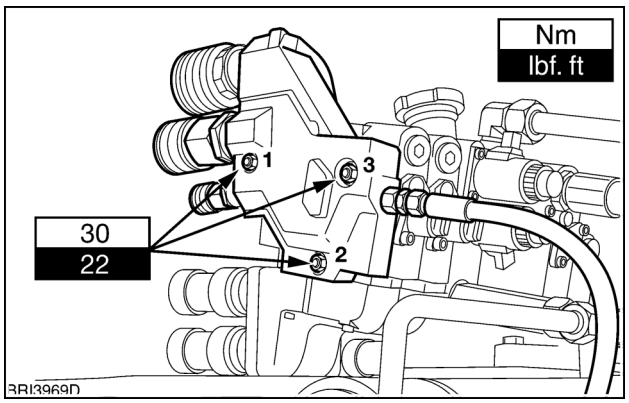
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PRIMARY HYDRAULIC POWER SYSTEM - Special tools

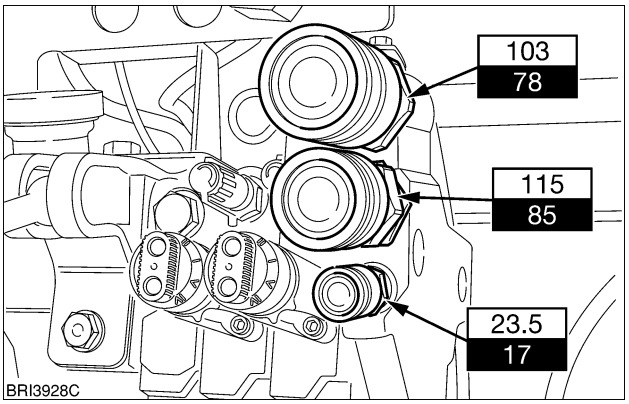
DESCRIPTION	PART NUMBER
Tee adaptor 11/16 ORFS female x 11/16 ORFS male x 7/16 UNF female	380000570*
Tee adaptor 7/16 JIC female x 7/16 JIC male x 7/16 UNF female	380000571*
Adaptor M10 banjo x 7/16 UNF female	380000572*
Tee adaptor 9/16 ORFS female x 9/16 ORFS male x 7/16 UNF female	380000572*
Blanking Cap 9/16 ORFS	380000573*
Blanking Cap 7/16 ORFS	380000575*
Adaptor 7/16 UNF female x 1/2 BSP male	380000576*
Adaptor 7/16 UNF female x M12 x 1.5p male	380000577*
Adaptor 7/16 UNF female x M14 x 1.5p male	380000578*
Adaptor M14 banjo x M14 x 1.5p female	380000579*
Tee adaptor 7/16 UNF female x 1/4 BSP hose tail x 1/2 hose	380000580*
7/16 UNF male Quick release adaptor	**380000492***
Adaptor M10 x 1.0p x 7/16 UNF female	**380000493***
Tee adaptor 1” ORFS female x 1” ORFS male x 7/16 UNF female	380000517
Blanking Cap 11/16 ORFS	380000599*
Pressure Gauge 0–10 bar	380000551#
Pressure Gauge 0–40 bar (5 off)	**380000552#**
Pressure Gauge 0–250 bar	380000553#
Remote valve coupling	5101741 or 380000554#
Quick release adaptor	**380000543**
Pressure gauge hose	**380000545#**
1/8 NPT fitting to attach hose 292246 to gauge	**380000544#**
Adaptor M10 x 1.0p x 7/16 JIC male (enables use of gauges with 7/16 JIC hoses if used)	**380000494**
diagnostic switch	**380000488**
Bypass connector	**380000561**
Trailer brake fitting	380000550#
Flow Meter 120 ltr/min minimum (procure locally)	
* Part of hydraulic adaptor kit **380000464**	
# Part of hydraulic pressure test kit **380000240**	
Remote Valve check valve removal tool	**380002720**

Power beyond - Torque



BAIL06CCM056ASA 1

Power Beyond Torque Sequence



BAIL06CCM180ASA 2

Power Beyond Coupler Torques

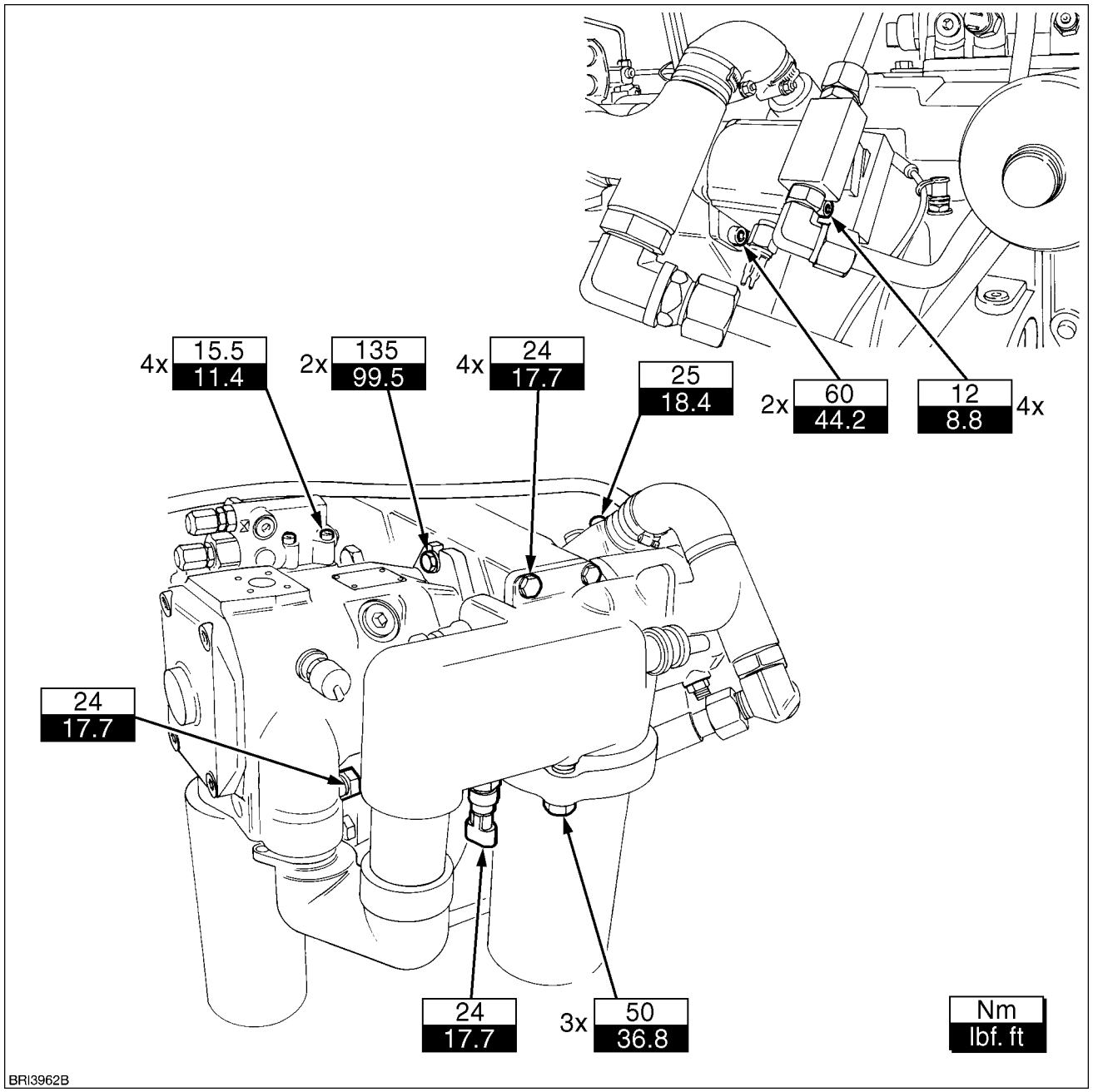
Refer to : **Power beyond - Install (A.10.A)**

Hydraulic pump Variable displacement pump - General specification

Load Sensed Variable Displacement Piston Pump (**120/150 Ltr/Min**)

Type		Variable Flow Piston Pump (Swash Plate Controlled)
Rotation		Clockwise
Pump Speed@ **2200 erpm**		**2662 rpm**
Output @ 2200 erpm	Standard Flow	**120 Ltr/min** **26.4 Imp Galls/min** **31.7 US Galls/min**
Output @ 2200 erpm	Hi- Flow	**150 Ltr/min** **32.9 Imp Galls/min** **39.6 US Galls/min**
Standby Pressure (Low Pressure Standby)		**26±1 bar** (**377±15 lbf.in2**)
Maximum System Pressure (High Pressure Standby)		**210±5 bar** (**3046±73 lbf/in2**)
Charge Pressure Filter Relief Valve		**6 bar**
Charge System Pressure		**3 bar**

Hydraulic pump Variable displacement pump - Torque



BAIL06CCM041GSA 1

Charge pump - General specification

Charge Pump (**106 Ltr/Min**)	
Type	Gear Type Pump
Charge Pressure Filter Dump Valve	Crack open @ **6.9 bar** (**100 lbf/in2**) Fully Open @ **12.4 bar** (**180 lbf/in2**)
Charge Pressure	Minimum **1.6 - 3.4 bar** (**23 - 50 lbf/in2**) @ **2100 rev/min** and variable flow piston pump 'On Load'
Charge Pressure Switch	Close @ **0.55 - 0.82 bar** (**8 - 12 lbf/in2**) Making charge pressure warning light flash

PRIMARY HYDRAULIC POWER SYSTEM - Static description

The hydraulic system comprises the following oil circuits:-

High pressure circuit

Hydraulic rear powerlift
Remote valves
Trailer brake system (where fitted)
Front axle suspension (where fitted)

Oil circuit of the steering hydraulics

Steering pump and steering cylinder
Control valve of the Turn Assist (where fitted)

Low pressure circuit

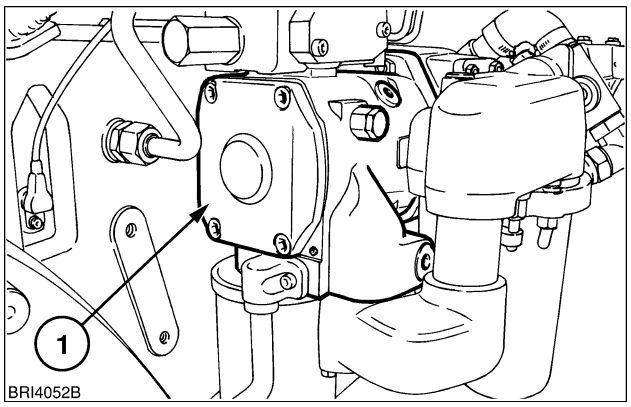
Engine PTO
Differential lock
All wheel drive
Actuation of transmission couplings and synchroniser units
Front axle servobrake
Engagement of the crawler gear
Servo-actuated main brake cylinder
Front PTO (where fitted)

Layout of the lubrication system

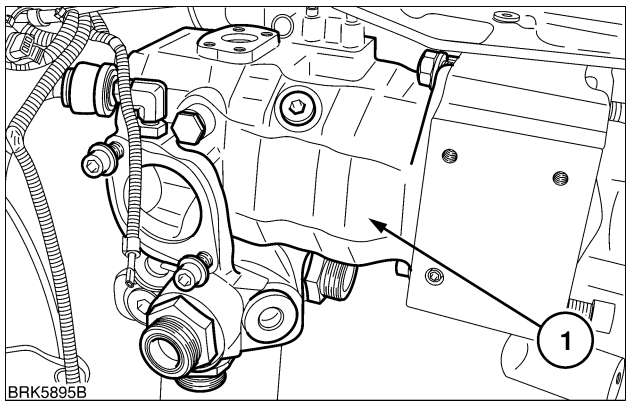
PTO coupling
Transmission coupling
Transmission shaft pressure lubrication
Bearing of the pump drive pinion
Lifting shaft of the hydraulic powerlift
The high pressure circuit is a closed Load Sensing system and is configured differently according to the variants in equipment for each tractor model.
Steering circuit, low pressure and lubrication circuits are configured as an open system.

VARIATIONS IN EQUIPMENT IN THE TRACTOR HYDRAULICS				
Transmission	High pressure hydraulic system	Hydraulic pump	Hydraulic powerlift	Remote valves
Full powershift transmission	Closed system	120 L/min CCLS variable displacement pump 150 L/min "Hi Flow" axial piston variable displacement pump	Electronic powerlift control	Closed system

CCLS axial piston variable displacement pump **(1)**.
Figure **1** **2**

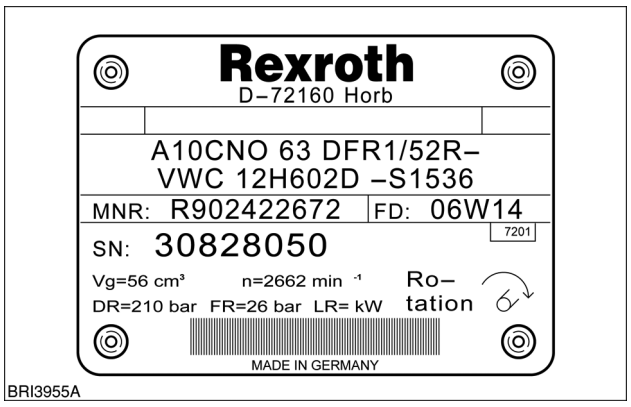


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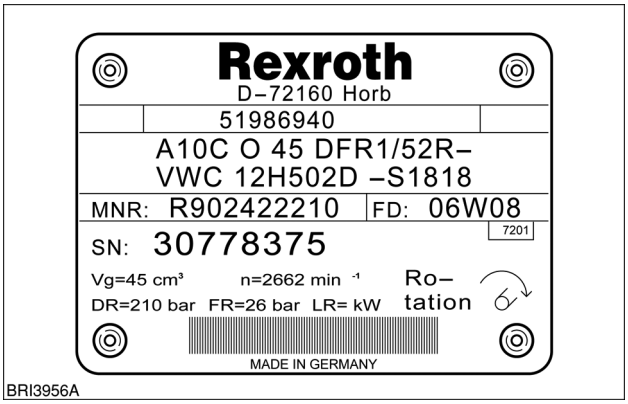
BAIL08CVT085ASA 2

The high-pressure hydraulic pumps in the Load Sensing version with closed circuit can be differentiated by the serial numbers on the plate above the pump:-
Figure **3** shows the rating plate of the **150 l/min** (**39.6 US gpm**) pump.



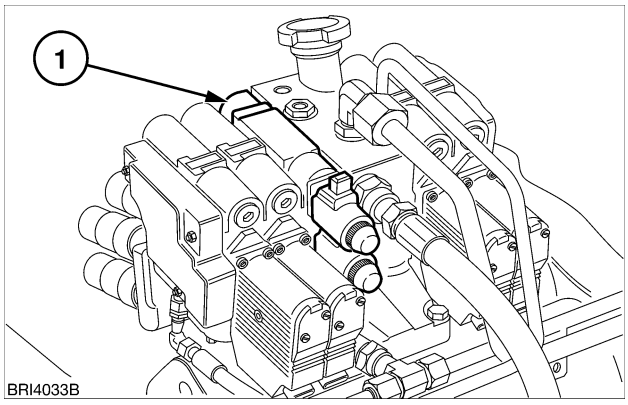
BAIL06CCM082ASA 3

Figure **4** shows the rating plate of the **120 l/min** (**31.7 US gpm**) pump.



BAIL06CCM083ASA 4

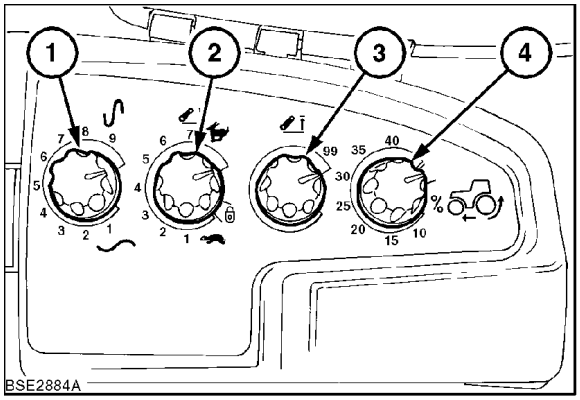
Closed Centre remote valves and electronic powerlift control **(1)**.



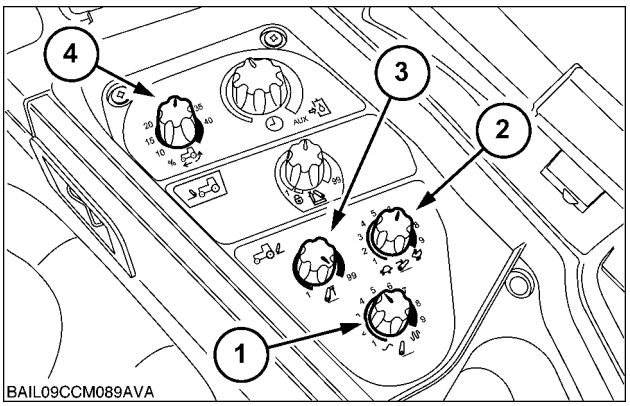
BAIL06CCM057ASA 5

Operating the electronic powerlift control

Operation of PUMA standard:
In tractors that are equipped with an electronic hydraulic powerlift control, all controls for the hydraulics are gathered together on one operating panel.
(1). Rotary control for draft control response sensitivity
(2). Lowering speed rotary control
(3). Rotary control for height limit control
(4). Rotary control for wheel slip control

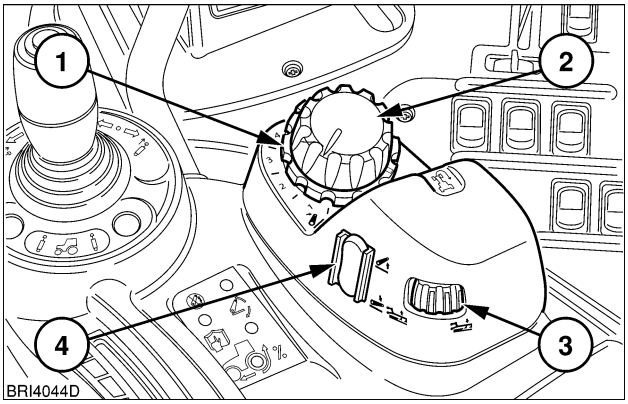


BSE2884A 7

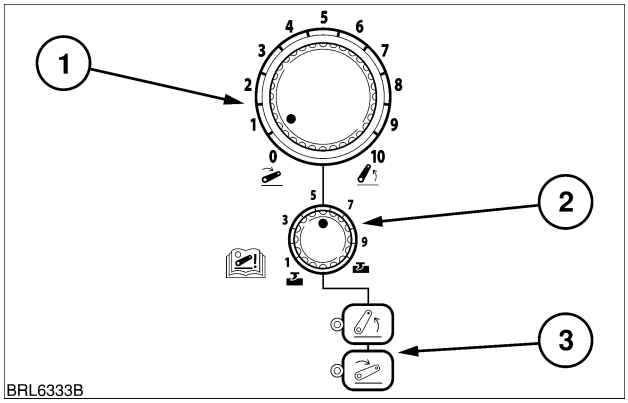


BAIL09CCM089AVA 8

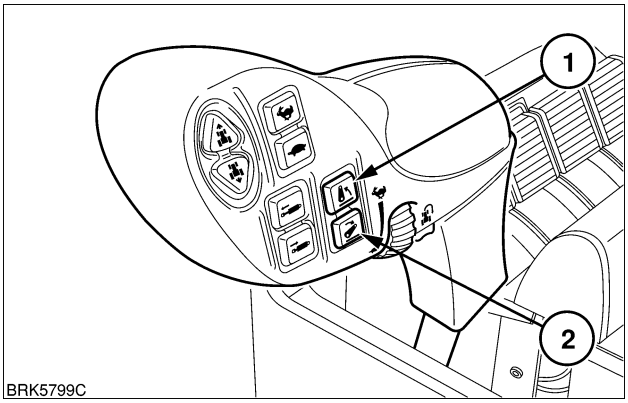
The control for the powerlift position control, the rapid control switch in the cab, and the controls for traction control make operation of the EPC simple.



BAIL06CCM153ASA 9

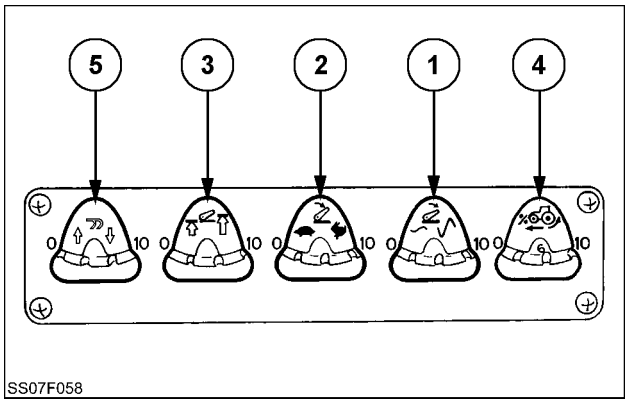


BRL6333B 10



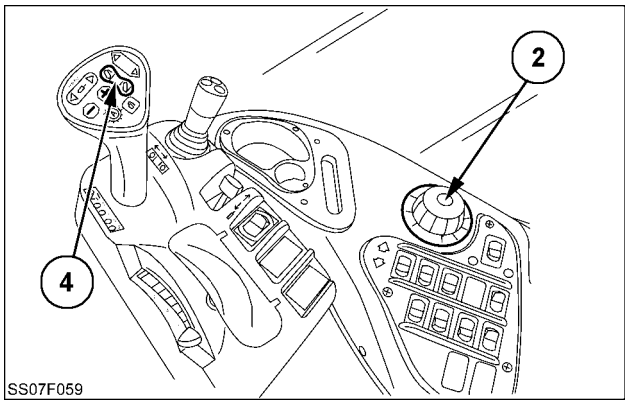
BRK5799C 11

Operation of the PUMA Multicontroller:
With the PUMA Multicontroller, all controls for the hydraulics are gathered together on the right-hand control panel and on the Multicontroller.
(1). Response sensitivity potentiometer (Traction control)
(2). Lowering speed potentiometer
(3). Lift limit control potentiometer
(4). Wheel slip control potentiometer
(5). Traction control potentiometer



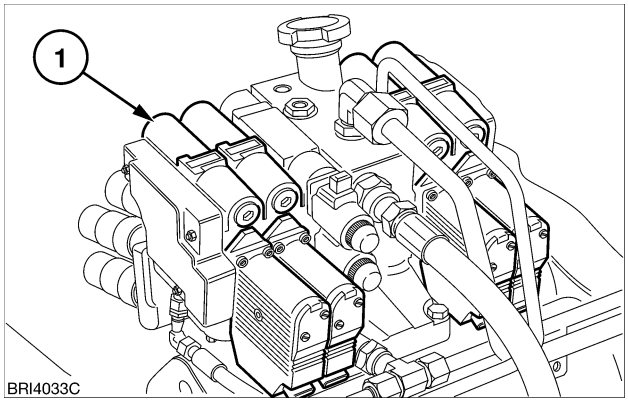
SS07F058 12

The position control potentiometer **(2)** and the CONTROL, TRANSPORT buttons **(4)** make operation of the EPC simple.



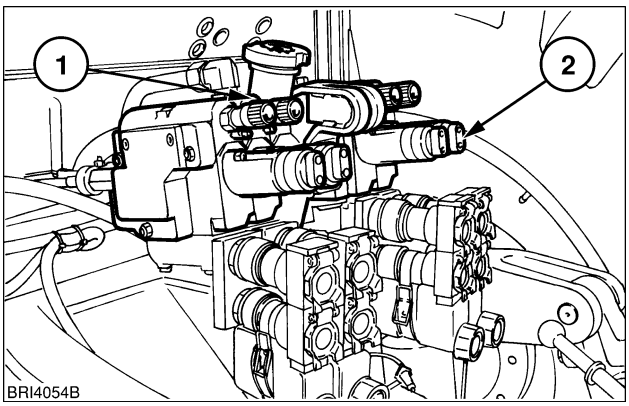
SS07F059 13

The tractors can also be fitted with electrohydraulic remote valves **(1)**.



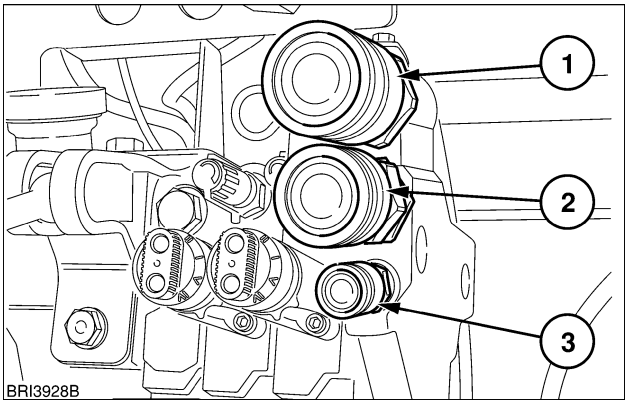
BAIL06CCM085ASA 14

Another optional version is mechanically-operated remote valves with adjustable locking **(2)** and flow rate regulators **(1)**. (does not apply to PUMA Multicontroller)



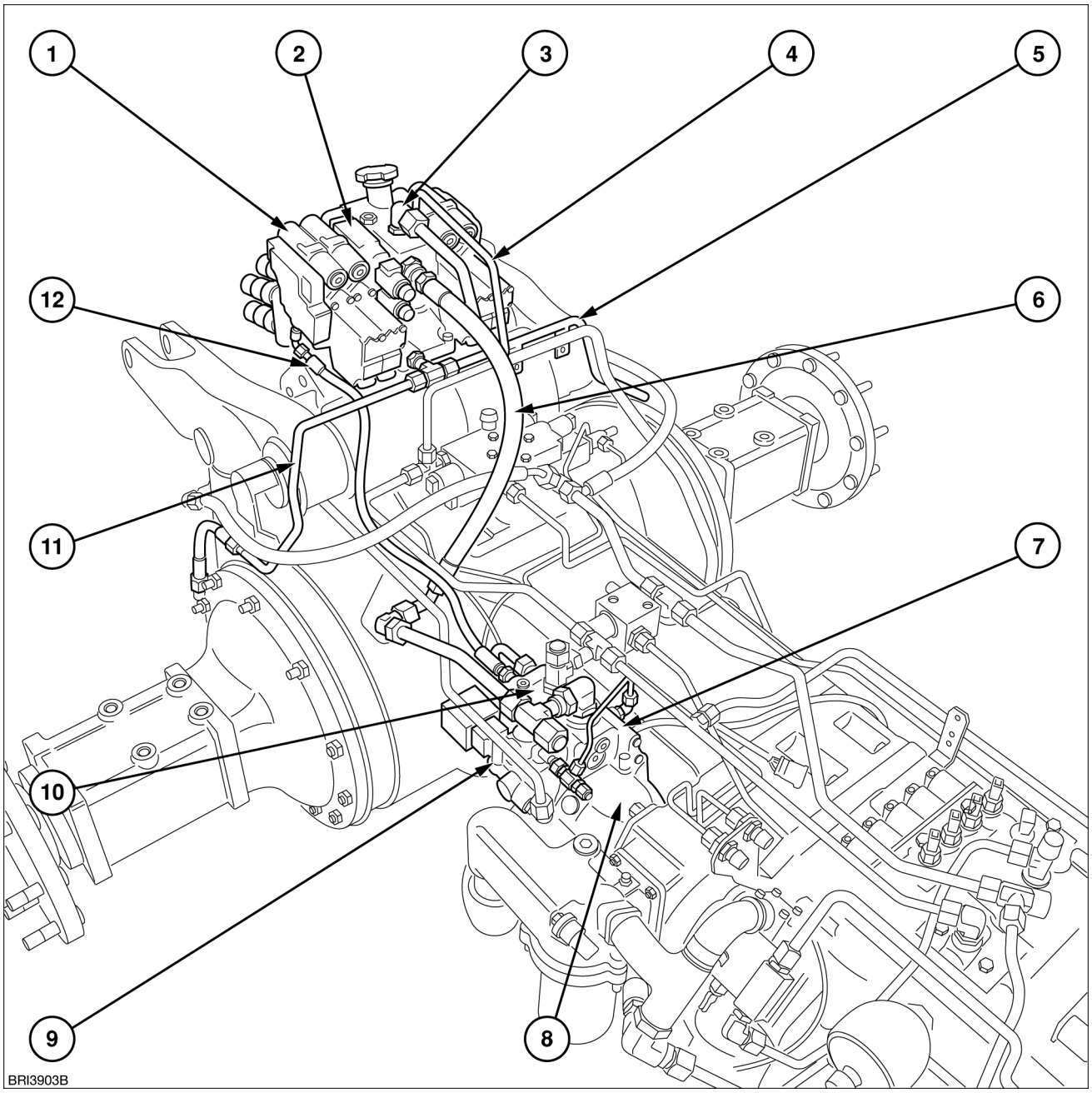
BAIL06CCM086ASA 16

For implements that require a continual oil flow from the tractor's hydraulic system, the connection of a Power-beyond valve segment on the control unit block is provided with oil couplings **(1)**, **(2)** and **(3)**.



BAIL06CCM054ASA 17

HIGH PRESSURE HYDRAULIC SYSTEM IN LOAD SENSING VERSION WITH CLOSED CIRCUIT

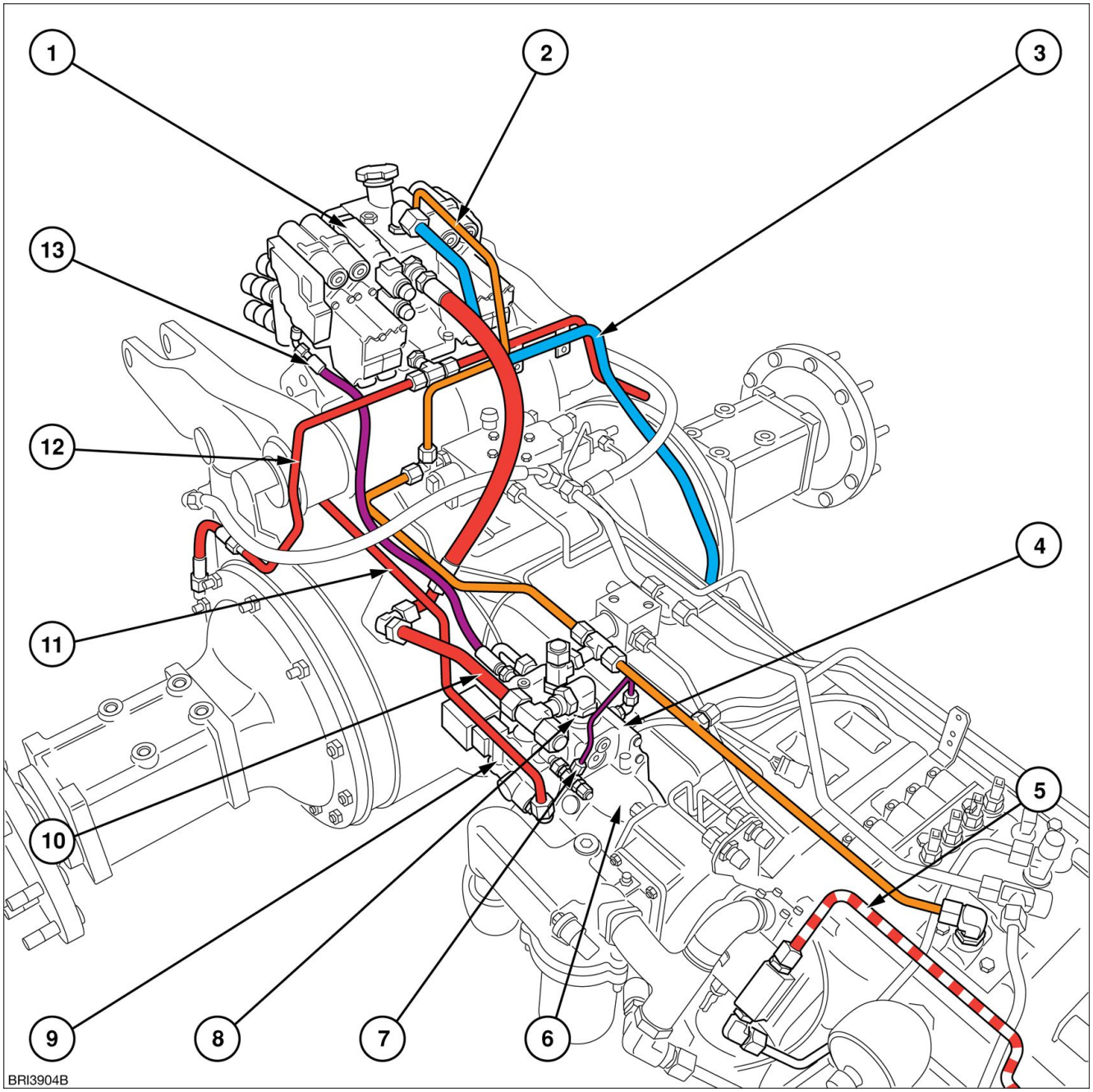


BAIL06CCM010GSA 18

1 Electrohydraulic remote valves
2 EPC control valve
3 Return pipe to the oil reservoir
4 Low pressure oil supply
5 To the lifting cylinders
6 Pump flow to electrohydr. remote valve and EPC
7 Flow control valve
8 Variable displacement pump
9 Trailer brake valve
10 Pressure-reducer priority valve
11 To the lifting cylinders
12 Load Sensing line from EPC control valve and electrohydr. remote valves

The basic principle of the Closed Centre high-pressure hydraulic system in the Load Sensing version with variable displacement pump is the availability of a needs-based oil flow. This makes possible simultaneous actuation of trailer brake system, hydraulic powerlift, remote valves and - where fitted - the front axle suspension. The Load Sensing variable displacement pump offers important advantages with regard to the reduction of engine power loss compared

to open-circuit systems, in which a higher oil volume flow, which is often clearly above the required amount, is continually pumped around the hydraulic system.



BAIL06CCM011GSA 19

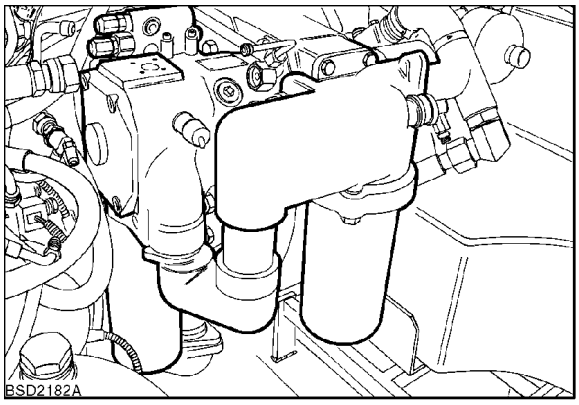
1 EPC control valve
2 Low pressure oil supply
3 Return pipe to the oil reservoir
4 Flow control valve
5 Oil pressure of the steering hydraulics oil pump
6 Variable displacement pump
7 Load Sensing line to the pressure reducer priority valve
8 Pressure-reducer priority valve
9 Trailer brake valve
10 Pump flow to electrohydr. remote valve and EPC
11 To the oil coupling of the trailer brake
12 Oil pressure to the lifting cylinders
13Load Sensing line from EPC control valve and electrohydr. remote valves

The high-pressure circuit illustrated in **PRIMARY HYDRAULIC POWER SYSTEM - Hydraulic schema (A.10.A)** comprises the following components:

Hydraulic pump unit

The Load Sensing valve with pressure and oil flow control valves, oil pump and priority valve for the steering hydraulics, intake filter and main oil filter as well as various electrical switches are integrated in the high-pressure variable displacement pump.
Figure **20** shows the main pump unit.

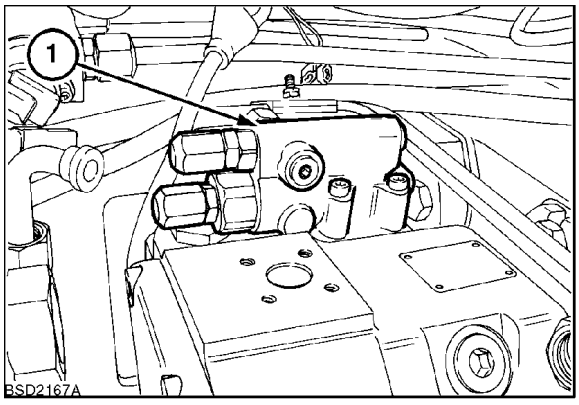
NOTE: *The oil pump for the steering hydraulics is shown separately to the main pump unit.*



BSD2182A_559 20

The Load Sensing valve block consists of a high-pressure control valve **(1)** and an oil flow control valve. The Load Sensing valve receives hydraulic control signals from the driven components and transmits these to the oil pump, which then matches the supply volume to the system's requirement for oil.

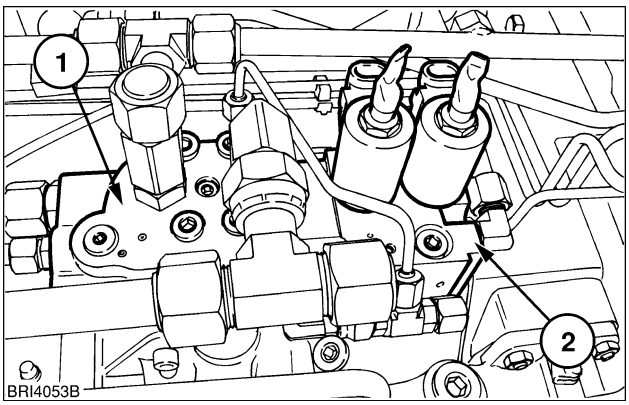
The Load Sensing valve block is illustrated in Figure **21**.



BSD2167A_561 21

Priority valve

The priority valve **(1)** on the top of the main oil pump channels high-pressure oil to the control block and to the trailer brake valve (where fitted). It also supplies the low-pressure control valve with low-pressure oil. If a front axle suspension is installed, a levelling valve **(2)** is mounted on the priority valve, which delivers an oil flow to the control valve for the suspension (Figure **30**) and to the cylinder.

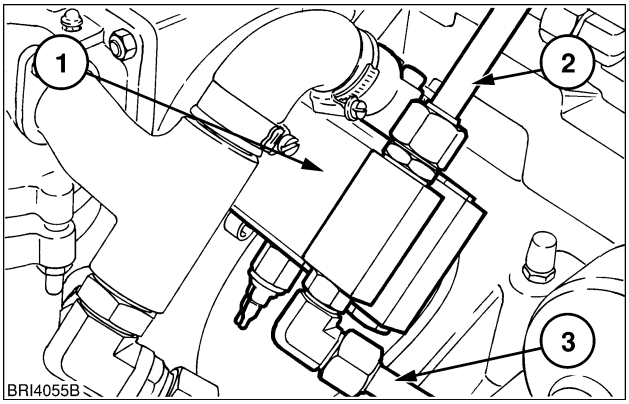


BAIL06CCM091ASA 22

Steering hydraulics oil pump

Figure **23** shows the oil pump for the steering hydraulics.
The oil pump for the steering hydraulics is configured as a separate unit, but it is also driven by the same geared wheel as the main oil pump.

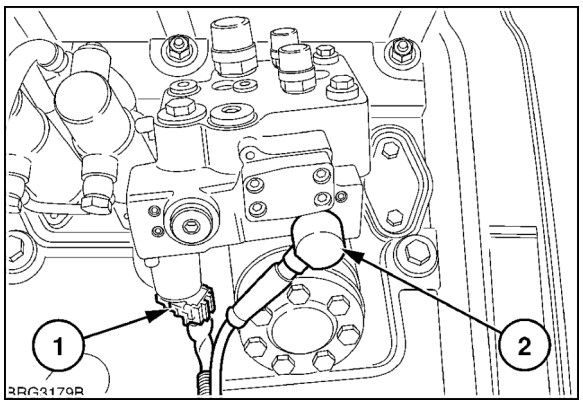
1. Oil pump for the steering hydraulics
2. Connection to the control pump
3. Line to the oil cooler



BAIL06CCM084ASA 23

Control valve of the Turn Assist (where fitted)

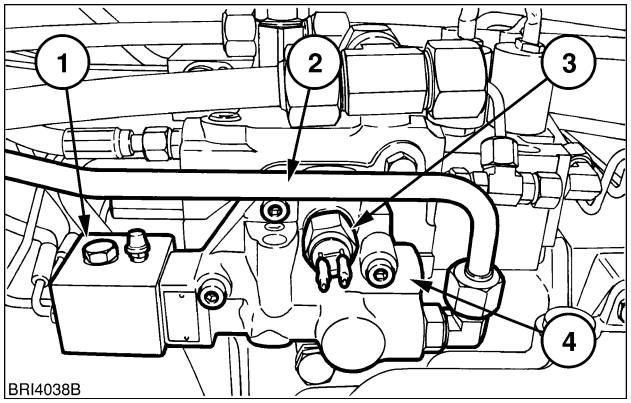
The Turn Assist, which is available as an optional extra, supplies increased responsiveness from the steering, when needed, e. g. during front loader operations.
From the straight ahead position, Turn Assistwill provide full right or left-hand steering lock with a **8 °** movement of the steering wheel.



BAIL06CCM076ASA 24

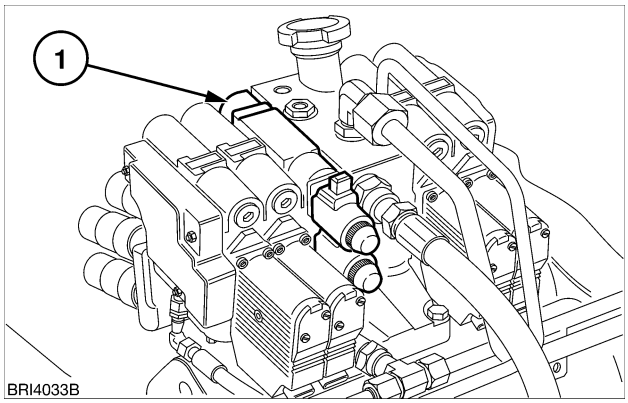
Trailer brake valve

The trailer brake valve is under the cab and is mounted on the priority valve at the top of the main pump unit. The trailer brake valve allows pressure oil to flow to the trailer brake system, when both of the tractor's brake pedals are depressed.
Figure **25** shows the trailer brake valve.



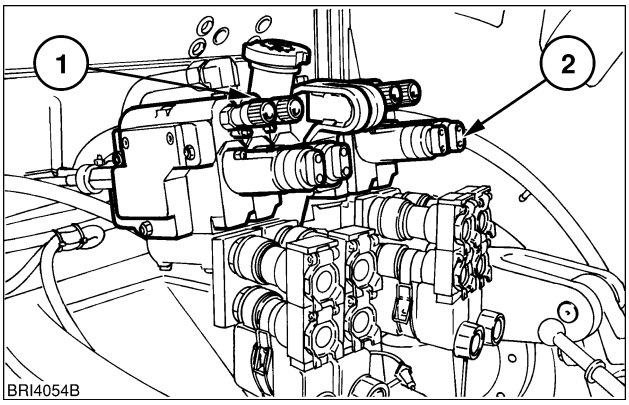
BAIL06CCM087ASA 25

The EPC control valve **(1)** is constructed as a subplate valve and is to be found together with the remote valves at the rear under the driver's cab; the safety valve of the lift cylinder is integrated into it.
The lifting cylinder safety valve protects the lifting cylinder from peaks in pressure and limits the pressure in the cylinder to **230 bar** (**3335.0 psi**).
The EPC control valve is a microcomputer-controlled magnetic control valve, which controls the lifting and lowering of the hydraulic powerlift.

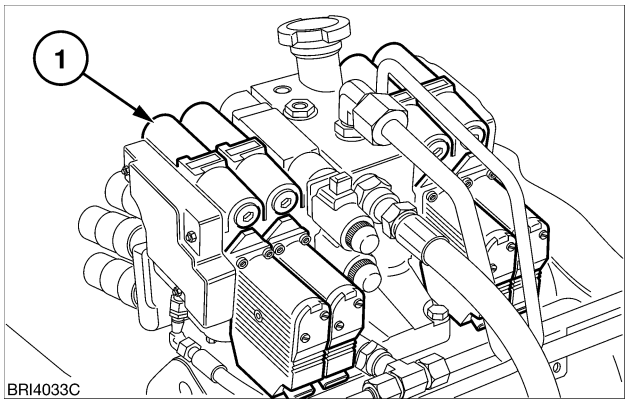


BAIL06CCM057ASA 26

CCLS remote valves
The remote valves for the closed hydraulic system are available in two versions. In the standard version, mechanical control units **(1)**, Fig. **27**) are mounted, which are actuated from the cab via a Bowden cable. As an optional extra, electrohydraulic control units (**(1)**, Fig. **28**) are available for all models, which are operated via electrical switches and are fitted with an electronic control module for flow volume regulation via a solenoid valve.
Up to four mechanically actuated remote valves can be installed, or in the electronic version, as an option, an additional fifth control valve as well.

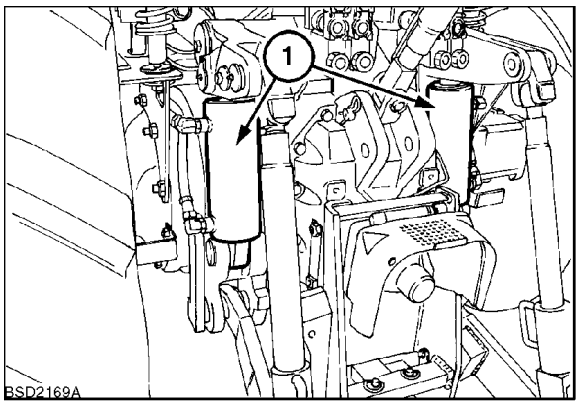


BAIL06CCM086ASA 27



BAIL06CCM085ASA 28

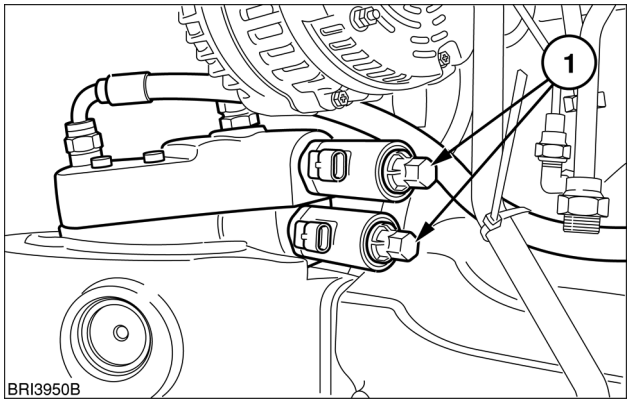
Lifting cylinder for the hydraulic powerlift
Two external lifting cylinders, one per lift arm, are mounted on the mounting points in the cast body of the rear axle mid housing, see Figure **29**. These are available in the three sizes / lifting force classes **80 mm**, **90 mm** and **100 mm**.



BSD2169A 29

Control valve for the front axle suspension

This is on the left-hand side of the tractor and is fastened to the suspension cylinder. The suspension control valve receives high-pressure oil via the pressure reducer priority valve and the levelling valve. With the help of electronically controlled PWM solenoid valves **(1)**, it controls the oil flow to a working cylinder, which is mounted between the front axle and front axle bearing block. This is how the front axle suspension is hydraulically controlled.



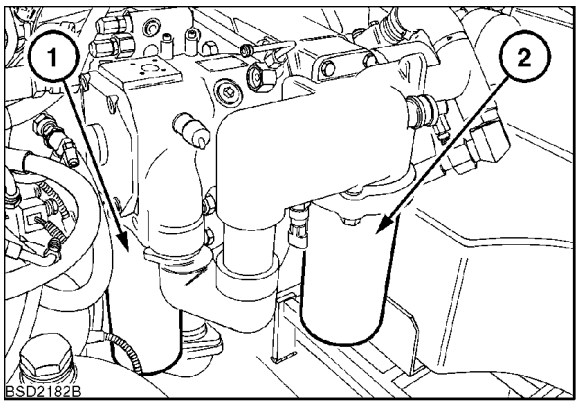
BAIL06CCM039ASA 30

Hydraulic oil filter

There are two different versions of the hydraulic filters, which are used on all tractor models.

(1) Oil filter for the feed pump

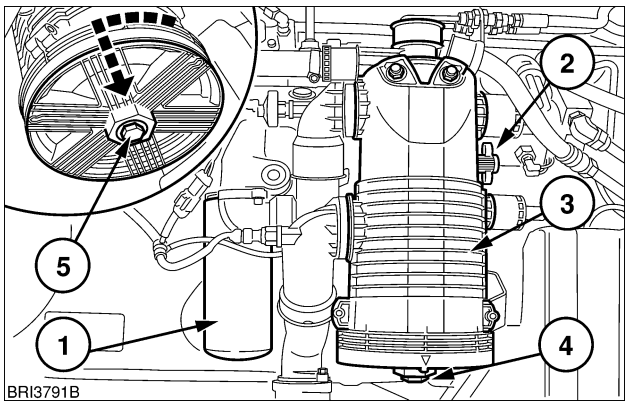
(2) Main flow oil filter



BSD2182B 31

(1) Oil filter for the feed pump

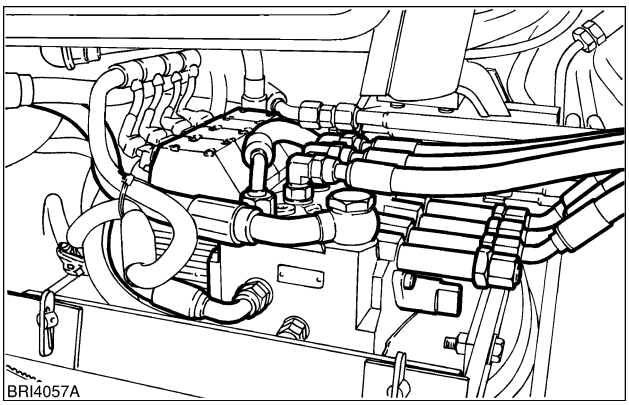
(3) Main flow oil filter



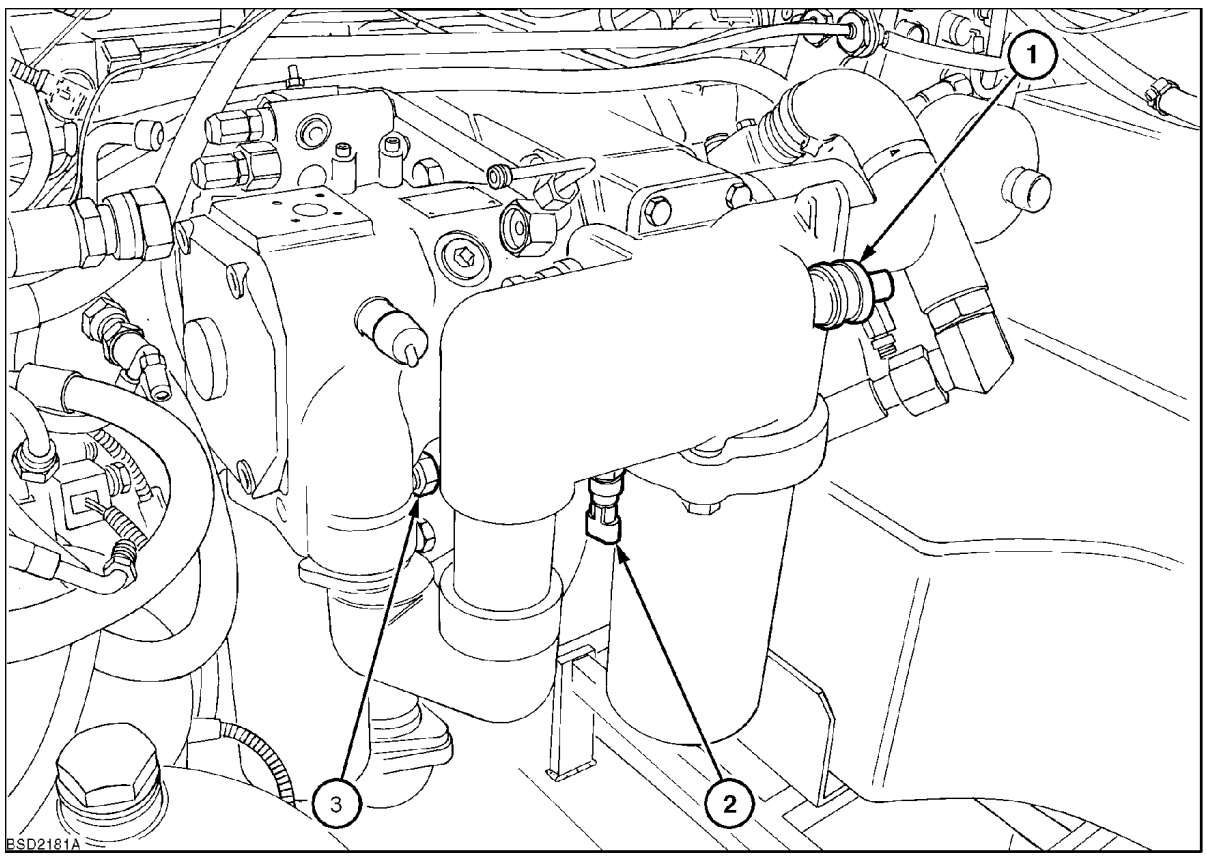
BAIL06CCM090ASA 32

Side-mounted remote valves

As an optional extra, other remote valves can be mounted under the driver's cab. They are installed via T-shaped threaded connections in the high-pressure oil line from the variable displacement pump behind the trailer brake valve and are actuated via a crossgate lever control in the driver's cab.



BAIL06CCM088ASA 33



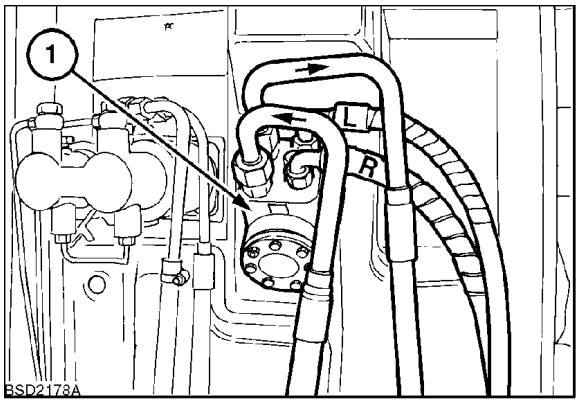
BSD2181A 34

High-pressure hydraulic system - Electrical switches

1. Vacuum switch of the inlet filter
2. Oil temperature switch
3. Pressure switch of the feed pressure telltale

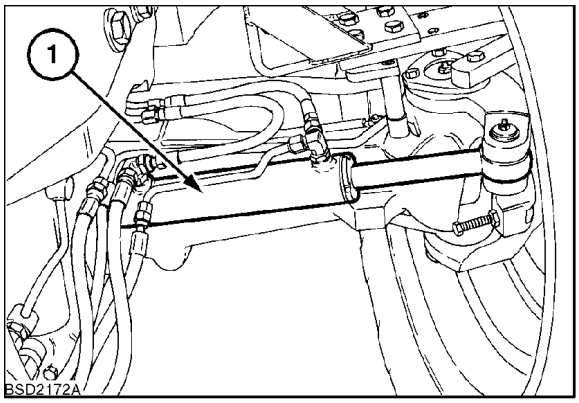
Control pump

. All models are fitted with a control pump with constant displacement volumes.



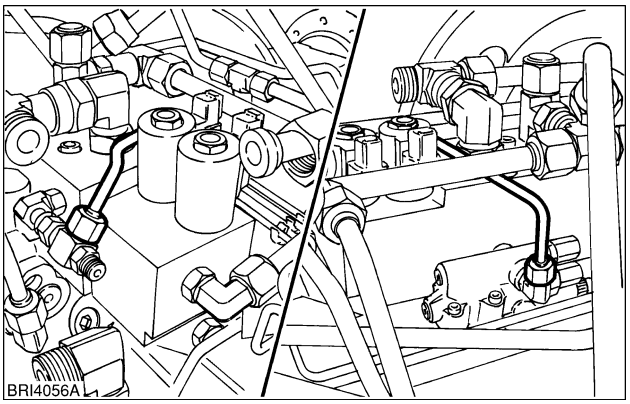
BSD2178A 35

Steering cylinder
The steering cylinders are directly supplied via the control pump with high-pressure oil.



BSD2172A 36

Load Sensing reversing valves
This valve is used in all remote valves, in the EPC control valve and between the trailer brake valve, the control valve of the front axle suspension and, if necessary, the side-mounted remote valves. It ensures that the unit with the highest demand for oil pressure applies pilot oil pressure to the Load Sensing valve of the CCLS variable displacement pump.



BAIL06CCM089ASA 37

The Closed Centre high-pressure oil circuit works in the following way:-

The components of the high pressure oil circuit are connected via Load Sensing lines with the hydraulic Load Sensing valve, which controls the capacity of the hydraulic pump.
If the trailer brake system, the remote valves, the hydraulic powerlift or the front axle suspension (where fitted) are operated, the Load Sensing valve of the variable displacement pump compares the pressure in the Load Sensing line of the components with the delivery pressure of the hydraulic pump.
If the pump pressure is less than the sum of the pressures of Load Sensing line and spring pressure on the oil flow regulator, the pump capacity is increased. As soon as the demand of the oil circuit is fulfilled, the pump pressure exceeds the sum of the pressures from Load Sensing line and spring pressure of the oil flow control valves. This pushes the control pin in the oil flow control valve to the right, whereby the pilot oil is fed to the control cylinder of the variable displacement pump swash plate, which reduces the pump stroke and thus adjusts the capacity to the demand of the oil circuit.
A detailed description of the Load Sensing working principle of the axial piston variable displacement pump can be found in **Hydraulic pump - Static description (A.10.A)**.

High-pressure hydraulic system in Load Sensing version with closed circuit
See **PRIMARY HYDRAULIC POWER SYSTEM - Hydraulic schema (A.10.A)**

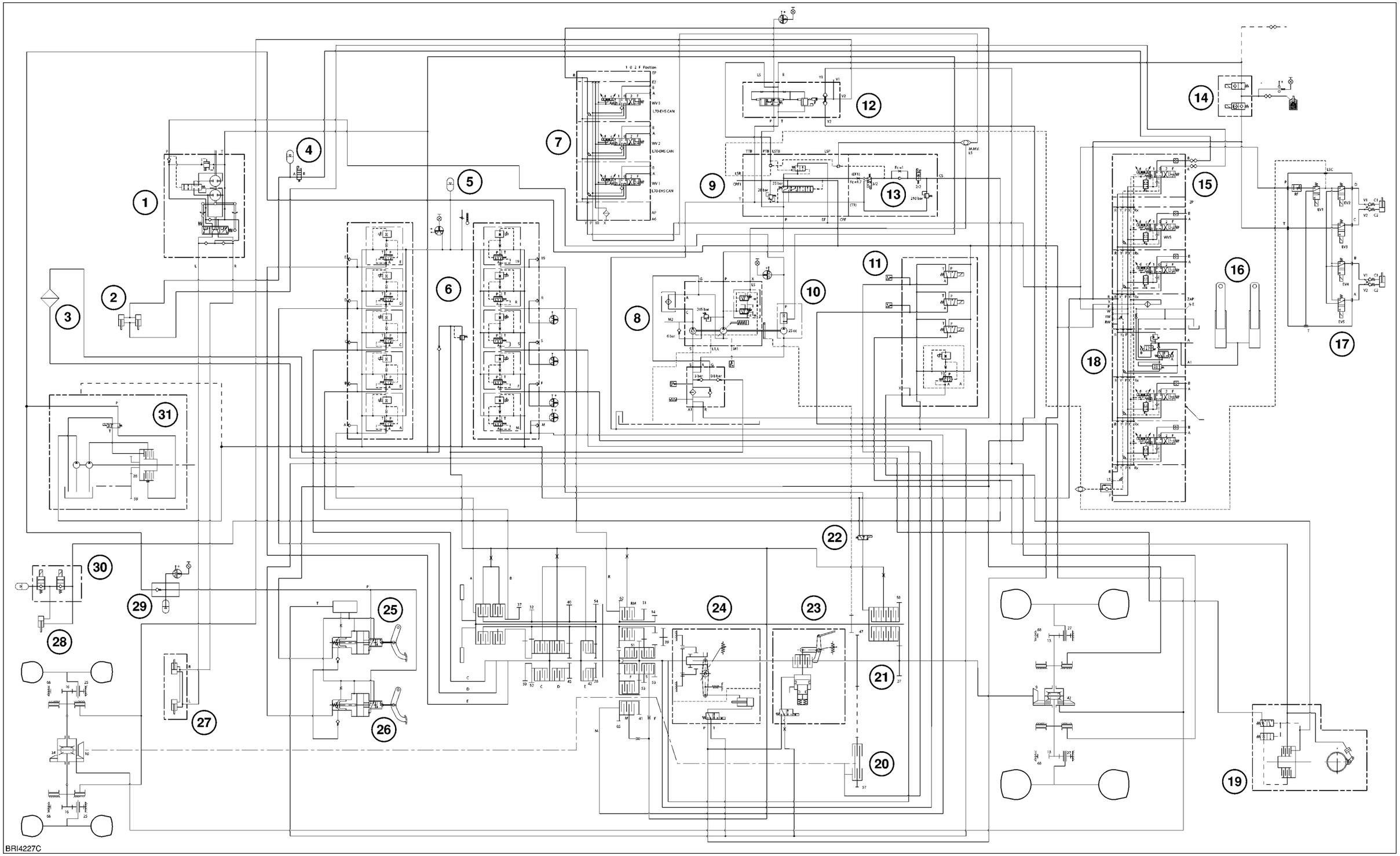
PRIMARY HYDRAULIC POWER SYSTEM - Static description

Pressure test kit **380000464** has been developed for pressure testing and contains adaptors specifically designed for access to test ports.
Refer to **PRIMARY HYDRAULIC POWER SYSTEM - Pressure test (A.10.A)** which describes the procedure for performing the following pressure tests using this kit and other standard fittings already available through CNH Logistics.
High Pressure System
High Pressure Standby
Sensing Line Pressure
Low Pressure Standby
Pump Charge Pressure
Steering
Lift Ram Pressure
Low Pressure System
Lubrication
Brake Boost Valve
Trailer Brake Valve
Before commencing hydraulic pressure testing perform the fault finding checks in **PRIMARY HYDRAULIC POWER SYSTEM - Troubleshooting (A.10.A)** followed by the fault finding procedure for the type of concern identified. Following these checks may identify an obvious cause for the concern and prevent unnecessary component disassembly.
The hydraulic pump is the heart of the hydraulic system and the chapter describes in detail the tests necessary to confirm that pump output is to specification. Once specified pump output has been confirmed attention can be focused on the appropriate pressure testing of individual components in the hydraulic circuit.

PRIMARY HYDRAULIC POWER SYSTEM - Hydraulic schema

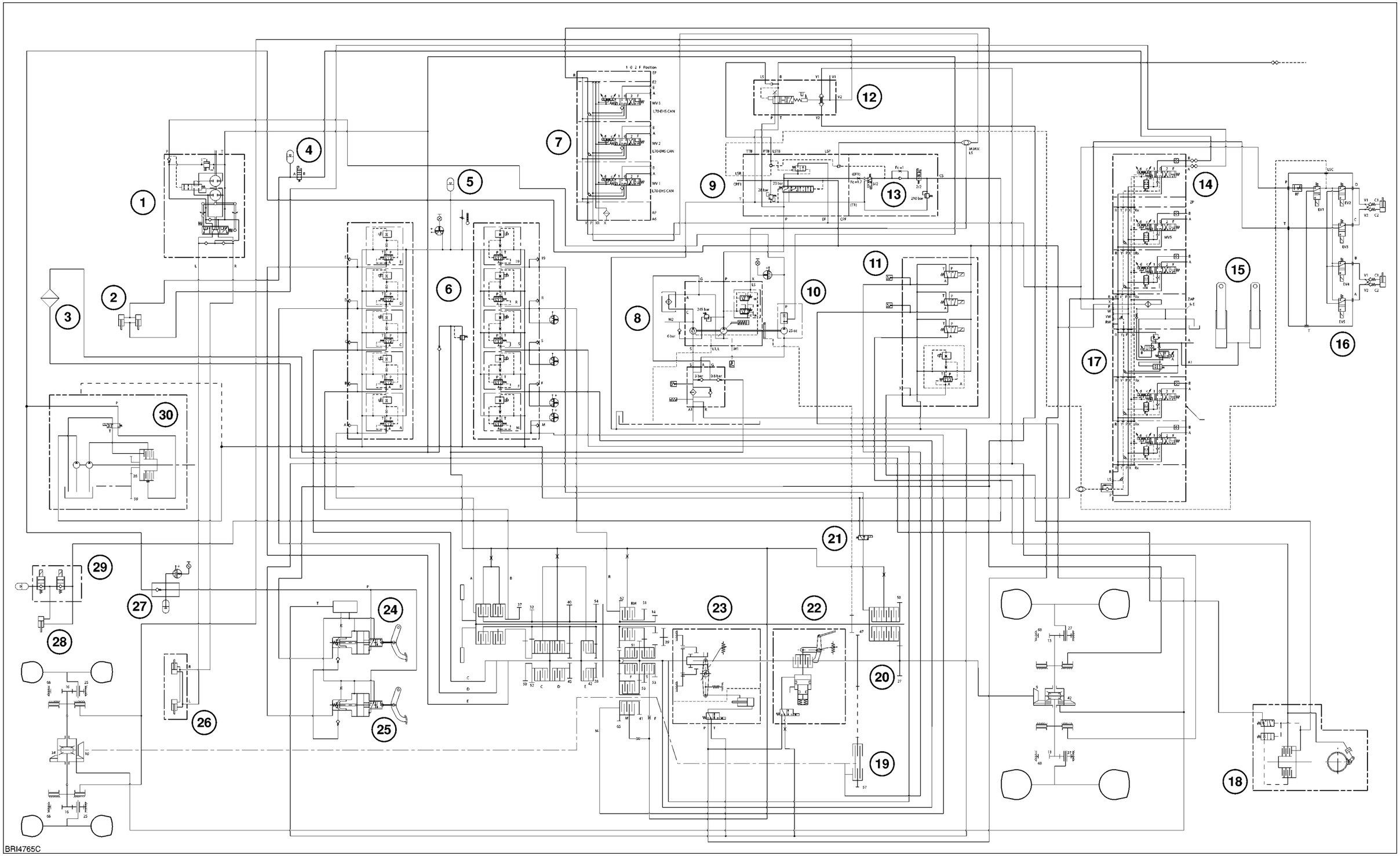
With Italian Trailer Brakes

1.Steering Motor (For Turn Assist Schematic refer to : **Fast steer system - Hydraulic schema (D.20.C)**
2.Front Lift Cylinders
3.Oil Cooler
4.Front Lift Valve
5.Accumulator
6.Transmission Control Valve Assembly
7.Mid Mount Remote Valves
8.Variable Displacement Pump
9.Pressure Reducing Priority Valve
10.Steering Pump
11.Low pressure Distribution Valve
12.Italian Trailer Brake Valve
13.Load Levelling Valve
14.Italian Trailer Brake Valve Solenoid Block
15.Electro Hydraulic Remote Valves (For Mechanical Remote Valves with Power Beyond refer to : **PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Hydraulic schema (A.10.B)**
16.Hydraulic Lift Cylinders
17.Diverter Valve for Hydraulically Adjustable Top and Right hand Links
18.Electronic Draft Control Valve
19.PTO Clutch and Brake
20.Four Wheel Drive Clutch
21.19th Gear Clutch
22.Dump Valve
23.Parking Brake
24.Creeper Assembly
25.Right Hand Brake
26.Left Hand Brake
27.Steering Cylinders
28.Suspension Cylinder
29.Brake Booster Accumulator
30.Suspension Control Valve
31.Front PTO



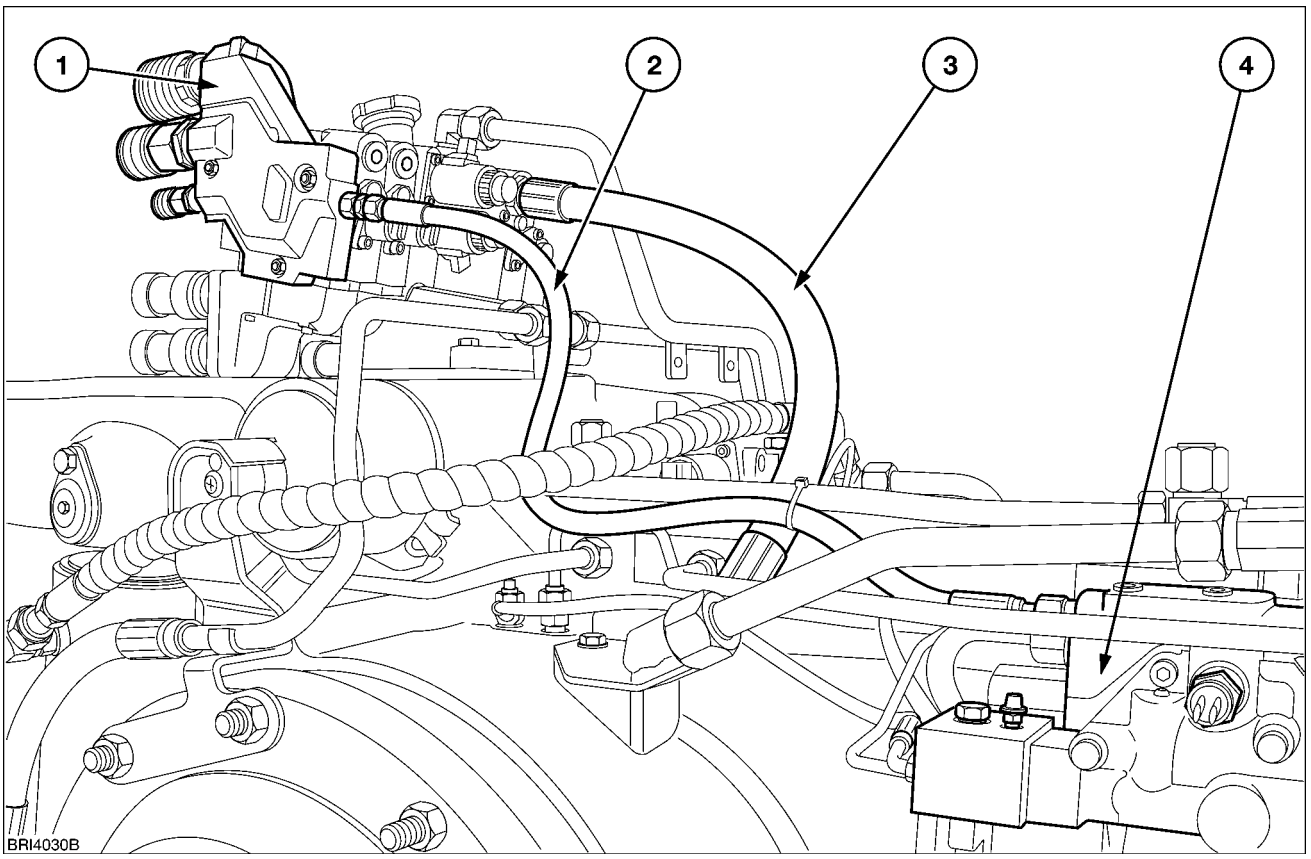
BAIL07CCM270JSA 1

With Universal Trailer Brakes	
1.Steering Motor (For Turn Assist Schematic refer to : **Fast steer system - Hydraulic schema (D.20.C)**	2.Front Lift Cylinders
3.Oil Cooler	4.Front Lift Valve
5.Accumulator	6.Transmission Control Valve Assembly
7.Mid Mount Remote Valves	8.Variable Displacement Pump
9.Pressure Reducing Priority Valve	10.Steering Pump
11.Low pressure Distribution Valve	12.Trailer Brake Valve
13.Load Levelling Valve	14.Electro Hydraulic Remote Valves (For Mechanical Remote Valves with Power Beyond refer to : **PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Hydraulic schema (A.10.B)**
15.Hydraulic Lift Cylinders	16.Diverter Valve for Hydraulically Adjustable Top and Right hand Links
17.Electronic Draft Control Valve	18.PTO Clutch and Brake
19.Four Wheel Drive Clutch	20.19th Gear Clutch
21.Dump Valve	22.Parking Brake
23.Creeper Assembly	24.Right Hand Brake
25.Left Hand Brake	26.Steering Cylinders
27.Suspension Cylinder	28.Brake Booster Accumulator
29.Suspension Control Valve	30.Front PTO



BAIL07CCM300JSA 2

Power beyond - Static description

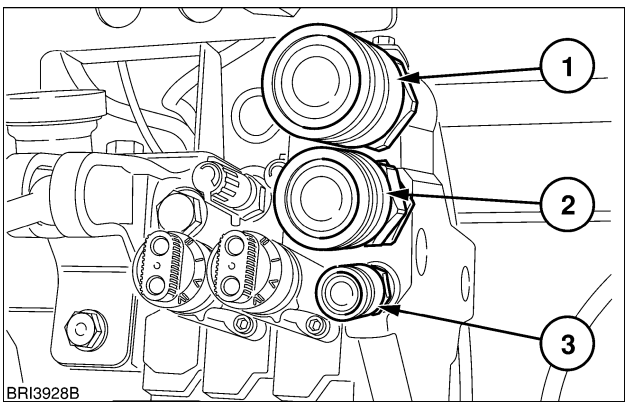


BAIL06CCM050FSA 1

Power Beyond Component Layout

1. Power Beyond Slice
2. Load Sensing Line
3. Pressure Feed Hose
4. Priority Valve

For implements or attachments requiring a continuous oil flow from the tractor hydraulic system, provision is made to connect directly into the main hydraulic circuit at the rear of the tractor.
High pressure oil is fed from the main pump via hose **(3)** (Figure **1**) to the remote valve central manifold and through the pressure gallery to the power beyond slice **(1)**. Pressure is fed through the slice to the coupler and then to the implement or attachment, and is returned to the return coupler. The return oil is fed through the remote valve stack and back to tank.
The power beyond slice incorporates a load sensing port or coupler which allows the pressure compensating valve on the pump to detect the load pressure from the implement and adjust the pump output accordingly.



BAIL06CCM054ASA 2

1.Return Coupler
2.Pressure Coupler
3.Load Sensing Coupler

Hydraulic pump - Static description

The variable flow closed centre load sensing hydraulic pump assembly is mounted on the right hand side of the rear axle centre housing and contains within its body two hydraulic pumps.

- A charge pump of the gear type to supply oil at a charge pressure of **3 bar** (**44 lbf/in2**) to a variable flow closed centre load sensing hydraulic piston pump.
- A variable flow closed centre load sensing piston type hydraulic pump supplying oil to the high pressure circuits for operation of:-
  Trailer Brake
  Hydraulic Lift Assembly
  Remote Control Valves
  Front Axle Suspension
  Front Lift
  Mid Mount remote valves

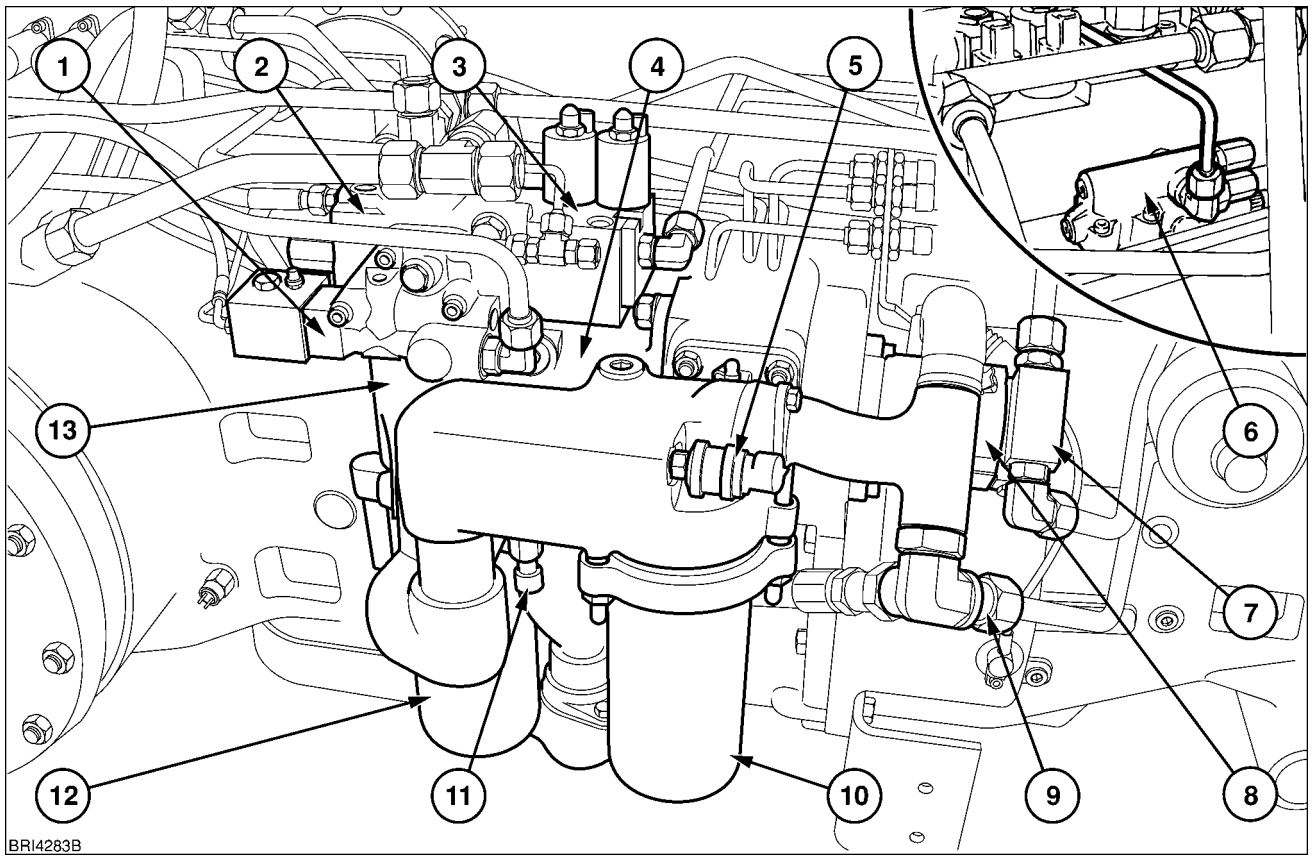
Principal of Operation

Both pumping elements are driven by a 'live' drive gear train directly connected to the PTO clutch input drive shaft and driven by the engine flywheel.
The operating principal of the fixed displacement gear pump is to provide a constant oil flow directly related to the rotation speed of the pump.
The operating principal of a variable flow piston pump is to provide oil flow on demand and minimises the engine power absorbed in driving the hydraulic pump when the hydraulic circuits do not require maximum pump flow.
The variable flow piston pump in hydraulic systems therefore has distinct power loss advantages over fixed displacement gear type pumps, which continually provide oil flow and absorb engine power even when the hydraulic circuits do not require the total pump output.

Variable Displacement Piston Pump
The major components of the variable flow piston pump with closed centre load sensing are:-

- A nine element pumping head.
- A plate mechanism (swash plate) to adjust piston stroke and corresponding pump output.
- A load sensing valve which monitors the requirements of the hydraulic circuits and signals the pump to increase or decrease hydraulic oil flow accordingly.

The nine element pumping head is cylindrical in shape and has nine barrels, into each of which, is installed a piston. On the end of each piston is pressed a slipper which always remains in contact with the face of the swash plate located at the front of the pumping head.
The drive shaft, which is driven by the pump drive gear, rotates the pumping head. As the pumping head rotates, the pistons move in and out of their barrels, following the contour of the swash plate. For every revolution of the drive shaft each piston completes one pumping cycle.
The swash plate, which does not rotate but pivots about the front of the pumping head, is the control mechanism that limits the stroke of each piston and works in conjunction with the pressure and flow compensating valves in the load sensing line.
As the pumping head rotates each barrel passes over the inlet and then the outlet ports of the pump. During the inlet cycle for each piston and barrel, oil is pumped into the barrel pushing the piston forward so that it always remains in contact with the swash plate. The stroke of each piston and volume of oil charged into its barrel is therefore dependent on the angle of the swash plate.
After a piston and barrel has completed the inlet stroke, further rotation of the head aligns the barrel with the outlet port. Oil within the barrel is then forcibly ejected by the piston through the exhaust port to the hydraulic circuits.



BAIL06CCM193FSA 1

Variable Displacement Hydraulic Pump Installation

1 Trailer Brake Valve Assembly
2 Pressure Reducing Priority Valve
3 Load Levelling Valve (Where fitted)
4 Variable Displacement Pump
5 Filter Restriction Switch
6 Load Sensing Valve
7 Steering / Lube Priority Valve
8 Steering / lube Supply Pump
9 Supplementary Lube Valve
10 Main Intake Filter
11 Low Oil Temperature Switch
12 Charge Pressure Filter
13 Charge Pump

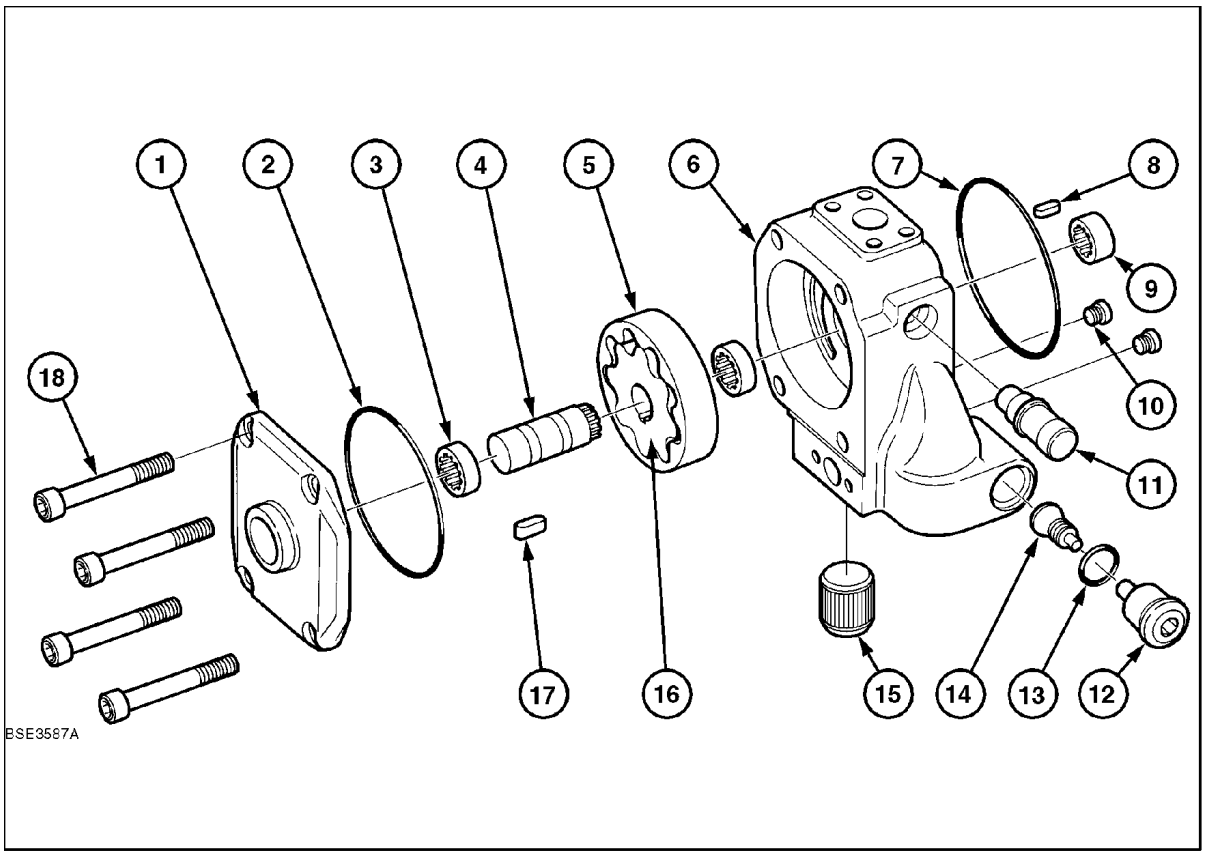
The location of the principal components in the hydraulic pump assembly are identified above. These items are shown on the hydraulic circuit diagrams which describe the operating modes of the pump. The principal function of the valves and switches is as follows:-

Intake Filter and Restriction Switch

Oil for both the charge and steering pump is drawn from the rear axle centre housing via the intake filter. The filter incorporates a by-pass valve, which is an integral part of the replaceable filter and it is therefore essential that the correct filter is installed at every filter change.
When the filter is blocked the oil filter restriction vacuum switch is activated and illuminates the oil filter restriction warning light on the instrument panel.



Because oil is more viscous (thicker) when cold and can falsely indicate that the filter requires servicing a low temperature oil switch is also used in the filter restriction circuit. This switch ensures that the warning light will not operate if the oil temperature is less than **40 °C**.



BSE3587A 2

Charge Pump Components

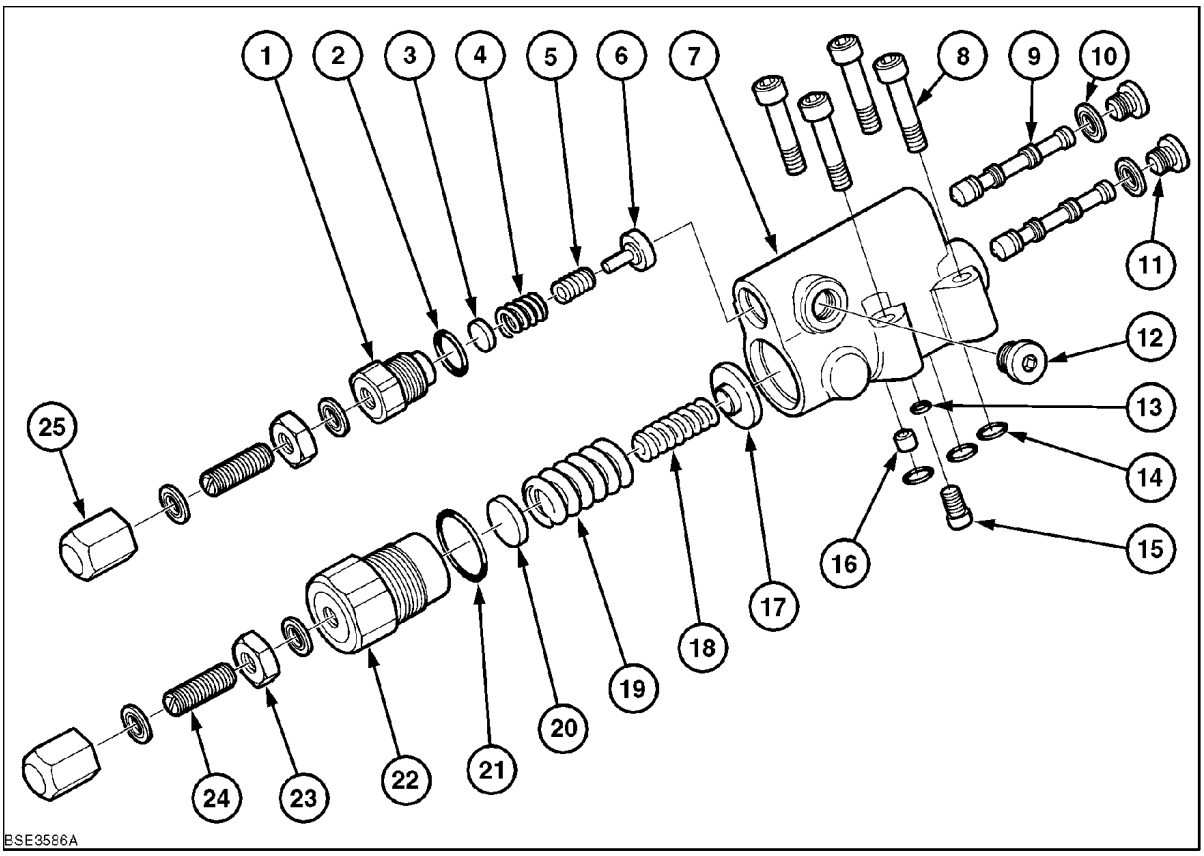
1 EndPlate
2 Seal
3 Coupling
4 Shaft
5 Rotor Housing
6 Charge Pump Housing
7 Seal
8 Pin
9 Hub
10 Screw Plug
11 System Relief Valve (**245 Bar**)
12 Check Valve Plug
13 Seal
14 Charge Pressure Filter Dump Valve Spool
15 Main Charge Filter
16 Pump Rotor
17 Key
18 Screws

Low Charge Pressure Switch

The low charge pressure switch will cause a light to ‘Flash’ on the instrument cluster whenever the charge pressure is less than **0.75 bar** (**11 lbf/in2**)

Charge Pressure Filter Dump Valve

The charge pressure filter dump valve is a safety relief valve for relieving excess pressure on the charge pump should the filter be restricted. This valve will start to operate if the charge pressure exceeds **6 bar** (**87 lbf/in2**).
Charge Pressure Valve
The charge pressure valve diverts excess oil supplied by the charge pump and not required by the variable flow piston pump to the inlet port of the steering and lubrication circuit pump.
This valve starts to operate at a pressure of **1 bar** (**14.5 lbf/in2**) and when fully open limits the charge pressure circuit oil to **3 bar** (**44 lbf/in2**) .



BSE3586A 3

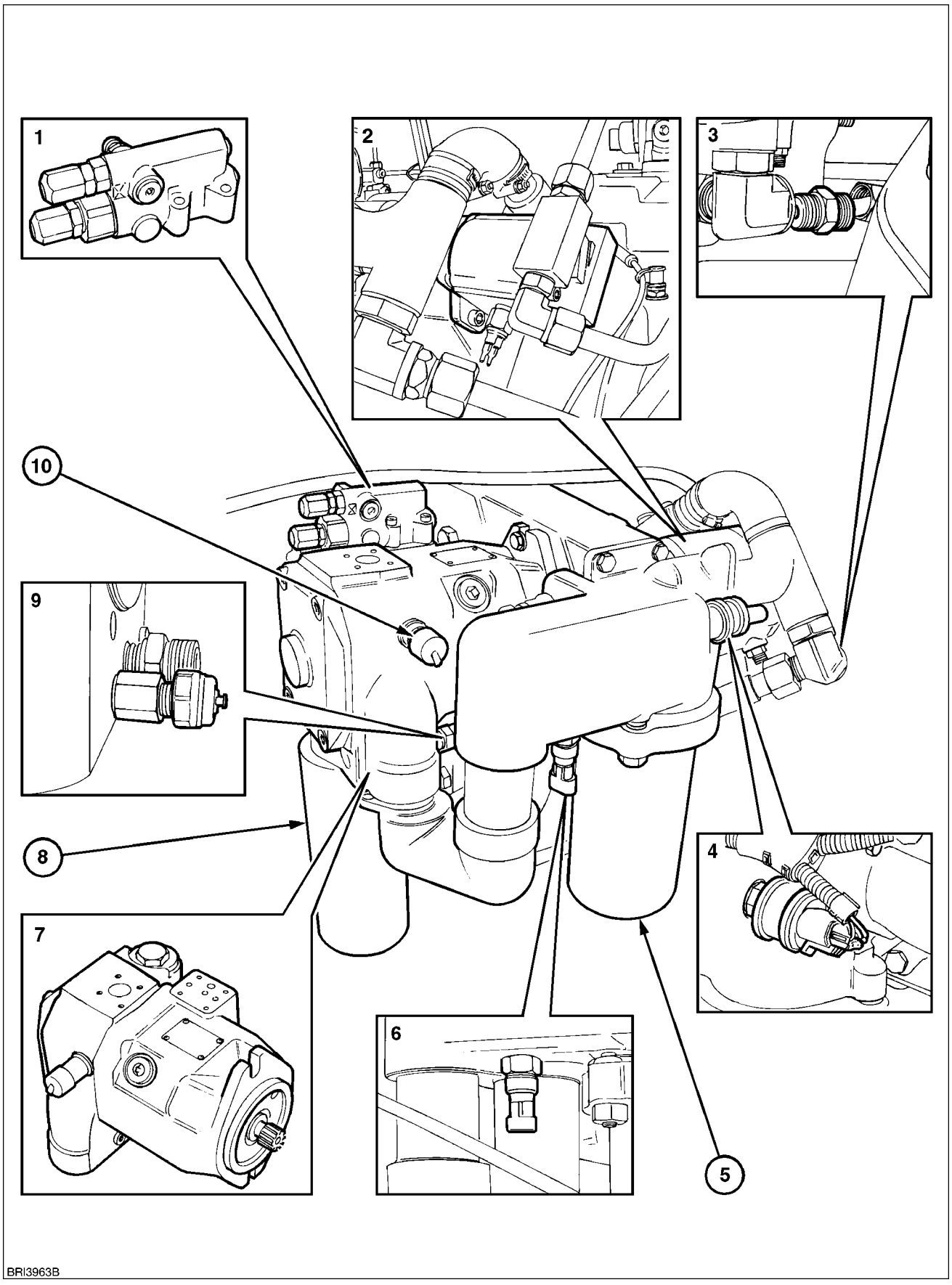
Flow and Pressure Compensating Valves

1 Plug
2 Seal
3 Disc
4 Spring
5 Spring
6 Seat
7 Housing
8 Screw
9 Spool
10 Snap-ring
11 Plug
12 Plug
13 Seal
14 Seal
15 Damper Screw
16 Nozzle
17 Seat
18 Spring
19 Spring
20 Disc
21 Seal
22 Plug
23 Nut
24 Screw
25 Locknut

Flow and Pressure Compensating Valves

Output from the variable flow piston pump is determined by adjusting the angle of the swash plate in the pump. The flow compensating valve senses the circuit operating pressure and adjusts the swash plate angle to control pump output.
If pump output and circuit pressure rises to **205 bar** (**2973 lbf/in2**) the pressure compensating valve overrides the flow compensating valve and adjusts the swash plate angle to limit maximum system pressure.

Hydraulic pump - Overview

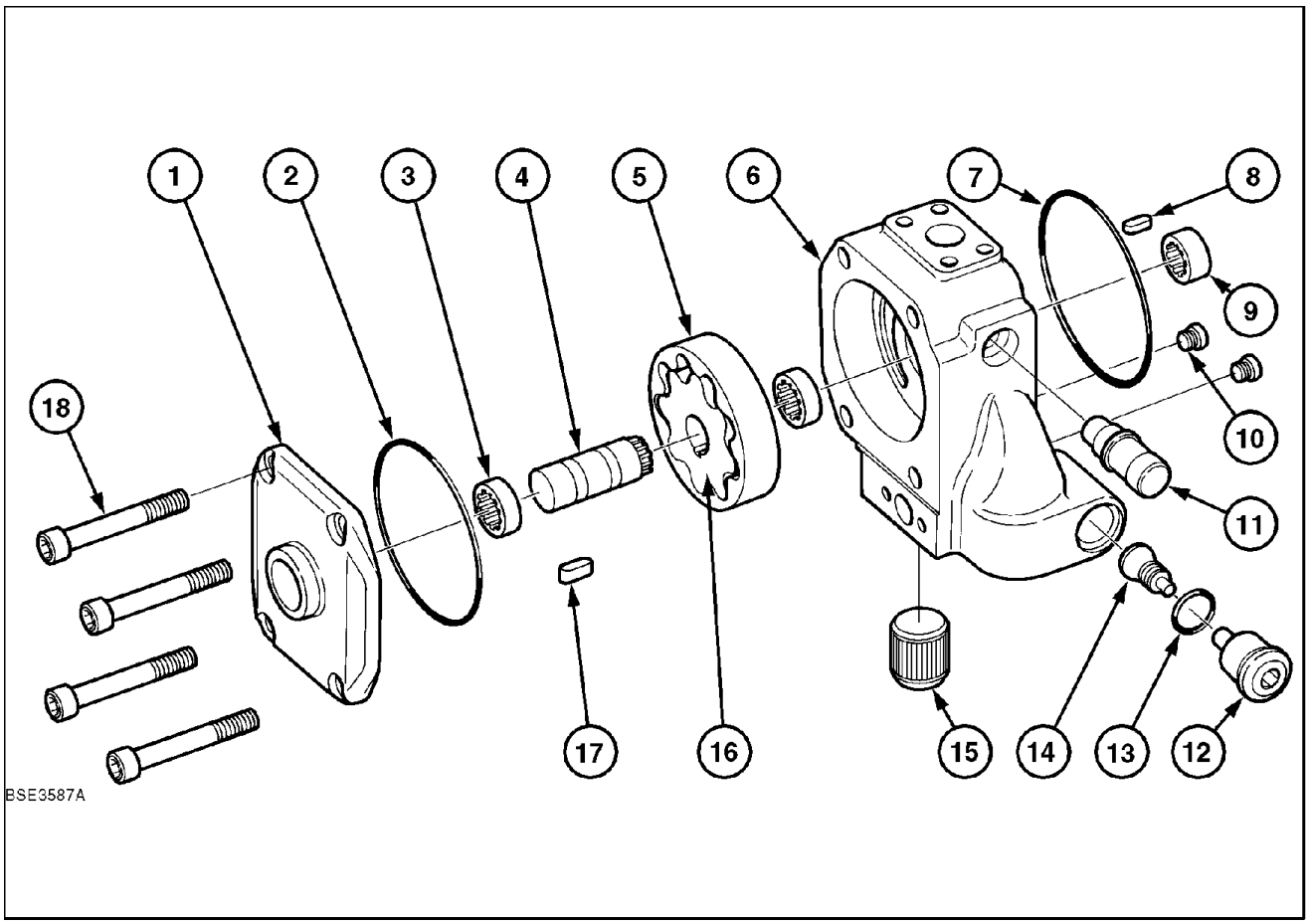


BAIL06CCM042HSA 1

Hydraulic Pump Assembly With Variable Displacement Closed Centre Load Sensing

1 Load Sensing Valve assembly
2 Steering Pump
3 Supplementary Lube valve
4 Main Intake Filter restriction (vacuum) Switch
5 Main Filter
6 Low Oil Temperature Switch
7 Variable Displacement Pump and Charge Pump
8 Charge Pump Filter
9 Low Charge Pressure Warning Switch
10 Main System Relief Valve (**245 bar**)

Charge pump - Exploded view

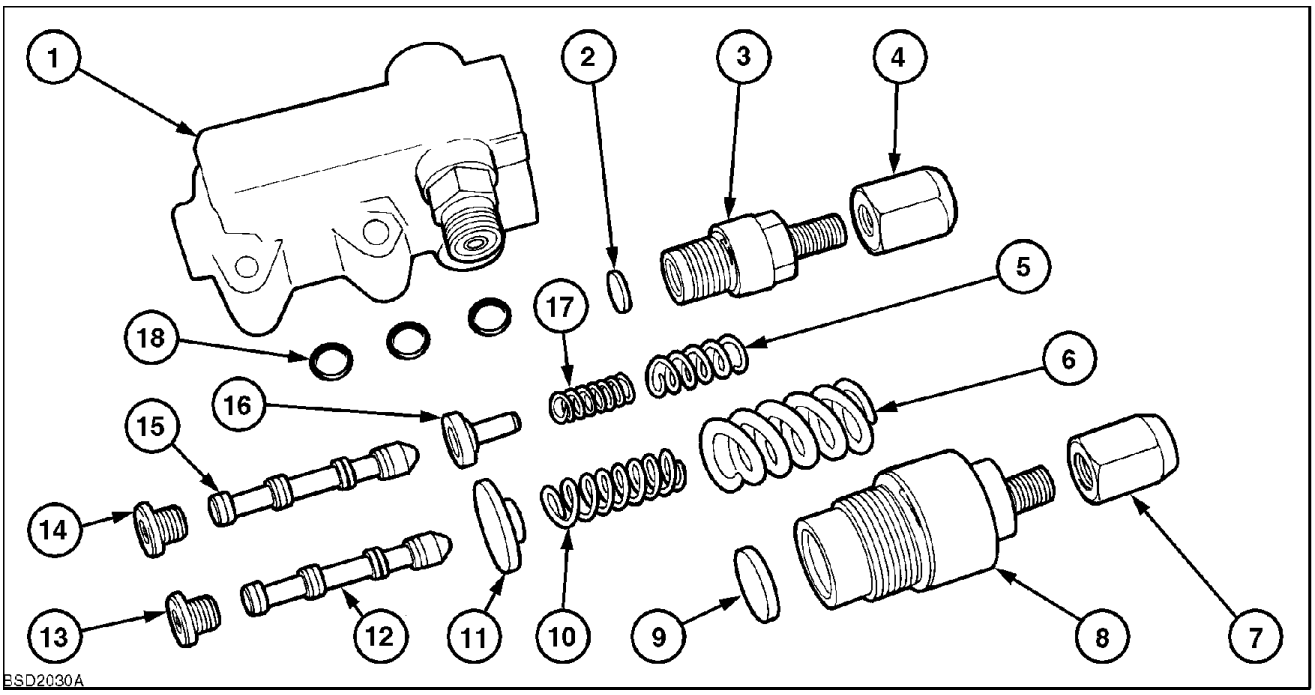


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Charge Pump Components

1 End Plate
2 Seal
3 Coupling
4 Shaft
5 Rotor Housing
6 Charge Pump Housing
7 Seal
8 Pin
9 Hub
10 Screw Plug
11 System Relief Valve (**245 bar** (**3552.5 psi**))
12 Check Valve Plug
13 Seal
14 Check Valve Spool
15 Main Charge Filter
16 Pump Rotor
17 Key
18 Screws

Compensator - Exploded view



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Flow and Pressure Compensating Valves

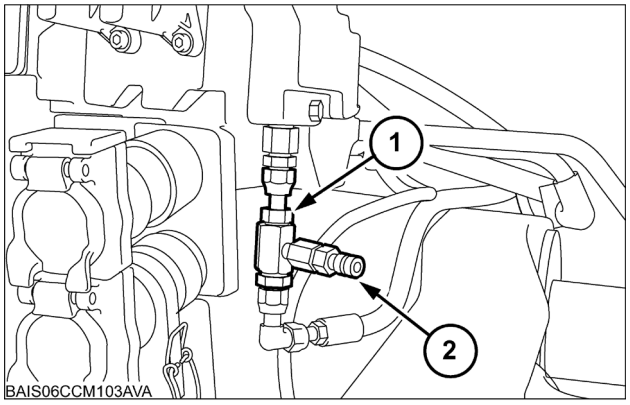
1 Housing
2 Seat
3 Adjuster and ‘O‘ Ring seal
4 Locknut
5 Spring
6 Spring
7 Locknut
8 Adjuster and ‘O‘ Ring seal
9 Seat
10 Spring
11 Seat
12 Pressure Compensator Spool
13 Plug and ‘O’ Ring
14 Plug and ‘O’ Ring
15 Flow Compensating Spool
16 Seat
17 Spring
18 ‘O‘ Ring Seal

Signal valve - Pressure test

IMPORTANT: *Before a pressure test or volume flow measurement, drive the tractor until the transmission oil in the rear axle is warmed up to operating temperature.* ***65 °C*** *(* ***145 °F****).*

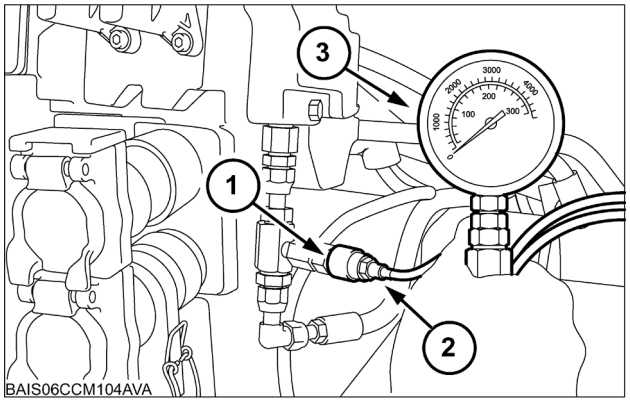
1. This test shows how you test whether the control lines for the displacement volume regulation of the hydraulic pump are working. With the test device installed in the picture, the Load Sensing oil circuit of the hydraulic remote valves is tested. To test other Load Sensing oil circuits, the test device must be installed in the Load Sensing line of the oil circuit to be tested.

2. Install the T piece **(1) 380000573** and the fast coupling sleeve **380000492 (2)** into the load sensing line.



BAIS06CCM103AVA 1

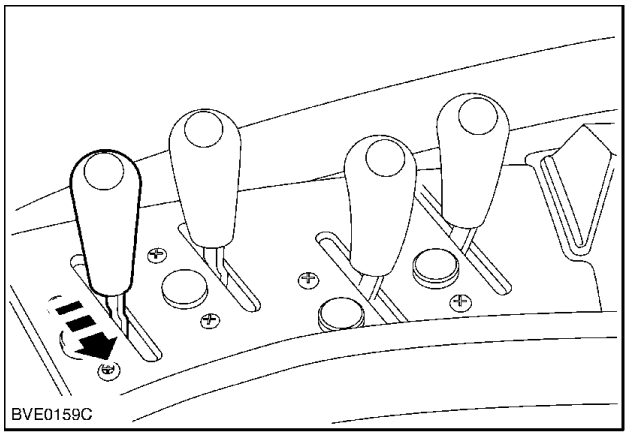
3. Connect the pressure gauge with display range **0 - 250 bar** (**0 - 3600 lbf/in2**) **(3)** 380000553 with hose **(2)** 380000545 and fast coupler **(1)** 380000543 .



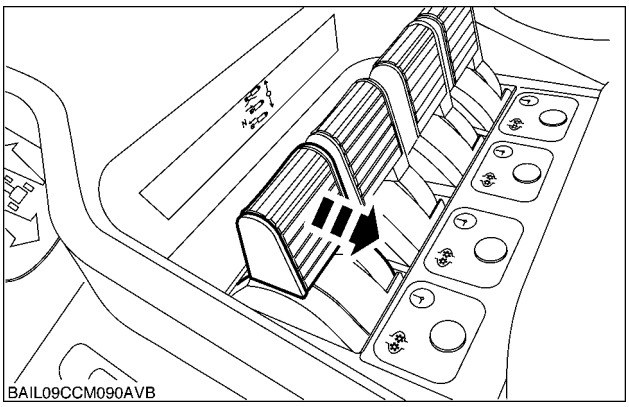
BAIS06CCM104AVA 3

4. Set the engine speed to **1500 rev/min**.
   Operate all control units one after the other. When each of the control units is operated, the pressure must rise from **0 bar** (**0 lbf/in2**) to a maximum value of **210±5 bar** (**3046±73 lbf/in2**). Changes in pressure indicate that the Load Sensing line of the relevant control unit is working.

   Operation of the remote valves in PUMA Multicontroller, see **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Static description (A.10.C)**



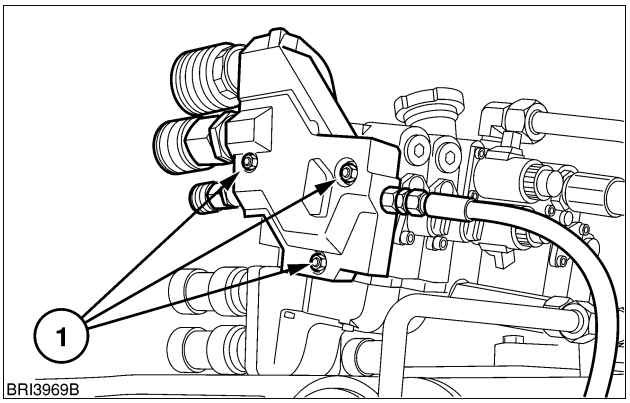
BVE0159C 4



BAIL09CCM090AVB 5

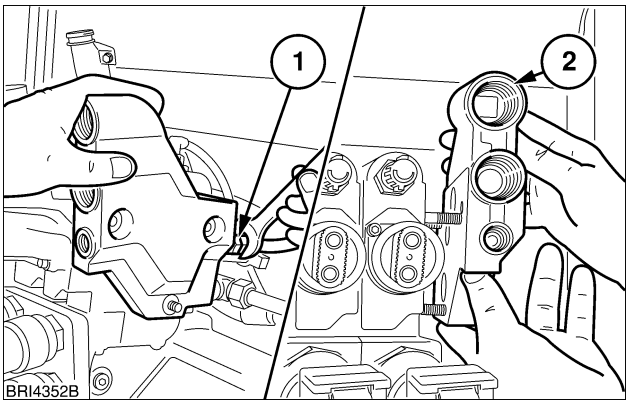
Power beyond - Remove

1. Undo the three retaining nuts **(1)** .



BAIL06CCM051ASA 1

2. Undo the load sensing connection **(1)**, and remove power beyond slice **(2)**.



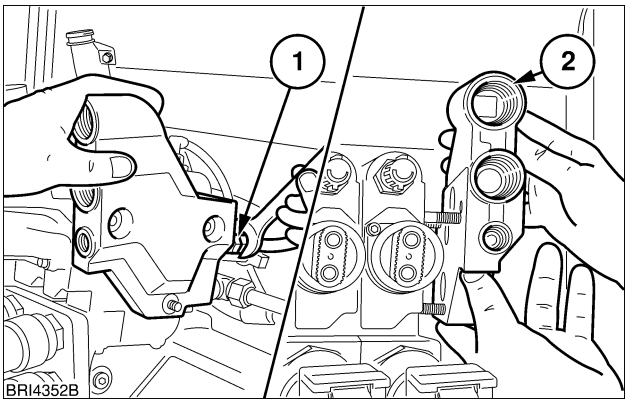
BAIL06CCM242ASA 2

Next operation:
Power beyond - Install (A.10.A)

Power beyond - Install

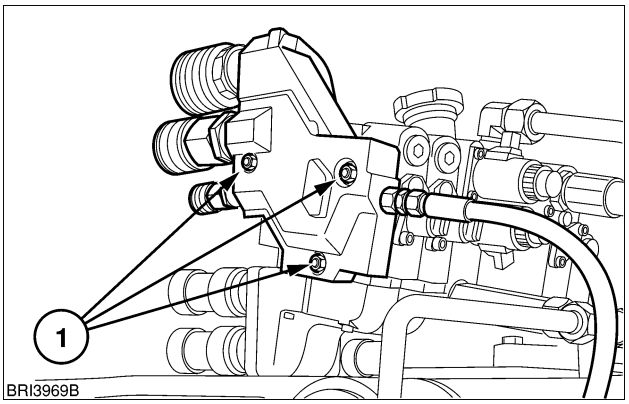
Prior operation:
Power beyond - Remove (A.10.A)

1. Locate the power beyond slice **(2)** onto the three tie rods protruding from the remote valve and connect the load sensing hose **(1)**.



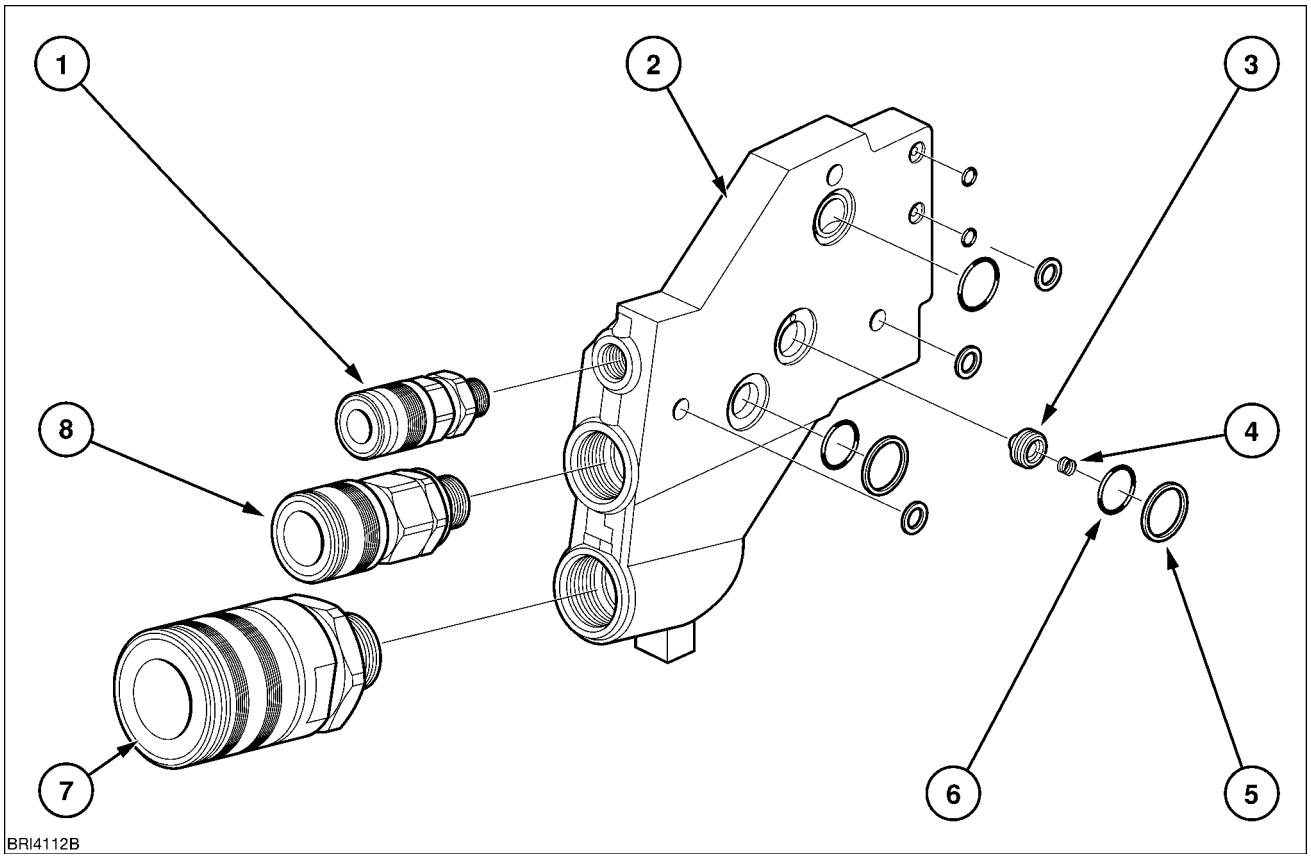
BAIL06CCM242ASA 1

2. Replace the retaining nuts **(1)** and torque in the sequence as specified. Refer to **Power beyond - Torque (A.10.A)**



BAIL06CCM051ASA 2

Power beyond - Assemble



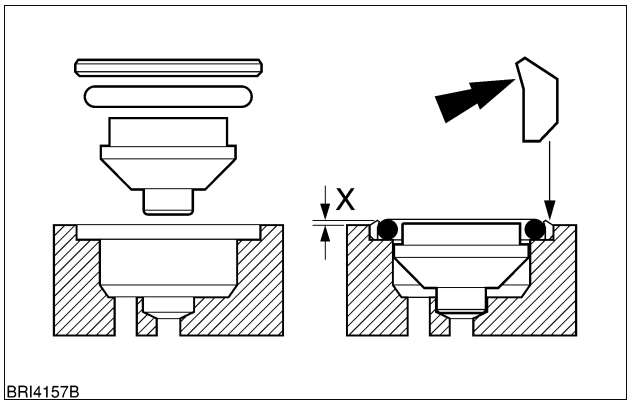
BAIL06CCM170FSA 1

Power Beyond Slice Components

1. Load Sensing Coupler
2. Power Beyond Manifold
3. Load Sensing Shuttle Valve
4. Spring
5. Support Ring
6. 'O' Ring
7. Return Coupler
8. Pressure Coupler

1. Screw the couplers onto the power beyond slice and tighten to the required torque. Refer to **Power beyond - Torque (A.10.A)**
2. Insert load sensing shuttle valve along with the 'O' ring and support ring as shown.

NOTE: *Clearance X should be approximately* ***0.5 mm*** *from the flange face of the valve segment to the top edge of the inserted shuttle valve.*



BAIL06CCM139ASA 2

3. Insert new 'O' rings into the rest of the ports.

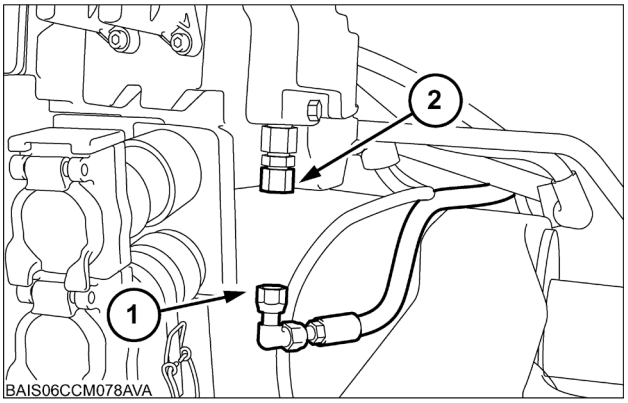
Next operation:
Power beyond - Install (A.10.A)

Hydraulic pump - Pressure test

IMPORTANT: *Before a pressure test or volume flow measurement, drive the tractor until the transmission oil in the rear axle is warmed up to operating temperature.* ***65 °C*** *(* ***145 °F****).*

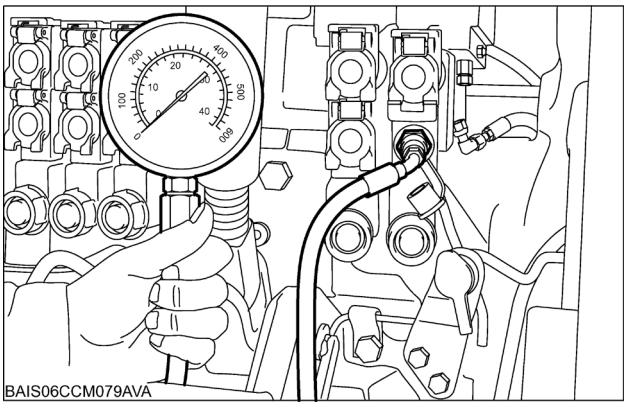
Low pressure standby

1. The following tests constitute a function test of the hydraulic pump and the connected high pressure oil circuits. Unscrew the Load-Sensing line **(1)** of the remote control units and screw on the screw plug **(2)** 380000574.



BAIS06CCM078AVA 1

2. Connect a pressure gauge with display range **0 - 40 bar** (**0 - 600 lbf/in2**) **380000552** to the remote connection of the control unit. Use the oil coupling 380000554, adapter 380000576, fast coupling sleeve **380000492**, fast coupling **380000543** and hose **380000545** to do this.
   Set the engine speed to **1500 rev/min**.

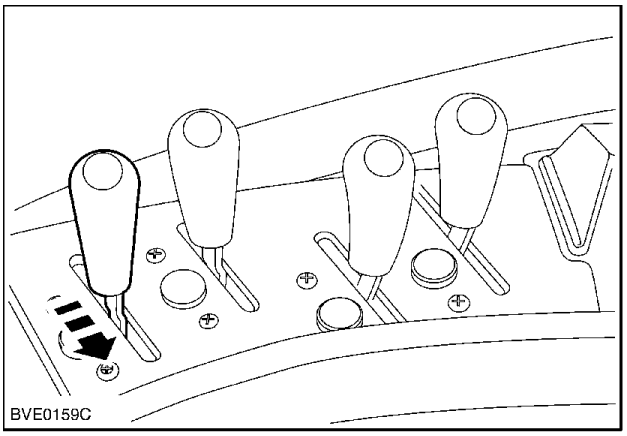


BAIS06CCM079AVA 3

3. Pull the relevant control unit control lever and hold in the Raise position.
   A pressure of **26±1 bar** (**377±15 lbf.in2**) must be displayed. This is the 'Low pressure standby'.

   Operation of the remote valves in PUMA Multicontroller, see **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Static description (A.10.C)**

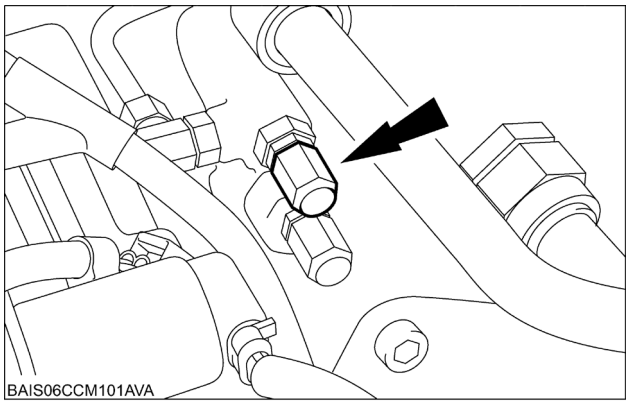
IMPORTANT: *Do not operate the tractor brake, while the control unit lever is in the Work position, because this increases the system pressure to the maximum pressure of* ***120 - 140 bar*** *(* ***1740 - 2031 lbf.in2****) and damages the pressure gauge.*



BVE0159C 4

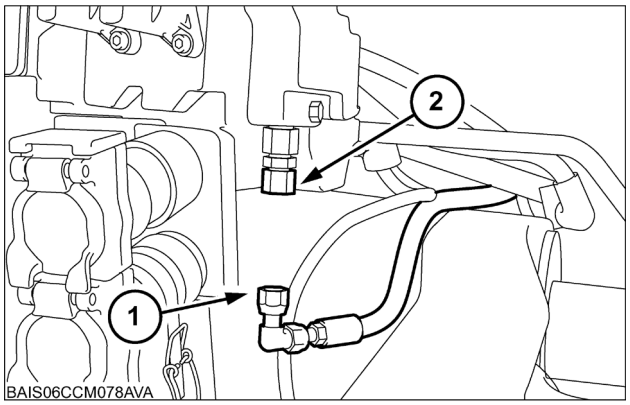
4. If the display value deviates slightly from the desired value, adjust the flow control valve.
   If the display value is too high, check whether the control pin of the flow control valve is sticking.

NOTE: *A full turn changes the pressure by about* ***16 bar*** *(* ***232 lbf.in2****).*



BAIS06CCM101AVA 6

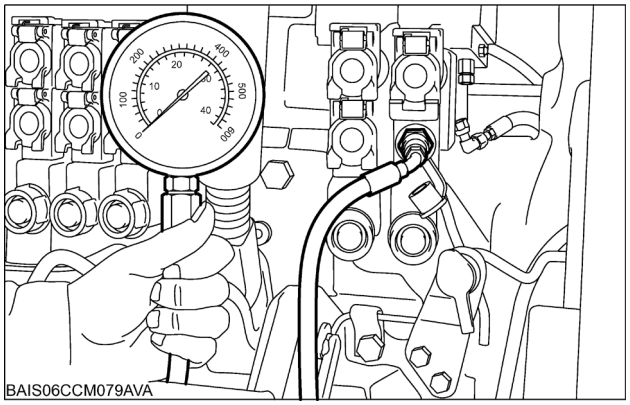
5. Remove the connection **(2)** 380000574. Connect the Load Sensing line **(1)** again.



BAIS06CCM078AVA 7

High pressure standby

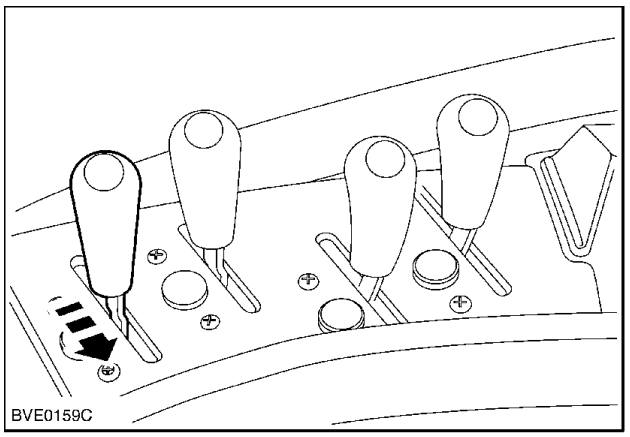
6. Connect a pressure gauge with display range **0 - 255 bar** (**0 - 3600 lbf/in2**) 380000553 to the remote connection of the control unit. Use the oil coupling 5101741, fitting 380000576, fast coupling sleeve **380000492**, fast coupling plug 380000543 and hose **380000545**.
   Set the engine speed to **1500 rev/min**.



BAIS06CCM079AVA 9

7. Pull the relevant control unit control lever and hold in the Raise position.
   The displayed pressure value must rise to **210±5 bar** (**3046±73 lbf.in2**). This is the 'high pressure standby'.

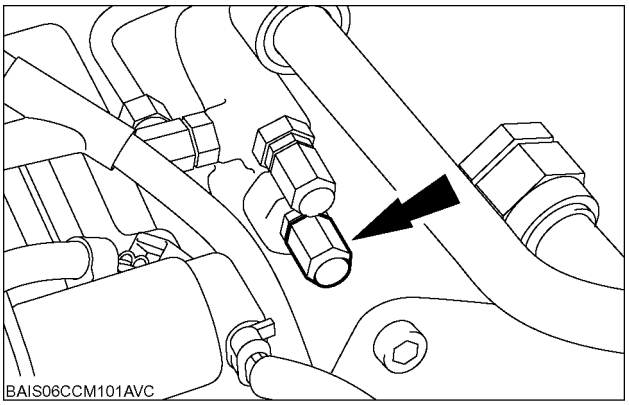
   Operation of the remote valves in PUMA Multicontroller see **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Static description (A.10.C)**



BVE0159C 10

8. If the display value does not match the desired value, adjust the flow control valve.

NOTE: *A full turn changes the pressure by about* ***50 bar*** *(* ***725 lbf.in2****).*

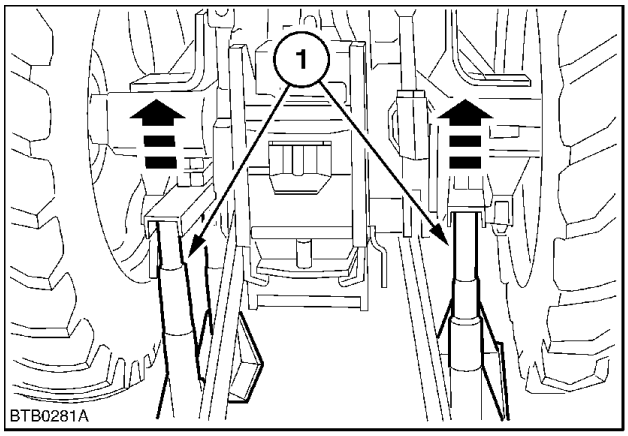


BAIS06CCM101AVC 12

Hydraulic pump Variable displacement pump - Remove

1. Raise the rear of the tractor and place two suitable axle stands **(1)** under the final drive cases.

NOTE: *If required, detach the lift rods from the lower links.*



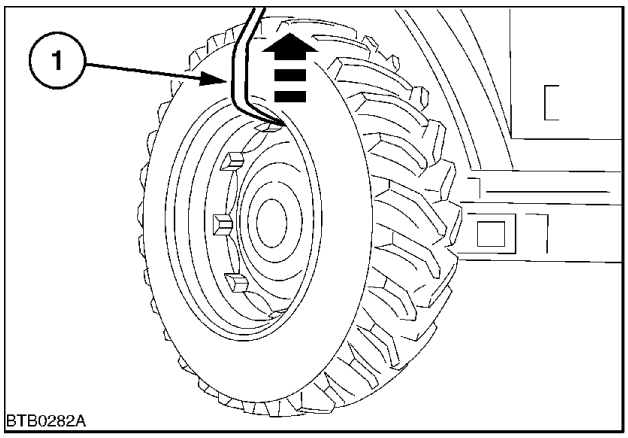
BTB0281A 1

2. Using a suitable sling **(1)**, connect the rear right-hand wheel to a hoist and remove the rear right-hand wheel.

⚠ WARNING ⚠

Tractor wheels are very heavy. Handle with care and ensure, when stored, that they cannot fall and cause injury. Never operate the tractor with a loose wheel rim or disc. Always tighten nuts to the specified torque and at the recommended intervals.

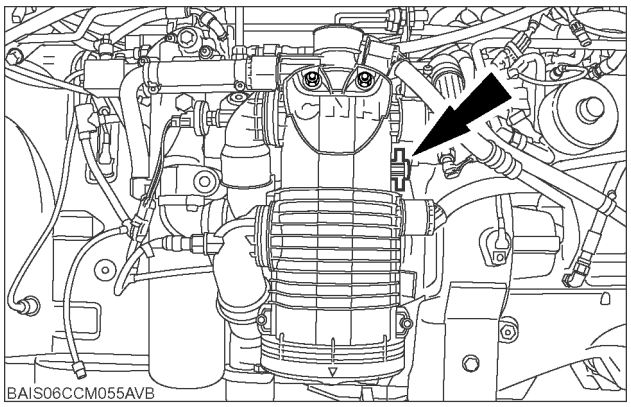
B105



BTB0282A 2

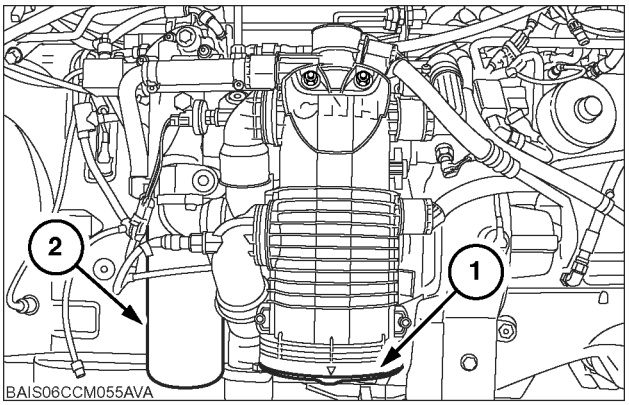
3. Remove the hydraulic oil pump vent cap.

NOTE: *Leave for one minute to allow oil in the filters to drain into the sump.*



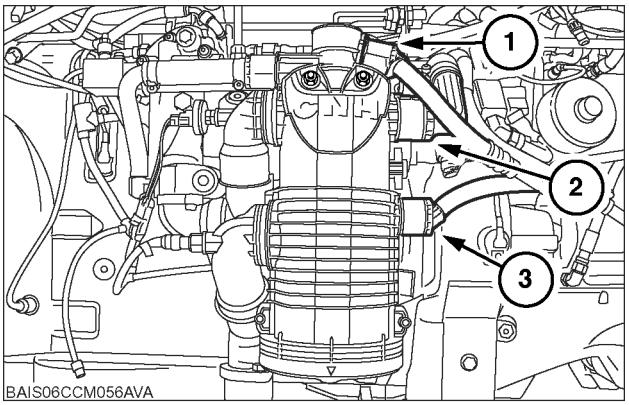
BAIS06CCM055AVB 3

4. Remove the return filter element **(1)** and the pressure filter cartridge **(2)**.



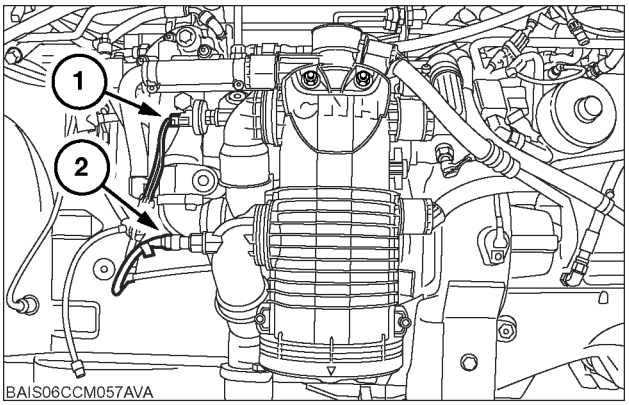
BAIS06CCM055AVA 4

5. Disconnect the transmission control cover return hose **(1)**, steering pump return hose **(2)** and the mid mount valves return hose **(3)**.



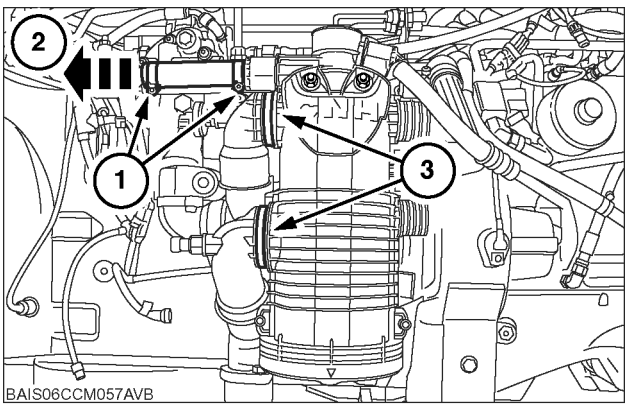
BAIS06CCM056AVA 5

6. Disconnect the electrical connectors **(1)** and **(2)**.



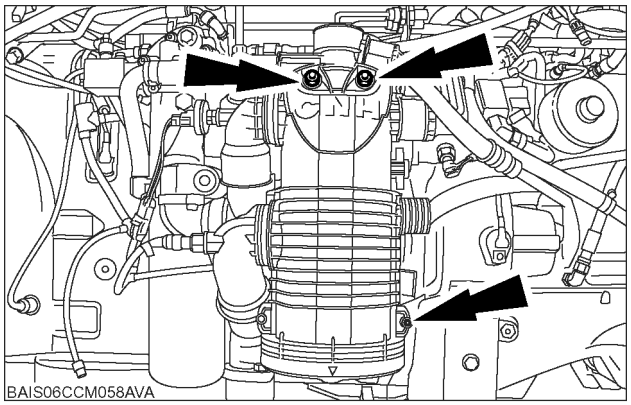
BAIS06CCM057AVA 6

7. Detach the retaining clips **(1)** and disconnect the return pipe **(2)**. Detach the return pipe clips **(3)**.



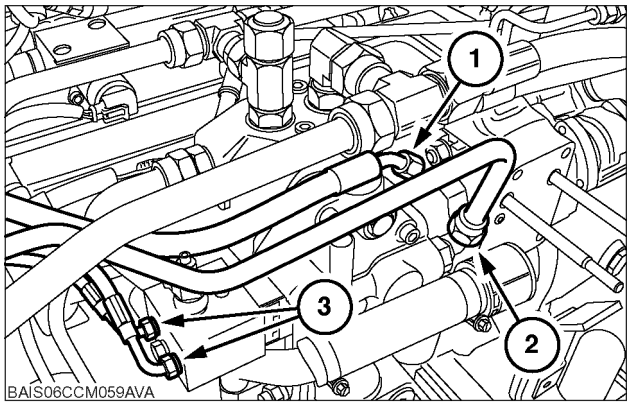
BAIS06CCM057AVB 7

8. Remove the transmission/hydraulic return filter housing.



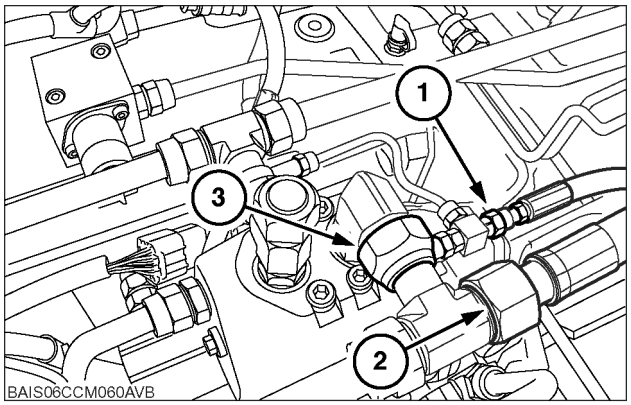
BAIS06CCM058AVA 8

9. Disconnect the load sensing line **(1)**, trailer brake valve supply pipe **(2)** and the left and right trailer brake lines **(3)**.



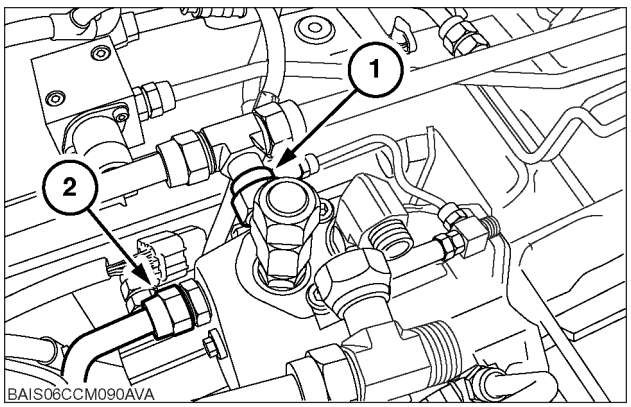
BAIS06CCM059AVA 9

10. Disconnect the mid mount valves load sensing line **(1)** and supply hose **(2)** (If equipped). Disconnect the main supply pipe **(3)**.



BAIS06CCM060AVB 10

11. Disconnect the remote valve pipes **(1)** and **(2)**.



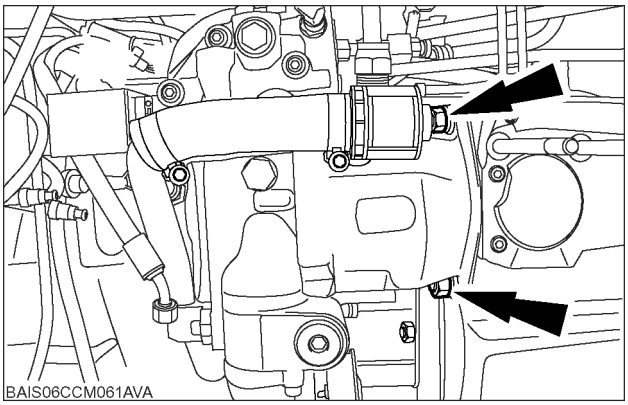
BAIS06CCM090AVA 11

12. Remove the variable displacement hydraulic pump.

⚠ WARNING ⚠

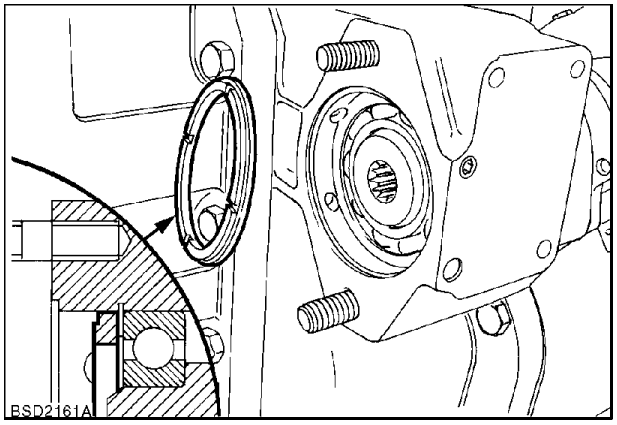
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



BAIS06CCM061AVA 12

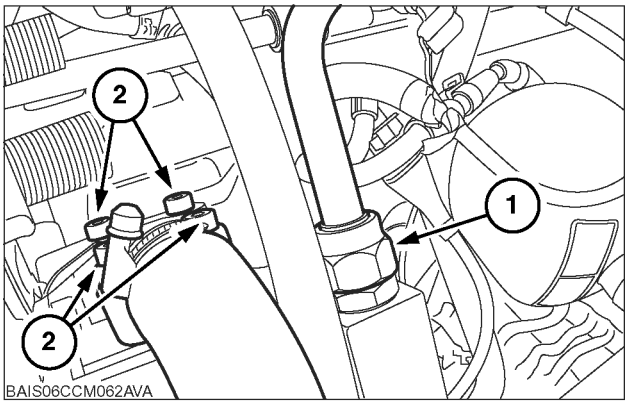
13. Make a note of pump spacer position for correct re-assembly.



BSD2161A 13

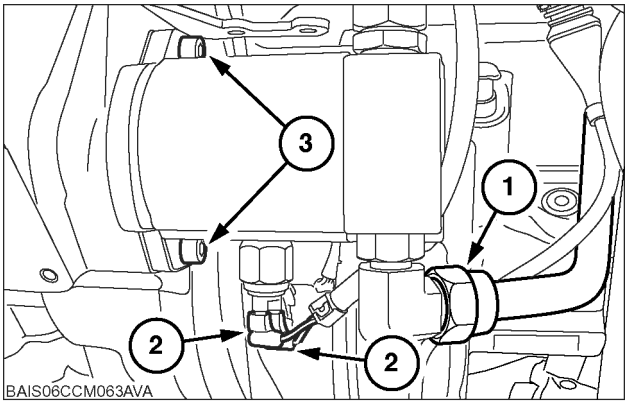
Steering Pump

14. Disconnect the steering pump return pipe **(1)** and detach the steering pump supply pipe housing **(2)**.



BAIS06CCM062AVA 14

15. Disconnect the steering motor supply pipe **(1)**, and the electrical connectors **(2)**. Remove the steering pump **(3)**.



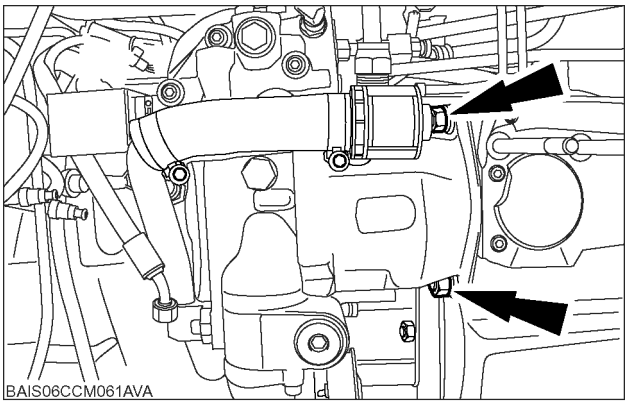
BAIS06CCM063AVA 15

Next operation:
Hydraulic pump Variable displacement pump - Overhaul (A.10.A).

Hydraulic pump Variable displacement pump - Overhaul

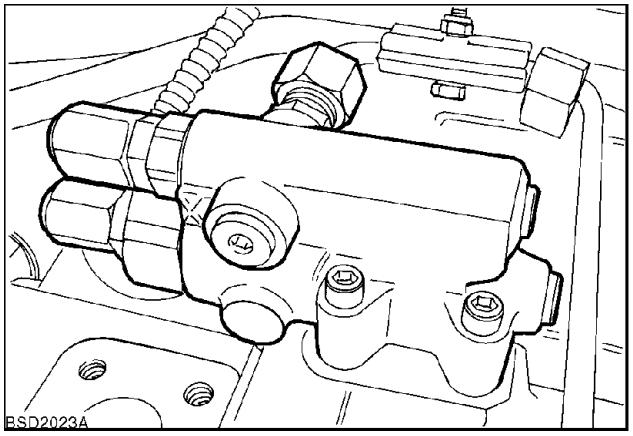
This procedure describes the overhaul of the Load Sensed Variable Displacement pump assembly when removed from the tractor. Refer to **Hydraulic pump Variable displacement pump - Remove (A.10.A)** The following items however can be serviced with the pump installed on the tractor.

1. Blocked Filter Dump Valve
2. Pressure and Flow Compensating Valves
3. Steering Pump Assembly
4. Steering Flow Control Valve (Priority Valve)
5. Remove hydraulic pump assembly from tractor as described in . **Hydraulic pump Variable displacement pump - Remove (A.10.A)**



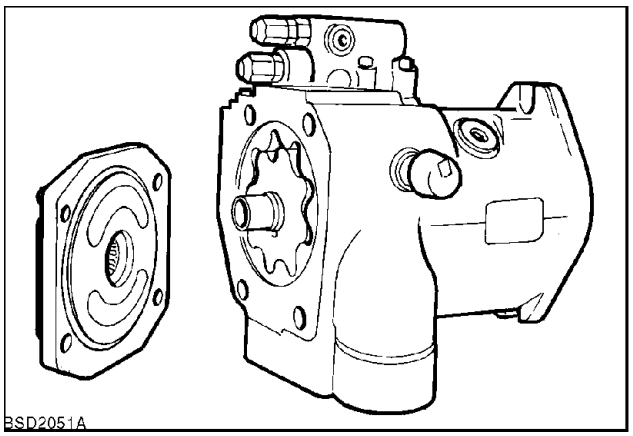
BAIS06CCM061AVA 1

6. Remove pressure and flow compensating valves assembly.



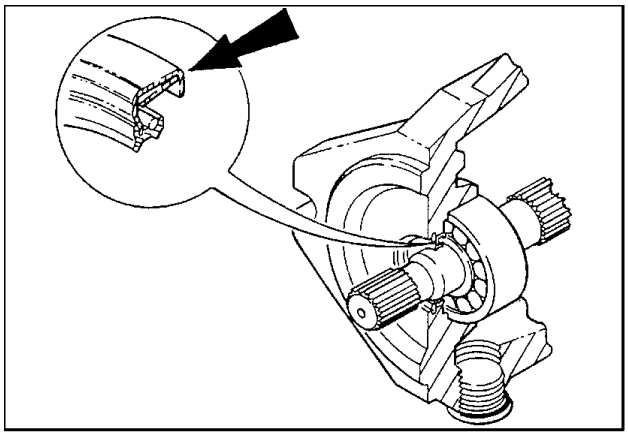
BSD2023A 2

7. Undo the 4 retaining bolts and remove circlip from opposite end of pump.Gently remove charge Pump from main pump assembly.



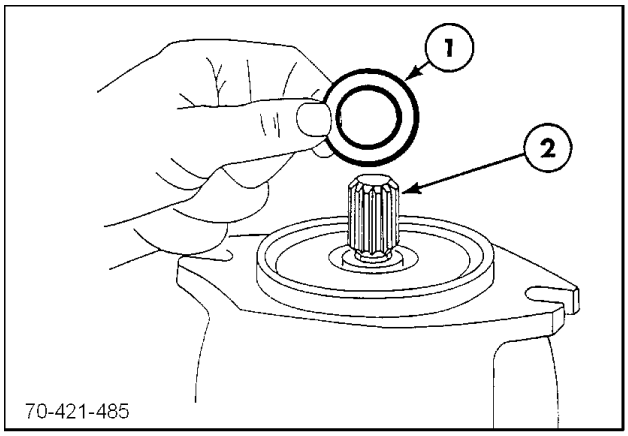
BSD2051A 3

8. When replacing the input shaft seal, make sure the pump housings mounting flange is clean. Use circlip pliers to remove the input shaft seal retaining ring.



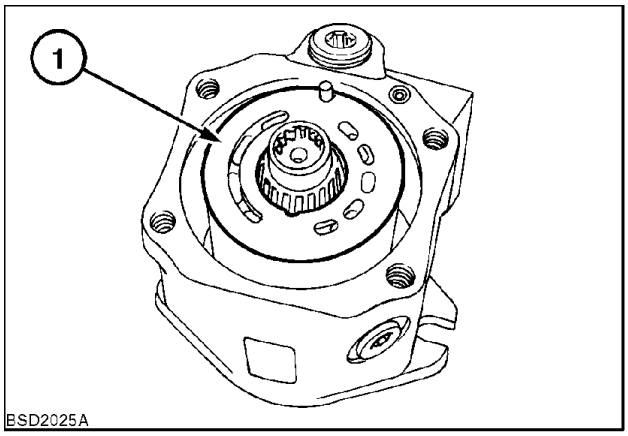
1b0o2004061061 4

9. With the retaining ring removed, use a punch or similar tool, and carefully pierce the top of the lip seal. Using the punch, pry the seal from its bore.



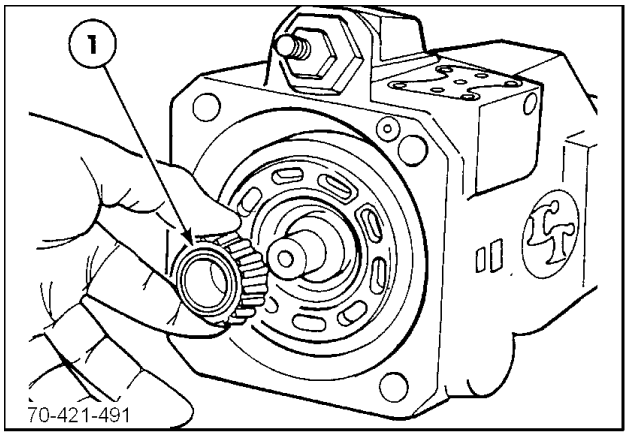
70-421-485 5

10. Examine valve plate **(1)**. Check to see if it is scored, nicked, warped or damaged by cavitation. Look for score marks or damage around the bearing surface area. Check the inlet and discharge port area for signs of contamination. This contamination may show as grooves starting in the feathering notch,



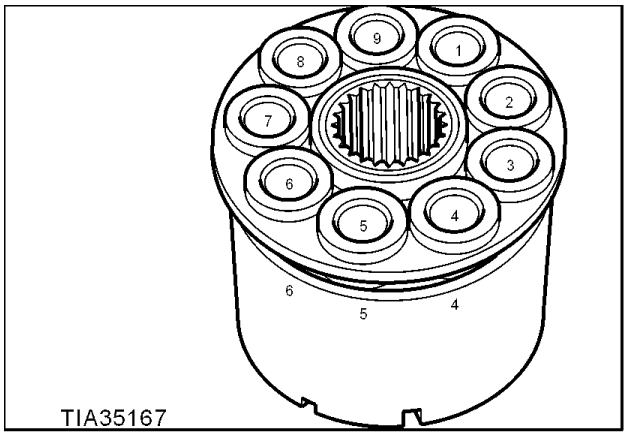
BSD2025A 6

11. Remove bearing cone **(1)** and splined connector.



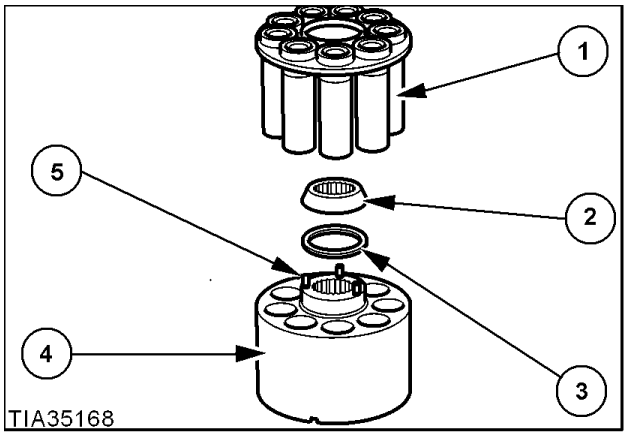
70-421-491 7

12. Remove preload spacer from driveshaft. Remove pumping head and piston from housing. Using a suitable marker identify each piston and slipper to their corresponding barrel in the pumping head.



TIA35167 8

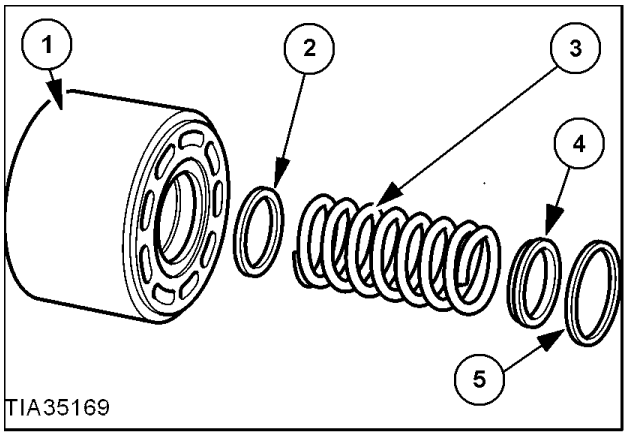
13. Separate pumping head and slipper assembly and inspect for damage. Where damage is identified the pumping element must be replaced.
Pumping Head and Slipper Assembly
1. Pistons and Slippers
2. Cone
3. Washer
4. Pumping Head
5. Pins (3 off)



TIA35168 9

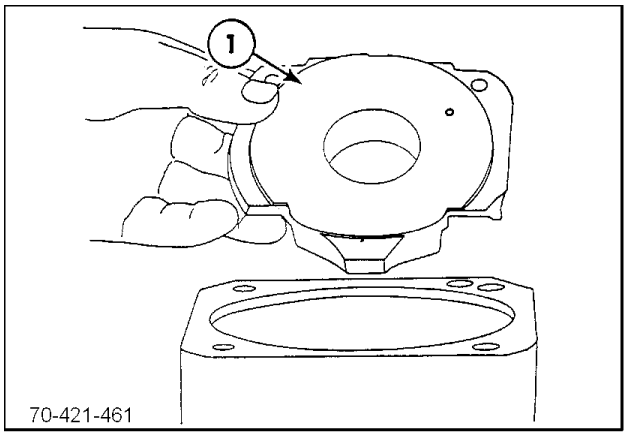
14. If necessary disassemble pumping head spring assembly by compressing the collar against the spring.
Pumping Head Spring Assembly
1. Pumping Head
2. Washer
3. Spring
4. Collar
5. Retaining Ring

IMPORTANT: *Due to high spring pressure take care when removing retaining ring.*



TIA35169 10

15. Remove swash plate (1) assembly.
Inspect components for wear and replace if damaged.



70-421-461 11

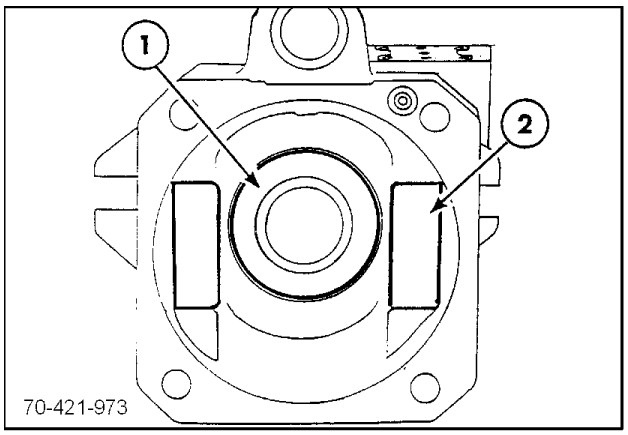
Next operation:
Hydraulic pump Variable displacement pump - Assemble (A.10.A)

Hydraulic pump Variable displacement pump - Assemble

Prior operation:
Hydraulic pump Variable displacement pump - Overhaul (A.10.A)

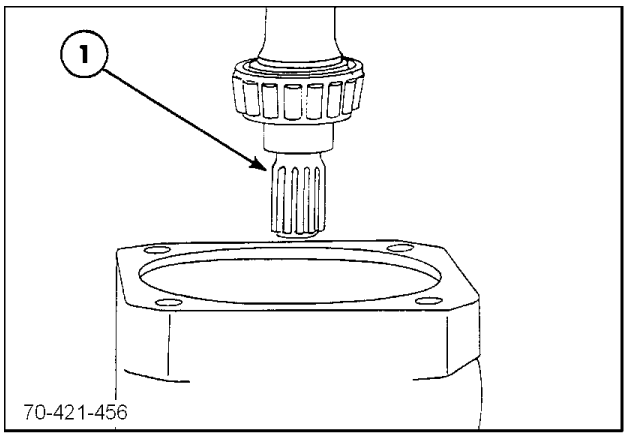
Pump Reassembly

1. Before reassembling the load sensed variable displacement pump, replace all worn and damaged parts and assemblies and all seals and O rings. Lubricate the seals and O rings with petroleum jelly to retain them during reassembly and provide lubrication to the dust and shaft seals. Also lubricate all part surfaces freely with clean hydraulic fluid.
   Install a new input shaft bearing cup, **(1)** , and swash plate bearings **(2)**.



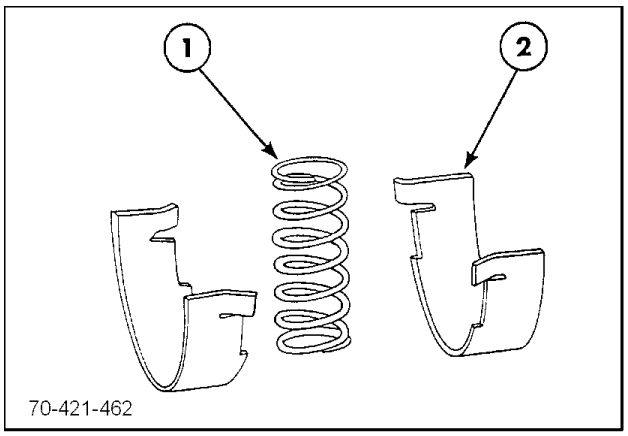
70-421-973 1

2. Install input shaft into housing.



70-421-456 2

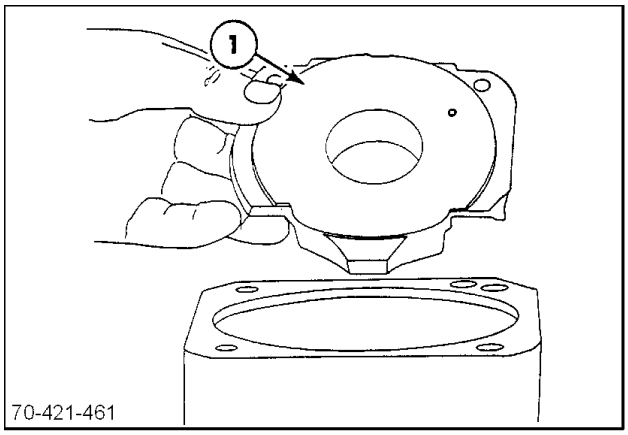
3. Install swash plate control spring and swash plate bearings.



70-421-462 3

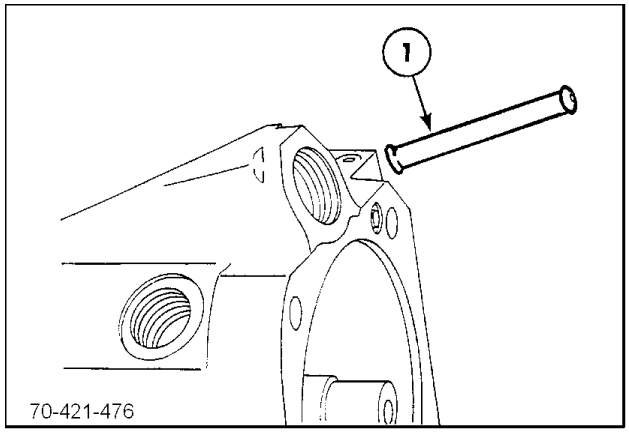
4. Reassemble the swash plate, 1, into the housing by tilting the swash plate with the push rod socket up slightly and installing.

NOTE: *Caution must be used when installing the complete swash plate so as not to dislodge the swash plate spring or the saddle bearings.*



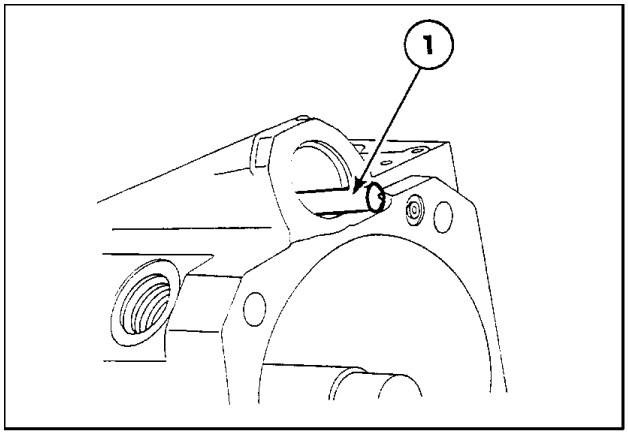
70-421-461_460 4

5. Insert the push rod, 1, through the stroke piston bore and reengage the end of the tube into the swash plate socket.



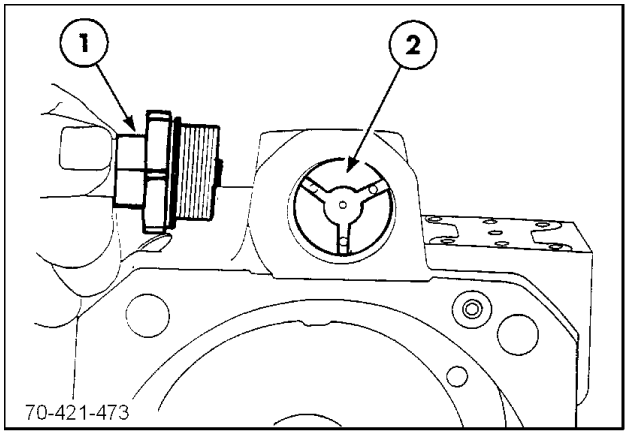
70-421-476 5

6. Tilt the swash plate up and insert the push rod, 1, down and into the socket. Make sure the push rod is engaged in the socket correctly.



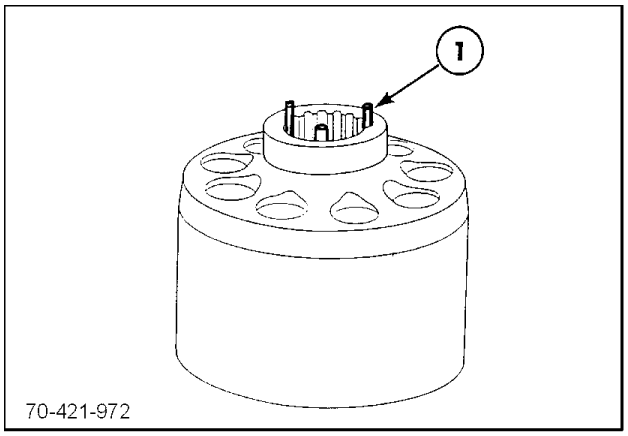
1b0o2004061062 6

7. Install the stroke control piston, 2, in the bore. Screw the plug, 1, back on.



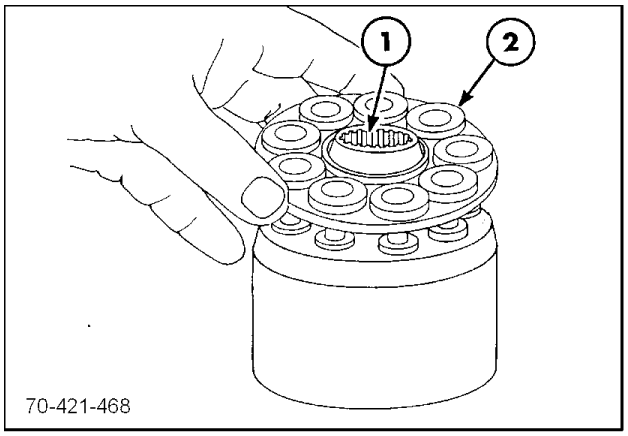
70-421-473 7

8. Pumping Head and Piston Assembly
Install the guide pins, **(1)**, in the block splines.



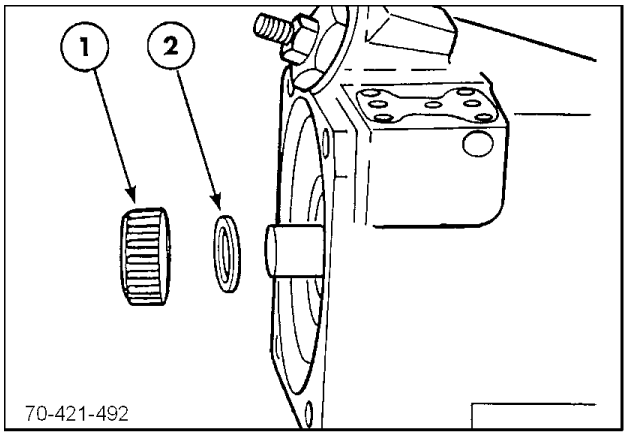
70-421-972 8

9. Lubricate and install the bearing, **(1)**, spider and piston assemblies, **(2)**, on the pivot and into the block assembly.



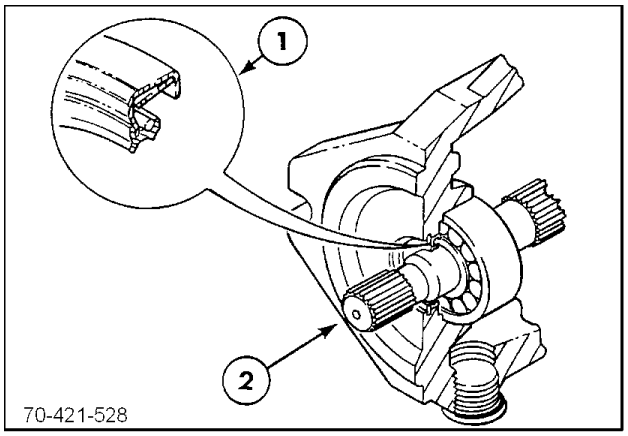
70-421-468 9

10. Check bearing preload before installing the rotating group. Install bearing, 1, and spacer, 2, on the shaft.



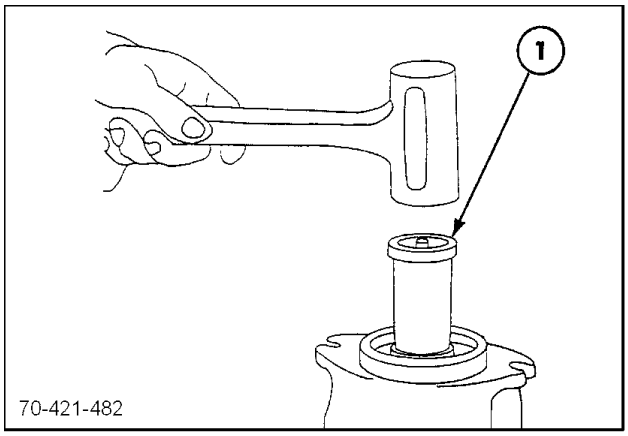
70-421-492 10

11. Protect the inner lip of the new shaft seal, 1, lubricate and install the seal over the input shaft, 2, and into the pump housing.



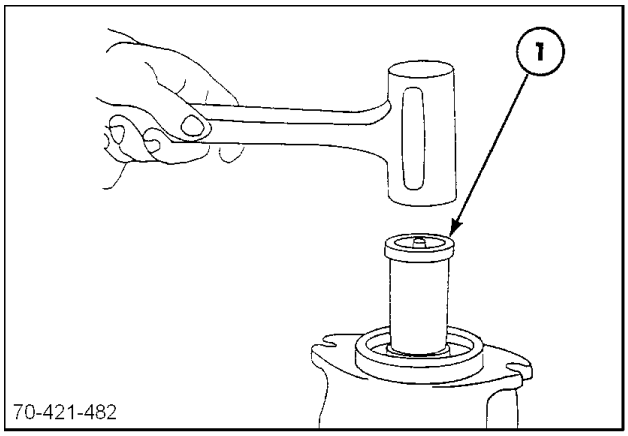
70-421-528 11

12. Tap the shaft seal into the pump housing until it is just slightly below flush of the counterbore face. DO NOT SEAT THE SEAL AT THIS TIME.



70-421-482 12

13. Use a seal driver, 1, such as a **1-1/4 in** ID **1-1/2 in** OD x **2-1/2 in** long pipe as shown here, to press both the retaining ring and shaft seal into the pump housing. NOTE: Press the retaining ring in just far enough that it snaps into the retaining ring groove machined into the pump housing.



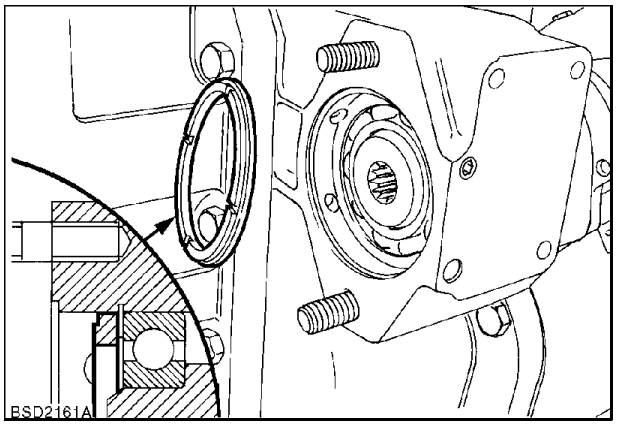
70-421-482_456 13

Next operation:
Hydraulic pump Variable displacement pump - Install (A.10.A)

Hydraulic pump Variable displacement pump - Install

Prior operation:
Hydraulic pump Variable displacement pump - Remove (A.10.A), **Hydraulic pump Variable displacement pump - Overhaul (A.10.A)**.

1. When installing the pump make sure the spacer is mounted correctly in the housing.



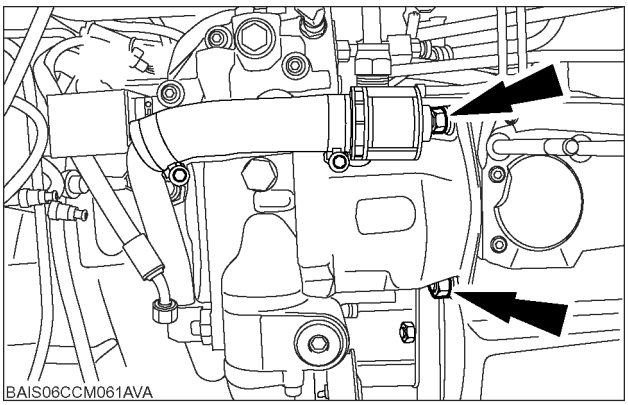
BSD2161A 1

2. Install the variable displacement hydraulic pump. Tighten to **135 Nm 99.5 lb ft**.

⚠ WARNING ⚠

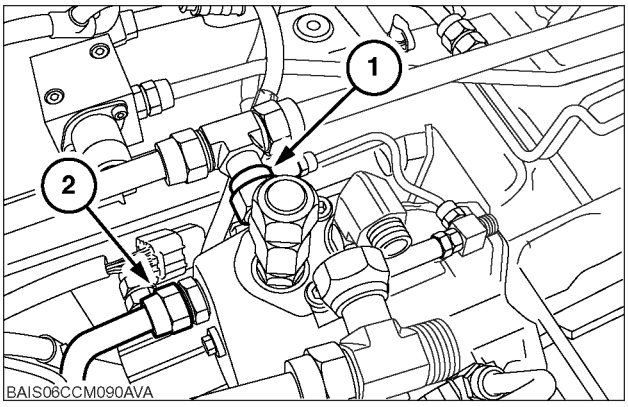
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



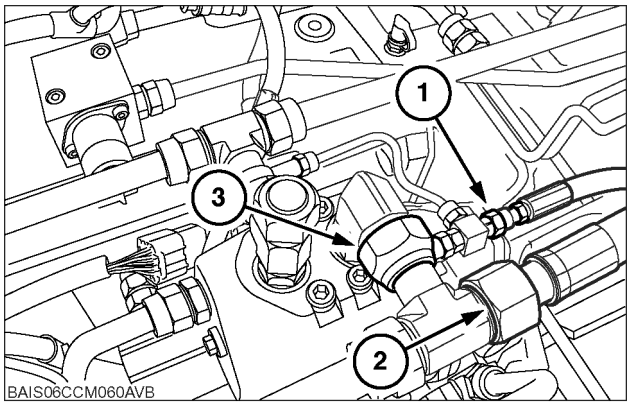
BAIS06CCM061AVA 2

3. Connect the remote valve pipes **(2)** and **(1)**.



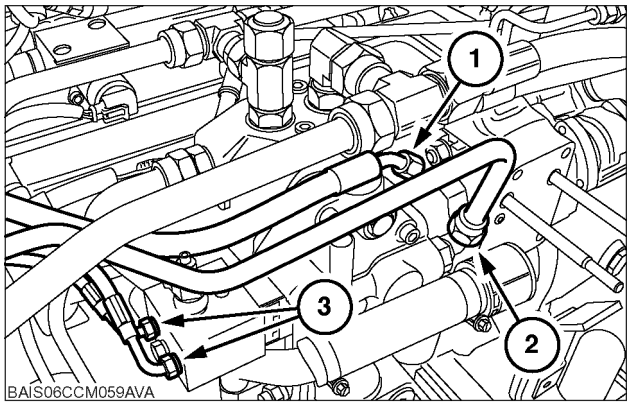
BAIS06CCM090AVA 3

4. Connect the main supply pipe **(3)**, the mid mount valves load sensing line **(1)** and supply hose **(2)** (If equipped).



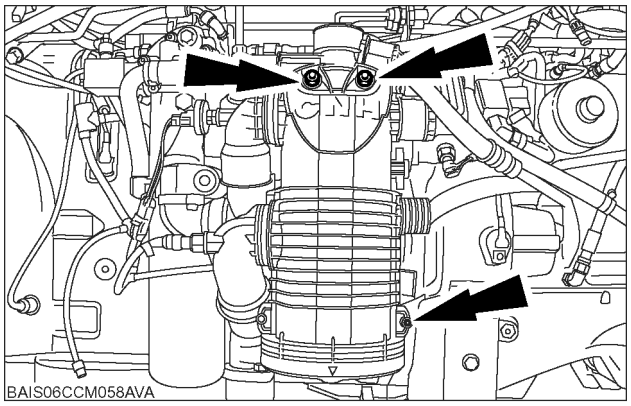
BAIS06CCM060AVB 4

5. Connect the load sensing line **(1)**, the trailer brake valve supply pipe **(2)** and the left and right trailer brake lines **(3)**.



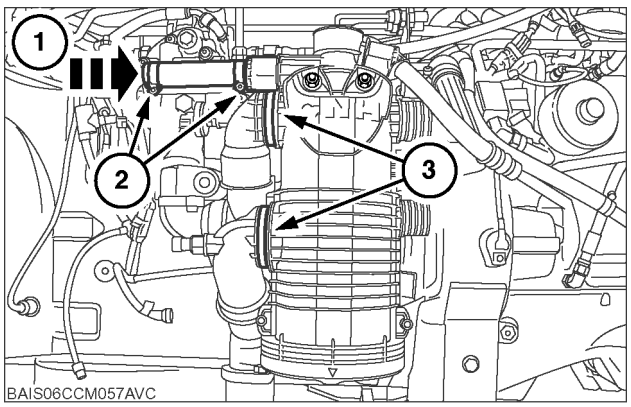
BAIS06CCM059AVA 5

6. Install the transmission/hydraulic return filter housing.



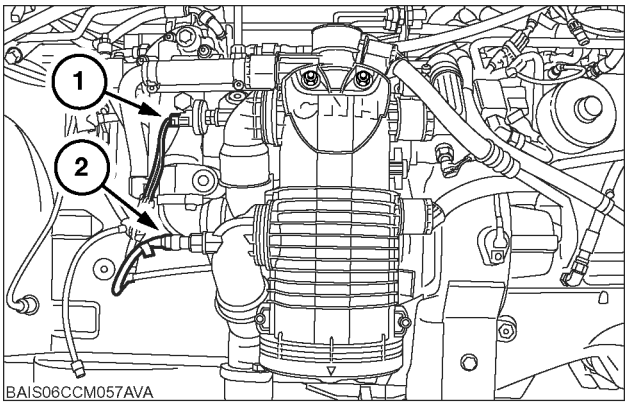
BAIS06CCM058AVA 6

7. Install the return pipe **(1)** and retaining clips **(2)**. Install the return pipe clips **(3)**.



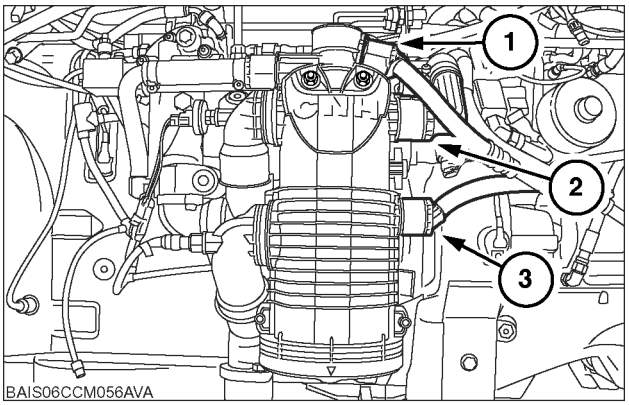
BAIS06CCM057AVC 7

8. Connect the electrical connectors **(1)** and **(2)**.



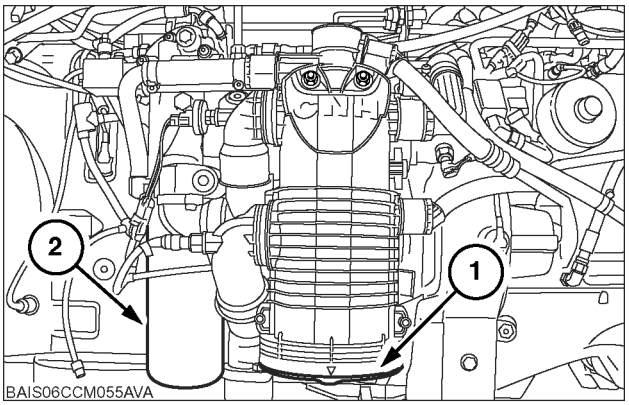
BAIS06CCM057AVA 8

9. Connect the transmission control cover return hose **(1)**, steering pump return hose **(2)** and the mid mount valves return hose **(3)**.



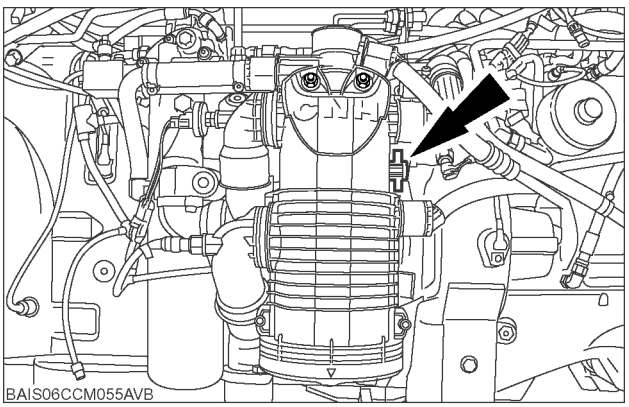
BAIS06CCM056AVA 9

10. Install a new return filter element **(1)** and a new pressure filter cartridge **(2)**.



BAIS06CCM055AVA 10

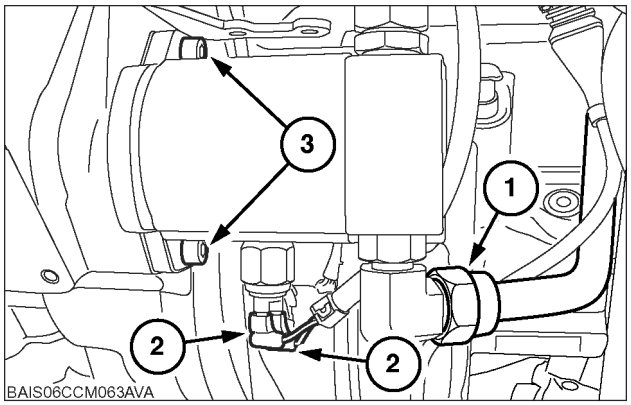
11. Install the hydraulic oil pump vent cap.



BAIS06CCM055AVB 11

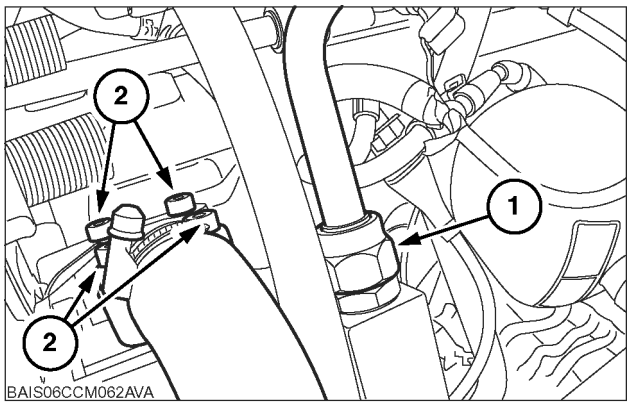
Steering Pump

12. Install the steering pump **(3)**. Connect the steering motor supply pipe **(1)**, and the electrical connectors **(2)**.



BAIS06CCM063AVA 12

13. Connect the steering pump return pipe **(1)** and the steering pump supply pipe housing **(2)**.



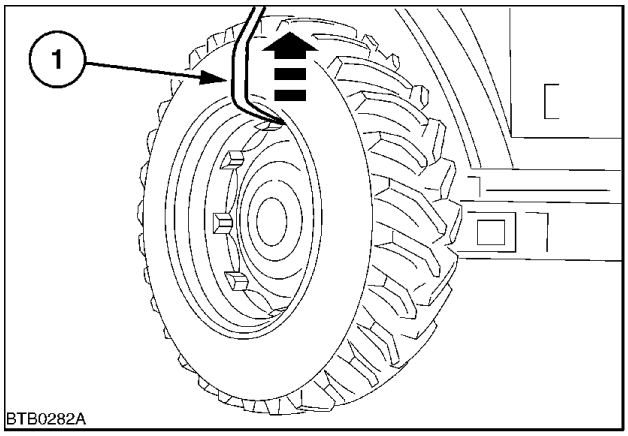
BAIS06CCM062AVA 13

14. Using a suitable sling **(1)**, connect the rear right hand wheel to a hoist and install the rear right-hand wheel. For correct torque refer to **Rear wheel - Torque (D.50.C)**.

⚠ WARNING ⚠

Tractor wheels are very heavy. Handle with care and ensure, when stored, that they cannot fall and cause injury. Never operate the tractor with a loose wheel rim or disc. Always tighten nuts to the specified torque and at the recommended intervals.

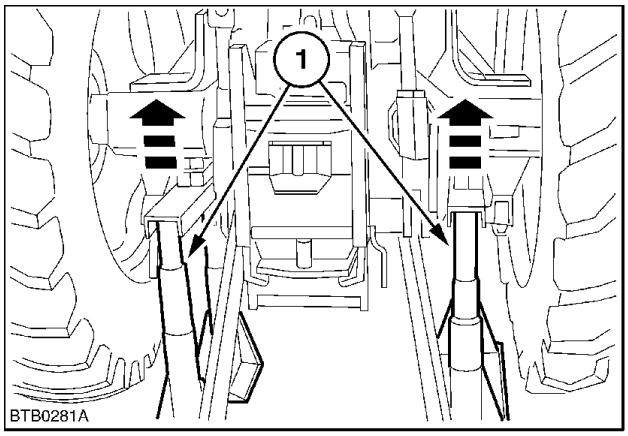
B105



BTB0282A 14

15. Raise the rear of the tractor and remove the axle stands **(1)**.

NOTE: *If required, attach the lift rods to the lower links.*



BTB0281A 15

Charge pump - Overhaul

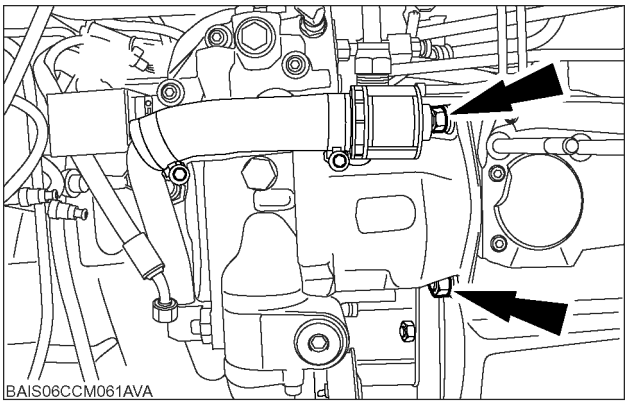
Prior operation:
Hydraulic pump Variable displacement pump - Remove (A.10.A)

1. Remove pump from pump housing.

⚠ WARNING ⚠

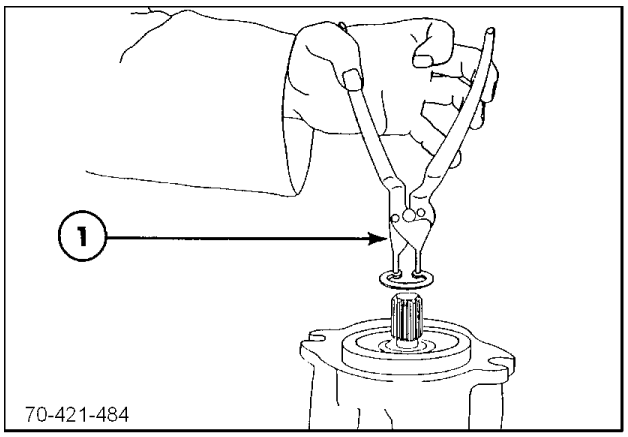
Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012



BAIS06CCM061AVA 1

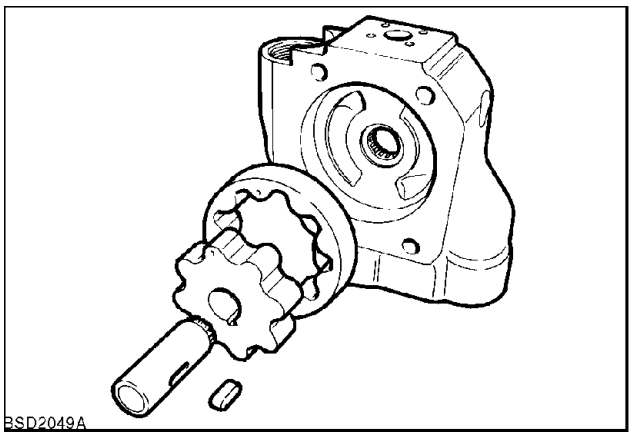
2. Remove 4 bolts securing charge pump housing. Refer to **Charge pump - Exploded view (A.10.A)** Carefully separate charge pump housing from main pump body.Use circlip pliers to remove the input shaft seal retaining ring **(1)**.



70-421-484 2

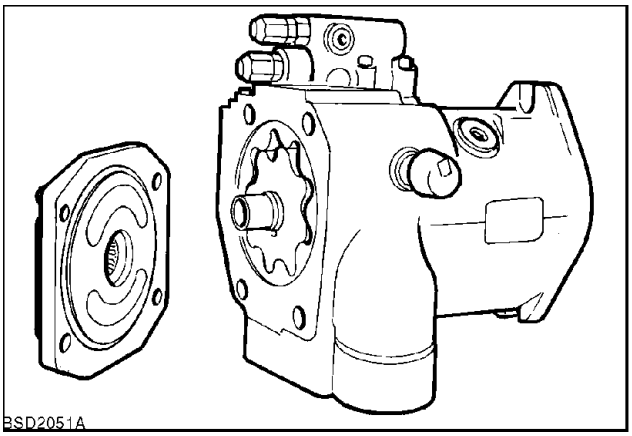
3. Remove pump rotor, housing and rotor shaft. Inspect for wear or damage.

NOTE: *Ensure when reassembling the pump that the punched dot markings on the rotor and rotor housing face to the outside of the pump housing, as illustrated.*



BSD2049A 3

4. Inspect seal in end cover and replace if required. Tighten housing retaining bolts to a torque of **50 - 62 Nm** (**36.9 - 45.7 lbft**).



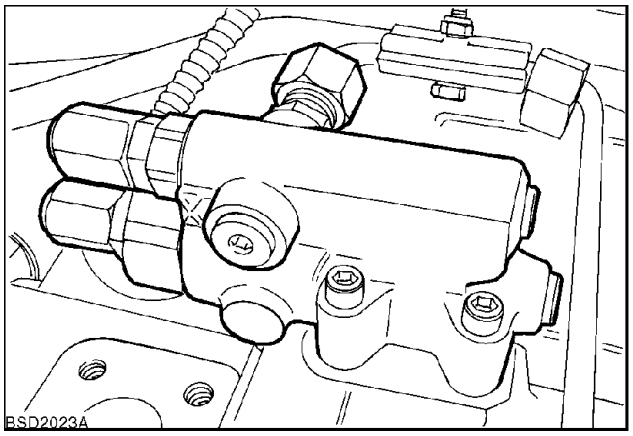
BSD2051A 4

Next operation:
Hydraulic pump Variable displacement pump - Overhaul (A.10.A)

Compensator - Overhaul

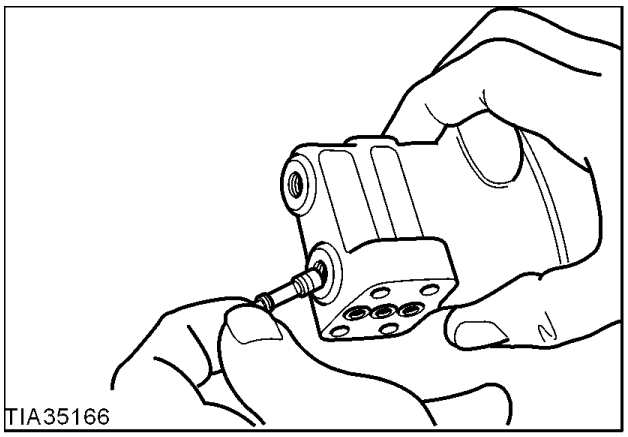
1. Disconnect load sense line connection and remove pressure and flow compensating valve assembly. Remove the tamper proof caps, carefully unscrew each adjuster and remove the component parts. Refer to **Compensator - Exploded view (A.10.A)** To ensure correct reassembly keep the component parts for each valve separate.

IMPORTANT: *Due to extreme spring pressure within valves DO NOT remove rear plugs until the adjusters have been removed.*



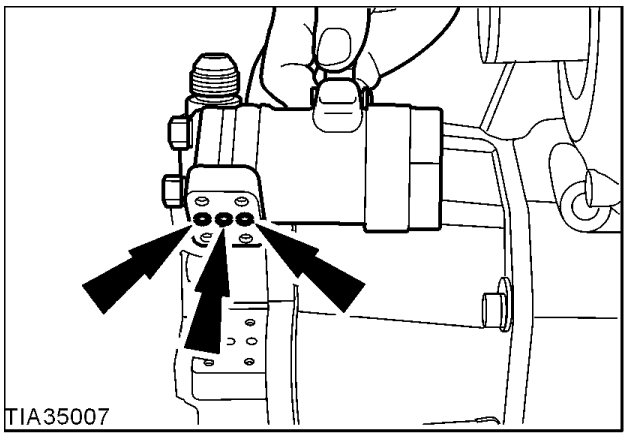
BSD2023A 1

2. Reassembly of the valves follows the removal procedure in reverse. On reassembly observe the following :-
   Wash all components in a suitable solvent.
   Examine all components for wear or damage. If the spools are damaged it is necessary to replace the complete valve assembly.
   Lubricate all parts with clean hydraulic oil.
   To aid reassembly of pressure and flow compensating valves, the spools should be inserted into the rear of the housing.
   Tighten all plugs and locknuts to the correct torque as detailed in Specifications.



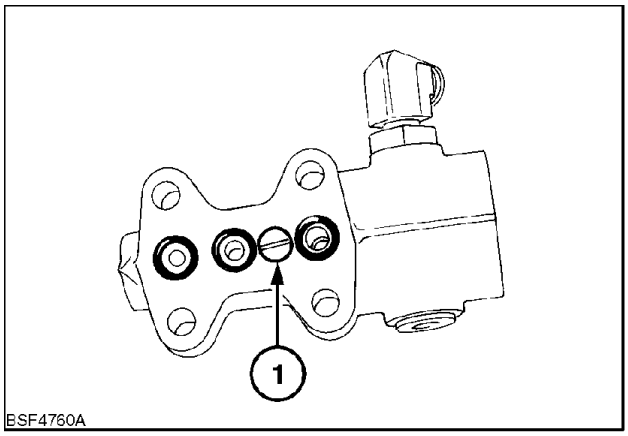
TIA35166 2

3. When installing valve on pump ensure all 'O' ring seals are correctly installed.
   Pressure test the pump and adjust the pressure and flow compensating valves to the correct specification as detailed **Hydraulic pump - Pressure test (A.10.A)**.



TIA35007 3

NOTE: *If the damper screw* ***(1)*** *is removed for any reason it should be reinstalled in alignment with the three ports and should be fixed into position using a suitable threadlock and seal.product. Failure to adjust this screw correctly could reduce the efficiency of the system.*



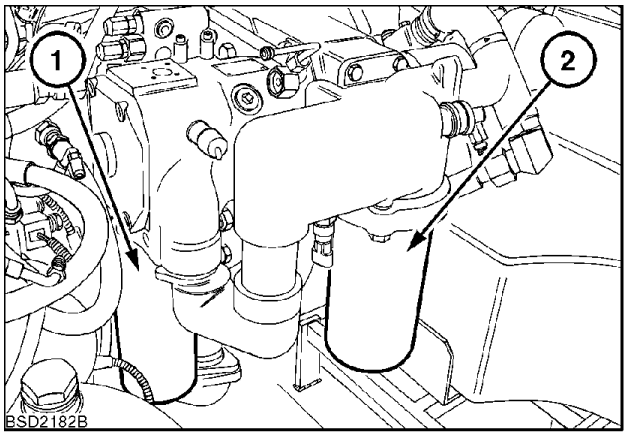
BSF4760A 4

Filter - Replace

NOTE: *There are two types of filter assembly fitted to these models as shown in figures **1** and **2**.*

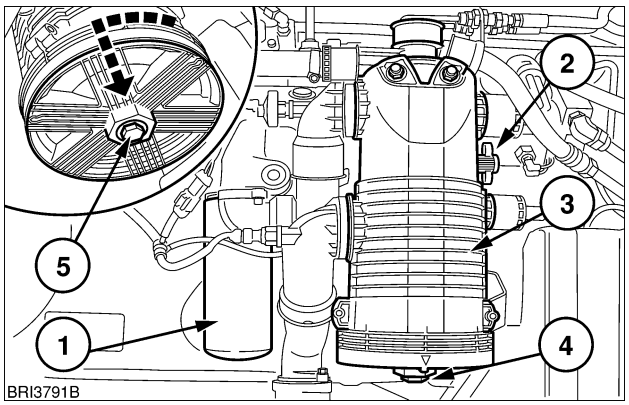
1. There are two filters , the main filter **(2)** which has a replaceable cartridge, and the charge filter **(1)**, which has a disposable type.

ATTENTION: *Before changing the disposable charge filter clean the area around the mounting plate and filter .*



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2. Unscrew the charge filter **(1)** and discard in an appropriate container.
3. Clean the inlet channel and the face of the filter mounting. Smear clean oil around the rubber seal of the new filter and install into the filter housing. Screw up until the faces just meet, then tighten a further 3/4 of a turn. Do not overtighten.
4. To remove the main filter undo the three retaining nuts and remove filter cover.
5. Remove old filter cartridge and install a replacement, ensuring the cover is clean prior to fitting.
6. Lightly oil the sealing ring before reassembling to the pump housing. Do not overtighten the retaining nuts.
7. Before changing the main filter cartridge in housing **(3)** Figure **2** , release the air bleed valve **(2)** by unscrewing fully. This will allow air into the filter so that most of the oil can drain back to the reservoir. Wait a few moments and then remove the 19 mm plug **(5)** from the filter casing and allow the oil to drain out into a suitable container.



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8. Using as **41 mm** socket or ring spanner, remove the filter support plate by turning approximately **45 °** to the left. Remove filter and plate.
9. Ensure support plate is clean before installing the new cartridge. Lightly oil the sealing ring and refit the assembly to the filter housing, making sure that plate locks into place and the lug **(4)** aligns correctly with the arrow on the filter casing.

PRIMARY HYDRAULIC POWER SYSTEM - Troubleshooting

Problem	Possible Cause	Correction
Initial Fault Finding Checks To be Performed Before Proceeding to General Diagnostic Procedure	Error code identified by microprocessor Component malfunction	Refer to Error code fault finding **ELECTRONIC SYSTEM - Static description (A.50.A)**
	Rear Axle oil level incorrect Oil level not checked and adjusted at appropriate service interval	Add oil to rear axle
	Oil contaminated with dirt, water, or antifreeze Filters not replaced at correct service interval	Replace all filters on pump. Refer to **Filter - Replace (A.10.A)**
	Warning light displayed on instrument cluster Component not functioning correctly	Identify function not operating correctly and refer to the appropriate fault finding chart
Transmission Low Pressure Warning Light 'ON'.	High pressure system components do not operate, i.e., hydraulic lift, remote valves and trailer brakes High pressure pump malfunction	Perform tests for high pressure pump. Refer to **Hydraulic pump - Pressure test (A.10.A)**.
	Low pressure systems components do not operate, i.e., transmission, PTO, FWD and Diff Locks Low pressure regulating valve sticking, broken components or relief valve may be stuck open	Pressure test the low pressure circuit. If the pressure is not **23±1 bar** (**333.5±15 psi**) , inspect the low pressure regulating valve or relief valve. If this does not clear the fault check for a large leak in one of the low pressure system component circuits.
	Low pressure systems components do not operate, i.e., transmission, PTO, FWD and Diff Locks If the pressure is **23±1 bar** (**333.5±15 psi**) there may be an electrical fault	Check for an electrical fault which may affect the operation of all low pressure components, i.e., disconnected harness to low pressure block
	Low pressure systems components do operate, Oil pressure switch not functioning correctly or faulty wiring	If the warning lamp does not remain on inspect the switch. It should be open , replace if faulty. If the lamp remains on repair wiring fault between **C036** and **C081** Pin 12 of the instrument cluster
Charge Pressure Light Flashing	Rear axle oil level incorrect Oil level not checked and adjusted at appropriate service interval	Add oil to rear axle
	If charge pressure is correct **1.6 - 3.4 bar** (**23.20 - 49.30 psi**) disconnect wiring to low charge pressure switch. If the light is not extinguished Short circuit to chassis in R/N/B colour wire from instrument console connector and charge pressure switch **C173**	Locate and repair short circuit
	As above, but light is extinguished Blocked/contaminated filters	Replace charge pump and inlet filters Refer to **Filter - Replace (A.10.A)**
	If filters have been replaced and pressure is correct Faulty low charge pressure switch	Replace low charge pressure switch
	Filters changed but still pressure is incorrect Charge pressure filter dump valve and charge pressure valves sticking open	Replace valves
	Filters changed but still pressure is incorrect Worn charge pump	Replace pump. Refer to **Charge pump - Overhaul (A.10.A)**

Problem	Possible Cause	Correction
Intake Filter Restriction Warning Light On	Rear axle oil level incorrect Oil level not checked and adjusted at appropriate service interval	Add oil to rear axle
	Inlet and charge pressure filters not functioning Filters contaminated	Replace filters. Refer to **Filter - Replace (A.10.A)**
	If wiring to filter restriction switch is disconnected and light is not extinguished Short circuit to chassis in B/N colour wire from instrument console connector Pin 16 and intake filter restriction switch **C175**	Locate and repair short circuit
	If wiring to filter restriction switch is disconnected and light is extinguished Intake filter restriction switch faulty	Replace intake filter restriction switch
Power Steering Not Working or Working Incorrectly	Steering pressure warning light is illuminated Incorrect pressure in the steering system	Pressure test the steering system as described in **STEERING Hydraulic - Pressure test (D.20.C)** .
	Steering pressure warning light is illuminated Steering pump faulty	Remove steering pump and examine the drive to the pump, if O.K. repair or replace the steering pump assembly (refer to **Hydraulic pump - Remove (A.12.A)**)
	Pressure is correct up to the steering cylinders Mechanical fault in the steering components	If pump output is good but pressure to the cylinders is low or zero, suspect a faulty steering motor. See **Control valve - Remove (D.20.C)** and **Control valve - Overhaul (D.20.C)**for steering motor removal and overhaul.
Trailer Brakes Not Working	Trailer brakes not working correctly Air in system	Bleed the trailer brakes
	Trailer brakes not working correctly Pressure incorrect in system	Pressure test the Trailer brakes
	Pressure test confirms fault Hydraulic lift not working satisfactorily	Test maximum system pressure at remote valve coupler. Pressure **2900 - 3000 lbf/in2** (**200 - 207 bar**)
	Pressure test confirms fault If pressure not correct	Adjust flow/pressure compensating valve. If this does not clear the fault examine flow/ compensating valve for sticking component Check the variable flow pump swash plate to ensure it is not sticking Refer to **Hydraulic pump Variable displacement pump - Overhaul (A.10.A)**
	If pressure test confirms correct pressure Trailer brake valve faulty	Operate and hold remote valve to generate maximum system pressure and at the same time operate the trailer brakes. If the trailer brake valve does not function correctly overhaul trailer brake valve
Hydraulic Lift Not Working Correctly	In cab fast raise /work switch not in correct position	Move switch to work position
	Is hitch enabled symbol illuminated	Capture hitch Check position of controls on control panel
	Charge pressure light flashing Charge pump system problem	refer to charge pressure light flashing fault finding chart **Charge pump - Incorrect work (A.10.A)**
	Electronic draft control error code identified	Refer to Electronic draft control fault codes in **ELECTRONIC SYSTEM - Static description (A.50.A)**
	Trailer brakes (if fitted) not working correctly. (Install a pressure gauge in the trailer brake coupler) Fault in the variable displacement pump	Pressure test the pump to determine the fault Refer to **Hydraulic pump - Pressure test (A.10.A)**

Problem	Possible Cause	Correction
	Remote valves not operating correctly. (Install a pressure gauge in the remote valve coupler) Contaminated components in low pressure regulating valve assembly	Inspect the low pressure regulating valve assembly for sticking spool. dirt contamination or broken components. Rectify as required Refer to **Priority valve - Disassemble (A.14.A)**
	Hydraulic lift working erratically Circuit leak	Perform pump leak test to determine if fault relates to either internal leak or hydraulic circuit leak
	Lift arms locked in either fully raised or lowered position Sticking plunger in EDC valve raise or lower solenoid	Check EDC valve raise or lower solenoid for sticking plungers and rectify accordingly. Refer to **Control valve - Disassemble (H.10.D)**
	Perform standby pressure test . If pressure is not **300 - 350 lbf/in2** (**21 - 24 bar**) Flow compensating valve requires examination or adjustment	Adjust/examine flow compensating valve . Refer to **Compensator - Overhaul (A.10.A)**
	Perform standby pressure test . If pressure is not **300 - 350 lbf/in2** (**21 - 24 bar**) Variable displacement pump swash plate sticking	Disassemble variable displacement and check swash plate piston for sticking. Refer to **Hydraulic pump Variable displacement pump - Overhaul (A.10.A)**
	Standby pressure is correct and whilst operating remotes at high pressure standby hydraulic lift operates correctly Fault in load sensing line from EDC valve	Investigate and rectify fault in load sensing line
	If the hydraulic lift does not operate correctly Sticking spools in EDC valve or leaking lift cylinder safety valve	Examine EDC valve for sticking spool and rectify or if lift cylinder safety valve is leaking replace.
	If the hydraulic lift does not operate correctly Lift arms leak down under pressure if heavy weight is placed on them	Overhaul lift cylinder
Remote Control Valves Not Working - Mechanically Operated Type	If hydraulic lift is not working Various causes	Refer to fault finding chart for hydraulic lift not working **HITCH Electronic draft control - Not function (H.10.D)**
	If hydraulic lift is working Remote control valve fault	Test maximum system pressure at each remote valve coupler. If they reach correct pressure (**2900 - 3000 lbf/in2** - **200 - 207 bar**) examine flow/pressure compensating valve for sticking
	One of the remote valves does not reach the correct pressure	Operate all remote valve levers simultaneously. If the defective remote valve does not reach correct pressure, overhaul as required
	Defective remote valve does reach the required pressure Faulty Load sensing valve	Examine load sensing valve between remote valve sections
Remote Control Valves Not Working - Electro-Hydraulic (EHR) Type	When the key start is switched on the EHR control lever solenoids cannot be heard to activate Faulty fuses (39 or 41)	Replace fuses if faulty. (Refer to **Fuse and relay box - General specification (A.30.A)**
	The EHR control lever solenoids can be heard to activate Hydraulic stop button not in the operating position	Activate switch to the operating position
	Hydraulic stop button is in operating position Hydraulic lift not working	Refer to 'Hydraulic lift not working' **HITCH Electronic draft control - Not function (H.10.D)**

Problem	Possible Cause	Correction
	Hydraulic stop button is in operating position EHR enable relay faulty	Replace the relay
	Hydraulic stop button is in operating position EHR fault codes may be stored in the controller memory	Refer to the fault code chapter in the electrical section **ELECTRONIC SYSTEM - Static description (A.50.A)**
	Hydraulic stop button is in operating position Components in low pressure system may not be operating correctly	Low pressure supply to remotes not available. Fault find the low-pressure system as described in 'Transmission warning light ON ' **SECONDARY HYDRAULIC POWER SYSTEM - Constant on (A.12.A)**
	Hydraulic lift and remote valve are operated simultaneously and pressure is registered from the remote coupler Fault in the load sense circuit or the compensating valve in the variable displacement pump	Identify and remedy fault
	Hydraulic lift and remote valve are operated simultaneously and pressure is NOT registered from the remote coupler Fault in the electrical system	Perform the EHR valve renumbering procedure **Control module - Configure (A.50.A)**. If the valves are still inoperative check the CANBUS wiring between the remotes and the central controller. If the fault still persists re-load the software into the central controller and if still inoperative replace the processor

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DISTRIBUTION SYSTEMS - A

PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - 10.B

PUMA 165
PUMA 180
PUMA 195
PUMA 210

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PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Dynamic description

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OIL FLOW IN NEUTRAL

When the remote valves are in neutral the control valve spool is held in the central position by the centering spring.
Oil flow from the parallel gallery **(A)** to the raise and lower ports is blocked by the lands of the main control spool.
Gallery **(C)** and load sensing gallery **(D)** are vented to reservoir through galley **(G)**.
The galleries to the raise and lower ports are blocked by the lands on the main control spool.
The pin on the lock valve is positioned in the waisted section of the spool allowing the valve to be spring loaded into the closed position preventing an extended cylinder retracting under load should there be a slight leakage in the main spool.
See Figure **1**

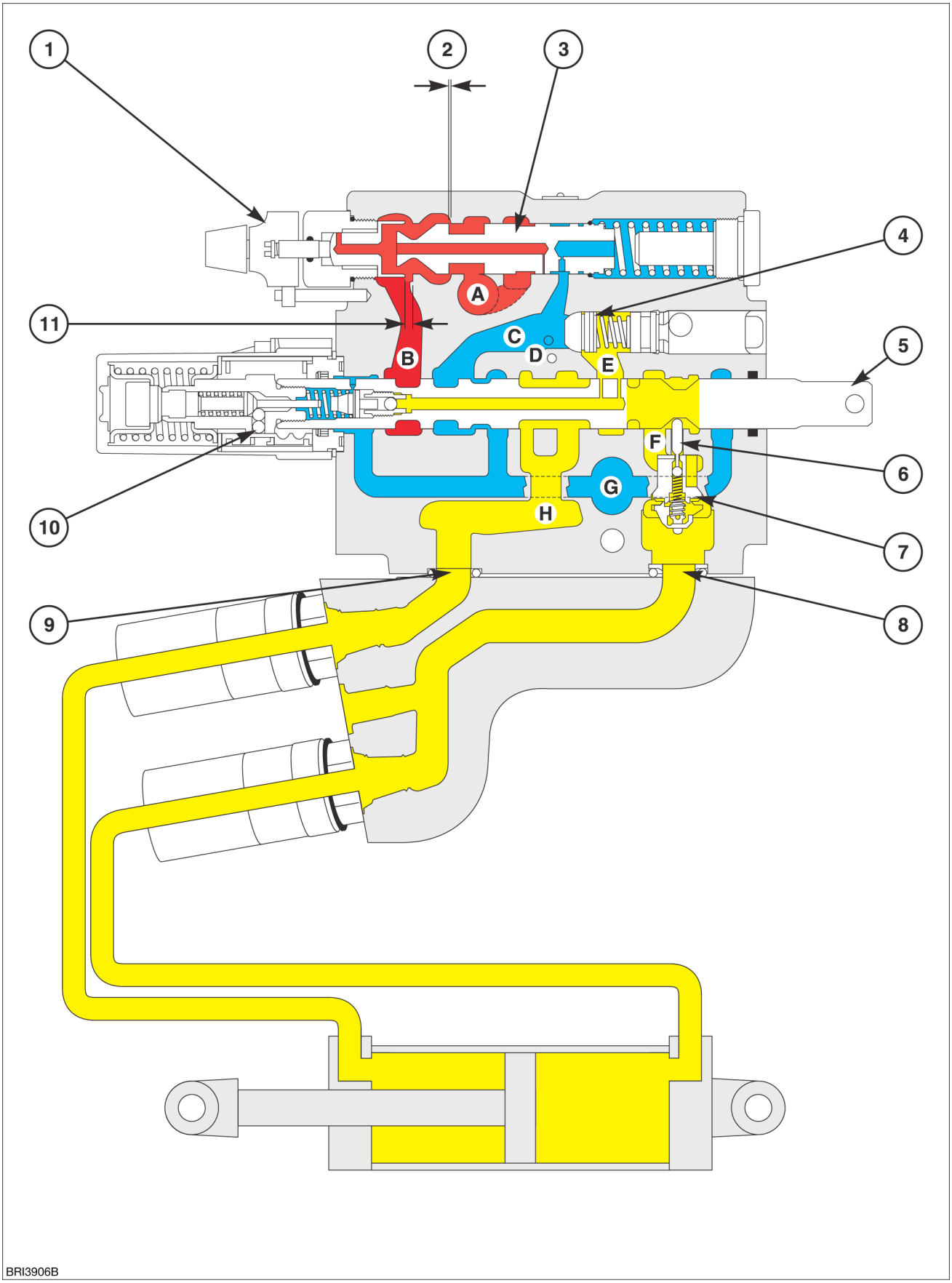
Single Remote Control Valve Operation-Neutral

1. Flow Control Adjuster
2. Metering Land
3. Flow Control Spool
4. Load Hold Check Valve
5. Main Control Spool
6. Pin
7. Lock Valve
8. Raise (Cylinder Extend) Port
9. Lower (Cylinder Retract) Port
10. Spool Centering and Detent Mechanism
11. Manually Adjusted Flow Control Restriction

Pump Pressure

Trapped Oil

Return to Reservoir



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OIL FLOW IN RAISING (CYLINDER EXTEND)

When the remote valve lever is moved to the raise position the control spool moves to the left and the spring loaded detent balls engage with the left hand groove in the detent mechanism **(10)**. See Figure **2**
Moving the spool to the raise position causes the pin **(6)** on the lock valve to ride up the ramp of the spool and hold the valve in the open position.
Gallery **(B)** is now open to gallery **(C)** and gallery **(E)** is open to gallery **(F)**.
The flow from gallery **(C)** is blocked by the load hold check valve **(4)** until pressure in the gallery is sufficient to lift the ball of its seat against the back pressure in the lift port gallery **(E)**.
Oil can flow from:-
Gallery **(C)** past the load hold check valve into Gallery **(E)**.
Across the flat on the main control spool to Gallery **(F)**.
Through the lock valve **(7)**.
Out through the raise port **(8)** of the remote valve.
Exhaust oil from the extending cylinder returns through the lowering port and gallery **(H)**, around the land on the main control spool and back to reservoir via the common gallery **(G)**.
If the load hold check valve **(4)** was not installed the situation could occur where pump pressure is insufficient to support the load in the raise port when the remote valve is moved from neutral to raise condition. Under this situation the load would momentarily drop until pump pressure was sufficient to support the load.
The rate of flow through the remote control valve is adjusted by the manual flow control knob **(1)**, which manually changes the size of restriction **(11)**.
To maintain set flow through the remotes under all conditions with varying pump inlet pressure in parallel gallery **(A)** the flow control spool senses the differential pressure across the manually adjusted flow control restriction **(11)** between galleries **(A)** and **(B)**.
The differential pressure sensed on each end of the spool causes the spool to move to a new state of equilibrium and continually regulates the flow across the spool metering lands **(2)** to maintain a constant flow through the manual flow control restriction **(11)** irrespective of pressure in other hydraulic circuits.
The pressure in gallery **(C)** is also transmitted down the load sensing gallery **(D)** to the flow compensating valve of the variable flow piston pump where pump output is regulated according to circuit demand.
Figure **2**

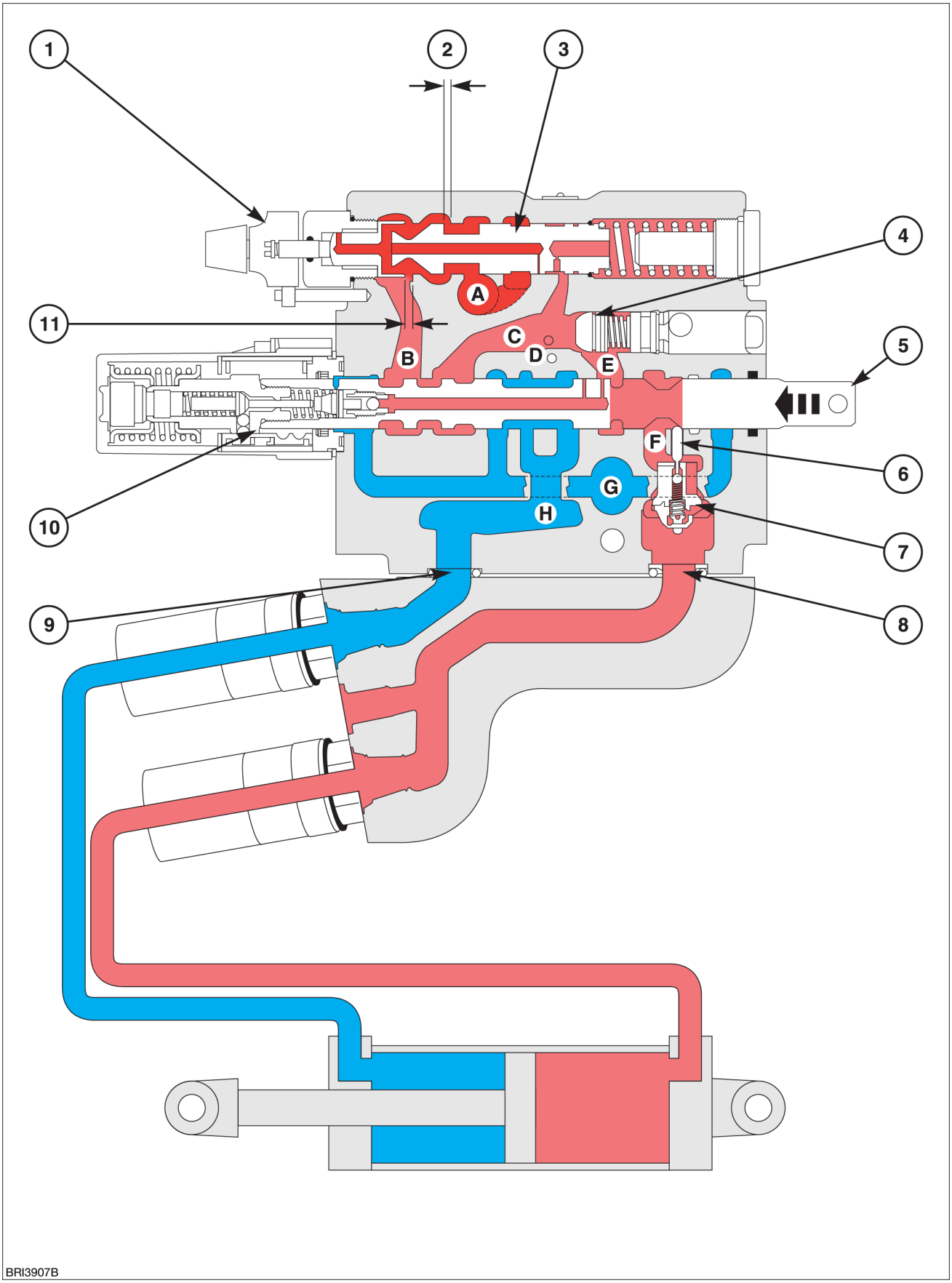
Single Remote Control Valve Operation-Raising (Cylinder Extend)

1. Flow Control Adjuster
2. Metering Land
3. Flow Control Spool
4. Load Hold Check Valve
5. Main Control Spool
6. Pin
7. Lock Valve
8. Raise (Cylinder Extend) Port
9. Lower (Cylinder Retract) Port
10. Spool Centering and Detent Mechanism
11. Manually Adjusted Flow Control Restriction

Pump Pressure

Remote Valve Operating Pressure

Return to Reservoir



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OIL FLOW IN LOWERING (CYLINDER RETRACT)

When the remote valve lever is moved to the lower position the control spool moves to the right and the spring loaded detent balls engage with the middle groove in the detent mechanism. See Figure **3**
In a similar manner as for the raise cycle of the remote valve the position of the spool causes the pin on the lock valve to hold the valve in the open position.
Gallery **(B)** is now open to gallery **(C)** and gallery **(E)** is open to gallery **(H)**.
Oil from the parallel gallery **(A)** flows past the flow control valve spool and restrictor **(2)** into gallery **(C)** and the load sensing gallery **(D)**.
The load hold check valve **(4)** remains closed until pump system pressure is sufficient to overcome the back pressure in gallery **(E)**. When the load hold check valve lifts off the seat, oil flows into gallery **(H)**, round the control valve spool to gallery **(G)** and out through the lowering port of the remote valve coupling.
Exhaust oil from the Retracting cylinder returns to reservoir gallery **(G)** though the raising port and lock valve **(7)**.
Pump output and system pressure will continually react to the maximum demand of the tractor high pressure hydraulic circuits as sensed through the load sensing lines.
Flow through the remotes is controlled in exactly the same manner as described in the ‘Oil Flow In Raising’ section by sensing differential pressure across manually flow control restriction **(11)**.
Figure **3**

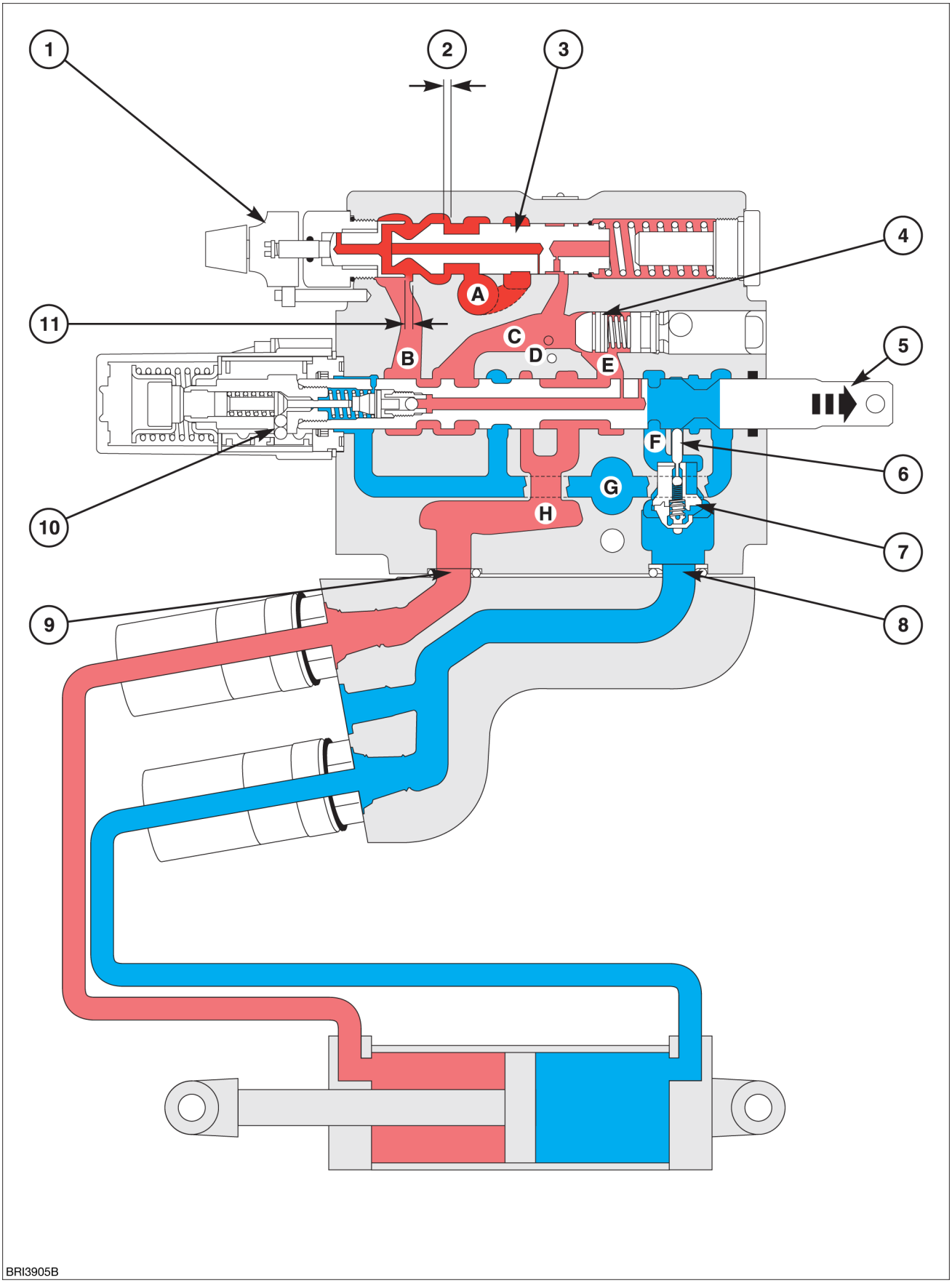
Single Remote Control Valve Operation-Lowering (Cylinder Retract)

1. Flow Control Adjuster
2. Metering Land
3. Flow Control Spool
4. Load Hold Check Valve
5. Main Control Spool
6. Pin
7. Lock Valve
8. Raise (Cylinder Extend) Port
9. Lower (Cylinder Retract) Port
10. Spool Centering and Detent Mechanism
11. Manually Adjusted Flow Control Restriction

Pump Pressure

Remote Valve Operating Pressure

Return to Reservoir



BAIL06CCM013GSA 3

OIL FLOW IN FLOAT

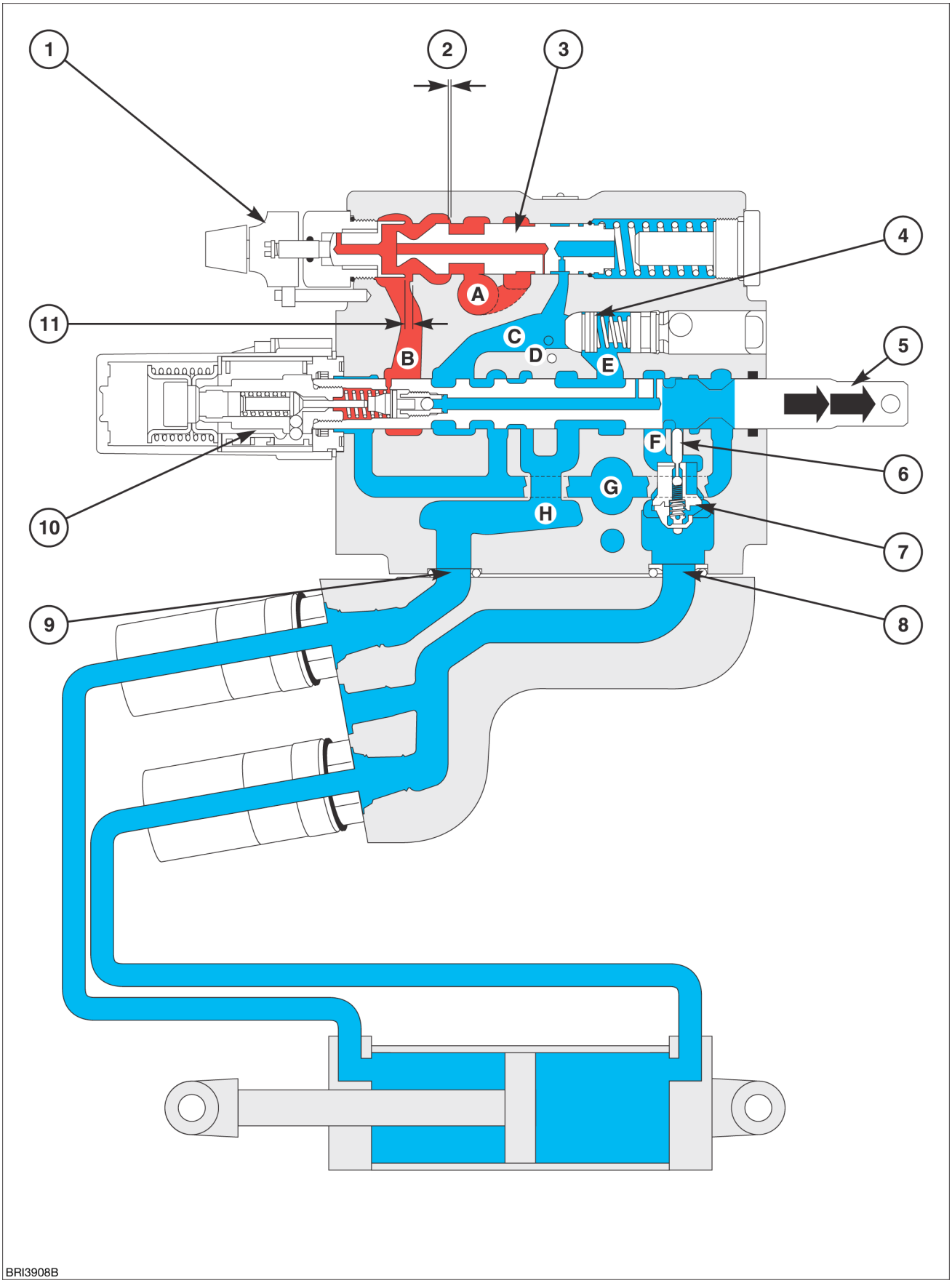
The float position allows the free flow of oil from both the raise and lower ports of the remote valve permitting the cylinder to extend or retract freely. This feature is particularly useful to allow equipment such as scraper blades to 'float' or follow the ground contour. See Figure **4**
When the remote valve lever is pushed fully forward to the float position the spool is moved fully to the right and the spring loaded detent balls **(10)** engage with the right hand groove in the detent mechanism.
Oil flow from the gallery **(B)** to the raise and lower ports is blocked by the lands of the spool.
The position of the spool causes the pin **(7)** on the lock valve to hold the valve in the open position.
The raise and lower ports of the remote valve are open to reservoir gallery **(G)** allowing a free flow of oil from one port of the cylinder to the other.
Should a void occur in the circuit oil will be drawn by suction from one side of the cylinder to the other.
Figure **4**

Single Remote Control Valve Operation-Float

1. Flow Control Adjuster
2. Metering Land
3. Flow Control Spool
4. Load Hold Check Valve
5. Main Control Spool
6. Pin
7. Lock Valve
8. Raise (Cylinder Extend) Port
9. Lower (Cylinder Retract) Port
10. Spool Centering and Detent Mechanism
11. Manually Adjusted Flow Control Restriction

Pump Pressure

Return to Reservoir



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OPERATION OF DETENT PRESSURE REGULATING VALVE

Under normal operating conditions excessive pressures in the remote circuits are protected by the detent pressure regulating valve which returns the control valve spool to neutral when the operating pressure of the cylinder exceeds the factory preset value. See Figure **5**

If the remote valve control lever is physically held by the operator to prevent the spool returning to neutral the maximum operating pressure is restricted to a maximum of **160 bar** by the pressure compensating valve in the closed centre load sensing (CCLS) hydraulic pump.

Operation of the detent regulating valve is as follows:-

When the control valve spool is moved to the raise or lower position the detent balls of the spool centering and detent mechanism **(1)** are held in detents by the tapered face of the spring loaded plunger .

In the raise or lower condition the operating pressure of the remote valve circuit is also sensed in the centre drilling of the spool through the small radial drillings **(2)**. As pressure increases a force is applied to the small ball **(4)** in the end of the spool **(3)** which pushes the detent regulating valve piston **(5)** and spring loaded plunger **(6)** to the left. The detent balls in the centering mechanism are no longer held in the detent by the tapered face of the spring loaded plunger and the centering spring moves the spool to neutral.

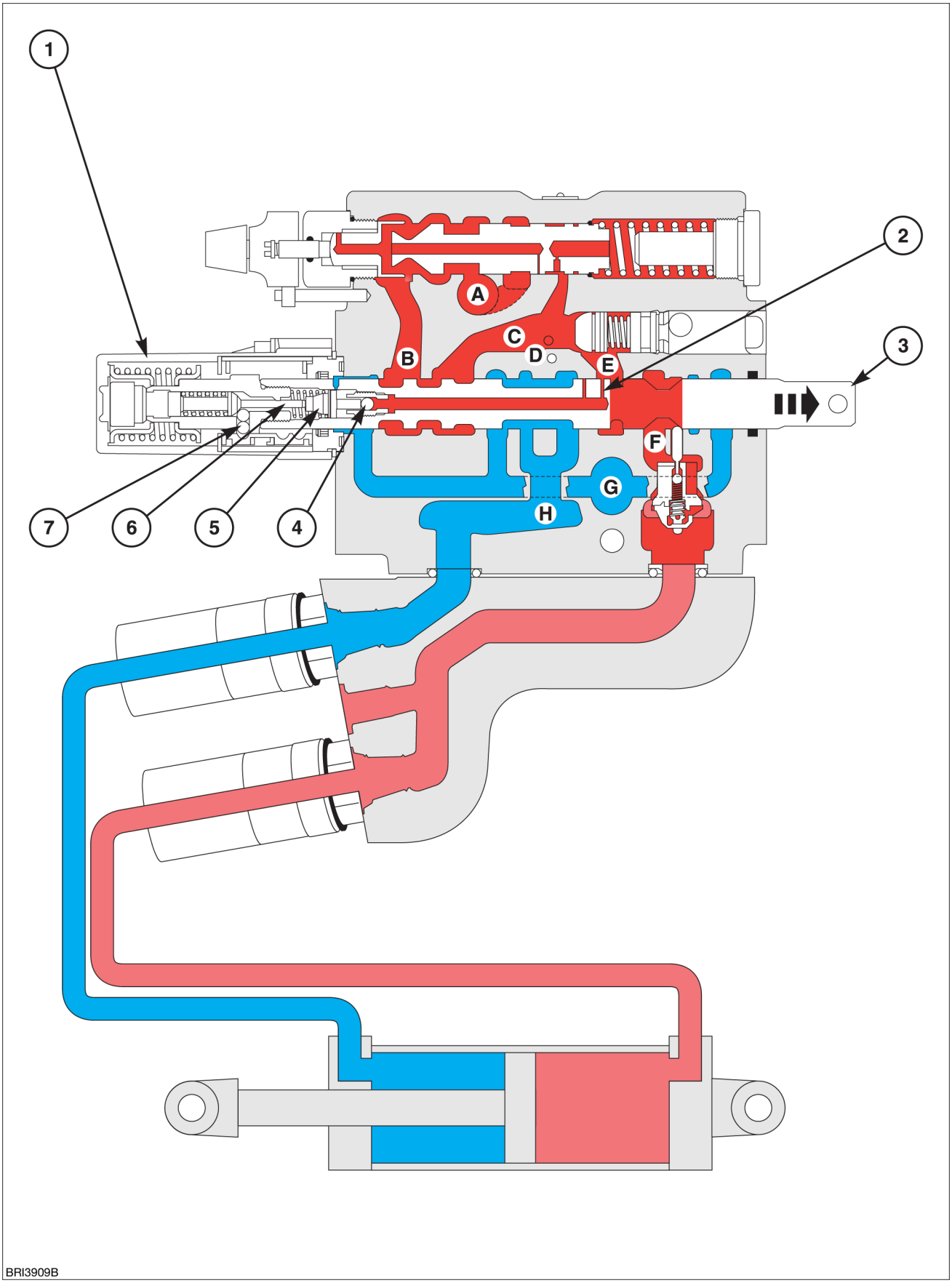
Figure **5**

Operation of Detent Pressure Regulating Valve

1. Spool Centering and Detent Mechanism
2. Radial Drillings
3. Main Control Spool
4. Ball
5. Detent Piston
6. Spring Loaded Plunger
7. Detent Balls

Remote Valve Pressure @ **160 bar**

Return to Reservoir



BAIL06CCM016GSA 5

OPERATION OF TWO OR MORE CONTROL VALVES SIMULTANEOUSLY

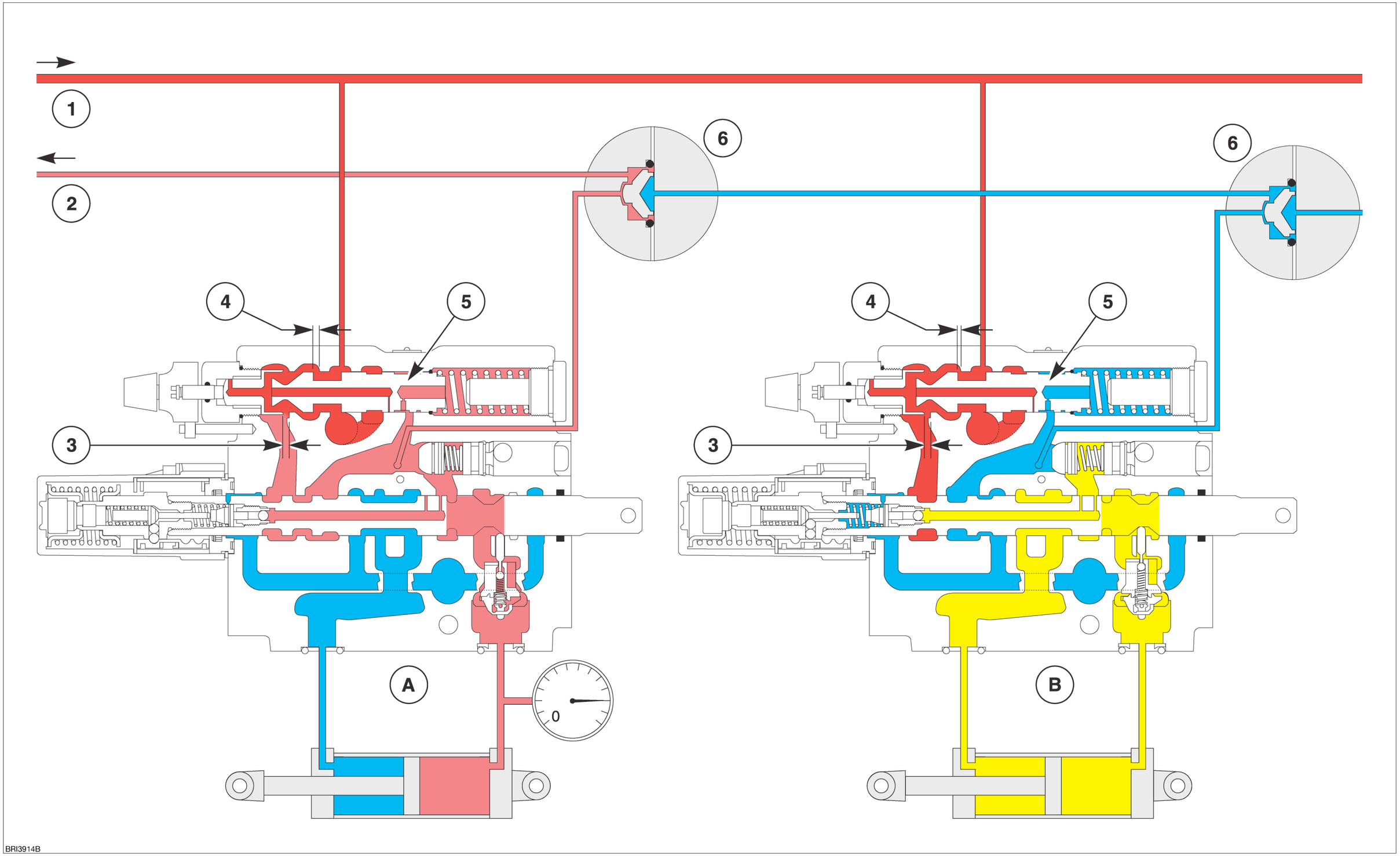
Because the stack type remote valves have a common parallel input gallery and individual flow control valves it is possible to operate two or more remotes simultaneously without loss of efficiency.
This is achieved by the flow control spools which regulate flow through each remote valve irrespective of pump system pressure.
If these valves were not fitted and two remotes were operating simultaneously at different pressures all oil would attempt to flow to the light load circuit.
The following details the process of operating a single remote valve and then operating an additional remote valve at the same time.
When a single service is operated the pressure in the parallel gallery is at pump pressure. See **6**
The pressure in the load sense line to the hydraulic pump is equal to the operating pressure of the working remote valve.
Required flow through the remote valve is set by turning the manual flow control knob. This action adjusts the size of restriction **(3)**.
The pressure differential across the restriction **(3)** is sensed on each end of the flow control valve spool and causes the spool to move to a position of equilibrium which adjusts the flow across the spool metering lands **(4)**.
The adjustment of flow across the metering land **(4)** produces a constant flow across the manually adjusted flow control restriction **(3)** and through the remote valve.

Single Remote Valve Operating

1 Parallel Gallery (Interconnecting Remote Valves Sections)
2 Load Sense Line (Interconnecting Remote Valves Sections)
3 Manually Adjusted Flow Control Restriction
4 Spool Metering Lands
5 Flow Control Spool
6 Load Sense Line Check Valve

Pump Pressure
Return to Reservoir
Remote Valve Operating Pressure
Trapped Oil

A Remote Valve in Operation
B Remote Valves in Neutral



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Two Remote Valves Operating

It is essential that the flow of oil through two or more remote valves operating simultaneously at different pressure is individually controlled otherwise oil will always flow to the circuit operating at the lowest pressure.

When operating two or more hydraulic services the operating pressure in the parallel gallery is at the highest operating pressure of the hydraulic system as sensed through the load sense line.

Check valves in the load sense line between each valve section ensure only the highest pressure is directed to the pump flow pressure compensating valve.

In the same manner as for single remote valve operation the differential pressure across the manually adjusted flow control restriction **(3)** is sensed by the flow compensating spool.

Because each remote valve is operating at a different pressures the flow control valve spools will move to different positions to achieve a state of equilibrium.

The flow across the metering land **(4)** of the lower pressure operating remote valve will be different to the flow across the metering land of the higher operating pressure remote valve.

The metering land on each flow control spool now maintains the required constant flow through the manually adjusted flow control restriction in each remote valve irrespective of the higher pump system pressure required to operate other hydraulic circuits.

Two Remote Valves Operating

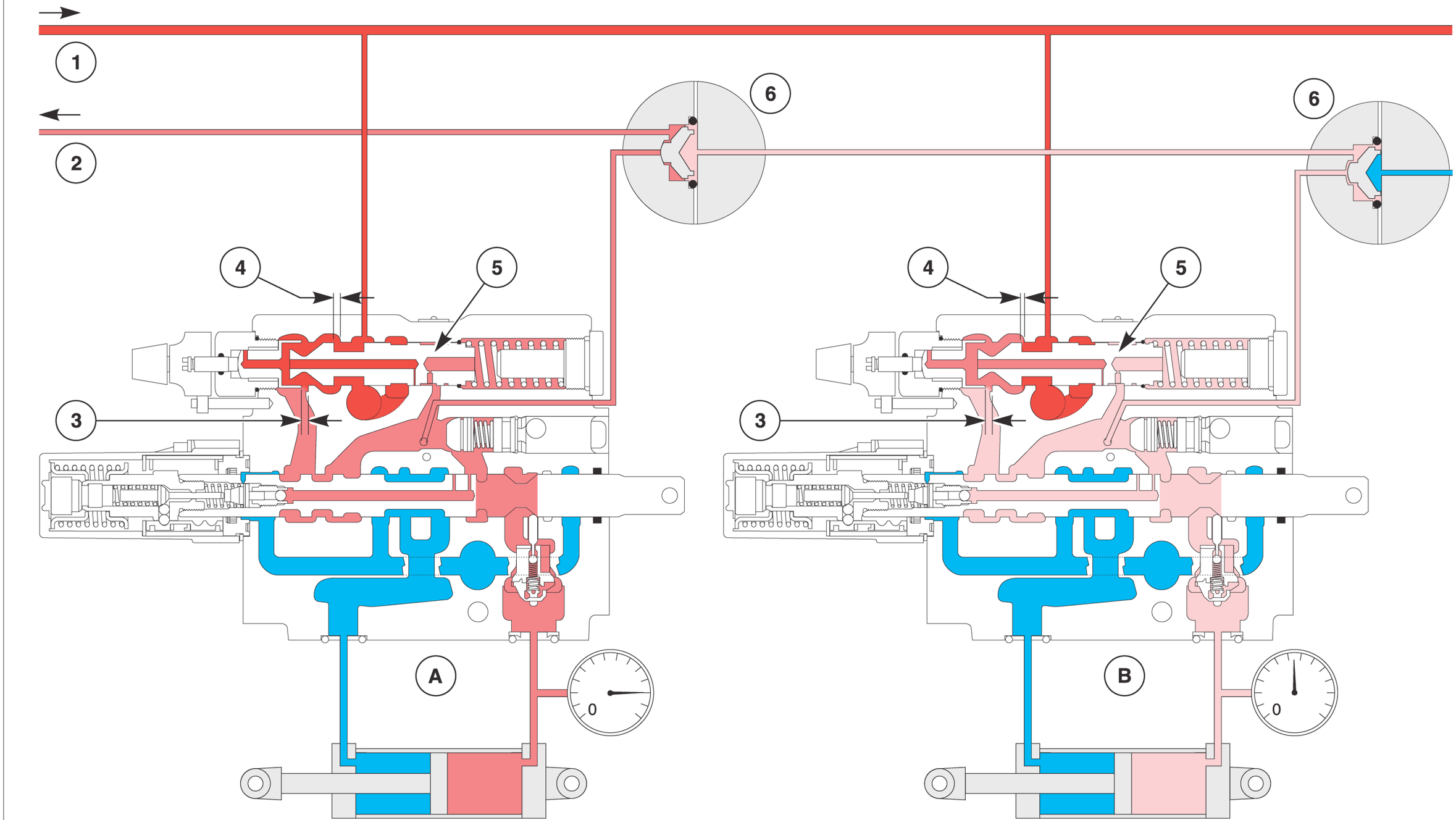
1 Parallel Gallery (Interconnecting Remote Valves Sections)
2 Load Sense Line (Interconnecting Remote Valves Sections)
3 Manually Adjusted Flow Control Restriction
4 Spool Metering Lands
5 Flow Control Spool
6 Load Sense Line Check Valve

Pump Pressure

High Pressure Remote Valve Operation

Lower Pressure Remote Valve Operation

Return To Reservoir



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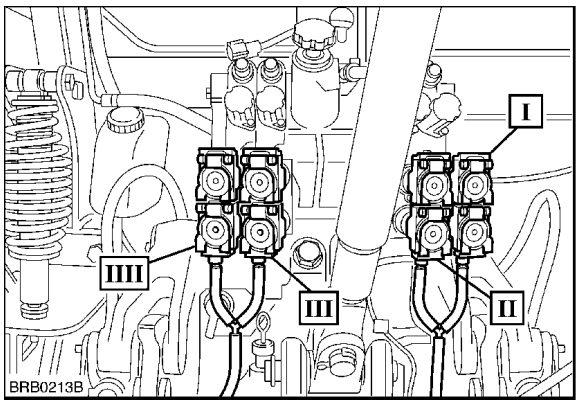
PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Static description

PUMA 165, PUMA 180, PUMA 195, PUMA 210

Closed centre remote control valves **(1)** are installed on all tractors with a closed centre load sensing variable displacement hydraulic pump.

NOTE: *On closed centre remote installations the upper port of the valve is the cylinder retract port and the lower port is the cylinder extend port.*

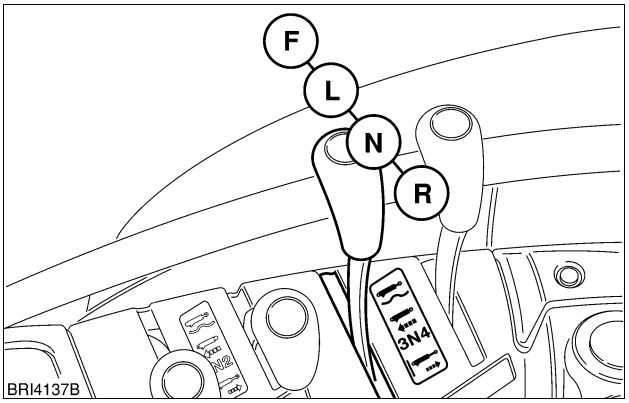
Up to four remote control valves may be installed and each operating lever is colour coded for identification:



BRB0213B 1

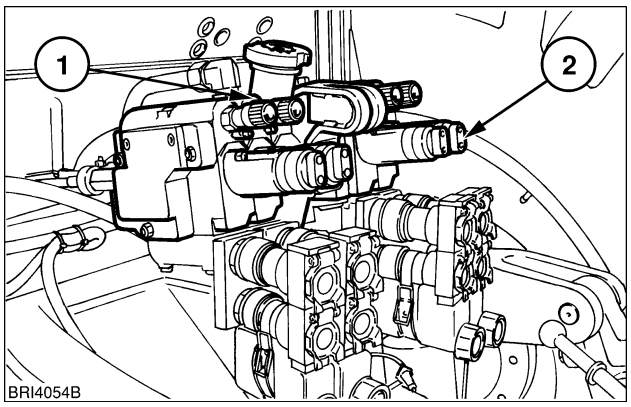
Lever Colour	Valve Position/No.
Green	Right–hand outer – I
Blue	Right–hand inner – II
Ginger	Left–hand inner – III
Black	Left–hand outer – IIII

Each remote valve has four operating positions.
Raise **(R)** - Pull a lever toward you to extend the cylinder to which it is connected.
Neutral **(N)** - Push the lever forward to select neutral and de-activate the connected cylinder.
Lower **(L)** - Push the lever forward, past neutral, to retract the cylinder.
Float **(F)** - Push the lever fully forward, beyond the ‘lower’ position, to select ‘float’. This will permit the cylinder to extend or retract freely, allowing equipment such as scraper blades to ‘float’ or follow the ground contour.

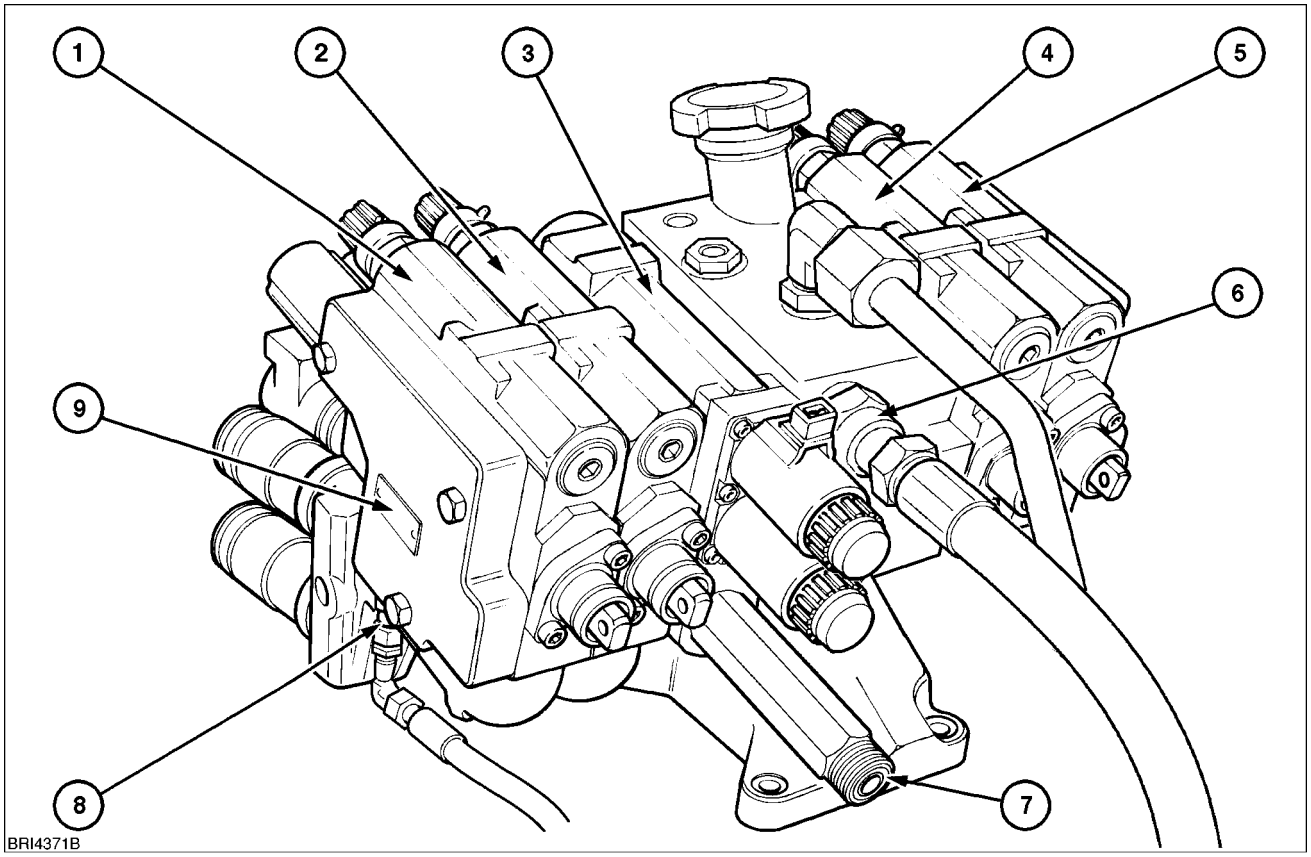


BAIL06CCM166ASA 2

The remote valves **(1)** are a stack type design with configurable detents (where fitted) **(2)** clamped together with the hydraulic lift electronic draft control valve .



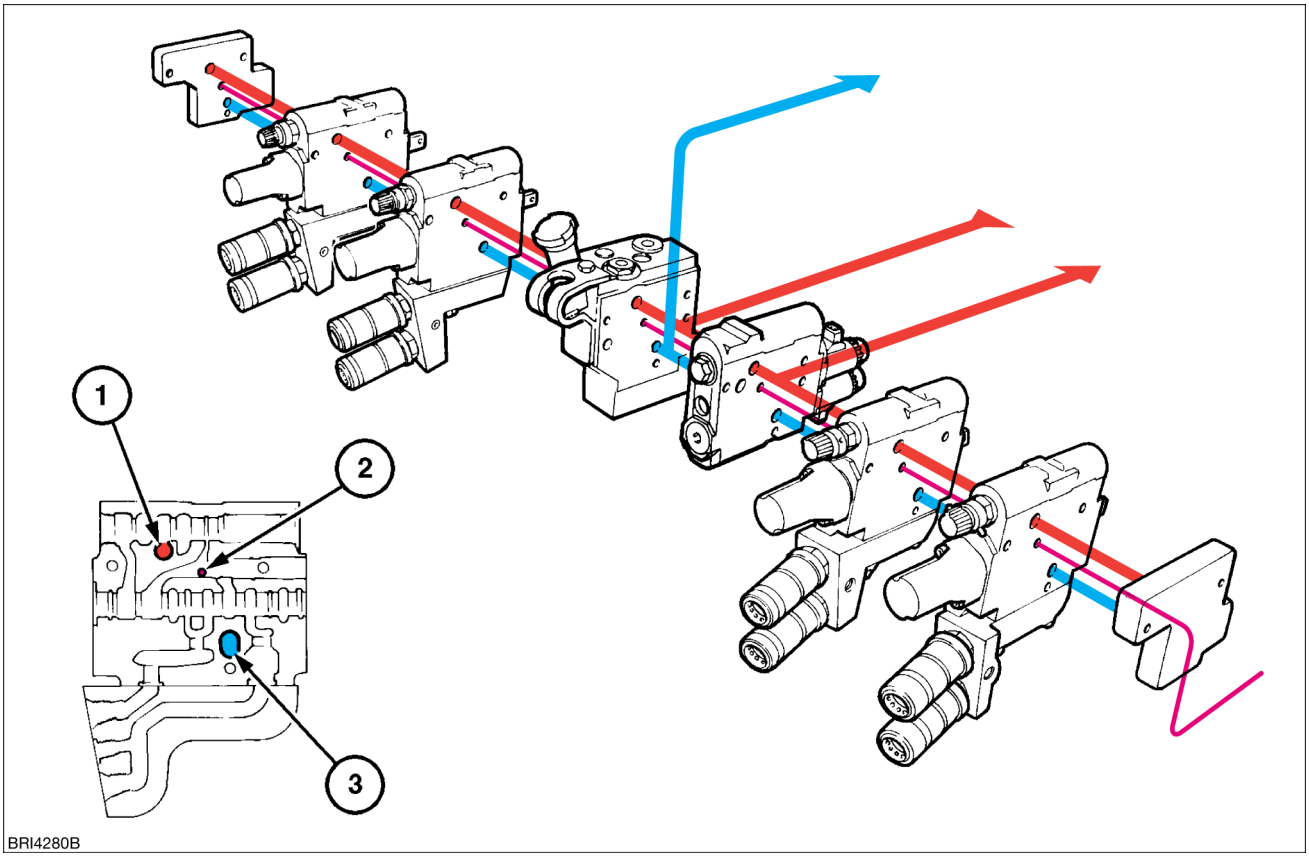
BAIL06CCM086ASA 3



BAIL06CCM248FSA 4

Electronic Draft Control and Mechanical Closed Centre Remote Control Valve Stack

1 Remote Control Valve No I
2 Remote Control Valve No II
3 Electronic Draft Control Valve
4 Remote Control Valve No III
5 Remote Control Valve No IIII
6 Inlet Port
7 To Hydraulic Lift
8 Load Sensing Line Connection
9 End Cover



BAIL06CCM192FSA 5

Remote Control Valve and EDC Control Valve Interconnecting Galleries

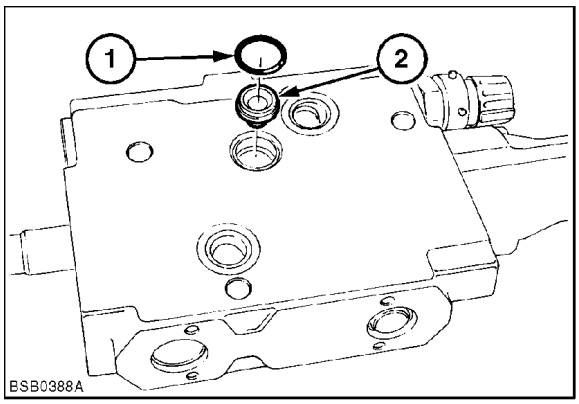
Pump Pressure

Return To Reservoir

Load Sensing

1 Parallel Supply Gallery
2 Load sensing Gallery
3 Return to Reservoir

All valve sections have a common parallel inlet and return to reservoir gallery.
The load sensing gallery passes through the centre of the valve stack and signals the pump to increase or decrease output according to demand.
The parallel gallery and load sensing system enables two or more valves to be operated simultaneously without loss of efficiency.
'O' ring seals **(1)** and load sense check valves **(2)** between each valve section ensure the highest circuit load sense pressure is transmitted to control output of the hydraulic pump.



BSB0388A 6

The principal hydraulic components within each remote control valve section are:-

Flow Control Adjuster

The flow control adjuster is manually operated and adjusts oil flow through the remote valve. Turning the adjuster changes the size of the restriction in the path of oil flowing through the flow control spool.

Flow Control Spool

The flow control valve spool senses pressure differential across the restriction set by the flow control adjuster and regulates flow through the remote valve. Because each flow control spool individually senses the pressure differential in the remote valve being operated, two or more circuits working at different pressures can be controlled simultaneously.

Load Hold Check Valve

The check valve prevents a backflow of pressure from the remote valve circuit when the control spool is operated and pump system pressure is less than the back pressure in the circuit.
This is explained by the following example:-
When a cylinder is holding a heavy load and the control valve spool is moved from the neutral to raise position, the pump system pressure may be less than the back pressure in the remote valve circuit. When this occurs the back pressure would cause oil in the circuit to flow backwards and the load to momentarily drop before pump system pressure has risen to hold and then raise the load further. The load hold check valve prevents this situation from occurring.

Lock Valve

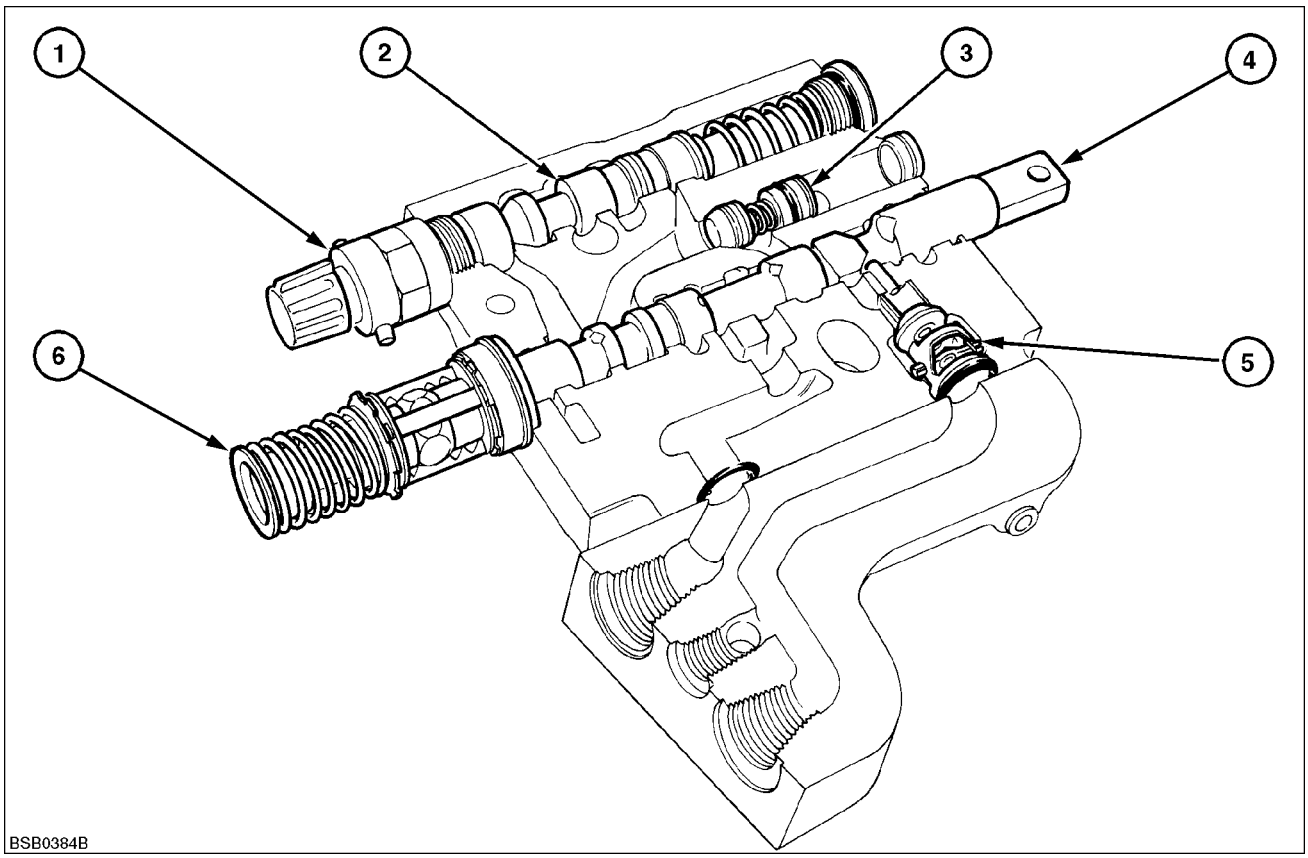
The lock valve is located in the raise port of the remote valve and is closed whenever the remote valve is in neutral. The lock valve prevents leakdown of an implement should there be any leakage across the lands of the spool when in the neutral position. The lock valve is automatically opened whenever the control spool is moved from the neutral position.

Control Valve Spool

The control valve spool is spring centred to a neutral position and when moved directs oil flow to the raise or lower ports of the control valve.

Spool Centering and Detent Mechanism

The spool centering mechanism spring loads the control valve spool to the neutral position. When the spool is moved to the Raise, Lower or Float positions the mechanism holds the spool in position using ball bearings which engage in grooves within a detent cage.
A factory set detent regulating valve in the mechanism automatically releases the balls and returns the spool to neutral whenever operating pressure exceeds the preset value.



BAIL06CCM165FSA 7

Closed Centre Remote Control Valve Components

1 Flow Control Adjuster
2 Flow Control Spool
3 Check Valve
4 Control Valve Spool
5 Load Holding Check Valve
6 Spool Centering Mechanism

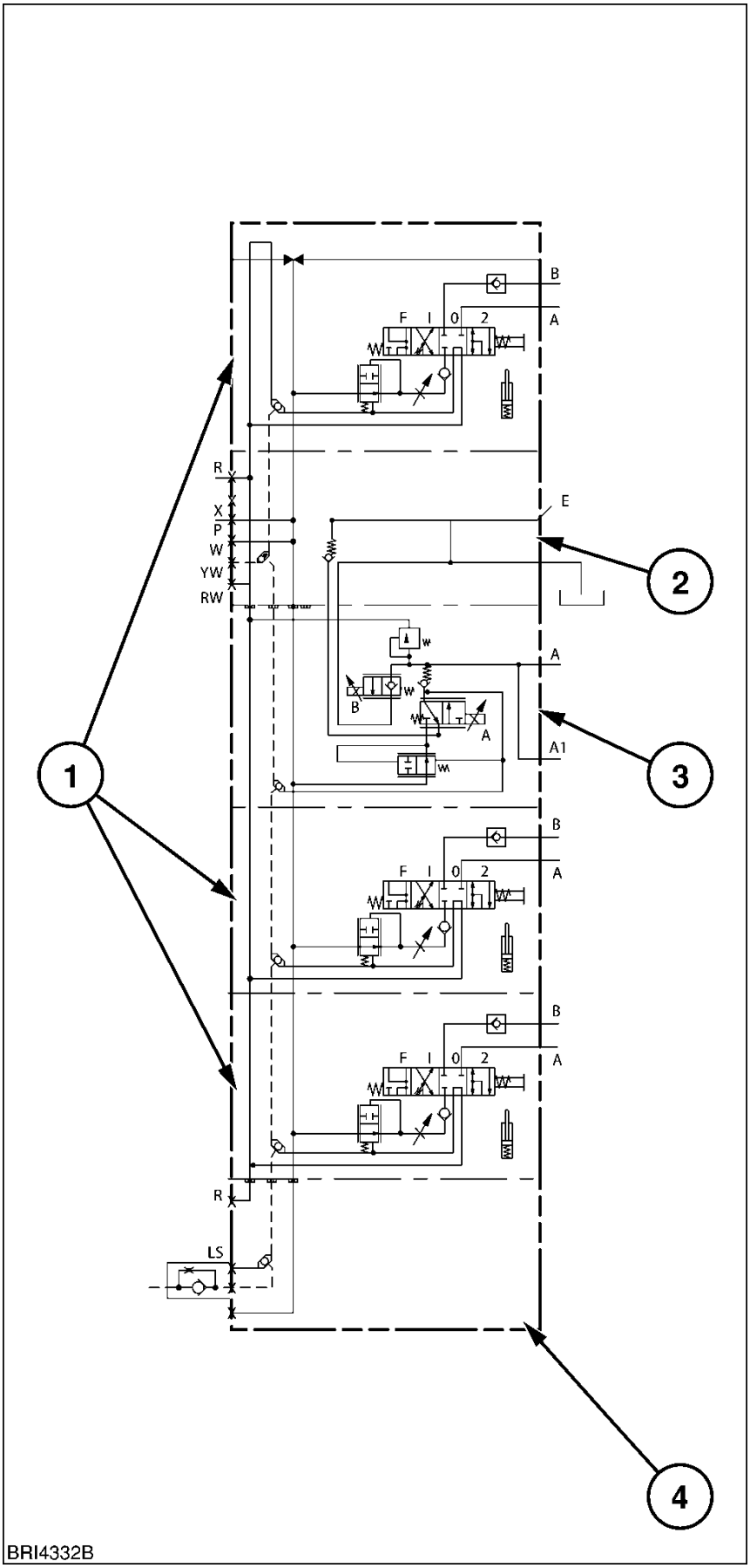
PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Hydraulic schema

PUMA 165, PUMA 180, PUMA 195, PUMA 210

Refer to **PRIMARY HYDRAULIC POWER SYSTEM - Hydraulic schema (A.10.A)** for main hydraulic schematic.

Hydraulic Schematic for Mechanical Remote Valves With Power Beyond

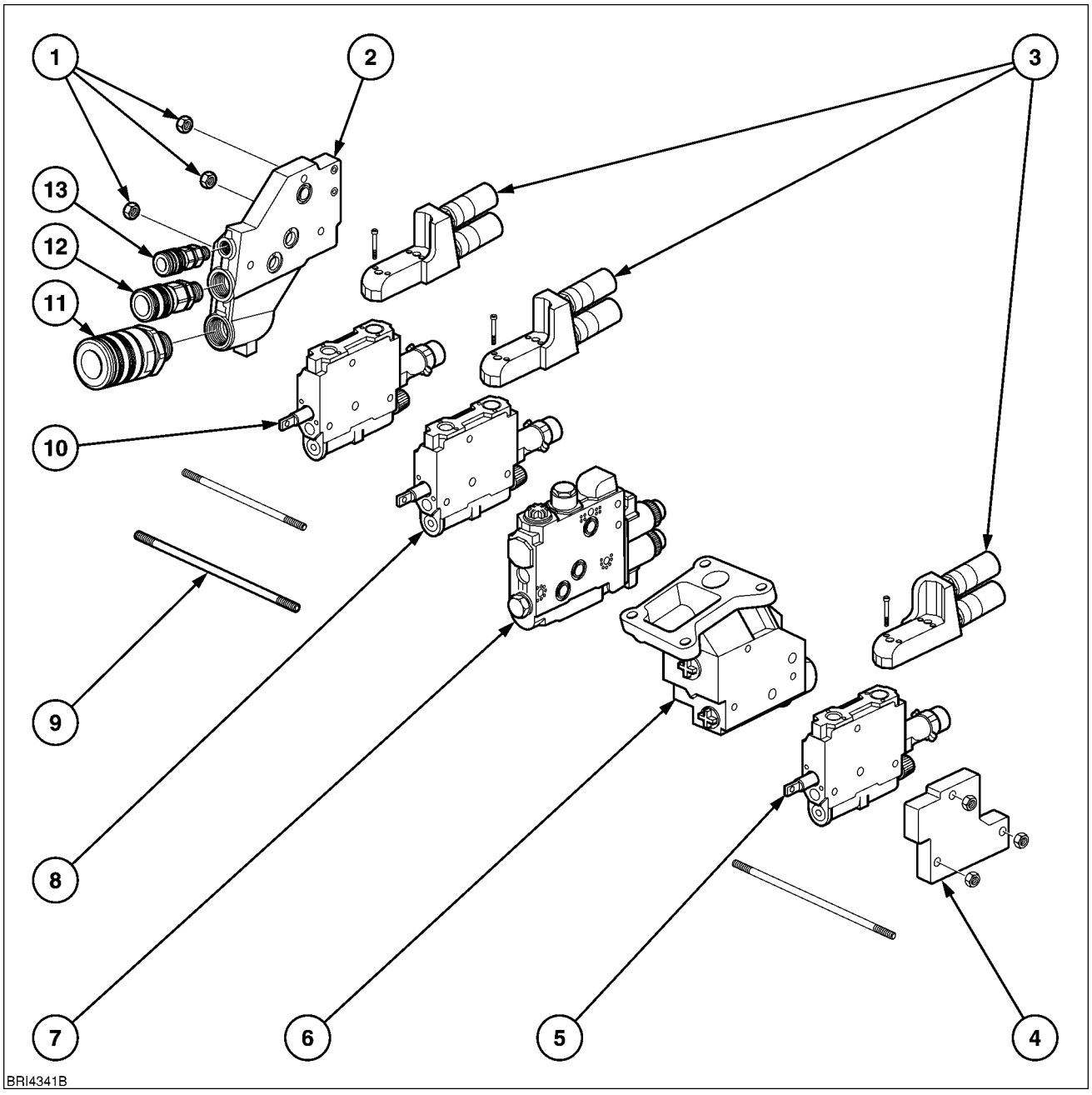
1.Remote Valve Slices
2.Manifold Block
3.Electronic Draft Control Valve
4.Power Beyond Slice



BAIL06CCM214CSA 1

PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Exploded view With Power Beyond

PUMA 165, PUMA 180, PUMA 195, PUMA 210



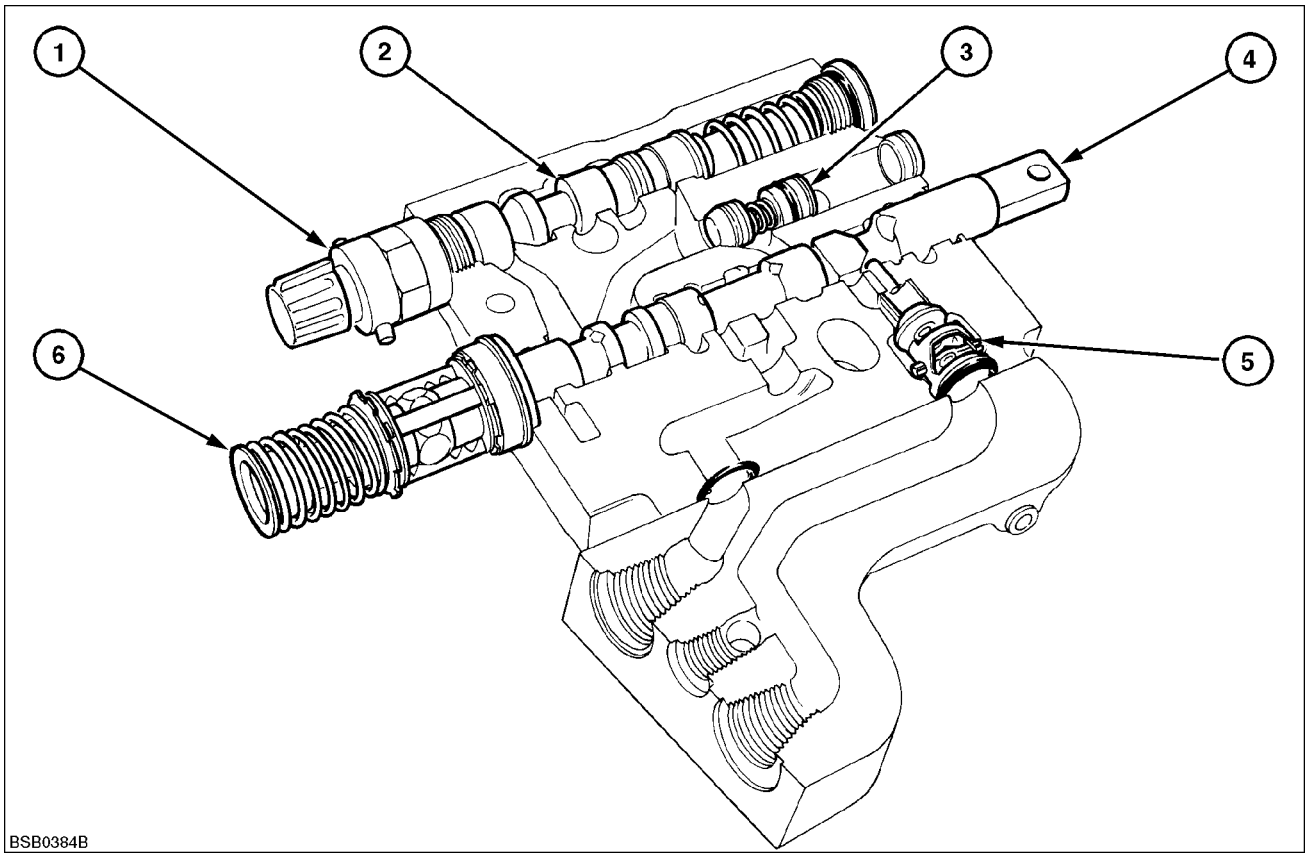
BAIL06CCM239GSA 1

Closed Centre Mechanical Remote Valves with Power Beyond

1. Retaining Nuts
2. Power Beyond Slice
3. Couplers
4. End Slice
5. Remote Valve
6. Manifold
7. Electronic Draft Control Valve
8. Remote Valve
9. Tie Rod
10. Remote Valve
11. Return Coupler
12. Pressure Coupler
13. Load Sensing Coupler

PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Disassemble

PUMA 165, PUMA 180, PUMA 195, PUMA 210

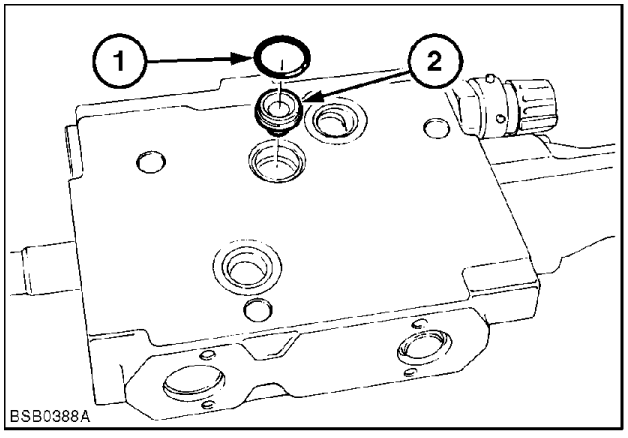


BAIL06CCM165FSA 1

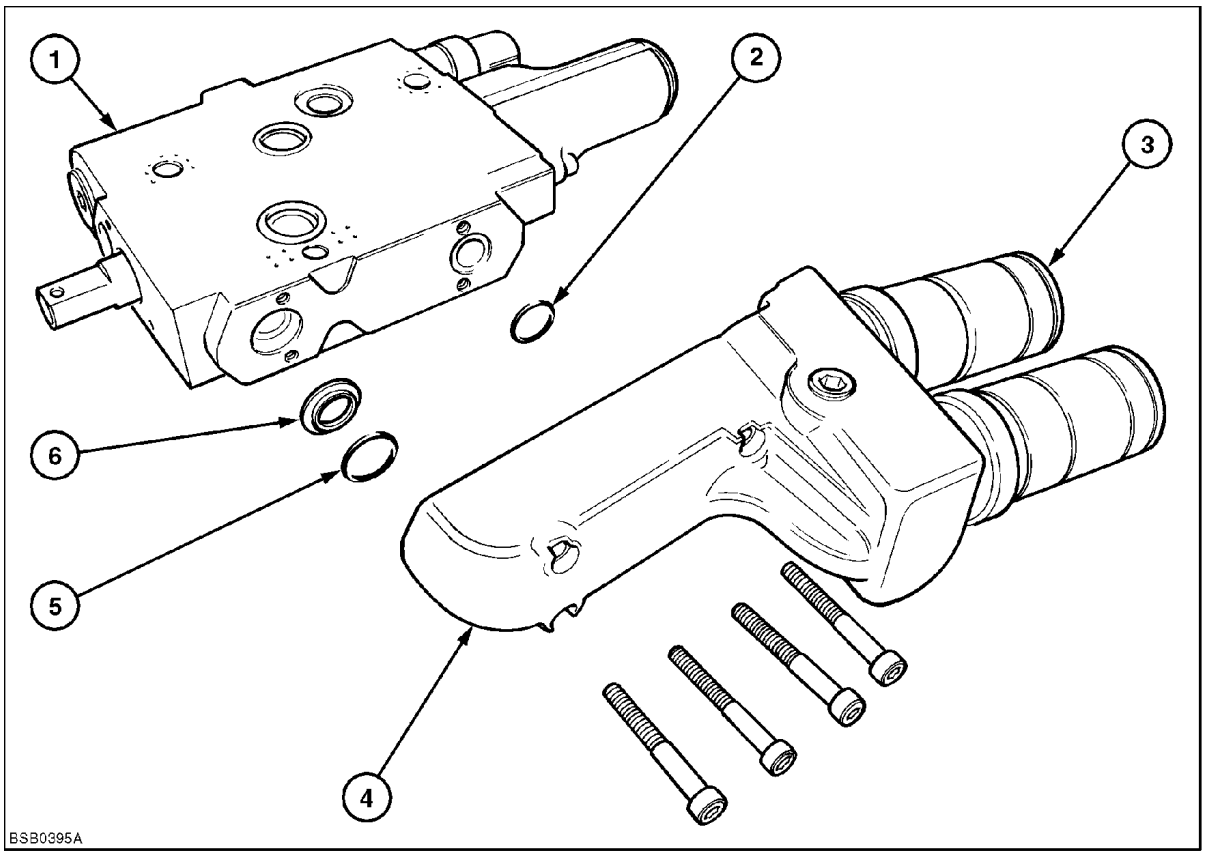
Closed Centre Remote Control Valve Components

1 Flow Control Adjuster
2 Flow Control Spool
3 Check Valve
4 Control Valve Spool
5 Load Holding Check Valve
6 Spool Centring Mechanism

1. Disassemble using following instructions and illustrations.
   Remove 'O' ring **(1)** and load sense check valve **(2)**. Remove flow control adjuster knob and unscrew flow control adjuster from valve body



BSB0388A_191 2



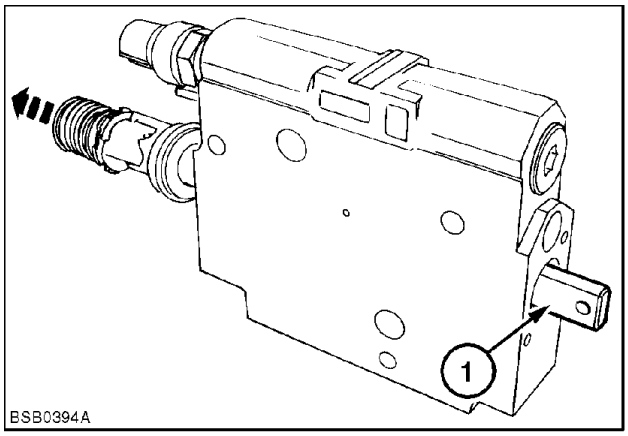
BSB0395A 3

Remote Valve and Coupler Housing

1 Valve Section
2 'O' Ring
3 Coupler
4 Coupler Housing
5 Seat
6 'O' Ring

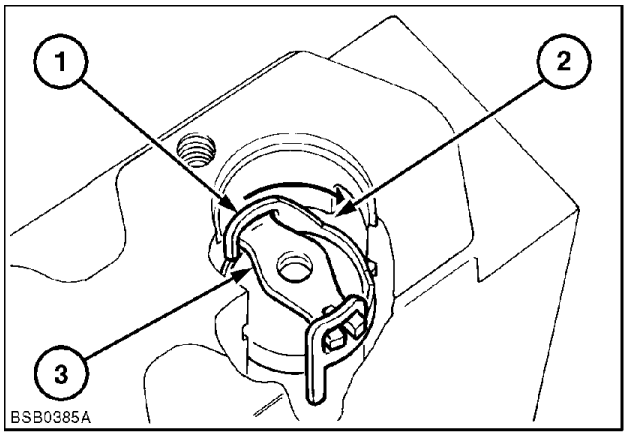
2. The couplers are serviced as an assembly and should not be disassembled.
   Remove spool.

NOTE: *Prior to removing spool ensure flats* ***(1)*** *on end of spool are in vertical position as shown. If it is necessary to rotate spool Do not use force otherwise damage to spool and load check valve pin will occur.*

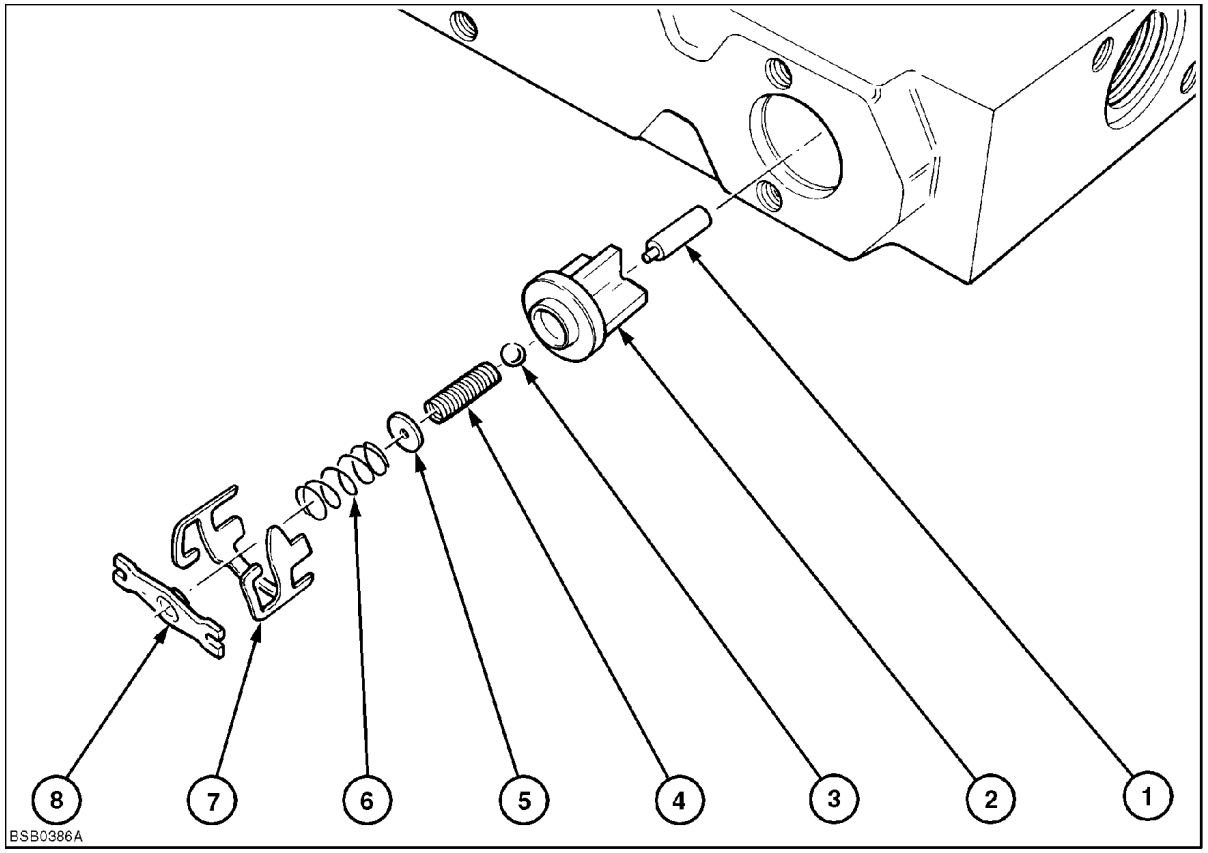


BSB0394A 4

3. Remove load holding valve from raise port as follows:-
   Using small screwdriver, open the two slots **(1)** on keeper **(2)** and turn keeper through **90 deg**.
   Remove spring seat **(3)** from housing
   Remove load check valve and plunger



BSB0385A 5



BSB0386A 6

Load Check Valve

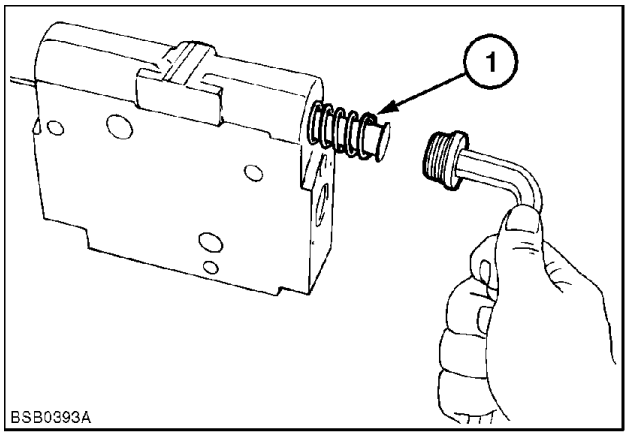
1 Plunger
2 Load Holding Valve
3 Ball
4 Spring
5 Washer
6 Spring
7 Spring Seat
8 Keeper

4. Carefully remove flow control valve plug.

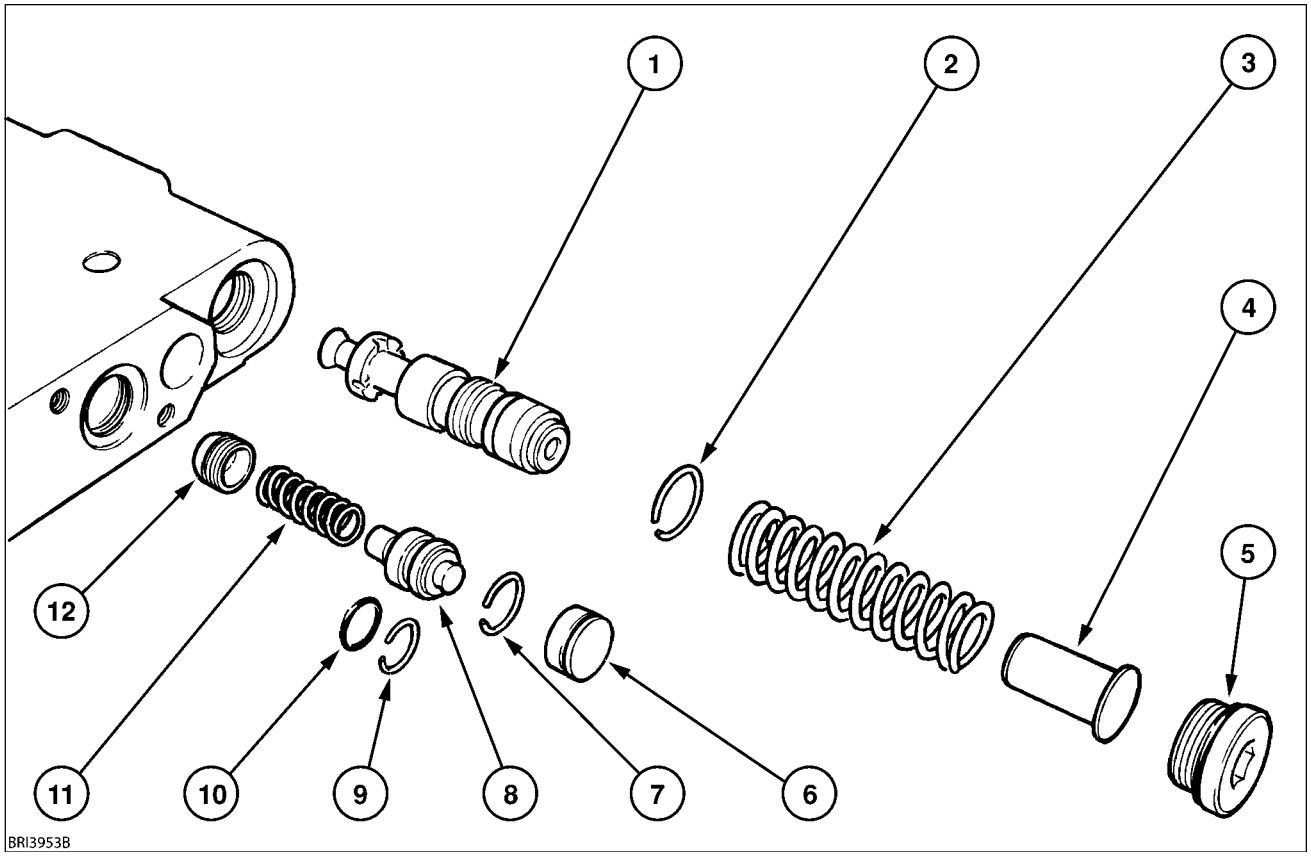
⚠ WARNING ⚠

A large spring is positioned beneath the plug, take extreme care when removing plugs.

B041



BSB0393A 7



BAIL06CCM211FSA 8

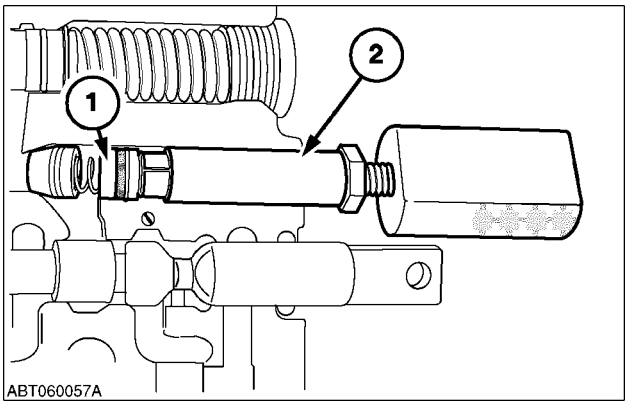
Flow Control Spool and Check Valve

1 Flow Control Spool
2 Retainer
3 Spring
4 Spring Guide
5 Plug and 'O' Ring
6 Plastic Cap
7 Retainer
8 Plug
9 Back-up Ring
10 'O' Ring
11 Spring
12 Check Valve Cone

Lift Check Valve Removal

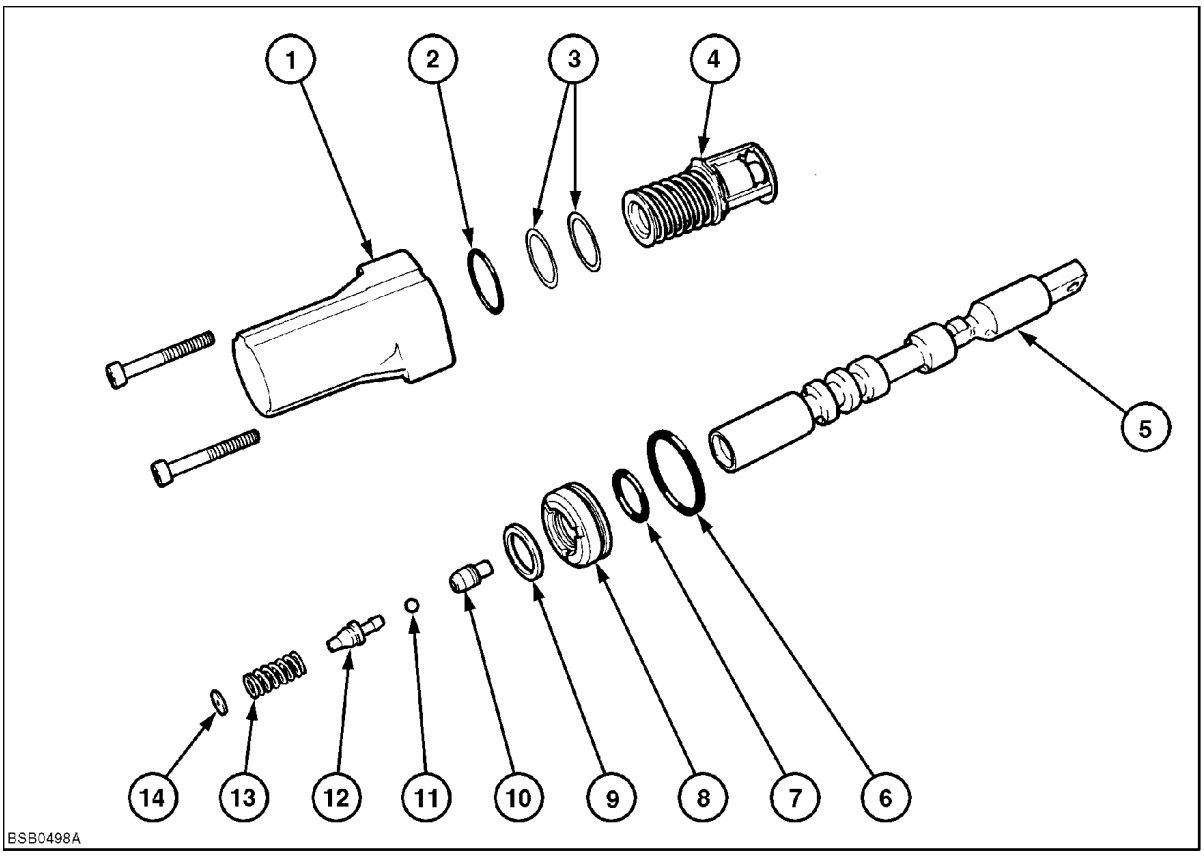
5. Remove the plastic cap **(6)** and the snap ring **(7)** Figure **8** , taking care not to scratch the bore.

6. Locate and clamp the extractor tool **380002720** onto the retainer **(1)** by tightening the nut on the tool **(2)**.



BAIL06CCM222ASA 9

7. Pull out the tool and retainer.
8. Remove the check valve and spring.



BSB0498A 10

Control Valve Spool

1 End Cap
2 'O' Ring
3 Shims
4 Spool Centring Mechanism
5 Spool
6 'O' Ring
7 'O' Ring
8 Spacer
9 Back-Up Ring
10 Detent Release Orifice
11 Ball
12 Plunger
13 Spring
14 Spring Seat

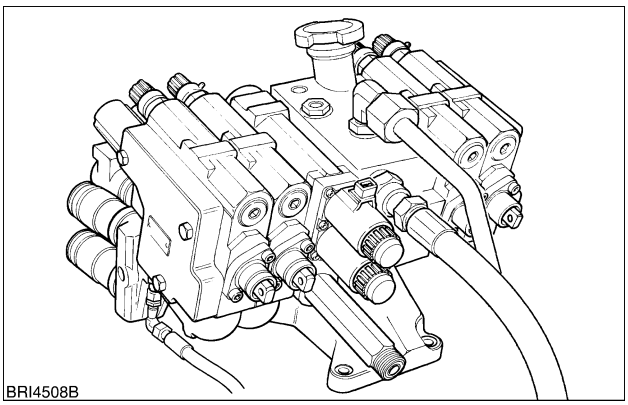
9. Remove control valve spool by unscrewing the spool centring mechanism. It is not recommended that the mechanism is disassembled.
   Housed within the centre of the spool is the detent release orifice. This is factory preset and servicing should be restricted to washing in an approved degreasing agent without removing the orifice from within the spool.

Next operation:
PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Assemble (A.10.B)

PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Remove

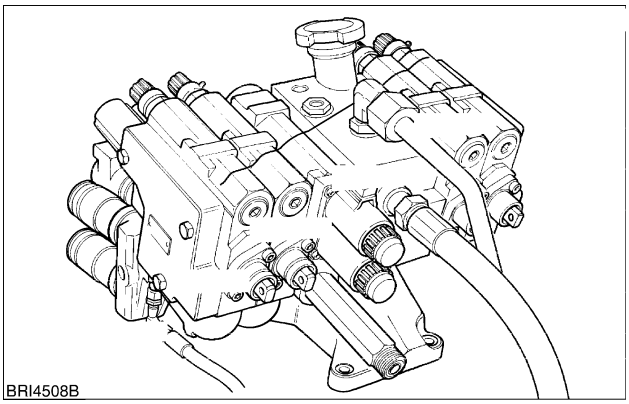
PUMA 165, PUMA 180, PUMA 195, PUMA 210

1. Lower hydraulic links and thoroughly clean remote valve stack.
   Disconnect control cables at rear of remotes.



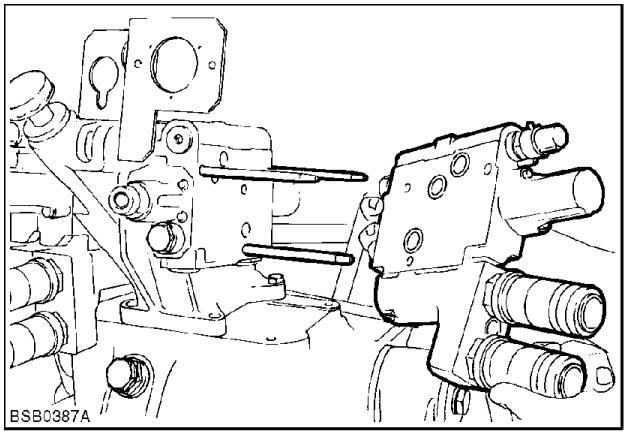
BAIL06CCM258ASA 1

2. To aid reassembly draw a diagonal line across the valve stack.



BAIL06CCM259ASA 2

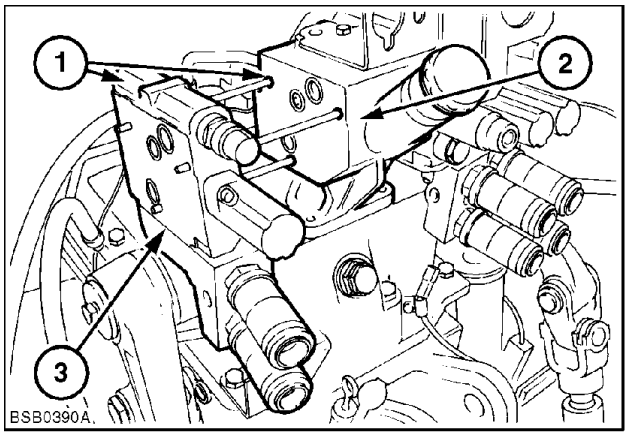
3. Undo and remove tie rod nuts. Remove end plate and valve assemblies from the tie rods.



BSB0387A 3

4. Remote valves 3 and 4 Removal
   Undo tie rod nuts and remove end plate and valve assemblies .

NOTE: *Small shims **(1)** are positioned between the manifold **(2)** and remote valve number **(3)**. Take care not to damage the shims.*

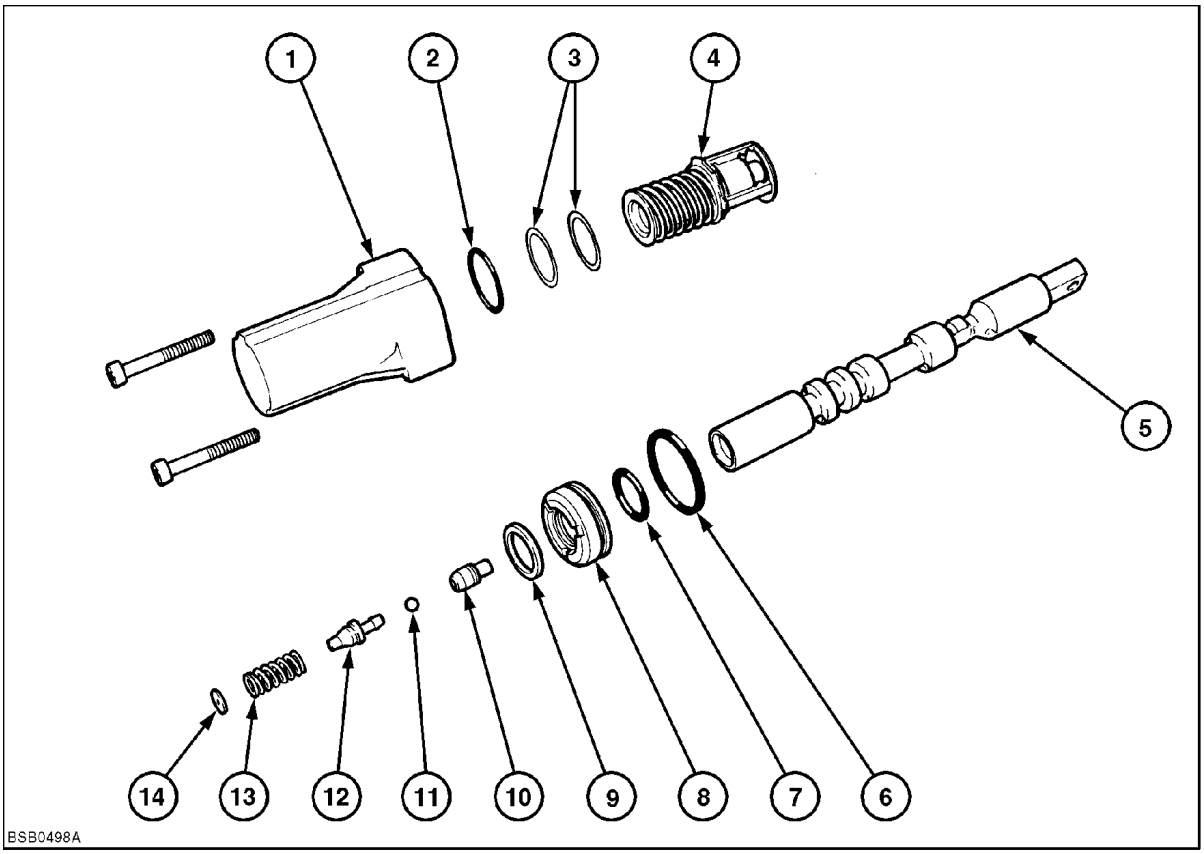


BSB0390A 4

Next operation:
PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Disassemble (A.10.B)

PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Assemble

PUMA 165, PUMA 180, PUMA 195, PUMA 210



BSB0498A 1

Control Valve Spool

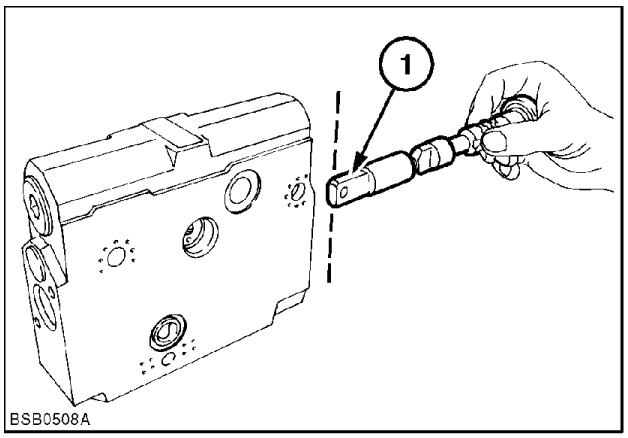
1 End Cap
2 'O' Ring
3 Shims
4 Spool Centring Mechanism
5 Spool
6 'O' Ring
7 'O' Ring
8 Spacer
9 Back-Up Ring
10 Detent Release Orifice
11 Ball
12 Plunger
13 Spring
14 Spring Seat

1. Prior to inserting control valve spool in housing ensure flats **(1)** on end of spool are in vertical position as shown, then install the load holding check valve, as described below.. Do Not rotate spool after installing load holding valve otherwise damage to spool and load holding valve plunger will occur.

⚠ WARNING ⚠

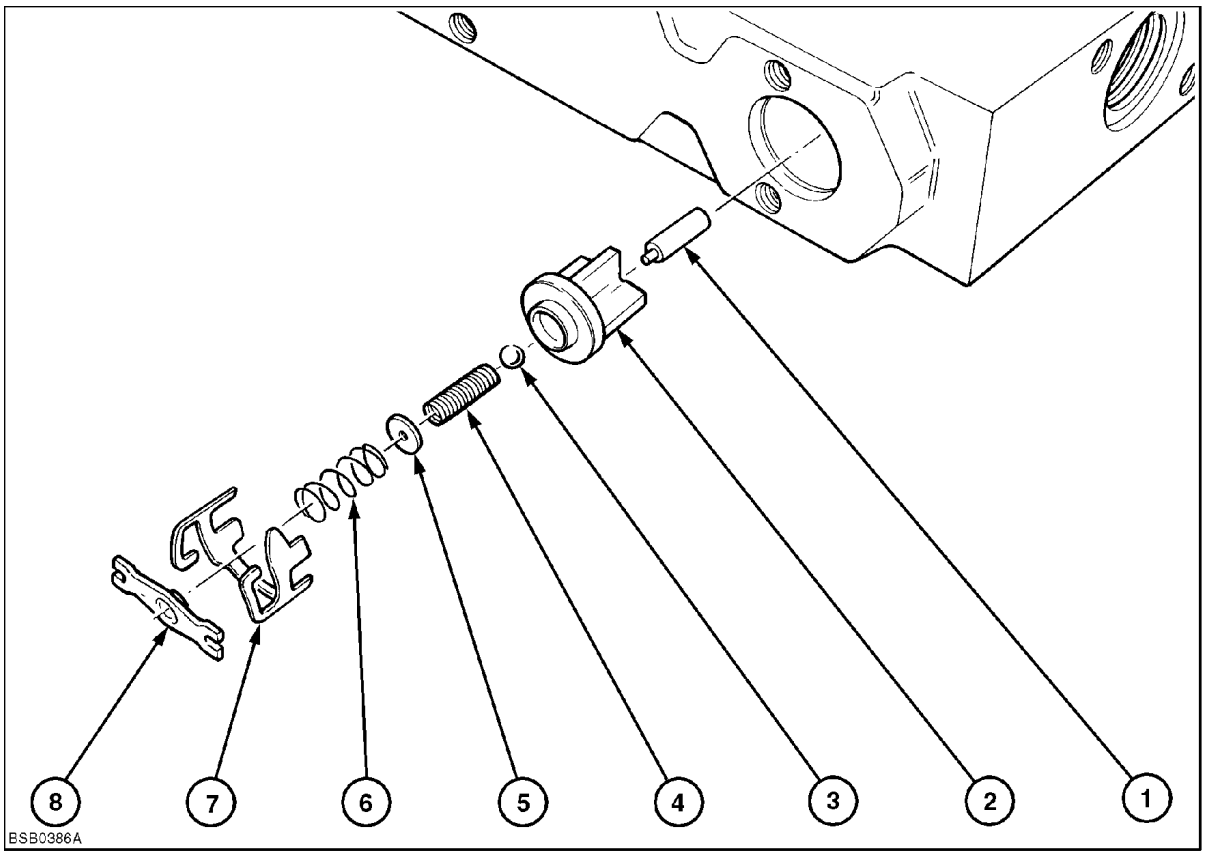
Do not rotate the main control spool or use force once inserted into the bore, otherwise damage to the main control spool and the lock valve pin will occur.

B004



BSB0508A 2

2. Install Control Valve spool. Retain by screwing on the spool centreing mechanism.



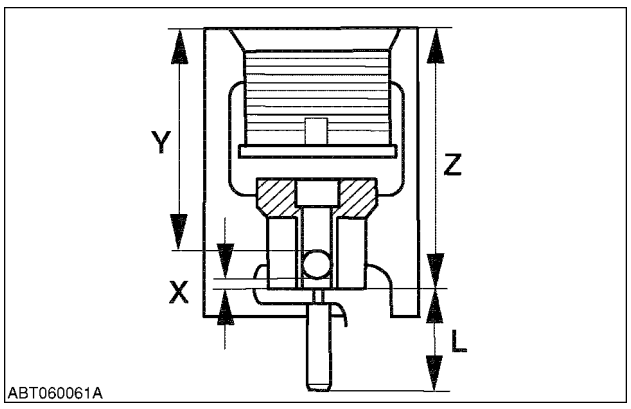
BSB0386A 3

Load Check Valve

1 Plunger
2 Load Holding Valve
3 Ball
4 Spring
5 Washer
6 Spring
7 Spring Seat
8 Keeper

3. Load check valve installation
   Dimensions:
   L = Plunger Length
   Z = Depth to the Plunger
   Y = Depth to the Pilot Ball
   B = Pilot Ball diameter (**4 mm** (**0.16 in**)
   X = Gap between the Plunger and the Pilot Ball

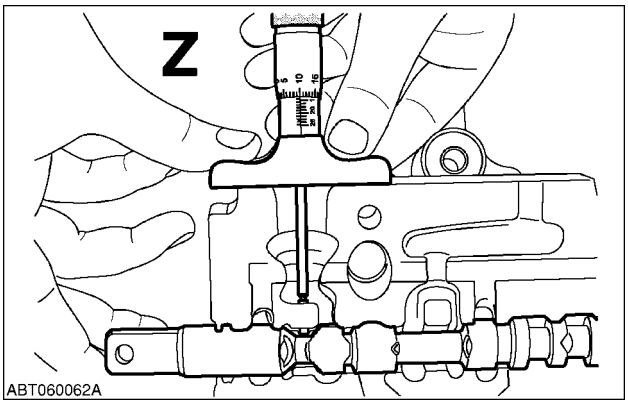
NOTE: *When the control valve is in the neutral position there must be a gap (X)* ***0.2 - 0.3 mm*** *(****0.008 - 0.012 in****) between the plunger and the pilot ball.*



BAIL06CCM194ASA 4

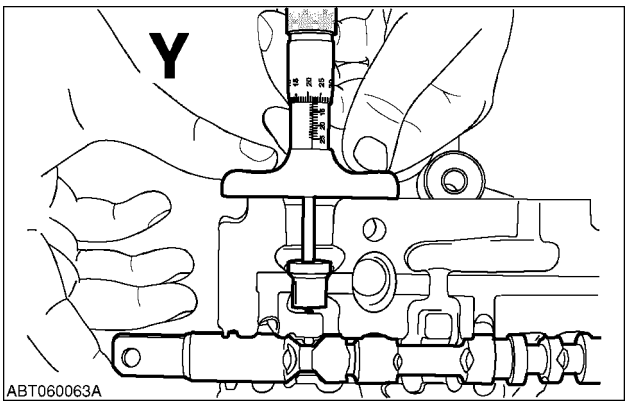
Calculating Gap (X)

4. Install the shortest plunger (No rings , **15.07 mm** (**0.59 in**)) in position with the control valve in neutral.



BAIL06CCM195ASA 5

5. Measure dimension ‘Z‘ from the top of the plunger to the top face of the remote valve body (e.g. **36.43 mm** (**1.43 in**)).
6. Remove the plunger.
7. Install the load check valve and the pilot ball. Ensure that both are fully seated
8. Measure dimension ‘Y‘ from the top of the ball to the top face of the valve body (e.g. **36.43 mm** (**1.43 in**))

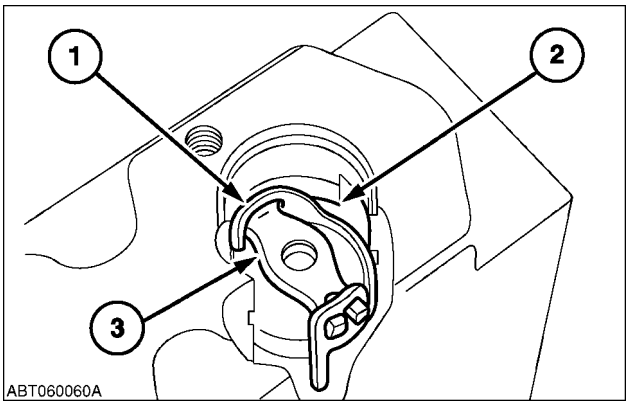


BAIL06CCM196ASA 6

Load Check Valve Installation

9. Ensure that the control spool is in neutral.
10. Install the determined plunger using long nosed pliers.
11. Install the lock valve , pilot ball, pilot spring, washer and the spring (Refer to Figure **3**)
12. Use a screwdriver to bend both retainer lugs **(1)** (figure **6**) upwards, and locate the retainer to the bore.

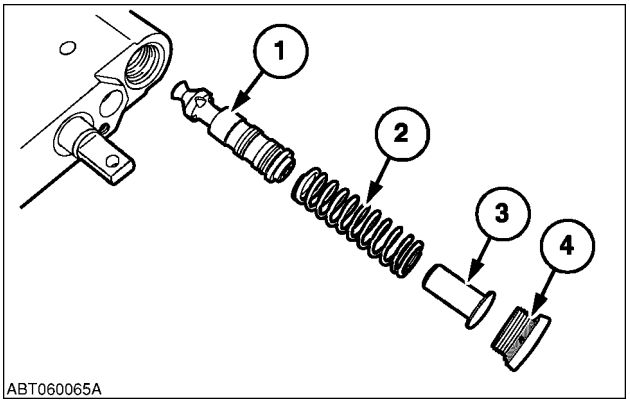
13. Fit the spring seat into the retainer, straighten the lugs and turn the assembly anti clockwise **90 °** to secure in the remote valve body.



BAIL06CCM197ASA 7

Flow Control Valve Installation

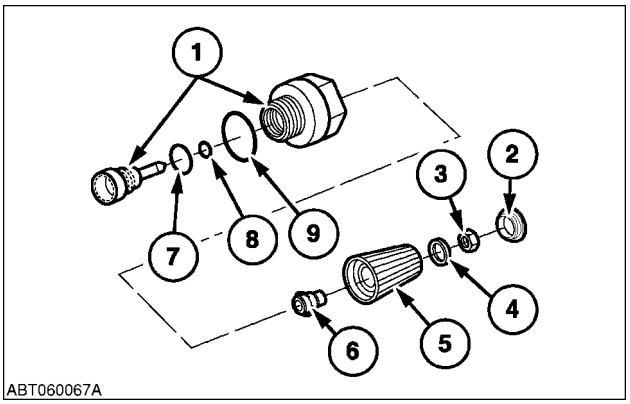
14. Install the flow control spool valve **(1)**, together with the spring **(2)** , guide **(3)** and retaining plug **(4)** . Tighten the retaining plug to a torque of **67 Nm** (**49.42 lbft**)



BAIL06CCM198ASA 8

Flow Control Regulator Installation

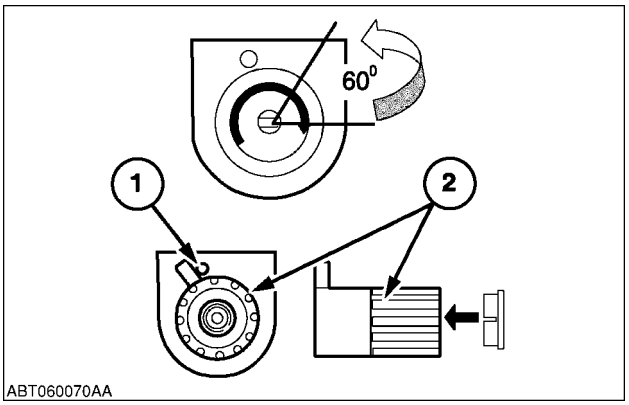
15. Assemble the flow control regulator **(1)** with ‘O‘ rings **(7)**, **(8)**, and **(9)**.



BAIL06CCM199ASA 9

16. Screw the flow control regulator into the valve body.

17. Using a screwdriver, turn the restrictor clockwise as far as it will go, and then turn back **60 °**(minimum flow position).

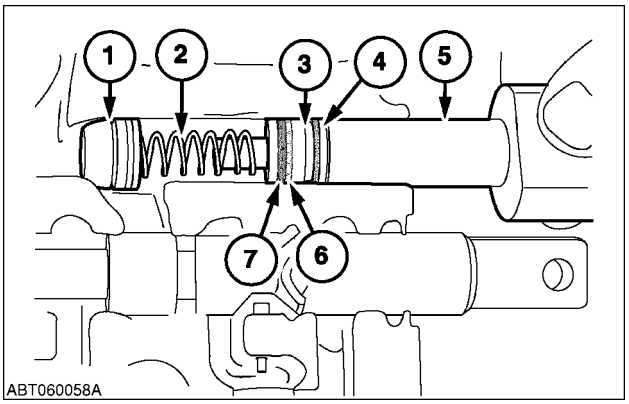


BAIL06CCM200ASA 10

18. Install the clamp, rotary knob **(2)** , washer and the nut to the restrictor stem. Ensure that the rotary knob lug is located to the left of the stop pin **(1)** .
19. Tighten the nut to a torque of **3 Nm** (**2.213 lbft**) without rotating the restrictor.
20. Install the cap with the groove facing the knob lug.
21. Check the minimum and maximum flow available from the remote valve using a flow meter.
    If the rotary knob has been installed as described above the minimum flow should be approximately **10 l/min** (**2.64 US gpm**) and the maximum flow should be approximately **80 l/min** (**21.13 US gpm**).

Lift Check Valve Installation

22. Check the bore for any rough edges and smooth if necessary
23. Install the check valve **(1)** into the remote valve body.



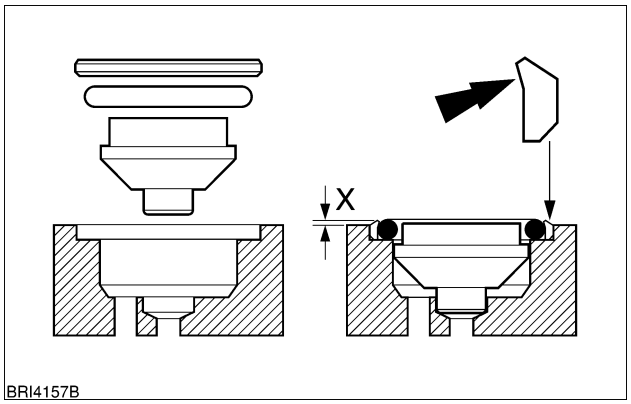
BAIL06CCM201ASA 11

24. Fit the back up ring **(6)** and the 'O' ring **(7)** in the groove in the retainer **(3)** and locate the spring **(2)** onto the inner spigot of the retainer.
25. Locate the snap ring **(4)** , retainer and spring assembly onto the installation tool **380002720 (5)** .Install the assembly into the remote valve bore and push until the tool handle contacts the remote valve body.
26. The snap ring must be located in the groove. Ensure that the retainer is located up against the snap ring . Install a new plastic cap.

Load Sense Check Valve Installation

27. Install new ’O’ Ring seal and back up ring

NOTE: *Clearance ’X’ should be approximately* ***0.5 mm*** *(****0.020 in****) from the flange face of the valve segment to the top edge of the inserted check valve.*



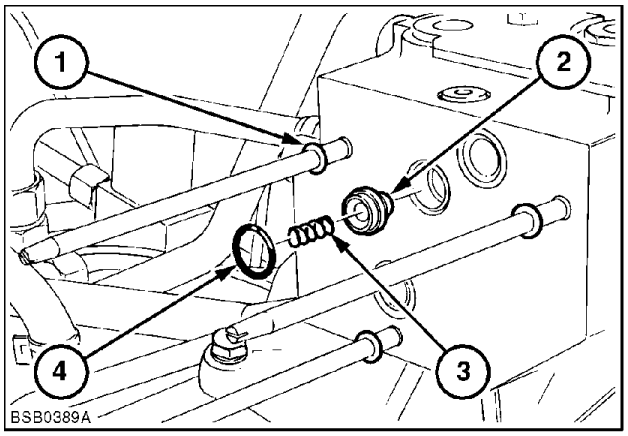
BAIL06CCM139ASA 12

PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Install

PUMA 165, PUMA 180, PUMA 195, PUMA 210

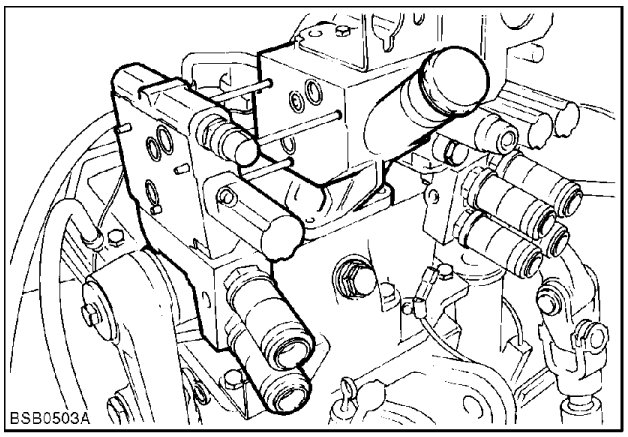
Prior operation:
PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Assemble (A.10.B)

1. Installation
   Apply petroleum jelly to the shims **(1)** and position on each tie rod.
   Ensure load sense check valve **(2)**, spring **(3)** and 'O' rings **(4)** are located in manifold block.



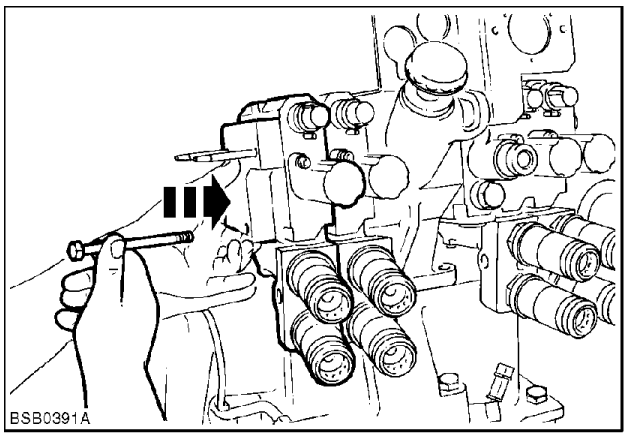
BSB0389A 1

2. Install remote valves and end cap



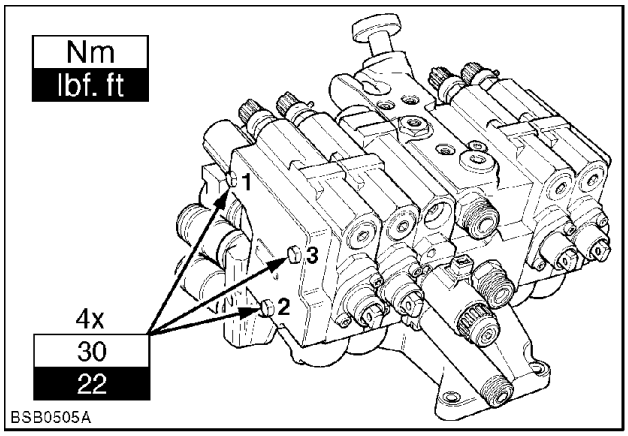
BSB0503A 2

3. To prevent shims from moving out of position use hand pressure to clamp valve stack together while tightening the tie rod nuts.



BSB0391A 3

4. Tighten tie rod nuts to **30 Nm** (**22.1 lbft**) in sequence **(1)**, **(2)** , and **(3)**.

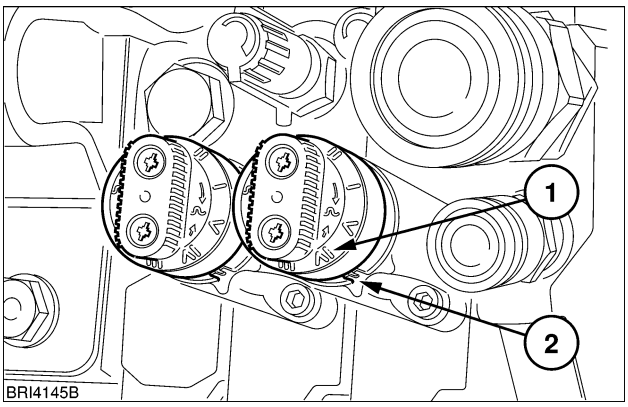


BSB0505A 4

Command Configurable detent - Remove

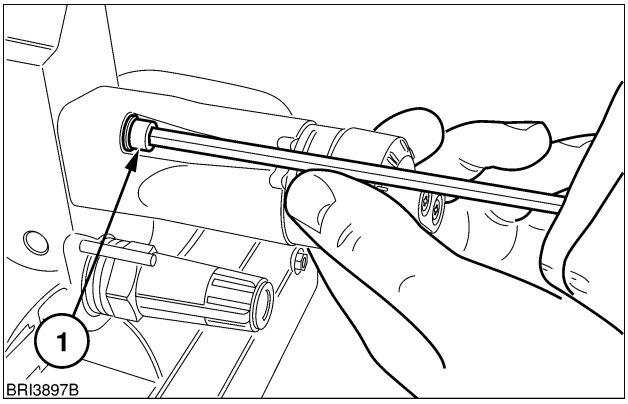
PUMA 165, PUMA 180, PUMA 195, PUMA 210

1. Before removing the detent housing ensure the remote spool is in the neutral position and the detent configuration knob **(1)** is in position III.



BAIL06CCM175ASA 1

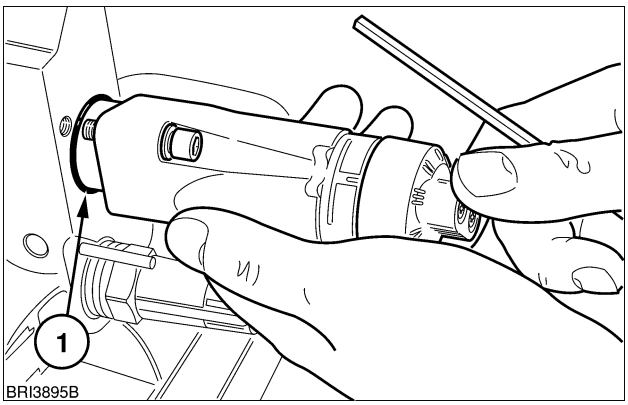
2. Unscrew the two hexagon headed screws **(1)** which retain the cap to the valve slice.



BAIL06CCM176ASA 2

3. Carefully remove the cap. Do not push or pull the spool whilst removing the cap. Ensure that the 'O' ring **(1)** is not damaged during the removal process.

NOTE: *Inside the cap there are shims between the spring seat and the cap. These shims are unique to the detent unit and should be removed from the cap and kept safe for installation.*



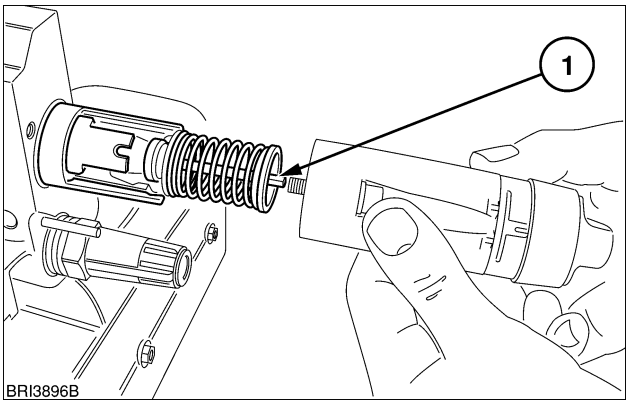
BAIL06CCM177ASA 3

Command Configurable detent - Install

PUMA 165, PUMA 180, PUMA 195, PUMA 210

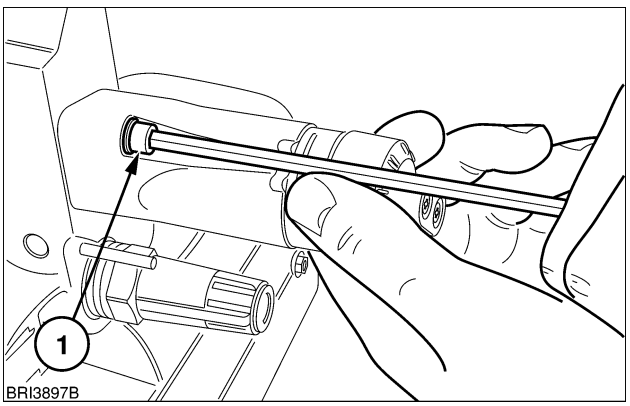
Prior operation:
Command Configurable detent - Remove (A.10.B)

1. Ensure the detent configuration knob is in position III on the cap. Place the shims inside the cap making sure they are correctly positioned.
2. Fit the cap over the detent section making sure rotary shaft **(1)** of the adjustable detent fits onto the configuration knob.



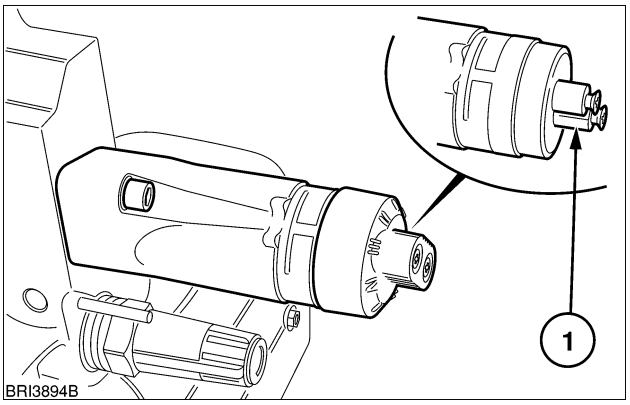
BAIL06CCM178ASA 1

3. Place the hexagon headed screws **(1)** into cap and tighten both screws evenly to a torque of **5.5 Nm** (**4.06 lbft**) .



BAIL06CCM176ASA 2

4. Move the spool from neutral to lower, raise, and back to neutral to ensure smooth operation.
5. To assemble the plastic knob to the alloy knob **(1)** use the screws that are supplied with the new knob . These screws are coated with micro encapsulated adhesive and can only be used once . Torque to **1.5 Nm** (**1.11 lbft**) .

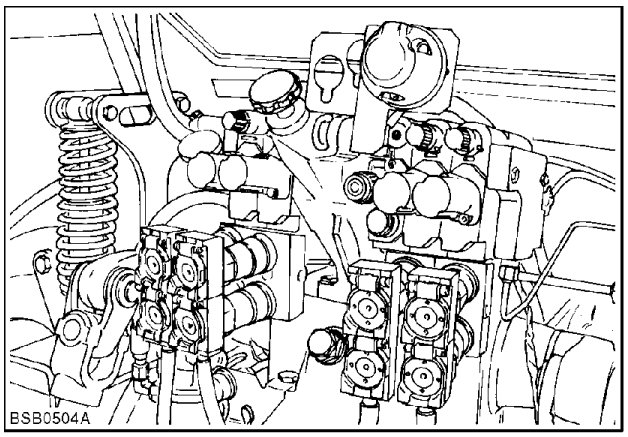


BAIL06CCM179ASA 3

Stack valve - Remove

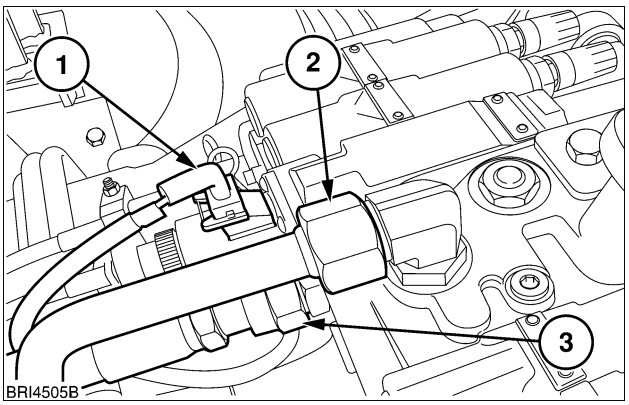
PUMA 165, PUMA 180, PUMA 195, PUMA 210

1. Removal - Complete Valve Stack
   Steam clean remote control valve assembly prior to removal.
   Lower hydraulic links.
   Remove covers on remote valve couplers.



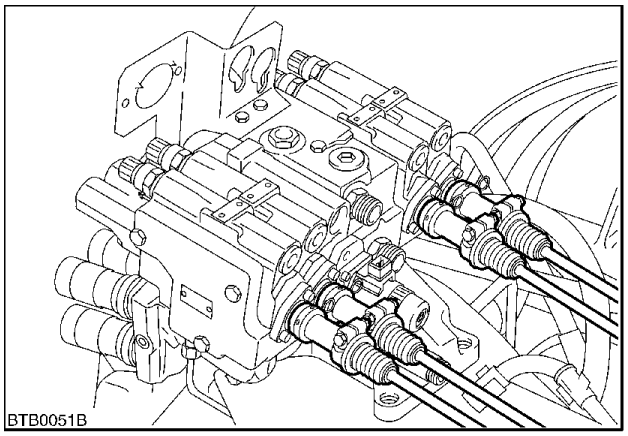
BSB0504A 1

2. Remove trailer socket (Where fitted)
   Disconnect electrical connections to each electronic draft control solenoid **(1)** .
   Disconnect hydraulic pipes **(2)** and **(3)** .



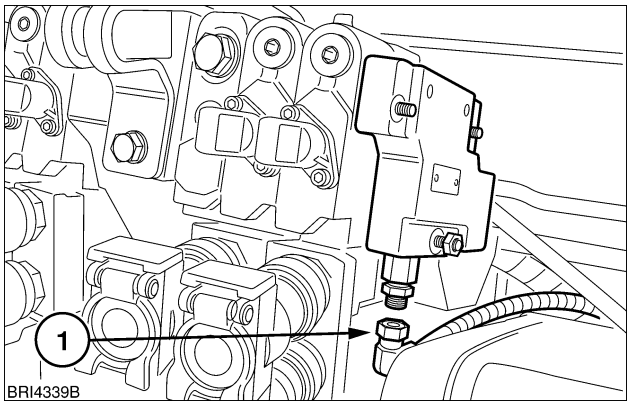
BAIL06CCM260ASA 2

3. Disconnect remote valve control linkage.



BTB0051B_189 3

4. Remove load sense line **(1)**



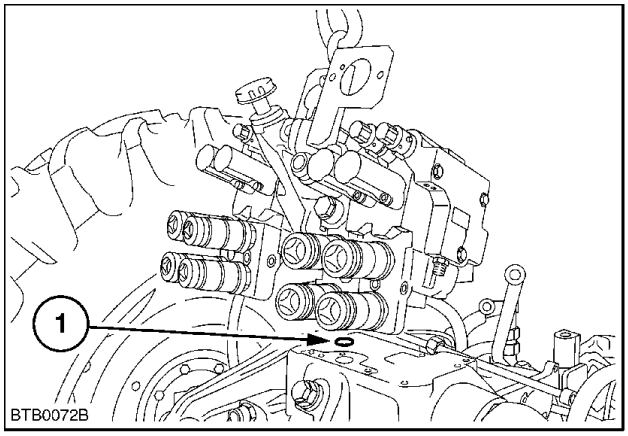
BAIL06CCM249ASA 4

5. Using suitable lifting equipment support remote valve assembly, remove base securing bolts and lift valve stack from tractor.
   Retrieve 'O' ring **(1)**

⚠ WARNING ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012



BTB0072B 5

Next operation:
PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Remove (A.10.B)

Stack valve - Install

PUMA 165, PUMA 180, PUMA 195, PUMA 210

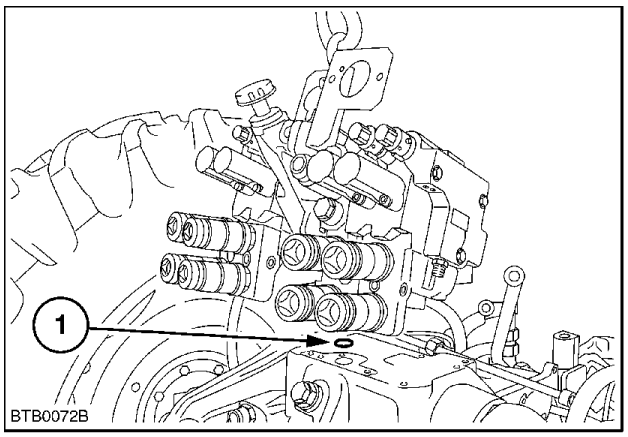
Prior operation:
Stack valve - Remove (A.10.B)

1. Install 'O' ring **(1)** . Using suitable lifting equipment support remote valve assembly and locate on rear axle. Secure with retaining bolts .
   Tighten retaining bolts to torque of **43 Nm** (**31.7 lbft**).

⚠ WARNING ⚠

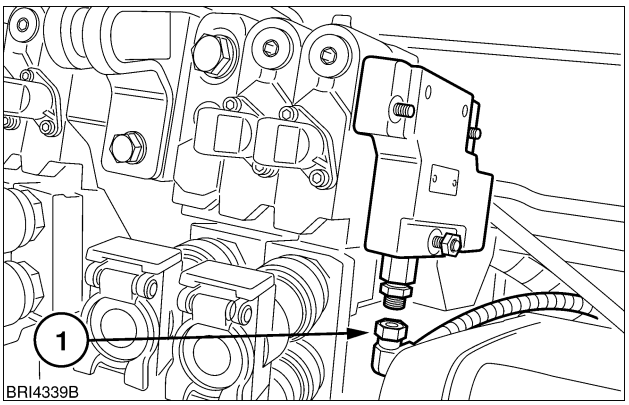
Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012



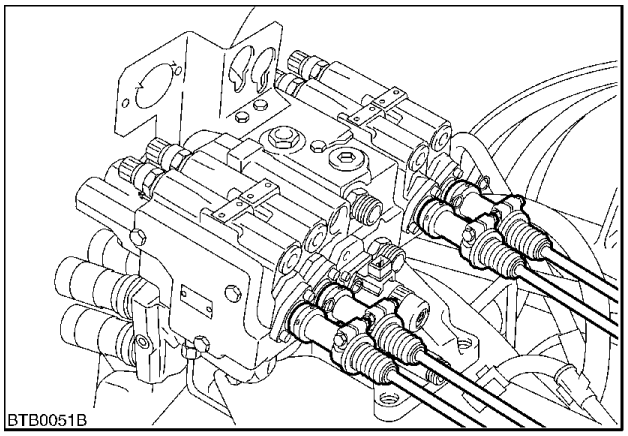
BTB0072B 1

2. Reconnect the load sense hose **(1)** .



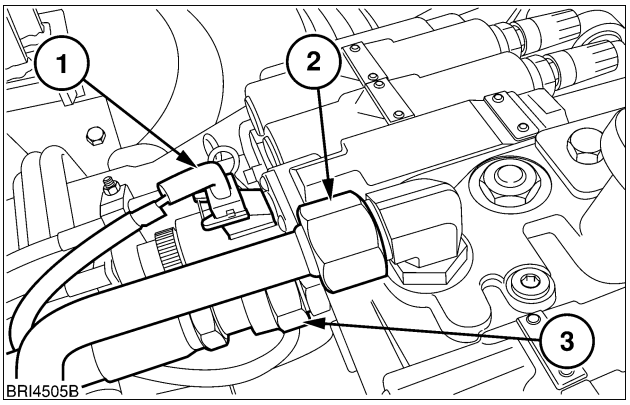
BAIL06CCM249ASA 2

3. Reconnect the remote valve control linkage



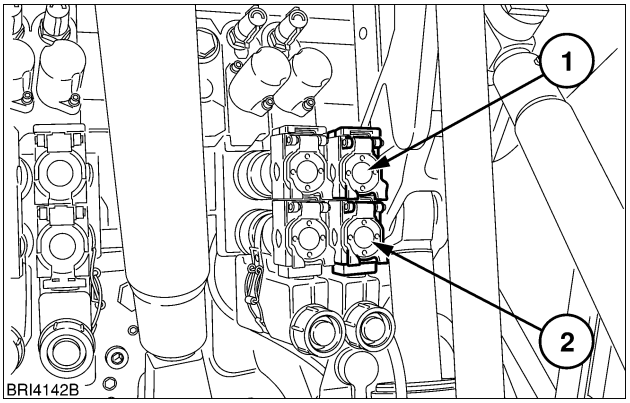
BTB0051B_189 3

4. Reconnect electronic draft control electrical connections **(1)** and connect the hydraulic pipes. **(2)** and **(3)** .
   Refit trailer socket (Where fitted).



BAIL06CCM260ASA 4

5. Install the remote valve coupler covers **(1)** and **(2)** .



BAIL06CCM162ASA 5

Remote control valve - Troubleshooting

PUMA 165, PUMA 180, PUMA 195, PUMA 210

Problem	Possible Cause	Correction
No spool movement	Valve spool sticking	Check that the spool moves into both end detent positions
	Operating cable incorrectly adjusted or worn	Readjust cable or replace if worn or faulty
	Oil leakage from detent or mechanical seizure	If oil is present disassemble the detent cap and replace the 'O' rings and if necessary any damaged parts.
	Lift check valve spring faulty or broken	Remove and replace lift check valve assembly. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Assemble (A.10.B)**
	Load holding check valve plunger worn, broken, or incorrectly adjusted	Replace load holding check valve and plunger. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Assemble (A.10.B)**
	Remote Valve Slice faulty	Replace complete valve section. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Remove (A.10.B)**
No oil flow	Valve slices may be faulty	Check oil flow of valve slices. Refer to **PRIMARY HYDRAULIC POWER SYSTEM - Pressure test (A.10.A)**
	Control valve sticking	Check that the control valve moves into both end detent positions.
	Flow regulator not adjusted correctly	Adjust flow regulator. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Assemble (A.10.B)**
	Flow control valve spool sticking	Remove flow control valve spool and replace
	Valve slice faulty	Replace complete valve slice. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Remove (A.10.B)**
Oil leakage	Lift check valve bore plug leaking	Remove lift check valve and install new valve assembly. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Assemble (A.10.B)**
	'O' ring failure between valve slices	Replace 'O' rings. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Remove (A.10.B)**
	Oil ingress through detent cap	Disassemble detent cap and replace 'O' rings. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Assemble (A.10.B)**
	Oil flow regulator leaking	Remove and replace flow control regulator.
	Oil leakage between coupler manifold and remote valve slice.	Separate the coupler manifold from the valve slice and replace the 'O' rings.
	Couplers seals worn or damaged	Replace seals. Refer to **Coupler - Overhaul (A.10.C)**

Problem	Possible Cause	Correction
	Remote valve slice faulty	Replace complete valve slice and torque retaining nuts in correct sequence. Torque **30 Nm** (**22.13 lbft**)
High oil operating temperature	Flow control regulator incorrectly adjusted	Adjust the flow control regulator for the required flow at operational engine r.p.m. NOTE : DO NOT USE AN EXTERNAL RESTRICTOR FOR OIL FLOW CONTROL.
Implement creeps down with the remote valve in the 'neutral' position	Feed hose incorrectly connected to coupler.	Connect feed hose to 'raise coupler.
	Load check valve faulty or incorrectly adjusted	Replace valve or ensure correct adjustment. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Assemble (A.10.B)**
Implement dips initially when the operating linkage is in the 'Raise' position	Lift check valve worn or damaged	Remove and replace lift check valve. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Closed center mechanical remote valve - Assemble (A.10.B)**

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DISTRIBUTION SYSTEMS - A

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - 10.C

PUMA 165 Multicontroller , PUMA 165 [Z7BH01001 - Z9BH40000] , PUMA 165 [Z7BH50001 - Z9BH60000] , PUMA 180 Multicontroller , PUMA 180 [Z7BH01001 - Z9BH40000] , PUMA 180 [Z7BH50001 - Z9BH60000] , PUMA 195 Multicontroller , PUMA 195 [Z7BH01001 - Z9BH40000] , PUMA 195 [Z7BH50001 - Z9BH60000] , PUMA 210 Multicontroller , PUMA 210 [Z7BH01001 - Z9BH40000] , PUMA 210 [Z7BH50001 - Z9BH60000]

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Mid-mount remote control valve

Torque 7
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

FUNCTIONAL DATA

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve

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Mid-mount remote control valve

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Install 76
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Calibrate 77
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Coupler

Overhaul 80
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Mid-mount remote control valve

Remove 81
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Install 83
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Disassemble 85
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Assemble 86
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

DIAGNOSTIC

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve

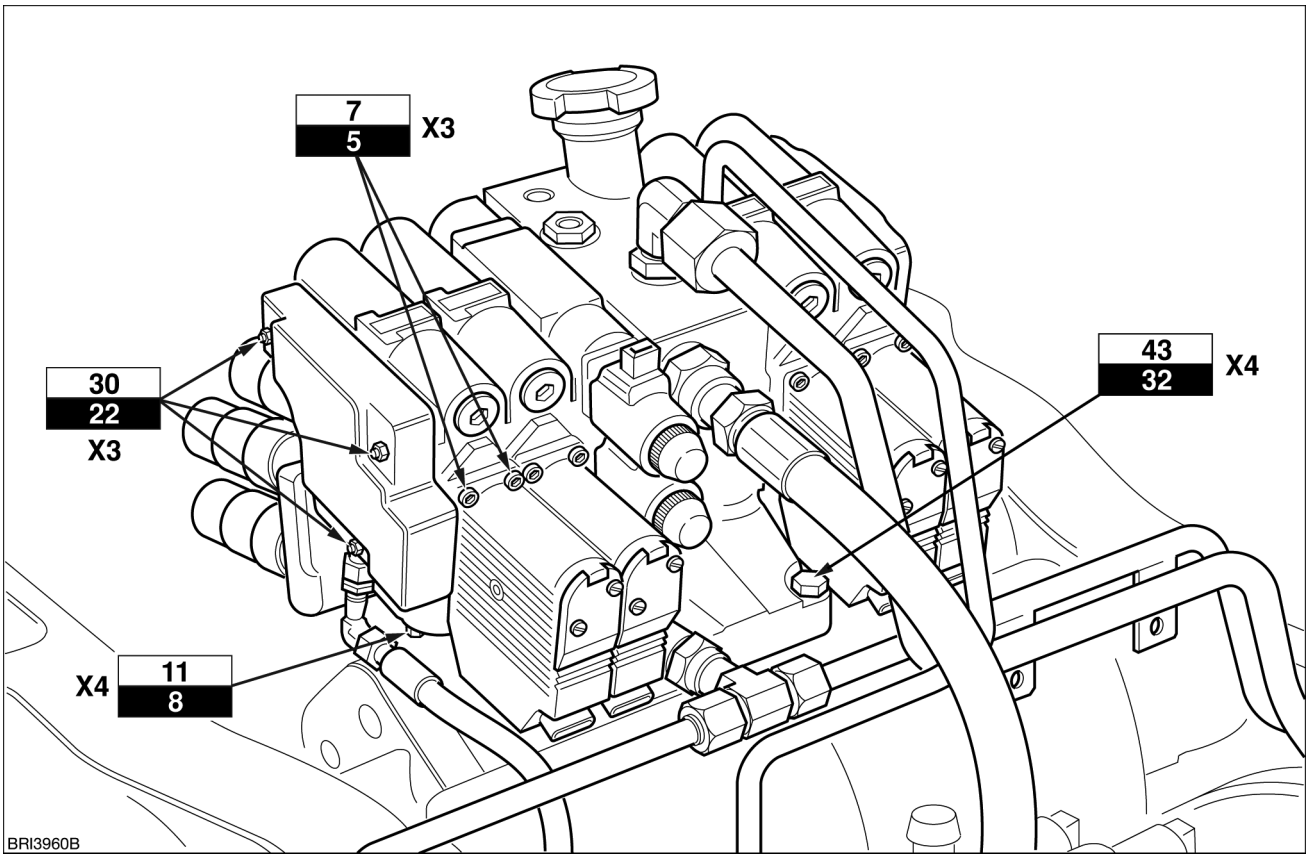
Troubleshooting 90
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Remote control valve

Troubleshooting 91
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Torque

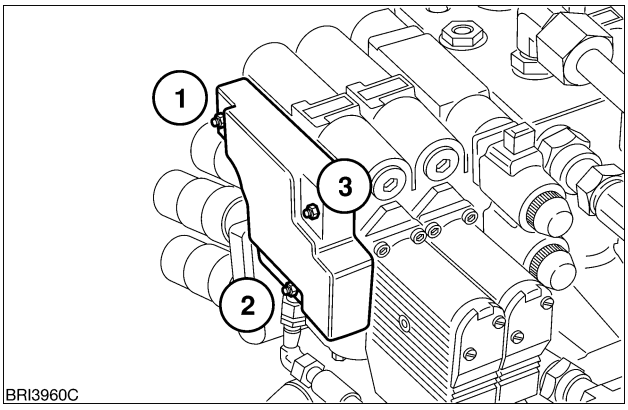
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller



BAIL06CCM032FSA 1

Remote Valve Assembly Torques

IMPORTANT: *Apply torque to retaining nuts in the correct sequence as shown in figure* ***2***



BAIL06CCM159FSA 2

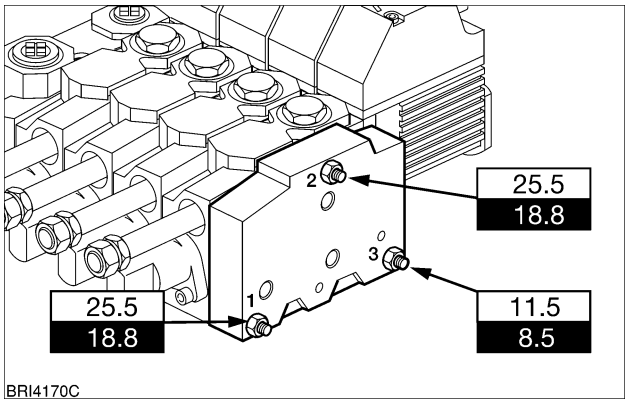
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Special tools

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

380002720	Check valve removing and refitting tool
Procure Locally	Flowmeter **0 - 200 l/min** (**0.0 - 52.8 US gpm**)

Mid-mount remote control valve - Torque

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller



BAIL06CCM141ASA 1

Mid Mount Valve Assembly Torques showing tightening sequence
Refer to Mid-mount remote control valve - Assemble (A.10.C)

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Dynamic description

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

When the remote valves are in neutral the control valve spool is held in the central position by the centering spring **(5)** See .Figure **1**
Oil flow from the parallel gallery **(A)** to the raise and lower ports is blocked by the lands of the main control spool **(4)**. Gallery **(C)** and load sensing gallery **(D)**' are vented to reservoir through galley **(G)**.
The galleries to the raise and lower ports are blocked by the lands on the main control spool.
The pin on the lock valve is positioned in the waisted section of the spool allowing the valve to be spring loaded into the closed position preventing an extended cylinder retracting under load should there be a slight leakage in the main spool.

Single Remote Control Valve Operation-Neutral

1. Flow Control Spool
2. Metering Land
3. Load Hold Check Valve
4. Main Control Spool
5. Spool Centering Spring
6. Control Spool Operating Piston
7. Position Sensor
8. Micro Processor
9. Solenoid Valve
10. Pin
11. Lock Valve
12. Raise (Cylinder Extend) Port
13. Lower (Cylinder Retract) Port



Pump Pressure



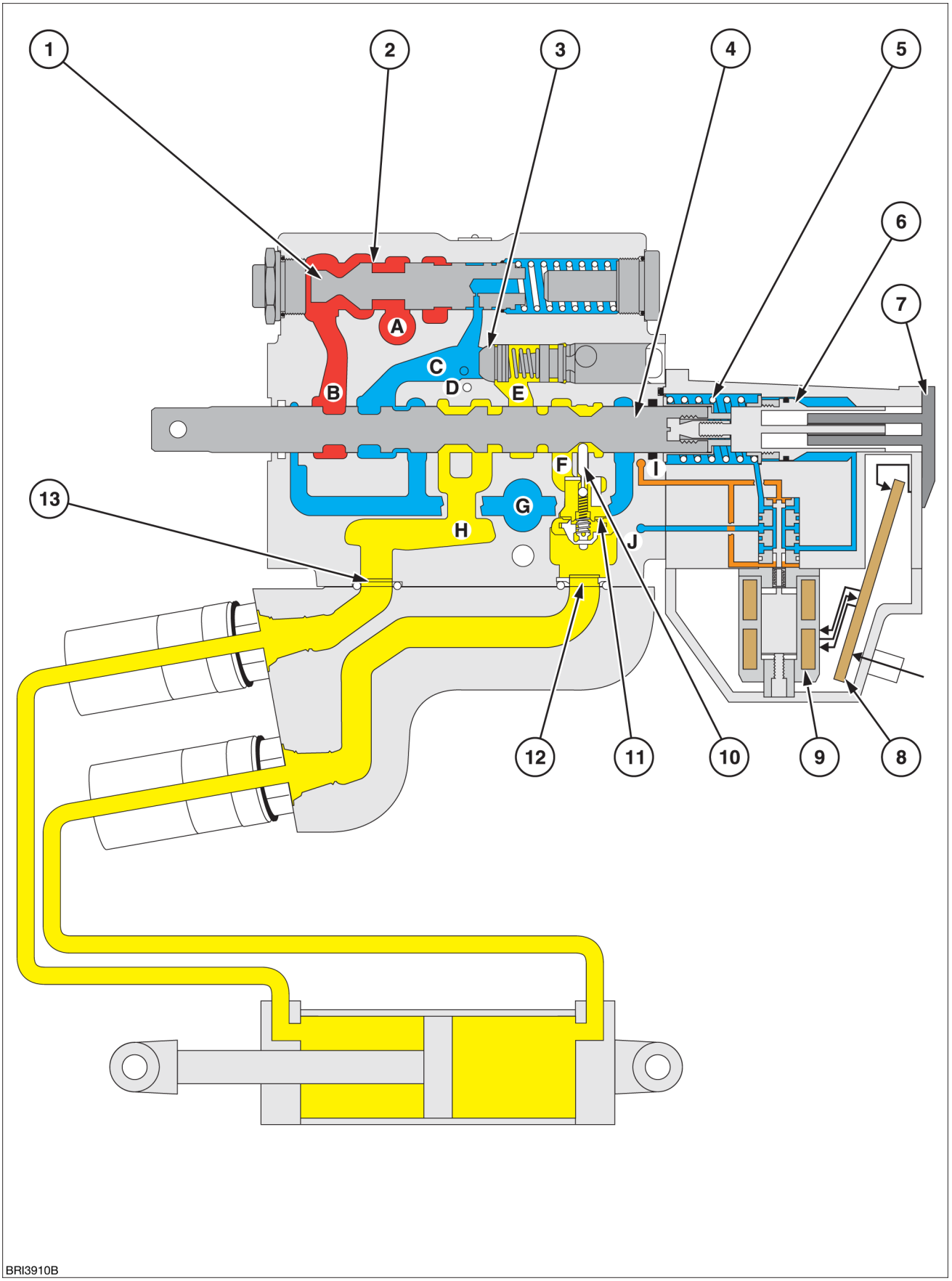
Return to Reservoir



Trapped Oil



Pilot Line Pressure



BAIL06CCM019GSA 1

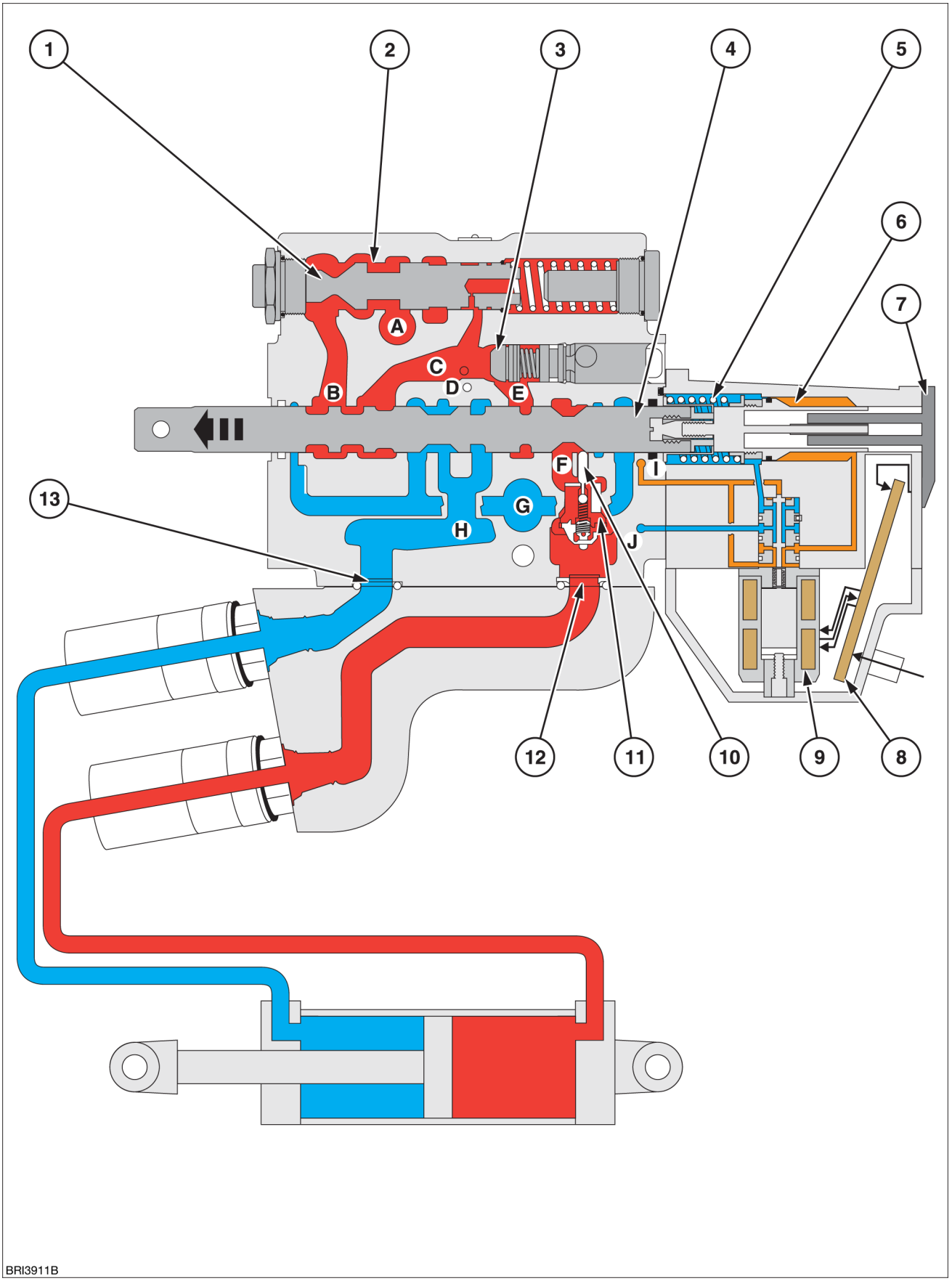
OIL FLOW IN RAISING (CYLINDER EXTEND)

When the remote valve operator control switch is moved to the raise position the control spool is moved to the left via pilot line oil from the solenoid control unit, supplied from Gallery **(I)**. See Figure **2**
Moving the spool to the raise position causes the pin **(6)** on the lock valve to ride up the ramp of the spool and hold the valve in the open position.
Gallery **(B)** is now open to gallery **(C)** and gallery **(E)** is open to gallery **(F)**.
The flow from gallery **(C)** is blocked by the load hold check valve **(3)** until pressure in the gallery is sufficient to lift the valve off its seat against the back pressure in the lift port gallery **(E)**.
Oil can flow from:-
Gallery **(C)** past the load hold check valve into Gallery **(E)**.
Across the flat on the main control spool to Gallery **(F)**.
Through the lock valve **(7)**.
Out through the raise port **(8)** of the remote valve.
Exhaust oil from the extending cylinder returns through the lowering port and gallery **(H)**, around the land on the main control spool and back to reservoir via the common gallery **(G)**.
If the load hold check valve **(3)** was not installed the situation could occur where pump pressure is insufficient to support the load in the raise port when the remote valve is moved from neutral to raise condition. Under this situation the load would momentarily drop until pump pressure was sufficient to support the load.
The rate of flow through the remote control valve is controlled electronically by the control unit solenoid, again based on the setting of the flow potentiometer within the cab.
To maintain set flow through the remotes under all conditions with varying pump inlet pressure in parallel gallery **(A)** the flow control spool senses the pressure and the spool adjusts to provide the required flow at each operating remote. The differential pressure sensed on each end of the spool causes the spool to move to a new state of equilibrium and continually regulates the flow across the spool metering lands **(2)** to maintain a constant flow through the flow control restriction irrespective of pressure in other hydraulic circuits.
The pressure in gallery **(C)** is also transmitted down the load sensing gallery **(D)** to the flow compensating valve of the variable flow piston pump where pump output is regulated according to circuit demand.

Single Remote Control Valve Operation-Raising (Cylinder Extend)

1. Flow Control Spool
2. Metering Land
3. Load Hold Check Valve
4. Main Control Spool
5. Spool Centering Spring
6. Control Spool Operating Piston
7. Position Sensor
8. Micro Processor
9. Solenoid Valve
10. Pin
11. Lock Valve
12. Raise (Cylinder Extend) Port
13. Lower (Cylinder Retract) Port

	Pump Pressure		Return to Reservoir
	Remote Valve Operating Pressure		Pilot Line Pressure



BAIL06CCM020GSA 2

OIL FLOW IN LOWERING (CYLINDER RETRACT)

When the remote valve operator control switch is moved to the lower position the control spool is moved to the right via pilot line oil from the solenoid control unit, supplied from gallery **(I)**.See Figure **3**
In a similar manner as for the raise cycle of the remote valve the position of the spool causes the pin on the lock valve to hold the valve in the open position.
Gallery **(B)** is now open to gallery **(C)** and gallery **(E)** is open to gallery **(H)**.
Oil from the parallel gallery **(A)** flows past the flow control valve spool and restrictor **(2)** into gallery **(C)** and the load sensing gallery **(D)**.
The load hold check valve **(3)** remains closed until pump system pressure is sufficient to overcome the back pressure in gallery **(E)**. When the load hold check valve lifts of the seat oil flows into gallery **(H)**, round the control valve spool to gallery **(G)** and out through the lowering port of the remote valve coupling.
Exhaust oil from the Retracting cylinder returns to reservoir gallery **(G)** though the raising port and lock valve **(7)**.
Pump output and system pressure will continually react to the maximum demand of the tractor high pressure hydraulic circuits as sensed through the load sensing lines.
Flow through the remotes is controlled in exactly the same manner as described in the ‘Oil Flow In Raising’ section by sensing differential pressure across the flow control spool.

Single Remote Control Valve Operation-Lowering (Cylinder Retract)

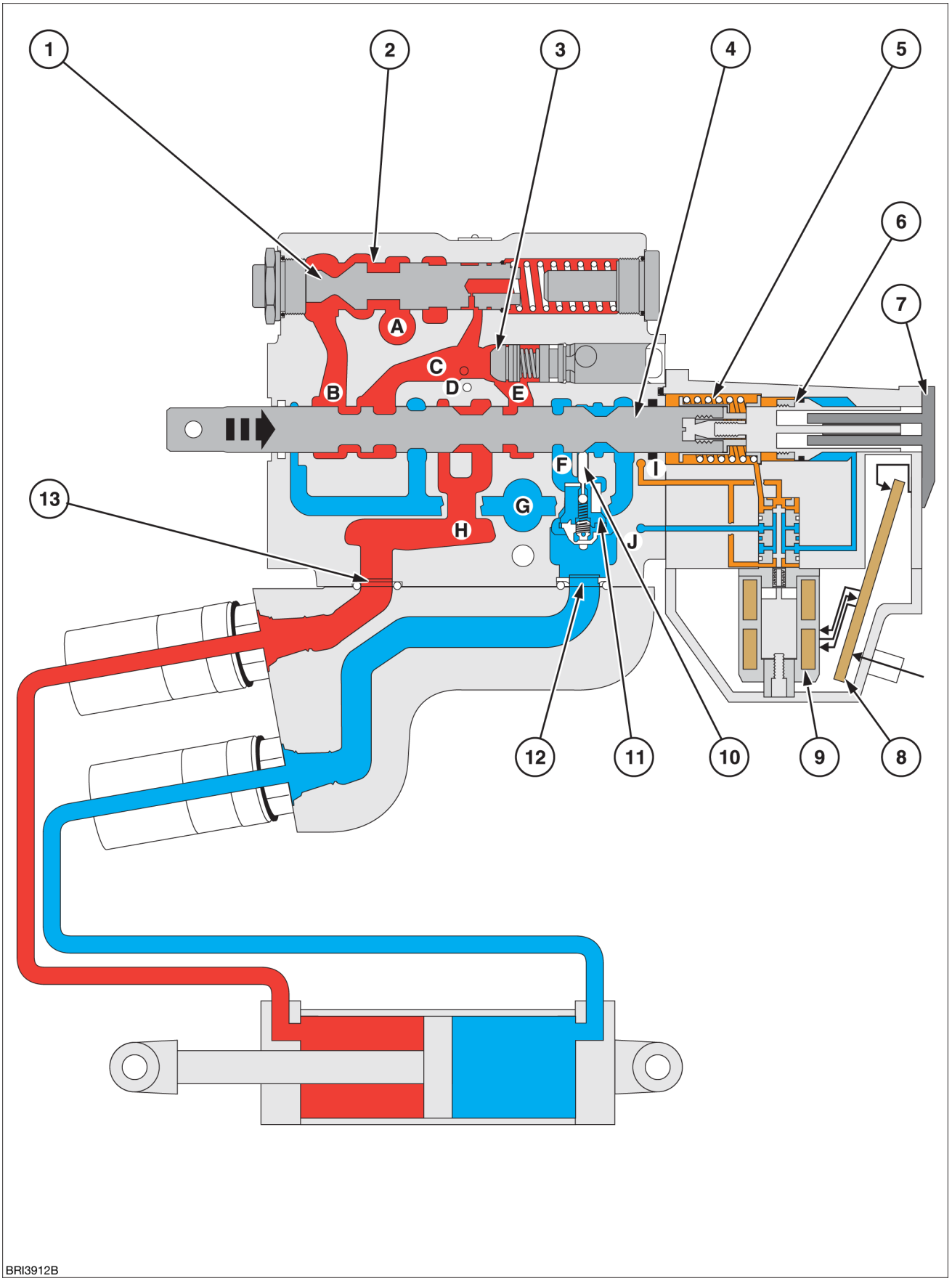
1. Flow Control Spool
2. Metering Land
3. Load Hold Check Valve
4. Main Control Spool
5. Spool Centering Spring
6. Control Spool Operating Piston
7. Position Sensor
8. Micro Processor
9. Solenoid Valve
10. Pin
11. Lock Valve
12. Raise (Cylinder Extend) Port
13. Lower (Cylinder Retract) Port

Pump Pressure

Return to Reservoir

Remote Valve Operating Pressure

Pilot Line Pressure



BAIL06CCM021GSA 3

OIL FLOW IN FLOAT

The float position allows the free flow of oil from both the raise and lower ports of the remote valve permitting the cylinder to extend or retract freely. This feature is particularly useful to allow equipment such as scraper blades to 'float' or follow the ground contour. See Figure **4**
When the remote valve operator control switch is moved to the float position the control spool is moved fully to the right via pilot line oil from the solenoid control unit, supplied from gallery **(I)**.
Oil flow from the gallery **(B)** to the raise and lower ports is blocked by the land of the spool end.
The position of the spool causes the pin **(7)** on the lock valve to hold the valve in the open position.
The raise and lower ports of the remote valve are open to reservoir gallery **(G)** allowing a free flow of oil from one port of the cylinder to the other.
Should a void occur in the circuit oil will be drawn by suction from one side of the cylinder to the other.

Single Remote Control Valve Operation-Float

1. Flow Control Spool
2. Metering Land
3. Load Hold Check Valve
4. Main Control Spool
5. Spool Centering Spring
6. Control Spool Operating Piston
7. Position Sensor
8. Micro Processor
9. Solenoid Valve
10. Pin
11. Lock Valve
12. Raise (Cylinder Extend) Port
13. Lower (Cylinder Retract) Port



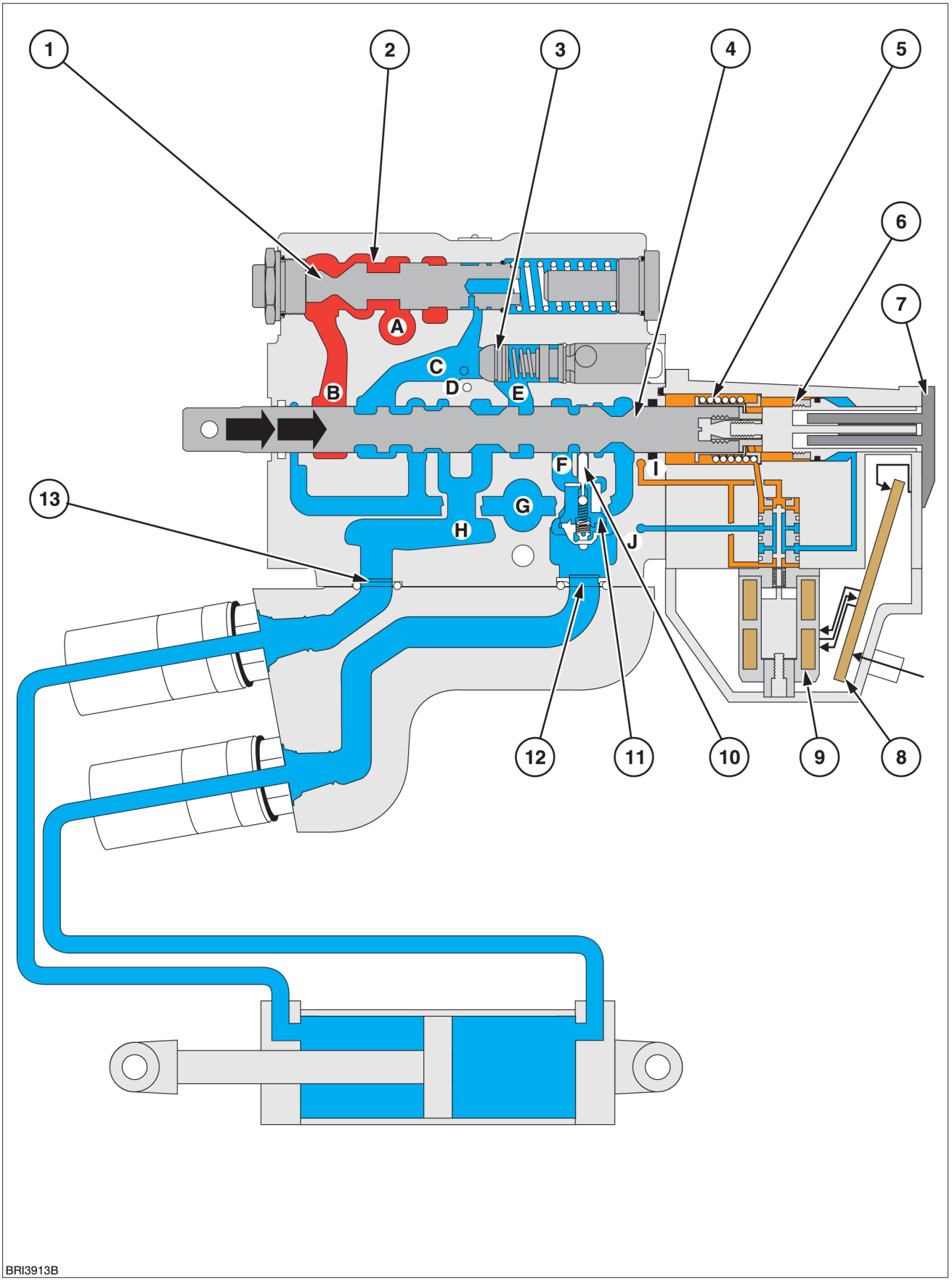
Pump Pressure



Return to Reservoir



Pilot Line Pressure



BAIL06CCM022GSA 4

OPERATION OF TWO OR MORE CONTROL VALVES SIMULTANEOUSLY

Because the stack type remote valves have a common parallel input gallery and individual flow control valves it is possible to operate two or more remotes simultaneously without loss of efficiency. See Figure **5**
This is achieved by the flow control spools which regulate flow through each remote valve irrespective of pump system pressure.
If these valves were not fitted and two remotes were operating simultaneously at different pressures all oil would attempt to flow to the light load circuit.
The following details the process of operating a single remote valve and then operating an additional remote valve at the same time.
When a single service is operated the pressure in the parallel gallery is at pump pressure.
The pressure in the load sense line to the hydraulic pump is equal to the operating pressure of the working remote valve.
Required flow through the electro-hydraulic remote valve is set by turning the operator controlled potentiometer in the cab. The flow is then determined by the control valve spool which is electrically controlled by the control unit solenoid.
The pressure differential in combination with the spring acting on the ends of the flow control spool causes the spool to move to a position of equilibrium which adjusts the flow across the spool metering lands **(3)**.
The adjustment of flow across the metering land **(3)** produces a constant flow through the remote valve.

Single Remote Valve Operating

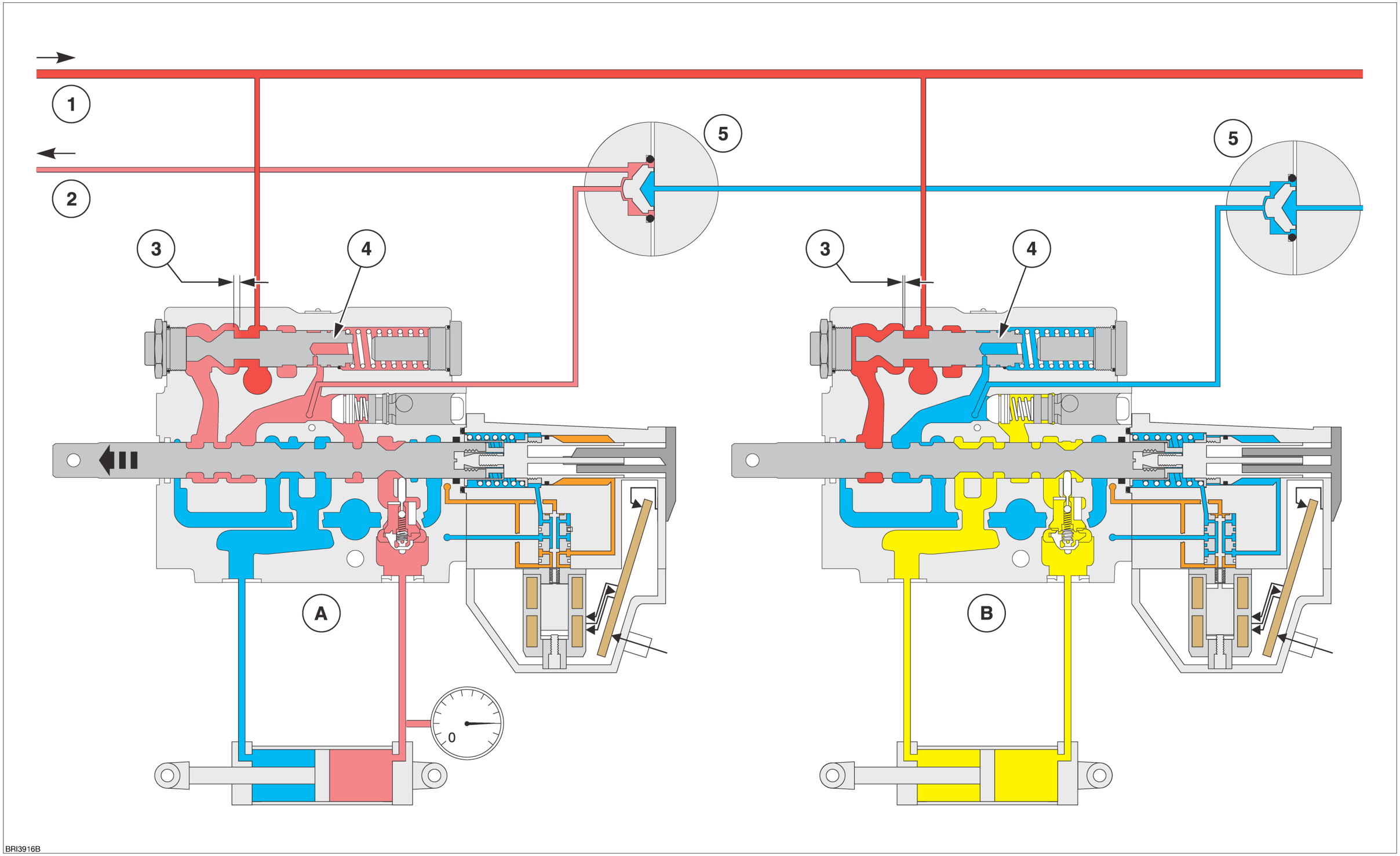
A Remote Valve in Operation
B Remote Valves in Neutral
1 Parallel Gallery (Interconnecting Remote Valves Sections)
2 Load Sense Line (Interconnecting Remote Valves Sections)
3 Spool Metering Lands
4 Flow Control Spool
5 Load Sense Line Check Valve


Pump Pressure


Remote Valve Operating Pressure


Return to Reservoir


Trapped Oil



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It is essential that the flow of oil through two or more remote valves operating simultaneously at different pressures is individually controlled otherwise oil will always flow to the circuit operating at the lowest pressure. See Figure **6**
When operating two or more hydraulic services the operating pressure in the parallel gallery is at the highest operating pressure of the hydraulic system as sensed through the load sense line.
Check valves in the load sense line between each valve section ensure only the highest pressure is directed to the pump flow pressure compensating valve.
In the same manner as for single remote valve operation the differential pressure across the flow control spool is sensed and flow adjusted accordingly.
Because each remote valve is operating at a different pressure the flow control valve spools will move to different positions to achieve a state of equilibrium.
The flow across the metering land **(3)** of the lower pressure operating remote valve will be different to the flow across the metering land of the higher operating pressure remote valve.
The metering land on each flow control spool now maintains the required constant flow through the flow control restriction in each remote valve irrespective of the higher pump system pressure required to operate other hydraulic circuits.

Two Remote Valves Operating

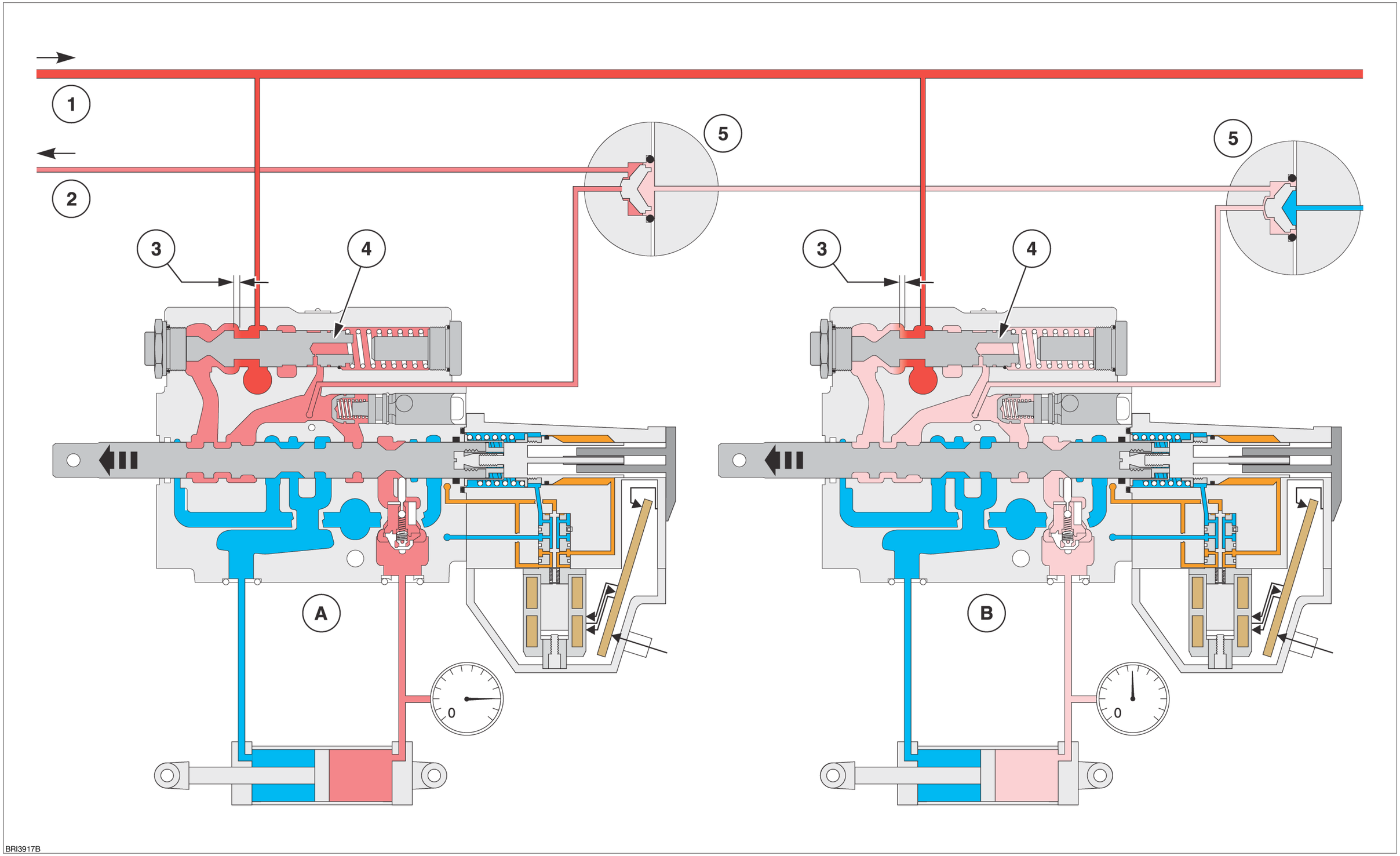
A Remote Valve operating at high pressure
B Remote Valve operating at lower pressure
1 Parallel Gallery (Interconnecting Remote Valves Sections)
2 Load Sense Line (Interconnecting Remote Valves Sections)
3 Spool Metering Lands
4 Flow Control Spool
5 Load Sense Line Check Valve


Pump Pressure


High Pressure Remote Valve Operation


Lower Pressure Remote Valve Operation


Return To Reservoir



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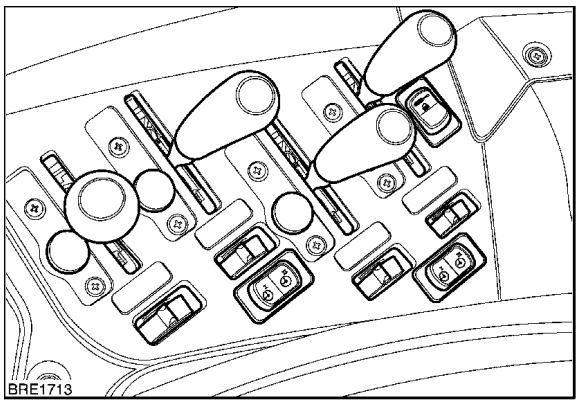
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Static description

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Electro-Hydraulic type remote valves are optional on all models.
Each remote valve has its own built in microprocessor which controls the oil flow through a solenoid activated valve, based on inputs received from the operator controlled switches.
Each remote valve is connected into the electrical CAN BUS system to the XCM processor, located under the Electronic Draft Control panel in the right hand console. Each remote valve can also detect system faults and send a message to the XCM processor which in turn sends a signal to allow a fault code to be displayed on the instrument cluster.
. The fault finding flow charts can be found in **Control module - Fault code index (A.50.A)**.

Control Levers

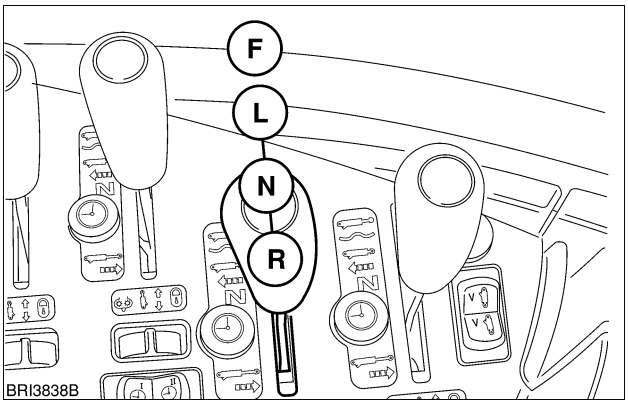
Remotes valves I to IV are operated by control levers in the right-hand console. Each control lever is coloured to correspond to the colour on the remote valve. A maximum of five electro-hydraulic remote valves may be fitted. The fifth valve is operated by a rocker switch situated to the right of the levers.



BRE1713 1

1. Control lever I — Green
2. Control lever II — Blue
3. Control lever III — Brown
4. Control lever IIII — Black

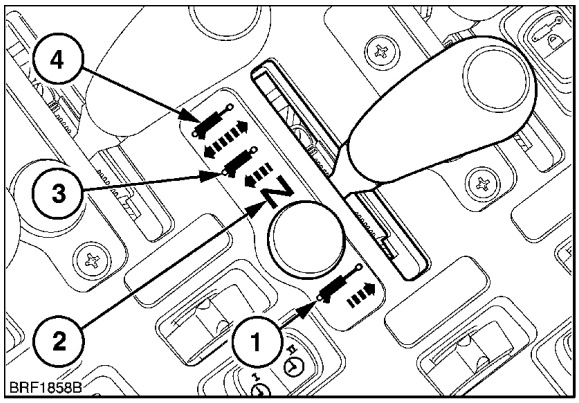
The remote valve control levers have four positions: neutral, extend, retract, and float.
The remote valve control levers have four positions: neutral, extend, retract, and float.
Pull the lever back from the neutral position, to the “extend" (raise) position. From neutral, push forward to the “retract" (lower) position. Push the lever fully forward to the float position. Float will permit the cylinder to extend or retract allowing equipment such as scraper blades to “float" or follow the ground contour.



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The “float" position is also used for retracting a single-acting cylinder and for the OFF position for hydraulic motors.

The extend, **(1)**, neutral, **(2)**, retract, **(3)**, and float, **(4)**, positions are identified by symbols on the decal behind each control lever.

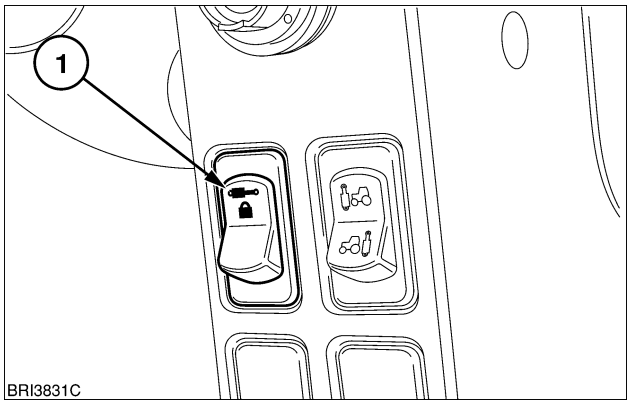


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Isolator Switch

The remote valves will not operate unless the system is energised using the isolator switch which is located on the ‘C‘ pillar. **(1)**. Press and release the switch to activate the system, press again to de-activate. Once energised, the remote valves will operate whenever the tractor engine is running.

IMPORTANT: *The isolator switch may be used to immediately stop operation of the rear remote hydraulics by quickly depressing the switch. The isolator switch only controls the remote valves and has no effect on three point linkage operation.*

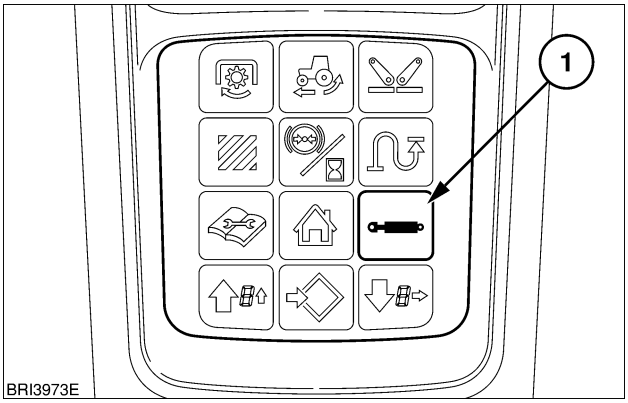


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Manual and Programmable Lever Operation

The Enhanced keypad is used to select and programme the timed functions for each of the electro-hydraulic remote valves. As each remote valve is selected using the remote valve key **(1)**, a visual display of the valve functions will appear in the Dot Matrix screen.

Depress the key once to activate the remote valve display in the DMD. Repeated operation of the key will cycle through each valve display individually.



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Manual Operation

When used in manual mode, without the timer function, the electronic remote valves will operate in a similar way to the mechanical valves previously described.

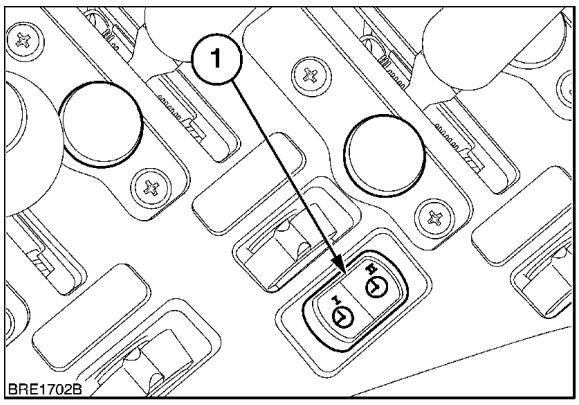
IMPORTANT: *Care must be taken when operating in the manual mode that the remote valve lever is not left in the detented extend or retract positions when using remote cylinders. When the cylinder has reached the end of its stroke the control lever must be returned to the neutral position manually. Failure to observe this procedure will overheat the oil and may lead to failure of hydraulic or driveline components.*

IMPORTANT: *Never use the neutral position from the extend or retract position to stop a hydraulic motor. Sudden hydraulic lock up of the system may cause extensive damage to the motor.*

In manual mode, oil flow through each valve is adjusted using the flow rate setting as previously described.

Timed Programme Operation

Timed programme operation is provided primarily for operation of hydraulic cylinders. This feature allows the operator to programme a time delay between when the control levers are activated and when the oil flow to the implement is stopped.
To operate the electronic remote valves in programmed mode, depress the appropriate side of timer control switch **(1)** as shown. When the switch is depressed, the green light adjacent to the switch will start to flash. The system is now in standby mode ready to accept a programme sequence. The light will continue to flash for twenty seconds allowing the operator sufficient time to begin the programming sequence. If a programme is not started within this period, the system will automatically de-activate, depress the timer control switch again to restart the sequence.



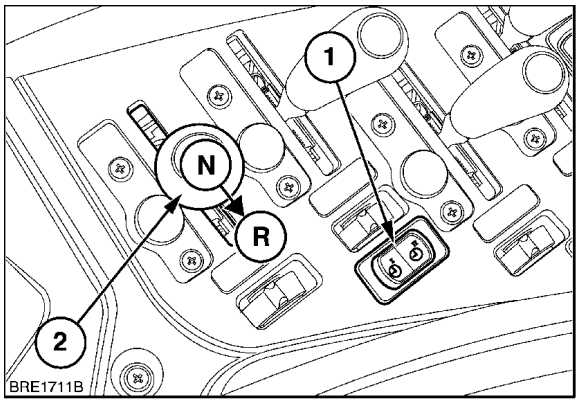
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Programming a Double Acting Service

To programme the remote valves, first ensure the cylinder hydraulic hoses are properly connected to the appropriate rear remote valve. Start the tractor engine and set at the normal operating speed in which the cylinder is to be operated. This is important as the programming of the control levers is based on a time interval corresponding to the time it takes the cylinder rod to extend and retract. Any change in engine rpm will have an effect on hydraulic flow and therefore the time taken for the cylinder to extend and retract.

The timed period for control lever operation remains the same regardless of oil flow, therefore consistent operation is required for the system to function correctly. Using the corresponding timer switch **(1)** depress the switch so the light begins to flash. While the light is flashing move control lever **(2)** to extend the cylinder. At this point the light ceases to flash and will remain on.

Hold the lever until the cylinder is extended to the desired position and then return the lever to the neutral position. When the lever is returned to the neutral position the programming light will begin to flash again indicating the retract phase of the cycle should now be programmed.

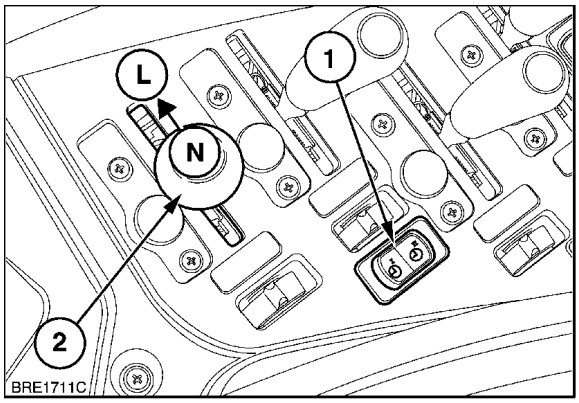


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Operate the control lever **(2)** to retract the cylinder **(L)** and the programming light will cease to flash and remain on. Hold the lever until the cylinder has completed the retract cycle and then return to the neutral position. After the second phase has been programmed the light will remain on.

Timed programme operation of the remote valve is now completed for both extend and retract movements of the cylinder.

Repeat the above sequence to programme the remaining control levers.



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Programming of the control lever can be performed in either sequence, extend/retract, retract/extend or for one movement only, extend or retract. The maximum allowable time span for any timed operation is **30 seconds**.

NOTE: *Turning the keystart switch OFF will erase the programme.*

Programming a Single Acting Service

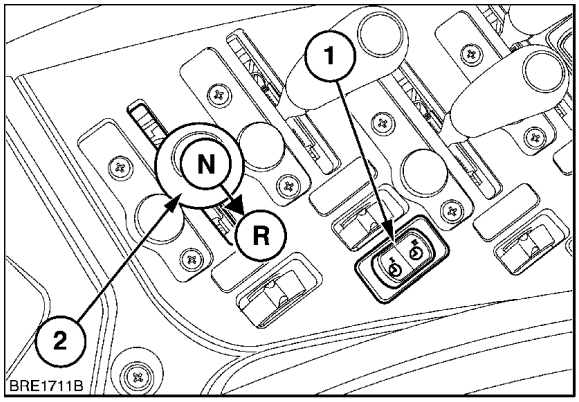
To programme a single acting service carry out the same setup procedure as previously described for a double acting service.

With the programme light flashing, move the remote valve lever from neutral to the extend position **(R)**. When the cylinder has extended to the desired position, manually return the lever to the neutral position. The programme light will continue to flash but this should be ignored and the lever left in the neutral position. After **10 seconds** the light will cease to flash and will remain on, thus indicating the single acting programme has been memorised.

The single acting service can be programmed in both the extend and retract modes.

NOTE: *When using a timed sequence for a single acting service i.e. programmed in extend mode only, the retract mode will not function until the programme sequence has been deleted.*

If the control lever is moved to the float position no timed programme is possible and the control lever must be returned to neutral manually.



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Replaying a Timed Programme

The timed sequence begins as soon as the lever is placed in the extend or retract detent position. On reaching the end of the timed period, oil flowing through the remote valve will be halted, the remote valve lever should now be returned to the neutral position ready for the next operation. Throughout the replay sequence, the green warning light will remain illuminated.

Deleting Programmes

To delete a programme, depress the programme switch to de-activate timer operation. The light will extinguish and the memorised sequence will be cleared from the programme in the memory.

Relieving System Pressure

To ease removal and installation of the couplers, relieve the pressure in the system. Securely support the implement. Make sure no one will be injured by moving equipment when relieving pressure in the system. Move the control lever to the float position with the engine running. This will relieve the pressure. Turn the engine off with the control lever still in float. After the engine is shut down return the control lever to the neutral position. The couplers can now be connected or disconnected with minimal pressure and effort.

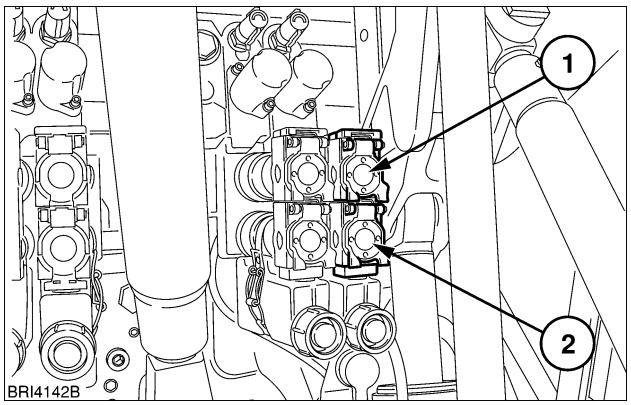
⚠ WARNING ⚠

Before connecting or disconnecting hydraulic hoses at the remote cylinders, relieve the pressure in the circuit by first starting the engine and then move the control levers fully forward to the “float" position. Then stop the engine. Make sure no one will be injured by moving equipment when relieving pressure in the system. Before disconnecting cylinders or equipment, make sure the equipment or implement is supported securely. Never work under equipment supported by a hydraulic device because it may drop if the control is actuated (even with the engine stopped) or in the event of hose failure, etc. always use a secure support for equipment which must be serviced while in the raised position. Make sure that oil contained within the remote cylinders is clean and is of the correct grade.

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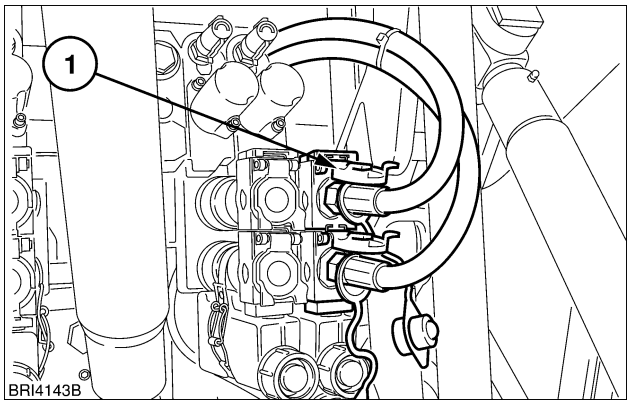
QUICK COUPLERS

Each remote control valve has a pair of **1/2 in**. quick-disconnect, female couplers **(1)** and **(2)**. The couplers are of a self–sealing/locking design but will allow remote cylinder hoses to pull free if the implement should become disconnected from the tractor. The lower coupler **(2)** of each pair is for the feed hose, the upper coupler **(1)** is for the return hose. The couplers referred to in this picture are for remote control valve No. I.
The covers are color coded grey, brown, blue, green to correspond to the control levers in the cab console.



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Hinged, spring-loaded dust caps are provided on each coupler. To connect a remote cylinder, lift the dust cap **(1)** and insert the feed and/or return hose into the coupler, ensuring that it is correctly seated. Ensure that there is sufficient slack in the hoses to allow the tractor/implement to turn in either direction.
Actuate the remote valve to supply hydraulic pressure which will complete the hydraulic coupling of the tractor and implement.
To disconnect, grip the hose a short distance from the coupler, push the hose forward, into the coupler, then quickly pull on the hose to 'pop' the coupler free
The couplers will accept standard **1/2 in** SAE or ISO connectors. The couplers can be connected or disconnected under pressure. Disconnect pressure is proportional to system pressure. Increased system pressure will require increased force to disconnect the couplers.



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NOTE: *The oil flow through remote valve number one will always take priority over the other valves. For equipment using more than one valve, the hydraulic service requiring the highest flow should be connected to valve number one.*

Relieving System Pressure

To ease removal and installation of the couplers, relieve the pressure in the system. Securely support the implement. Make sure no one will be injured by moving equipment when relieving pressure in the system. Move the control lever to the float position with the engine running. This will relieve the pressure. Turn the engine off with the control lever still in float. After the engine is shut down return the control lever to the neutral position. The couplers can now be connected or disconnected with minimal pressure and effort.

NOTE: *Before connecting or disconnecting hydraulic hoses at the remote cylinders, relieve the pressure in the circuit by first starting the engine and then move the control levers fully forward to the "float" position. Then stop the engine. Make sure no one will be injured by moving equipment when relieving pressure in the system. Before disconnecting cylinders or equipment, make sure the equipment or implement is supported securely. Never work under equipment supported by a hydraulic device because it may drop if the control is actuated (even with the engine stopped) or in the event of hose failure, etc. always use a secure support for equipment which must be serviced while in the raised position. Make sure that oil contained within the remote cylinders is clean and is of the correct grade.*

CONNECTING SINGLE-ACTING CYLINDERS

Connect the hose from a single-acting cylinder to the left lower coupler on the remote control valve, as previously described

.

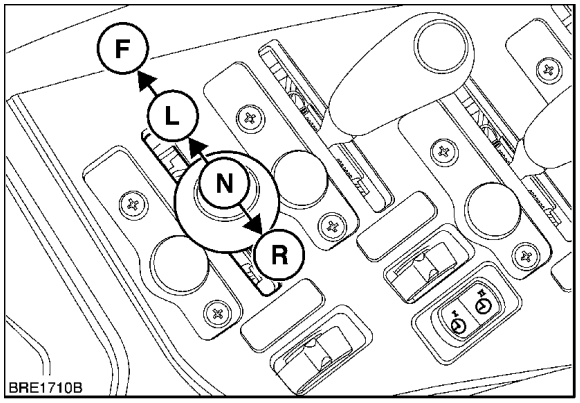
To extend a single-acting cylinder, pull the control lever back to the “extend" position **(2)**.

Manually return the lever to the neutral position to stop the cylinder before it is fully extended or allow the valve to return to neutral automatically when the cylinder reaches the end of its stroke and timed operation.

To retract a single-acting cylinder, move the lever fully forward to the “float" position **(F)**.

NOTE: *In single acting timer mode the remote lever will lock in the extend position and will not automatically return to the neutral position.*

IMPORTANT: *Always use the “float" position to lower a single-acting cylinder. The “retract" position is for double-acting cylinders only.*



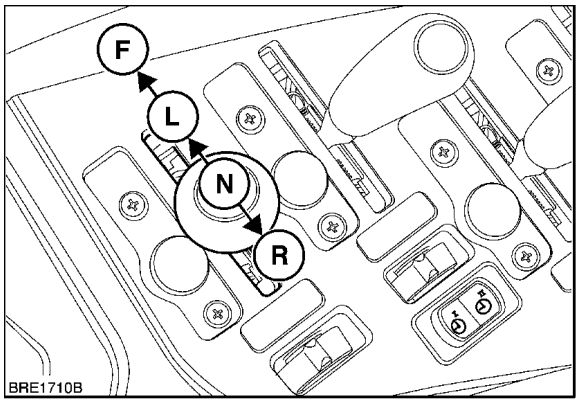
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CONNECTING DOUBLE-ACTING CYLINDERS

Connect the feed hose from a double-acting cylinder to the lower coupler on the remote control valve and the return hose to the upper coupler, as previously described. To extend a double-acting cylinder, pull the control lever back to the “extend" position **(2)**.
To retract a double-acting cylinder, push the control lever forward past neutral to the “retract" position **(3)**. Further forward movement of the lever will select “float" **(4)** which will allow the cylinder to extend or retract freely. This feature is very helpful when carrying out work with equipment such as scraper blades and loaders.

OPERATING CONTINUOUS FLOW HYDRAULIC EQUIPMENT

Continuous flow hydraulic equipment (e.g., hydraulic motors) should be connected to the 1st remote control valve couplers with the pressure hose connected to the right retract coupler and the return hose connected to the low pressure return circuit.



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The flow control should be adjusted to regulate the motor speed. If the flow control is open too far, the 3-point hitch and other remote valves will slow down or stop. Using the flow control this way will ensure that the hydraulic system will only supply the oil required by the motor.

With the remote control valve lever fully forward in the “float" **(4)** position, the motor will be stationary. The hydraulic motor will operate if the lever is pulled back to the “retract" **(3)** position. To stop the motor, move the lever from the retract position to the float position. In the float position the motor will be able to stop slowly, which will not damage the motor.

IMPORTANT: *When operating continuous flow equipment, the remote control valve lever must not be moved rearward to the neutral or raise positions as damage to the equipment may result.*

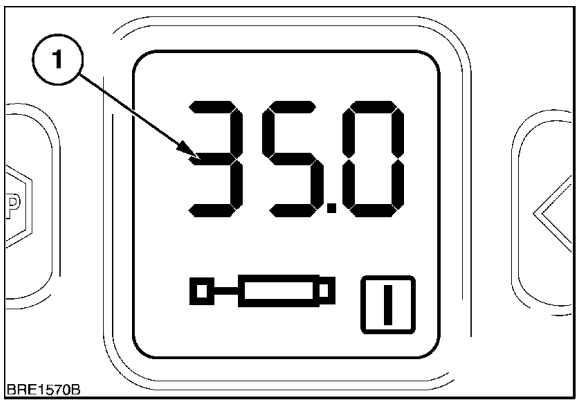
Observe the following to further protect the tractor and equipment.

- Do not open any bypass valve in the equipment or motor. Use the flow control to regulate the rate of flow or speed of the motor.
- Do not hold the remote control valve lever to operate the equipment.
- To ensure optimum hydraulic oil cooling, operate continuous flow equipment at the highest flow setting (by use of the flow control) and lowest engine speed that will give the required machine performance and speed.

OPERATING SEVERAL REMOTE VALVES SIMULTANEOUSLY OR REMOTE VALVES AND HYDRAULIC LIFT SIMULTANEOUSLY

If operating two or more remote control valves simultaneously or remote valves and the hydraulic lift, all the flow control valves **(1)**, should be adjusted using the enhanced keypad to provide a partial flow, as previously described. If not so adjusted, all the available flow may be directed to the full flow circuit when the pressure in that circuit is less than that of the other circuits in use.

NOTE: *The oil flow through remote valve number one will always take priority over the other valves. For equipment using of more than one remote valve, the hydraulic service with the highest flow requirement should be connected to valve number one.*



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BLEEDING REMOTE CYLINDERS

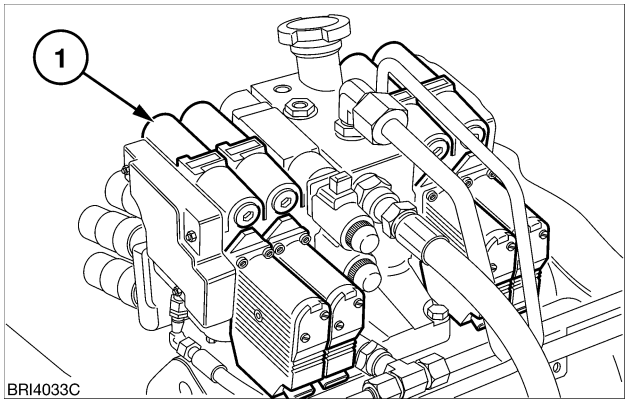
When connecting a cylinder with trapped air, i.e., a new cylinder, one that has been out of service or one that has had the hoses disconnected, it will be necessary to bleed the cylinder to remove the air.

With the hoses connected to the remote control valve couplers at the rear of the tractor, position the cylinder with the hose end uppermost and extend and retract the cylinder seven or eight times using the remote control valve operating lever.

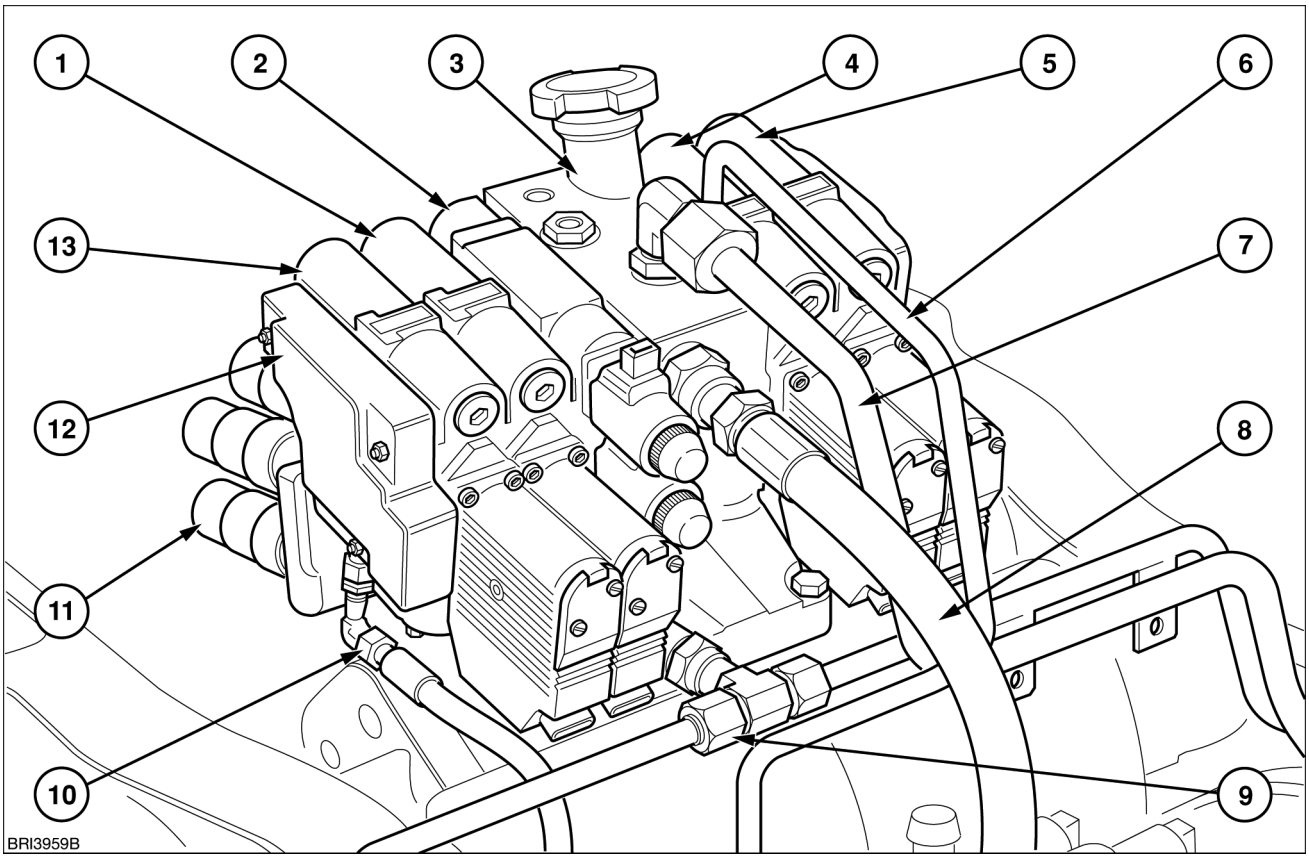
Check the rear axle oil level before and after operating a remote cylinder.

DESCRIPTION

The remote valves **(1)** are a stack type design clamped together with the hydraulic lift electronic draft control valve .

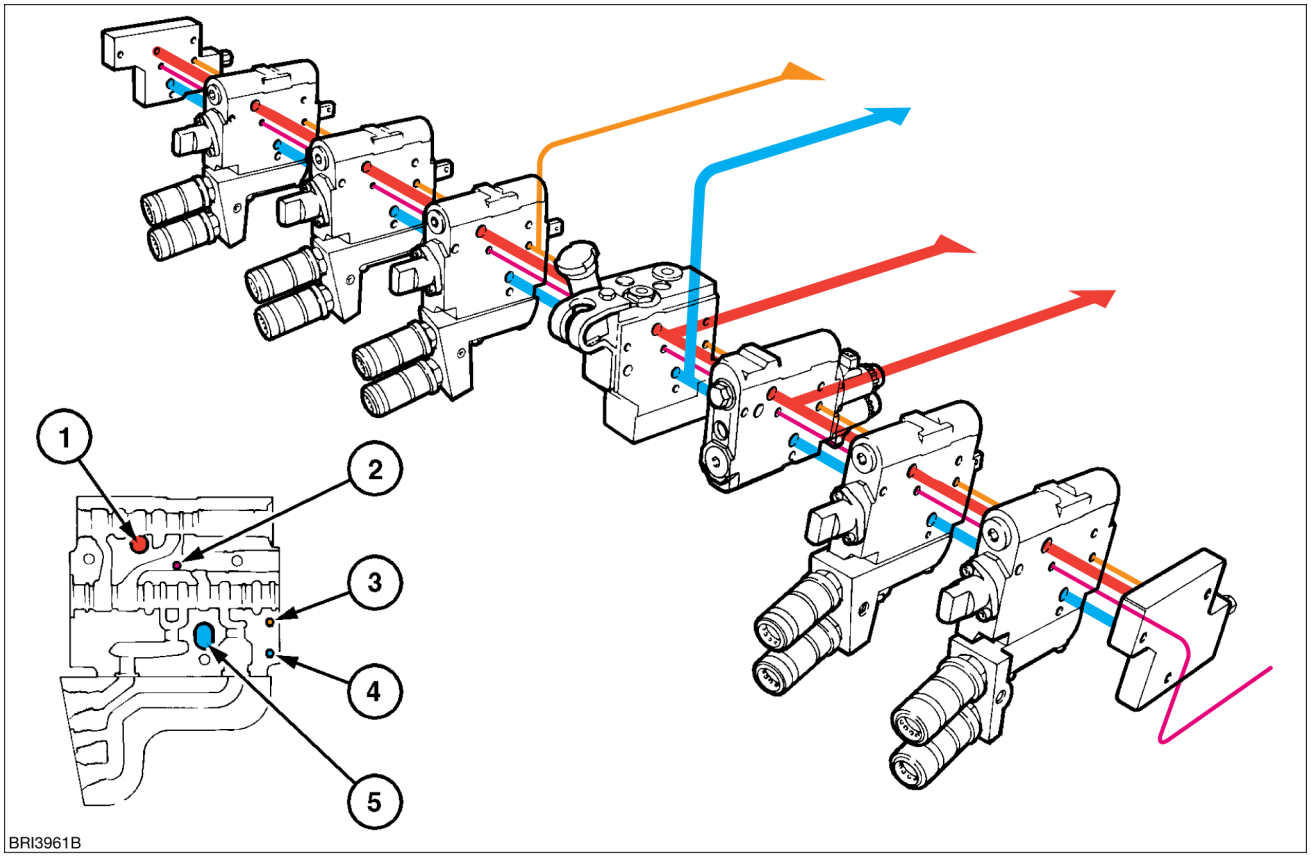


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1. Remote Control Valve
2. Electronic Draft Control Valve
3. Manifold Block
4. Remote Control Valve
5. Remote Control Valve
6. Pilot Line Pressure
7. Return To Tank
8. Pressure Feed
9. To Hydraulic Lift Cylinders
10. Load Sensing Line connection
11. Remote Couplers
12. End Plate
13. Remote Control Valve



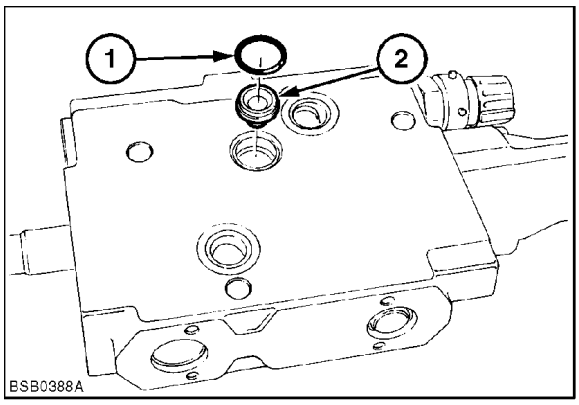
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Remote Control Valve and EDC Control Valve Interconnecting Galleries

	Pump Pressure		Return To Reservoir
	Load Sensing		Control Valve Pilot Oil

1 Parallel Supply Gallery
2 Load sensing Gallery
3 Control valve pilot line oil
4 Control valve pilot line return oil
5 Return to Reservoir

All valve sections have a common parallel inlet and return to reservoir gallery. The electro-hydraulic remote valve sections also have common galleries for the control valve pilot pressure and return oil.
The load sensing gallery passes through the centre of the valve stack and signals the pump to increase or decrease output according to demand.
The parallel gallery and load sensing system enables two or more valves to be operated simultaneously without loss of efficiency.
'O' ring seals **(1)** and load sense check valves **(2)** between each valve section ensure the highest circuit load sense pressure is transmitted to control output of the hydraulic pump.



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The principal hydraulic components within each Electro-Hydraulic remote control valve section are:-

Solenoid Control Unit (Figure **20**)

A signal to operate a solenoid activated valve is received from the operator control switches into the micro-processor of the control unit. The spool within the solenoid valve moves according to the forces of the solenoid which allows pilot oil pressure, regulated to **21 - 24 bar**, to act on the control valve spool. The control unit is also able to accurately sense the position of the spool and can detect errors in the system, which, via the CAN BUS electrics, can be displayed as fault codes which have a 'R' prefix.

Flow Control Spool **(2)** Figure **19**

Ensures that if more than one remote valve is operated that the available oil flow is proportionally distributed amongst the valves being operated depending on demand. The flow control valve spool senses the differential pressure within the valve and regulates the flow accordingly. Because each flow control spool individually senses the pressure in the remote valve being operated, two or more circuits working at different pressures can be controlled simultaneously.

Load Hold Check Valve **(3)**

The check valve prevents a backflow of pressure from the remote valve circuit when the control spool is operated and pump system pressure is less than the backpressure in the circuit.
This is explained by the following example:-
When a cylinder is holding a heavy load and the control valve spool is moved from the neutral to raise position, the pump system pressure may be less than the back pressure in the remote valve circuit. When this occurs the back pressure would cause oil in the circuit to flow backwards and the load to momentarily drop before pump system pressure has risen to hold and then raise the load further. The load hold check valve prevents this situation from occurring.

Lock Valve **(5)**

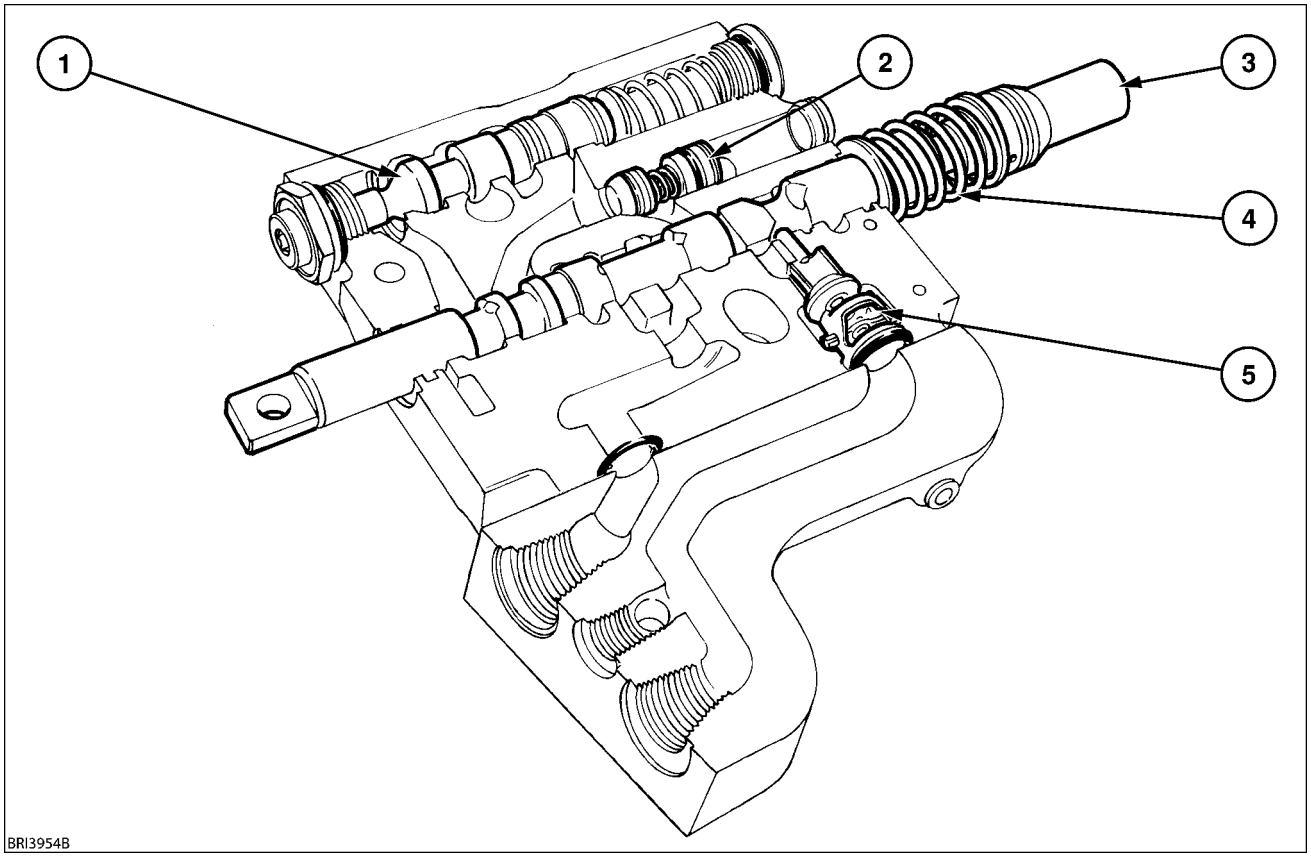
The lock valve is located in the raise port of the remote valve and is closed whenever the remote valve is in neutral. The lock valve prevents leakdown of an implement should there be any leakage across the lands of the spool when in the neutral position. The lock valve is automatically opened whenever the control spool is moved from the neutral position.

Control Valve Spool **(4)**

The control valve spool is spring centred to a neutral position and when moved by the regulated pilot pressure, via the solenoid control unit, directs oil flow to the raise or lower ports of the control valve.

Spool Centering Spring **(6)**

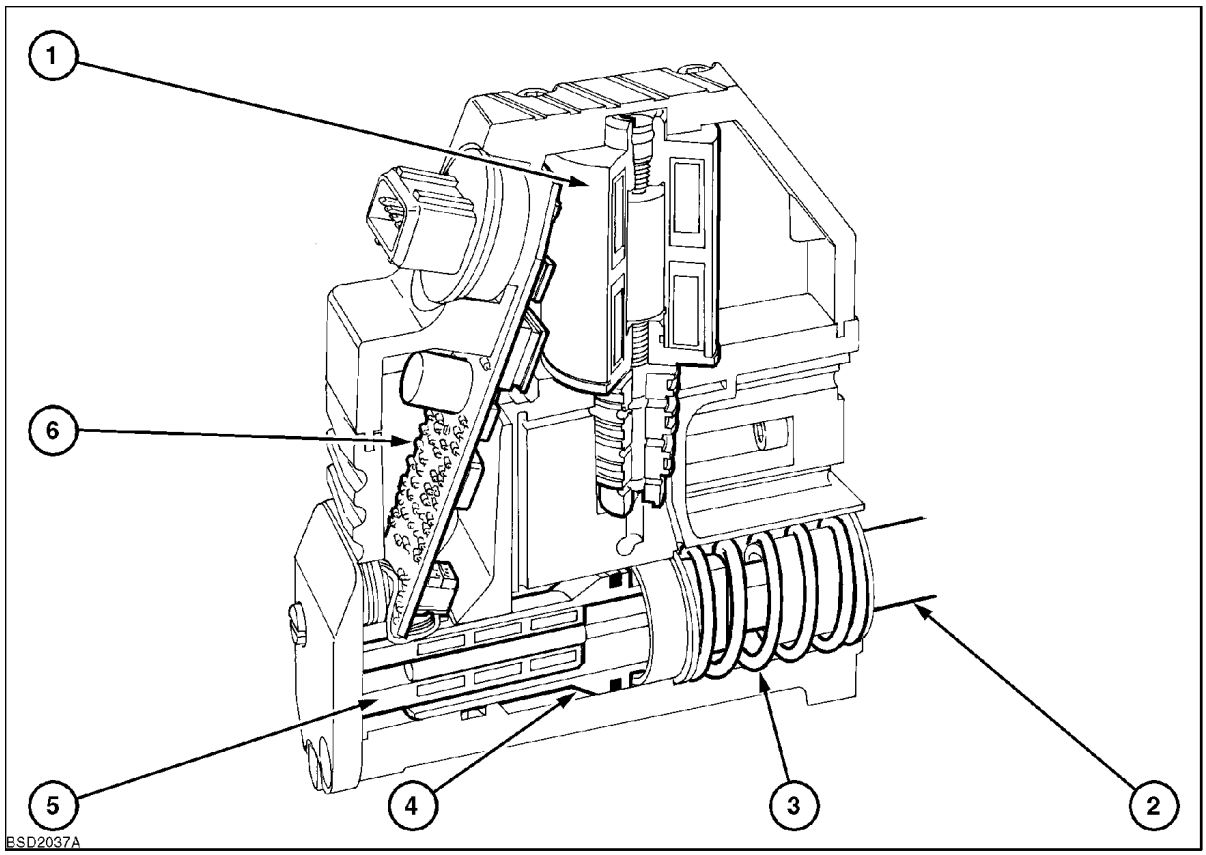
The spool centering mechanism spring loads the control valve spool to the neutral position.



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Closed Centre Remote Control Valve Component

1 Flow Control Spool
2 Check Valve
3 Control Valve Spool
4 Spool Centering Spring
5 Load Holding Check Valve



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Control Unit Assembly

1 Solenoid Valve
2 Control Valve Spool
3 Centering Spring
4 Control Piston and Seal
5 Position Sensor
6 Control Micro Processor

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Static description Activity

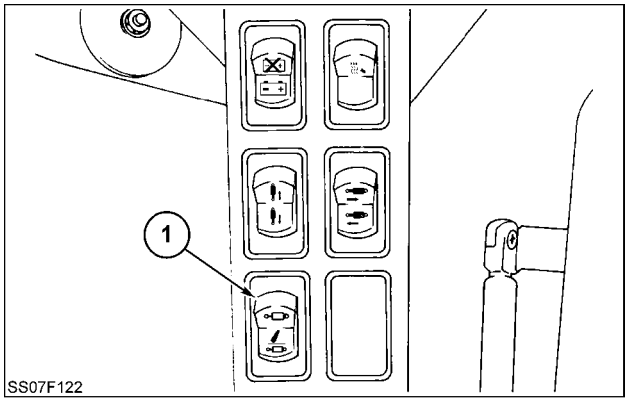
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

For all Puma Multicontroller models, three electro-hydraulically actuated remote valves are available, as standard on the rear and on request as mid-mount remote valves. Up to a maximum of four electro-hydraulically actuated remote valves are mounted on the rear and four under the cab (mid-mounted).

Each remote valve has its own integrated microcomputer, which controls the oil flow with the aid of a solenoid valve according to the signals of the control lever or switch operated by the driver. Each remote valve has its own integrated microcomputer, which controls the oil flow with the aid of a solenoid valve according to the signals of the control lever or switch operated by the driver.
All remote valves are connected via a CAN bus system to the transmission controller/options controller on the right-hand side behind the driver's seat.
Each remote valve can have its own separate system errors and can transmit an operating message to the appropriate controller, which in turn sends an interrogation signal to display a fault code on the ICU2.

Hydraulics master switch

The remote valves only work when the system is supplied with power via the hydraulics master switch **(1)**.



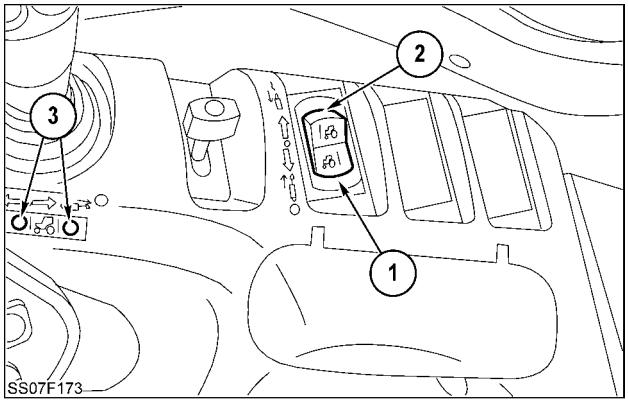
SS07F122 1

Schalterstellungen

top	Remote valves operating
centre	EDC and remote valves not operating
bottom	EDC and remote valves operating

Selection switch

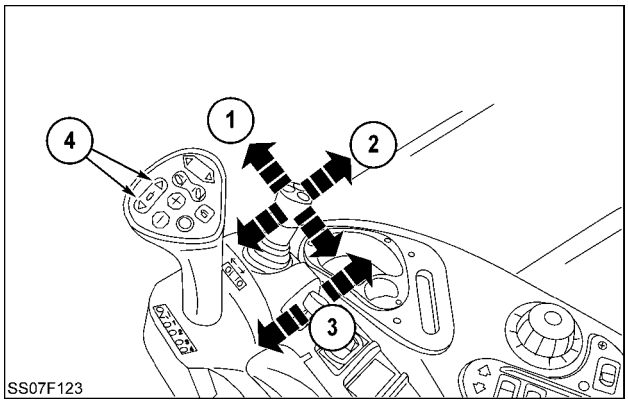
Either the rear or the mid-mounted remote valves can be actuated using the joystick. Using the selection switch on the armrest, the driver can switch the joystick operation between the remote valve group at the rear **(2)** and mid-mounted remote valve group **(1)**. The telltale **(3)** for the selected remote valve group lights up.



SS07F173 2

Operation

The remote valves R1 (mounted at the rear of the tractor) are actuated via control levers on the armrest. The control levers each have the same colour as the corresponding remote valve (plug-in coupling).

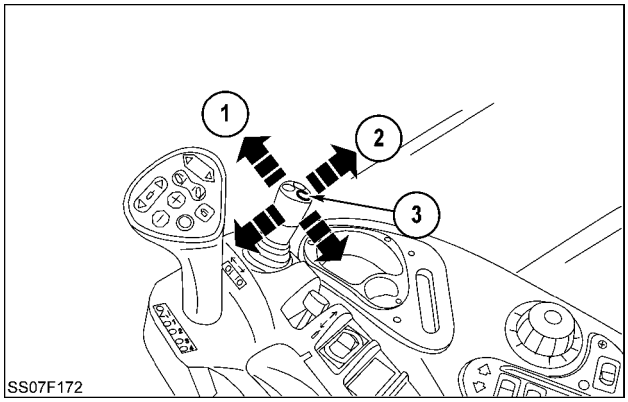


SS07F123 3

Heck Zusatzsteuergeräte

R1 Joystick **(1)**
R2 Joystick **(2)**
R3 Control lever **(3)**
R4 Push button RAISE/LOWER **(4)**

The mid-mounted remote valves F1 to F4 (mounted under the cab) are actuated via control levers on the armrest. The control levers each have the same colour as the corresponding remote valve (plug-in coupling).

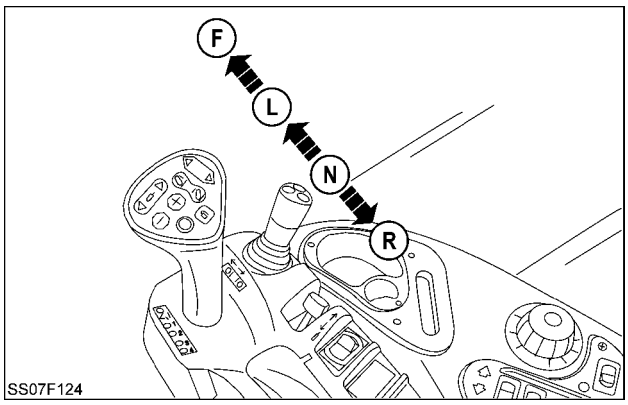


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Mid-mount Zusatzsteuergeräte

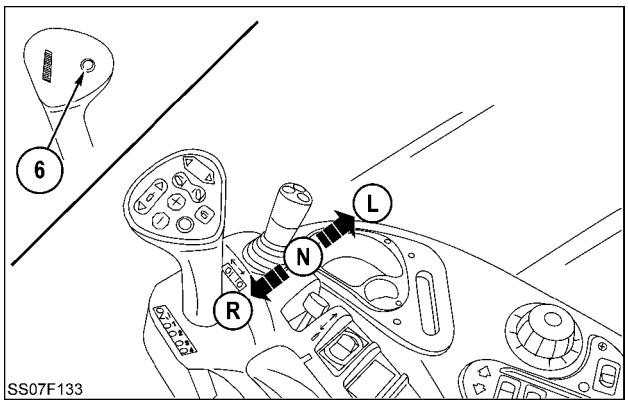
F1 Joystick **(1)**
F2 Joystick **(2)**
F3 Joystick **(1)** and push button **(3)**
F4 Joystick **(2)** and push button **(3)**

The control lever of the control unit R1/F1 has four positions and functions (see Figure **5**):
Neutral position **(N)**, Raise **(R)**, Lower **(L)** and Floating position **(F)**.
The lever engages in the Neutral position and Floating position. (with option front loader ready)
The lever engages in the Raise position, in Neutral and in the Floating position.



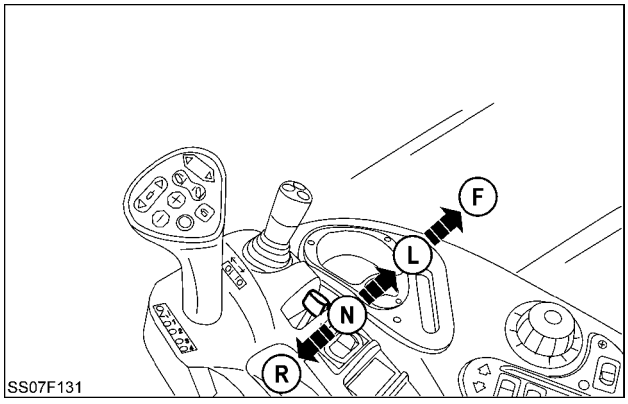
SS07F124 5

The control lever of control unit R2/F2 has three positions and four functions (see Figure **6**):
Neutral position **(N)**, Raise **(R)**, Lower **(L)** and Floating position **(F)**.
The Floating position function is called up by putting the joystick into the Lower position **(L)** and pressing the Shift button **(6)** on the Multicontroller at the same time.
The lever only engages in the Neutral position.



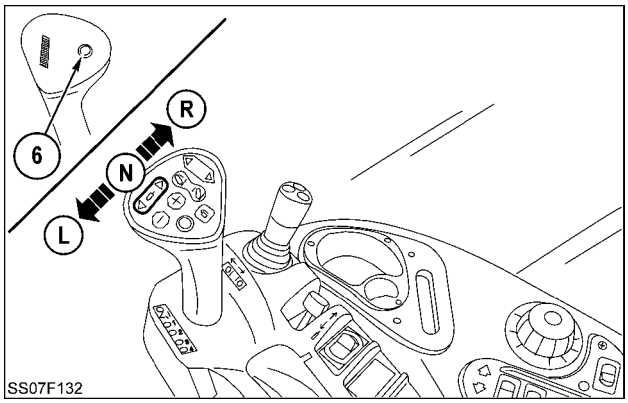
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The control lever of the control unit R3 has four positions and functions (see Figure **7**):
Neutral position **(N)**, Raise **(R)**, Lower **(L)** and Floating position **(F)**.
The lever engages in the Raise position, in Neutral and in the Floating position.



SS07F131 7

The push button of the control unit R4 has three positions and four functions (see Figure **8**):
Neutral position **(N)**, Raise **(R)**, Lower **(L)** and Floating position **(F)**.
The Floating position function is called up by pressing the push button R4/F4 into the Lower position **(L)** and pressing the Shift button **(6)** on the Multicontroller at the same time. The function is ended by briefly pressing the Raise or Lower button.



SS07F132 8

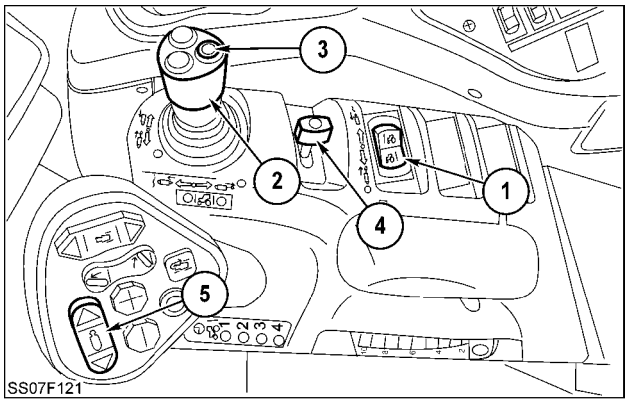
NOTE: *If only three remote valves are mounted (at the rear), the push buttons are used in parallel as operation for R2.*

Selection switch (1) in position for rear area

Actuation of the joystick **(2)** in a longitudinal direction for the operation of the remote valve R1
Actuation of the joystick **(2)** in a longitudinal direction and press and hold push button **(3)** for the operation of remote valve F1.

Actuation of the joystick **(2)** in a transverse direction for the operation of remote valve R2
Actuation of the joystick **(2)** in a transverse direction and press and hold push button **(3)** for the operation of remote valve F2.

Actuation of the control lever **(4)** for the operation of remote valve R3
Actuation of the push button **(5)** for the operation of remote valve R4.

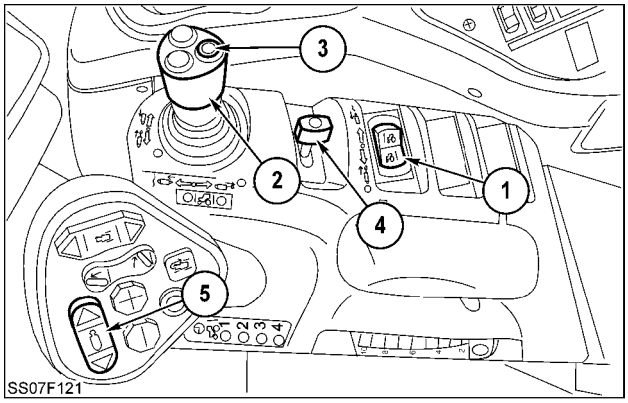


SS07F121 9

NOTE: *If only three remote valves are mounted at the rear, the push buttons* ***(5)*** *are used in parallel as operation for R2.*

Selection switch (1) in position for front area

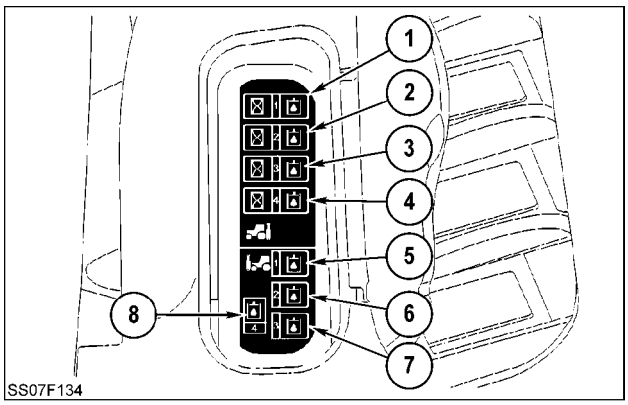
Actuation of the joystick **(2)** in a longitudinal direction for the operation of remote valve F1.
Actuation of the joystick **(2)** in a transverse direction for the operation of remote valve F2.
Actuation of the joystick **(2)** in a longitudinal direction and press and hold push button **(3)** for the operation of remote valve F3.
Actuation of the joystick **(2)** in a transverse direction and press and hold push button **(3)** for the operation of remote valve F4.



SS07F121 10

Oil flow controller

The hydraulic oil flow volume to all remote valves can be continuously variably set from **0 - 90 l/min**. The remote valves can be operated independently of each other and used to supply several consumers with different oil flow volumes simultaneously. Proceed as follows when using the oil flow control function on the remote valves: Press the keypad button for the desired remote valve. Display for RAISE appears automatically on the ICU2 for the remote valve affected. Press the keypad button twice and the display for LOWER appears.

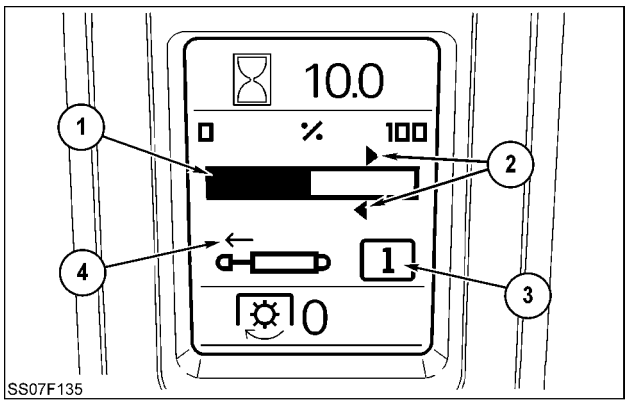


SS07F134 11

(1.)	Remote valve R1	**0 % - 100 %**
(2.)	Remote valve R2	**0 % - 100 %**
(3.)	Remote valve R3	**0 % - 100 %**
(4.)	Remote valve R4	**0 % - 100 %**
(5.)	Remote valve F1	**0 % - 100 %**
(6.)	Remote valve F2	**0 % - 100 %**
(7.)	Remote valve F3	**0 % - 100 %**
(8.)	Remote valve F4	**0 % - 100 %**

Display on the ICU2

When you press the desired remote valve button on the keypad for oil flow control, the following information is displayed for each control unit on the dot matrix display ICU2:
(1) The black bar shows the actual flow (%).
(2) The maximum flow volume (%) set by the driver is indicated by the Raise/Lower directional arrows.
(3) Number of the actuated control unit.
(4) Direction of the cylinder movement: Extend (Raise) or retract (Lower).

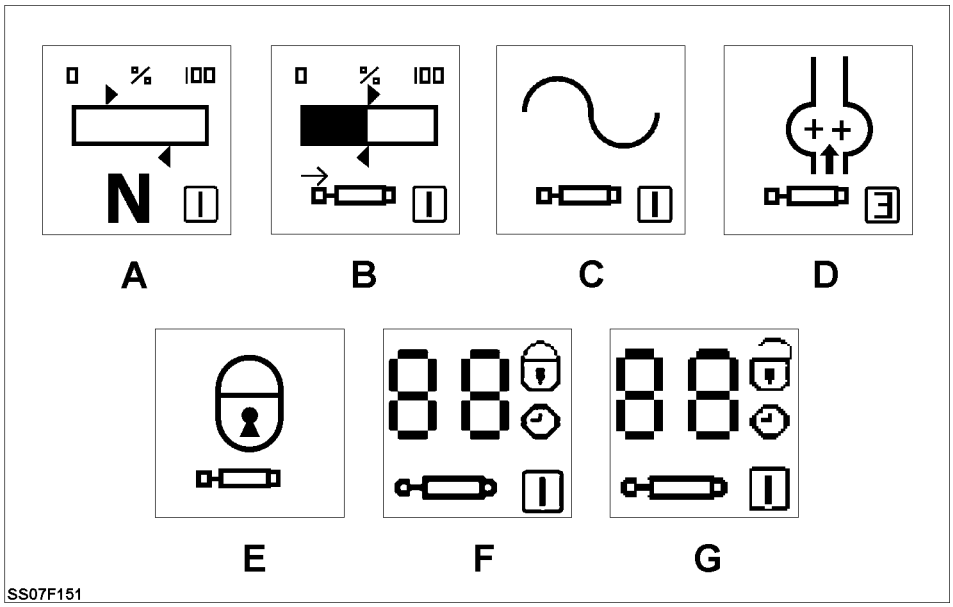


SS07F135 12

The desired amount can be set using the finger wheel on the Multicontroller and read off on the ICU2. After about 10 seconds the screen automatically disappears again.

Additional displays on the ICU2

As soon as a function of the electro-hydraulic remote valves is selected, the corresponding graphic representation appears on the dot matrix display.



SS07F151 13

(A) Lever of the remote valve no. 1 in NEUTRAL POSITION

(B) Remote valve no. 1 is being operated with the max. flow volume set by the driver.
The figure shows the cylinder in RETRACT mode.

(C) Lever of the remote valve no. 1 in FLOATING POSITION

(D) MOTOR mode was selected for remote valve no. 3.
Only LOWER and FLOATING POSITION available.

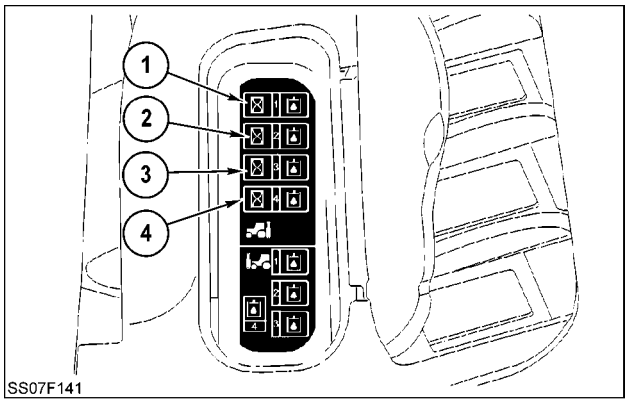
(E) Electrohydraulic remote valves SWITCHED OFF.
All functions of the remote valves are deactivated.

(F) Timer function locked

(G) Timer function open

Time setting for remote valves in the rear area

The time-controlled operating mode serves above all to operate hydraulic cylinders. Using this function, the driver can program a time delay between the actuation of the control lever and the shutting down of the oil flow to the unit.



SS07F141 14

(1.) Remote valve R1
(2.) Remote valve R2
(3.) Remote valve R3
(4.) Remote valve R4

Timer programming

By briefly pressing the corresponding Timer button, telltale starts to flash. While the telltale is flashing, move the control lever to extend the cylinder. At this point the light stops flashing and will remain lit. Hold the control lever until the cylinder has extended to the desired position and then return it to the Neutral position. As soon as the control lever is in the Neutral position, the programming telltale flashes again, as the retraction of the cylinder must now be programmed. Actuate the control lever to retract the cylinder, the light stops flashing and will remain lit. Hold the control lever until the cylinder has retracted completely and then return it to the Neutral position. After this second phase is programmed, the telltale is lit again continuously. After this second phase is completed and the lever has been returned to the Neutral position, the program is automatically stored. The max. programmable time is 30 seconds. The programming remains stored even after the starter switch has been switched off.

Playing a Timer function

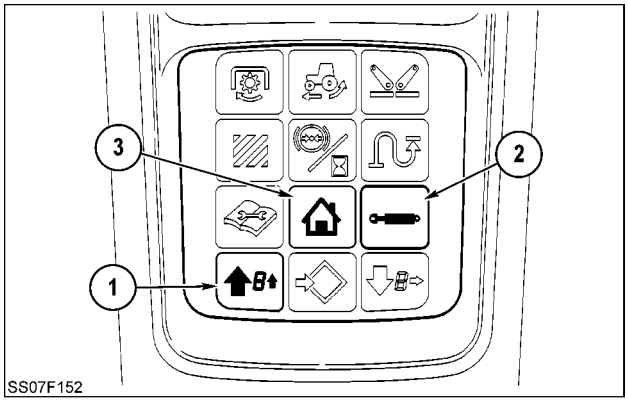
Actuate the Timer button of the desired remote valve until the telltale lights up. To start the Timer function, briefly actuate and release the corresponding control lever. After the programmed time has elapsed, the remote valve automatically switches off.

Priority setting of the remote valves

A remote valve with priority always has priority over the other remote valves with regard to oil flow. In the case of electro-hydraulic remote valves, the driver can give a control unit priority. Put the starter switch in the ON position. Then press the Menu/Enter button **(1)** and keep it pressed until Ehrx appears on the centre LCD display (the 'x' is the number of the control unit which is currently defined for priority).

NOTE: *If a dash (-) appears on the display, priority is defined for no control unit.*

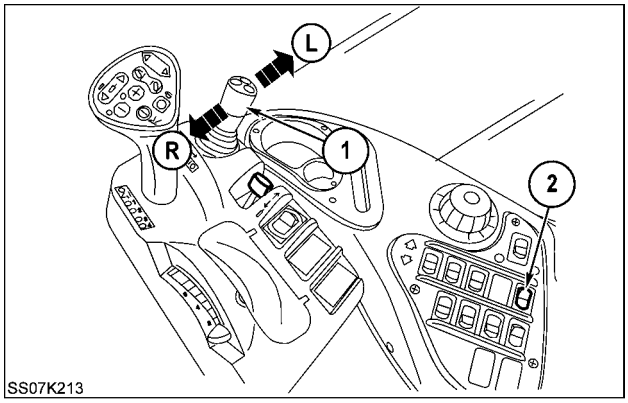
After a few seconds, the display of the LCD display changes to PEhr. Briefly press on the button of the electrohydraulic control unit **(2)** to select the control unit, for which you wish a priority oil supply. Pressing the button several times takes you through the entire control unit numbers. As soon as the desired control unit number is shown on the display, press the End/Cancel button **(3)** to end the setup and to go back to the previous display. The priority setting of the control units is then stored.



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Oil motor operation

The oil motor switch works with remote valve F2. Actuation of the joystick **(1)** in position RAISE / LOWER and hold, bring oil motor switch **(2)** to operating position. Deactivate by actuation joystick to floating position. The remote valve F2 now switches the spool valve to the Floating position. This ensures that when large oil motors are switched off, no peaks in pressure arise, which damage the devices and hoses.

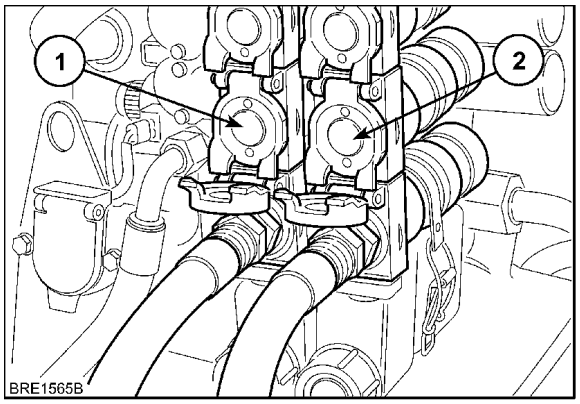


SS07K213 16

QUICK COUPLERS

Each remote control valve has a pair of **1/2 in.**
quick-disconnect, female couplers **(1)** and **(2)**. The couplers are of a self-sealing/locking design but will allow remote cylinder hoses to pull free if the implement should become disconnected from the tractor. The raise (lift) coupler **(1)**, is on the left-hand side, the lower (drop) coupler **(2)**, on the right-hand side. The couplers referred to in this picture are for remote control valve No. I.

The flip-up covers are colour coded black, brown, blue and green to corresponding to the control levers in the cab.

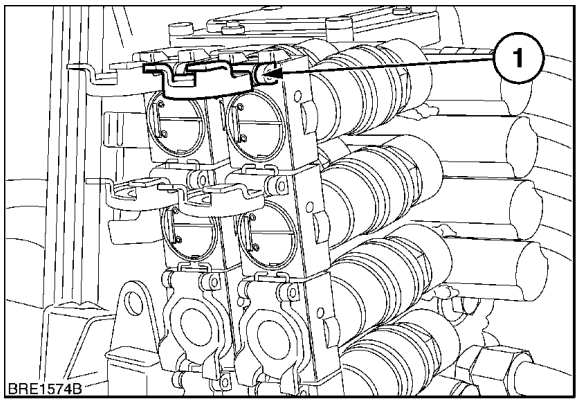


BRE1565B 17

Hinged, spring-loaded dust caps are provided on each coupler. To connect a remote cylinder, lift the dust cap **(1)** and insert the feed and/or return hose into the coupler, ensuring that it is correctly seated. Ensure that there is sufficient slack in the hose(s) to allow the tractor/implement to turn in either direction.

Actuate the remote valve to supply hydraulic pressure which will complete the hydraulic coupling of the tractor and implement.

To disconnect, grip the hose a short distance from the coupler, push the hose forward, into the coupler, then quickly pull on the hose to ‘pop’ the coupler free
The couplers will accept standard **1/2 in** SAE or ISO connectors. The couplers can be connected or disconnected under pressure. Disconnect pressure is proportional to system pressure. Increased system pressure will require increased force to disconnect the couplers.



BRE1574B 18

NOTE: *The oil flow through remote valve number one will always take priority over the other valves. For equipment using more than one valve, the hydraulic service requiring the highest flow should be connected to valve number one.*

Relieving System Pressure

To ease removal and installation of the couplers, relieve the pressure in the system. Securely support the implement. Make sure no one will be injured by moving equipment when relieving pressure in the system. Move the control lever to the float position with the engine running. This will relieve the pressure. Turn the engine off with the control lever still in float. After the engine is shut down return the control lever to the neutral position. The couplers can now be connected or disconnected with minimal pressure and effort.

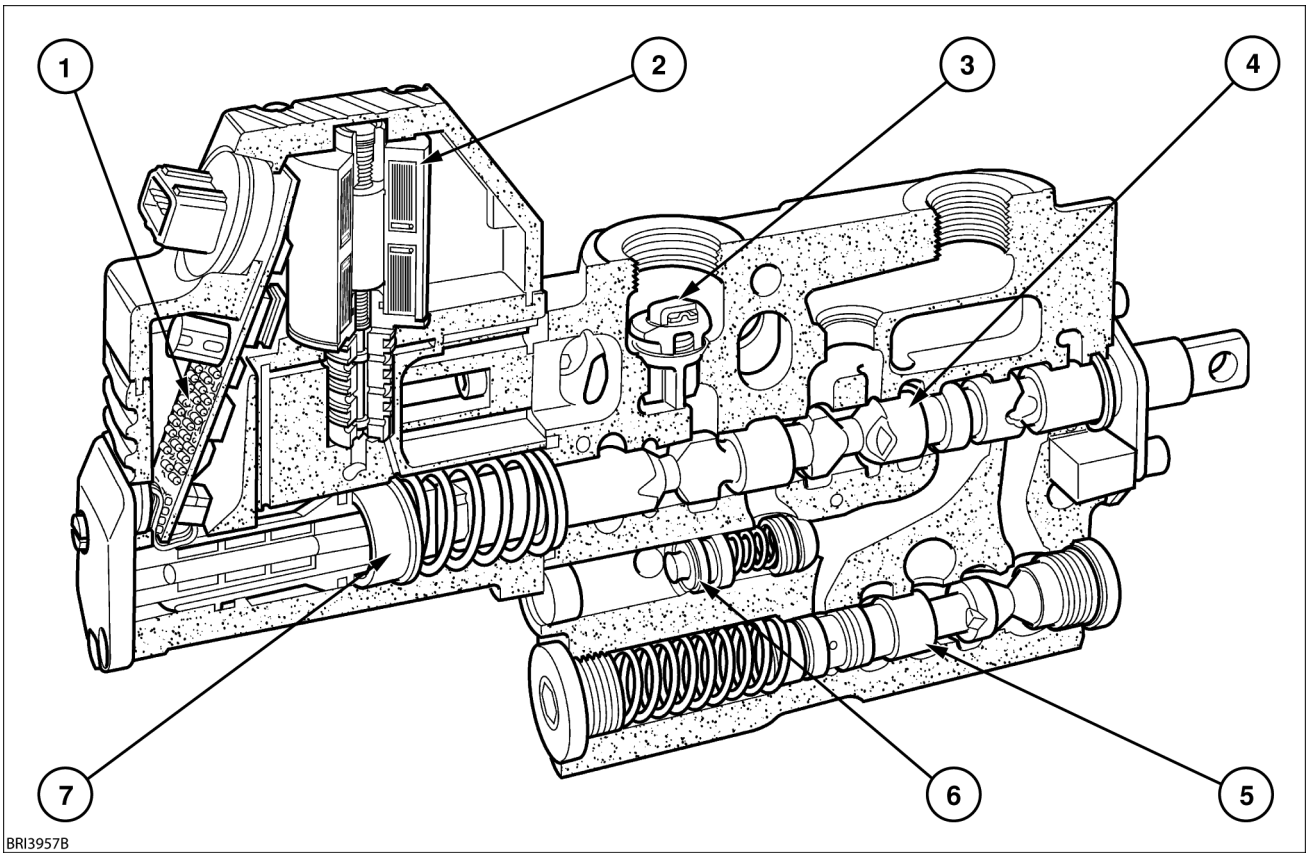
⚠ WARNING ⚠

Before connecting or disconnecting hydraulic hoses at the remote cylinders, relieve the pressure in the circuit by first starting the engine and then move the control levers fully forward to the “float" position. Then stop the engine. Make sure no one will be injured by moving equipment when relieving pressure in the system. Before disconnecting cylinders or equipment, make sure the equipment or implement is supported securely. Never work under equipment supported by a hydraulic device because it may drop if the control is actuated (even with the engine stopped) or in the event of hose failure, etc. always use a secure support for equipment which must be serviced while in the raised position. Make sure that oil contained within the remote cylinders is clean and is of the correct grade.

B064

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Sectional view

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller



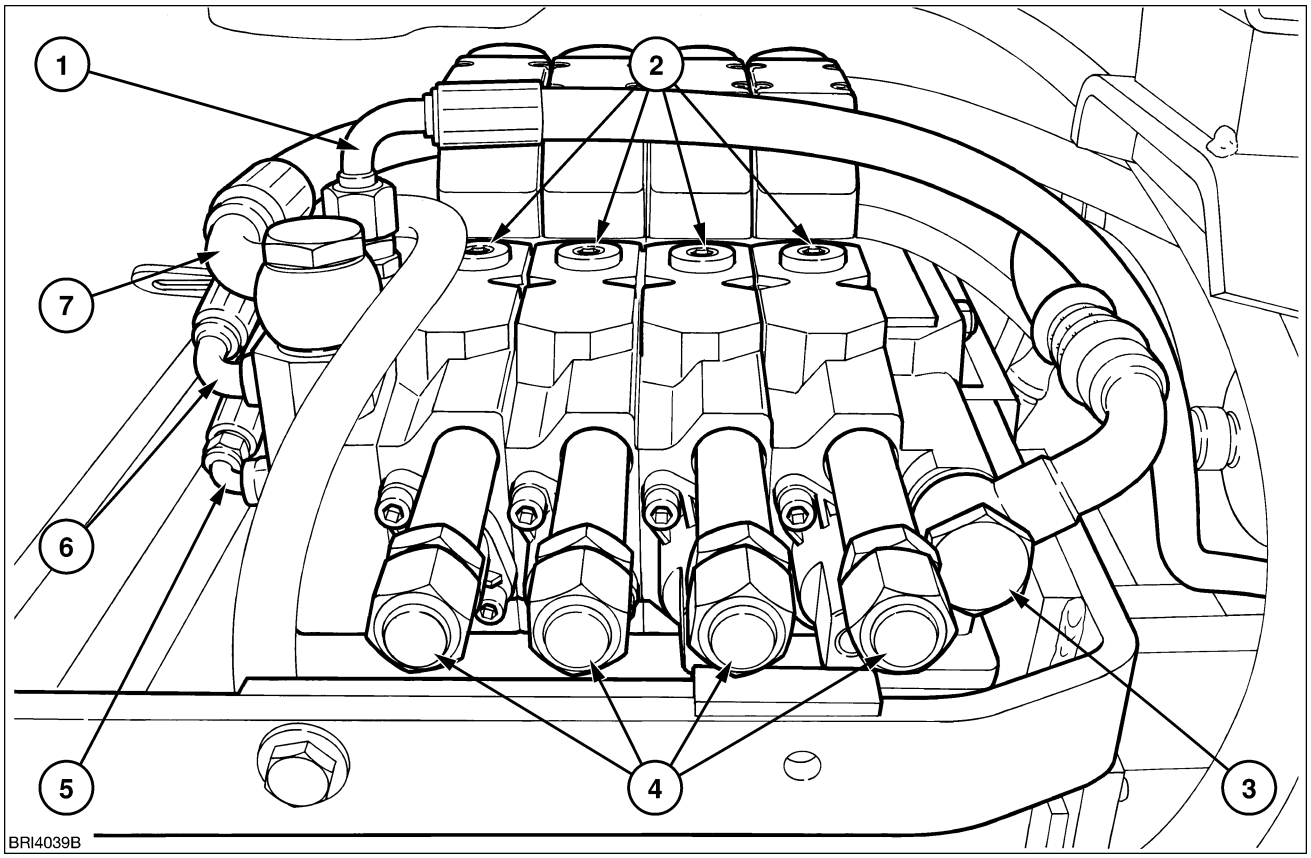
BAIL06CCM034FSA 1

1 Micro processor Unit
2 Solenoid valve
3 Load Holding Check Valve
4 Control Valve Spool
5 Flow Control Spool
6 Lift check Valve
7 Centering Spring Guide

Refer to : **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Disassemble (A.10.C)**

Mid-mount remote control valve - Static description

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

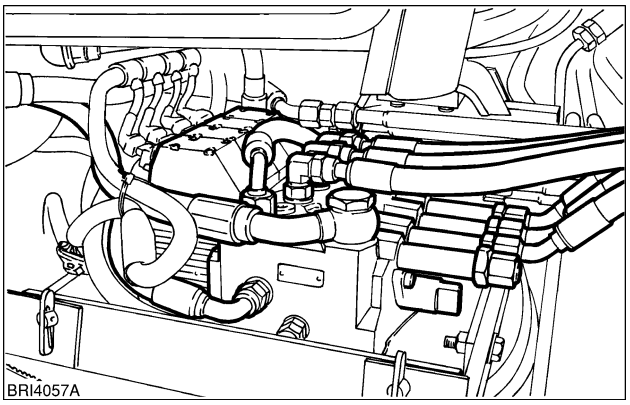


BAIL06CCM065FSA 1

Hydraulic connections of the mid-mounted valve block

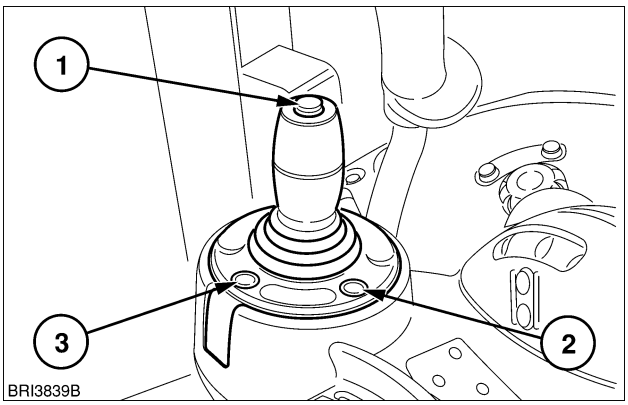
1. Pilot oil return pipe
2. Pressure connection for front loader hose
3. Return hose
4. Return connection for front loader hose
5. Load Sensing hose
6. Pressure oil hose of the control line
7. Pressure oil hose supply hose

On tractors with optional front loader control block, the joystick control on the driver's seat, the mid-mounted valve block, the line system and the attachment bracket are provided for the attachment of the front loader link.
The mid-mounted valve block is located on the right-hand side under the cab. In the basic version the valve block consists of two control units to raise and lower the link and to tip and tilt the bucket, if used with a front loader.



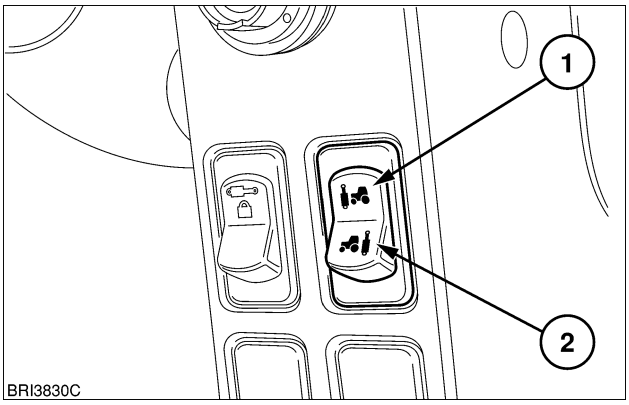
BAIL06CCM088ASA 2

In the PUMA standard:
The control units are actuated via a crossgate lever, which is installed on the right-hand side next to the driver's seat.



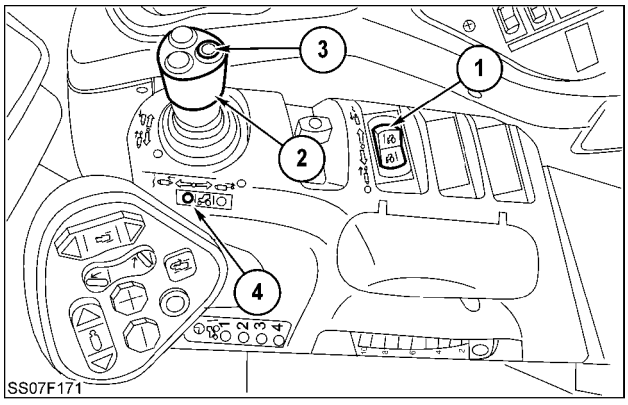
BAIL06CCM052ASA 3

In the PUMA standard:
In tractors, which are fitted with side and rear-mounted control units, optionally both valves blocks can be actuated using the crossgate lever. Once the starter switch is switched on, the telltales for the crossgate lever do not light up and the crossgate lever is deactivated. To activate the crossgate lever, press the **(1)** button. The telltale for the mid-mounted control units **(3)** confirm the activation by lighting up. Using a selection switch on the cab's C-pillar, the driver can switch the crossgate lever actuation between the valve blocks for the rear control units **(2)** and mid-mounted control units **(1)**.



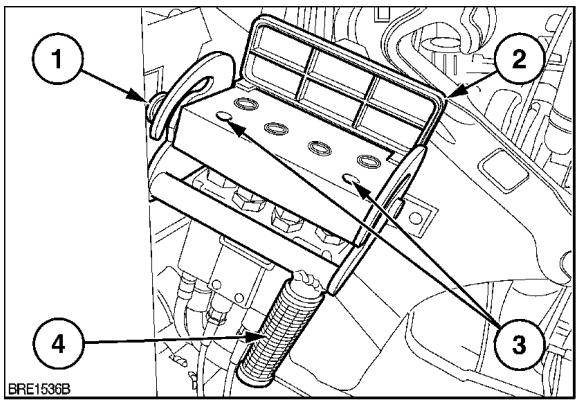
BAIL06CCM053ASA 4

In the PUMA Multicontroller:
To actuate the control units, the selection switch **(1)** must be switched to the "Front area" position. The selected function is indicated by the telltale **(4)**.
The control units are actuated using the crossgate lever **(2)** and the button **(3)**.
For operation of the individual control units, see **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Static description (A.10.C)**



SS07F171 5

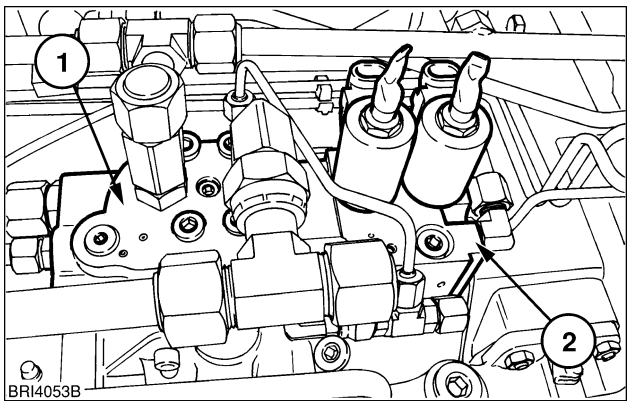
All tractors equipped for front loader operation in Europe are fitted with a "Multi-Quick" multi-coupling. This allows all oil couplings to be connected and disconnected in a flash with minimal oil loss.



BRE1536B 6

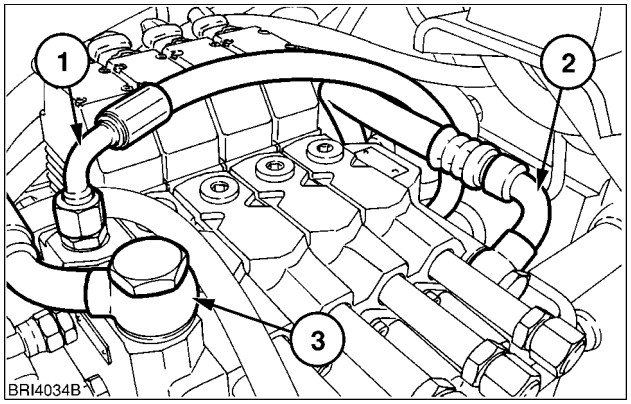
1. Retaining pin
2. Cover
3. Centring holes
4. Clamp lever

The mid-mounted valve block is supplied with oil via a hose from the valve block of the priority control units **(1)** on the right-hand side of the rear axle housing.



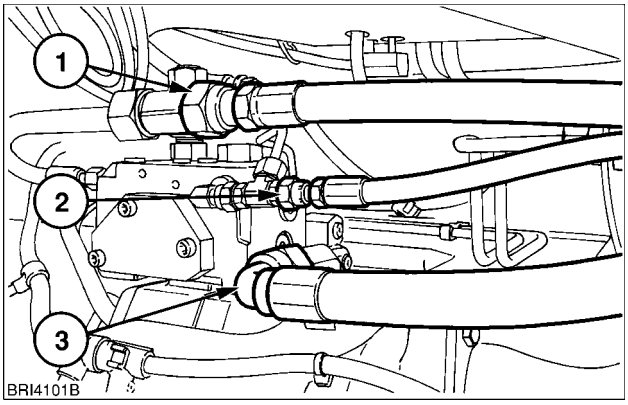
BAIL06CCM091ASA 7

The high pressure oil flows through the hose **(3)** on the connection plate and through hose **(2)** back to the oil filter housing. The pilot oil flowing back from the electronically actuated solenoid valves flows in hose **(1)**.



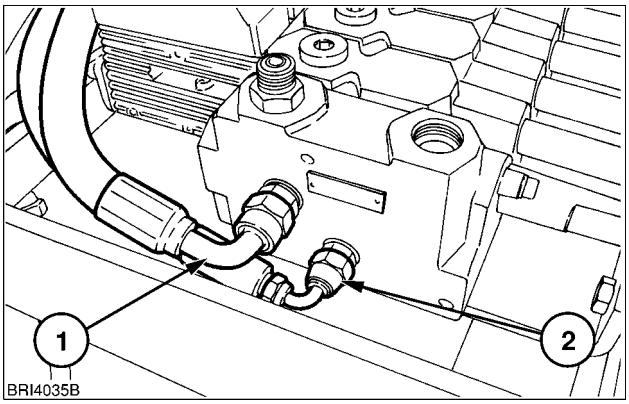
BAIL06CCM061ASA 8

The oil flows back from the return connection of the mid-mounted valve block through hose **(3)** and a pipe bend to the filter housing of the hydraulic pump. The Load Sensing connection is a T-shaped threaded connection **(2)**, which is connected to the pressure control valve of the hydraulic pump. The high pressure hose is connected via another T-shaped threaded connection **(1)** to the pressure and flow control valve.



BAIL06CCM118ASA 9

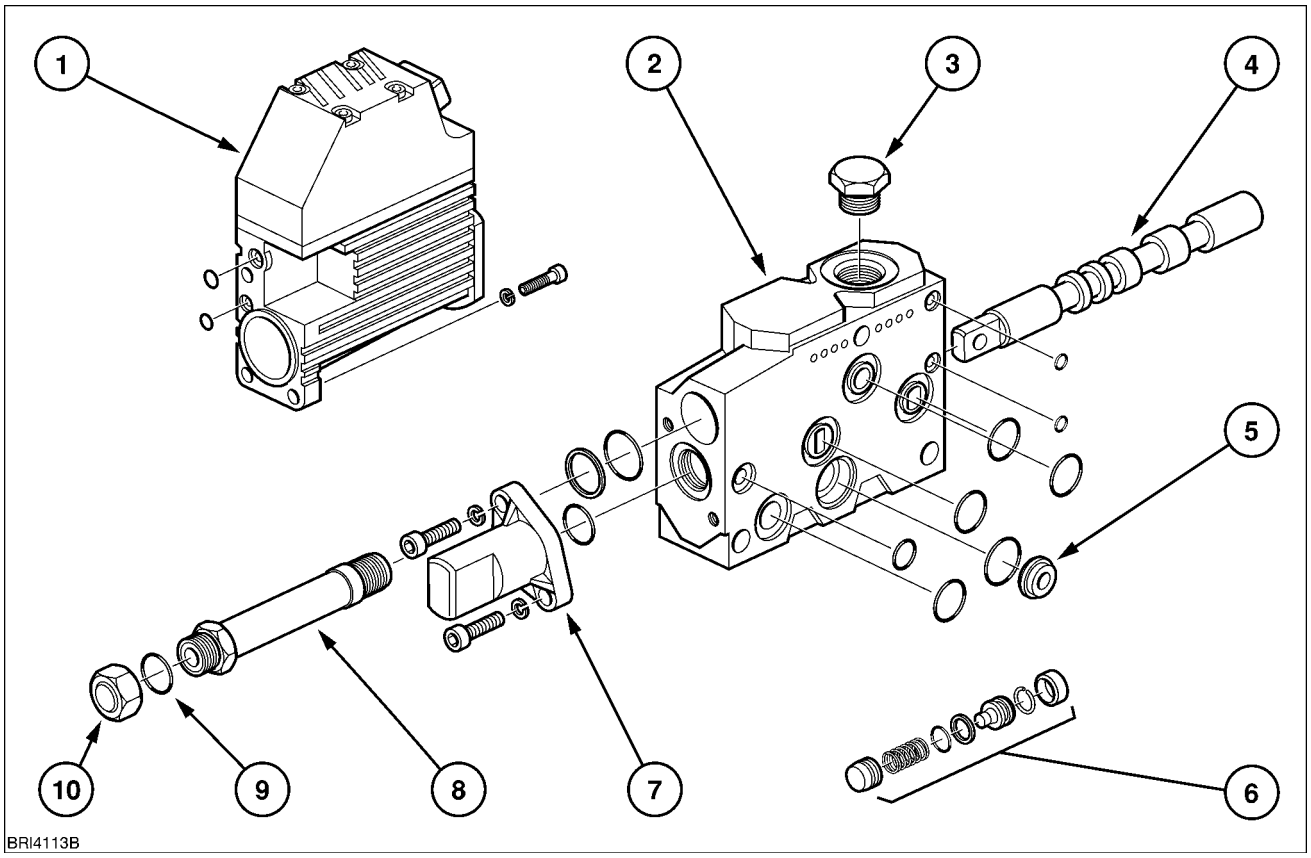
The pressure oil of the control line for actuation of the electrohydraulic solenoid valves flows from the low pressure circuit via hose **(1)** in the connection plate. The Load Sensing hose **(2)** is also connected to the connection plate. The return flow is connected to a fitting on the priority valve block.



BAIL06CCM062ASA 10

Mid-mount remote control valve - Exploded view

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller



BAIL06CCM125FSA 1

Mid Mount Valve Components

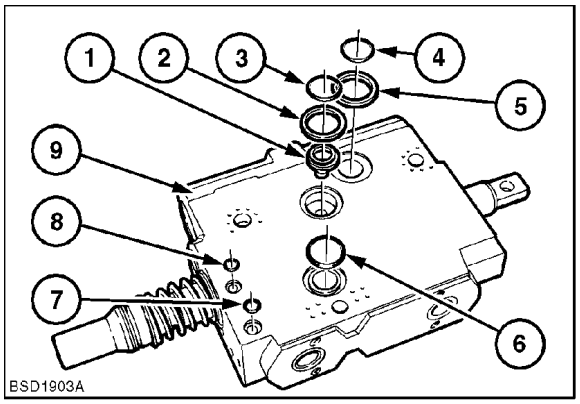
1. Spool Control Unit
2. Valve slice
3. Plug
4. Spool Valve
5. Load Sensing Valve
6. Check Valve
7. End Cap
8. Connection port
9. 'O' Ring
10. Nut

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Disassemble

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

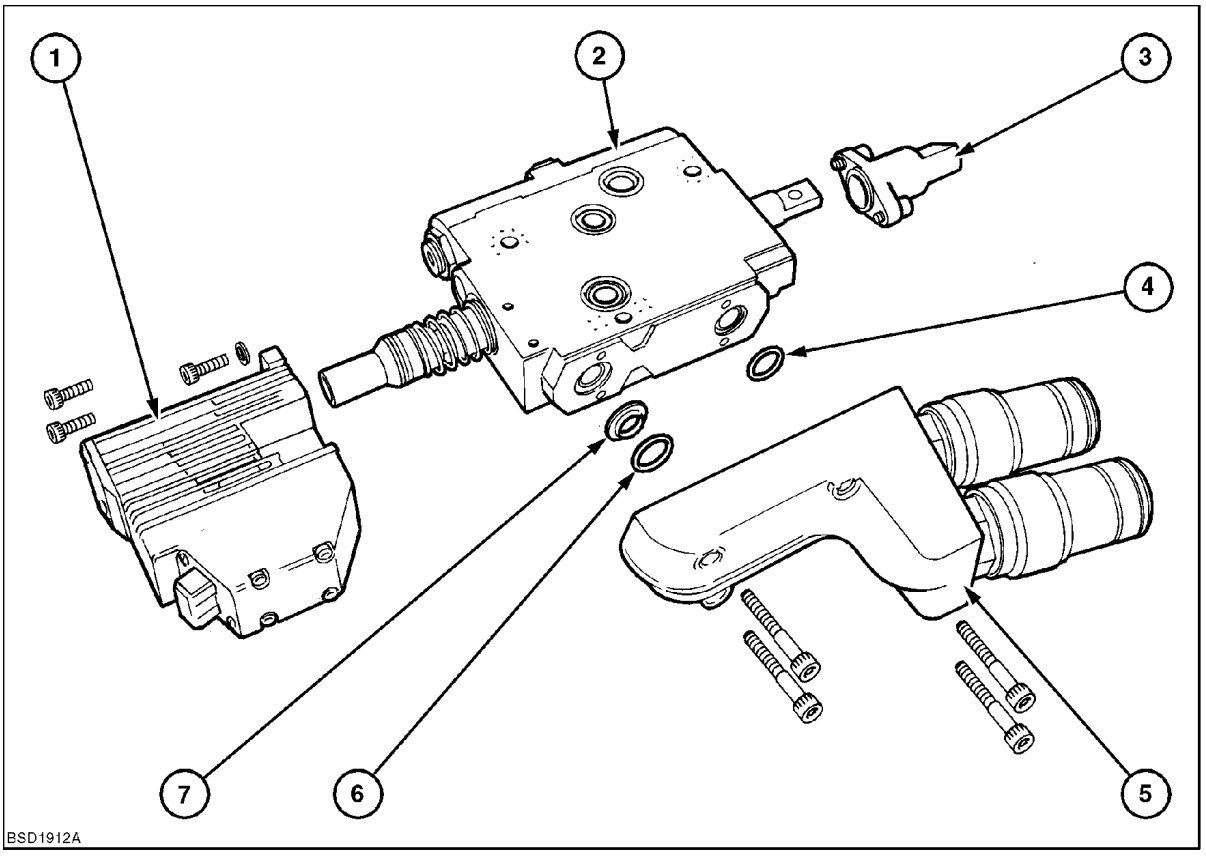
Prior operation:
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Remove (A.10.C)

1. Disassemble with reference to following.



BSD1903A 1

1 Load Sense Check Valve
2 Back up Ring
3 ‘O’ Ring
4 ‘O’ Ring
5 Back up Ring
6 ‘O’ Ring
7 ‘O’ Ring
8 ‘O’ Ring
9 Remote Valve Housing



BSD1912A 2

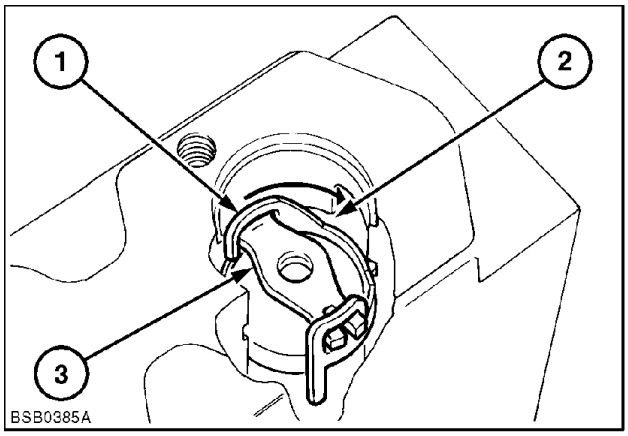
Remote Valve and Coupler Housing

1 Spool Control Unit
2 Remote Valve Body
3 Cap
4 'O' Ring
5 Coupler Housing
6 'O' Ring
7 Seat

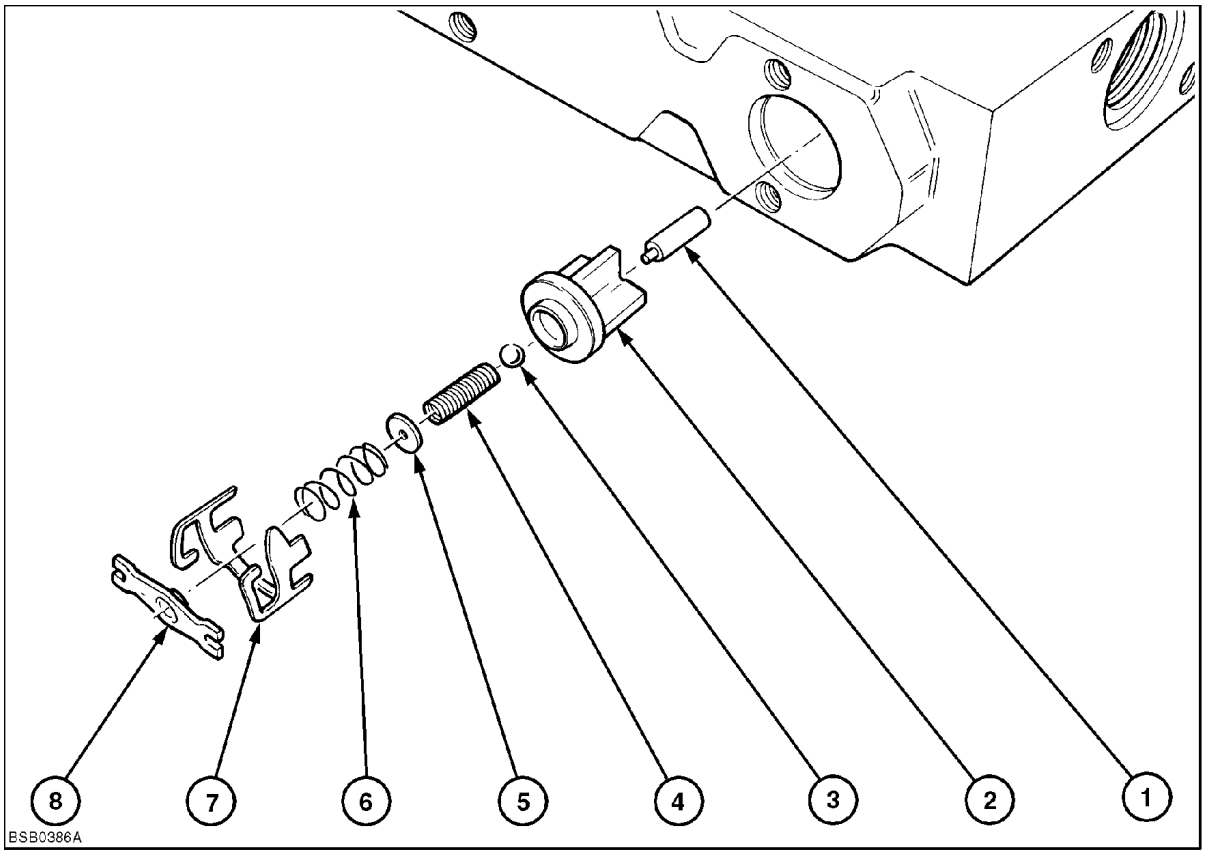
2. The couplers are serviced as an assembly and should not be disassembled.
   Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Sectional view (A.10.C)**

NOTE: *DO NOT attempt to remove the spool until the load holding valve* ***(3) PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Sectional view (A.10.C)****has been removed, otherwise damage to the spool will occur.*

3. Remove load holding valve from raise port as follows:-
   Using small screwdriver, open the two slots **(1)** on keeper **(2)**.
   Turn spring seat **(3)** through **90 °** and remove from housing.
   Remove load check valve components.



BSB0385A 3



BSB0386A 4

Load Check Valve

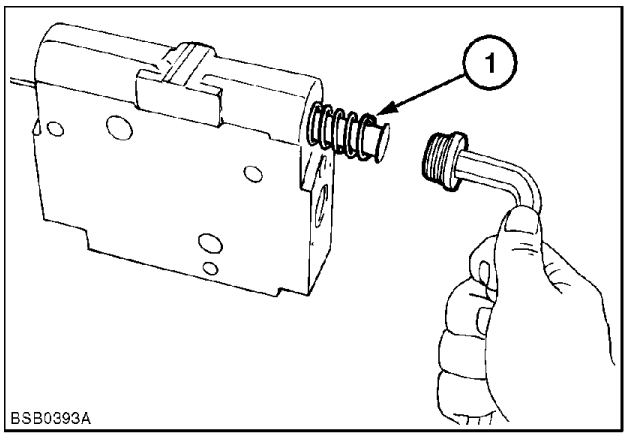
1 Plunger
2 Load Holding Valve
3 Ball
4 Spring
5 Washer
6 Spring
7 Spring Seat
8 Keeper

4. Carefully remove flow control valve plug.

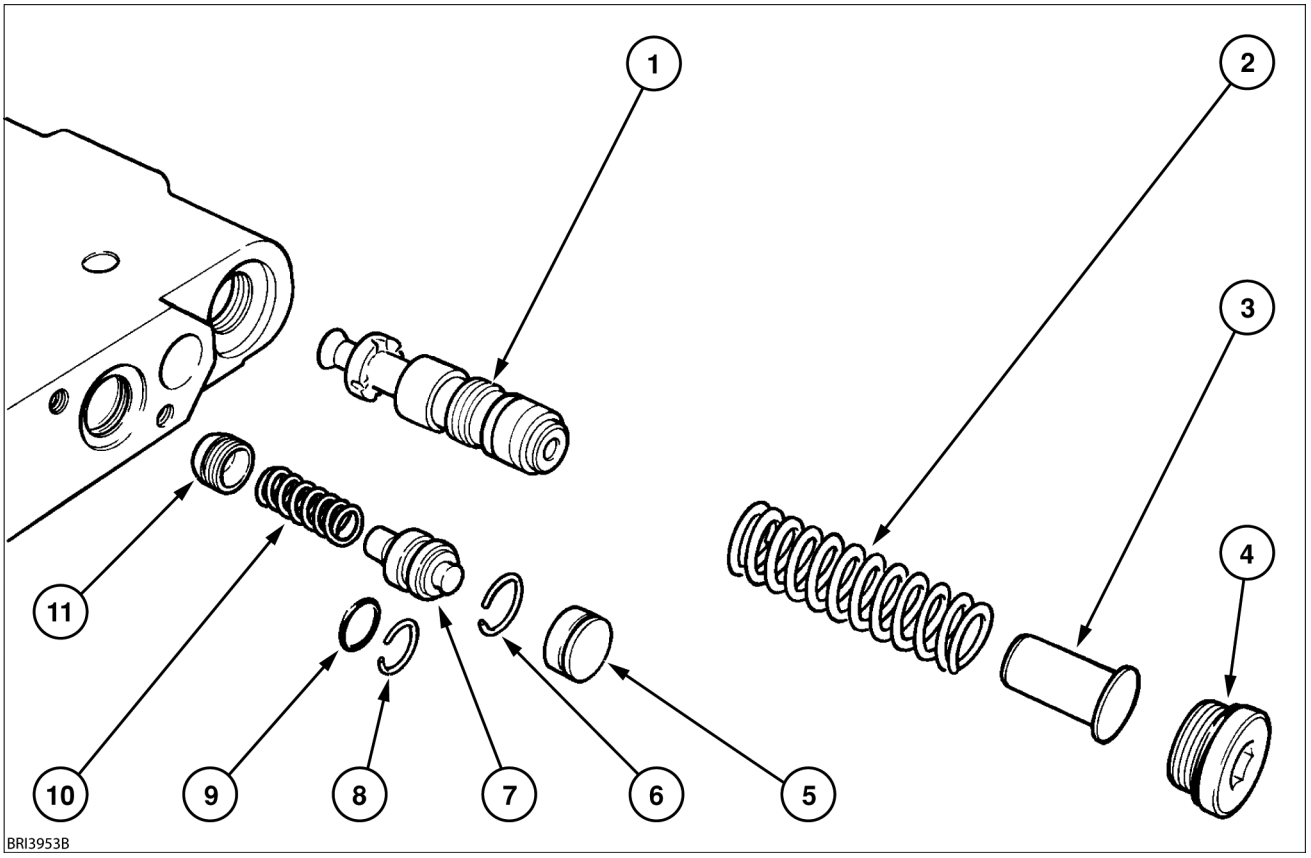
⚠ WARNING ⚠

A large spring is positioned beneath the plug, take extreme care when removing plugs.

B041



BSB0393A 5



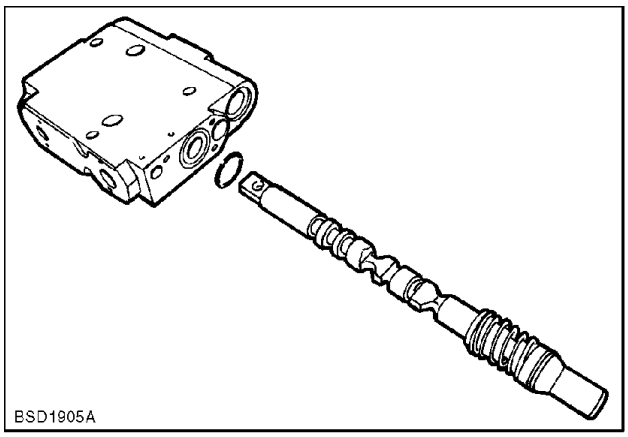
BAIL06CCM033FSA 6

Flow Control Spool and Check Valve

1 Flow Control Spool
2 Spring
3 Spring Guide
4 Plug and 'O' Ring
5 Plastic Cap
6 Retainer
7 Plug
8 Back-up Ring
9 'O' Ring
10 Spring
11 Check Valve Cone

Load Check Valve Removal

5. Remove the plastic cap **(5)** and the snap ring **(6)** Figure , taking care not to scratch the bore.
6. Locate and clamp the extractor tool **380002720** onto the retainer by tightening the nut on the tool.
7. Pull out the tool and retainer.
8. Remove the check valve and spring.
9. Withdraw control valve spool from housing.
   The spring centring mechanism is factory set. DO NOT disassemble the spool.



BSD1905A 7

Next operation:
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Assemble (A.10.C)

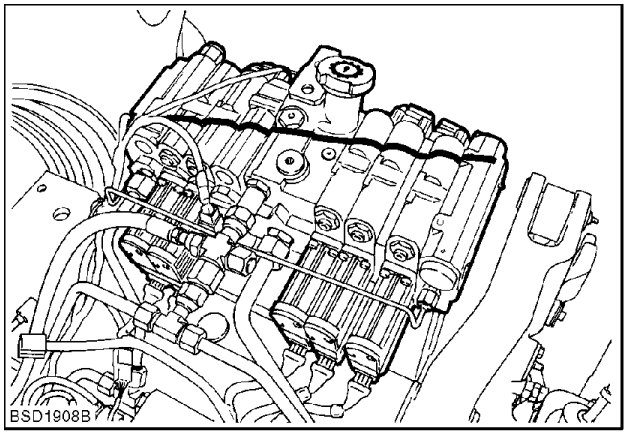
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Remove

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Prior operation:
Battery - Disconnect (A.30.A)

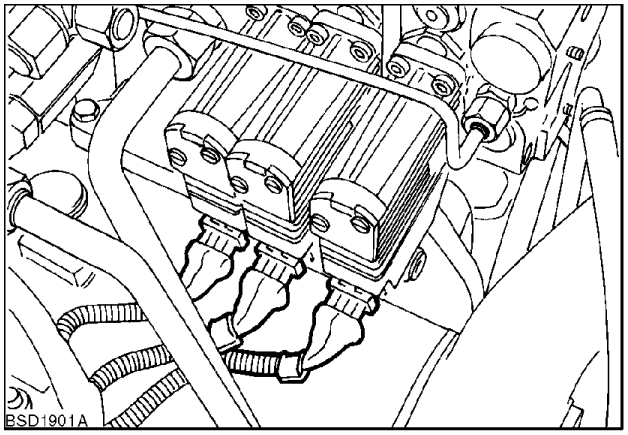
NOTE: *Individual remote valve assemblies can be removed from the tractor without the need to remove the complete valve stack.*

1. Lower hydraulic links and thoroughly clean remote valve stack.
   To aid reassembly draw a diagonal line across the valve stack.

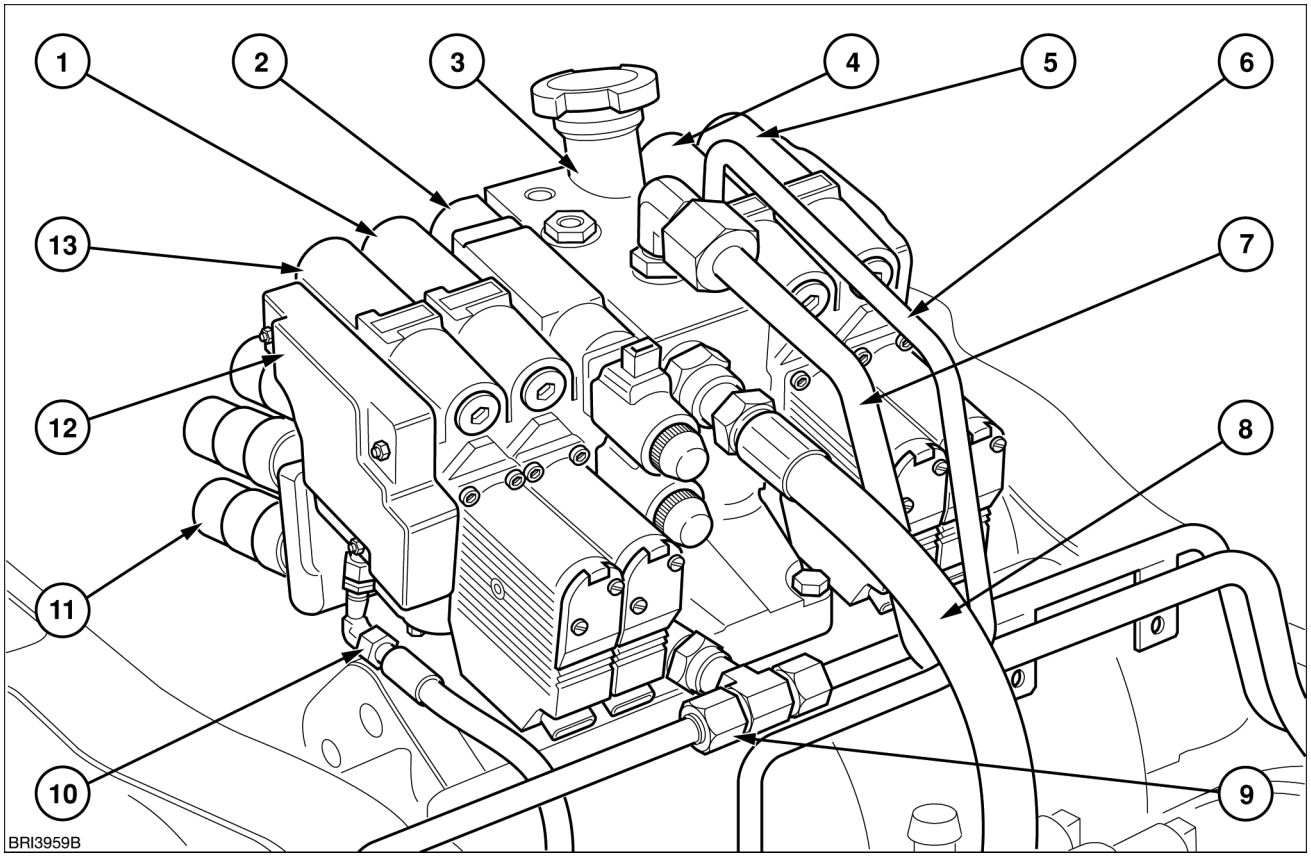


BSD1908B 1

2. Identify and disconnect the connectors to each remote valve solenoid.
   Disconnect hydraulic pipework.



BSD1901A_192 2

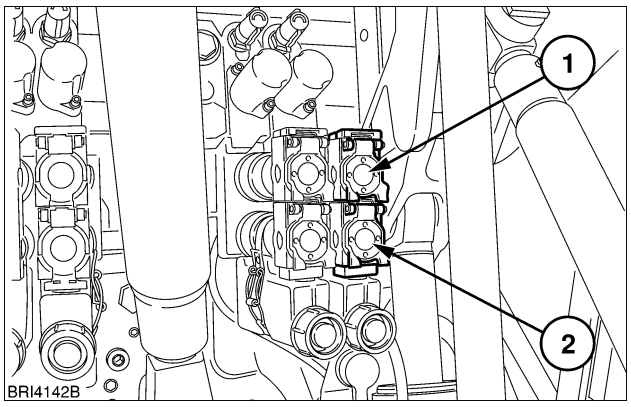


BAIL06CCM031FSA 3

Electronic Draft Control and Closed Centre Remote Control Valve Stack

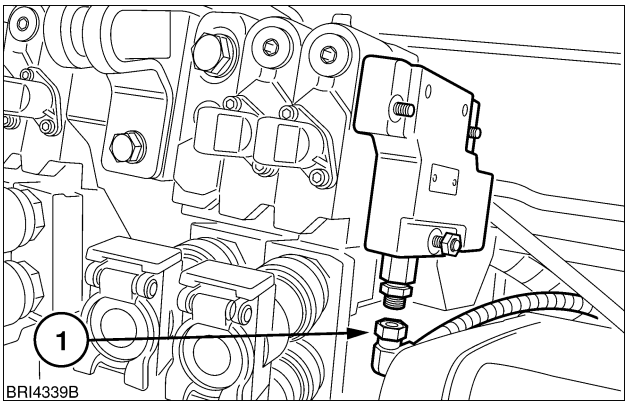
1. Remote Control Valve
2. Electronic Draft Control Valve
3. Manifold Block
4. Remote Control Valve
5. Remote Control Valve
6. Pilot Line Pressure
7. Return To Tank
8. Pressure Feed
9. To Hydraulic Lift Cylinders
10. Load Sensing Line connection
11. Remote Couplers
12. End Plate
13. Remote Control Valve

3. Remove dust caps **(1)** and **(2)** and oil drain collector bottles.



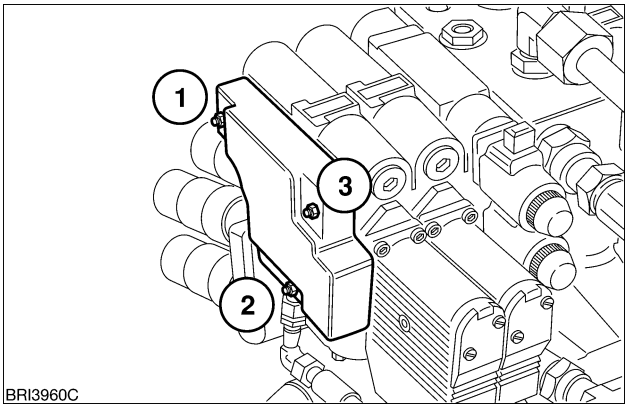
BAIL06CCM162ASA 4

4. Remove load sensing hose connection. **(1)** .



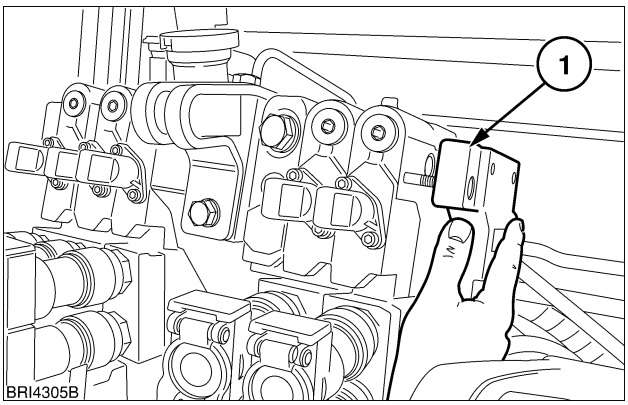
BAIL06CCM249ASA 5

5. Undo and remove the tie rod nuts **(1)**, **(2)**, and **(3)**.



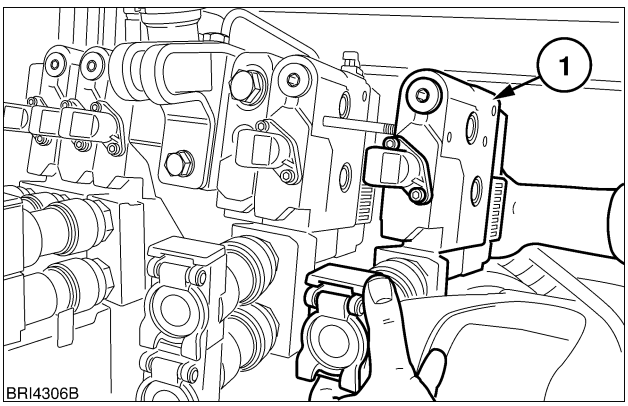
BAIL06CCM159FSA 6

6. Remove end cap.



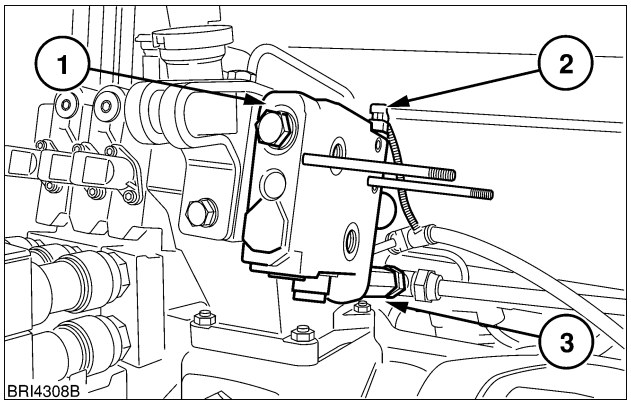
BAIL06CCM209ASA 7

7. Remove remote valves 1 and 2.



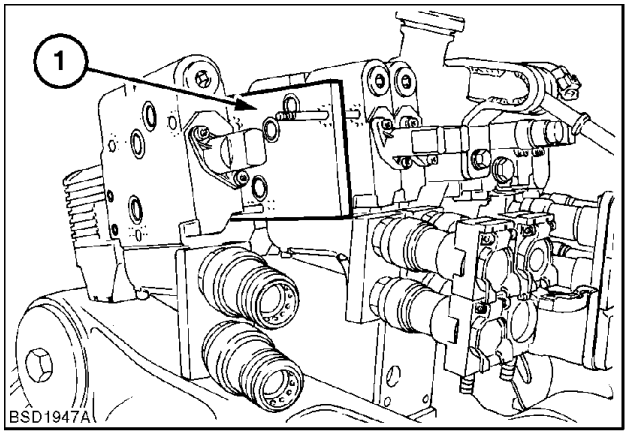
BAIL06CCM210ASA 8

8. Identify and disconnect the connectors to electronic draft control valve solenoids **(2)**. Disconnect Lift cylinder supply pipe **(3)** and remove valve from tie rods.



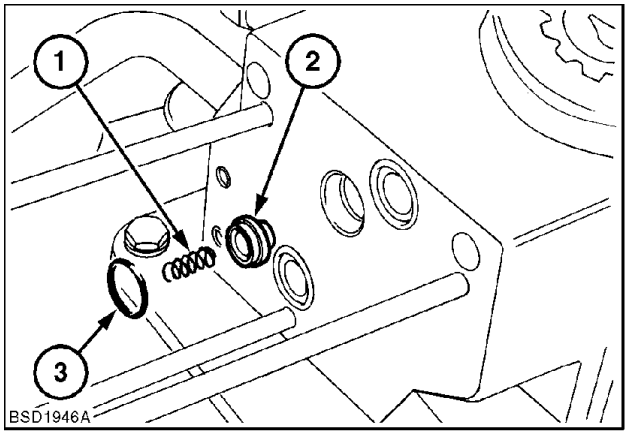
BAIL06CCM215ASA 9

9. Repeat procedure to remote valves on opposite side of manifold. Note that a spacer **(1)** is fitted between remote valves 4 and 5.



BSD1947A 10

10. When removing remote valve No 3 be careful not to lose the spring **(2)** which sits in the load sense check valve **(1)** located in the manifold. The check valve is held in position by 'O' ring **(3)**.



BSD1946A 11

Next operation:
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Disassemble (A.10.C)

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Assemble

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

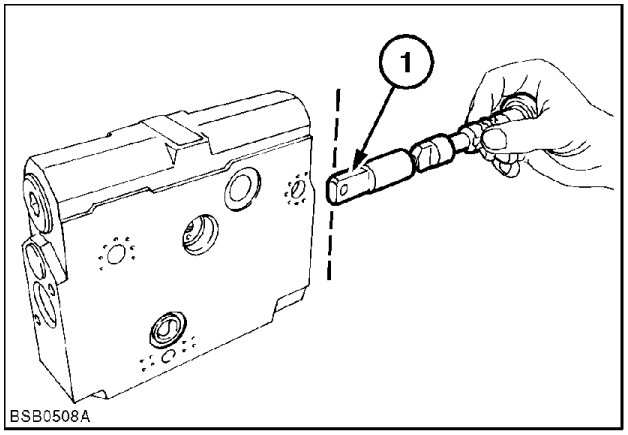
Prior operation:
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Disassemble (A.10.C)

1. Prior to inserting control valve spool in housing ensure flats **(1)** on end of spool are in vertical position as shown, then install the load holding check valve, as described below. Do Not rotate spool after installing load holding valve otherwise damage to spool and load holding valve plunger will occur.

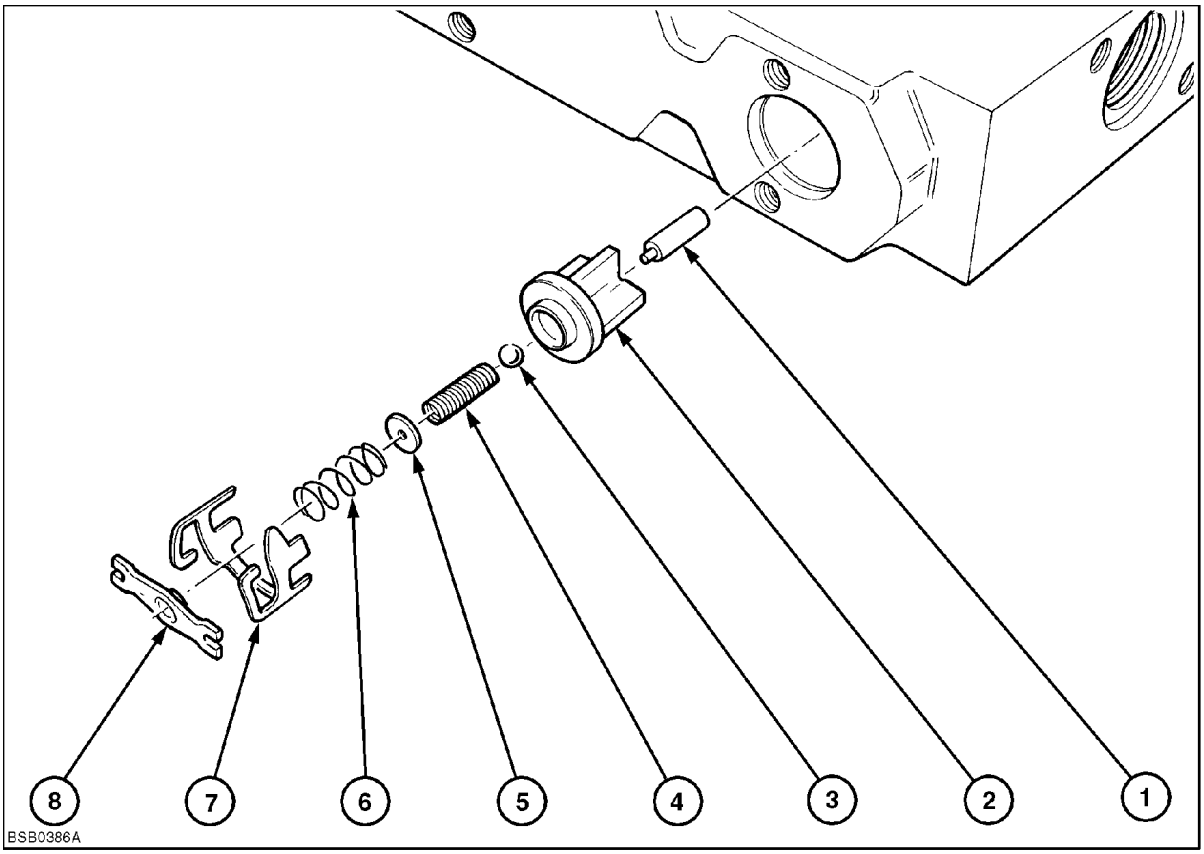
⚠ WARNING ⚠

Do not rotate the main control spool or use force once inserted into the bore, otherwise damage to the main control spool and the lock valve pin will occur.

B004



BSB0508A 1



BSB0386A 2

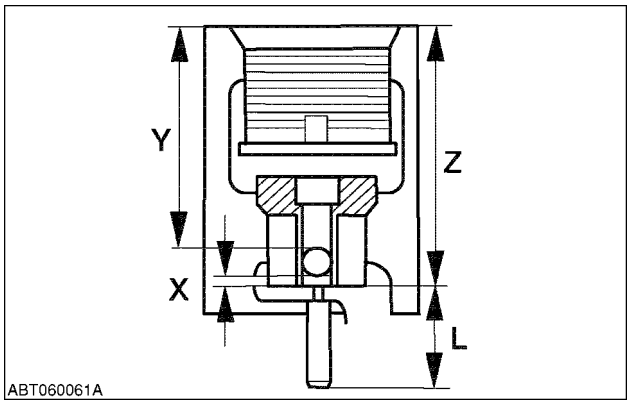
Load Check Valve

1 Plunger
2 Load Holding Valve
3 Ball
4 Spring
5 Washer
6 Spring
7 Spring Seat
8 Keeper

Load Holding Check Valve installation

2. Dimensions:
   L = Plunger Length
   Z = Depth to the Plunger
   Y = Depth to the Pilot Ball
   B = Pilot Ball diameter (**4 mm** (**0.16 in**)
   X = Gap between the Plunger and the Pilot Ball

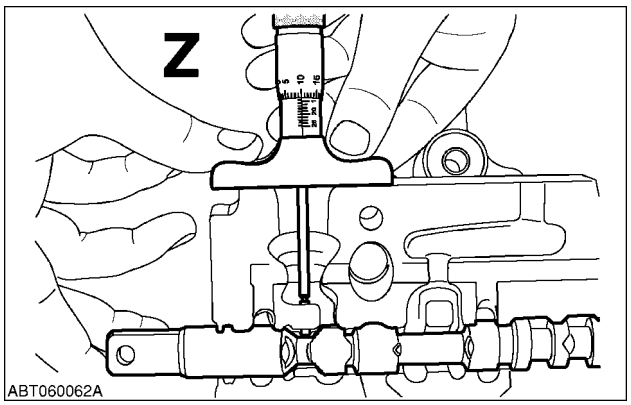
NOTE: *When the control valve is in the neutral position there must be a gap (X)* ***0.2 - 0.3 mm*** *(****0.008 - 0.012 in****) between the plunger and the pilot ball.*



BAIL06CCM194ASA 3

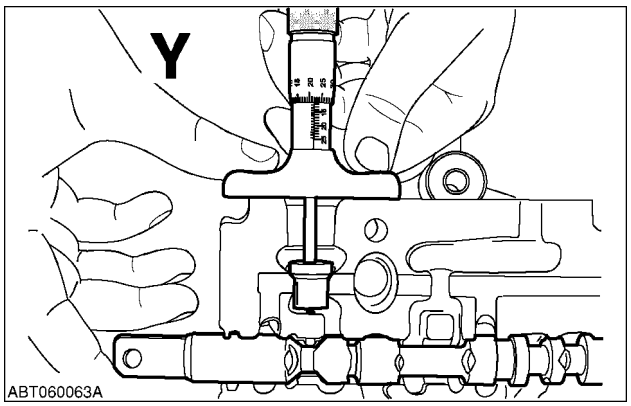
Calculating Gap (X)

3. Install the shortest plunger (No rings , **15.07 mm** (**0.59 in**)) in position with the control valve in neutral.



BAIL06CCM195ASA 4

4. Measure dimension ‘Z‘ from the top of the plunger to the top face of the remote valve body (e.g. **36.43 mm** (**1.43 in**)).
5. Remove the plunger.
6. Install the load check valve and the pilot ball. Ensure that both are fully seated
7. Measure dimension ‘Y‘ from the top of the ball to the top face of the valve body (e.g. **36.43 mm** (**1.43 in**))

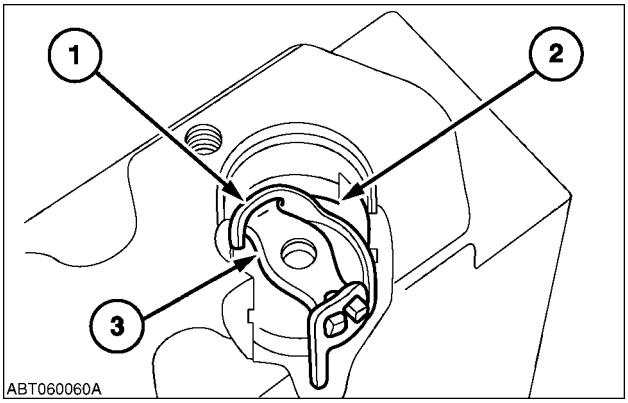


BAIL06CCM196ASA 5

Load Check Valve Installation

8. Ensure that the control spool is in neutral.
9. Install the determined plunger using long nosed pliers.

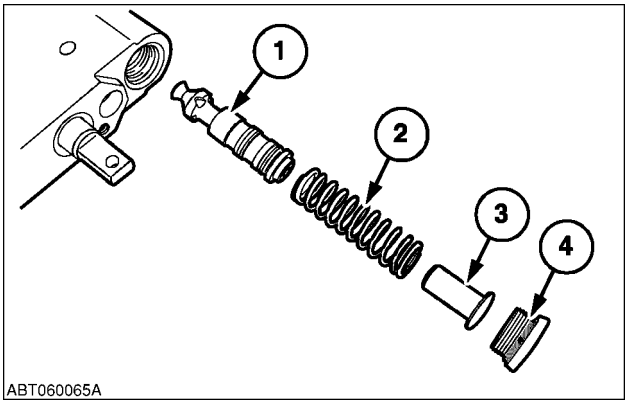
10. Install the lock valve , pilot ball, pilot spring, washer and the spring (Refer to Figure **2**)
11. Use a screwdriver to bend both retainer lugs **(1)** (figure **5**) upwards, and locate the retainer to the bore.
12. Fit the spring seat into the retainer, straighten the lugs and turn the assembly anti clockwise **90 °** to secure in the remote valve body.



BAIL06CCM197ASA 6

Flow Control Valve Installation

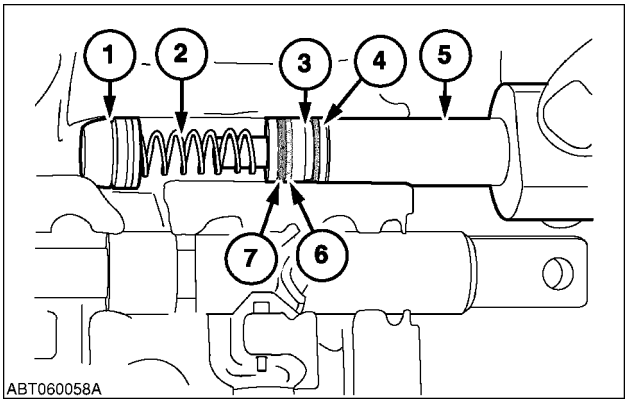
13. Install the flow control spool valve **(1)**, together with the spring **(2)** , guide **(3)** and retaining plug **(4)** . Tighten the retaining plug to a torque of **67 Nm** (**49.42 lbft**)



BAIL06CCM198ASA 7

Lift Check Valve Installation

14. Check the bore for any rough edges and smooth if necessary
15. Install the check valve **(1)** into the remote valve body.



BAIL06CCM201ASA 8

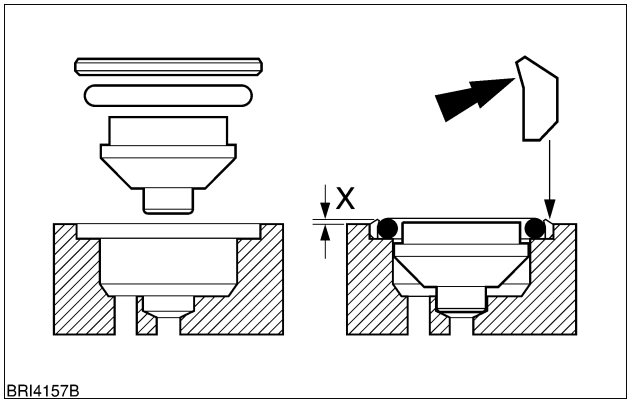
16. Fit the back up ring **(6)** and the 'O' ring **(7)** in the groove in the retainer **(3)** and locate the spring **(2)** onto the inner spigot of the retainer.

17. Locate the snap ring **(4)** , retainer and spring assembly onto the installation tool **380002720 (5)** .Install the assembly into the remote valve bore and push until the tool handle contacts the remote valve body.
18. The snap ring must be located in the groove. Ensure that the retainer is located up against the snap ring . Install a new plastic cap.

Load Sense Check Valve Installation

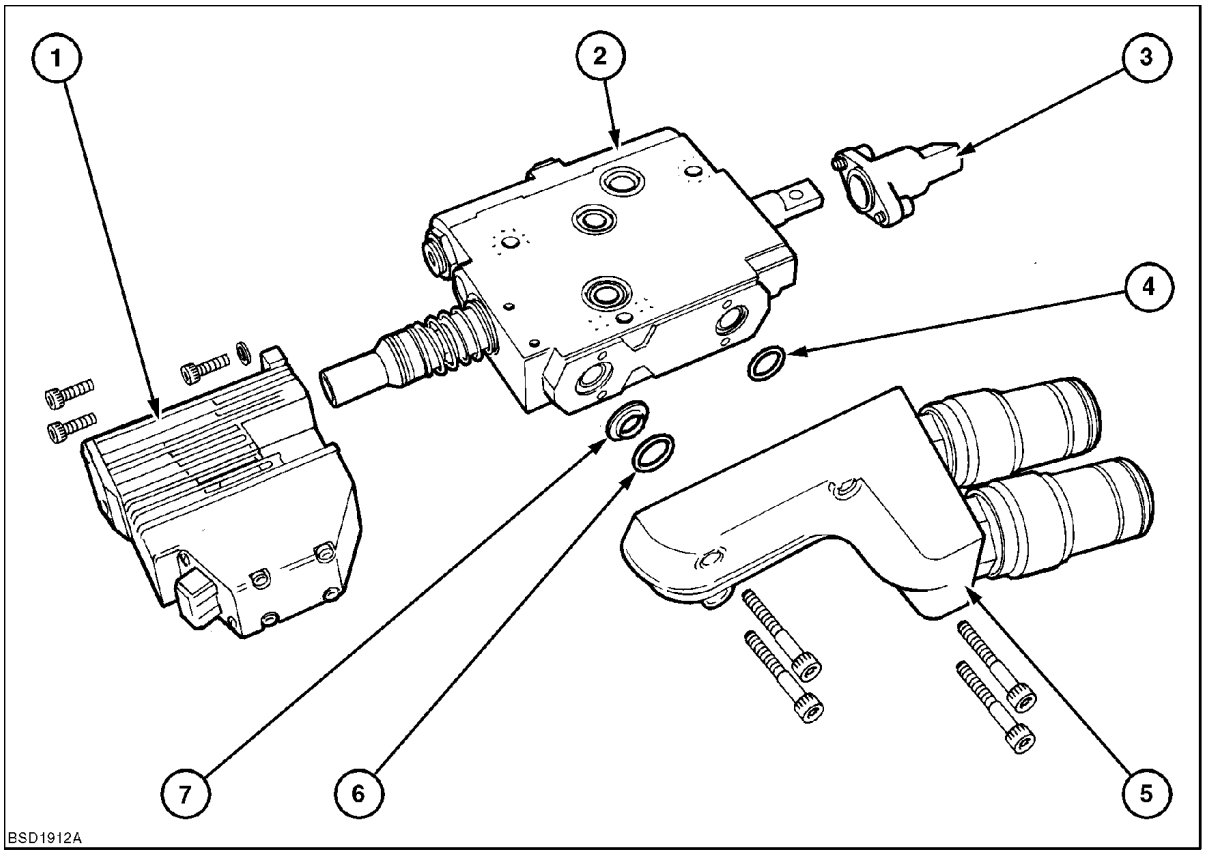
19. Install new 'O' Ring seal and back up ring

NOTE: *Clearance 'X' should be approximately* ***0.5 mm*** *(****0.020 in****) from the flange face of the valve segment to the top edge of the inserted check valve.*



BAIL06CCM139ASA 9

20. Assemble Spool control unit , coupler housing and spool cap to the assembled valve slice . Refer to . **10** . Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Torque (A.10.C)**



BSD1912A 10

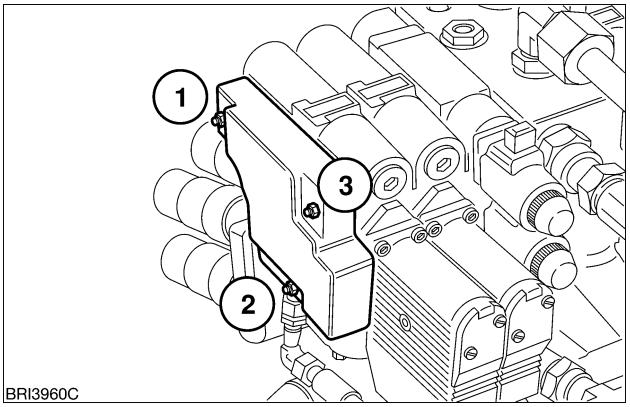
Remote Valve and Coupler Housing

1 Spool Control Unit
2 Remote Valve Body
3 Cap
4 ‘O’ Ring
5 Coupler Housing
6 ‘O’ Ring
7 Seat

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Install

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

1. Installation follows removal procedure in reverse. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Remove (A.10.C)**
   Install end caps and tighten bolts to specified torque **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Torque (A.10.C)** in sequence 1,2,3.



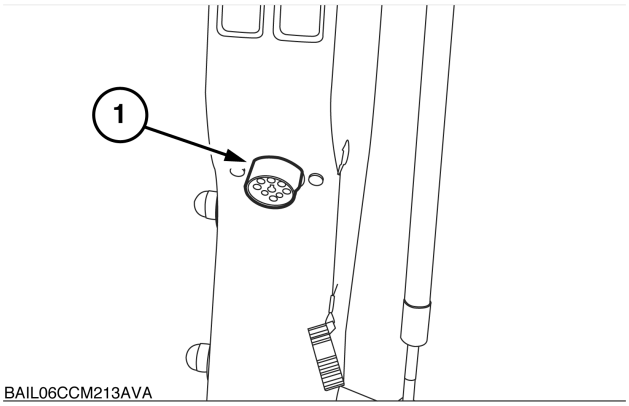
BAIL06CCM159FSA 1

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

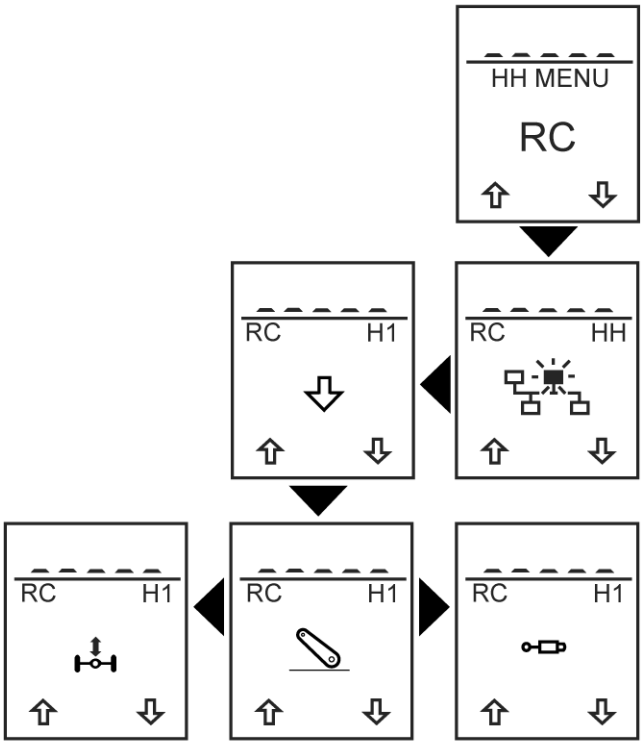
NOTE: *The calibration procedure is controlled by the electronic management system. To prevent inadvertent movement of the tractor, park the tractor away from any obstacles, firmly apply the parking brake and block the wheels, front and rear. Check that the Ground speed display is Zero before commencing.*

1. Install the diagnostic connector **380000843** into the diagnostic socket **(1)**.



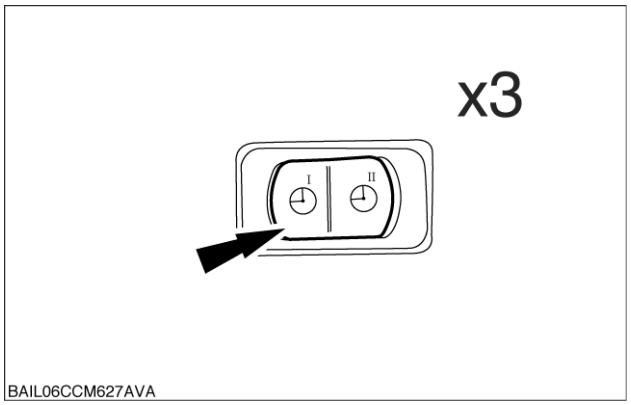
BAIL06CCM213AVA 1

2. Disconnect all implements from the rear remotes.
3. Make sure all EHR program switches are in the OFF position.
4. Use the "up", "down" and "menu" keys on the ICU2 to navigate the HH menu's to H1 and the rear EHR symbol on the RC controller.
   The top section of the display will show "CAL".



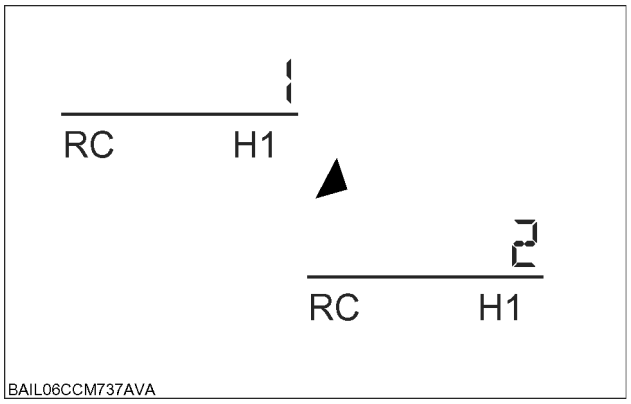
BAIL06CCM252FVB 2

5. Depress the program switch for lever No.1 three times.



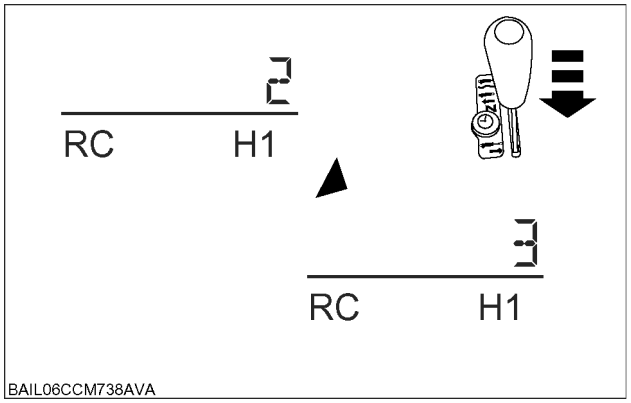
BAIL06CCM627AVA 3

6. The calibration will proceed, the program lamp for EHR 1 will be illuminated and the top section of the display will show "1".
When the neutral position has been acquired and stored, the program lamp is turned off and the top section of the display will show "2".



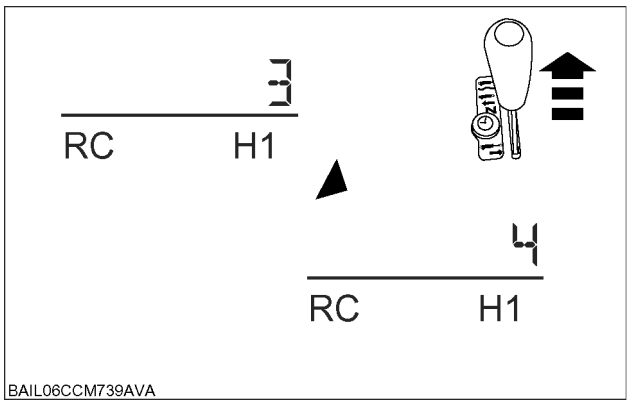
BAIL06CCM737AVA 4

7. While 2 is displayed move the lever to the raise position, the program light will illuminate.
When movement is detected the program lamp for EHR 1 is turned off. After the raise position is established the top section of the display will change to 3, the program light will switch off.



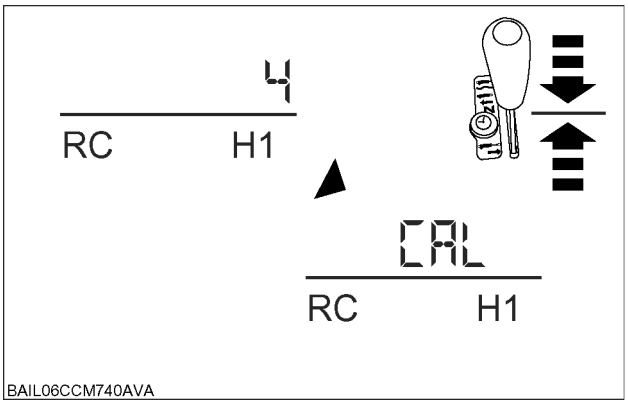
BAIL06CCM738AVA 5

8. While 3 is displayed move the lever to the full flow lower position, the program light will illuminate.
When a stable value for the full flow lower position of the lever is seen it is recorded with the minimum flow rate value, the top section of the display will change to 4, the program light will switch off.



BAIL06CCM739AVA 6

9. While 4 is displayed move the lever to the float position, the program light will illuminate.
When a stable value for the float position of the lever is seen and recorded the top section of the display will change to "CAL" to indicate the calibration procedure is complete.



BAIL06CCM740AVA 7

10. To calibrate the remaining EHR levers (2 to 4), repeat the steps 5 to 9.

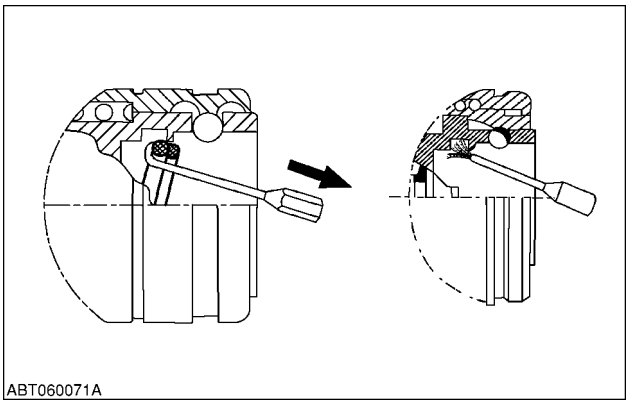
11. Key OFF to store the calibration values.

NOTE: *If a lever is not calibrated the program lamp is switched on regardless of the program switch state.*

Coupler - Overhaul

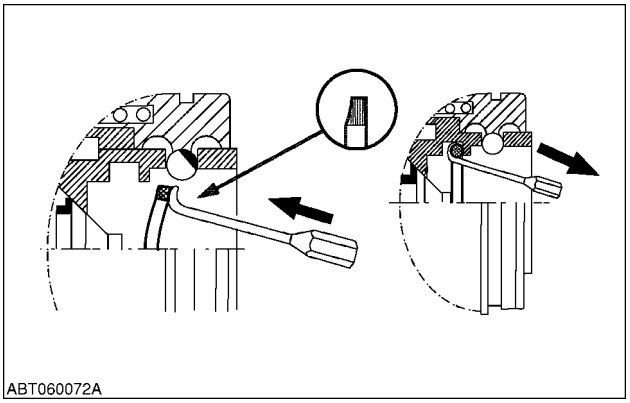
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

1. Remove the 'O' ring and back up ring using a suitable hooked tool.
   Ensure the groove is clean



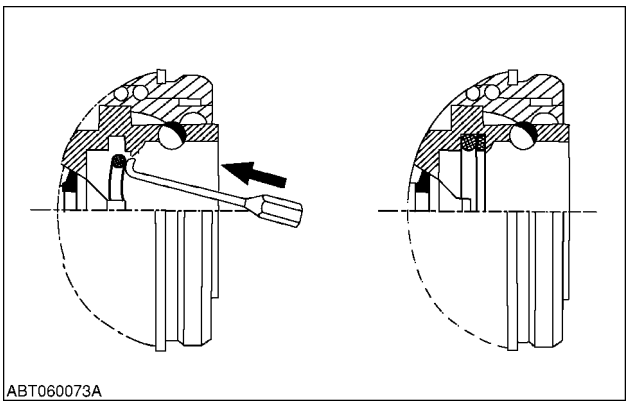
BAIL06CCM206ASA 1

2. Install the new back up ring ensuring that it is fully seated in the groove.



BAIL06CCM207ASA 2

3. Lubricate the new 'O' ring with clean transmission oil and insert into the groove.

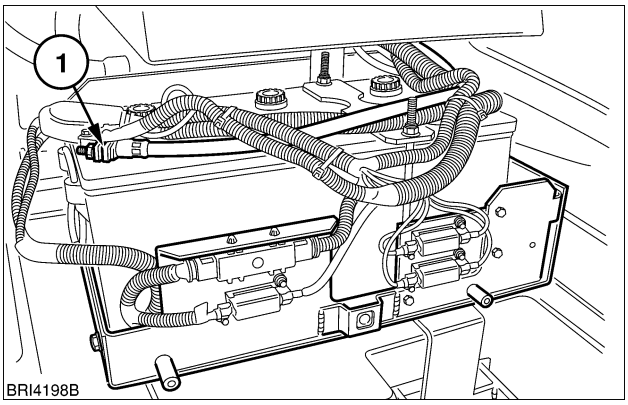


BAIL06CCM208ASA 3

Mid-mount remote control valve - Remove

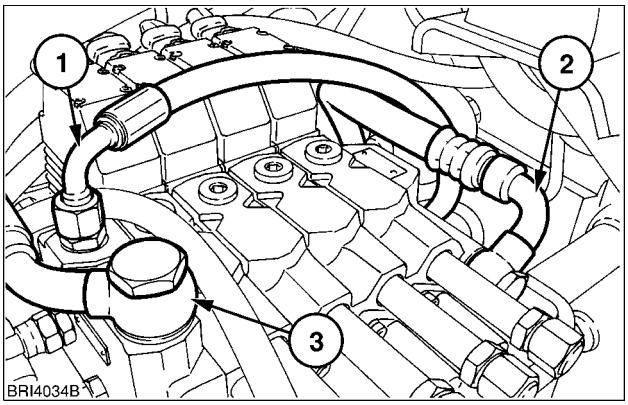
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

1. Disconnect the negative cable **(1)** from the battery and insulate. Refer to **Battery - Disconnect (A.30.A)**



BAIL06CCM151ASA 1

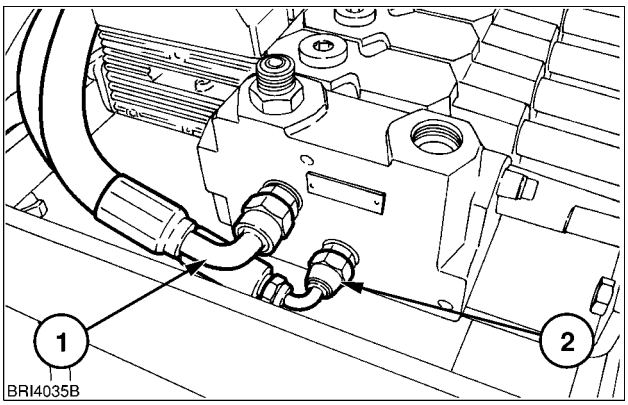
2. Disconnect the mid mount valve pilot return hose **(1)**, return hose **(2)**and supply hose **(3)** .



BAIL06CCM061ASA 2

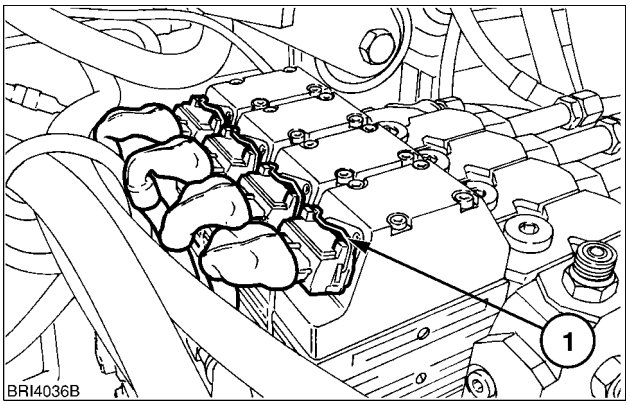
3. Disconnect the pilot line pressure hose **(1)** and the load sensing hose **(2)**

NOTE: *Drain all hoses into a suitable receptacle*



BAIL06CCM062ASA 3

4. Disconnect the electrical connectors **(1)** .



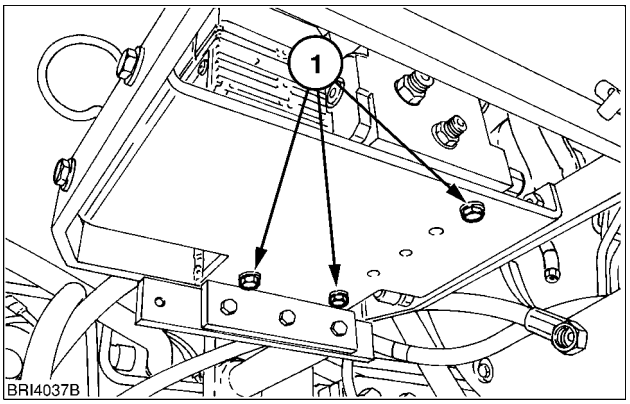
BAIL06CCM063ASA 4

5. Undo the mid mount valve stack retaining bolts. **(1)** . Remove valve stack from support.

⚠ WARNING ⚠

The remote valve assembly is heavy and must be removed under the complete control of the technician to prevent bodily injury.

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BAIL06CCM064ASA 5

Next operation:
Mid-mount remote control valve - Disassemble (A.10.C)

Mid-mount remote control valve - Install

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

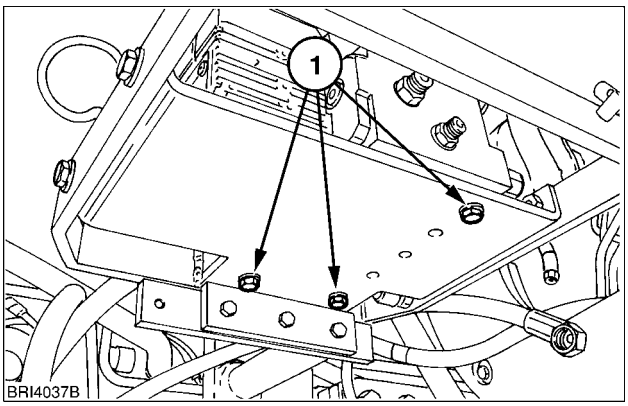
Prior operation:
Mid-mount remote control valve - Remove (A.10.C) Mid-mount remote control valve - Disassemble (A.10.C)

1. Place the remote valve assembly onto the support.

⚠ WARNING ⚠
The valve stack is very heavy DO NOT attempt to install without the use of lifting equipment.

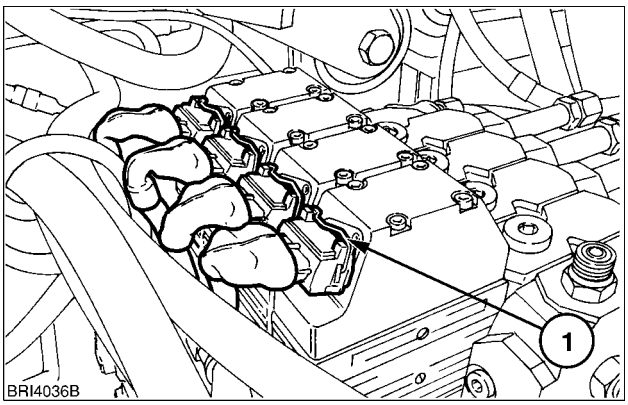
B037

2. Tighten retaining bolts **(1)** to **24 Nm 18 Foot pounds**.



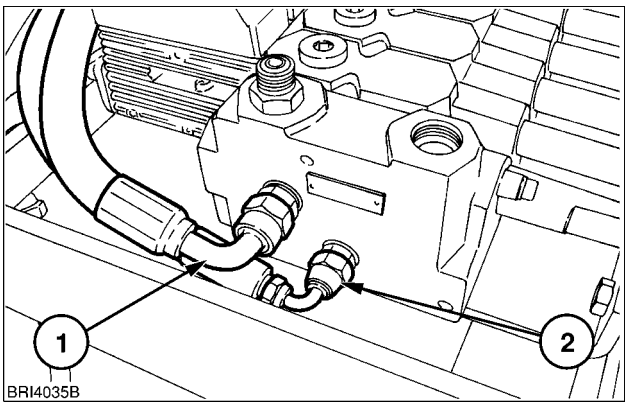
BAIL06CCM064ASA 1

3. Connect the harness connectors **(1)** to the remote valve solenoids.



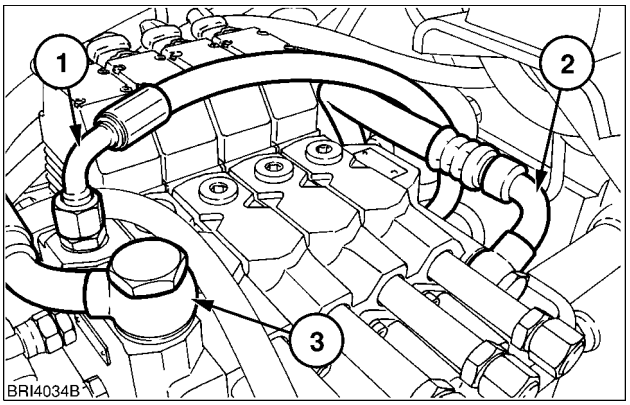
BAIL06CCM063ASA 2

4. Reconnect the pilot line pressure hose **(1)** and load sensing hose **(2)** .



BAIL06CCM062ASA 3

5. Reconnect pilot return hose **(1)** , main return hose **(2)**, and pressure hose **(3)**.



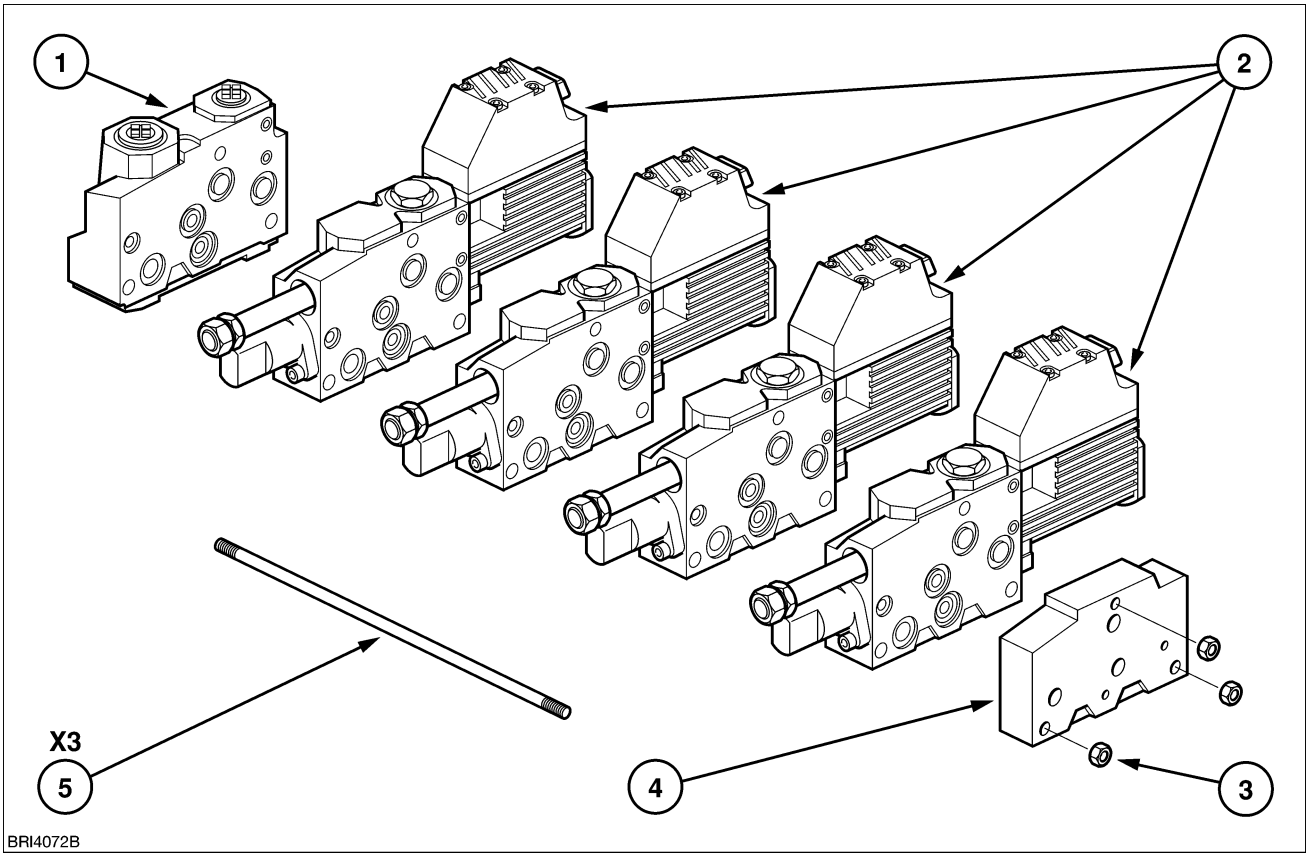
BAIL06CCM061ASA 4

6. If a new valve slice has been replaced or added it will be necessary to reprogram the number of the valve within the valve assembly. Refer to **Control module - Configure (A.50.A)**.

Mid-mount remote control valve - Disassemble

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Prior operation:
Mid-mount remote control valve - Remove (A.10.C)



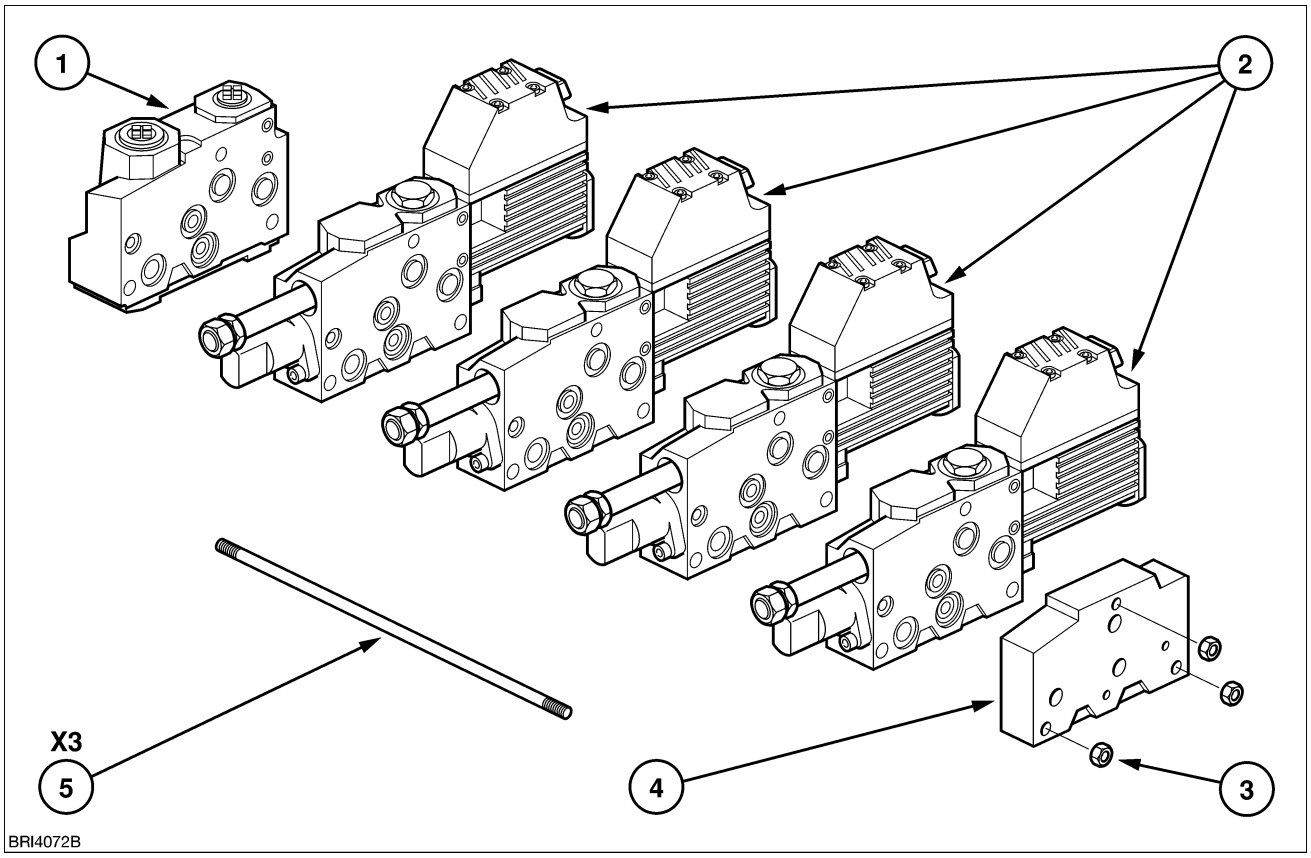
BAIL06CCM092FSA 1

1. Inlet Manifold
2. Electronic Remote Valves
3. Tie Rod Nuts
4. End Plate
5. Tie Rod

1. Loosen and remove the tie rod nuts **(3)** from the end plate **(4)** .
2. Remove the end plate .
3. Remove the remote valve slices **(2)** taking care not to dislodge the load sensing valves and 'O' rings seated in the valve face.
4. Unscrew the tie rod bolts from inlet manifold
5. Refer to **Mid-mount remote control valve - Exploded view (A.10.C)** to view valve components and **Mid-mount remote control valve - Assemble (A.10.C)** for reassembly.

Mid-mount remote control valve - Assemble

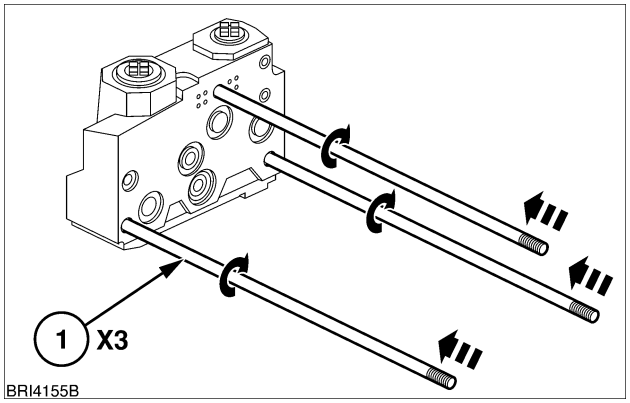
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller



BAIL06CCM092FSA 1

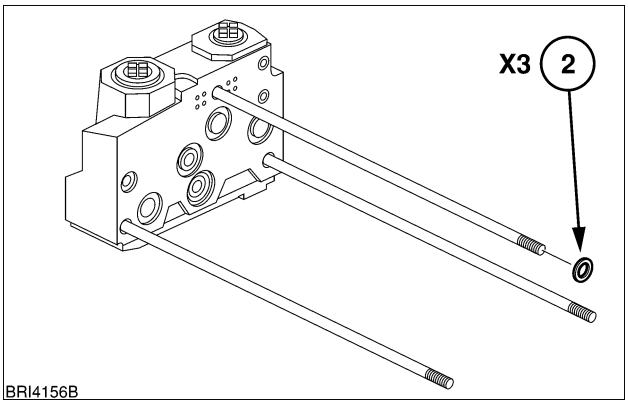
1.Inlet Manifold
2.Electronic Remote Valves
3.Tie Rod Nuts
4.End Plate
5.Tie Rod

1. Insert the tie rods into the inlet manifold and screw in by hand as far as they will go.



BAIL06CCM128ASA 2

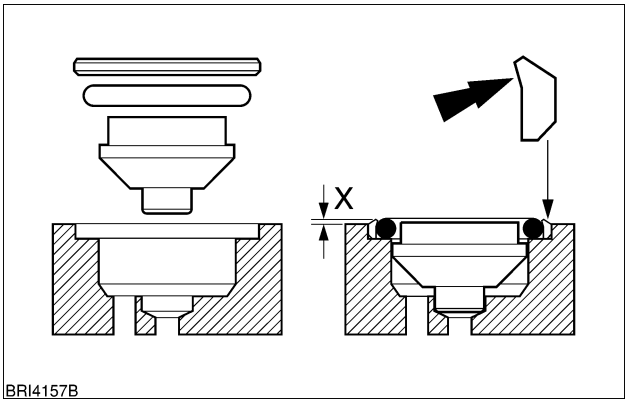
2. Push a shim onto the tie rods if any adhesive shims have been used previously.



BAIL06CCM129ASA 3

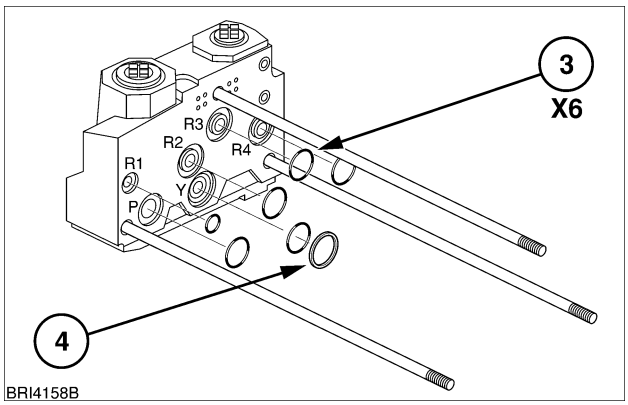
3. Insert load sensing shuttle valve along with the 'O' ring and support ring as shown in Figure **4** in port 'Y'. Figure **5**

NOTE: *Clearance X should be approximately* ***0.5 mm*** *from the flange face of the valve segment to the top edge of the inserted shuttle valve.*



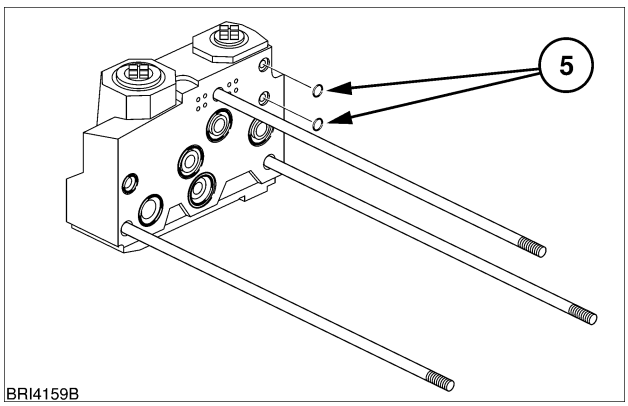
BAIL06CCM139ASA 4

4. Insert new 'O' Rings **(3)** into the pressure and return ports and also the load sense 'O Ring and support ring **(4)**.



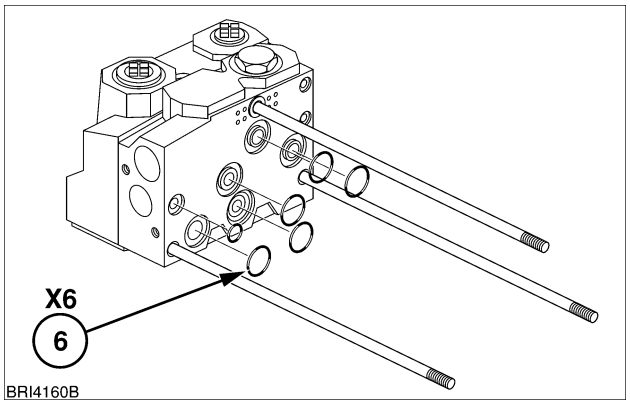
BAIL06CCM131ASA 5

5. Insert new 'O' Rings **(5)** into pilot line oil holes



BAIL06CCM132ASA 6

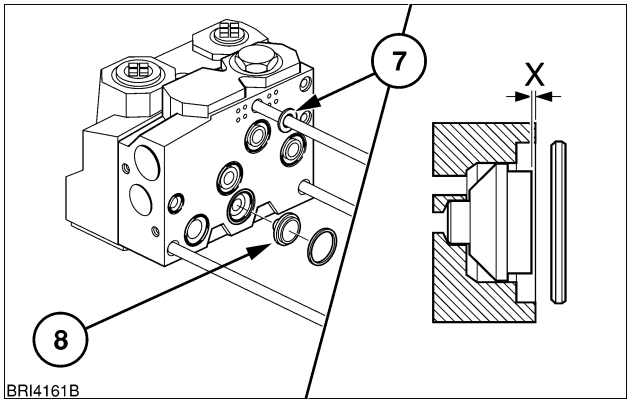
6. Place the first valve slice onto the tie rods and insert new 'O' rings **(6)** into the relevant ports.



BAILCCM133ASA 7

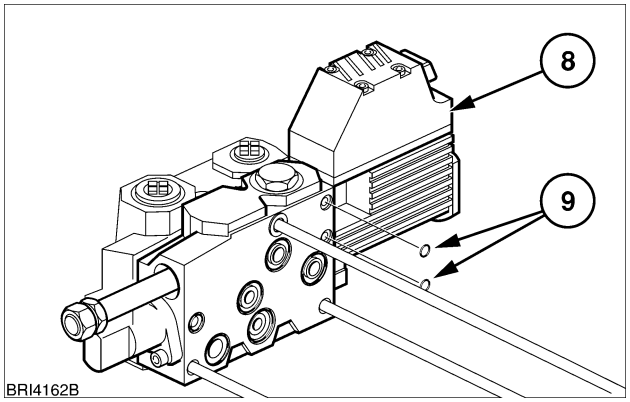
7. If the flange face has corrugations that have been smoothed with a dressing stone, one spacer **(7)** must be threaded onto each tie rod. Insert the load sense valve **(8)** and support ring as shown.

NOTE: *Clearance X should be approximately* ***0.5 mm*** *from the flange face of the valve segment to the top edge of the inserted shuttle valve.*



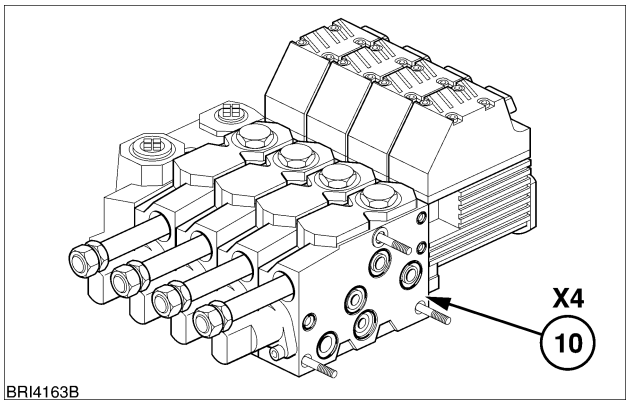
BAIL06CCM134ASA 8

8. Insert the 'O' rings **(9)** into the control oil holes.



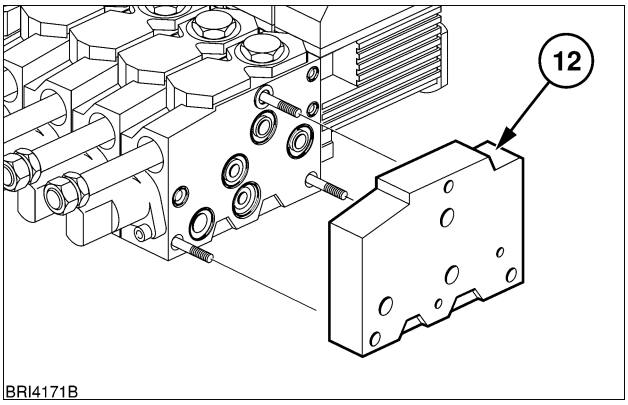
BAIL06CCM135ASA 9

9. Push the last slice **(10)** onto the tie rods and insert the 'O' rings.



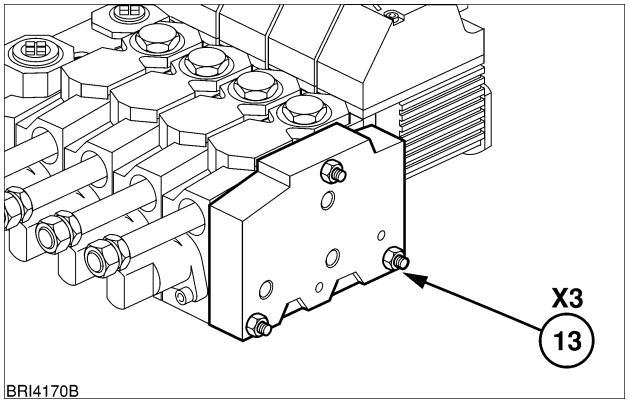
BAIL06CCM136ASA 10

10. Fit the end plate **(12)**.



BAIL06CCM138ASA 11

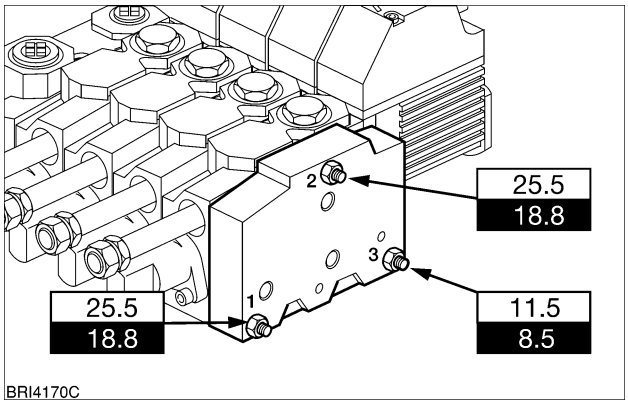
11. Push the end plate onto the tie rods and screw on the nuts **(13)** by hand



BAIL06CCM140ASA 12

12. Place the now assembled valve stack onto a level surface to correctly align the sections.

13. Tighten the nuts in the specified order and to the correct torque. See figure **13**



BAIL06CCM141ASA 13

Next operation:
Mid-mount remote control valve - Install (A.10.C)

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Troubleshooting

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Problem	Possible Cause	Correction
All of the EHR valves are inoperative	Isolator switch not activated	Press the switch to activate
	Faulty switch	Check operation of the switch using a suitable multi-meter and if faulty replace the switch
	EHR relay not operating	Replace the relay (Refer to **Fuse and relay box - General specification (A.30.A)**
	EHR CAN BUS wiring faulty	Disconnect one of the EHR's and using a suitable multi-meter check the resistance of the CAN wiring between terminals 2 and 3 (green and yellow). If the resistance is NOT approximately **120 Ω** Trace the fault in the wiring and repair If the resistance is approximately **120 Ω** reload the software into the XCM processor - RC Module If the EHR's are still inoperative replace the processor with one of known performance
One or more EHR valves do not operate	Error code 4*** displayed on instrument cluster	Refer to **Control module - Fault code index (A.50.A)**
	If hydraulic lift is not working this may indicate a high pressure system fault	Refer to **HITCH Electronic draft control - Not function (H.10.D)**
	If hydraulic lift is working flow compensating valve could be faulty	Operate and hold control lever to test maximum system pressure at each remote valve coupler. If pressure at each valve coupler is below **195 - 205 bar** (**2828 - 2973 lbf/in2**) examine flow/pressure compensating valve for sticking Repair or replace the flow compensating valve
	Load Sensing valve between valve sections requires check	Operate all remote valve levers simultaneously and check if the pressure at the defective remote valve is **195-205 bar** (**2828-2973 lbf/in2**)
	Faulty remote valve	Operate all remote valve levers simultaneously and check if the pressure at the defective remote valve is NOT **195 - 205 bar** (**2828 - 2973 lbf/in2**) overhaul remote valve which failed the pressure test - Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Disassemble (A.10.C)**

Remote control valve - Troubleshooting

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Problem	Possible Cause	Correction
No spool movement	Valve spool sticking	Remove the end cap and operate the valve and observe the spool. If the spool operates correctly refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Troubleshooting (A.10.C)** for diagnosis.
	Lift check valve spring faulty or broken	Remove and replace lift check valve assembly. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Assemble (A.10.C)**
	Load holding check valve plunger worn, broken, or incorrectly adjusted	Replace load holding check valve and plunger. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Assemble (A.10.C)**
	Remote Valve Slice faulty	Replace complete valve section. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Remove (A.10.C)**
No oil flow	Valve slices may be faulty	Check oil flow of valve slices. Refer to **PRIMARY HYDRAULIC POWER SYSTEM - Pressure test (A.10.A)**
	Control valve sticking	Check that the control valve moves into both end detent positions.
	Valve slice faulty	Replace complete valve slice. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Remove (A.10.C)**
Oil leakage	Lift check valve bore plug leaking	Remove lift check valve and install new valve assembly. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Assemble (A.10.C)**
	'O' ring failure between valve slices	Replace 'O' rings. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Remove (A.10.C)**
	Oil leakage between coupler manifold and remote valve slice.	Separate the coupler manifold from the valve slice and replace the 'O' rings.
	Couplers seals worn or damaged	Replace seals. Refer to **Coupler - Overhaul (A.10.C)**
	Remote valve slice faulty	Replace complete valve slice and torque retaining nuts in correct sequence. Torque **30 Nm** (**22.13 lbft**)
Implement creeps down with the remote valve in the 'neutral' position	Feed hose incorrectly connected to coupler.	Connect feed hose to 'raise' coupler.
	Load check valve faulty or incorrectly adjusted	Replace valve or ensure correct adjustment. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Assemble (A.10.C)**
Implement dips initially when the operating linkage is in the 'Raise' position	Lift check valve worn or damaged	Remove and replace lift check valve. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Assemble (A.10.C)**

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DISTRIBUTION SYSTEMS - A

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - 10.C

Coupler - Overhaul 80
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Mid-mount remote control valve - Assemble 86
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Mid-mount remote control valve - Disassemble 85
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Mid-mount remote control valve - Exploded view 62
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Mid-mount remote control valve - Install 83
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Mid-mount remote control valve - Remove 81
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Mid-mount remote control valve - Static description 58
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Mid-mount remote control valve - Torque 7
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Assemble 71
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate 77
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Disassemble 63
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Dynamic description 8
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Install 76
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Remove 67
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Sectional view 57
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Special tools 5
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Static description 33
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Static description Activity 46
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Torque 5
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Troubleshooting 90
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Remote control valve - Troubleshooting 91
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

DISTRIBUTION SYSTEMS - A

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - 10.C

PUMA 165 [Z9BH40001 -] , PUMA 165 [Z9BH60001 -] , PUMA 180 [Z9BH40001 -] , PUMA 180 [Z9BH60001 -] , PUMA 195 [Z9BH40001 -] , PUMA 195 [Z9BH60001 -] , PUMA 210 [Z9BH40001 -] , PUMA 210 [Z9BH60001 -]

Contents

DISTRIBUTION SYSTEMS - A

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - 10.C

TECHNICAL DATA

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve

Torque 4
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Remote control valve

Torque 5
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Mid-mount remote control valve

Torque 6
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

FUNCTIONAL DATA

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve

Hydraulic schema 7
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Sectional view 8
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Exploded view 9
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Dynamic description 10
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Mid-mount remote control valve

Static description 20
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Exploded view 24
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

SERVICE

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve

Remove 25
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Disassemble 27
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Install 28
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Calibrate 31
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Coupler

Overhaul 34
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Mid-mount remote control valve

Remove 35
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Install 37
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Disassemble 39
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Assemble 40
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

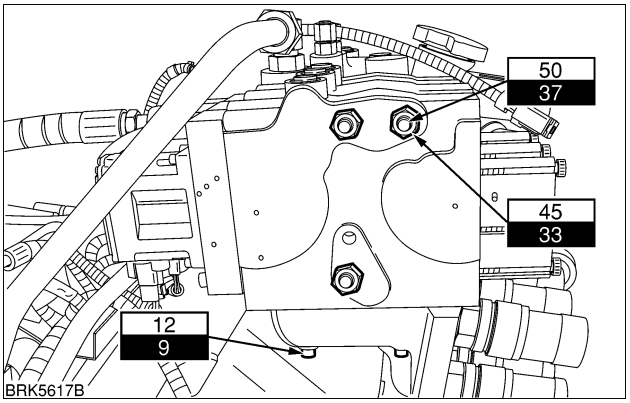
Stack valve

Remove 44
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Install 47
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Torque

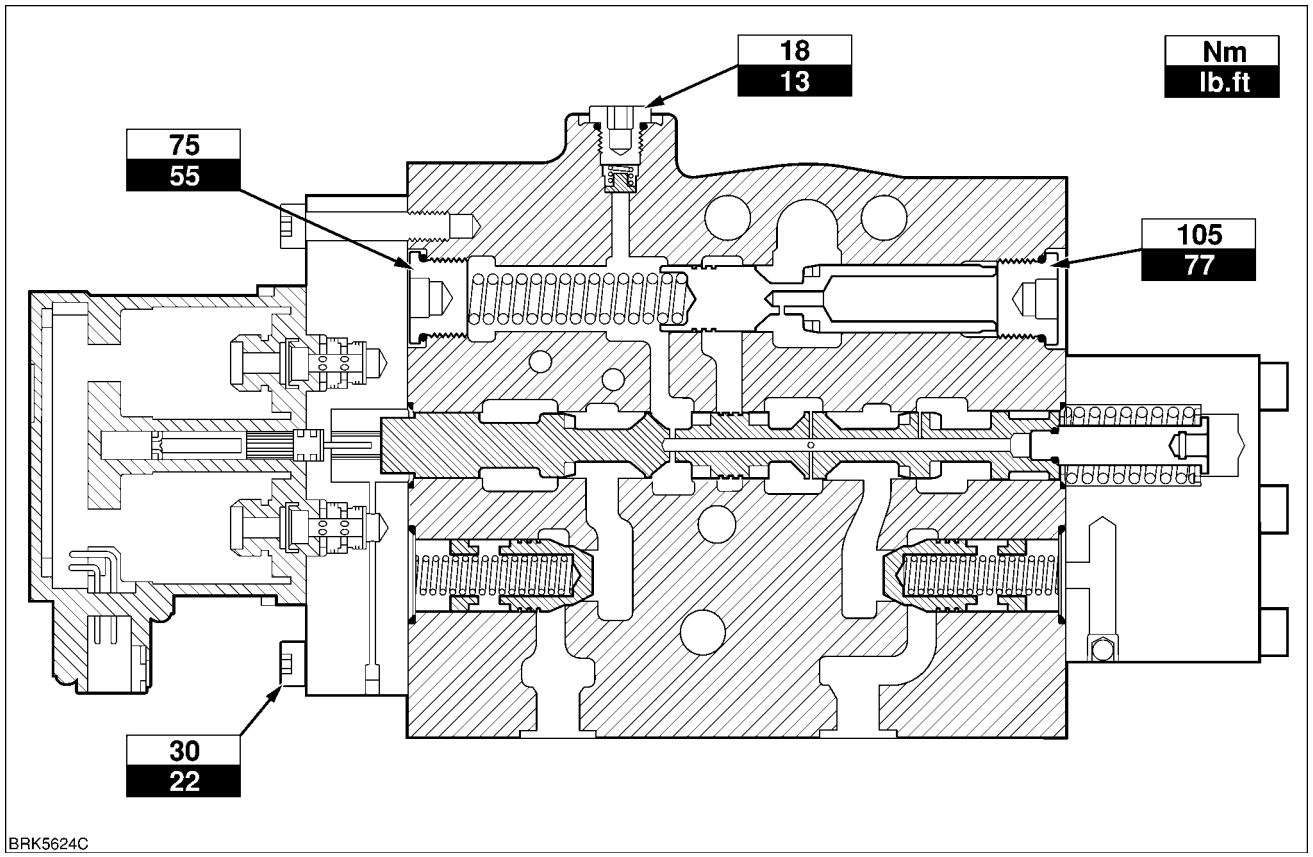
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]



BAIL08CVT001ASA 1

Remote control valve - Torque

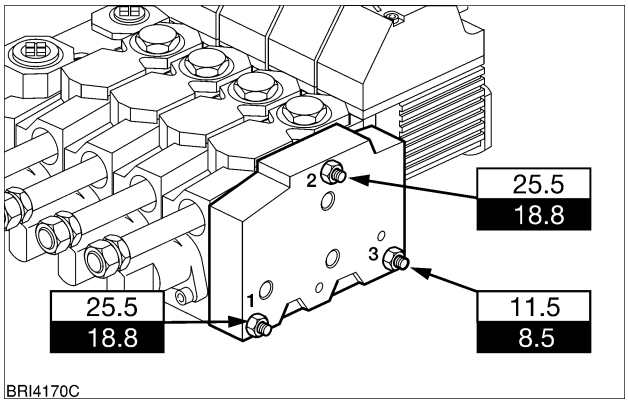
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]



BAIL08CVT143FSA 1

Mid-mount remote control valve - Torque

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

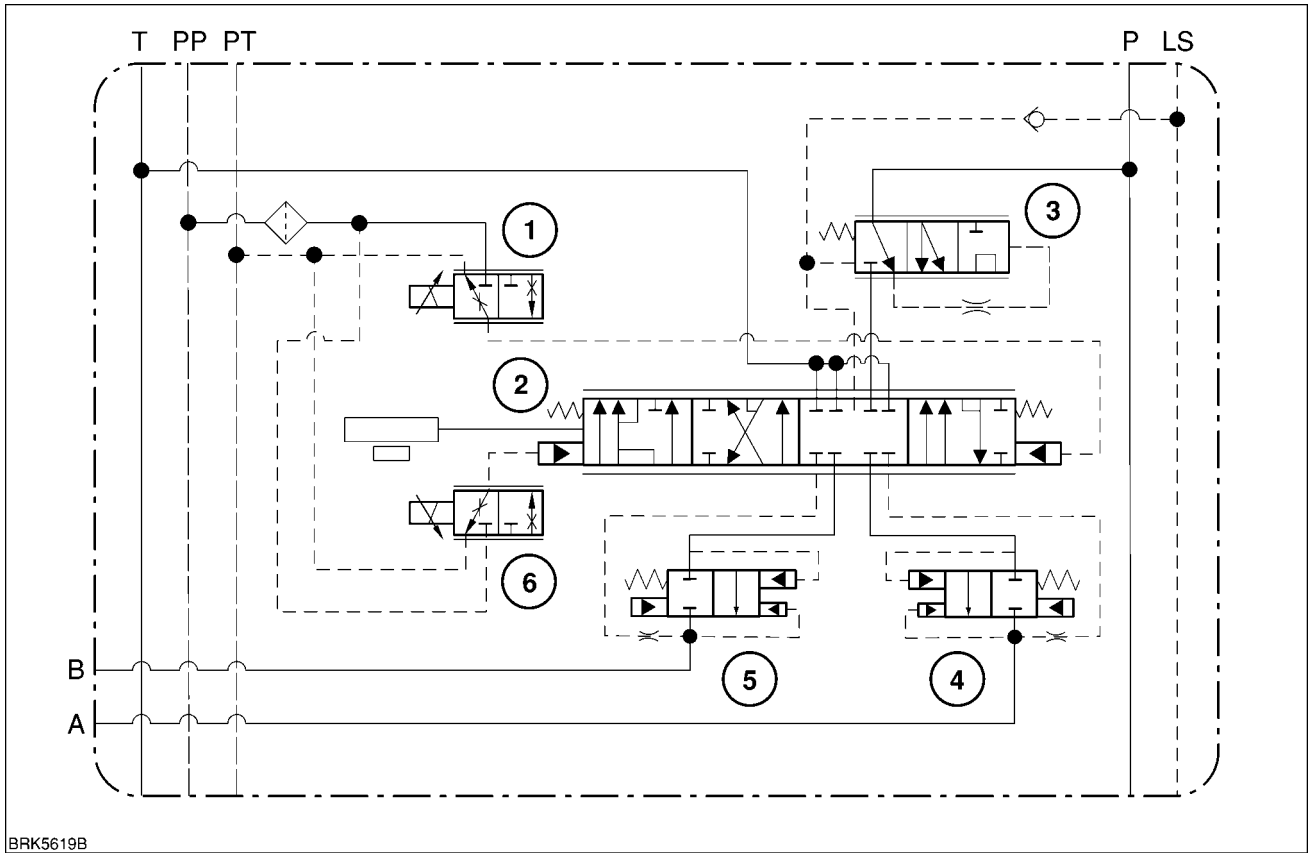


BAIL06CCM141ASA 1

Mid Mount Valve Assembly Torques showing tightening sequence
Refer to Mid-mount remote control valve - Assemble (A.10.C)

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Hydraulic schema

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]



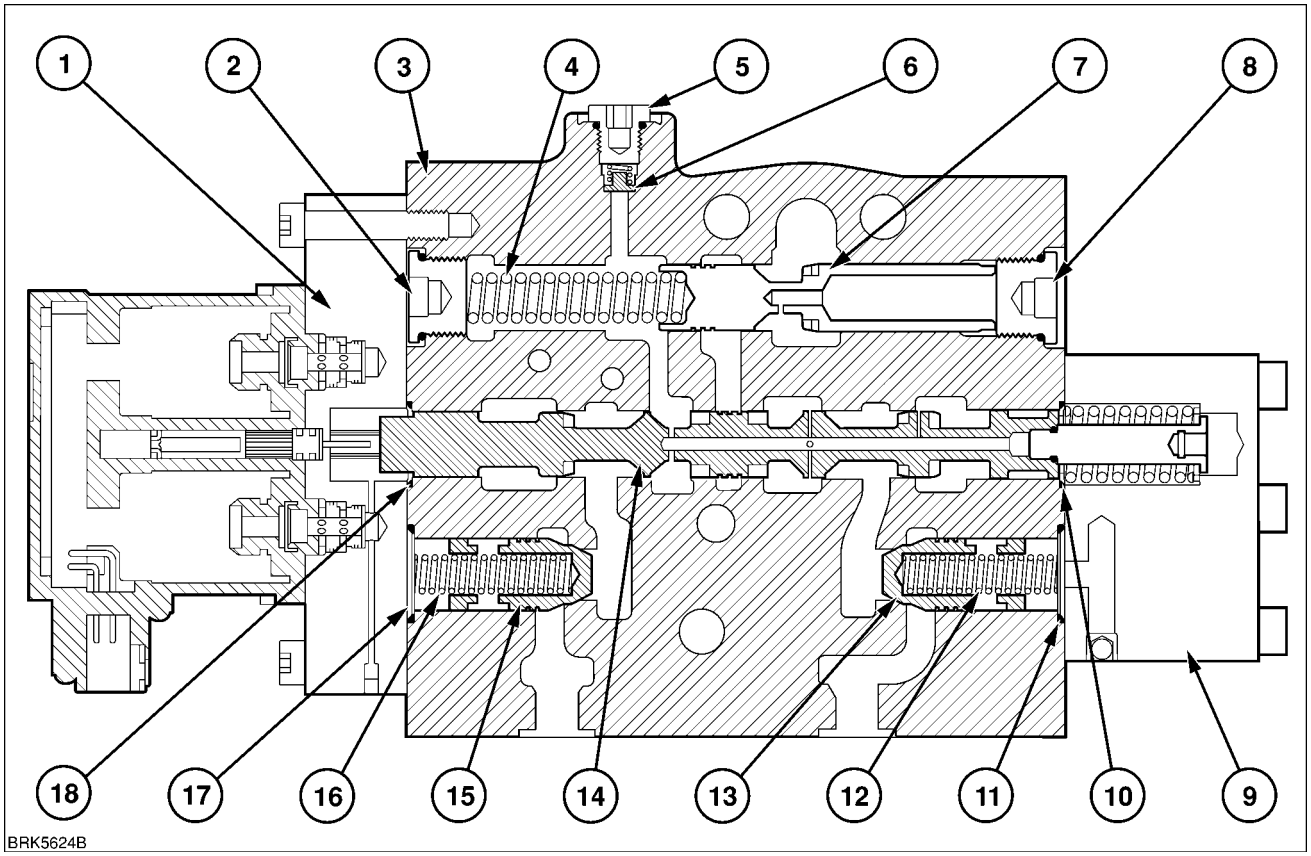
BAIL08CVT142FSA 1

1. Solenoid
2. Main spool
3. Pressure compensating spool
4. Check valve
5. Check valve
6. Solenoid

A Extend port
B Retract port
T Return to tank
PP Pilot pressure line
PT Pilot tank line
P Pressure line
LS Load sense line

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Sectional view

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

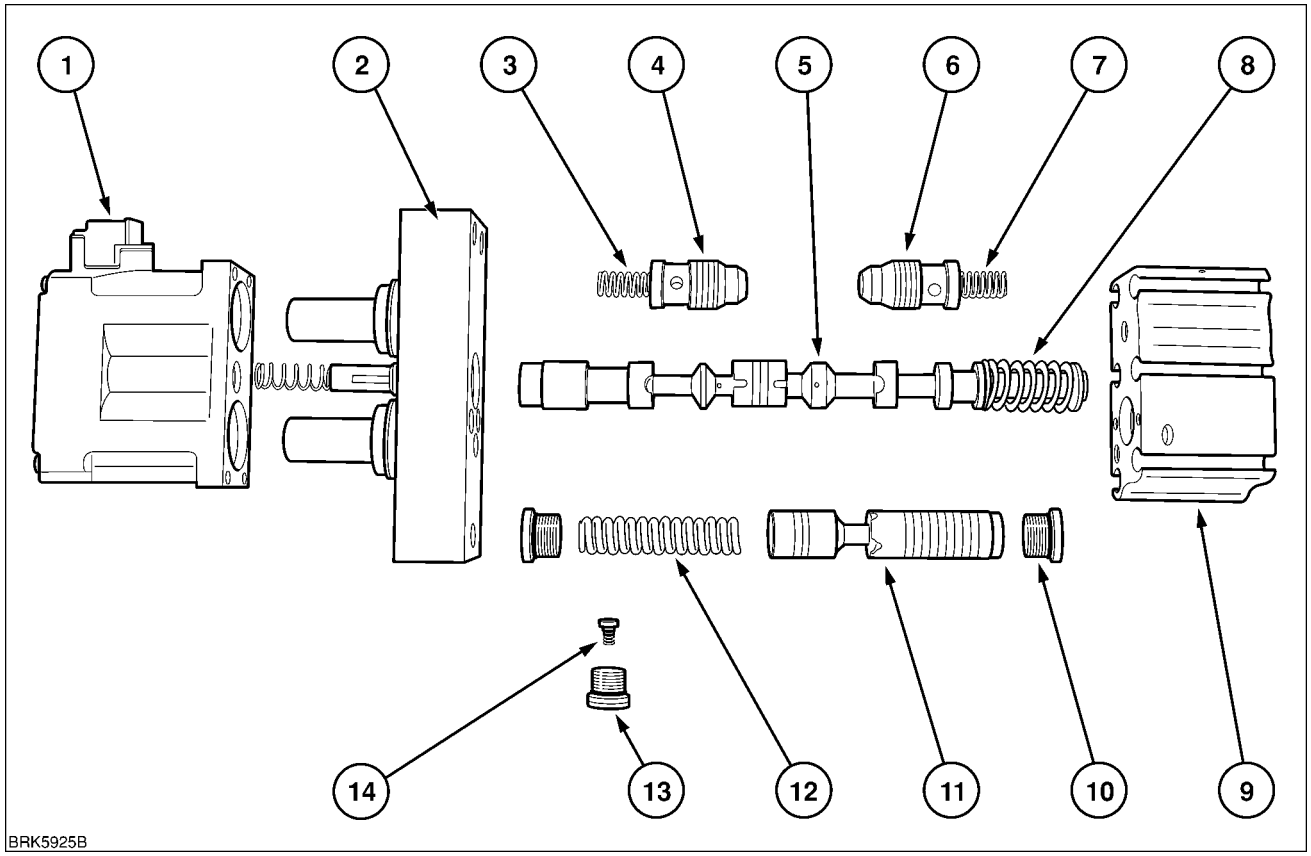


BAIL08CVT004FSA 1

1.Solenoid valve assembly
2.Plug
3.Valve body
4.Spring
5.Plug
6.Load sense check assembly
7.Pressure compensating spool
8.Plug
9.Pilot block assembly
10.Seal
11.Seal
12.Spring
13.Check lock poppet
14.Main spool
15.Check lock poppet
16.Spring
17.Seal
18.Seal

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Exploded view

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

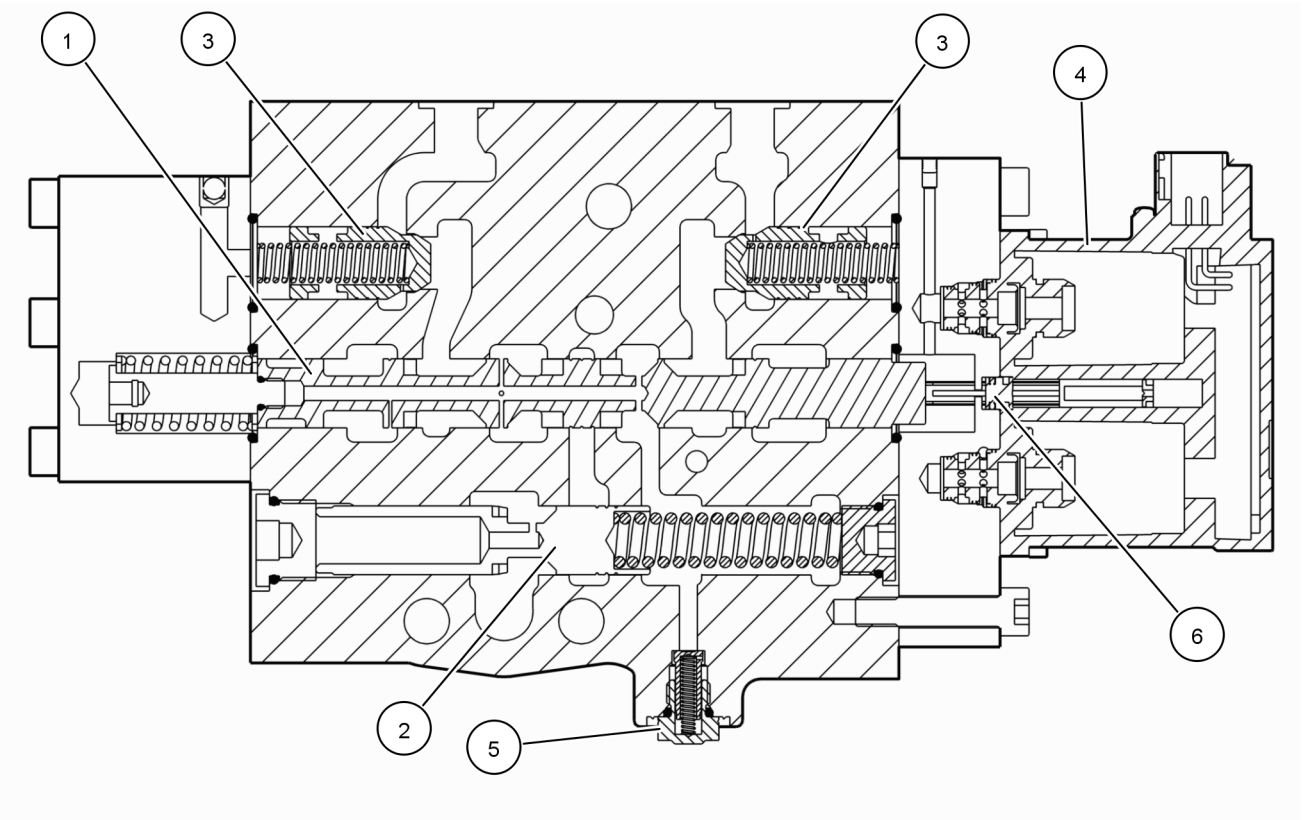


BAIL08CVT125FSA 1

1. Solenoid control unit
2. Solenoid valve manifold
3. Spring
4. Check lock poppet
5. Main spool
6. Check lock poppet
7. Spring
8. Centreing spring
9. Pilot block assembly
10. Plug
11. Pressure compensating spool
12. Spring
13. Plug
14. Load sense check valve

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Dynamic description

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]



RCIL08CCH022GAE 1

1. Main valve spool
2. Flow control spool
3. Lock check poppet
4. Extend/retract solenoid valve assembly
5. Signal check
6. Spool position sensor

The main valve spool **(1)** in a remote section is spring centered in neutral position. The main valve spool position determines the flow rate and the flow path of the supply flow.

Each valve section contains a pressure compensated flow control spool **(2)** which maintains a constant pressure drop across the main valve spool. This constant pressure drop results in a constant flow rate across the main valve spool.

Both remote section work ports are equipped with a lock check poppet **(3)** The lock checks are installed to prevent the settling of a load (in neutral) because of main spool leakage and to prevent a partially raised cylinder from dropping when the remote valve is operated. .

The signal check **(5)** isolates each remote valve's operating pressure from the other valves in the system. When more then one remote valve section is in operation, the valve operating at the higher pressure signals the compensator on the pressure and flow compensating (PFC) pump.

Each remote section contains an extend/retract valve solenoid assembly (4) that control the position of the main spool. Each valve solenoid assembly is equipped with a spool position sensor (6).

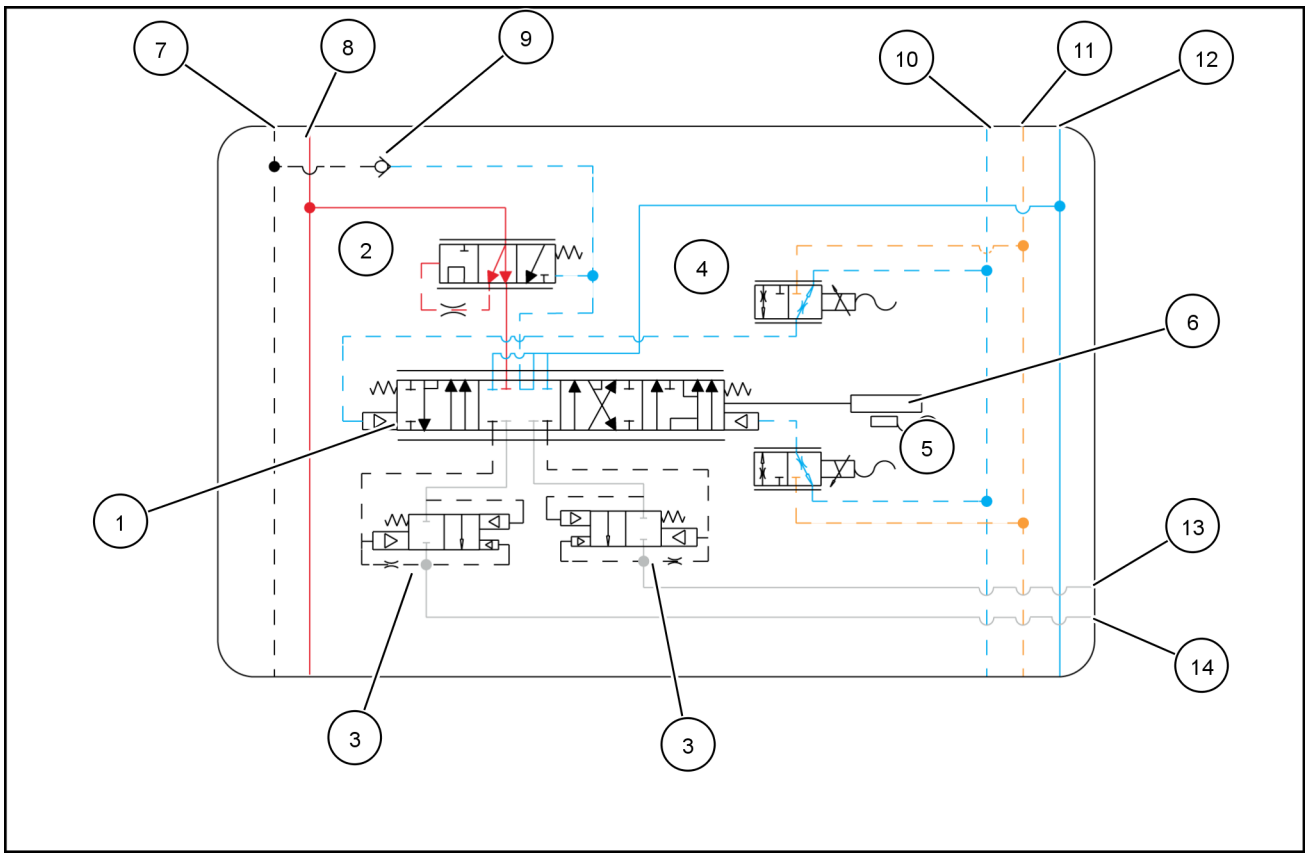
Neutral position

All remote valve sections function in the same way. In neutral position, the main valve spool is spring centered. Pump supply is available to the main valve spool of each valve section.

Pump pressure from the inlet is available to the left end of the pressure compensated flow control spool by way of an orifice in the center of the spool. Flow through the orifice forces the spool against the spring. Spring force tries to open supply flow to the main valve spool, and intermediate pressure on the left hand side of the spool tries to close flow. Once intermediate pressure is high enough to overcome the spring force, the flow control spool meters down the flow path to the main valve spool. In neutral, intermediate pressure is blocked from the work ports by the main valve spool.

A lock check is installed into both the extend and retract ports, which prevents the settling of a load (in neutral) due to main valve spool leakage and prevents a partially raised cylinder from dropping when the remote valve is operated.

A signal check valve is installed in the signal port, which isolates the highest pressure signal from each remote valve's operating pressure.



RCIL08CCH004FAE 2

Pump pressure

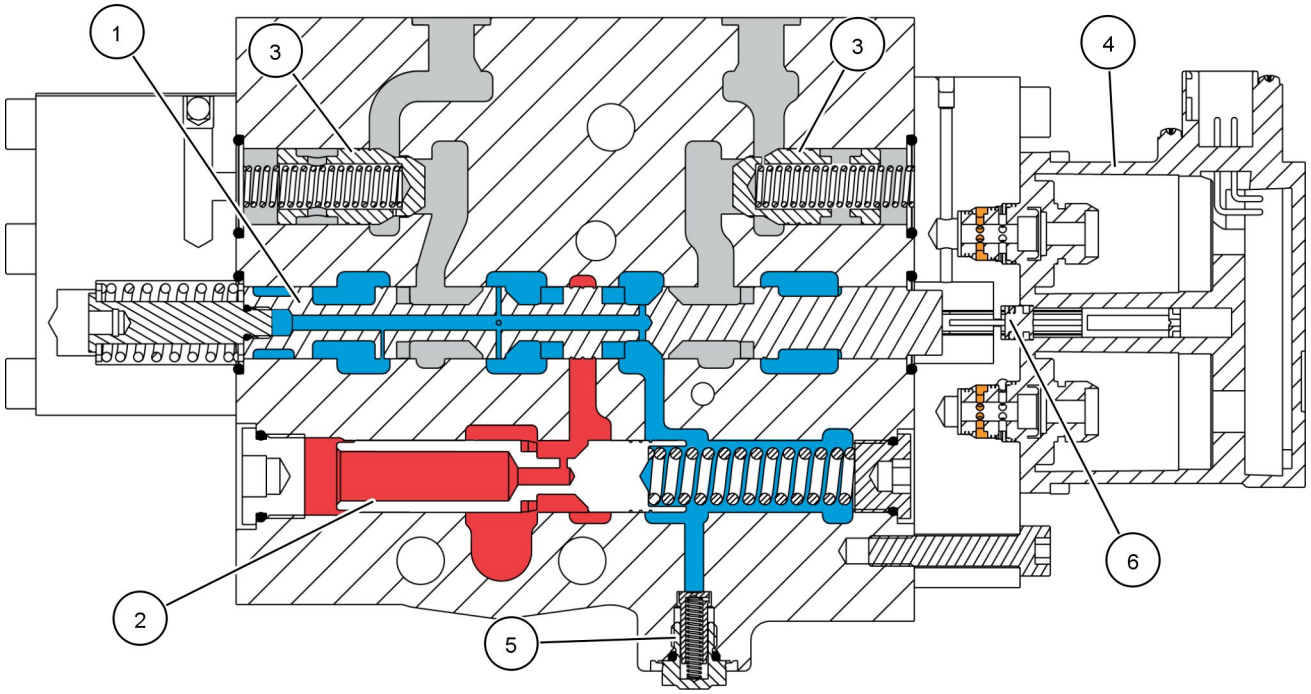
Return to tank pressure

Remote valve operating pressure

Trapped oil

Pilot pressure

1. Main valve spool
2. Flow control spool
3. Lock check
4. Extend solenoid
5. Retract solenoid
6. Spool position sensor
7. Signal to compensator
8. Pump supply
9. Signal check
10. Pilot drain
11. Pilot supply (regulated)
12. Return to tank
13. Retract port
14. Extend port



RCIL08CCH018GAE 3

Pump pressure

Return to tank pressure

Remote valve operating pressure

Trapped oil

Pilot pressure

1. Main valve spool
2. Flow control spool
3. Lock check
4. Extend/retract solenoid valve assembly
5. Signal check
6. Spool position sensor

Extend position

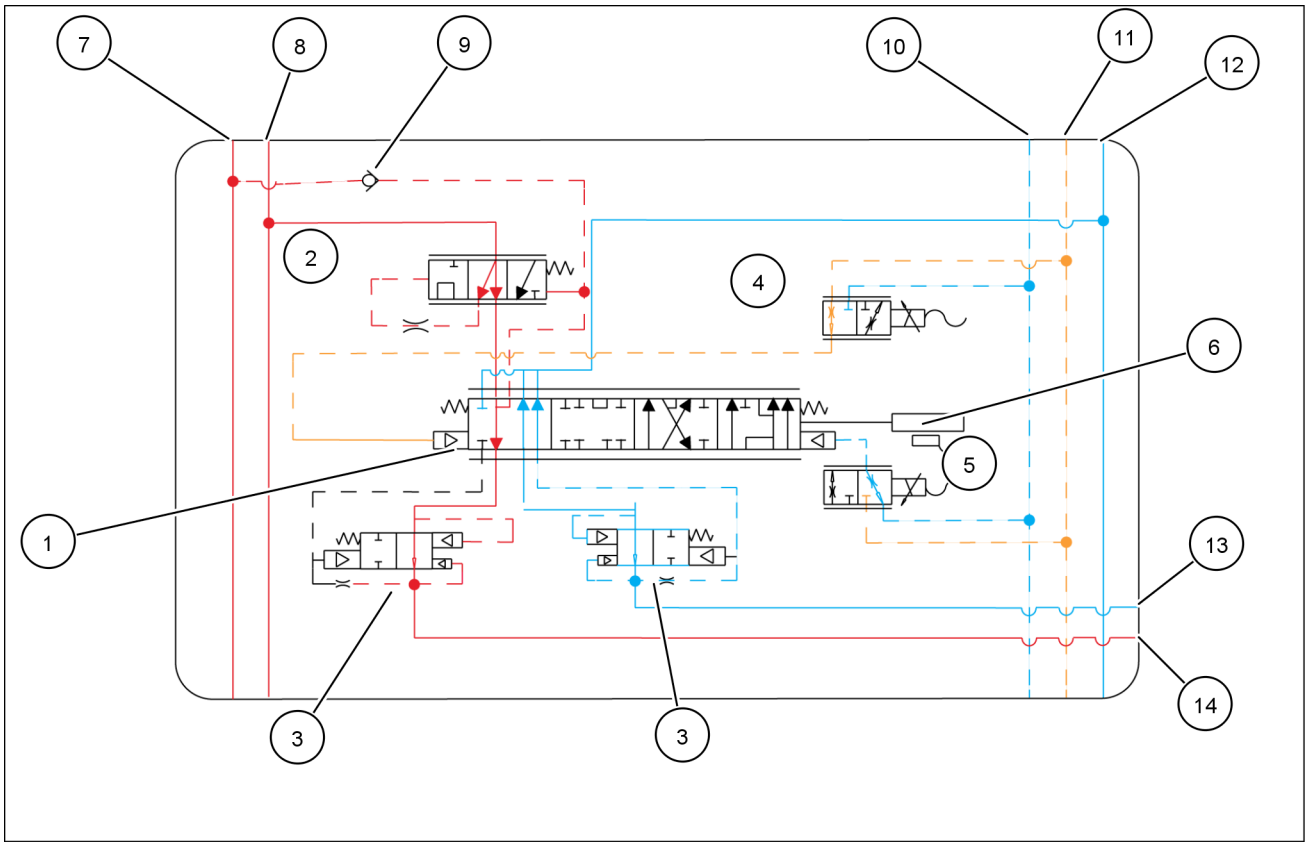
When the remote control lever is moved to the extend position, the main valve spool shifts to the left a fixed distance by supply pressure from the extend solenoid valve. The main spool position is based on input from controller which monitors main spool transducer position and flow control settings from the armrest. The position of the main valve spool determines the flow rate to the extend port.

As pump supply oil flows past the pressure compensated flow control spool, pressure drops to an intermediate pressure. Intermediate pressure is always equal to the pressure required by the load plus **689 kPa** (**100 psi**). The **689 kPa** (**100 psi**) is needed to balance the spring force on the right hand side of the flow control spool.

The main valve spool can now direct flow from the intermediate pressure area to the work pressure area and on to the remote valve coupler. As oil flows across the main valve spool there is always a **689 kPa** (**100 psi**) pressure drop. This constant pressure drop results in a constant flow across the main spool out to the remote coupler. The constant pressure drop is maintained through a balance of intermediate pressure on the left hand side of the flow control spool and work pressure and spring force on the right hand side of the spool.

At the same time the main valve spool first shifts, work pressure is also directed to the signal check. The work port pressure can open the signal check valve and signal the pump compensator to increase pump flow.

Also as the main spool begins to shift, any pressure trapped on the spring end of both lock checks is drained to tank. The flow exiting the extend port is now in a free flow condition shifting the lock check and out the extend port: Return oil from the retract coupler is directed into the retract port, shifting lock check to left, continuing past the spool and returning to tank.



RCIL08CCH007FAE 4

Pump pressure

Remote valve operating pressure

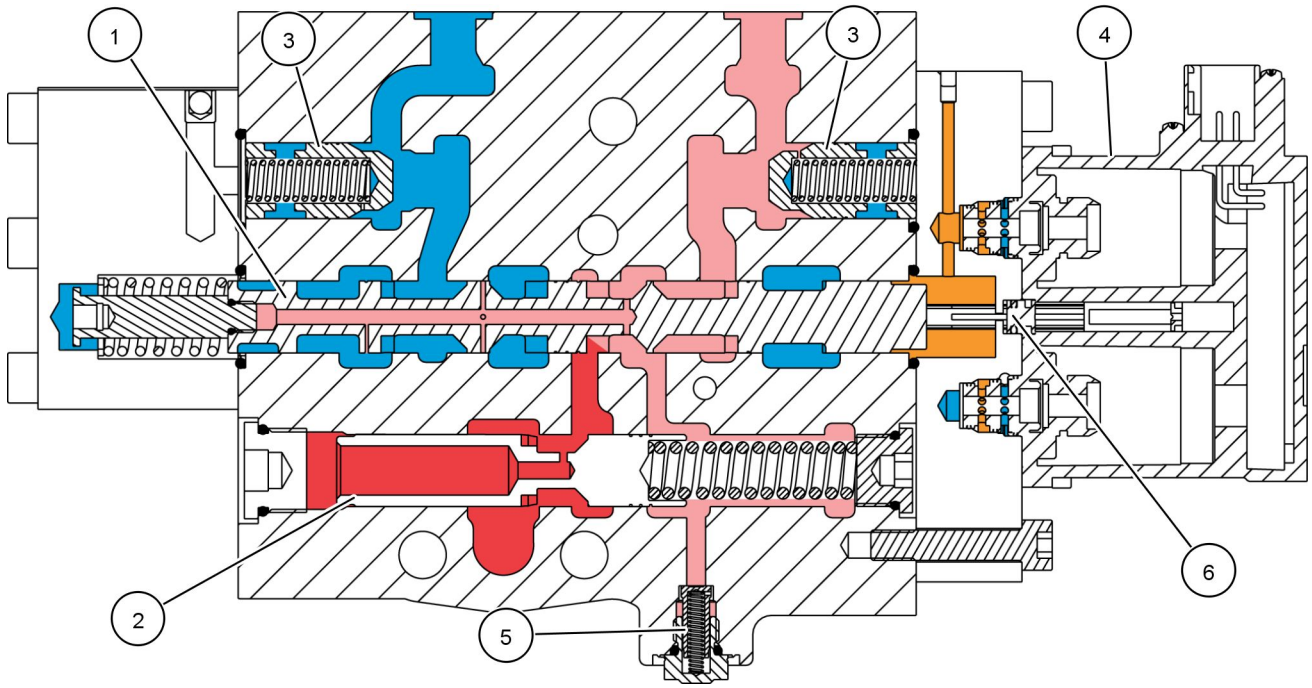
Pilot pressure

Return to tank pressure

Trapped oil

1. Main valve spool
8. Pump supply

2. Flow control spool
3. Lock check
4. Extend solenoid
5. Retract solenoid
6. Spool position sensor
7. Signal to compensator
9. Signal check
10. Pilot drain
11. Pilot supply (regulated)
12. Return to tank
13. Retract port
14. Extend port



RCIL08CCH019GAE 5

Pump pressure

Return to tank pressure

Remote valve operating pressure

Trapped oil

Pilot pressure

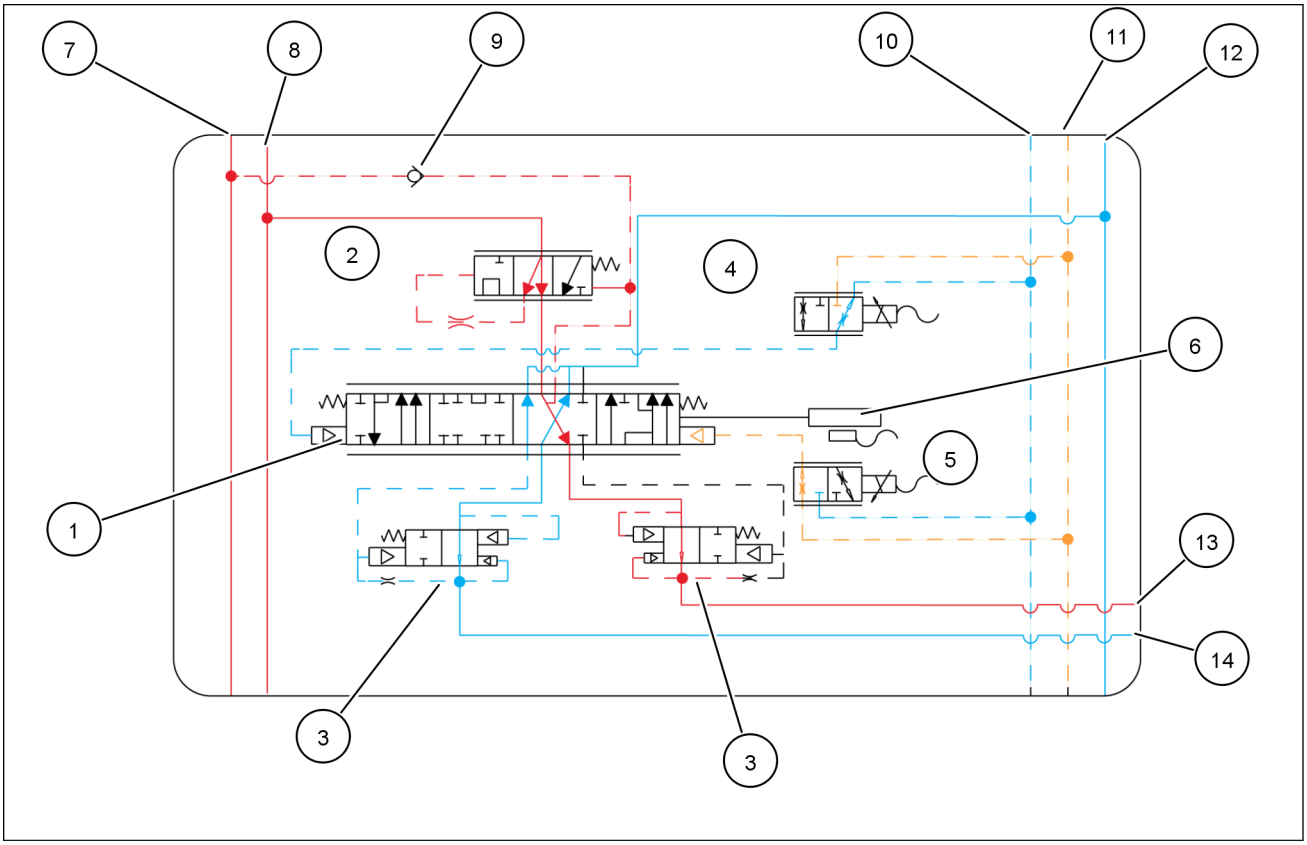
1. Main valve spool
2. Flow control spool
3. Lock check
4. Extend/retract solenoid valve assembly
5. Signal check
6. Spool position sensor

Retract position

When the remote control lever is moved to the retract position, the main valve spool shifts to the right a fixed distance by supply pressure from the retract solenoid valve. The main spool position is based on input from controller which monitors main spool transducer position and flow control settings from the armrest. The position of the main valve spool determines the flow rate to the retract port.

At the same time, work pressure is communicated to the signal check through the center drilled passage in the main valve spool. The signal check is forced off the seat and signal pressure is directed to the pump compensator to increase pump flow.

Also as the main spool begins to shift, any pressure trapped on the spring end of both lock checks is drained to tank. The flow exiting the retract port is now in a free flow condition shifting the lock check and out the retract port: Return oil from the extend coupler is directed into the extend port, shifting lock check to right, continuing past the spool and returning to tank.



RCIL08CCH005FAE 6

Pump pressure

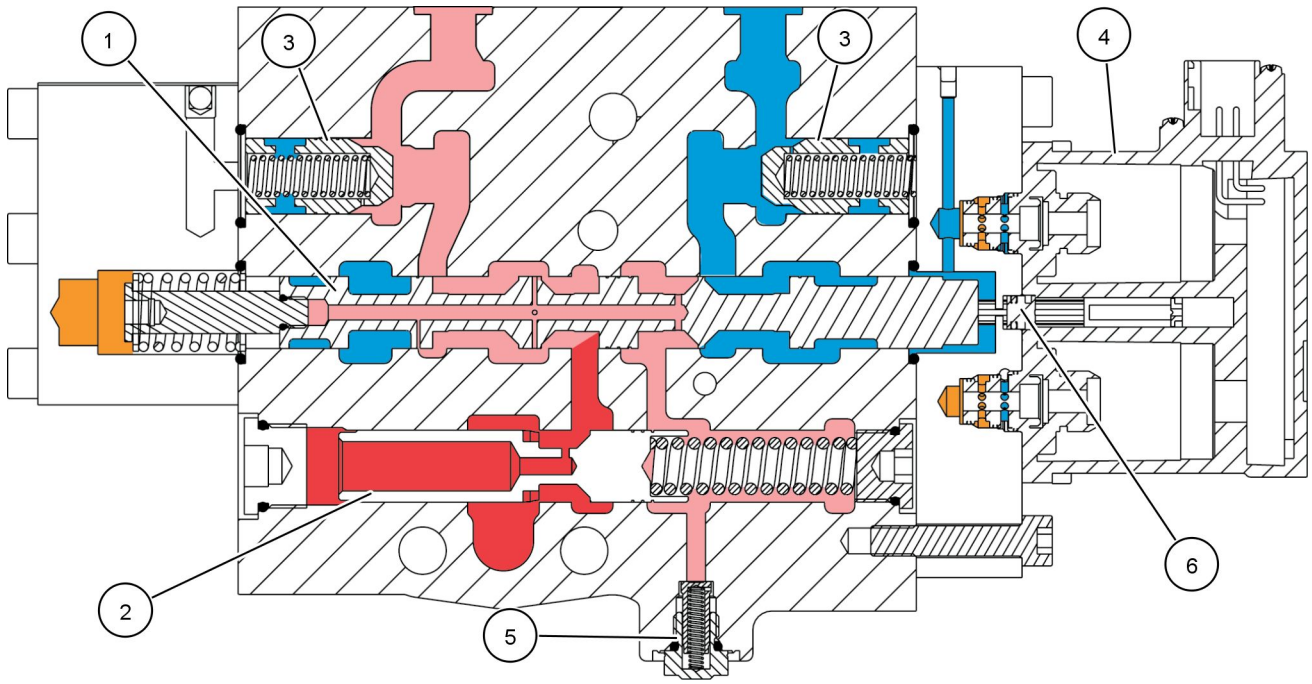
Return to tank pressure

Remote valve operating pressure

Trapped oil

Pilot pressure

1. Main valve spool
2. Flow control spool
3. Lock check
4. Extend solenoid
5. Retract solenoid
6. Spool position sensor
7. Signal to compensator
8. Pump supply
9. Signal check
10. Pilot drain
11. Pilot supply (regulated)
12. Return to tank
13. Retract port
14. Extend port



RCIL08CCH020GAE 7

Pump pressure

Return to tank pressure

Remote valve operating pressure

Trapped oil

Pilot pressure

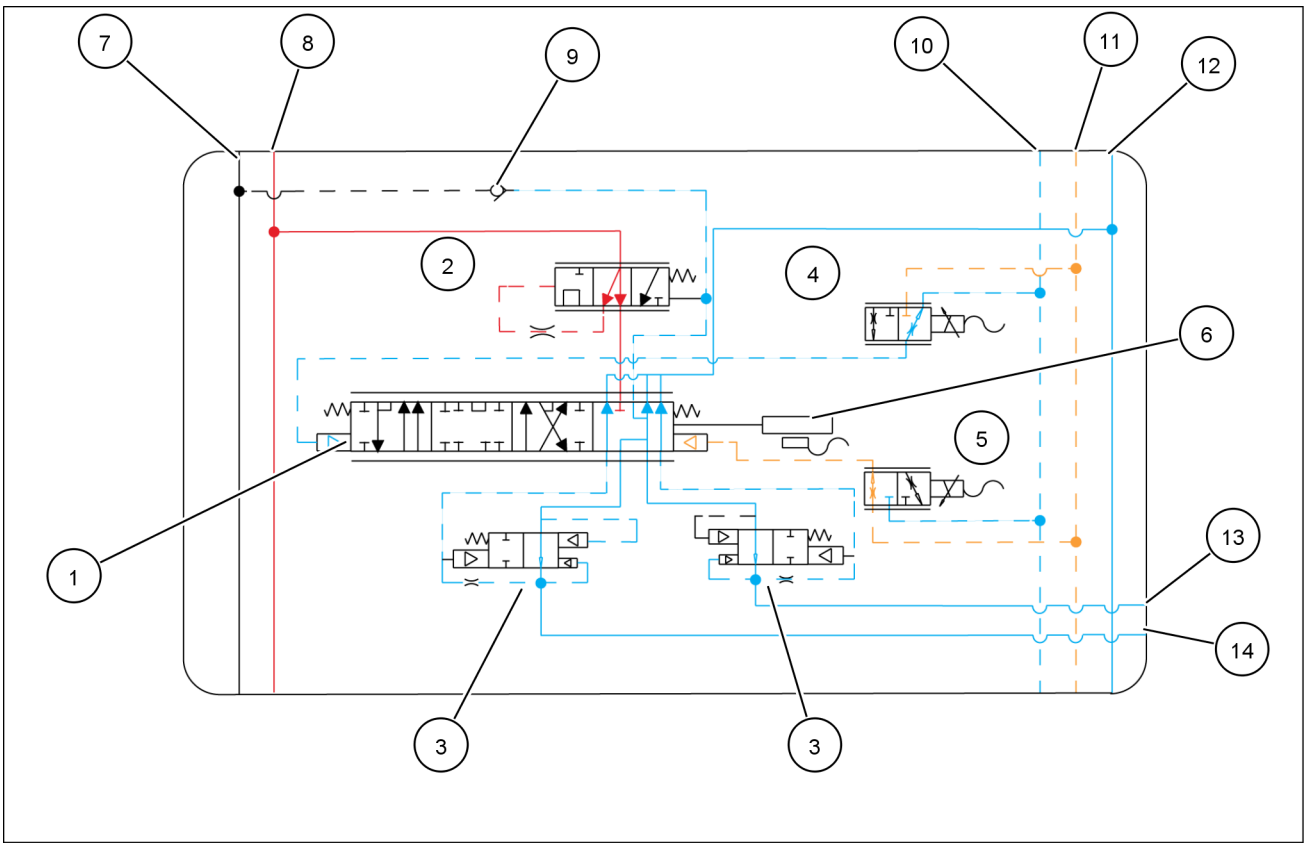
1. Main valve spool
2. Flow control spool
3. Lock check
4. Extend/retract solenoid valve assembly
5. Signal check
6. Spool position sensor

Float position

When the remote hydraulic control lever is moved to the float position, the main valve spool is moved to the far right position.

The main valve spool blocks flow to the extend and retract ports. At the same time, the main valve spool opens the work ports to the return to tank. With the main spool in the float position, any pressure trapped on the spring end of either lock check is drained to tank.

When the extend and retract work ports are connected to the return to tank, an attached implement can float and follow the contour of the ground. The valve will float a double acting or single acting cylinder.



RCIL08CCH006FAE 8

Pump pressure

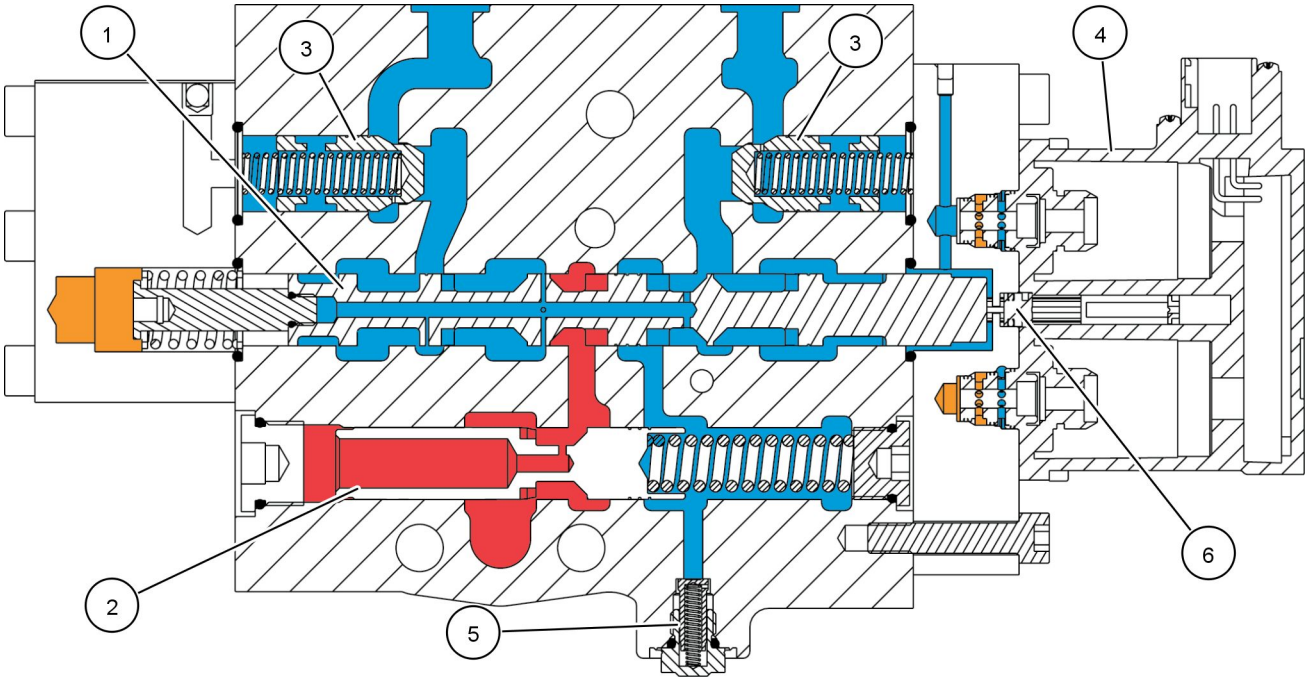
Return to tank pressure

Remote valve operating pressure

Trapped oil

Pilot pressure

1. Main valve spool
2. Flow control spool
3. Lock check
4. Extend solenoid
5. Retract solenoid
6. Spool position sensor
7. Signal to compensator
8. Pump supply
9. Signal check
10. Pilot drain
11. Pilot supply (regulated)
12. Return to tank
13. Retract port
14. Extend port



RCIL08CCH021GAE 9

Pump pressure

Return to tank pressure

Remote valve operating pressure

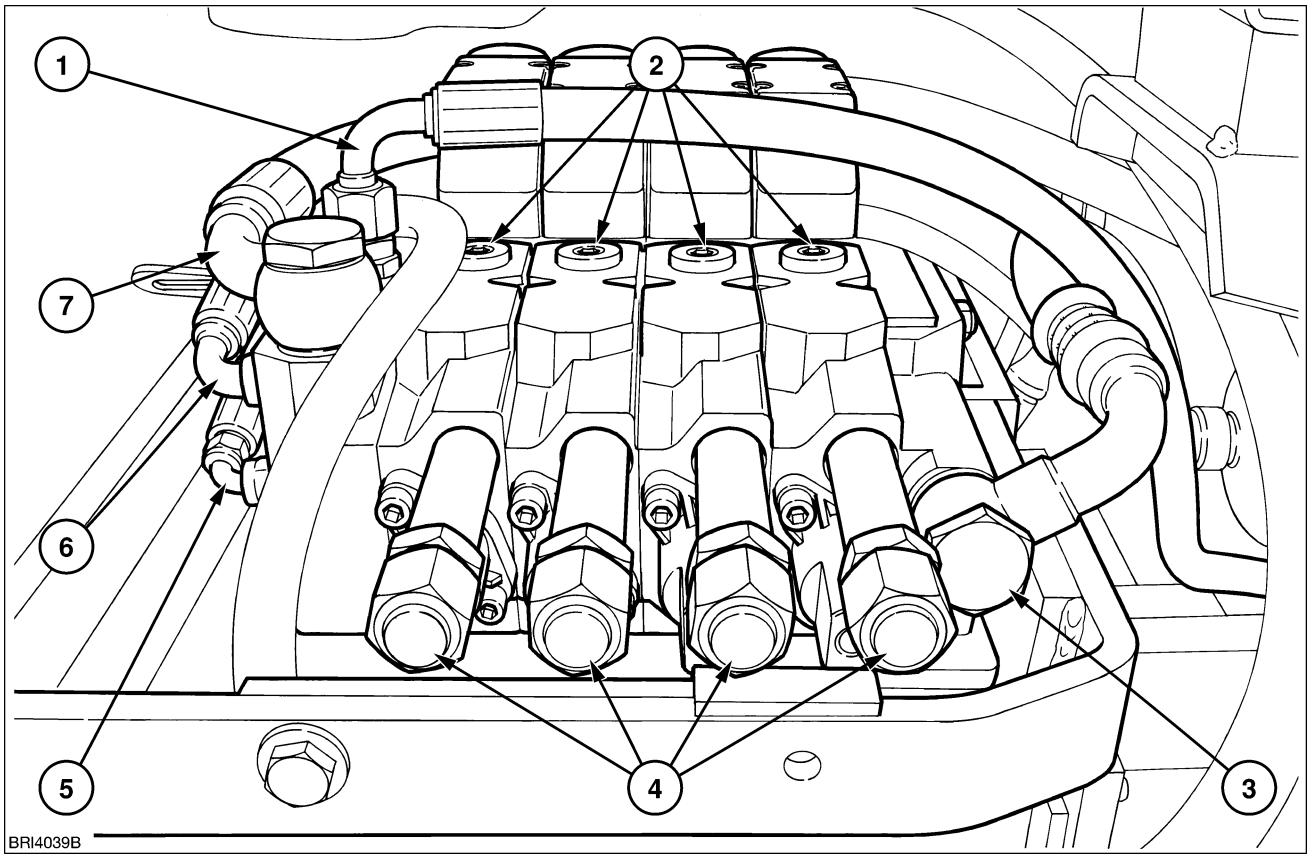
Trapped oil

Pilot pressure

1. Main valve spool
2. Flow control spool
3. Lock check
4. Extend/retract solenoid valve assembly
5. Signal check
6. Spool position sensor

Mid-mount remote control valve - Static description

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

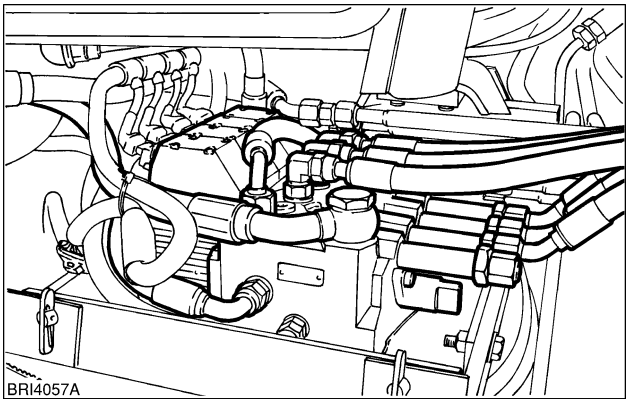


BAIL06CCM065FSA 1

Hydraulic connections of the mid-mounted valve block

1. Pilot oil return pipe
2. Pressure connection for front loader hose
3. Return hose
4. Return connection for front loader hose
5. Load Sensing hose
6. Pressure oil hose of the control line
7. Pressure oil hose supply hose

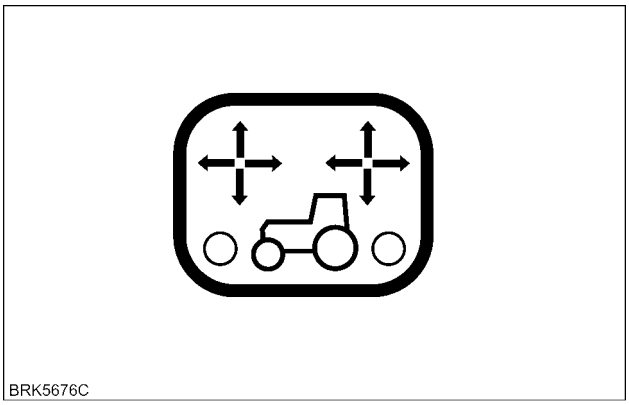
On tractors with optional front loader control block, the joystick control on the driver's seat, the mid-mounted valve block, the line system and the attachment bracket are provided for the attachment of the front loader link.
The mid-mounted valve block is located on the right-hand side under the cab. In the basic version the valve block consists of two control units to raise and lower the link and to tip and tilt the bucket, if used with a front loader.



BAIL06CCM088ASA 2

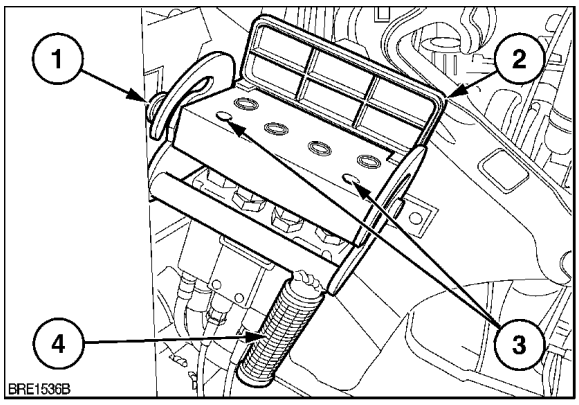
The control units are actuated via a crossgate lever, which is installed in the armrest.
In tractors, which are fitted with side and rear-mounted control units, optionally both valves blocks can be actuated using the crossgate lever. The joystick is activated when the engine is running and the operator is in the driver’s seat.

Using the selection switch on the cab's control panel, the driver can switch the crossgate lever actuation between the valve blocks for the rear control units and mid-mounted control units.



BRK5676C 3

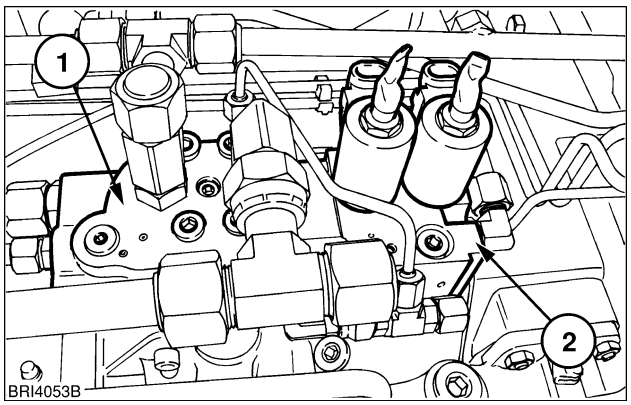
All tractors equipped for front loader operation in Europe are fitted with a "Multi-Quick" multi-coupling. This allows all oil couplings to be connected and disconnected in a easily with minimal oil loss.



BRE1536B 4

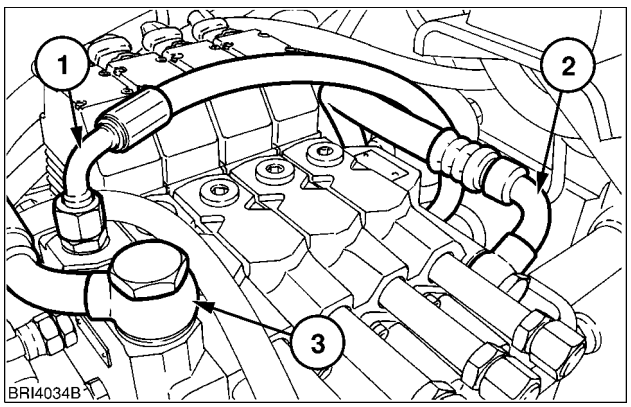
1. Retaining pin
2. Cover
3. Centring holes
4. Clamp lever

The mid-mounted valve block is supplied with oil via a hose from the valve block of the priority control units **(1)** on the right-hand side of the rear axle housing.



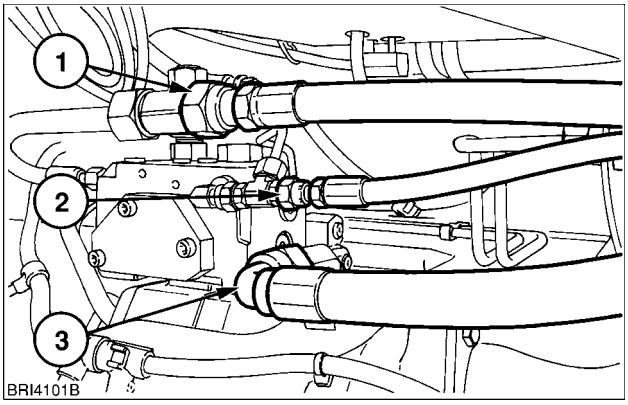
BAIL06CCM091ASA 5

The high pressure oil flows through the hose **(3)** on the connection plate and through hose **(2)** back to the oil filter housing. The pilot oil flowing back from the electronically actuated solenoid valves flows in hose **(1)**.



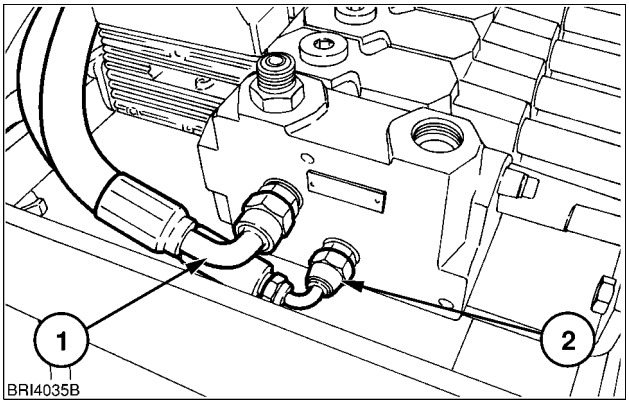
BAIL06CCM061ASA 6

The oil flows back from the return connection of the mid-mounted valve block through hose **(3)** and a pipe bend to the filter housing of the hydraulic pump. The Load Sensing connection is a T-shaped threaded connection **(2)**, which is connected to the pressure control valve of the hydraulic pump. The high pressure hose is connected via another T-shaped threaded connection **(1)** to the pressure and flow control valve.



BAIL06CCM118ASA 7

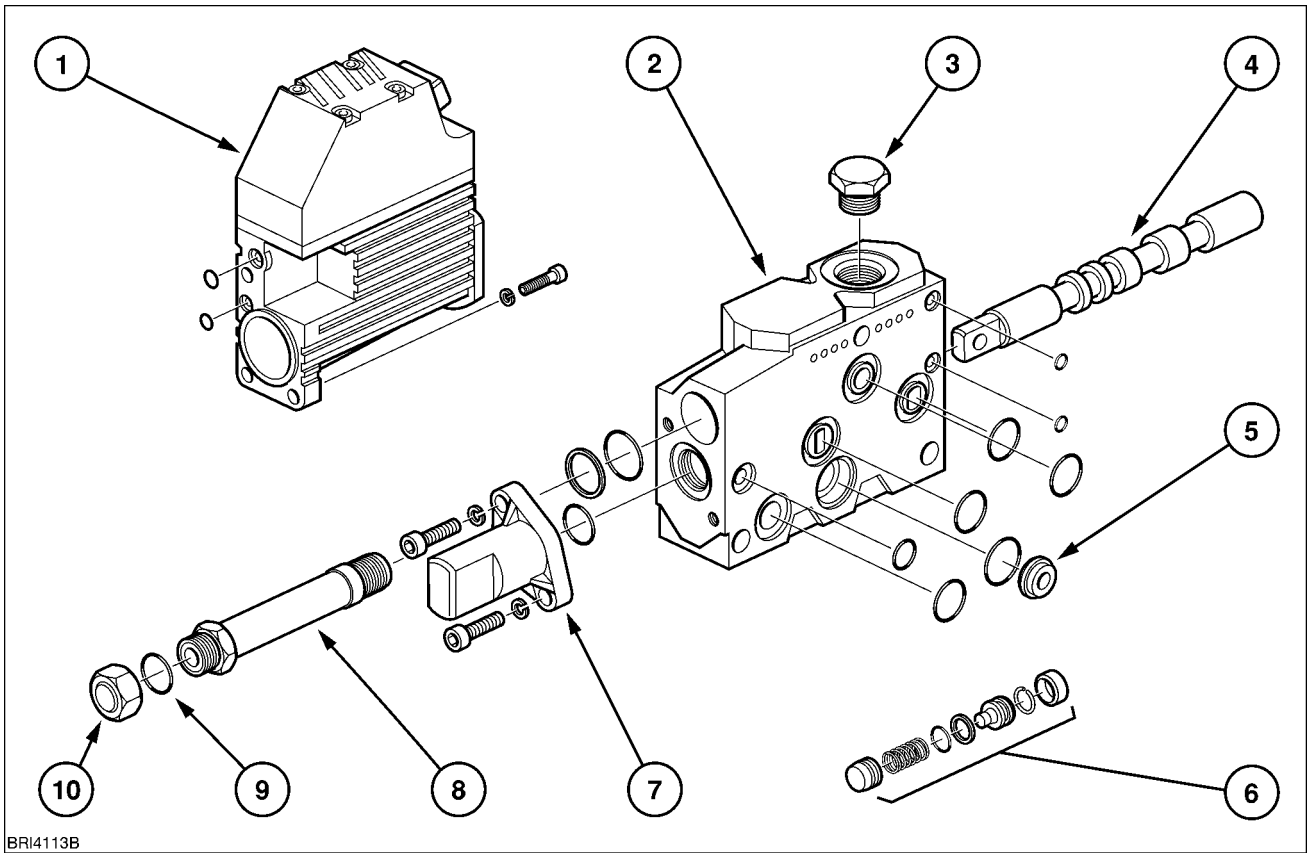
The pressure oil of the control line for actuation of the electrohydraulic solenoid valves flows from the low pressure circuit via hose **(1)** in the connection plate. The Load Sensing hose **(2)** is also connected to the connection plate. The return flow is connected to a fitting on the priority valve block.



BAIL06CCM062ASA 8

Mid-mount remote control valve - Exploded view

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]



BAIL06CCM125FSA 1

Mid Mount Valve Components

1. Spool Control Unit
2. Valve slice
3. Plug
4. Spool Valve
5. Load Sensing Valve
6. Check Valve
7. End Cap
8. Connection port
9. 'O' Ring
10. Nut

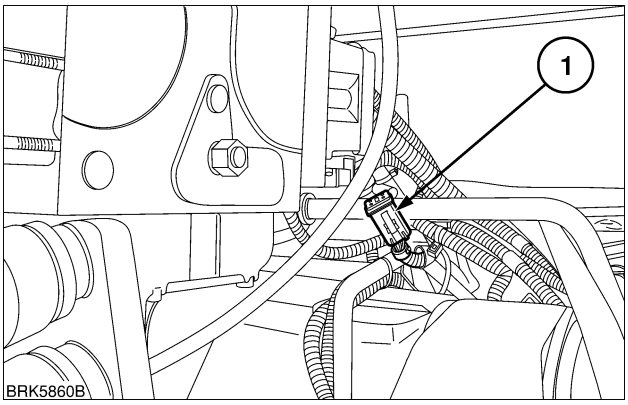
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Remove

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Prior operation:
Battery - Disconnect (A.30.A)

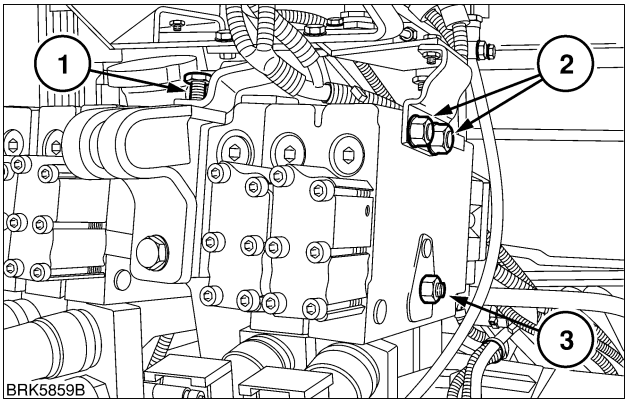
Removing valves 1 and 2

1. Disconnect the electrical connectors **(1)**.



BAIL08CVT055ASA 1

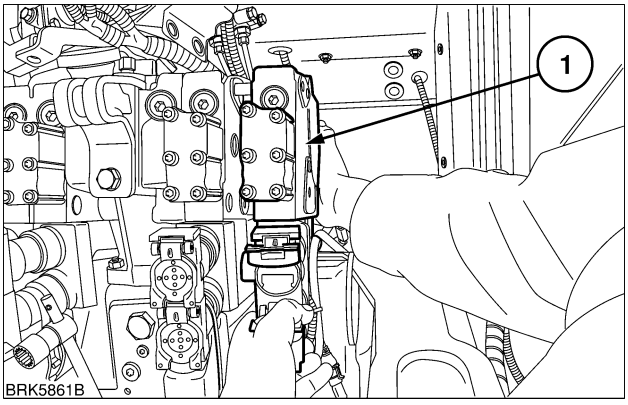
2. Remove pneumatic trailer brake bracket bolt from the top of the valve assembly **(1)**. Loosen and remove the top two retaining nuts on the side of the remote valve **(2)**. These also retain the trailer brake valve bracket (Where fitted). Undo and remove the remaining retaining nut at the lower part of the valve slice **(3)**.
3. Remove the oil collection bottles.



BAIL08CVT054ASA 2

4. Remove the end valve slice **(1)** from the tie rods.

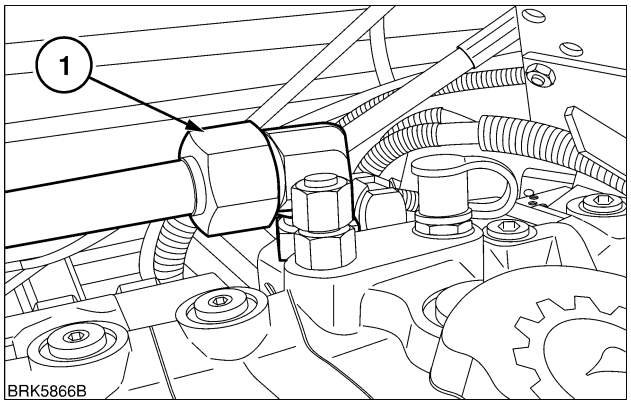
NOTE: *There are O-rings situated between the valve slices. Take care when removing the valves not to dislodge the O-rings.*



BAIL08CVT056ASA 3

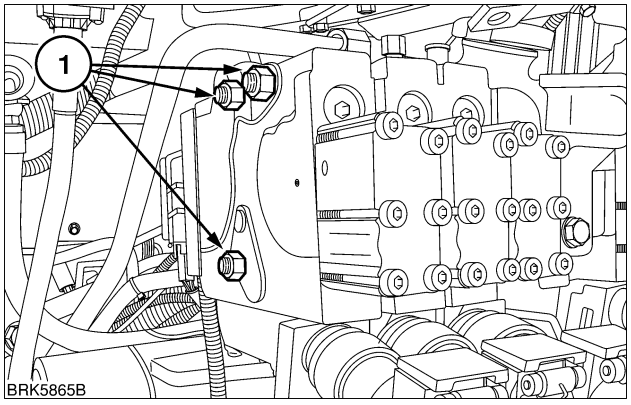
Removing valves 3, 4, and 5.(Where fitted)

5. If the machine is fitted with five valves it may be necessary to undo the return pipe from the central manifold in order to remove the fifth valve.



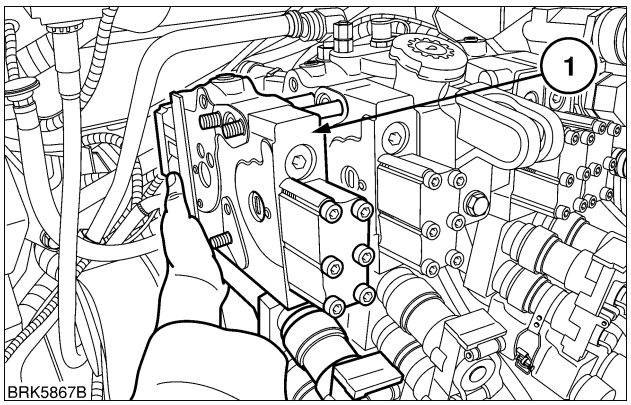
BAIL08CVT061ASA 4

6. Undo and remove the valve slice retaining nuts **(1)**.



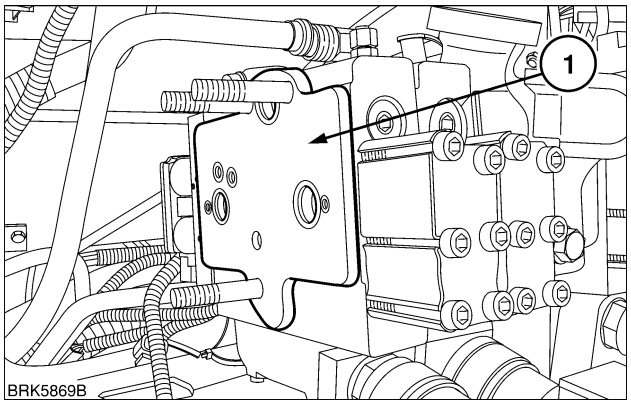
BAIL08CVT060ASA 5

7. Remove valve slice **(1)** from tie rods



BAIL08CVT062ASA 6

8. Remove spacer (where fitted)
9. Remove remaining valve slices



BAIL08CVT064ASA 7

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Disassemble

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

NOTE: *If a valve bore shows heavy wear or damage, the valve section must be replaced. Discontinue disassembly and replace the valve section.*

NOTE: *Always replace parts which show heavy wear or damage. if the parts are not serviced separately, the entire valve or valve section must be replaced.*

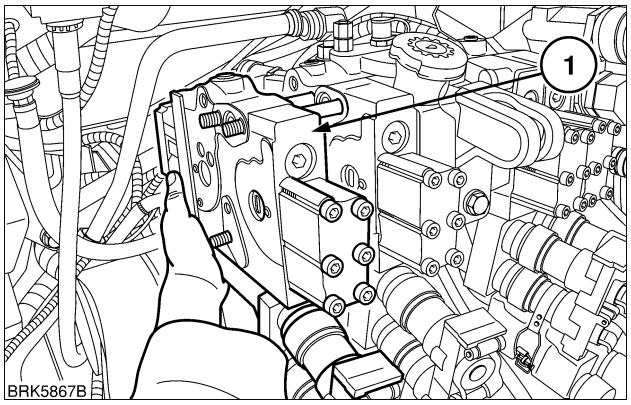
1. Thoroughly clean the valve section. Use a clean work surface to service the valve.
2. Remove the solenoid manifold from the valve body. See **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Exploded view (A.10.C)** and **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Sectional view (A.10.C)**
3. Remove the solenoid control unit and spring from the end of the solenoid manifold. Inspect the manifold and spring for damage.
4. Remove the main valve spool and spring. Mark which end of the spool is toward the solenoid for reference on reassembly. Inspect the spool and bore for heavy wear or damage. The spool must move freely within the bore.
5. Remove the pressure compensating spool and spring. Inspect the spool and bore for heavy wear or damage: the spool must move freely in the bore.
6. Remove the load sense check valve assembly. .
7. Remove the two signal check valves.

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Install

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

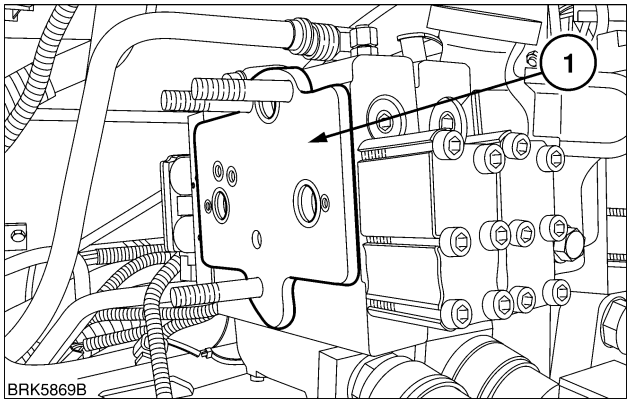
Valves 3, 4, and 5 (Where fitted)

1. Mount the valve **(1)** on the tie rods ensuring the O-rings are correctly installed.



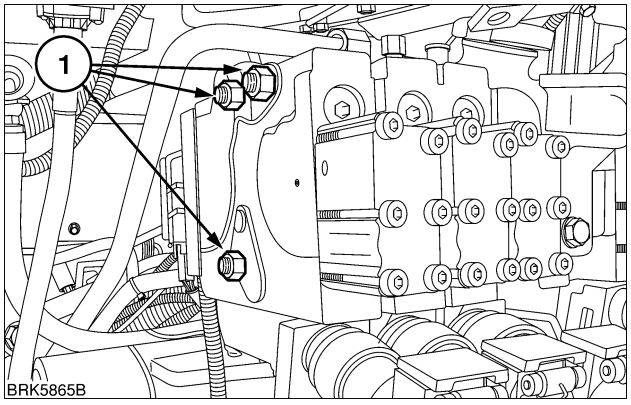
BAIL08CVT062ASA 1

2. Install the spacer **(1)** (if required)



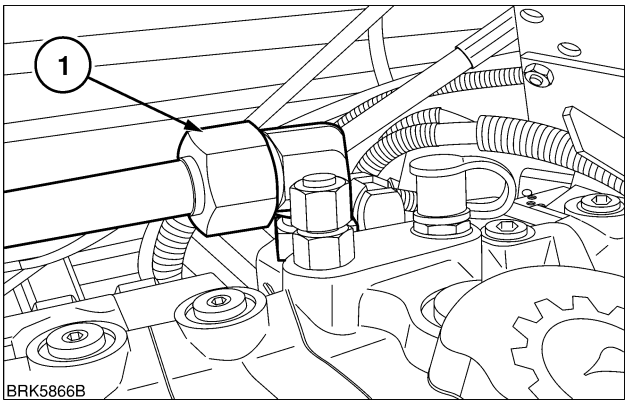
BAIL08CVT064ASA 2

3. Install the end valve slice ensuring all O-rings are in place. Tighten the retaining nuts to **45 Nm** (**33.2 lb ft**).



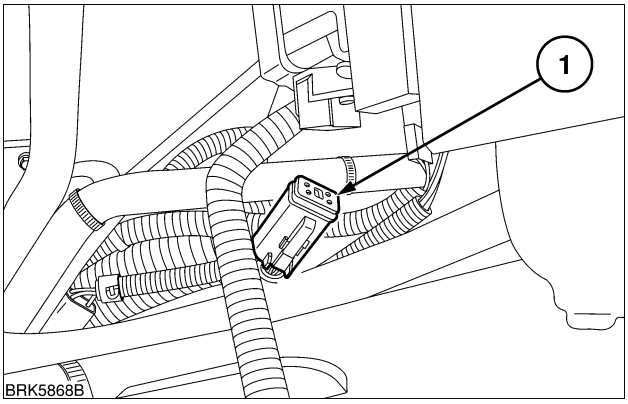
BAIL08CVT060ASA 3

4. Connect return pipe **(1)**.



BAIL08CVT061ASA 4

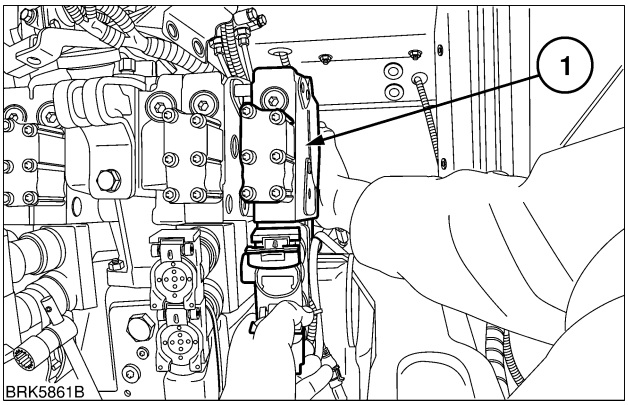
5. Reconnect electrical connectors **(1)** to the remote valve control modules.



BAIL08CVT063ASA 5

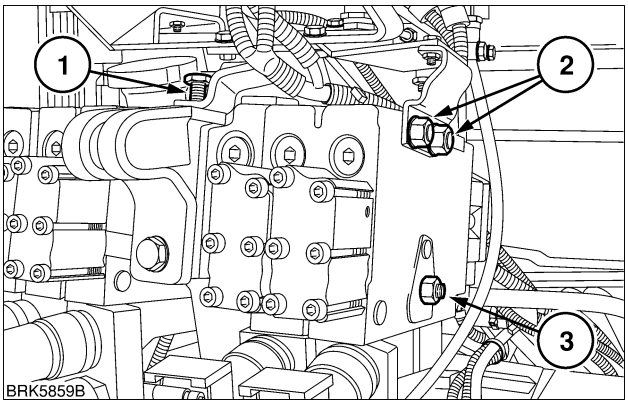
Valves 1 and 2

6. Mount valve 2 and then the end slice **(1)** onto the tie rods.



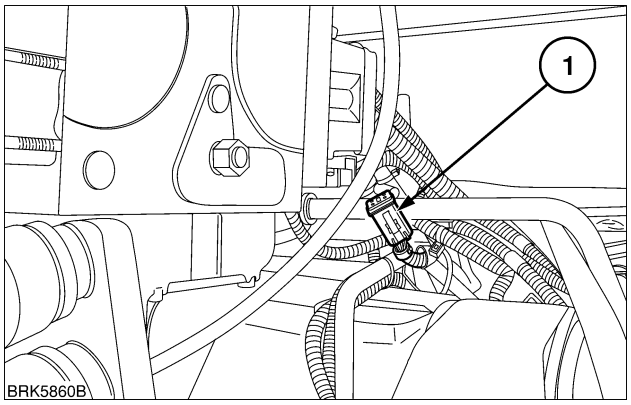
BAIL08CVT056ASA 6

7. Install the pneumatic valve bracket to the valve assembly and tighten the top retaining bolt **(1)** to **85 Nm** (**62.7 lb ft**) and nuts **(2)** and **(3)** to **45 Nm** (**33.2 lb ft**).



BAIL08CVT054ASA 7

8. Reconnect the electrical connectors **(1)** to the remote valve control modules.



BAIL08CVT055ASA 8

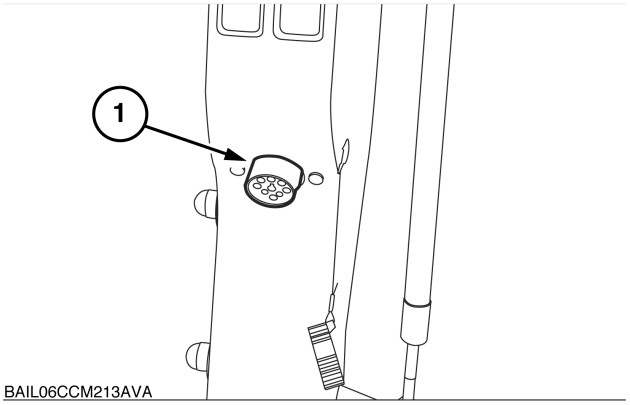
Next operation:
Refer to **Control module - Configure (A.50.A)**Calibration and valve renumbering.

PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

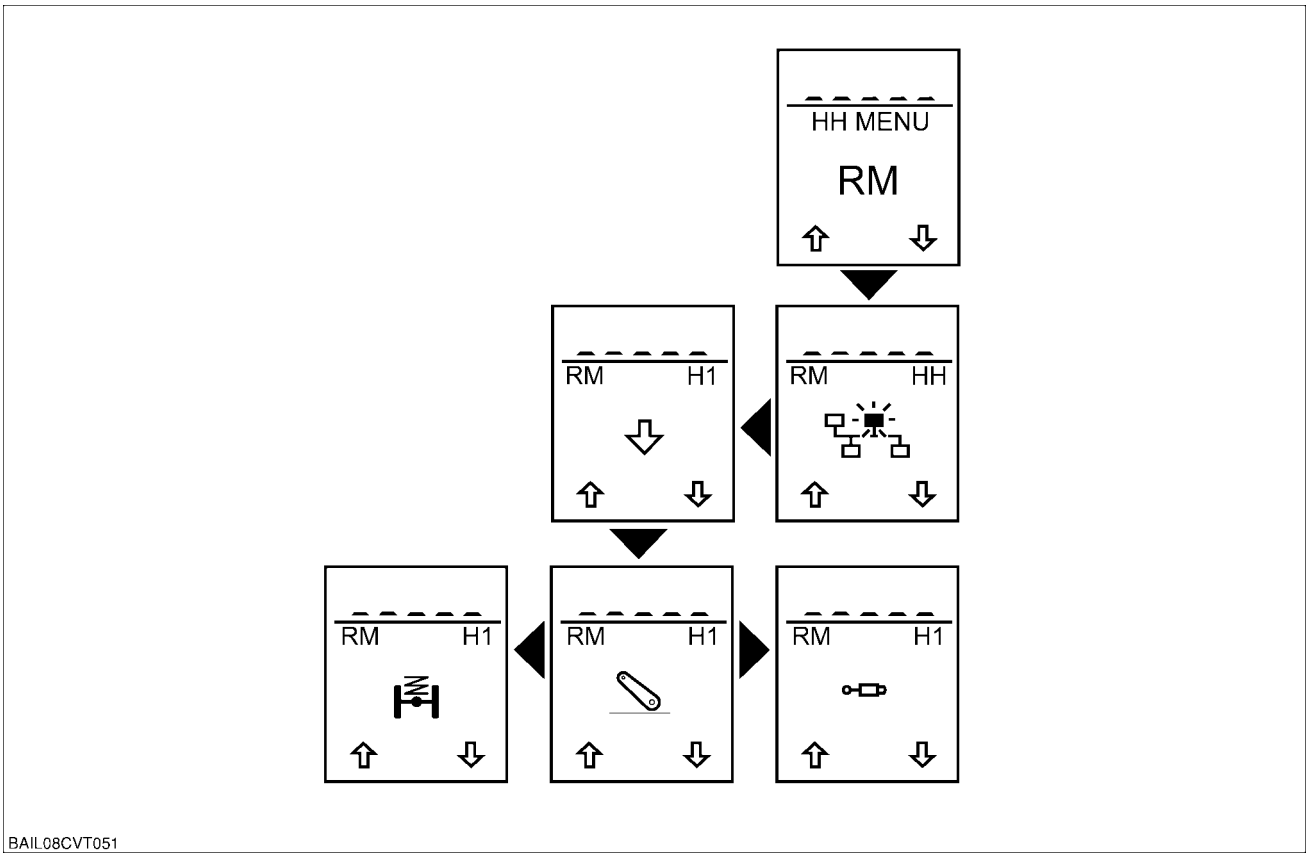
NOTE: *The calibration procedure is controlled by the electronic management system. To prevent inadvertent movement of the tractor, park the tractor away from any obstacles, firmly apply the parking brake and block the wheels, front and rear. Check that the Ground speed display is Zero before commencing.*

1. Install the diagnostic connector **380000843** into the diagnostic socket **(1)**.



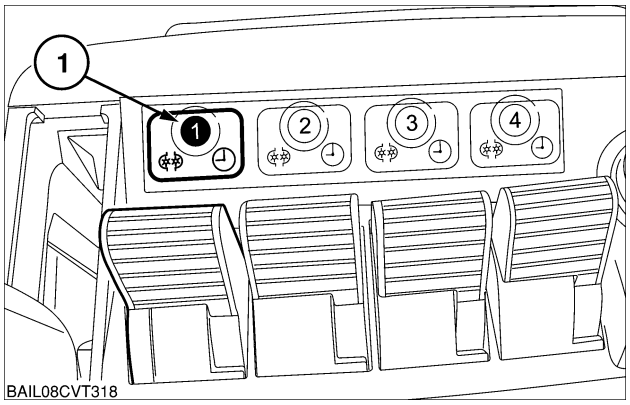
BAIL06CCM213AVA 1

2. Disconnect all implements from the rear remotes.
3. Make sure all EHR program switches are in the OFF position.
4. Use the "up", "down" and "menu" keys on the ICU3 to navigate the HH menu's to H1 and the rear EHR symbol on the RM controller.



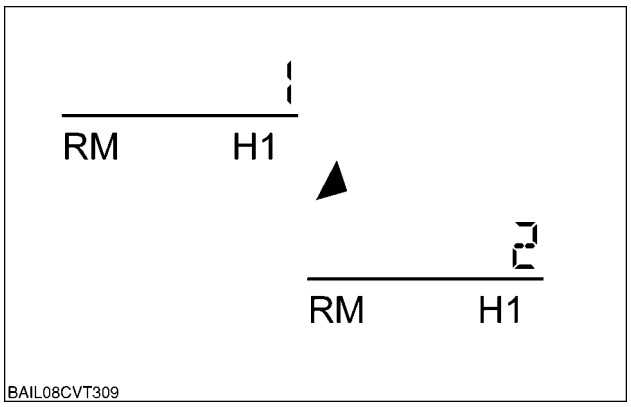
BAIL08CVT051 2

5. Press and hold the program switch **(1)**, for lever No.1 for at least 2 seconds until the display changes.



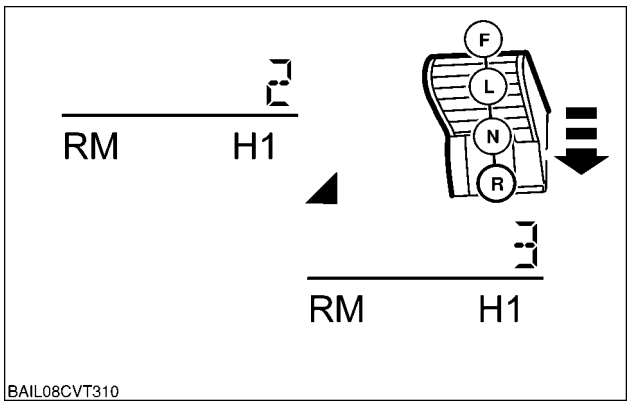
BAIL08CVT318 3

6. The calibration will proceed, the program lamp for EHR 1 will be illuminated and the top section of the display will show "1".
When the neutral position has been acquired and stored, the program lamp is turned off and the top section of the display will show "2".



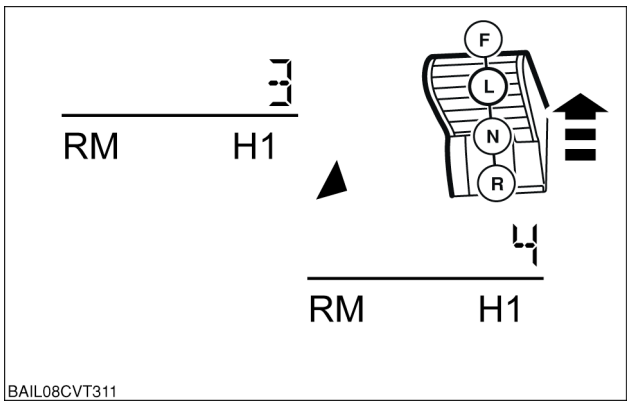
BAIL08CVT309 4

7. While "2" is displayed, move the lever to the raise position, the program light will illuminate.
When movement is detected the program lamp for EHR 1 is turned off. After the raise position is established the top section of the display will change to "3", the program light will switch off.



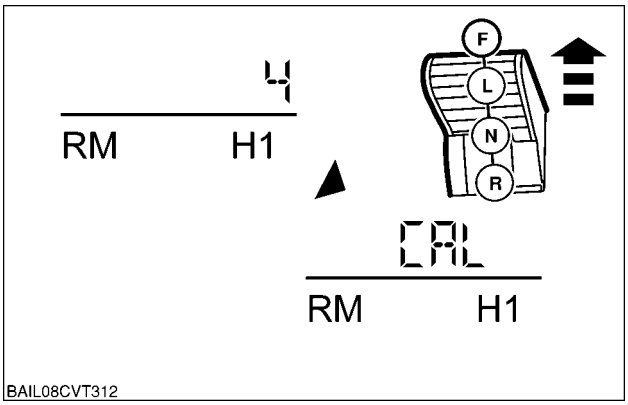
BAIL08CVT310 5

8. While "3" is displayed, move the lever to the full flow lower position, the program light will illuminate.
When a stable value for the full flow lower position of the lever is seen it is recorded with the minimum flow rate value, the top section of the display will change to "4", the program light will switch off.



BAIL08CVT311 6

9. While "4" is displayed move the lever to the float position, the program light will illuminate.
When a stable value for the float position of the lever is seen and recorded the top section of the display will change to "CAL" to indicate the calibration procedure is complete.



BAIL08CVT312 7

10. To calibrate the remaining EHR levers (2 to 4), repeat the steps **5** to **9**.

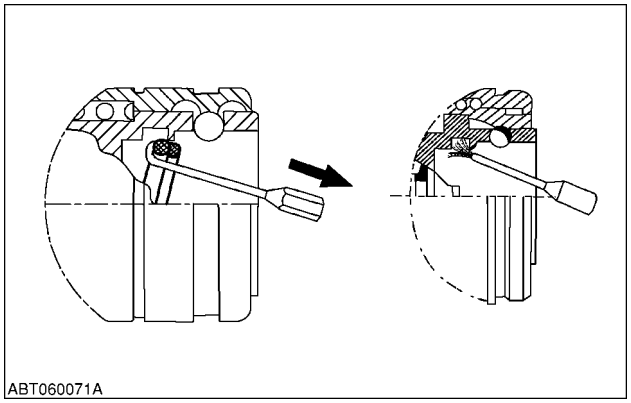
11. Key OFF to store the calibration values.

NOTE: *If a lever is not calibrated the program lamp is switched on regardless of the program switch state.*

Coupler - Overhaul

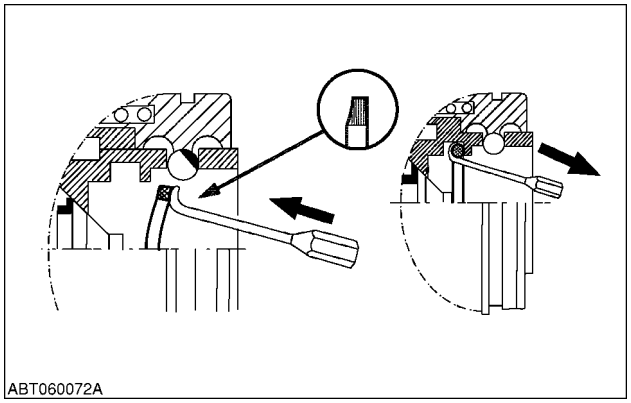
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

1. Remove the 'O' ring and back up ring using a suitable hooked tool.
   Ensure the groove is clean



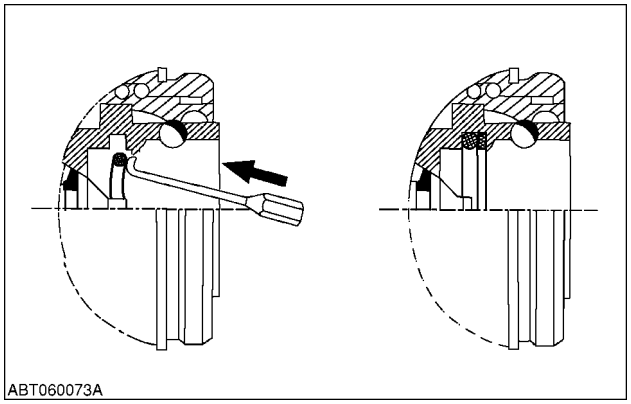
BAIL06CCM206ASA 1

2. Install the new back up ring ensuring that it is fully seated in the groove.



BAIL06CCM207ASA 2

3. Lubricate the new 'O' ring with clean transmission oil and insert into the groove.

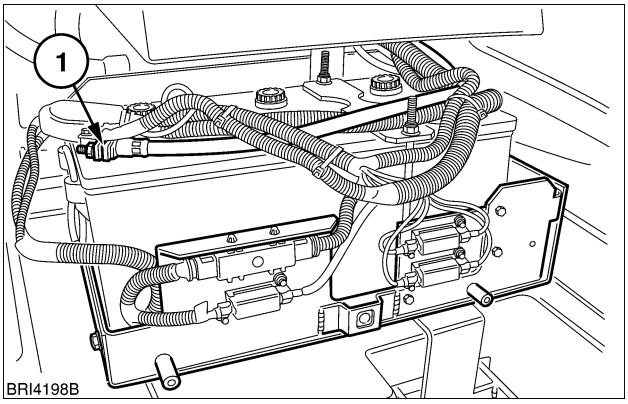


BAIL06CCM208ASA 3

Mid-mount remote control valve - Remove

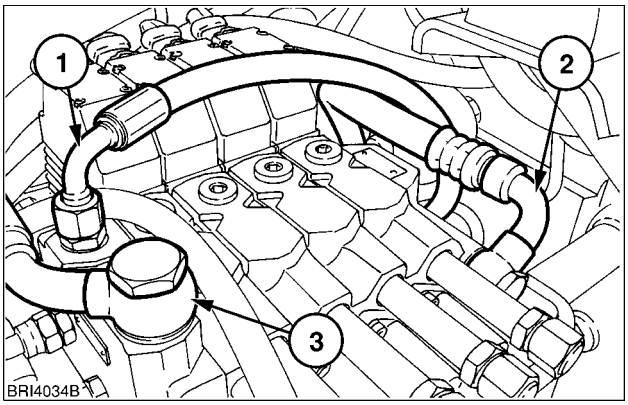
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

1. Disconnect the negative cable **(1)** from the battery and insulate. Refer to **Battery - Disconnect (A.30.A)**



BAIL06CCM151ASA 1

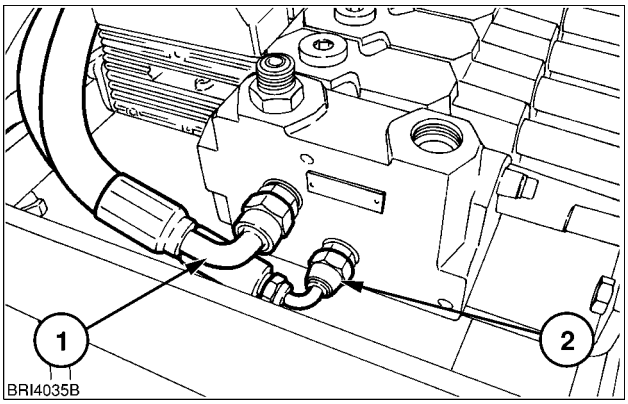
2. Disconnect the mid mount valve pilot return hose **(1)**, return hose **(2)**and supply hose **(3)** .



BAIL06CCM061ASA 2

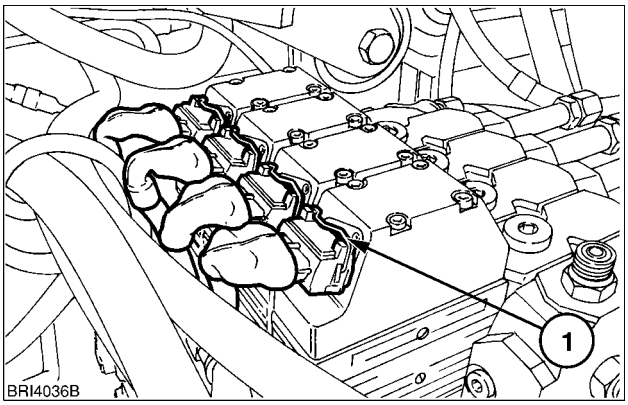
3. Disconnect the pilot line pressure hose **(1)** and the load sensing hose **(2)**

NOTE: *Drain all hoses into a suitable receptacle*



BAIL06CCM062ASA 3

4. Disconnect the electrical connectors **(1)** .



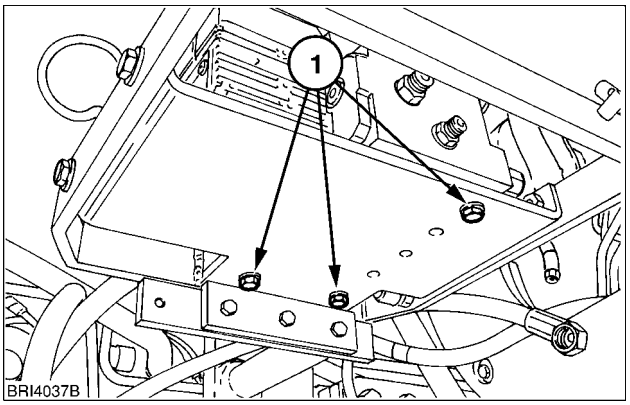
BAIL06CCM063ASA 4

5. Undo the mid mount valve stack retaining bolts. **(1)** . Remove valve stack from support.

⚠ WARNING ⚠

The remote valve assembly is heavy and must be removed under the complete control of the technician to prevent bodily injury.

M484



BAIL06CCM064ASA 5

Next operation:
Mid-mount remote control valve - Disassemble (A.10.C)

Mid-mount remote control valve - Install

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

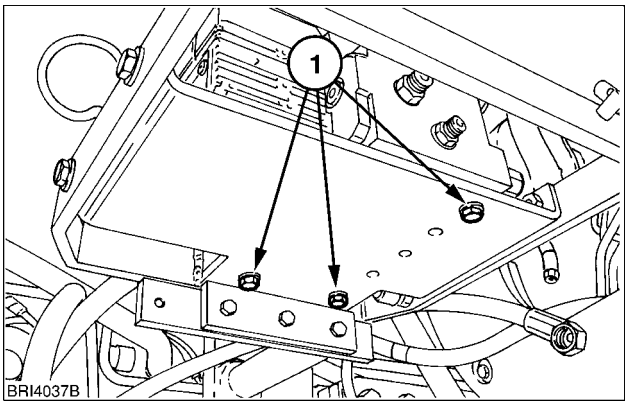
Prior operation:
Mid-mount remote control valve - Remove (A.10.C) Mid-mount remote control valve - Disassemble (A.10.C)

1. Place the remote valve assembly onto the support.

⚠ WARNING ⚠
The valve stack is very heavy DO NOT attempt to install without the use of lifting equipment.

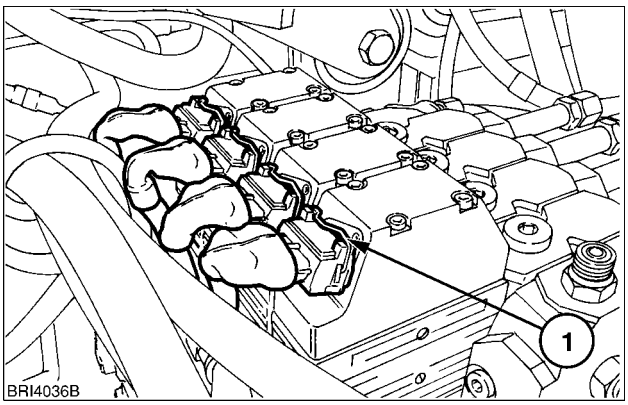
B037

2. Tighten retaining bolts **(1)** to **24 Nm 18 Foot pounds**.



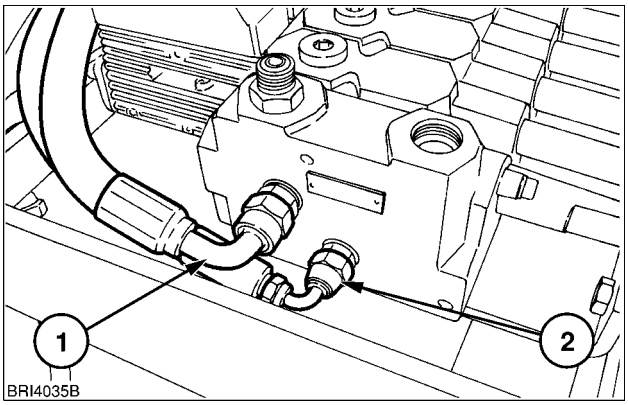
BAIL06CCM064ASA 1

3. Connect the harness connectors **(1)** to the remote valve solenoids.



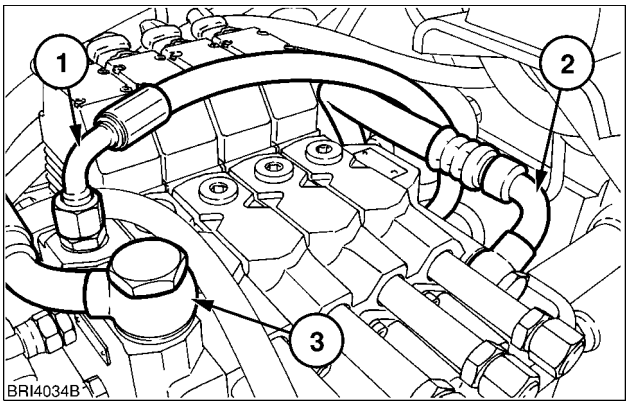
BAIL06CCM063ASA 2

4. Reconnect the pilot line pressure hose **(1)** and load sensing hose **(2)** .



BAIL06CCM062ASA 3

5. Reconnect pilot return hose **(1)** , main return hose **(2)**, and pressure hose **(3)**.



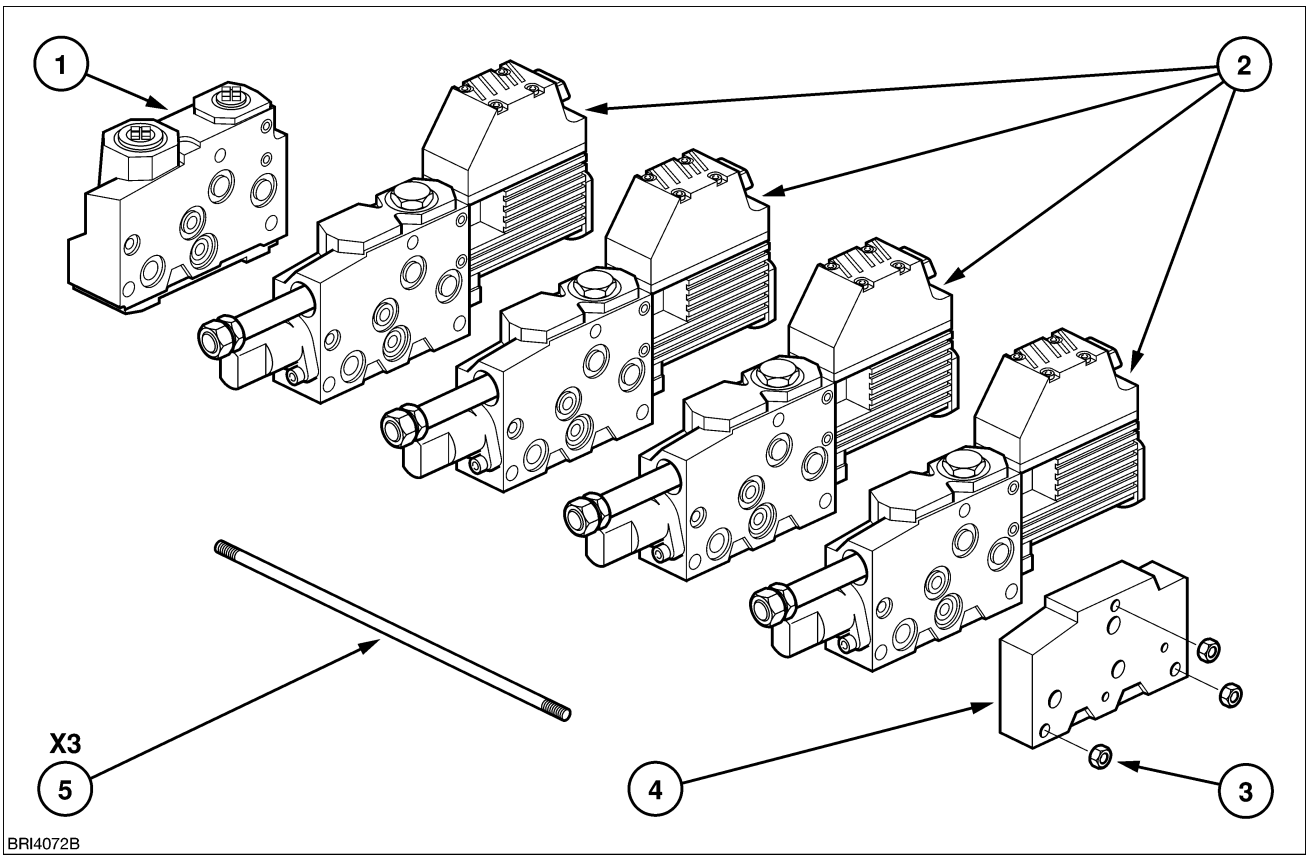
BAIL06CCM061ASA 4

6. If a new valve slice has been replaced or added it will be necessary to reprogram the number of the valve within the valve assembly. Refer to . **Control module - Configure (A.50.A)**

Mid-mount remote control valve - Disassemble

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Prior operation:
Mid-mount remote control valve - Remove (A.10.C)



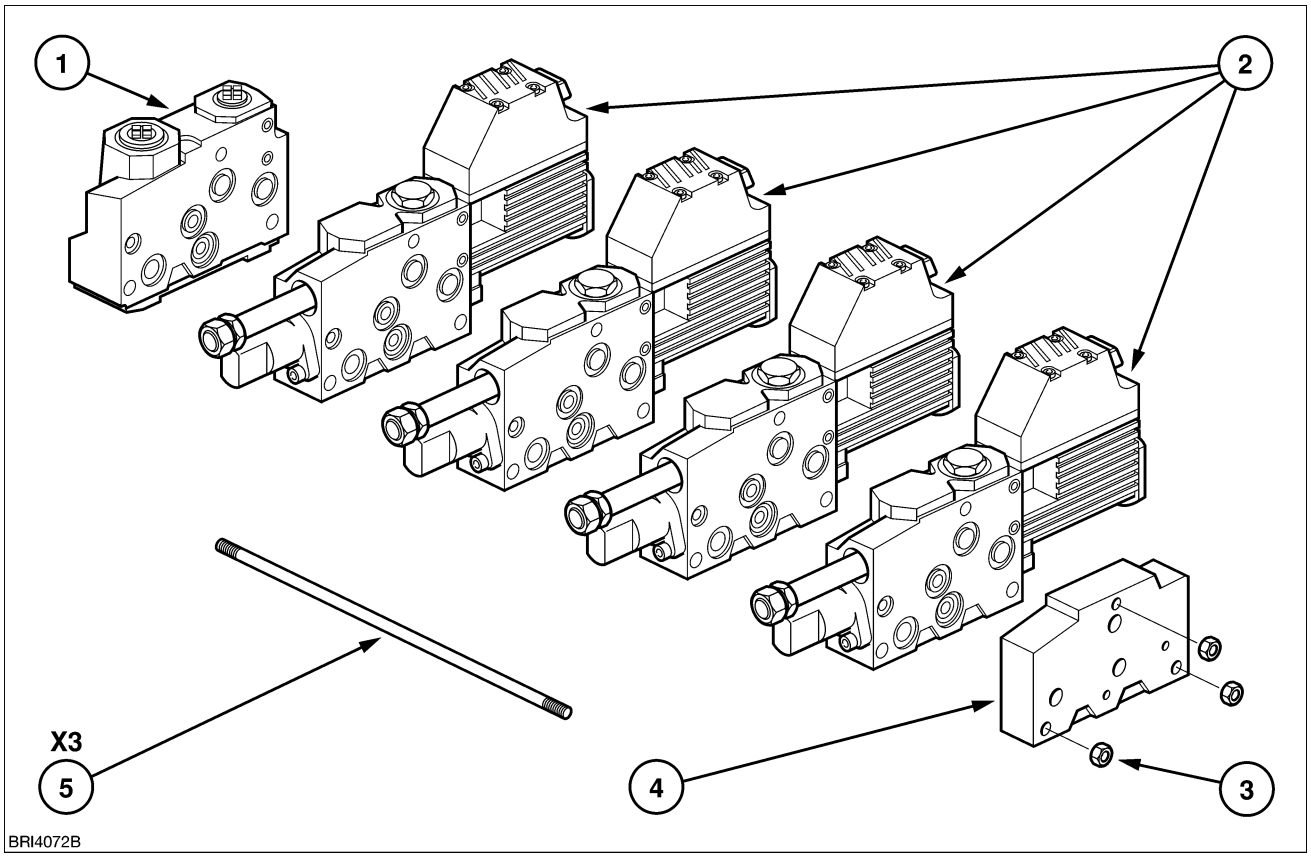
BAIL06CCM092FSA 1

1. Inlet Manifold
2. Electronic Remote Valves
3. Tie Rod Nuts
4. End Plate
5. Tie Rod

1. Loosen and remove the tie rod nuts **(3)** from the end plate **(4)** .
2. Remove the end plate .
3. Remove the remote valve slices **(2)** taking care not to dislodge the load sensing valves and 'O' rings seated in the valve face.
4. Unscrew the tie rod bolts from inlet manifold
5. Refer to **Mid-mount remote control valve - Exploded view (A.10.C)** to view valve components and **Mid-mount remote control valve - Assemble (A.10.C)** for reassembly.

Mid-mount remote control valve - Assemble

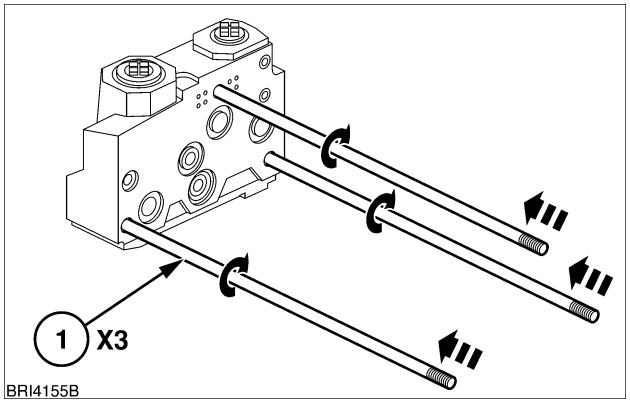
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]



BAIL06CCM092FSA 1

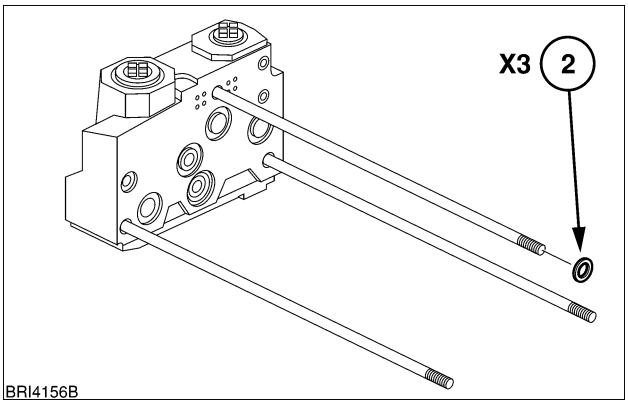
1.Inlet Manifold
2.Electronic Remote Valves
3.Tie Rod Nuts
4.End Plate
5.Tie Rod

1. Insert the tie rods into the inlet manifold and screw in by hand as far as they will go.



BAIL06CCM128ASA 2

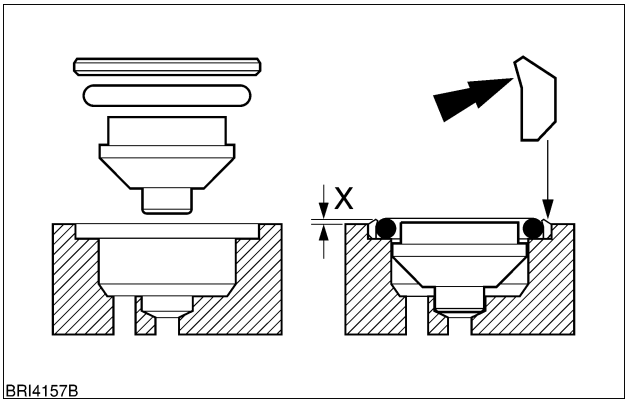
2. Push a shim onto the tie rods if any adhesive shims have been used previously.



BAIL06CCM129ASA 3

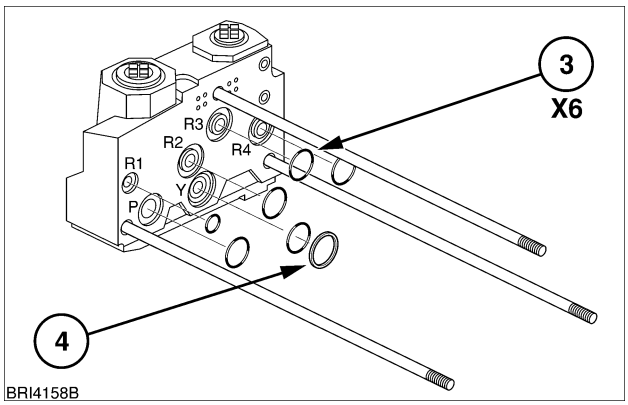
3. Insert load sensing shuttle valve along with the 'O' ring and support ring as shown in Figure **4** in port 'Y'. Figure **5**

NOTE: *Clearance X should be approximately* ***0.5 mm*** *from the flange face of the valve segment to the top edge of the inserted shuttle valve.*



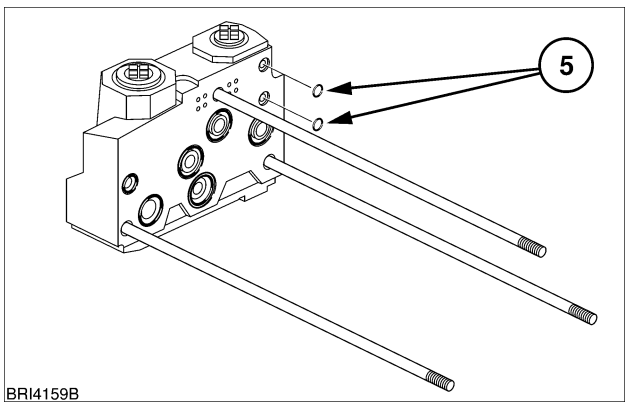
BAIL06CCM139ASA 4

4. Insert new 'O' Rings **(3)** into the pressure and return ports and also the load sense 'O Ring and support ring **(4)**.



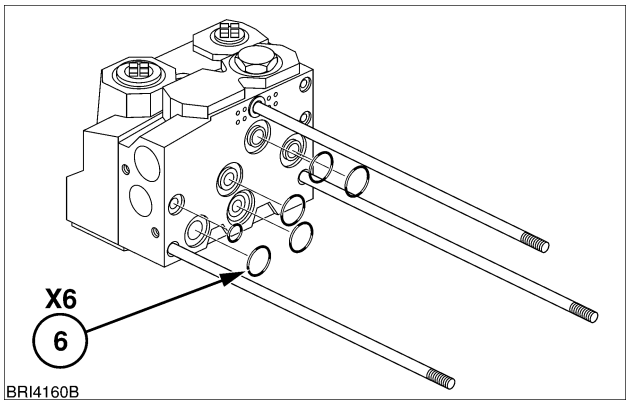
BAIL06CCM131ASA 5

5. Insert new 'O' Rings **(5)** into pilot line oil holes



BAIL06CCM132ASA 6

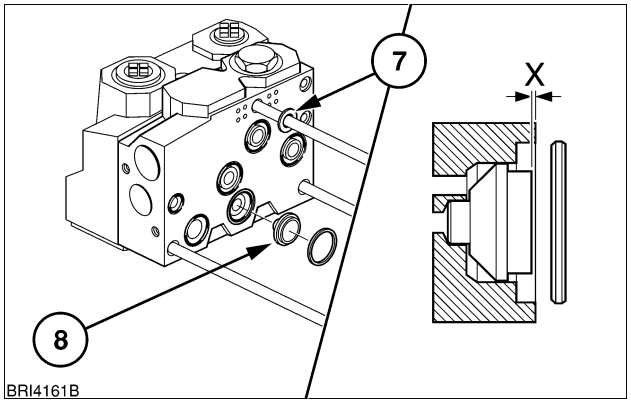
6. Place the first valve slice onto the tie rods and insert new 'O' rings **(6)** into the relevant ports.



BAILCCM133ASA 7

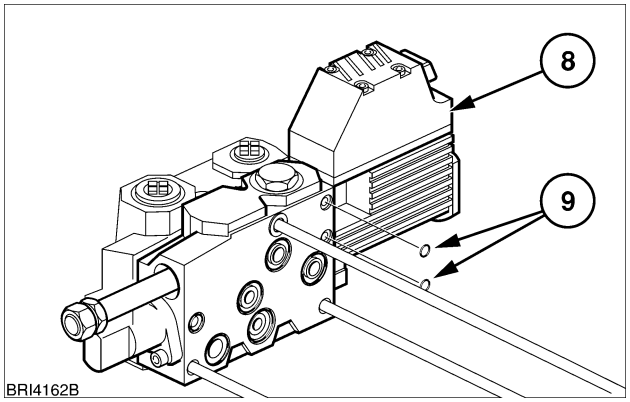
7. If the flange face has corrugations that have been smoothed with a dressing stone, one spacer **(7)** must be threaded onto each tie rod. Insert the load sense valve **(8)** and support ring as shown.

NOTE: *Clearance X should be approximately* ***0.5 mm*** *from the flange face of the valve segment to the top edge of the inserted shuttle valve.*



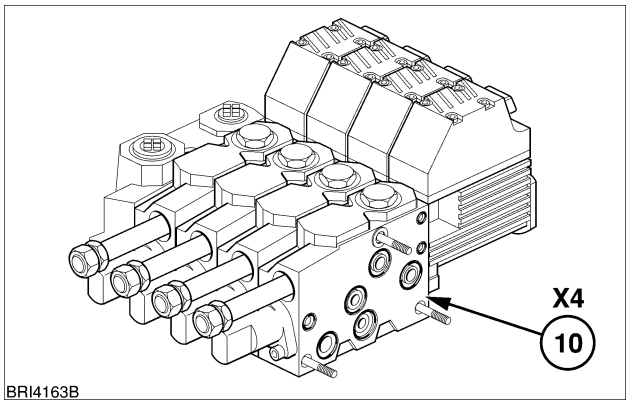
BAIL06CCM134ASA 8

8. Insert the 'O' rings **(9)** into the control oil holes.



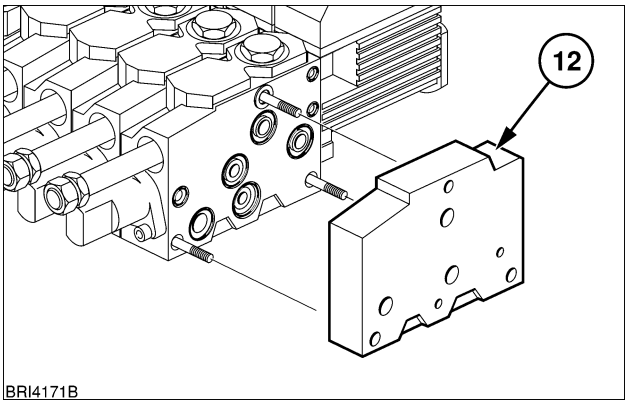
BAIL06CCM135ASA 9

9. Push the last slice **(10)** onto the tie rods and insert the 'O' rings.



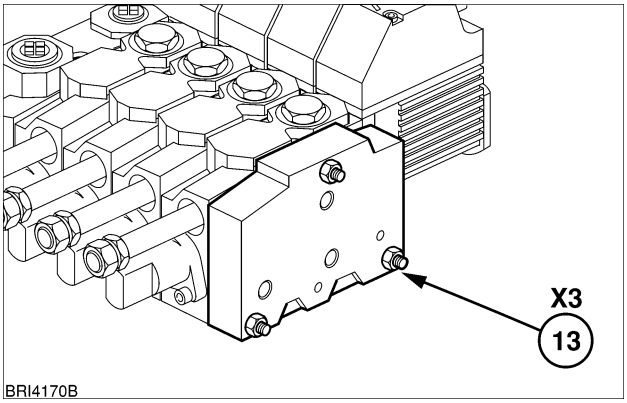
BAIL06CCM136ASA 10

10. Fit the end plate **(12)**.



BAIL06CCM138ASA 11

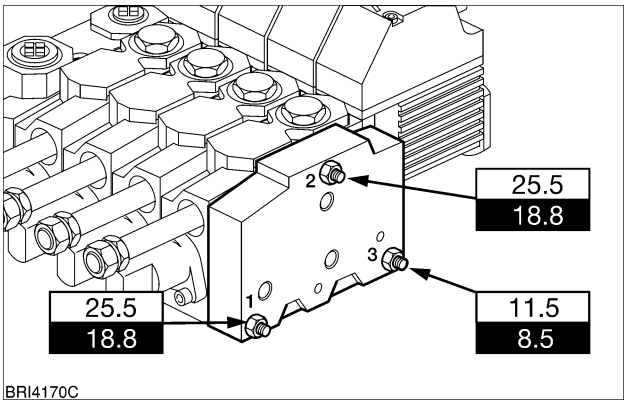
11. Push the end plate onto the tie rods and screw on the nuts **(13)** by hand



BAIL06CCM140ASA 12

12. Place the now assembled valve stack onto a level surface to correctly align the sections.

13. Tighten the nuts in the specified order and to the correct torque. See figure **13**



BAIL06CCM141ASA 13

Next operation:
Mid-mount remote control valve - Install (A.10.C)

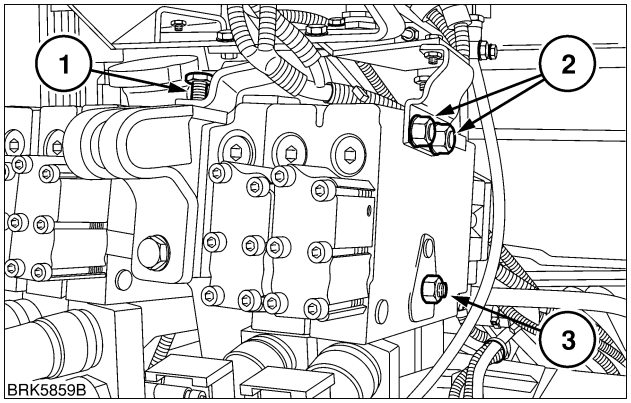
Stack valve - Remove

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Prior operation:
Battery - Disconnect (A.30.A)

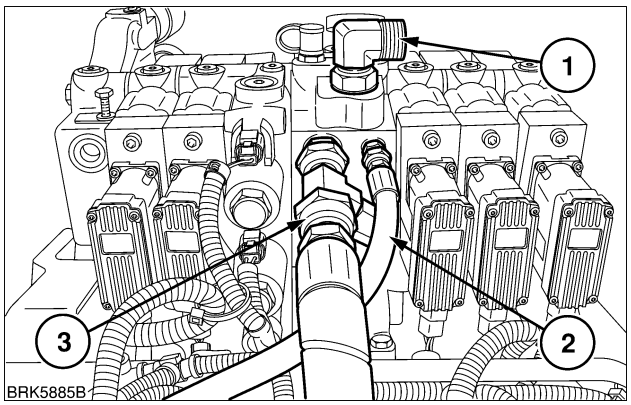
1. Remove the pneumatic trailer brake valve bracket assembly

NOTE: *The top right hand side retaining nuts are also the remote valve slice retaining nuts . Ensure these nuts are relocated on the valve assembly and retightened.*



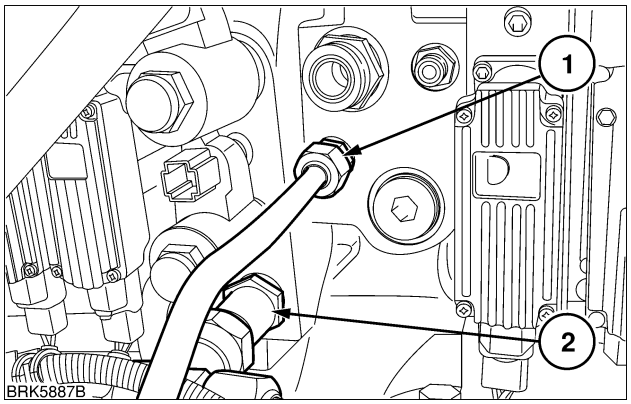
BAIL08CVT054ASA 1

2. Undo the return to tank pipe **(1)** from the top of the valve assembly and the load sensing hose **(2)** and main pressure feed hose **(3)** from the rear of the stack.



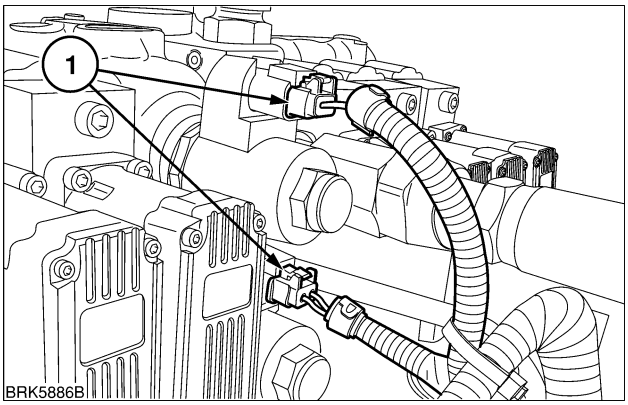
BAIL08CVT076ASA 2

3. Remove the pilot supply pipe **(1)** and the hydraulic lift pipe from **(2)** the EDC valve slice.



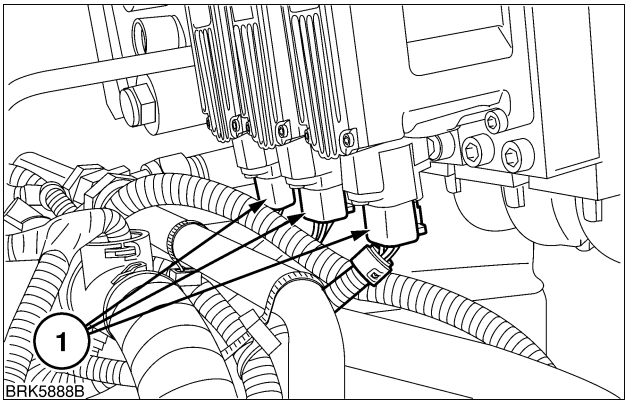
BAIL08CVT078ASA 3

4. Remove connectors **(1)** from EDC solenoids.



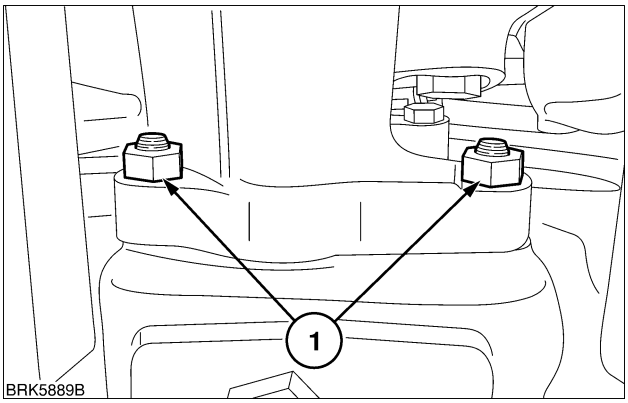
BAIL08CVT077ASA 4

5. Disconnect the electrical connectors **(1)** from the remote valve solenoids.



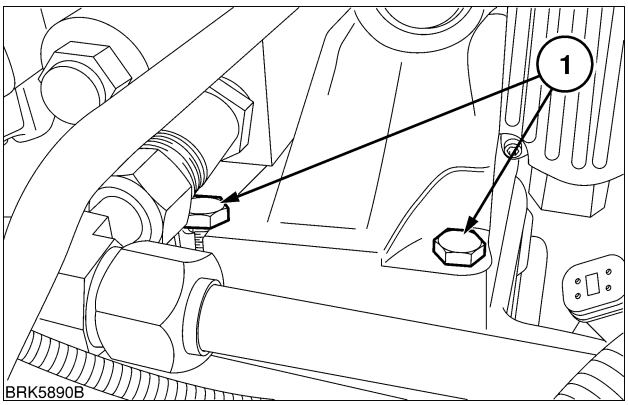
BAIL08CVT079ASA 5

6. Undo and remove the rear retaining nuts **(1)** at the base of the remote valve manifold.



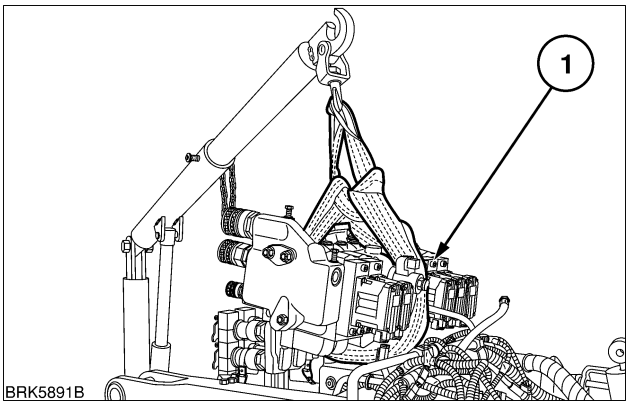
BAIL08CVT080ASA 6

7. Undo and remove the retaining bolts **(1)** at the front of the manifold. There is a slot where the right hand bolt is mounted to allow easier removal of the bolt due to the proximity of the EDC valve pipe.



BAIL08CVT081ASA 7

8. Using a suitable hoist and supports, lift the remote valve stack **(1)** clear of the rear axle housing. Place on a suitable support.

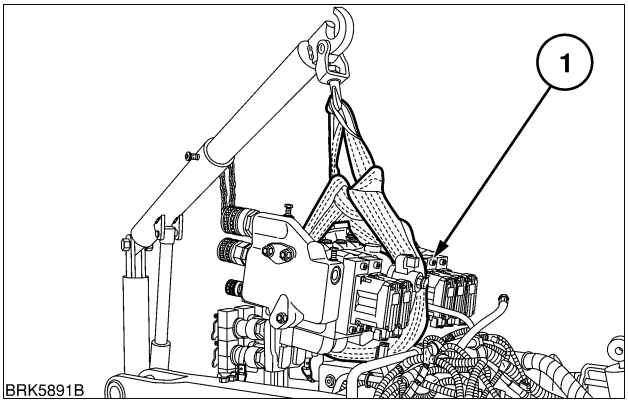


BAIL08CVT082ASA 8

Stack valve - Install

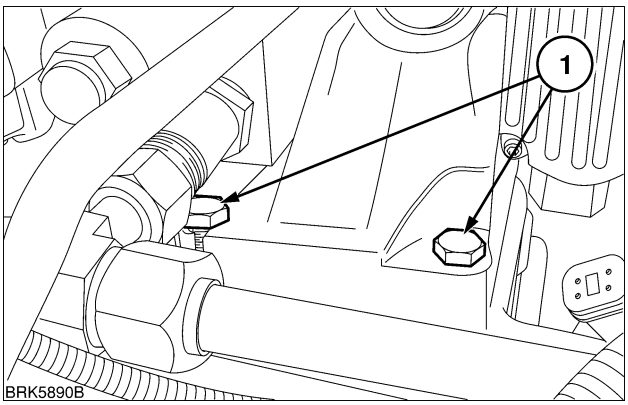
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

1. Using a suitable hoist locate the valve stack assembly **(1)** on to the rear axle housing.



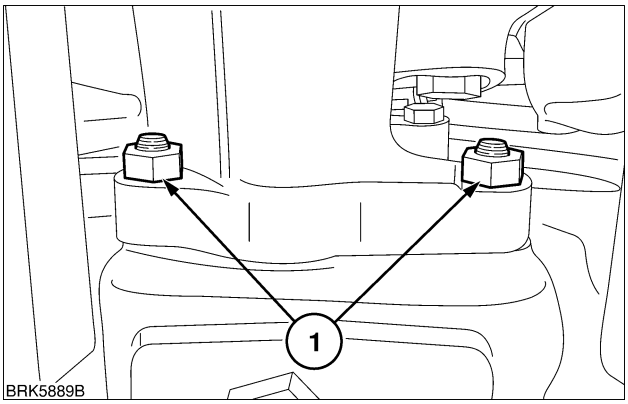
BAIL08CVT082ASA 1

2. Insert and tighten the retaining bolts **(1)** at the front of the manifold to **43 Nm** (**31.7 lb ft**).



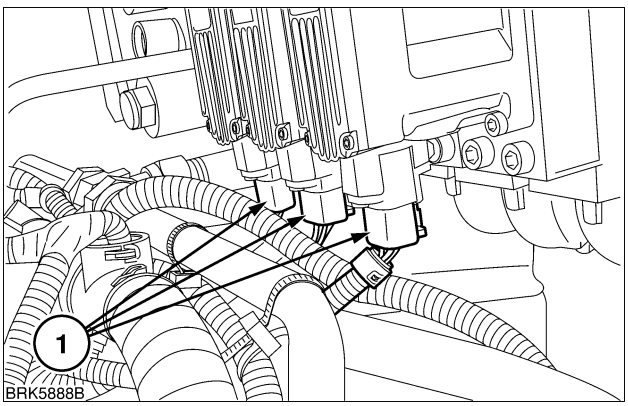
BAIL08CVT081ASA 2

3. Locate the retaining nuts at the rear of the manifold and tighten to **43 Nm** (**31.7 lb ft**).



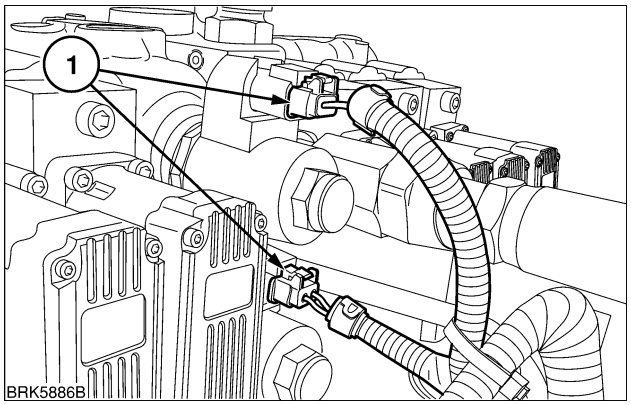
BAIL08CVT080ASA 3

4. Connect the electrical connectors **(1)** to the remote valve solenoids.



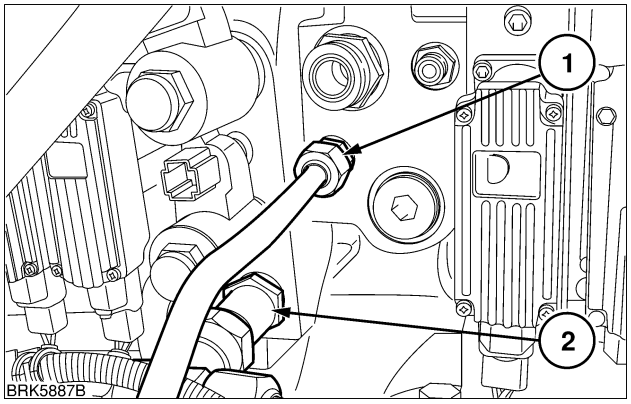
BAIL08CVT079ASA 4

5. Connect the wiring harness connectors **(1)** to the EDC solenoids.



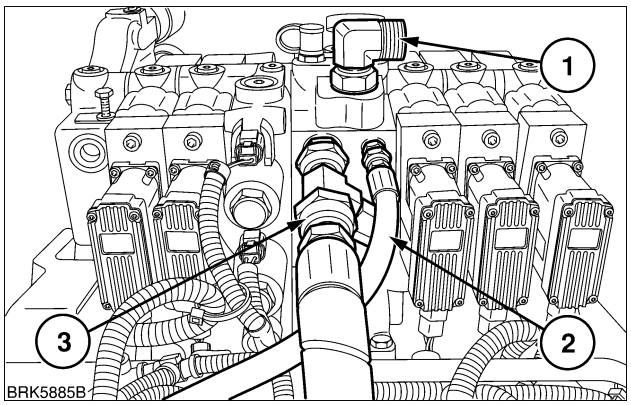
BAIL08CVT077ASA 5

6. Install the pilot supply pipe **(1)** and the EDC hydraulic lift pipe **(2)**.



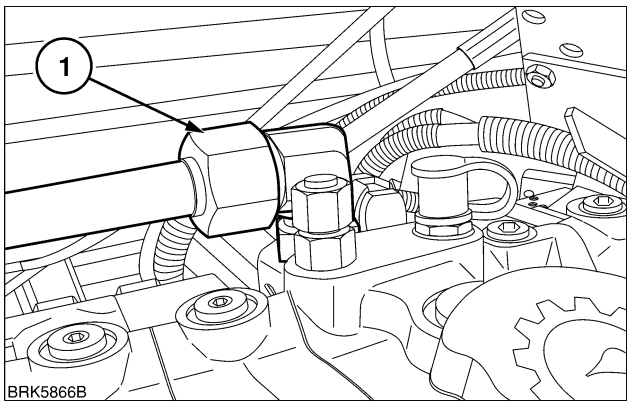
BAIL08CVT078ASA 6

7. Install the return to tank pipe connector **(1)** (if removed). Install the load sensing hose **(2)** and the main pressure feed hose **(3)**.



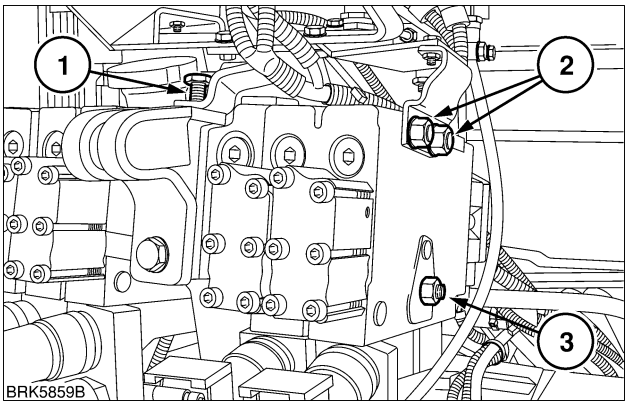
BAIL08CVT076ASA 7

8. Connect the return pipe **(1)**.



BAIL08CVT061ASA 8

9. Install the pneumatic valve bracket to the valve assembly and tighten the top retaining bolt **(1)** to **85 Nm** (**62.7 lb ft**) and nuts **(2)** and **(3)** to **45 Nm** (**33.2 lb ft**).



BAIL08CVT054ASA 9

Next operation:
Refer to **Control module - Configure (A.50.A)** Calibration and valve renumbering.

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Coupler - Overhaul 34
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Mid-mount remote control valve - Assemble 40
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Mid-mount remote control valve - Disassemble 39
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
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Mid-mount remote control valve - Install 37
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Mid-mount remote control valve - Remove 35
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Mid-mount remote control valve - Static description 20
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Mid-mount remote control valve - Torque 6
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate 31
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Disassemble 27
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Dynamic description 10
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Exploded view 9
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Hydraulic schema 7
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Install 28
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Remove 25
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Sectional view 8
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Torque 4
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Remote control valve - Torque 5
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Stack valve - Install 47
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Stack valve - Remove 44
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

DISTRIBUTION SYSTEMS - A

SECONDARY HYDRAULIC POWER SYSTEM - 12.A

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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  - Pressure test 4
- Priority valve
  - Pressure test 5
  - Overhaul 7
- Hydraulic pump
  - Pressure test 8
  - Remove Steering Pump 9
  - Overhaul 10

Hydraulic pump - General specification

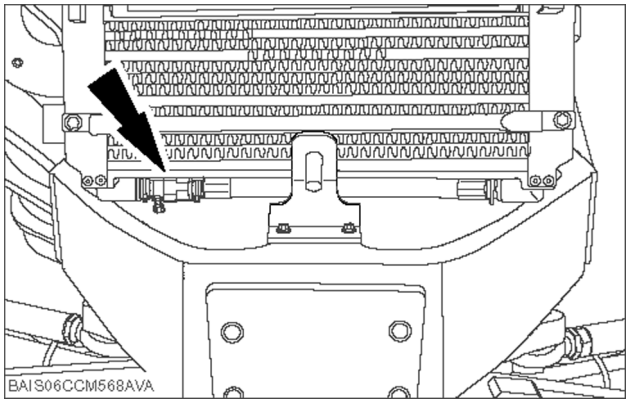
Steering/Low Pressure Circuit Pump

Type	Gear Type Pump
Minimum Output @ **2200 erpm**	**61.5 Ltr/min** **13 Imp Galls/min** **16 US Galls/min**
Flow to Steering Motor	**22 - 28 ltr/min** **4.8 - 6.2 Imp Galls/min** **5.8 - 7.4 US Galls/min**
Steering Pressure	**190 bar** (**2750 lbf/in2**) max

Regulator and lubrication valve - Pressure test

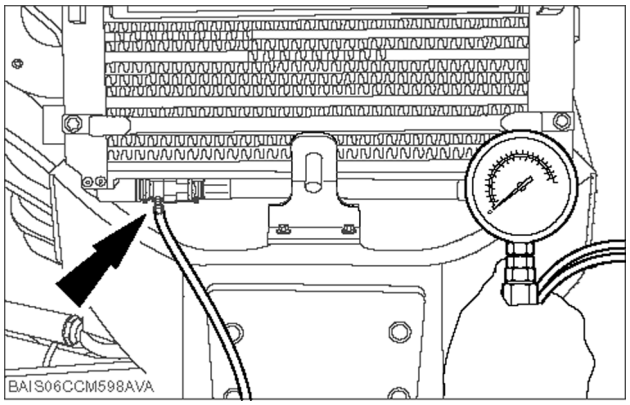
IMPORTANT: *Before performing any pressure or flow testing operate the tractor until the oil in the rear axle is at normal operating temperature* ***65 °C*** *(* ***145 °F****).*

1. The following test checks the operation of the cooler by–pass valve and lubrication valve and should be performed if insufficient lubrication pressure is suspected.
   Install special tool 380200006 into the lubrication tube on the oil cooler.



BAIS06CCM568AVA 1

2. Install **27 bar** (**300 lbf.in2**) gauge, **380001145** using hose **380000545** .



BAIS06CCM598AVA 2

3. The following pressures should be observed at the different engine rev/min.
   3.0 bar @ 1000 rev/min
   3.5 bar @ 1500 rev/min
   7.5 bar @ 2000 rev/min

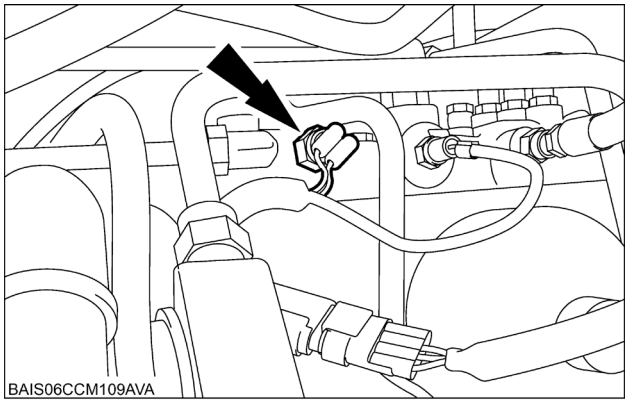
Priority valve - Pressure test

IMPORTANT: *Before performing any pressure or flow testing operate the tractor until the oil in the rear axle is at normal operating temperature.* ***65 °C (145 °F)****.*

Low Pressure System Test

1. The low pressure circuit can be checked by removing the low pressure warning switch, located in the top cover of the transmission, and inserting fitting 380000577 with a quick release fitting 380000492. Attach a **40 bar** (**600 lbf.in2**) gauge 380000552 using quick release coupler 380000543 and hose 380000545. Start and run the engine at **1500 rev/min**. The gauge should read **23±1 bar** (**334±15 lbf.in2**) .

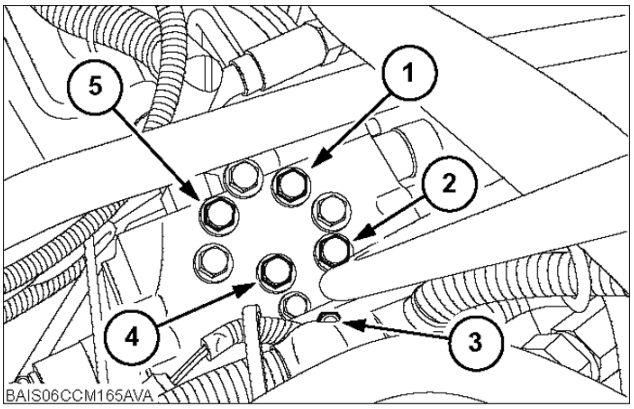
NOTE: *A pressure reading of approximately* ***28 bar (406 lbf.in2****) would indicate the priority valve may be sticking.*



BAIS06CCM109AVA 1

Low Pressure Component Tests

2. The components of the low pressure system, i.e., the PTO, PTO brake, Four Wheel Drive and Differential lock which are supplied from a common manifold can be tested from ports located in the manifold body.
   1. PTO Brake
   2. Four Wheel Drive
   3. PTO Clutch (Quick release adapter installed)
   4. Differential Lock
   5. PTO Lubrication



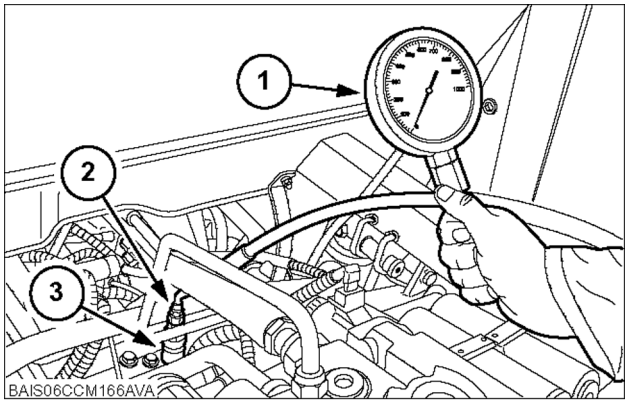
BAIS06CCM165AVA 2

3. Remove the test port plug and install adaptor, 380000493 and quick release fitting 380000492.

NOTE: *On tractors with cab suspension the panhard rod may obstruct the installation of the pressure test equipment in the PTO brake and PTO lubrication test ports. The use of additional adapter 380000572 may be required.*

4. Attach a **40 bar** (**600 lbf.in2**) gauge **(1)** 380000552 using quick release coupler **(3)** 380000543 and hose **(2)** 380000545.
   Start and run the engine at **1500 rev/min**. Operate the component to be tested, the gauge should read **23±1 bar** (**334±15 lbf.in2**).

NOTE: *The PTO lubrication test port will give a different pressure than quoted and is covered in another test. For additional information, refer to* ***PTO clutch - Pressure test (C.40.C)****.*



BAIS06CCM166AVA 3

5. If there is no change in pressure when the component is operated, but low pressure system oil has already been established, then the fault could be either with the solenoid or wiring. Check for voltage at the respective connector. If **+12 v** is available suspect the solenoid, if no voltage is seen suspect the wiring.

Priority valve - Overhaul

1. Inspect spool and components for wear or damage. If spool is damaged it is necessary to replace both spool and housing.
2. Lubricate spool with clean hydraulic oil prior to re-assembly.

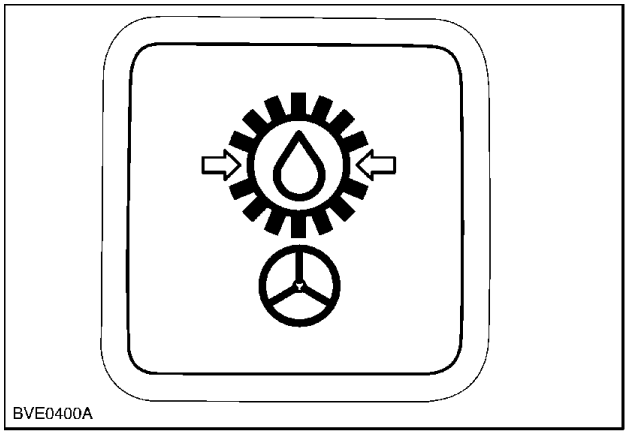
Hydraulic pump - Pressure test

IMPORTANT: *Before performing any pressure or flow testing operate the tractor until the oil in the rear axle is at normal operating temperature.* ***65 °C*** *(* ***145 °F****).*

Steering Pump Test

1. There is no relief valve in the steering pump. The following practical test will determine if steering pump output is sufficient to allow satisfactory operation of the steering system.
2. Set engine speed to **1100 rev/min**.
   Turn steering quickly from lock to lock.
   If steering is operating correctly the reaction should be immediate with no time delay between turning the steering wheel and movement of the wheels.
3. At full lock the relief valve in the steering motor should be heard to blow and the engine speed drop to approximately **1050 rev/min**.

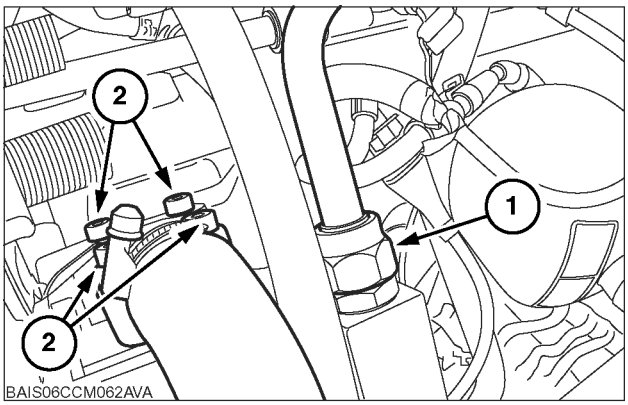
NOTE: *The hydraulic pump can get very hot during this test which is another indication the steering pump is faulty, this may occur after approximately 30 - 60 seconds of being held on full lock.*



BVE0400A 1

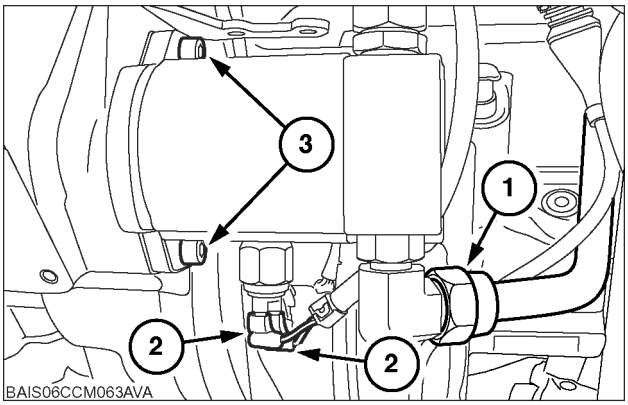
Hydraulic pump - Remove Steering Pump

1. Remove the steering pump return pipe **(1)** and undo Jubilee Clip from hose and remove suction tube housing **(2)** from steering pump.
   .



BAIS06CCM062AVA 1

2. Disconnect the steering motor supply pipe **(1)**and the electrical connectors **(2)** .Undo retaining bolts **(3)** and remove steering pump.
   Refer to :
   Hydraulic pump - Exploded view (A.12.A)
   Hydraulic pump - Overhaul (A.12.A)
   Priority valve - Overhaul (A.12.A)

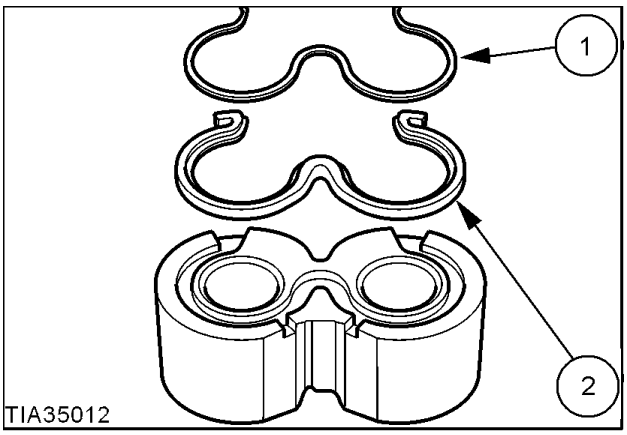


BAIS06CCM063AVA 2

Hydraulic pump - Overhaul

IMPORTANT: *When servicing the pump gears, particular attention must be paid to the following points:*

1. • The width of each gear set must be within **0.0002 in**. (**0.005 mm**) of each other to ensure satisfactory pump efficiency.
   • Journals must be within **0.0005 in**. (**0.013 mm**) of each other.
   • Gear faces must be flat. This feature may be checked by blueing a bearing face and rotating against the gear. This check will also reveal any sharp edges on the teeth.
   Install new seals and 'O' rings. When installing seals in the bearing block ensure that the plastic back-up seal **(1)** is correctly positioned in the rubber seal **(2)**.



TIA35012 1

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HYDRAULIC COMMAND SYSTEM - 14.A

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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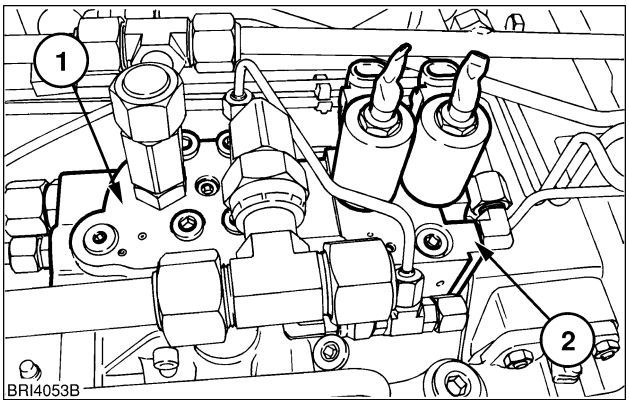
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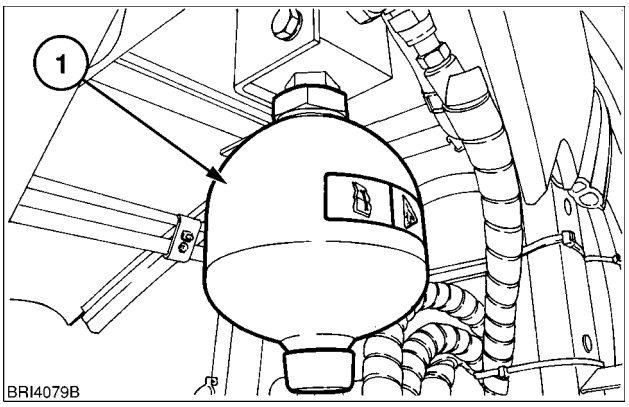
HYDRAULIC COMMAND SYSTEM - Static description

The low pressure hydraulic circuit for tractors with Full Powershift transmissions is shown on **PRIMARY HYDRAULIC POWER SYSTEM - Hydraulic schema (A.10.A)**
The function of the principal components in the circuit are described as follows:
High pressure oil from the CCLS variable displacement pump, via the trailer brake valve if fitted, is supplied to a flow dividing and low pressure regulating valve, **(1)** located directly on top of the variable displacement pump.
The oil is divided in the valve, depending on system demands and the oil destined for the low pressure system is regulated to **23 bar**, this oil is also the pilot line supply for the electronic remote valves, excess oil is returned to sump.



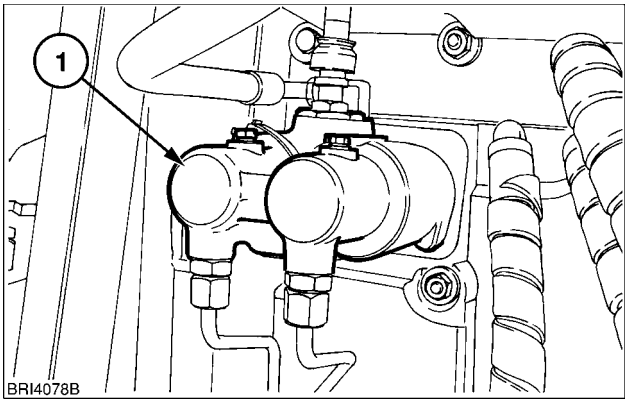
BAIL06CCM091ASA 1

The brake booster supply valve and accumulator assembly is located under the hood on the left hand side. The assembly is supplied with oil directly from the low pressure regulating valve outlet.



BAIL06CCM107ASA 2

The valve allows low pressure oil to supply the brake pedal booster units **(1)** when the tractor is producing sufficient oil pressure. If the oil pressure is lost the valve will close the brake system off from the low pressure system and the accumulator will provide sufficient pressure for several brake applications.

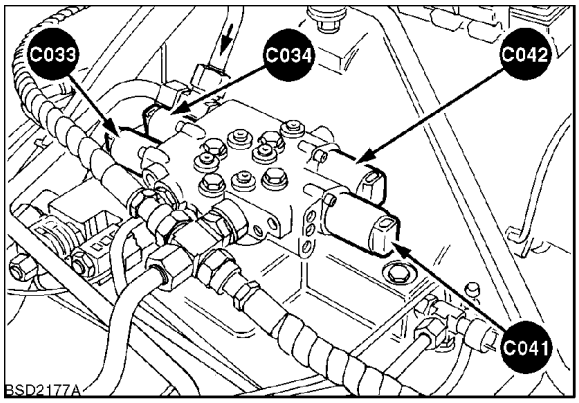


BAIL06CCM106ASA 3

The low pressure distributor valve block is located under the cab to the rear of the rear axle centre housing. The block is fed oil directly from the low pressure regulating valve outlet. Located in the valve block are the solenoid valves for the 4WD, differential lock, P.T.O and P.T.O. brake.

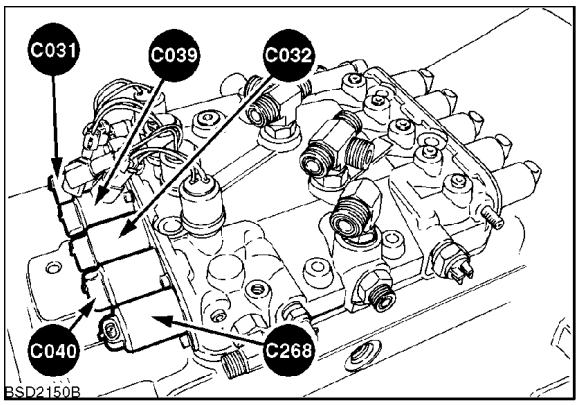
NOTE: *The four wheel drive is spring applied and the solenoid is energised whenever disengagement of the drive is required.*

C034 Four Wheel Drive
C033 PTO Brake
C042 PTO Engagement
C041 Differential Lock



BSD2177A 4

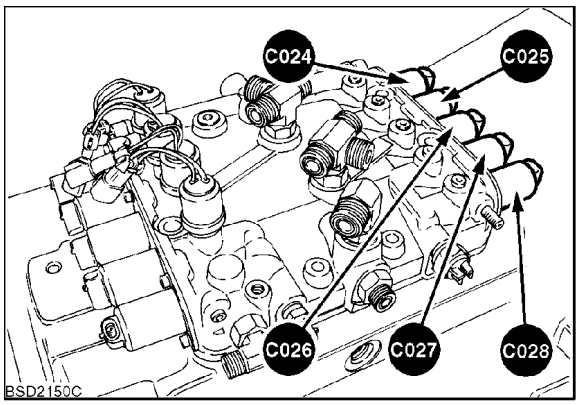
The transmission top cover contains all the transmission control solenoids. The range solenoids for engagement of the transmission range clutches and clutch engagement solenoids A, B, C, D and E. The low pressure oil is again supplied direct from the regulating valve outlet and is distributed by galleries within the top cover.
Solenoid Function
C040 Reverse Clutch
C039 High Range Clutch
C032 Low Range Clutch
C031 Medium Range Clutch
C268 19th Gear Solenoid (**50 km/h** (**31.1 mph**) Models)



BSD2150B 5

C024 A Clutch
C025 B Clutch
C026 C Clutch
C027 D Clutch
C028 E Clutch

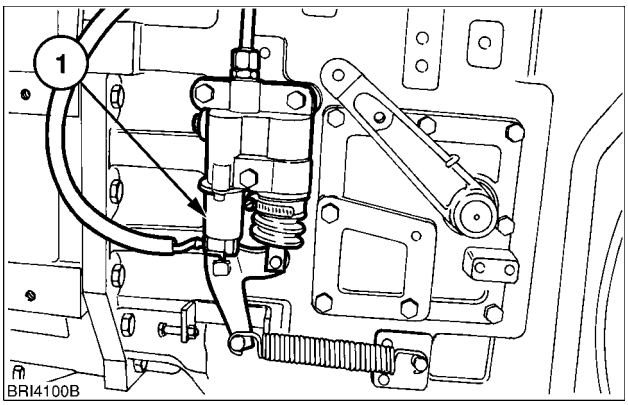
NOTE: *The 'C' number prefix before each solenoid description is the electrical connector reference.*



BSD2150C 6

Transmission Creeper

The creeper actuating solenoid valve is located on the left hand side of the the rear axle centre housing. The solenoid is supplied with low pressure oil from the distributor block.



BRI4100B 7

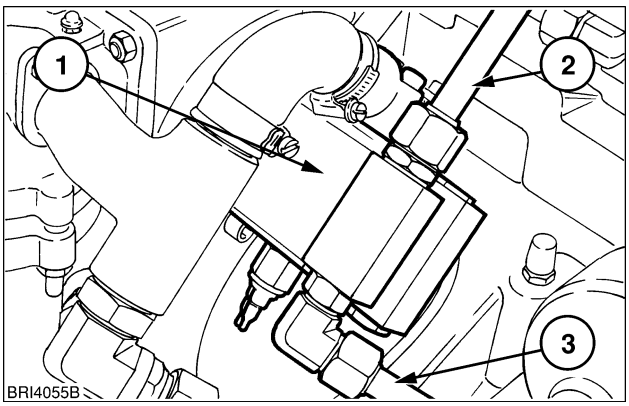
Lubrication Oil

Lubrication oil can be supplied from three sources. The steering priority valve **(1)** located on the end of the steering pump supplies oil to the lube circuit when the unit does not require oil for steering purposes. Lubrication oil is also supplied from the return side of the steering motor and from the charge pressure circuit via a supplementary lube valve.

A. Steering Pump

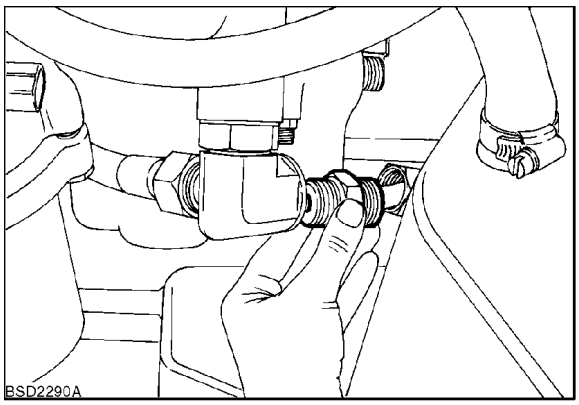
B. Connection to steering motor

C. Connection to oil cooler



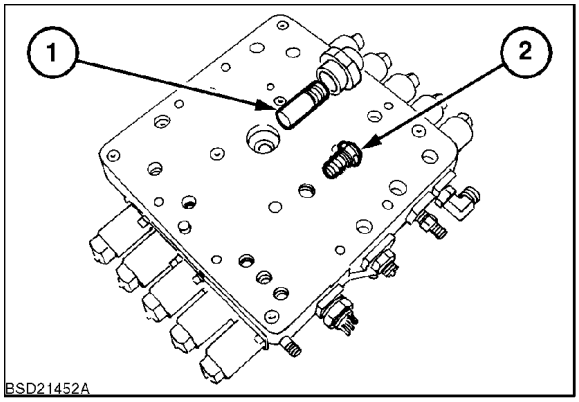
BAIL06CCM084ASA 8

The supplementary lube valve is located in a three way elbow in the inlet tube to the steering pump. The valve is rated at **0.8 bar** (**11.60 psi**) and will only operate when there is a drop in the lube pressure circuit below the combined pressure of the charge pressure circuit and the **0.8 bar**of the valve.



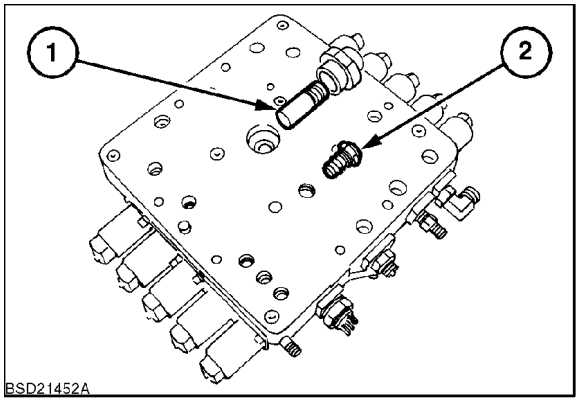
BSD2290A 9

The steering pump / steering return oil is directed through the oil cooler at the front of the tractor and is limited to a maximum pressure of **5 bar** (**73 lbf/in2**) by the lubrication relief valve **(2)** located in the transmission top cover. Components lubricated by this oil are transmission shafts and clutches, hydraulic pump drive gear and PTO clutch.

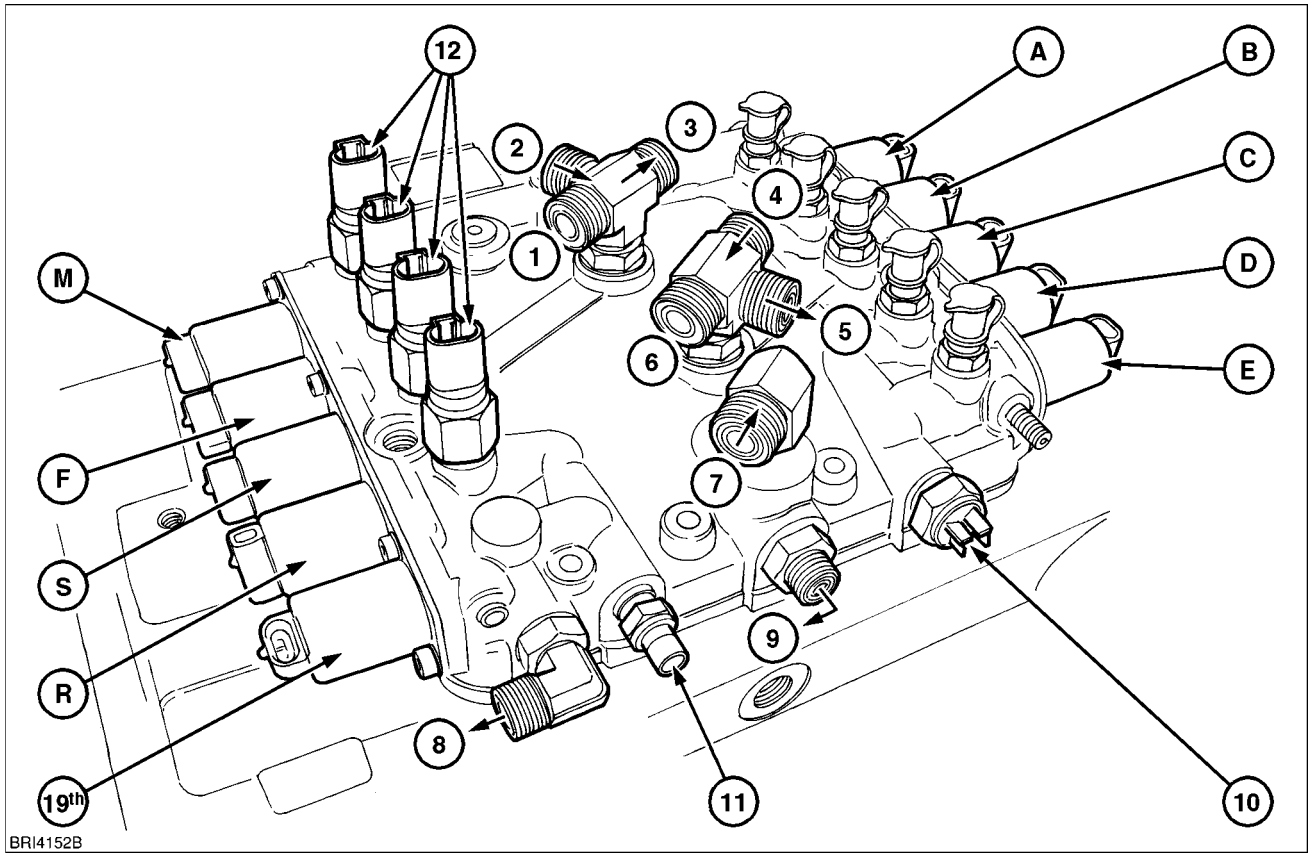


BSD21452A 10

When the oil is cold and pressure differential across the oil cooler is higher than **6 bar** (**87 lbf/in2**) the cooler by-pass valve **(1)** located in the transmission top cover will operate to ensure that adequate flow to the lubrication circuit is maintained. This feature of diverting oil from the cooler assists in aiding a rapid warm up of oil in cold weather conditions.



BSD21452A 11



BRI4152B 12

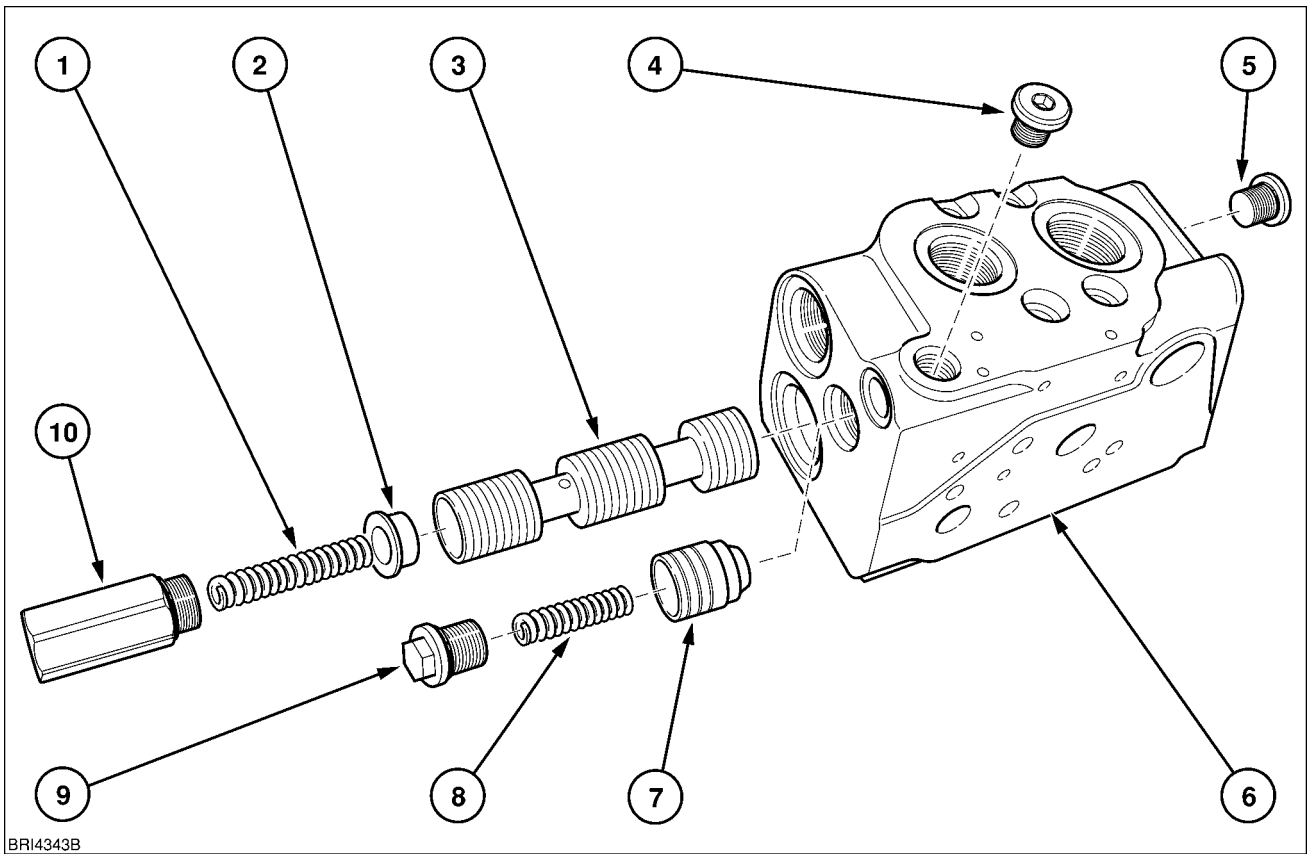
Transmission Top Cover

1. From steering pump flow divider (lube oil)
2. Return from steering motor
3. To oil cooler
4. Return from oil cooler
5. Supplementary lube oil from charge circuit
6. To lube circuit
7. Low pressure feed for transmission
8. Feed to 19th gear dump solenoid
9. Low pressure supply to brake booster circuit
10. Low pressure oil - low pressure warning switch
11. Transmission oil temperature sensor
12. Pressure sensors

B. Transmission Clutch B solenoid
A. Transmission Clutch A solenoid
D. Transmission Clutch D solenoid
C. Transmission Clutch C solenoid
M Medium Range clutch solenoid
E. Transmission Clutch E solenoid
S Low range clutch solenoid
F High range clutch solenoid
19 19th gear clutch solenoid
R Reverse range clutch solenoid

Low Pressure Hydraulic Circuit
Refer to **PRIMARY HYDRAULIC POWER SYSTEM - Hydraulic schema (A.10.A)**

Priority/Regulator valve - Exploded view



BAIL06CCM224FSA 1

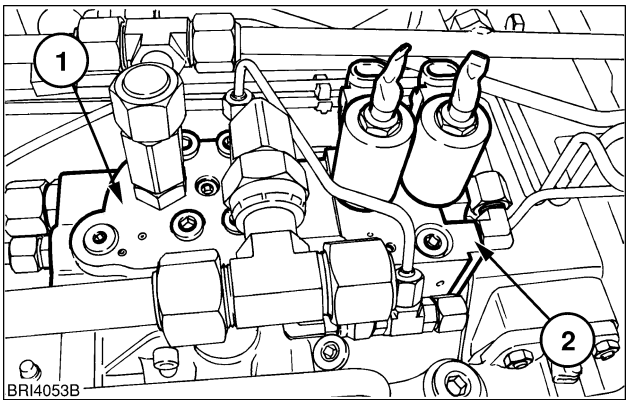
Priority Valve Components

1. Spring
2. Cup
3. Spool
4. Plug
5. Plug
6. Priority Valve Manifold
7. Relief Valve Spool
8. Spring
9. Plug
10. Cap

Refer to : **Priority/Regulator valve - Disassemble (A.14.A)**

Priority/Regulator valve - Static description

The pressure reducing priority valve **(1)** is bolted directly on to the top of the variable displacement pump . Internal galleries supply oil to the trailer brake valve (where fitted), and load levelling valve **(2)** , if front suspension is fitted.



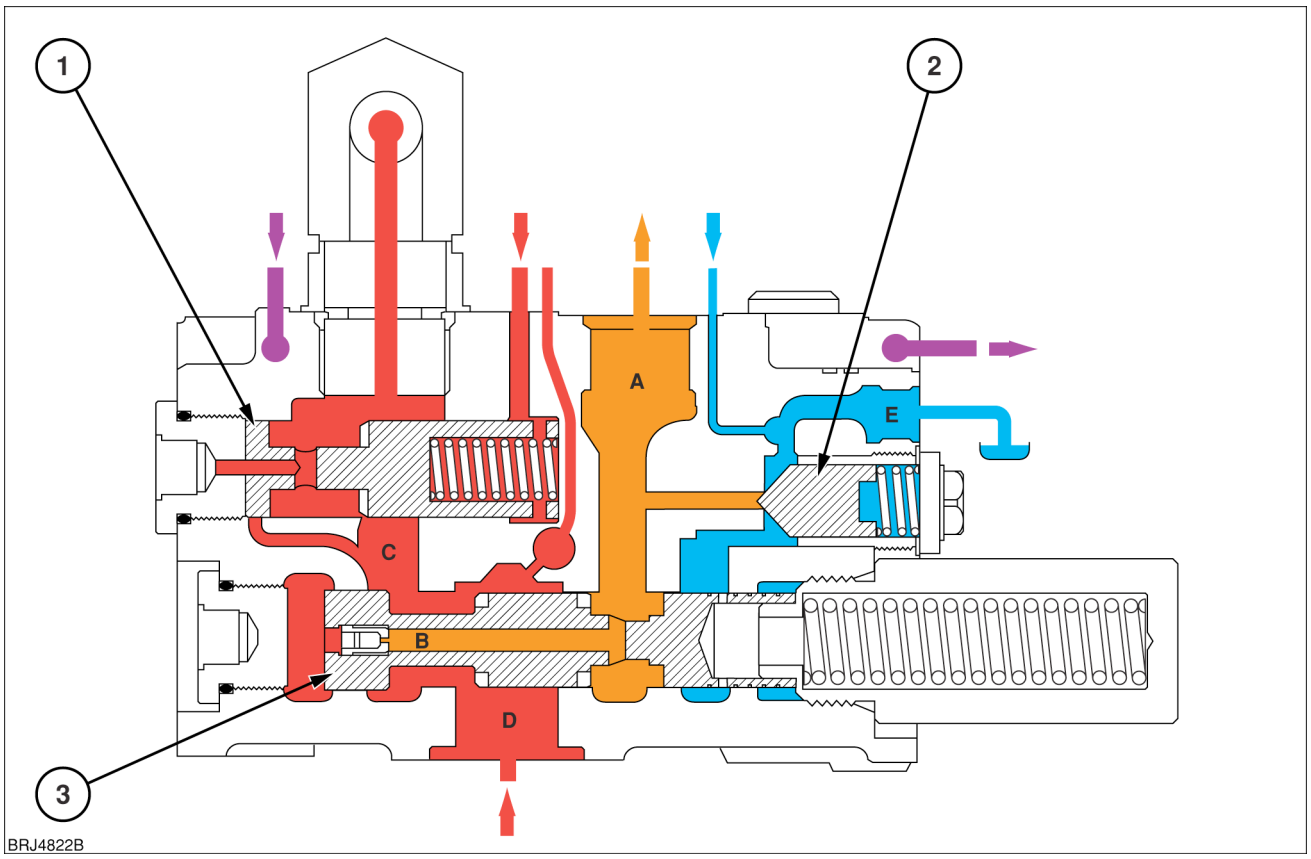
BAIL06CCM091ASA 1

High pressure oil is fed out of the hydraulic pump and into the priority valve manifold. The oil is divided in the valve depending on the system demands. Within the manifold the oil is regulated to **23 bar** (**333.50 psi**) ± **1.5 bar** (**21.75 psi**) by the valve spool. This low pressure oil is directed through a port on top of the valve and then flows via a T-connector rearwards to the low pressure distribution valve block and forwards to the transmission top cover The oil which flows to the low pressure distribution valve block is also used as pilot pressure for the electro-hydraulic remote valves (Where fitted), see Figure 13 **PRIMARY HYDRAULIC POWER SYSTEM - Static description (A.10.A)** . To prevent any damage occurring due to excessive pressures in the low pressure circuit, the low pressure relief valve will operate whenever the pressure increases to **28 bar** (**406.00 psi**) ± **2.5 bar** (**36.25 psi**)

Because high pressure pump output is directed through the trailer brake valve (Where fitted) the system ensures that the trailer brakes have priority over other circuits.

Further high pressure oil is directed through a pressure compensator valve and out to the high pressure components. Load sensing oil galleries allow the load sensing circuit to access the trailer brake valve (Where fitted) and the Electro-hydraulic remote valves and mid mount valves (Where fitted).

Priority/Regulator valve - Dynamic description

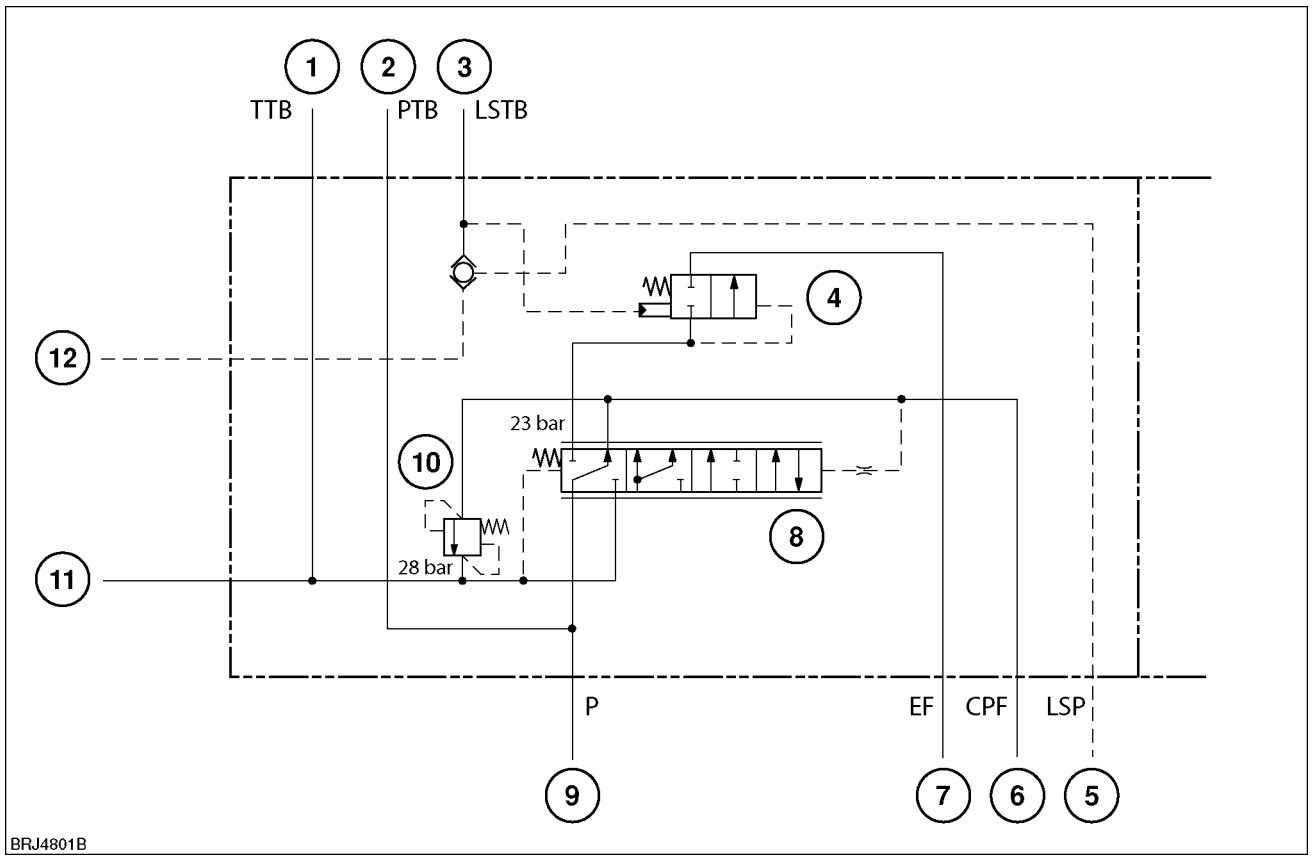


BAIL07CCM317FSA 1

Pressure Reducing Priority Valve

The regulated flow of oil discharged from the variable displacement piston pump is directed to the low and high pressure hydraulic circuits via the trailer brake valve (where fitted) and the pressure regulating valve.
Because pump output is initially directed through the trailer brake valve (where fitted), the system ensures that the trailer brakes have priority over other hydraulic circuits.
The pressure regulating valve is located on the top of the variable displacement pump and controls the maximum pressure of oil in the low pressure hydraulic circuit while at the same time directing high pressure system oil to the hydraulic power lift and remote control valves.
The low pressure hydraulic circuit, which is regulated at a pressure of **23 bar** (**333.50 psi**)) operates the electronic remote valve spools (where fitted), P.T.O., differential lock, four wheel drive engagement system and transmission control circuits.
When the pressure in the system is below **23 bar** (**333.50 psi**)the low-Pressure regulating valve **(3)** is held to the left by the spring allowing system pressure oil (Gallery **(D)**) from the variable displacement piston pump to flow to the low pressure hydraulic circuits through gallery **(A)** to give flow priority to the low-pressure circuit..
The resulting pressure in gallery **(A)** is sensed in the pressure sensing gallery **(B)** drilled through the centre of the spool. As the pressure in gallery **(A)** increases, the spool moves against the spring restricting the flow of oil into gallery **(A)** to maintain the pressure of oil in the low pressure hydraulic circuit at **23 bar** (**333.50 psi**)), while at the same time allowing system pressure oil to flow into gallery **(C)** .
It can now be seen that the spool moves back and forth to maintain the low pressure circuit oil at **23 bar** (**333.50 psi**)), while at the same time allowing system pressure oil to be directed to the high pressure hydraulic circuit for operation of the hydraulic lift and remote control valves.
When the high pressure hydraulic circuits are not in operation the priority valve **(1)** ensures an adequate supply is fed to the trailer brake valve (where fitted), and low pressure circuits to maintain circuit pressure of **23 bar** (**333.50 psi**)),
To prevent any damage occurring due to excessive pressures in the low pressure hydraulic circuit, the low pressure circuit safety valve **(2)** will operate whenever the pressure increases to **28 bar** (**406.00 psi**). Should this occur the safety valve poppet will lift off its seat and vent the circuit to reservoir through gallery **(E)**.
Refer to **Priority/Regulator valve - Hydraulic schema (A.14.A)**

Priority/Regulator valve - Hydraulic schema



BAIL07CCM308FSA 1

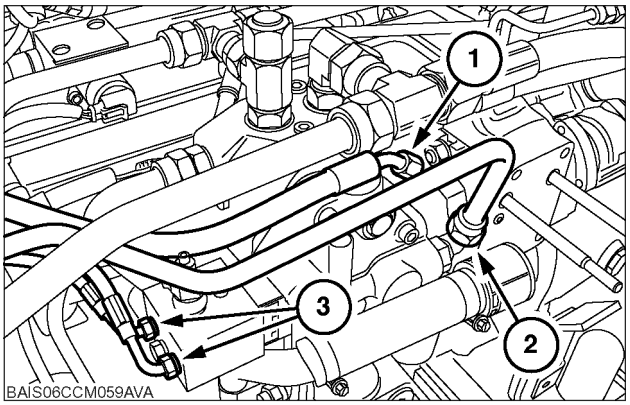
Pressure Reducing Priority Valve Manifold

1. Return from Trailer Brake Valve
2. High Pressure to Trailer Brake Valve
3. Trailer Brake Valve Load Sensing
4. Priority Valve
5. Load Sensing to Pump
6. Regulated Pressure for Transmission supply
7. To High Pressure Circuits (Remote Valves)
8. Pressure Reducing Valve Spool
9. High Pressure input from Variable displacement pump
10. Low Pressure Relief Valve
11. Return to Tank
12. Load Sensing from Remote Valve or Mid Mount Remote Valve (where fitted) (LSR)

For complete Hydraulic Schematic Refer to **PRIMARY HYDRAULIC POWER SYSTEM - Hydraulic schema (A.10.A)**
For description refer to **Priority/Regulator valve - Dynamic description (A.14.A)**

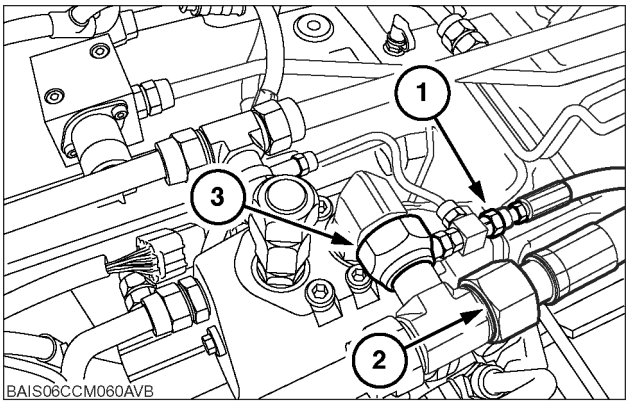
Priority/Regulator valve - Remove

1. Disconnect the load sensing line **(1)** , trailer brake valve supply pipe **(2)** and the left and right trailer brake lines **(3)**.



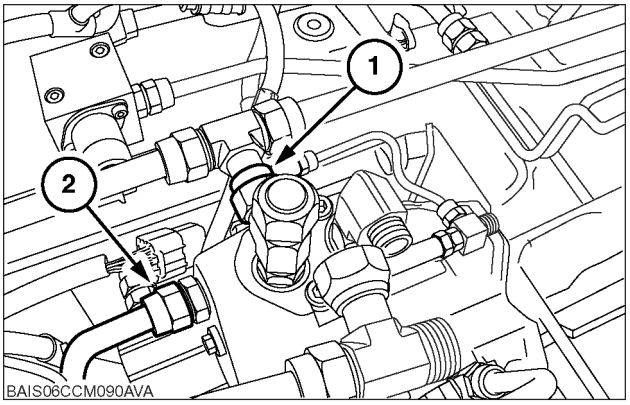
BAIS06CCM059AVA 1

2. Disconnect the mid mount valves load sensing line **(1)** and supply hose **(2)** (Where fitted). Disconnect the main supply pipe **(3)**.



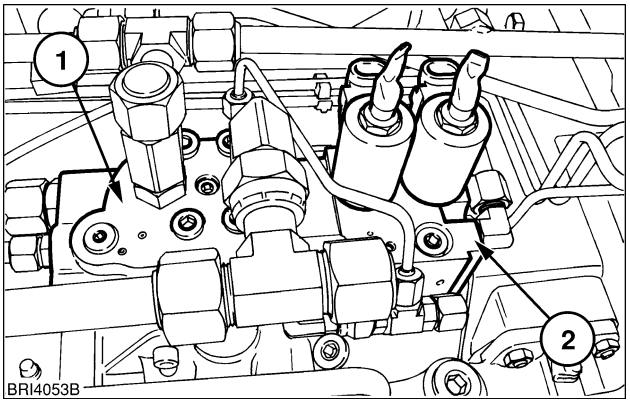
BAIS06CCM060AVB 2

3. Disconnect the remote valve pipes **(1)** and **(2)**.



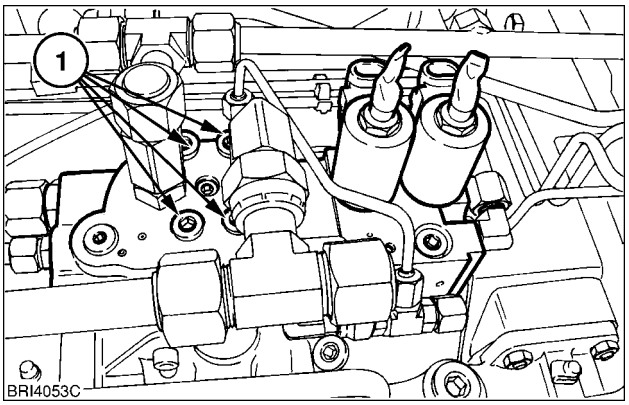
BAIS06CCM090AVA 3

4. Remove load levelling control valve **(2)** (Where fitted). Refer to **Control valve - Remove (D.40.C)**



BAIL06CCM091ASA 4

5. Undo and remove the four hexagon socket headed bolts **(1)** from the top of the priority valve. Lift priority valve away from the hydraulic pump assembly.



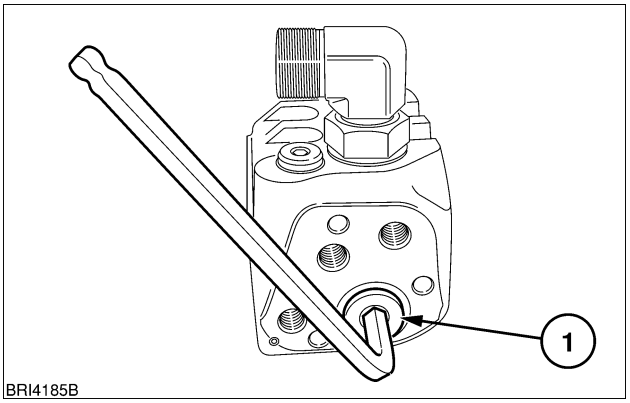
BAIL06CCM169ASA 5

Next operation:
Priority/Regulator valve - Disassemble (A.14.A)

Priority/Regulator valve - Disassemble

Prior operation:
Priority/Regulator valve - Remove (A.14.A)

1. Remove the hexagon socket headed plug **(1)** .

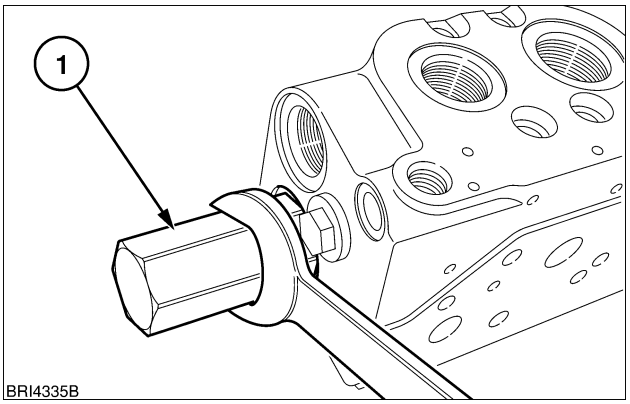


BAIL06CCM160ASA 1

2. Remove spool spring retaining cap **(1)** from housing. The cap is under spring pressure so take care when releasing the cap.

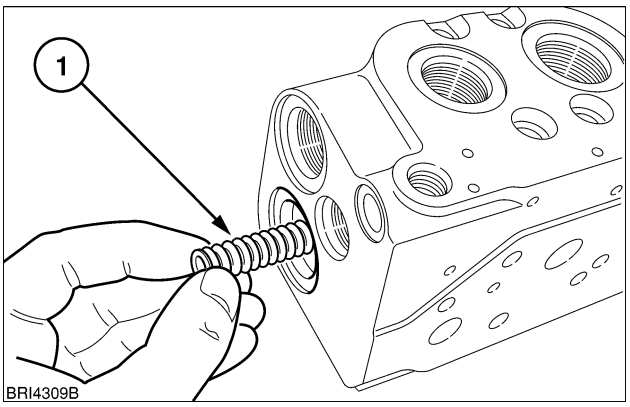
⚠ WARNING ⚠
A large spring is positioned beneath the plug, take extreme care when removing plugs.

B041



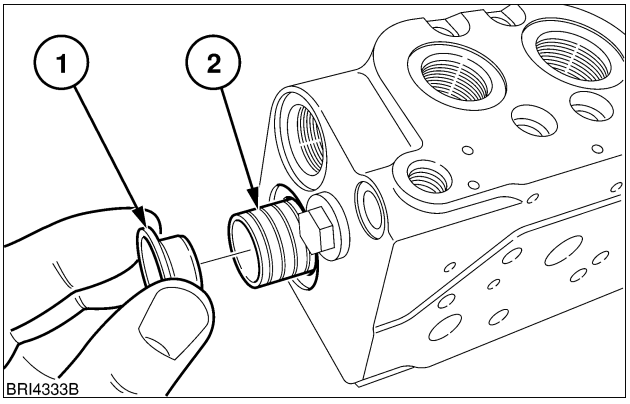
BAIL06CCM218ASA 2

3. Remove the spring **(1)** from the housing.



BAIL06CCM219ASA 3

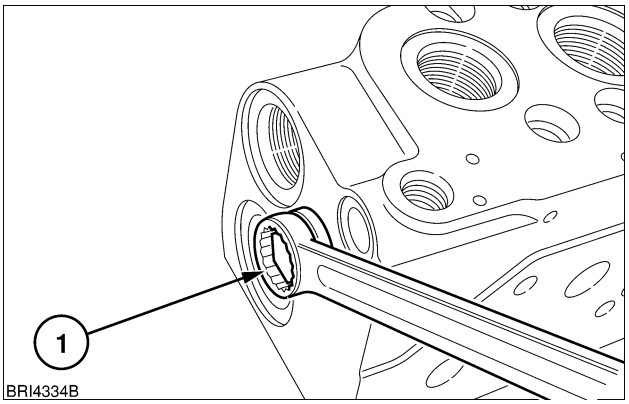
4. Remove the spring retaining cup **(1)** and pull out the spool valve **(2)** .



BAIL06CCM220ASA 4

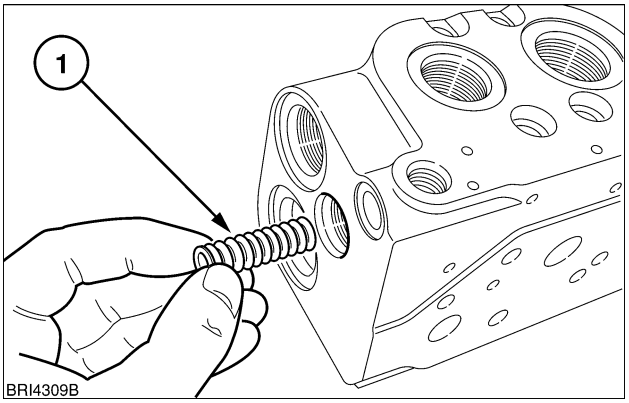
5. Inspect spool for wear or damage. If damaged it is necessary to replace both spool and housing. Lubricate spool with clean hydraulic oil prior to re-assembly.

6. Undo relief valve plug **(1)** and remove plug and spring..



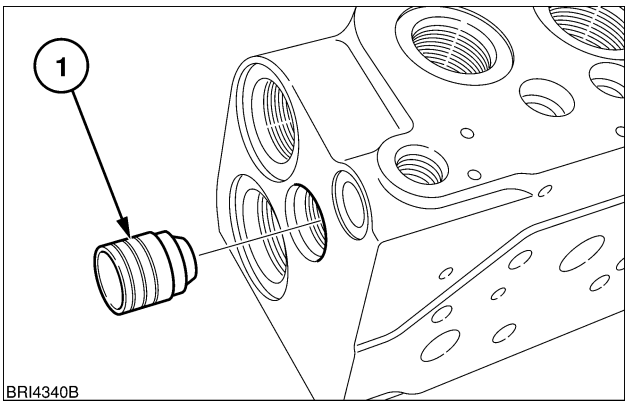
BAIL06CCM221ASA 5

7. Remove spring **(1)** .



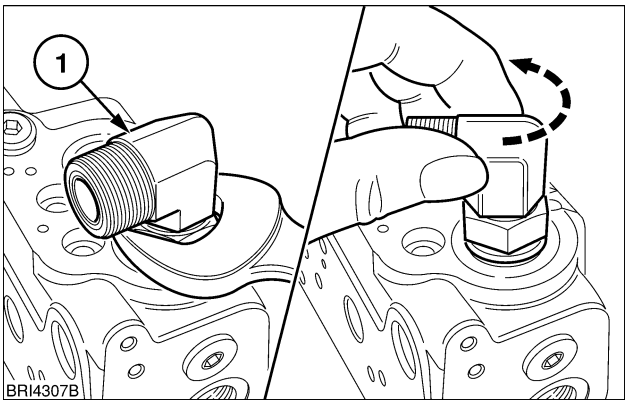
BAIL06CCM240ASA 6

8. Remove relief valve spool. **(1)** .



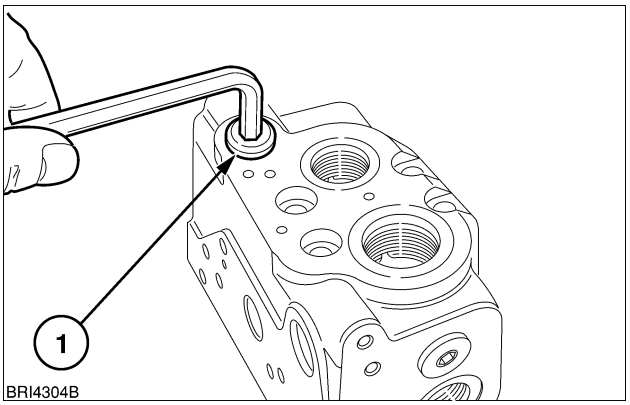
BAIL06CCM223ASA 7

9. Undo high pressure feed pipe elbow **(1)** by loosening the retaining nut and unscrewing the elbow.



BAIL06CCM216ASA 8

10. Using a hexagon socket key undo the plug **(1)** .



BAIL06CCM217ASA 9

Next operation:
Priority/Regulator valve - Overhaul (A.14.A)

Priority/Regulator valve - Overhaul

Prior operation:
Priority/Regulator valve - Disassemble (A.14.A)

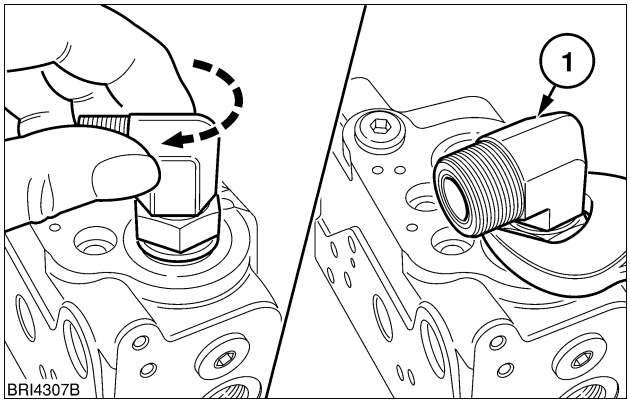
1. Inspect spool and components for wear or damage. If spool is damaged it is necessary to replace both spool and housing.
2. Lubricate spool with clean hydraulic oil prior to re-assembly.

Next operation:
Priority/Regulator valve - Assemble (A.14.A)

Priority/Regulator valve - Assemble

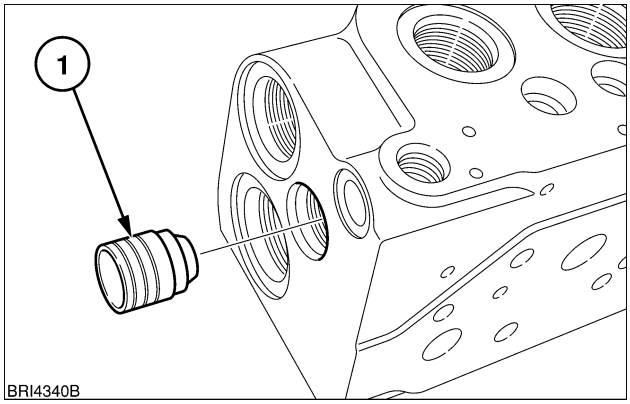
Prior operation:
Priority/Regulator valve - Disassemble (A.14.A)

1. Install the high pressure feed pipe elbow **(1)** by screwing into the valve housing,. Then tighten the retaining nut to **50 - 55 Nm** (**36.9 - 40.6 lbft**)



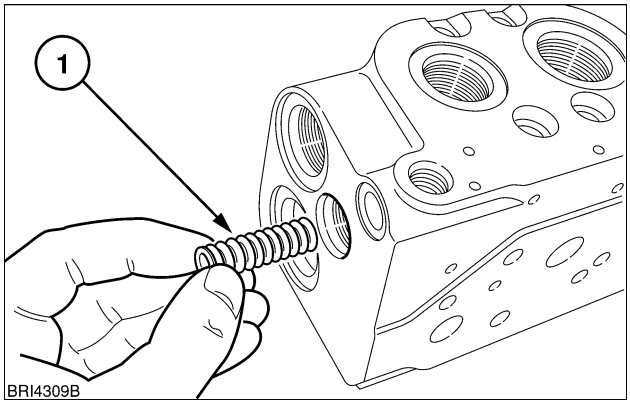
BAIL06CCM254ASA 1

2. Install the relief valve spool **(1)** into the housing.



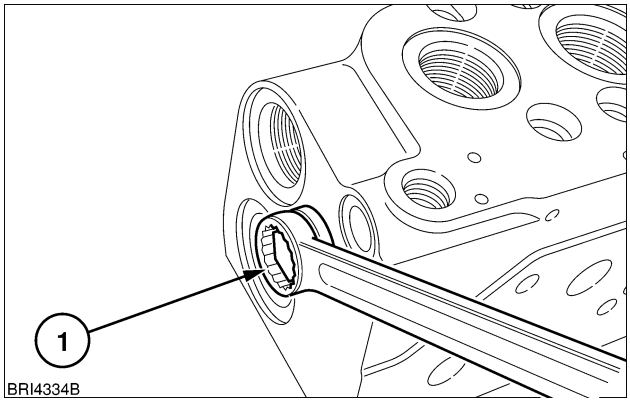
BAIL06CCM223ASA 2

3. Insert spring **(1)**



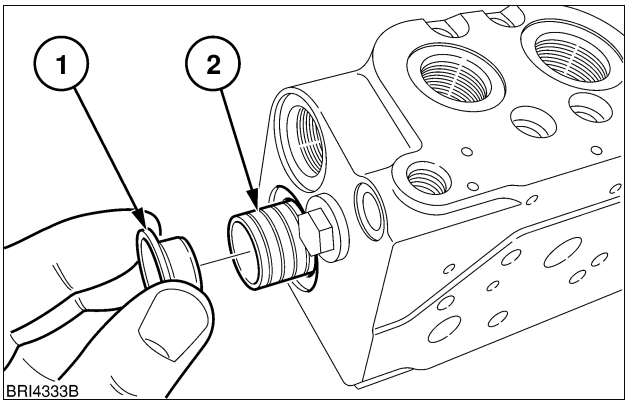
BAIL06CCM240ASA 3

4. Insert relief valve plug and tighten to **25 Nm** (**18.4 lbft**)



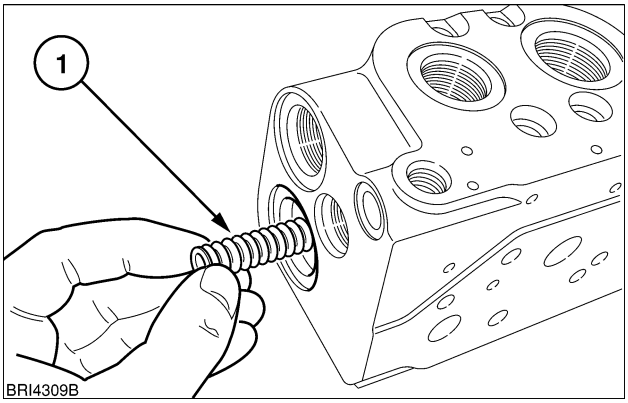
BAIL06CCM221ASA 4

5. Insert the spool **(2)** and spring retaining cup **(1)** .



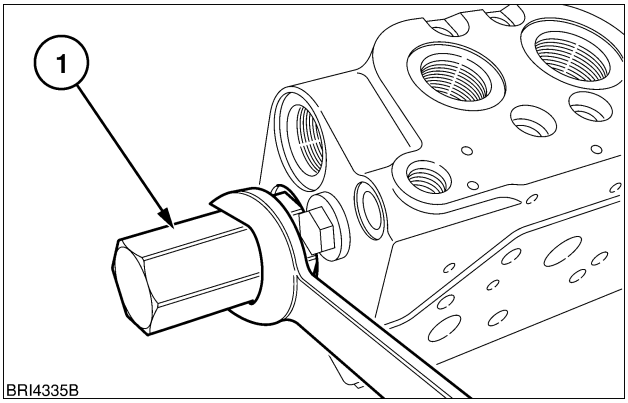
BAIL06CCM220ASA 5

6. Insert the spring **(1)**into the housing



BAIL06CCM219ASA 6

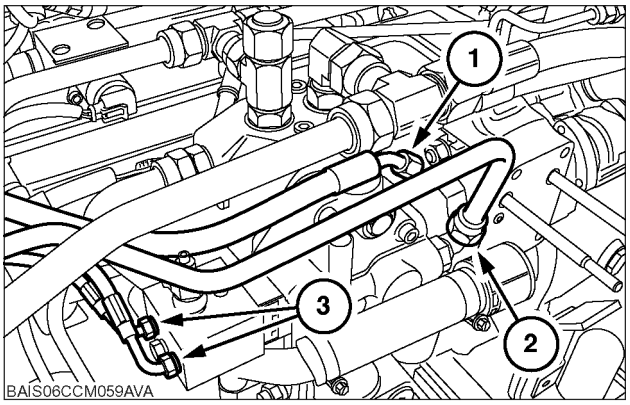
7. Refit the spring retaining cap



BAIL06CCM218ASA 7

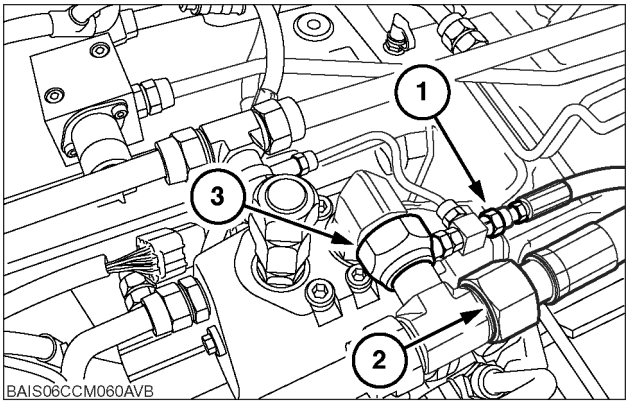
Priority valve - Remove

1. Disconnect the load sensing line **(1)**, trailer brake valve supply pipe **(2)** and the left and right trailer brake lines **(3)**.



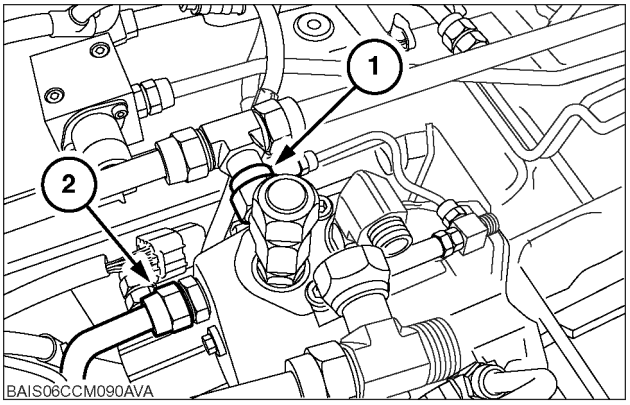
BAIS06CCM059AVA 1

2. Disconnect the mid mount valves load sensing line **(1)** and supply hose **(2)** (Where fitted). Disconnect the main supply pipe **(3)**.



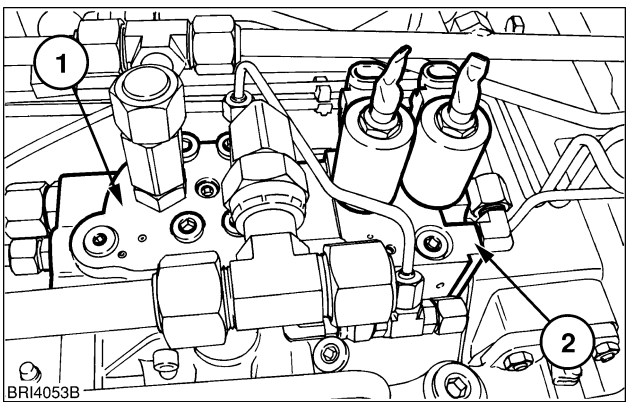
BAIS06CCM060AVB 2

3. Disconnect the remote valve pipes **(1)** and **(2)**.



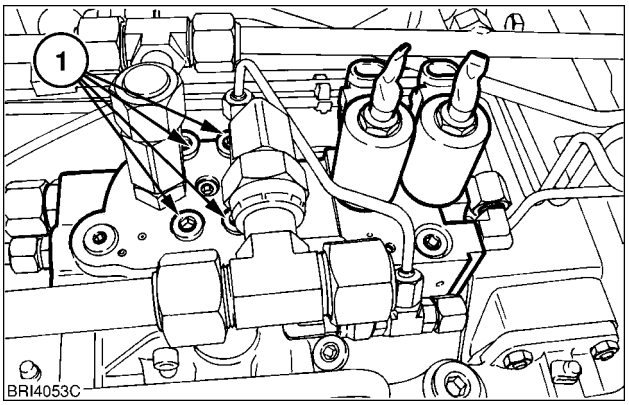
BAIS06CCM090AVA 3

4. Remove load levelling control valve **(2)** (Where fitted). Refer to **Control valve - Remove (D.40.C)**



BAIL06CCM091ASA 4

5. Undo and remove the four allen headed bolts from the top of the priority valve. Lift priority valve away from the hydraulic pump assembly.



BAIL06CCM169ASA 5

Next operation:
Priority valve - Disassemble (A.14.A)

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Priority/Regulator valve - Disassemble 14
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Priority/Regulator valve - Exploded view 8
Priority/Regulator valve - Hydraulic schema 11
Priority/Regulator valve - Overhaul 17
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PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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PNEUMATIC SYSTEM - 20.A

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Install 5

Air reservoir

Remove 6

Install 9

Air compressor

Remove 11

Install 13

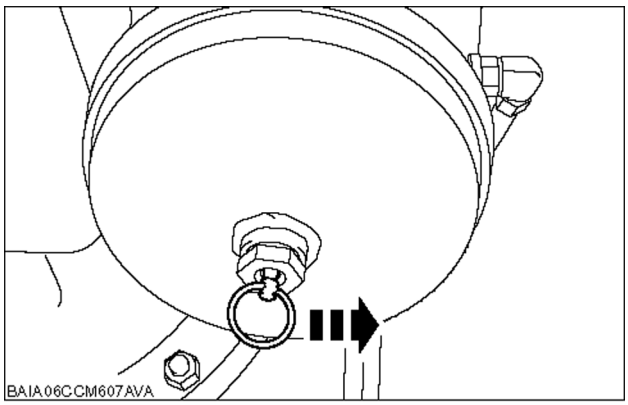
Relief valve - Remove

⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

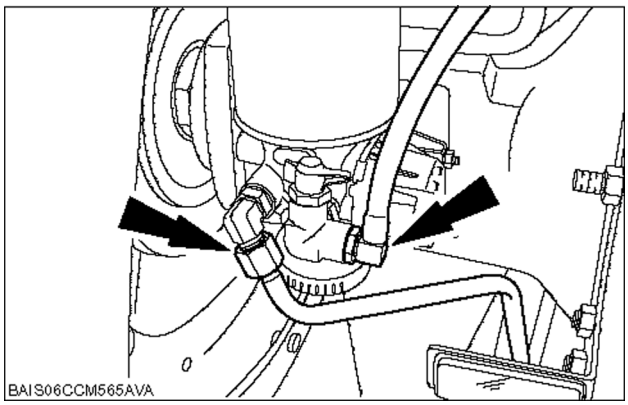
B026

1. Release the trailer brake system pressure from the trailer brake air tanks.



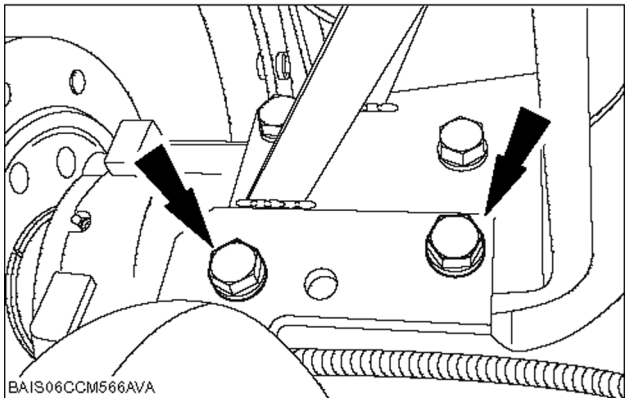
BAIS06CCM607AVA 1

2. Disconnect the pressure feed tube from the compressor and the outlet hose to the air tank.



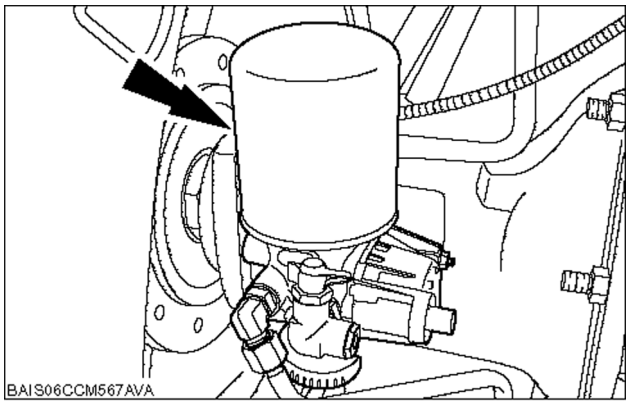
BAIS06CCM565AVA 2

3. Remove the relief valve bracket retaining bolts.



BAIS06CCM566AVA 3

4. Remove the relief valve.



BAIS06CCM567AVA 4

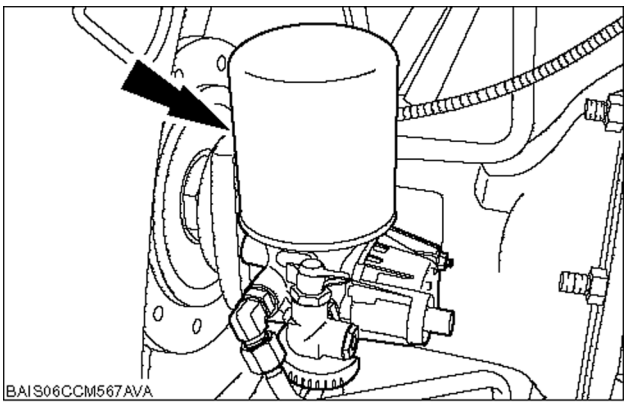
Relief valve - Install

⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

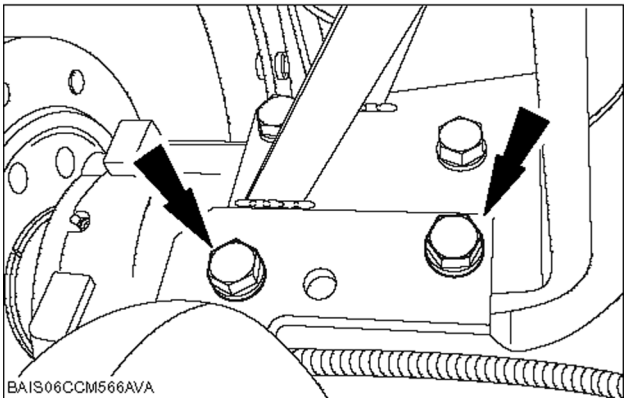
B026

1. Install the relief valve.



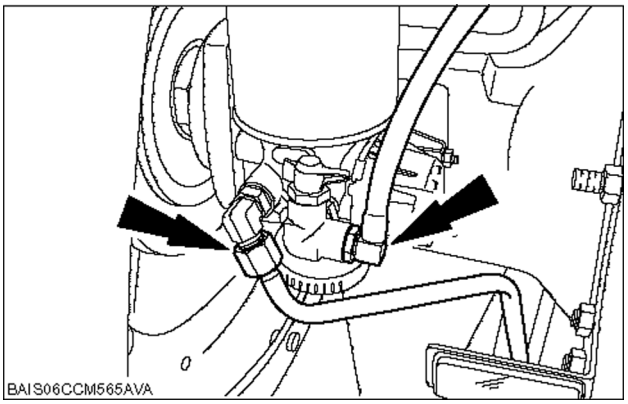
BAIS06CCM567AVA 1

2. Install the relief valve bracket retaining bolts. Tighten to **300 Nm** (**221 lb ft**)



BAIS06CCM566AVA 2

3. Connect the compressor feed tube and the air outlet hose to the relief valve.



BAIS06CCM565AVA 3

Air reservoir - Remove

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

B026

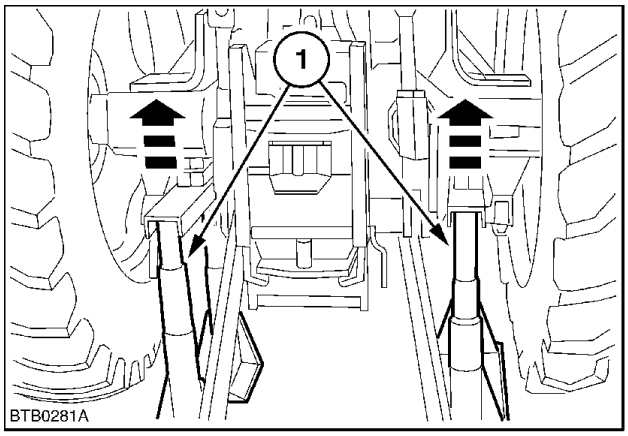
⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012

1. Ensure that the tractor is parked on a level surface.
2. Chock the front wheels using suitable wheels stops.
3. Raise the rear of the tractor and place two suitable axle stands **(1)** under the final drive cases.

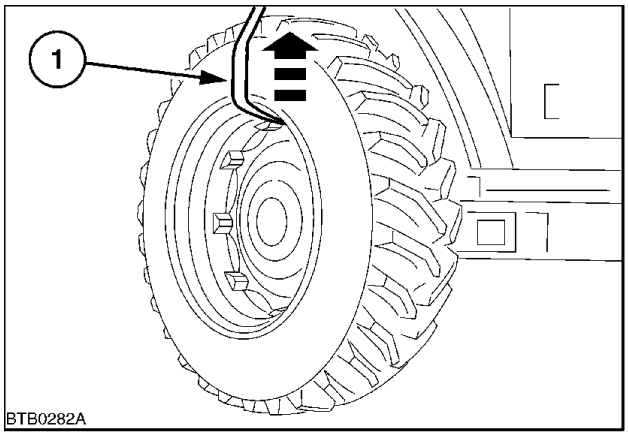
NOTE: *If required, detach the lift rods from the lower links.*



BTB0281A 1

4. Using a suitable sling **(1)** connect the rear wheel to a hoist and remove the rear wheel.

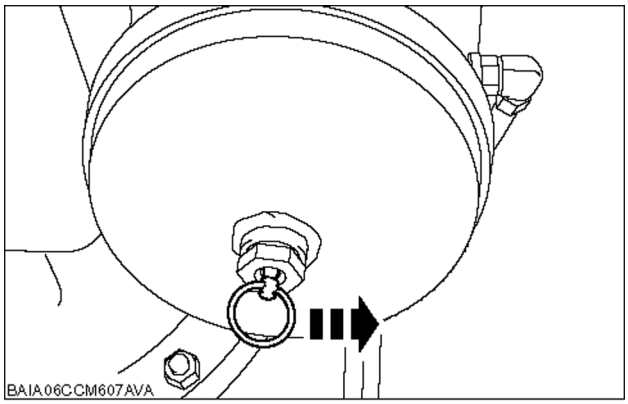
NOTE: *Repeat for the left hand wheel.*



BTB0282A 2

Both air tanks

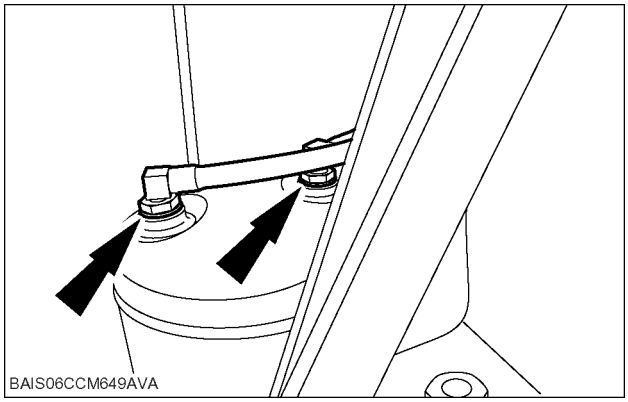
5. Release the trailer brake system pressure from the trailer brake air tanks.



BAIS06CCM607AVA 3

Left-hand air tank

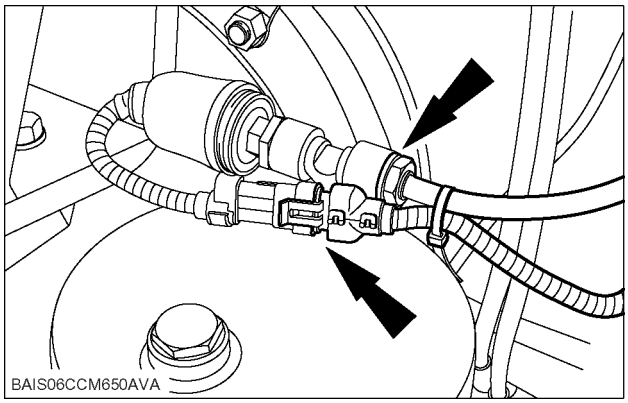
6. Disconnect the air tank supply pipes.



BAIS06CCM649AVA 4

Right-hand air tank

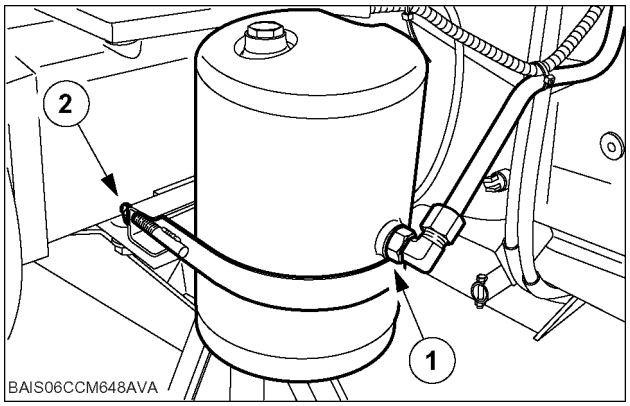
7. Disconnect the electrical connector and the supply pipe.



BAIS06CCM650AVA 5

Both air tanks

8. Disconnect the balance pipe from the air tanks **(1)** loosen the air tank retaining nuts **(2)** and remove air tanks.

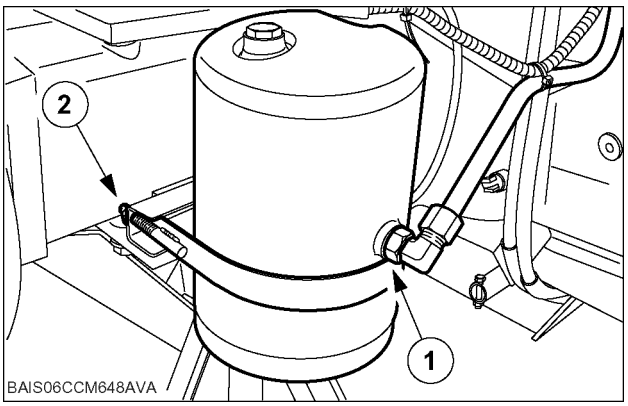


BAIS06CCM648AVA 6

Air reservoir - Install

Both Air Tanks

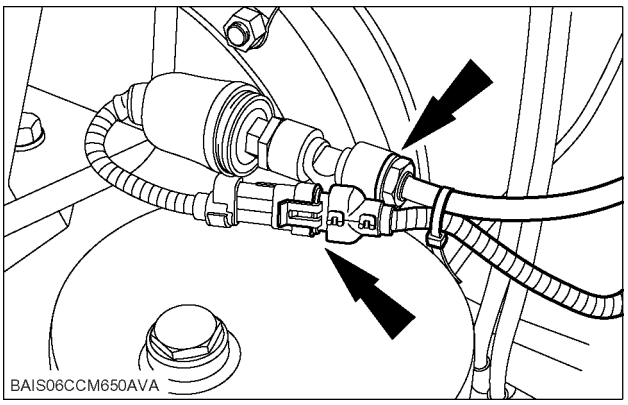
1. Install the air tanks and tighten the retaining nuts **(2)**. Connect the balance pipe to the air tanks **(1)**.



BAIS06CCM648AVA 1

Right-hand air tank

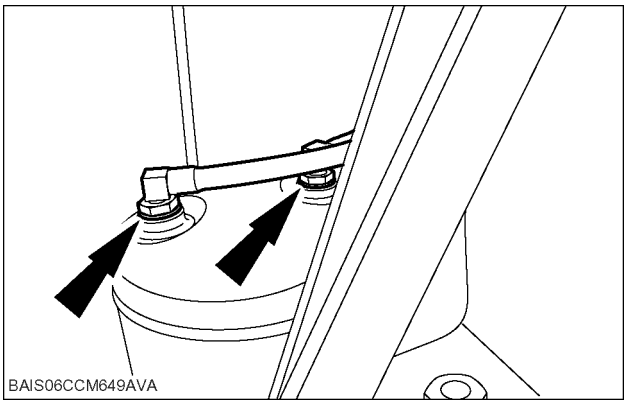
2. Connect the electrical connector and the supply pipe.



BAIS06CCM650AVA 2

Left-hand air tank

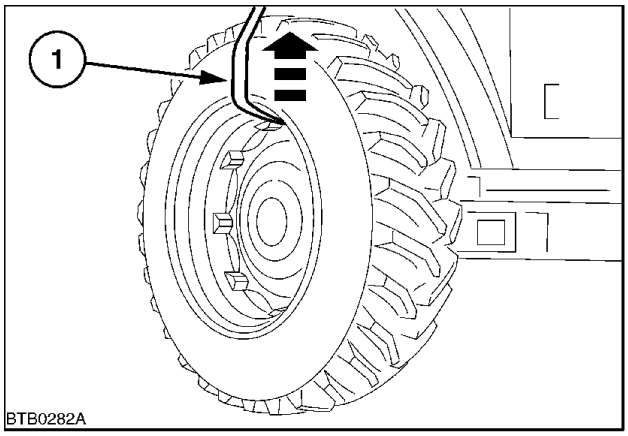
3. Connect the supply pipes to the air tank.



BAIS06CCM649AVA 3

4. Using a suitable sling **(1)** connect the rear wheel to a hoist and install the rear wheel.
   For correct torques, refer to **Rear wheel - Torque (D.50.C)**

NOTE: *Repeat for the left hand wheel.*



BTB0282A 4

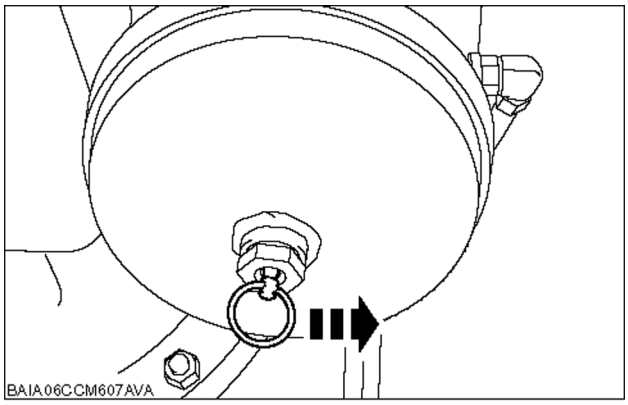
Air compressor - Remove

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

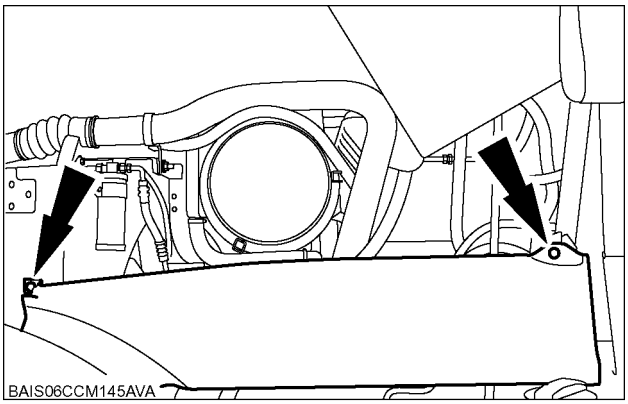
B026

1. Release the trailer brake system pressure from the trailer brake air tanks.



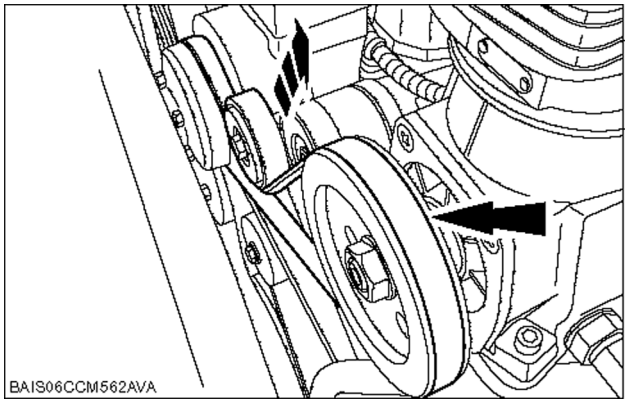
BAIS06CCM607AVA 1

2. Remove the engine side panel.



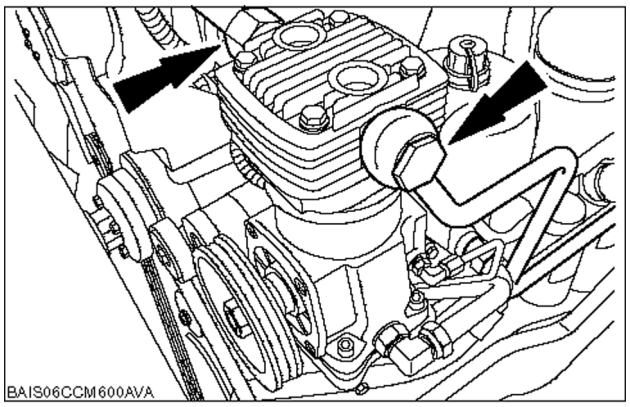
BAIS06CCM145AVA 2

3. Rotate the tensioner clockwise and remove the accessory drive belt.



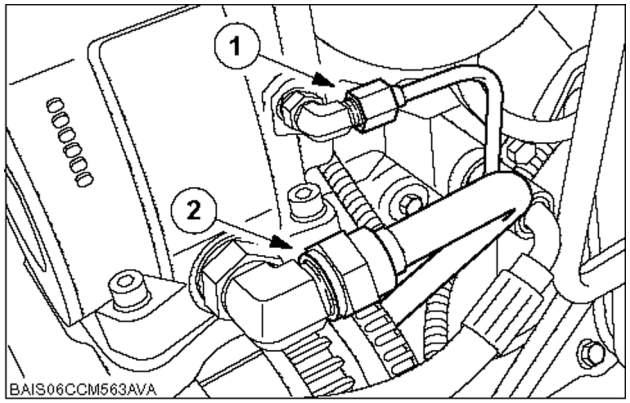
BAIS06CCM562AVA 3

4. Disconnect the air cleaner to compressor supply pipe and the compressor outlet pipe.



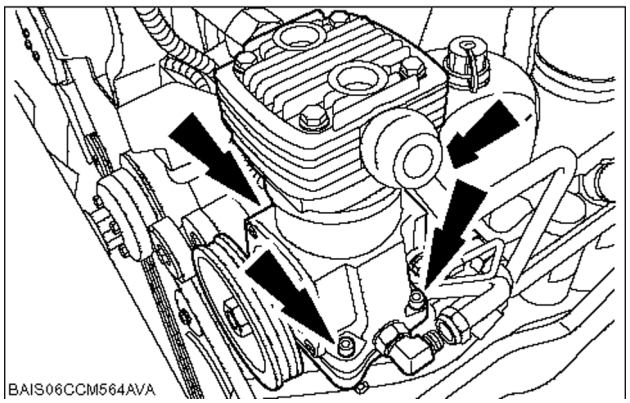
BAIS06CCM600AVA 4

5. Disconnect the oil supply pipe **(1)** and the oil outlet pipe **(2)** from the compressor.



BAIS06CCM563AVA 5

6. Remove the compressor.



BAIS06CCM564AVA 6

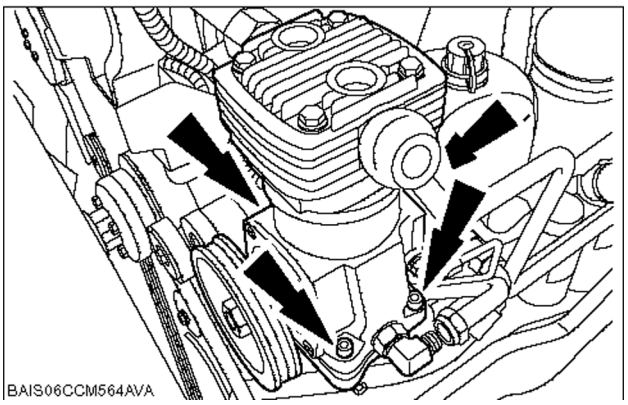
Air compressor - Install

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

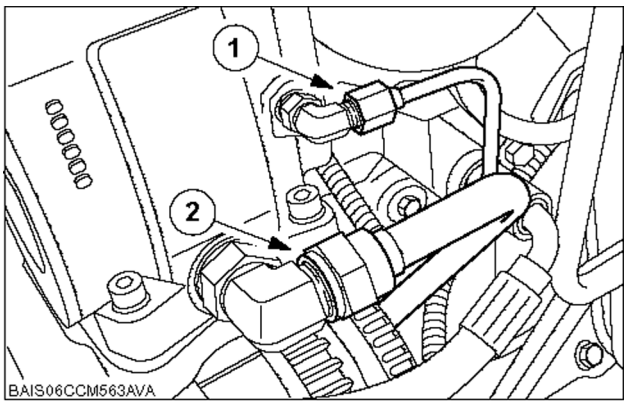
B026

1. Install the compressor.
   Tighten to **20-25 Nm** (**15-18 lb ft**).



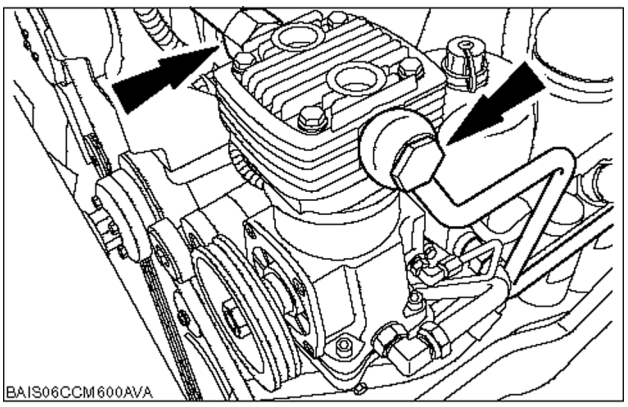
BAIS06CCM564AVA 1

2. Connect the oil supply pipe **(1)** and the oil outlet pipe **(2)**.
   Tighten **(1)** to **13-17 Nm** (**10-13 lb ft**).
   Tighten **(2)** to **42-62 Nm** (**31-46 lb ft**).



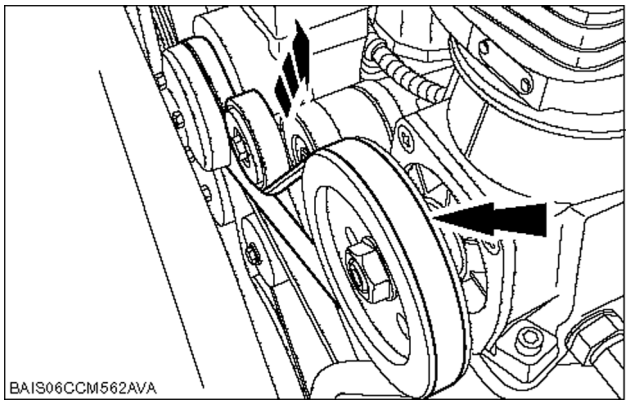
BAIS06CCM563AVA 2

3. Connect the air cleaner to compressor supply pipe and the compressor outlet pipe.
   Tighten compressor outlet pipe to **42-62 Nm** (**31-46 lb ft**).



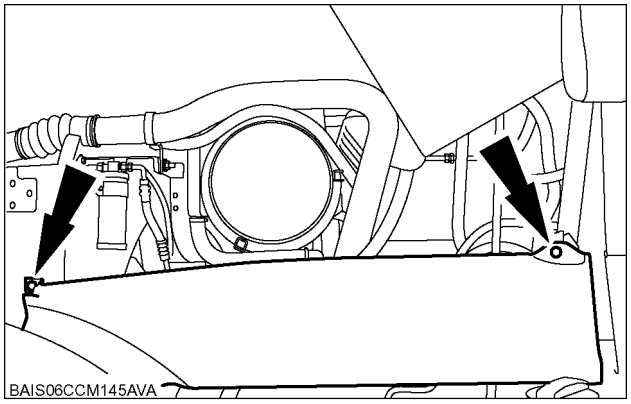
BAIS06CCM600AVA 3

4. Rotate the accessory drive belt tensioner clockwise and install the accessory drive belt.



BAIS06CCM562AVA 4

5. Install the engine side panel.



BAIS06CCM145AVA 5

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PUMA 165 Multicontroller , PUMA 165 [Z7BH01001 - Z9BH40000] , PUMA 165 [Z7BH50001 - Z9BH60000] , PUMA 180 Multicontroller , PUMA 180 [Z7BH01001 - Z9BH40000] , PUMA 180 [Z7BH50001 - Z9BH60000] , PUMA 195 Multicontroller , PUMA 195 [Z7BH01001 - Z9BH40000] , PUMA 195 [Z7BH50001 - Z9BH60000] , PUMA 210 Multicontroller , PUMA 210 [Z7BH01001 - Z9BH40000] , PUMA 210 [Z7BH50001 - Z9BH60000]

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Fuse and relay box

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

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Torque 22

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

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General specification 23

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

FUNCTIONAL DATA

ELECTRICAL POWER SYSTEM

Static description PROTECTING THE ELECTRONIC AND ELECTRICAL SYSTEMS DURING BATTERY CHARGING OR WELDING 24

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Fuse and relay box

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Alternator

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Electrical schematic frame 09 Transmission Systems (4) 84
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

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Electrical schematic frame 15 Electro-Hydraulic Remotes / Hydraulic Systems (2) 96
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Electrical schematic frame 16 Electro_Hydraulic Remotes / Hydraulic Systems (3) 98
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Electrical schematic frame 17 Electro-Hydraulic Remotes / Hydraulic Systems (4) 100
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Electrical schematic frame 19 Power Take Off Systems (1) 104
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Electrical schematic frame 20 Power Take Off Systems (2) 106
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

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Electrical schematic frame 22 Fast Steer System 110
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

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Component diagram 34 Plug connections 340-349 464
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Component diagram 35 Plug connections 350-359 467
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Component diagram 36 Plug connections 360-369 472
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Component diagram 38 Plug connections 380-389 490
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Component diagram 40 Plug connections 400-409 510
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 50 Plug connections 500-509 546
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 51 Plug connections 510-519 550
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 53 Plug connections 530-539 557
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 54 Plug connections 540-549 561
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 55 Plug connections 550-559 569
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 56 Plug connections 560-569 579
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 57 Plug connections 570-579 583
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 58 Plug connections 580-589 591
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 59 Plug connections 590-599 596
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 60 Plug connections 600-609 605
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 61 Plug connections 610-619 615
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 62 Plug connections 620-629 622
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 63 Plug connections 630-639 630
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 66 Plug connections 660-669 634
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 80 Plug connections 800-809 637
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 91 Plug connections 910-919 641
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 92 Plug connections 920-929 645
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 93 Plug connections 930-939 655
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 95 Plug connections 950-959 661
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 98 Plug connections 980-989 666
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component diagram 99 Plug connections 990-999 667
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

SERVICE

Alternator

Remove 668
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Install 669
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Preliminary test 670
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Electrical test 673
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Battery

Remove 678
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Install 679
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Electrical test 680
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Connect 688
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Disconnect 689
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

ELECTRICAL POWER SYSTEM - General specification

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

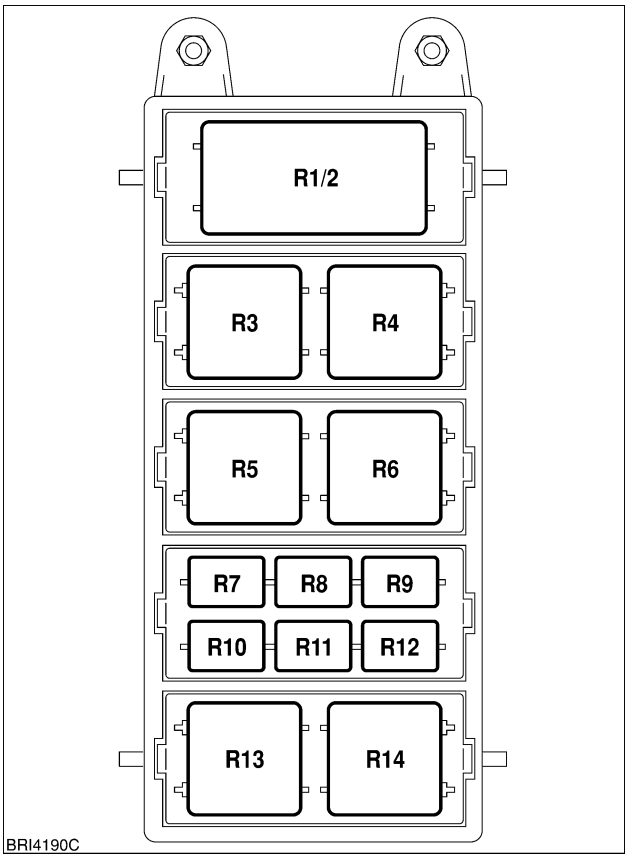
Description	All Models
Alternator	**12 volt**, 150 amp
Battery	Minimum maintenance **12 volt** 176 Ah (1300 cca)
Starting motor	Positive engagement, solenoid operated 4.2 kw - geared reduction
Cold starting aid	Optional Inlet manifold grid heater (80A) and fuel heater
Bulb rating and type	
- headlights	60/55W - H4
- parking lights (front)	5W - R5W
- parking lights (rear)	5W - P21/5W
- work lights (hi-mount rear and intermediate front)	50/55/60W - GE866/H3
- work lights (auxiliary)	50/55/60W - GE866/H3/HB3
- turn indicators (front)	21W - PY21W
- turn indicators (rear)	21W - P21W or PY21W
- stop lights	21W - P21/5W
- licence plate lights	5W - R5W
- rotating beacon	55W - H1
- SMV (slow moving vehicle) lights (N. America only) and extremity lights	21W-P21W

Fuse and relay box - General specification

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Description of the relays

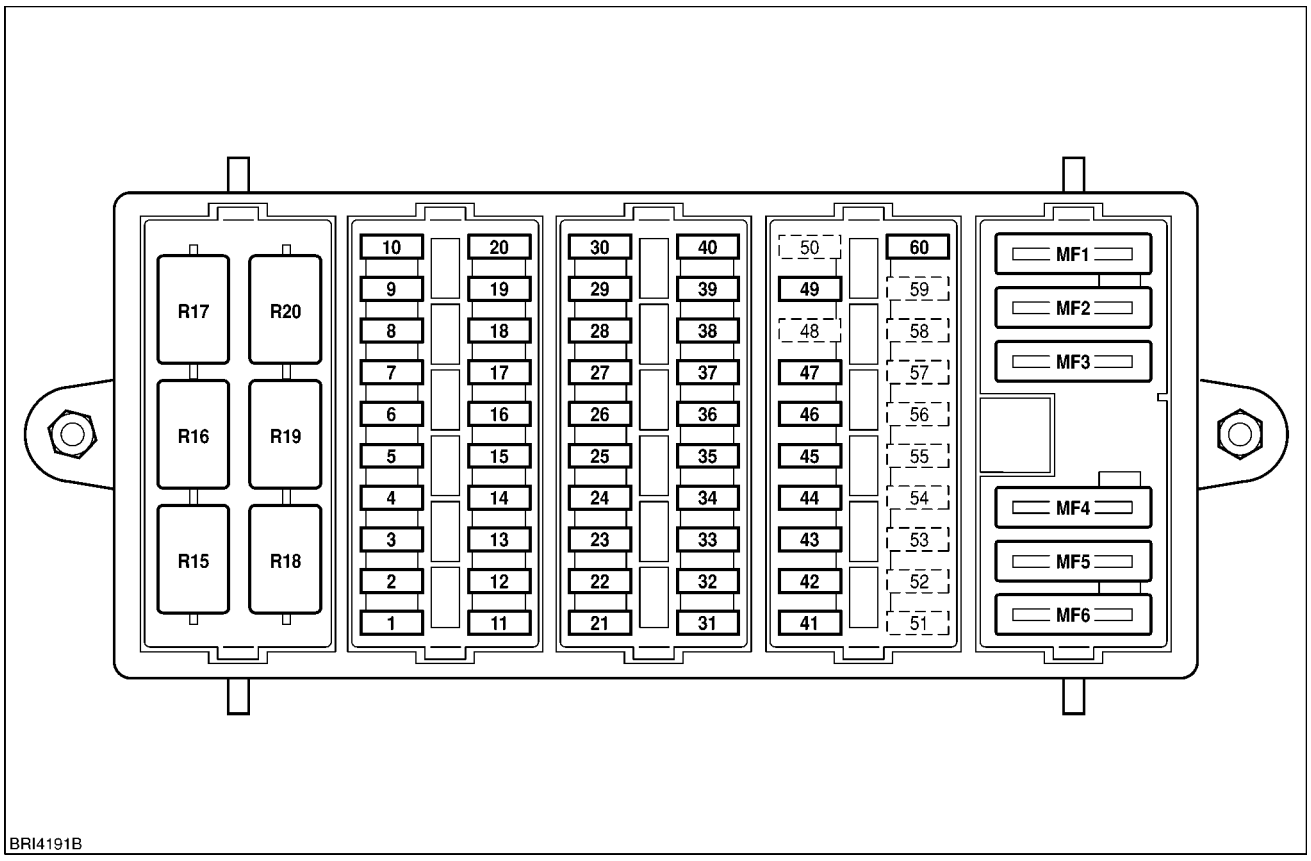
Relay	Function
R1 / R2	Front windscreen wiper switching module and rear screen wiper switching module
R3	Ignition relay
R4	Side marker lights and lighting
R5	Starter motor ON
R6	Blower motor
R7	Dipped beam headlight
R8	Brake lights
R9	Main beam
R10	Power supply for the hydr. trailer brake
R11	Power supply for the pneum. trailer brake
R12	Power supply for air brake system
R13	Power supply engine electronics
R14	(Not applicable)



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Relays 15 to 21	Function
R15	Work lamp (bonnet)
R16	Work lamp (C-pillar)
R17	Power supply Potential 15 (ECUs)
R18	Electronic battery isolator
R19	Air conditioning compressor coupling
R20	Power supply for the electrohydraulic remote valves
NOTE: The following relays are located outside the safety box!	
R21	Relay for the heated mirror
R22	Fuel pre-heating
R23	Heater grid
R24	ISO BUS 1
R25	ISO BUS 2
R26	Step light
R50	Battery isolator, electrical
R51	Time relay - battery isolator, electrical

Relay for front loader actuation (only in PUMA Multicontroller)	
R30	Front loader solenoid valve 1
R31	Power supply (D+ controlled)
R32	Front loader solenoid valve 2



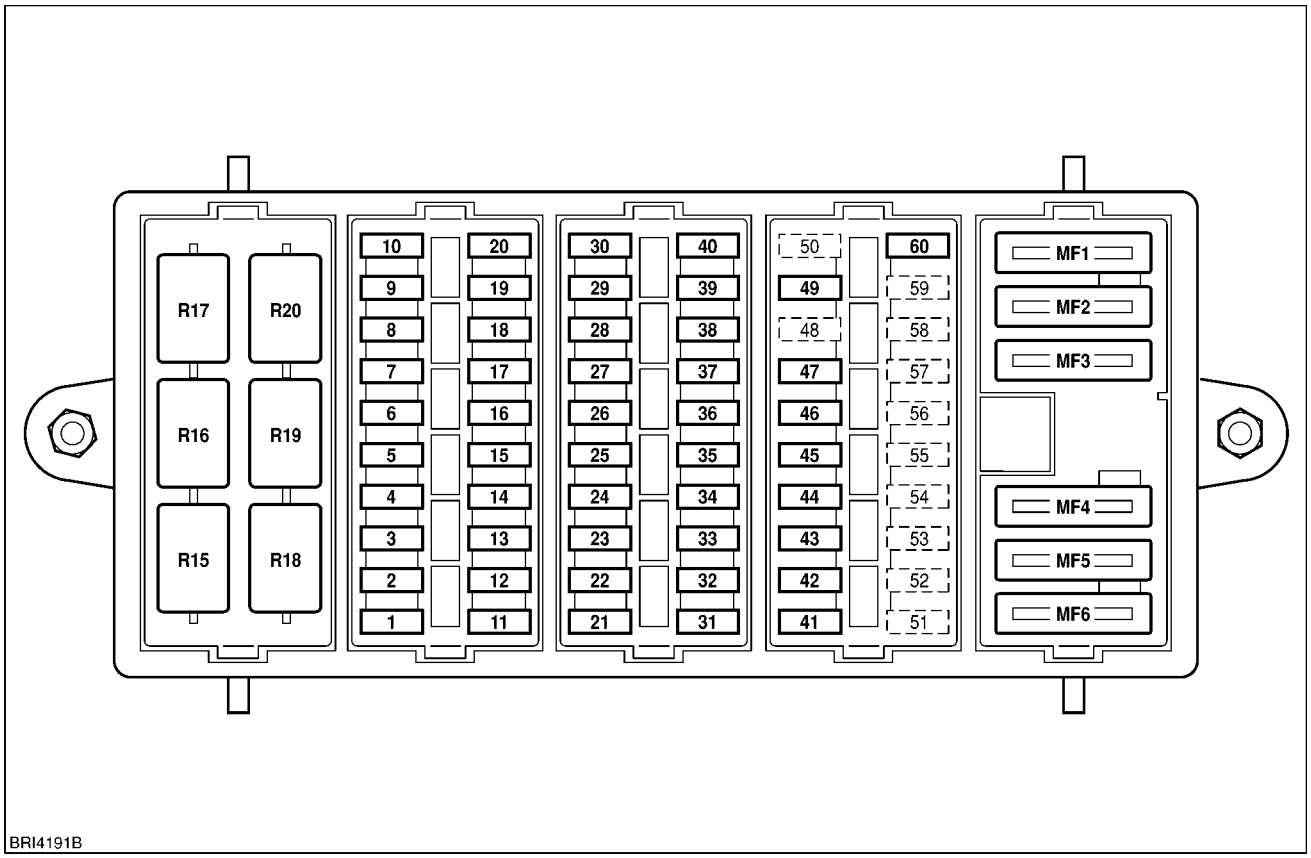
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Main fuses

No.	Amps	Circuit
1	10	Interior and step lighting and relay mirror heating
2	25	Cigar lighter and power socket, cab (potential 30)
3	10	Coupling of the A/C compressor

4	10	Screw terminal red (Potential 30)
5	30	Blower motor
6	10	Station memory and work lamp control unit
7	20	Switch - Main headlights and Hazard light switch
8	20	Starter switch
9	25	Front loader
10	30	Rear power socket (Potential 15)
11	10	Front windscreen wiper
12	10	Rear windscreen wiper / switch, Windscreen washing system, front/rear
13	15	Relay, brake lights
14	15	Headlight switch and flasher
15	20	Brake light switch and pedal lock
16	15	Trailer brake
17	25	Power socket, cab (potential 15)
18	15	Fan motor relay and driver's seat
19	15	Heated mirrors
20	10	Radar sensor, , Normal signal socket
21	15	Water sensor for the fuel filter, brake fluid level switch
22	15	Side marker lights, right
23	15	Side marker lights, left, licence plate lights
24	10	Lighting
25	15	Dipped beam headlights / Relay, steps lighting
26	15	Main headlights
27	15	Front work lamp (bonnet)
28	15	Work lamp control unit
29	30	Work lamp control unit
30	15	Work lamp (C-pillar)
31	15	Rotating beacon (via work lamp control unit)
32	30	Flasher
33	25	Diagnostics plug
34	10	ICU2 and handbrake switch
35	10	Potential 30 for electronics
36	10	ICU2 (Potential 15)
37	15	Transmission functions via starter switch
38	10	Rear PTO switch/light, powerlift, main control unit, ground drive PTO, gear displays, engine speed sensor, intermediate shaft sensor, vehicle speed sensor, upper link switch; lift link switch, PTO speed sensor, armrest supply (in PUMA Multicontroller)
39	10	Powerlift, armrest, Fast Steer, EPC; control lever for the electrohydr. remote valve (in PUMA standard), main control unit and options control unit (Potential 15), pressure switch air conditioning , control LEDs - armrest (in PUMA Multicontroller)
40	10	Radio
41	15	Front PTO, relay control lever for the electrohydr. remote valve (in PUMA standard) Relay electrohydr. remote valve (in PUMA Multicontroller)
42	10	Potentiometer Front powerlift
43	10	Engine electronics (Potential 15)
44	25	Front-mounted equipment socket (B+)
45	25	Power supply - 8A socket (Potential 15)
46	15	Engine controller
47	10	Engine controller
48		Not used
49	15	Fan electronics, relay heater grid, relay fuel filter heater

50		Not used
51		Not used
52		Not used
53		Not used
54		Not used
55		Not used
56		Not used
57		Not used
58		Not used
59		Not used
60	10	Relay battery isolator

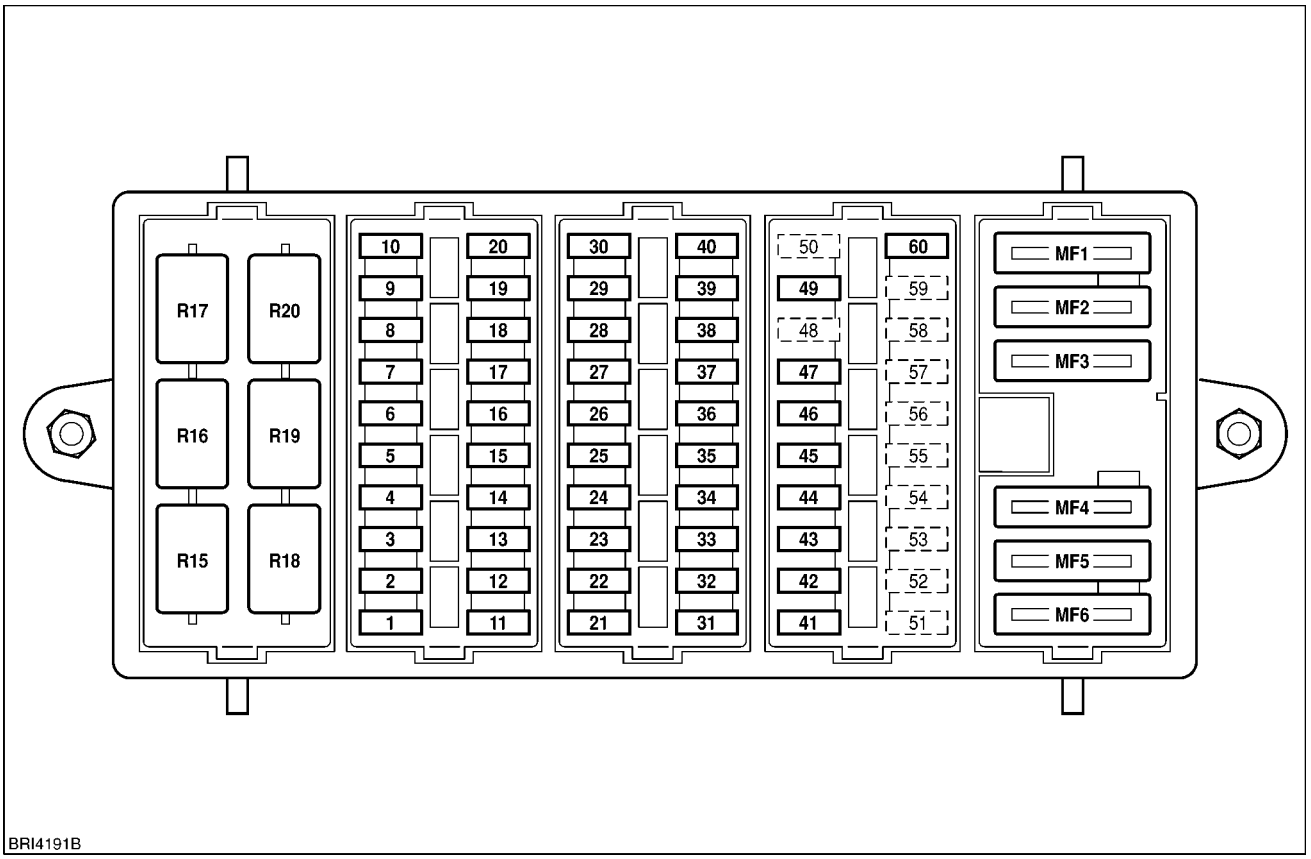


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Maxifuse fuses

No.	Amps	Fused components
MF1	80	Engine, ignition relay
MF2	30	Station memory and work lamp control unit, main headlights switch and hazard light switch, starter switch
MF3	80	B + buffer memory ICU2relay engine control unit, main and options control unit, diagnostics plug, work lamp control unit, relay work lamp (C-pillar), relay starter motor ON, Fast Steer, ISO BUS terminal,
MF4	80	Rear power socket (Potential 30), relay work lamp and side marker lights left/right(bonnet), work lamp control unit

MF5	80	Lighting, flasher, relay main and dipped headlight, work lamp control unit
MF6	80	Power socket cab, relay air conditioning compressor, relay blower motor, screwed terminal red (Potential 30)

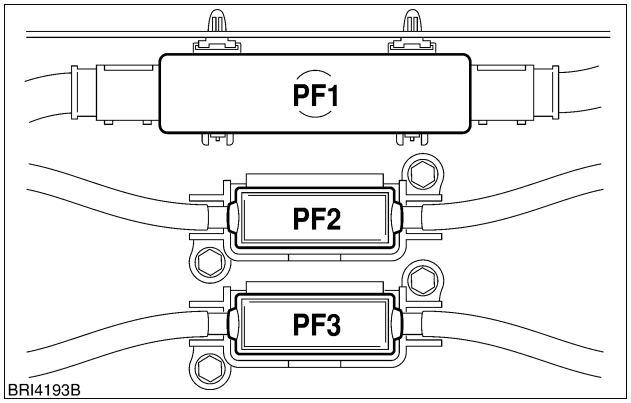


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All models

Fuses for the electrical supply

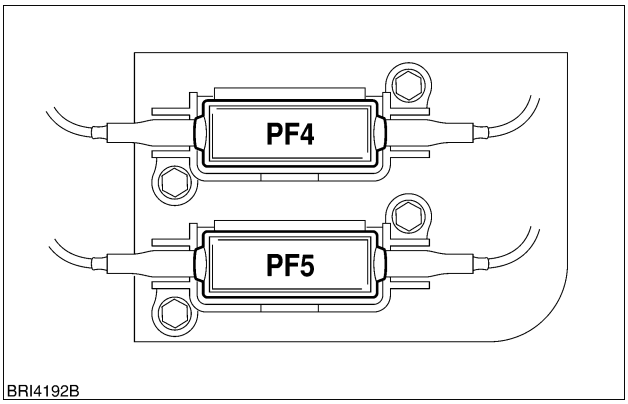
Fuse no.	Amps	Fuse-protected power supply
PF1	250	Main power supply B+
PF2	30	Power supply E, electronics
PF3	10	Power supply ECUs B+, battery isolator



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Main current fuses for the ISO BUS power supply (if installed)

Fuse no.	Amps	Fuse-protected power supply
PF4	30	ISO BUS relay 1
PF5	30	ISO BUS relay 2



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Alternator - Torque

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

	lbf.ft	Nm
Pulley Retaining Nut	59	80
Terminal Nut - B+	8	12
Terminal Nut - D+	2.5	3.5
Mounting Bolts	18	25

Alternator - General specification

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Polarity	Negative Ground
Nominal Voltage	**14.0 v**
Maximum Rev/Min. - Permanent/Intermittent	15,000/18,000
Nominal Output	**150 Amps**
Regulator Controlled Voltage	**14.1 V +/- 0.15**
Rotor Field Winding Resistance	**2.7 Ohm +/- 0.27 @ 23 °C +/- 5**

Battery - General specification

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Temperature	Efficiency of a Fully Charged Battery
25.0 °C (**77.0 °F**)	**100 %**.
-4.5 °C (**23.9 °F**)	**82 %**
-24.0 °C (**-11.2 °F**)	**64 %**
-27.5 °C (**-17.5 °F**)	**58 %**
-31.0 °C (**-23.8 °F**)	**50 %**
-34.5 °C (**-30.1 °F**)	**40 %**
-37.5 °C (**-35.5 °F**)	**33 %**

	176 Ah (**1300 cca**)
Slow Charge Programs	**46 hrs** at **5 A**
	23 hrs at **10 A**
Fast charge Program (emergencies only)	**13 hrs** at **18 A**.

Use the following table to determine the state of charge

State of Charge	Corrected Specific Gravity @ **15 °C**	Corrected Specific Gravity @ **25 °C**	Average Battery Voltage
100 %	1.295	1.287	12.76
75 %	1.253	1.246	12.52
50 %	1.217	1.210	12.30
25 %	1.177	1.170	12.06
Discharged	1.137	1.130	11.84

Specific Gravity	Fast charge up to :
1.150 SG or less	**60 minutes**
1.151 - 1.175 SG	**45 minutes**
1.176 - 1.200 SG	**30 minutes**
1.201 - 1.225 SG	**15 minutes**
	(Slow charge only)

Description	Battery Specification
Capacity (Ampere hour at 20 hour rate)	176
Cold Cranking Ampere Rating	1300
Voltage	12
Cells	6
Ground Terminal	Negative

ELECTRICAL POWER SYSTEM - Static description PROTECTING THE ELECTRONIC AND ELECTRICAL SYSTEMS DURING BATTERY CHARGING OR WELDING

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Precautions

To avoid damage to the electronic/electrical systems, always observe the following:

1. Never make or break any of the charging circuit connections, including the battery connections, when the engine is running.
2. Never short any of the charging components to earth.
3. Do not use a slave battery of higher than **12 volts** nominal voltage.
4. Always observe correct polarity when installing the batteries or using a slave battery to jump start the engine. Follow the instructions in the operator's manual when jump starting the tractor. Connect positive to positive and negative to negative.
5. Always disconnect the earth cable from the batteries before carrying out arc welding on the tractor or on any implement attached to the tractor.
6. Position the welder earth cable clamp as close to the welding area as possible.
7. If welding is to be carried out in close proximity to a computer module, then the module should be removed from the tractor. It is recommended that this procedure be carried out by an authorised dealer.
8. Never allow welding cables to lay on, near or across any electrical wiring or electronic component while welding is in progress.
9. Always disconnect the negative cable from the batteries when charging the batteries in the tractor with a battery charger.

⚠ WARNING ⚠

Batteries contain sulphuric acid. In case of contact with skin, flush the affected area with water for five minutes. Seek medical attention immediately. Avoid contact with the skin, eyes or clothing. Wear eye protection when working near batteries.

B040

IMPORTANT: *Failure to disconnect the two earth cable connections at the battery prior to charging the batteries or welding on the tractor or attached implement will result in damage to the electronic and electrical systems.*

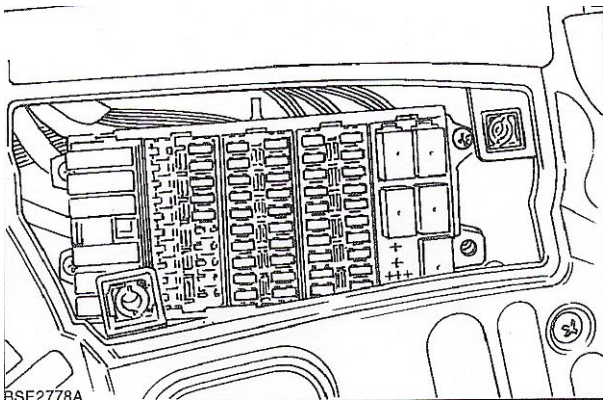
Fuse and relay box - Static description

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Fuses and Relays

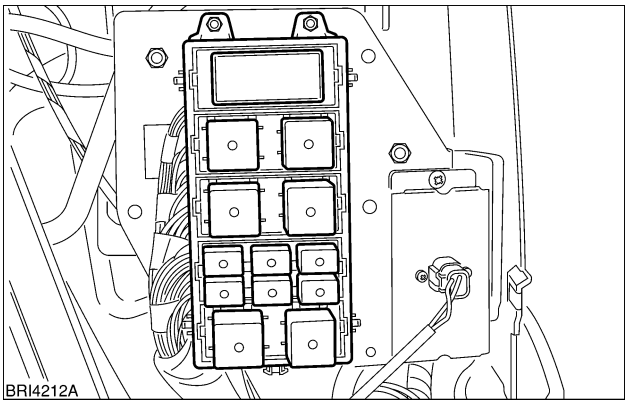
IMPORTANT: *Do not replace a blown fuse with another of a different rating.*

The fuse box is located behind a panel on the top of the right hand control console.
To check or change fuses, remove the two screws securing the panel to the console.
In addition to the main fuses there are additional 'Maxi' fuses which are provided to protect the main fuses and electrical circuit.



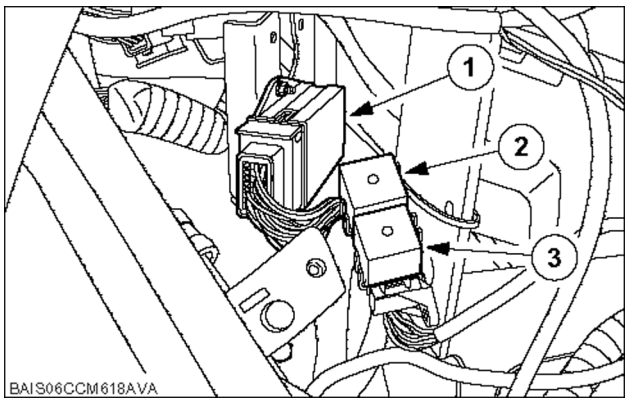
BSE2778A 1

There is provision for 60 fuses although they may not all be fitted, depending on the specification of the tractor. The fuses are numbered and colour coded
Refer to **Fuse and relay box - General specification (A.30.A)** for fuse positions and descriptions.
More relays are located behind the front of the right hand control console.
Refer to **Fuse and relay box - General specification (A.30.A)** for relay functions.



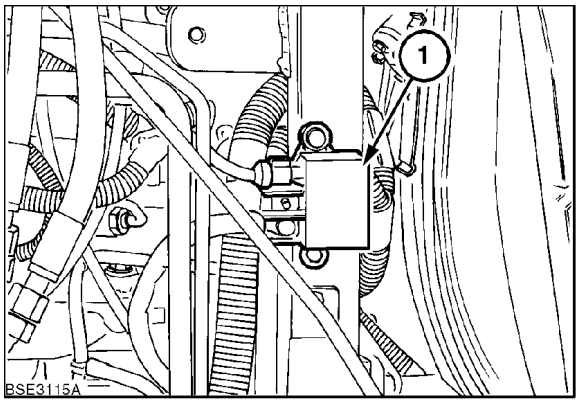
BRI4212A 2

The flasher relay unit **(1)**, is located behind the right hand trim under the transmission control levers, along with the 'See-U-Home' **(2)** and 'Heated Mirrors' **(3)**, relays.



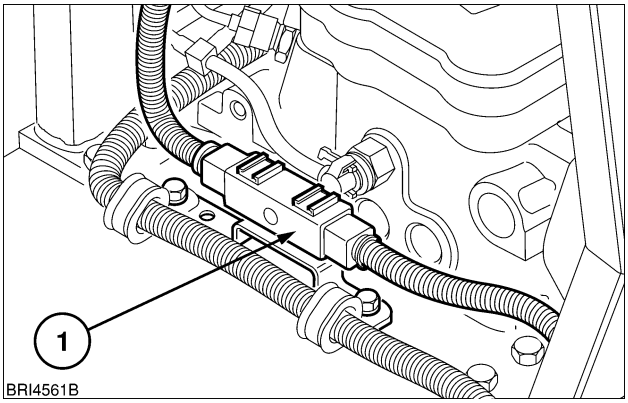
BAIS06CCM618AVA 3

Grid Heater relay, **(1)**, located to the rear of the left hand side of the engine.



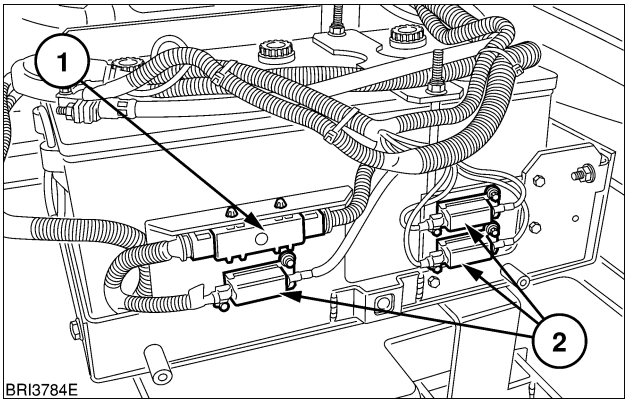
BSE3115A 4

Grid Heater Fuse (**250 Amp**), **(1)**, located on the right hand side of the engine near the starter motor.



BRI4561B 5

In addition to the fuses in the internal fuse box, there are also extra fuses located on the battery tray. A **250 Amp** 'MEGA' fuse **(1)** which protects the main electrical system and three **30 Amp** fuses **(2)** which protect the front lift electrical system, supply to the electronics system and implement ISO BUS circuit (where fitted).

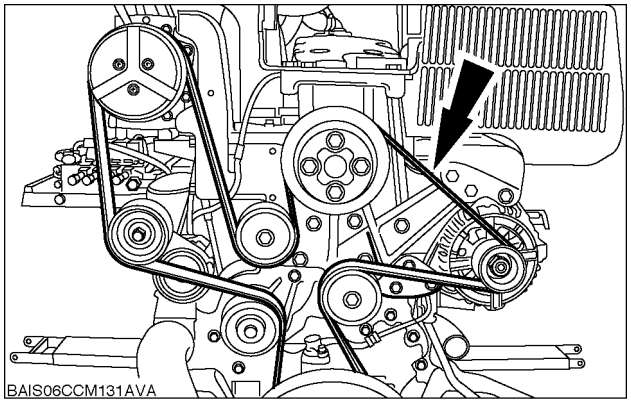


BRI3784E 6

Alternator - Static description

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

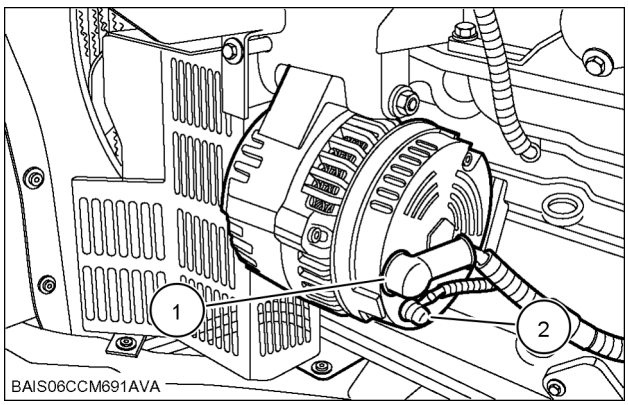
ISKRA 150 Amp alternators are fitted to all models. They incorporate internal cooling fans and integral regulators. The alternator is mounted at the front on the left hand side of the engine and is driven from a crankshaft pulley via a 'poly vee' drive belt.



BAIS06CCM131AVA 1

Alternator Operation

Refer to **Wiring harness - Electrical schematic frame 01 (A.30.A)**for charging circuit schematic.
When the key start switch is turned on a small current flows from the battery through the rotor field wiring. The circuit is made via the charge indicator warning lamp, alternator terminal 'D+' the rotor field winding, the alternator regulator and ground.
At this stage the warning light is illuminated and the rotor partially magnetised.
When the engine is started and the partially magnetised rotor revolves within the stator windings a 3-phase alternating current is generated. A constant portion of the generated current is converted to direct current by the three field diodes incorporated in the rectifier pack.
This direct current is fed back to supplement the current flowing through the rotor field winding.
This action results in an ever increasing magnetic influence of the rotor along with an associated rapid rise in generated output current and voltage.
During the rise in generated output voltage (reflected at the 'D+' terminal) the brilliance of the warning lamp is reduced and when the voltage at the 'D+' terminal equates to that at the battery side of the warning light the lamp is extinguished.
The voltage continues to rise until the predetermined regulated voltage level is reached.
In the event of drive belt breakage the voltage will not build up within the alternator and so the charge indicator light will remain on to indicate failure.



BAIS06CCM691AVA 2

Alternator

1 Output Connection (B+ Terminal)
2 Warning Lamp (D+ terminal)

Battery - Static description

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

All models use a single “low maintenance - hybrid" battery with negative ground of six cell construction and is located on the right hand side of the tractor behind the cab steps.

NOTE: *"Low maintenance" means that under normal charging conditions the battery may lose a small amount of water from the electrolyte. Conditions that may cause water loss include prolonged charging above* ***14.4 volts*** *where gassing occurs as it approaches full charge. This can be caused by a faulty charging system or boost/recovery charging equipment.*

The battery has four major functions:

- To provide a source of current for starting, lighting and instrumentation.
- To help control the voltage in the electrical system.
- To furnish current when the electrical demands exceed the alternator output.
- To support quiescent loads from radio and micro processor memory.

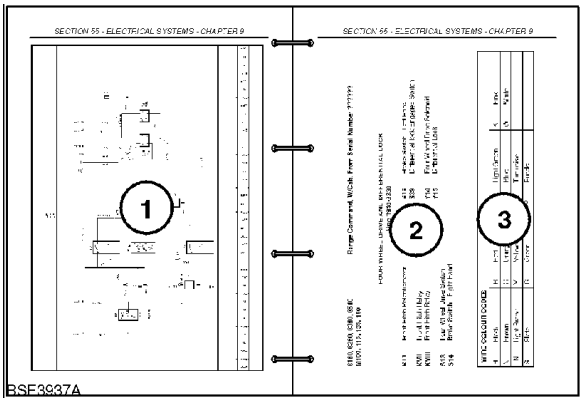
The battery is constructed in such a manner that each cell contains positive and negative plates placed alternatively next to each other. Each positive plate is separated from a negative plate by a non-conducting porous envelope separator. If any of the positive plates should make contact with negative plates within a cell, the cell will short circuit and suffer irreparable damage. All of the positive plates are welded to a bus-bar, forming a positive terminal and all of the negative plates are welded to a similar bus-bar forming a negative terminal.
Each positive plate is composed of a lead grid with lead peroxide pasted into the grid openings. The negative plates are composed of a lead grid with spongy lead pasted into the grid openings.
The plates are submerged in a liquid electrolyte solution of diluted sulphuric acid.

Wiring harness - Static description

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

The wiring diagrams have been drawn in a linear style. This means that the complete wiring diagram has been drawn over a number of pages but if joined together would make a complete diagram.
There are a number of guides to help assist in reading and understanding the wiring diagrams.

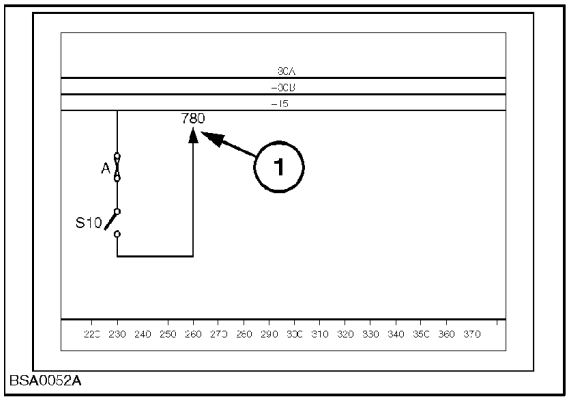
1. The wiring diagrams **(1)** are designed to be read in a landscape format. The titles and diagram keys **(2)** are located on the opposite pages along with the wire colour code table, **(3)** which is located below the key.
   The title and key details the frame number and frame decription. The key then details all the components used within that particular page.



BSE3937A 1

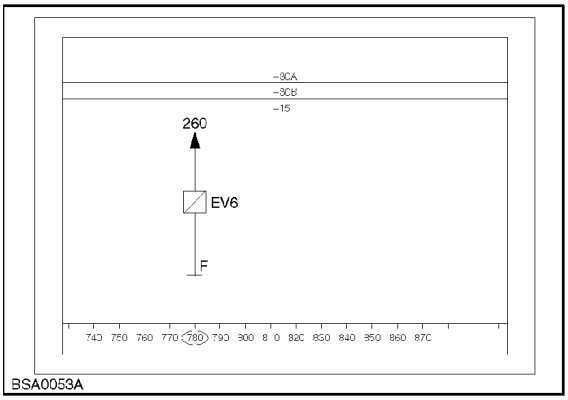
2. Every component and connector has its own unique reference number.
3. Every wire has a code assigned to it, this code refers to its function, the code is also physically marked on the actual wire. A key of all wire codes can be found at the rear of this section. Letters after the number indicate the wire colour. For example, ’57 B’ has a wire reference of 57, which is an earth wire and the letter B indicates its a solid black wire.
4. Each component and connector pin appears only once in the electrical drawings and has its own location point on the page.
5. The wiring diagrams are drawn in sections. However where a single component is used in a number of circuits such as a processor or multi function switch, it is drawn either on its own or on the circuit which it influences the most.
6. The wiring is drawn between three lines, two across the top of the page and one at the bottom of the page.
   The upper line is the constant live line, a direct +12 Volt feed from the battery. Below the +12 Volt line is the IGN line which is the ignition key on live line. The lowest line is the ground/earth line. On the lower part of the page a line is marked with numbers increasing by ten (10-20-30, etc.). This is the line used to reference wires and components.

Example
Figures **2** and **3** show a basic circuit drawn over two pages.
Power comes in from the ignition on live line +15 (IGN) through fuse A, which is located at point 230.



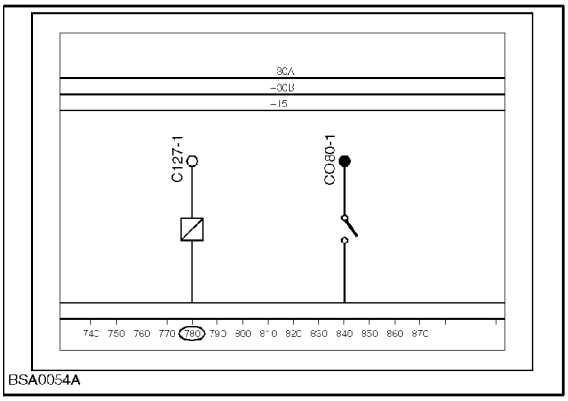
BSA0052A 2

Power comes to switch S10. If the switch is operated, power continues up and stops with an arrow **(1)** and a number. The arrow indicates the wire continuing to another page. The Number 780 refers to the line reference where it appears on a new page. Note the line reference directly below the wire being traced ie. 260. Following the line reference until 780 is found. Using either the index or following the page reference line. When 780 is located on the reference line the number 260 will be observed at the top of the page. Note the arrow points back to the previous part of the circuit. From this point follow the wire down to solenoid EV6. The diagram now indicates that power goes to ground.



BSA0053A 3

Where a circuit originates or terminates at a processor, ie, Transmission processor, EDC processor, Electronic Management Unit or Instrument cluster, the wire in the diagram is ended with a small circle and a connector reference number. A white circle **(1)** indicates a processor, a black circle **(2)** indicates an instrument cluster.
The diagrams have been constructed to ensure the minimum number of pin-outs, detailed above, are used. Due to this, many diagrams have been spread across 2 sheets and it will be necessary to follow from one page across to the next to complete a circuit.

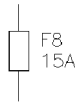
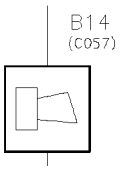
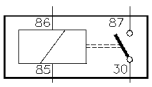
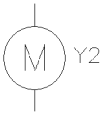
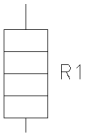
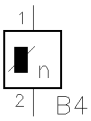
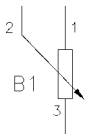
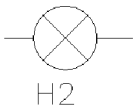
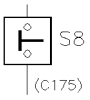
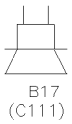
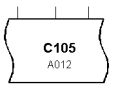
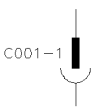


BSA0054A 4

Wiring harness - Electrical symbol

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Symbols

Fuse		Horn	
Relay		Diode	
Motor		Switch	
Earth/ground point		Resistor	
Sensor		Electro-Valve/solenoid	
Potentiometer		Temperature Switch	
Lamp		Pressure Switch	
Speaker		Processor	
Connector pin			

Wiring harness - Component identification

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
1	0-300	STARTING / CHARGING	10	PF1 - 250A		POWER FUSE - ELECTRONICS SUPPLY
1	0-300	STARTING / CHARGING	20	Y1	C579	BATTERY SW SOL
1	0-300	STARTING / CHARGING	30	PF2 - 30A		POWER FUSE - MAIN SUPPLY
1	0-300	STARTING / CHARGING	50	PF3 - 30A		POWER FUSE - IMPLEMENT SOCKET FRONT
1	0-300	STARTING / CHARGING	50	S1	C550	DIVERTER SWITCH
1	0-300	STARTING / CHARGING	60	F60 - 10A		FUSE - BATTERY ISOLATOR RELAY
1	0-300	STARTING / CHARGING	80	S2	C503	ISO CONTROL RELAY SWITCH
1	0-300	STARTING / CHARGING	100	K18		RELAY - BATTERY ISOLATOR
1	0-300	STARTING / CHARGING	120	MF1 - 80A		MAXI FUSE - ENGINE IGNITION RELAY
1	0-300	STARTING / CHARGING	130	D1	C504	DIODE
1	0-300	STARTING / CHARGING	130	M1	C006	START SOLENOID
1	0-300	STARTING / CHARGING	140	K3		RELAY - IGNITION
1	0-300	STARTING / CHARGING	170	G1	C013	ALTERNATOR
1	0-300	STARTING / CHARGING	190	K5		RELAY - STARTER CRANK
1	0-300	STARTING / CHARGING	230	F8 - 20A		FUSE - STARTER SWITCH
1	0-300	STARTING / CHARGING	230	MF2 - 30A		MAXI FUSE - LIGHTING, IGN SW, RADIO, WORKLAMP ECU
1	0-300	STARTING / CHARGING	260	S3	C072	STARTER SWITCH
1	0-300	STARTING / CHARGING	285	F43 - 10A		FUSE - STARTER SWITCH (RUN POSITION)
1	0-300	STARTING / CHARGING	290	K14		RELAY - FUEL SHUT OFF
2	310-600	ENGINE 1	320	K13		RELAY - COLD ADVANCE
2	310-600	ENGINE 1	380	S4	C376	FOOT THROTTLE - ELECTRONIC
2	310-600	ENGINE 1	430	S5	C401	CONSTANT ENGINE SPEED PROG SWITCH
2	310-600	ENGINE 1	450	S6	C309	CERPM CRUISE AUTO SWITCH

2	310-600	ENGINE 1	550	S7	C301	ENGINE INC/DEC SWITCH
2	310-600	ENGINE 1	580	S8	C009	VACUUM SWITCH
2	310-600	ENGINE 1	600	S9	C353	DE-GAS BOTTLE
3	610-900	ENGINE 2	635	B1	C255	ENGINE SPEED SENSOR
3	610-900	ENGINE 2	770	B2	C314	HAND THROTTLE
4	910-1200	ENGINE 3	930	B3	C017	H2O WATER IN FUEL SENSOR
4	910-1200	ENGINE 3	960	K22	C625	RELAY - FUEL HEATER
4	910-1200	ENGINE 3	970	R1	C626	FUEL HEATER
4	910-1200	ENGINE 3	980	K23	C354	RELAY - GRID HEATER
4	910-1200	ENGINE 3	990	R2	C367	GRID HEATER
4	910-1200	ENGINE 3	1020	F46 - 15A		FUSE - ECU BATTERY +
4	910-1200	ENGINE 3	1030	F49 - 15A		FUSE - ENGINE SENSOR SUPPLY
4	910-1200	ENGINE 3	1040	F47 - 10A		FUSE - ECU BATTERY +
4	910-1200	ENGINE 3	1080	E1	C276	VISTRONIC FAN
4	910-1200	ENGINE 3	1100	F9 - 25A		FUSE - LOADER
4	910-1200	ENGINE 3	1100	X1	C424	LOADER POWER CONNECTOR
4	910-1200	ENGINE 3	1110	X2	C442	LOADER VALVE 2 - MAIN HARNESS
4	910-1200	ENGINE 3	1110	X3	C441	LOADER VALVE 1 - MAIN HARNESS
4	910-1200	ENGINE 3	1120	Y2	C442	LOADER VALVE 2
4	910-1200	ENGINE 3	1120	Y3	C441	LOADER VALVE 1
4	910-1200	ENGINE 3	1150	B4	C427	BOOST PRESSURE/ TEMP SENSOR - EDC 7
4	910-1200	ENGINE 3	1190	Y4	C440	FUEL METERING UNIT - EDC 7
5	1210-1500	ENGINE 4	1220	B5	C428	OIL PRESSURE/ TEMP SENSOR - EDC 7
5	1210-1500	ENGINE 4	1260	B6	C429	RAIL PRESSURE SENSOR - EDC 7
5	1210-1500	ENGINE 4	1290	B7	C430	COOLANT TEMP SENSOR - EDC 7
5	1210-1500	ENGINE 4	1310	B8	C431	FUEL TEMP SENDER - EDC 7
5	1210-1500	ENGINE 4	1330	B9	C432	CRANK SPEED SENSOR - EDC 7
5	1210-1500	ENGINE 4	1360	B10	C433	CAM SPEED SENSOR - EDC 7
5	1210-1500	ENGINE 4	1390	Y5	C434	CYL INJECTOR 1 - EDC 7
5	1210-1500	ENGINE 4	1400	Y6	C435	CYL INJECTOR 2 - EDC 7
5	1210-1500	ENGINE 4	1430	Y7	C436	CYL INJECTOR 3 - EDC 7
5	1210-1500	ENGINE 4	1440	Y8	C437	CYL INJECTOR 4 - EDC 7
5	1210-1500	ENGINE 4	1470	Y9	C438	CYL INJECTOR 5 - EDC 7

5	1210-1500	ENGINE 4	1480	Y10	C439	CYL INJECTOR 6 - EDC 7
6	1510-1800	TRANSMISSION 1	1520	B11	C077	CLUTCH POT
6	1510-1800	TRANSMISSION 1	1570	S10	C075	SHUTTLE SWITCH
6	1510-1800	TRANSMISSION 1	1620	S11	C076	CLUTCH SWITCH
6	1510-1800	TRANSMISSION 1	1670	(NO CODE)	C103	GEARSHIFT LEVER - NOT USED
7	1810-2100	TRANSMISSION 2	1830	B12	C046	AXLE SPEED SENSOR
7	1810-2100	TRANSMISSION 2	1870	S12	C036	TRANS OIL PRESSURE SWITCH
7	1810-2100	TRANSMISSION 2	1910	S13	C243	FPS HI RANGE PRESS SWITCH
7	1810-2100	TRANSMISSION 2	1930	S14	C244	FPS MED PRESS SWITCH
7	1810-2100	TRANSMISSION 2	1950	S15	C245	FPS LOW PRESSURE SWITCH
7	1810-2100	TRANSMISSION 2	1960	S16	C246	FPS REV PRESSURE SWITCH
7	1810-2100	TRANSMISSION 2	1990	S17	C262	TRANS AUTO FUNCTION SWITCH
7	1810-2100	TRANSMISSION 2	2030	B13	C347	CREEPER POT
7	1810-2100	TRANSMISSION 2	2070	Y11	C268	FPS 19TH GEAR SOLENOID
7	1810-2100	TRANSMISSION 2	2090	Y12	C024	CLUTCH E SOLENOID
8	2110-2400	TRANSMISSION 3	2120	Y13	C028	CLUTCH A SOLENOID
8	2110-2400	TRANSMISSION 3	2150	Y14	C040	REVERSE RANGE SOLENOID
8	2110-2400	TRANSMISSION 3	2180	Y15	C031	MED RANGE SOLENOID
8	2110-2400	TRANSMISSION 3	2210	Y16	C026	CLUTCH C SOLENOID
8	2110-2400	TRANSMISSION 3	2240	Y17	C025	CLUTCH D SOLENOID
8	2110-2400	TRANSMISSION 3	2270	Y18	C222	CREEPER SOLENOID
8	2110-2400	TRANSMISSION 3	2300	Y19	C289	19TH GEAR DUMP SOLENOID
8	2110-2400	TRANSMISSION 3	2330	Y20	C032	LOW RANGE SOLENOID
8	2110-2400	TRANSMISSION 3	2360	Y21	C027	CLUTCH B SOLENOID
8	2110-2400	TRANSMISSION 3	2390	Y22	C039	HIGH RANGE SOLENOID
9	2410-2700	TRANSMISSION 4	2430	A1	C104	GEARSHIFT INDICATOR - DOG
9	2410-2700	TRANSMISSION 4	2485	S18	C192	CREEPER GEAR SWITCH
9	2410-2700	TRANSMISSION 4	2660	B14	C037	INTERMEDIATE SPEED PICK UP
9	2410-2700	TRANSMISSION 4	2690	B15	C023	TRANS OIL TEMP SENDER
10	2710-3000	COMMAND ARM	2730	S19	C624	TRANS CONTROL - COMMAND ARM
10	2710-3000	COMMAND ARM	2790	S20	C302	HTS RECORD SWITCH
10	2710-3000	COMMAND ARM	2820	A2	C120	EDC CONTROL PANEL 1

10	2710-3000	COMMAND ARM	2860	A3	C121	EDC CONTROL PANEL 2
10	2710-3000	COMMAND ARM	2930	B16	C240	EDC MOUSE CONNECTOR
10	2710-3000	COMMAND ARM	2990	B17	C623	HAND THROTTLE - COMMAND ARM
11	3010-3300	EDC/HYDRAULICS 1	3020	S21	C176	HYDRAULIC TEMP SWITCH
11	3010-3300	EDC/HYDRAULICS 1	3020	S22	C175	HYDRAULIC BLOCKED FILTER SWITCH
11	3010-3300	EDC/HYDRAULICS 1	3040	S23	C302	HTS RECORD SWITCH
11	3010-3300	EDC/HYDRAULICS 1	3110	B18	C113	FRONT HITCH POT
11	3010-3300	EDC/HYDRAULICS 1	3160	F42 - 10A		FUSE - FRONT SUSPENSION
11	3010-3300	EDC/HYDRAULICS 1	3300	X4	C510	HI-FLOW PUMP CONNECTOR - CIRCUIT 5830
12	3310-3600	EDC/HYDRAULICS 2	3320	S24	C146	LIFT-O-MATIC SWITCH
12	3310-3600	EDC/HYDRAULICS 2	3345	S25	C134	HPL EXTERNAL RIGHT HAND SWITCH
12	3310-3600	EDC/HYDRAULICS 2	3365	S26	C135	HPL EXTERNAL LEFT HAND SWITCH
12	3310-3600	EDC/HYDRAULICS 2	3390	F39 - 10A		FUSE - HPL, SEAT, ARMREST, EDC, EHR LEVERS
12	3310-3600	EDC/HYDRAULICS 2	3490	X5	C549	FRINT HITCH DETECT
12	3310-3600	EDC/HYDRAULICS 2	3510	A19	C631	JOYSTICK CAN
12	3310-3600	EDC/HYDRAULICS 2	3530	H37		JOYSTICK INDICATOR LAMP - FRONT
12	3310-3600	EDC/HYDRAULICS 2	3540	H38		JOYSTICK INDICATOR LAMP - REAR
13	3610-3900	EDC/HYDRAULICS 3	3620	Y23	C334	EXTEND TOP A
13	3610-3900	EDC/HYDRAULICS 3	3635	Y24	C335	RETRACT TOP B
13	3610-3900	EDC/HYDRAULICS 3	3650	Y25	C336	EXTEND SIDE C
13	3610-3900	EDC/HYDRAULICS 3	3665	Y26	C337	RETRACT SIDE D
13	3610-3900	EDC/HYDRAULICS 3	3680	Y27	C338	SAFETY VALVE DUMP - LIFT LINK CIRCUIT
13	3610-3900	EDC/HYDRAULICS 3	3710	B19	C047	LH DRAFT PIN
13	3610-3900	EDC/HYDRAULICS 3	3730	B20	C048	RH DRAFT PIN
13	3610-3900	EDC/HYDRAULICS 3	3770	B21	C052	ROCKSHAFT POTENTIOMETER
13	3610-3900	EDC/HYDRAULICS 3	3820	S27	C173	LOW CHARGE PRESSURE SWITCH S2
13	3610-3900	EDC/HYDRAULICS 3	3840	Y28	C216	TEMPERATURE SWITCH
13	3610-3900	EDC/HYDRAULICS 3	3860	Y29	C217	EDC UP SOLENOID
14	3910-4200	EHR/HYDRAULICS 1	3930	Y30	C283	EHR VALVE CONNECTOR 5
14	3910-4200	EHR/HYDRAULICS 1	3980	Y31	C282	EHR VALVE CONNECTOR 4

14	3910-4200	EHR/HYDRAULICS 1	4030	Y32	C281	EHR VALVE CONNECTOR 3
14	3910-4200	EHR/HYDRAULICS 1	4080	Y33	C280	EHR VALVE CONNECTOR 2
14	3910-4200	EHR/HYDRAULICS 1	4130	Y34	C279	EHR VALVE CONNECTOR 1
15	4210-4500	EHR/HYDRAULICS 2	4220	S28	C547	TOP LINK SWITCH
15	4210-4500	EHR/HYDRAULICS 2	4260	S29	C546	SIDE LINK SWITCH
15	4210-4500	EHR/HYDRAULICS 2	4330	Y35	C571	EHR 7
15	4210-4500	EHR/HYDRAULICS 2	4350	Y36	C572	EHR 8
15	4210-4500	EHR/HYDRAULICS 2	4360	R3	C604	BUS TERNINATION RESISTOR
15	4210-4500	EHR/HYDRAULICS 2	4370	Y37	C573	EHR 9
15	4210-4500	EHR/HYDRAULICS 2	4390	R4	C344	TERMINATING RESISTOR 1A FPS SWB
15	4210-4500	EHR/HYDRAULICS 2	4390	Y38	C574	EHR 10
16	4510-4800	EHR/HYDRAULICS 3	4530	S30	C548	EHR SELECT SWITCH
16	4510-4800	EHR/HYDRAULICS 3	4570	K20		RELAY - EHR POWER
16	4510-4800	EHR/HYDRAULICS 3	4600	S31	C313	HYDRALIC STOP (EHR STOP SWITCH)
16	4510-4800	EHR/HYDRAULICS 3	4720	H1	C391	LAMP 1
16	4510-4800	EHR/HYDRAULICS 3	4735	H2	C396	LAMP 2
16	4510-4800	EHR/HYDRAULICS 3	4750	H3	C397	LAMP 3
16	4510-4800	EHR/HYDRAULICS 3	4765	H4	C398	LAMP 4
16	4510-4800	EHR/HYDRAULICS 3	4780	H5	C399	MASTER LAMP
17	4810-5100	EHR/HYDRAULICS 4	4860	S32	C569	5TH REMOTE SWITCH
17	4810-5100	EHR/HYDRAULICS 4	4920	S33	C395	EHR 3/4 TIME/FLOW SWITCH
17	4810-5100	EHR/HYDRAULICS 4	4970	S34	C400	EHR 3-4 LEVER ASSY
17	4810-5100	EHR/HYDRAULICS 4	5050	S35	C390	EHR 1-2 LEVER ASSY
17	4810-5100	EHR/HYDRAULICS 4	5085	S36	C394	EHR 1/2 TIME/FLOW SWITCH
18	5110-5400	FWD & DIFF LOCK	5110	Y39	C042	DIFF LOCK SOLENOID
18	5110-5400	FWD & DIFF LOCK	5120	Y40	C034	FWD SOLENOID
18	5110-5400	FWD & DIFF LOCK	5130	S37	C035	FWD SWITCH
18	5110-5400	FWD & DIFF LOCK	5140	S38	C043	DIFF LOCK OP SWITCH
18	5110-5400	FWD & DIFF LOCK	5190	S39	C183	DIFF LOCK SWITCH
18	5110-5400	FWD & DIFF LOCK	5220	K12		RELAY - STOPLAMPS SWITCH, AIR BRAKES
18	5110-5400	FWD & DIFF LOCK	5260	F15 - 20A		FUSE - STOPLAMP SWITCH AND PEDAL LATCH
18	5110-5400	FWD & DIFF LOCK	5280	S40	C062	RIGHT HAND STOPLAMP SWITCH
18	5110-5400	FWD & DIFF LOCK	5280	S41	C063	LEFT HAND STOPLAMP SWITCH
18	5110-5400	FWD & DIFF LOCK	5300	K8		RELAY - STOPLAMPS
18	5110-5400	FWD & DIFF LOCK	5330	F13 - 15A		FUSE - STOPLAMPS
18	5110-5400	FWD & DIFF LOCK	5380	S42	C182	4WD SWITCH
19	5410-5700	POWER TAKE OFF 1	5510	H6	C117	REAR PTO ENGAGE LAMP
19	5410-5700	POWER TAKE OFF 1	5510	S43	C118	REAR PTO BRAKE SWITCH AND LAMP

19	5410-5700	POWER TAKE OFF 1	5540	H7	C114	FRONT PTO ENGAGE LAMP
19	5410-5700	POWER TAKE OFF 1	5605	S44	C115	FRONT PTO SWITCH
19	5410-5700	POWER TAKE OFF 1	5645	S45	C116	REAR PTO SWITCH
19	5410-5700	POWER TAKE OFF 1	5650	B22	C288	PTO SHAFT TWIST SENSOR
19	5410-5700	POWER TAKE OFF 1	5690	X6	C558	FRONT BREAK AWAY (OPTION)
20	5710-6000	POWER TAKE OFF 2	5750	Y41	C033	PTO BRAKE
20	5710-6000	POWER TAKE OFF 2	5780	Y42	C041	PTO SOLENOID
20	5710-6000	POWER TAKE OFF 2	5810	B23	C054	PTO SPEED SENSOR
20	5710-6000	POWER TAKE OFF 2	5840	S46	C422	PTO MGT SWITCH
20	5710-6000	POWER TAKE OFF 2	5930	X7	C254	FRONT HITCH/PTO EXTENSION CONNECTOR
21	6010-6300	FRONT SUSPENSION	6020	B24	C611	ACCELEROMETER
21	6010-6300	FRONT SUSPENSION	6060	B25	C253	FRONT SUSPENSION POT
21	6010-6300	FRONT SUSPENSION	6130	Y43	C250	SUSPENSION LOWER LOCKOUT SOLENOID
21	6010-6300	FRONT SUSPENSION	6170	S47	C247	FRONT SUSPENSION SWITCH
21	6010-6300	FRONT SUSPENSION	6220	Y44	C249	SUSPENSION LOWER SOLENOID
21	6010-6300	FRONT SUSPENSION	6250	Y45	C251	SUSPENSION RAISE SOLENOID
21	6010-6300	FRONT SUSPENSION	6280	Y46	C252	SUSPENSION RAISE LOCKOUT SOLENOID
22	6310-6600	FAST STEER SYSTEM	6330	B26	C511	FAST STEER - LVDT COILS
22	6310-6600	FAST STEER SYSTEM	6360	Y47	C512	FAST STEER SOLENOID VALVE
22	6310-6600	FAST STEER SYSTEM	6380	B27	C513	FAST STEER STEERING WHEEL SENSOR
22	6310-6600	FAST STEER SYSTEM	6430	S48	C514	FAST STEER STEERING WHEEL SWITCH
23	6610-6900	CAB ACCESSORIES 1	6610	B28	C385	SPEAKER - REAR LH
23	6610-6900	CAB ACCESSORIES 1	6620	F6 - 10A		FUSE - RADIO KAM & WORKLAMP ECU
23	6610-6900	CAB ACCESSORIES 1	6630	B29	C110	RIGHT HAND SPEAKER
23	6610-6900	CAB ACCESSORIES 1	6645	A4	C106/C107	RADIO A + RADIO B
23	6610-6900	CAB ACCESSORIES 1	6660	B30	C386	SPEAKER - REAR RH
23	6610-6900	CAB ACCESSORIES 1	6670	F40 - 10A		FUSE - RADIO
23	6610-6900	CAB ACCESSORIES 1	6680	B31	C111	LEFT HAND SPEAKER
23	6610-6900	CAB ACCESSORIES 1	6700	H8	C387	CONSOLE LAMP RH
23	6610-6900	CAB ACCESSORIES 1	6710	S49	C090	LEFT HAND DOOR SWITCH

23	6610-6900	CAB ACCESSORIES 1	6725	H9	C388	PUDDLE LAMP LH
23	6610-6900	CAB ACCESSORIES 1	6730	S50	C091	RIGHT HAND DOOR SWITCH
23	6610-6900	CAB ACCESSORIES 1	6755	H10	C389	PUDDLE LAMP RH
23	6610-6900	CAB ACCESSORIES 1	6760	H11	C099	INTERIOR LAMP
23	6610-6900	CAB ACCESSORIES 1	6790	F1 - 10A		FUSE - INTERIOR, PUDDLE LIGHTS, HANDBRAKE, HEATED MIRRORS
23	6610-6900	CAB ACCESSORIES 1	6800	F4 - 10A		FUSE - ACCESSORY SOCKETS
23	6610-6900	CAB ACCESSORIES 1	6800	X8	C417	8 AMP RING TERMINALS - 2 OFF
23	6610-6900	CAB ACCESSORIES 1	6820	F2 - 25A		FUSE - CIGAR LIGHTER, POWER STUDS
23	6610-6900	CAB ACCESSORIES 1	6830	X9	C416	20 AMP SOCKET - 3 PIN
23	6610-6900	CAB ACCESSORIES 1	6840	F17 - 25A		FUSE - ACCESSORY SOCKETS
23	6610-6900	CAB ACCESSORIES 1	6870	R5	C193	CIGAR LIGHTER
24	6910-7200	CAB ACCESSORIES 2	6915	M2	C607	ELEC MIRROR LH
24	6910-7200	CAB ACCESSORIES 2	6950	S51	C609	MIRROR CONTROL SWITCH
24	6910-7200	CAB ACCESSORIES 2	6985	M3	C608	ELEC MIRROR RH
24	6910-7200	CAB ACCESSORIES 2	6990	F19 - 15A		FUSE - ELECTRIC MIRRORS
24	6910-7200	CAB ACCESSORIES 2	7010	S52	C551	HEATED MIRROR SWITCH
24	6910-7200	CAB ACCESSORIES 2	7015	K21		RELAY - HEATED MIRRORS
24	6910-7200	CAB ACCESSORIES 2	7050	MF4 - 80A		MAXI FUSE - IMPLEMENT SOCKET REAR
24	6910-7200	CAB ACCESSORIES 2	7050	X10	C143	IMPLEMENT SOCKET
24	6910-7200	CAB ACCESSORIES 2	7060	F10 - 30A		FUSE - REAR IMPLEMENT SOCKET
24	6910-7200	CAB ACCESSORIES 2	7070	F45 - 25A		FUSE - FRONT IGNITION, 8 AMP SOCKET
24	6910-7200	CAB ACCESSORIES 2	7070	X11	C365	8 AMP SOCKET
24	6910-7200	CAB ACCESSORIES 2	7130	K24	C587	RELAY - ISO 1
24	6910-7200	CAB ACCESSORIES 2	7140	PF4 - 30A		POWER FUSE - ISO RELAY 1
24	6910-7200	CAB ACCESSORIES 2	7155	X12	C591	BREAKAWAY
24	6910-7200	CAB ACCESSORIES 2	7170	K25	C588	RELAY - ISO 2
24	6910-7200	CAB ACCESSORIES 2	7180	PF5 - 30A		POWER FUSE - ISO RELAY 2

25	7210-7500	CAB ACCESSORIES 3	7210	B32	C057	HORN
25	7210-7500	CAB ACCESSORIES 3	7230	H12	C092	CONSOLE LAMP
25	7210-7500	CAB ACCESSORIES 3	7270	F20 - 10A		FUSE - RADAR, DIAGS SOCKETS, ADIC KEYPAD, BACKUP ALARM
25	7210-7500	CAB ACCESSORIES 3	7300	A5	C373	INSTRUMENT CLUSTER KEYPAD
25	7210-7500	CAB ACCESSORIES 3	7360	M4	C138	SEAT PUMP (MOTOR)
25	7210-7500	CAB ACCESSORIES 3	7380	S53	C138	SEAT PUMP (SWITCH)
25	7210-7500	CAB ACCESSORIES 3	7420	D2	C368	DIODE CONNECTOR
25	7210-7500	CAB ACCESSORIES 3	7440	D3	C368	DIODE CONNECTOR
25	7210-7500	CAB ACCESSORIES 3	7475	E2	C265	BUZZER UNIT
25	7210-7500	CAB ACCESSORIES 3	7500	X14	C321	DIA HEADLAMP
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7525	H13	C094	RIGHT HAND NASO REAR FLASHER
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7570	H14	C131	LICENCE PLATE LAMP
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7590	F22 - 15A		FUSE - SIDELAMPS RH
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7590	H15	C131	LICENCE PLATE LAMP
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7600	F24 - 10A		FUSE - ILLUMINATION
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7610	H16	C093	LEFT HAND NASO REAR FLASHER
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7620	F23 - 15A		FUSE - SIDELAMPS LH
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7660	D4	C377	DIODE CONNECTOR
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7680	H17	C095	LEFT HAND REAR LICENCE WORKLAMP
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7700	H18	C096	RIGHT HAND REAR LICENCE WORKLAMP
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7710	S54	C257	LEFT HAND FENDER PTO SWITCH
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7750	S55	C258	RIGHT HAND FENDER PTO SWITCH
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7780	H19	C129	WORKLAMP RIGHT HAND FENDER
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7800	H20	C130	WORKLAMP LEFT HAND FENDER
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7810	K7		RELAY - DIP BEAM HEADLAMPS
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7820	F25 - 15A		FUSE - DIP BEAM HEADLAMPS
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7830	K26	C632	RELAY - SEE U HOME ....

27	7810-8100	MAIN LAMPS/ INDICATORS 2	7910	H21	C059	RIGHT HAND HEADLAMP
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7930	H22	C060	LEFT HAND HEADLAMP
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7950	F26 - 15A		FUSE - MAIN BEAM HEADLAMPS
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7950	K9		RELAY - MAIN BEAM HEADLAMPS
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7990	K4		RELAY - LIGHTS (SIDE AND ILLUMINATION)
27	7810-8100	MAIN LAMPS/ INDICATORS 2	8030	F7 - 20A		FUSE - MAIN LIGHTS AND HAZARD SWITCH
27	7810-8100	MAIN LAMPS/ INDICATORS 2	8040	S56	C190	MAIN LAMPS SWITCH
27	7810-8100	MAIN LAMPS/ INDICATORS 2	8070	F14 - 15A		FUSE - MAIN LIGHT SWITCH AND FLASHER UNIT
27	7810-8100	MAIN LAMPS/ INDICATORS 2	8090	S57	C425	AUX HEADLAMP SWITCH
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8130	S58	C083	HAZARD SWITCH
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8150	H23	C066	RIGHT HAND SIDE LAMP
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8170	F32 - 30A		FUSE - FLASHER UNIT
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8180	H24	C067	LEFT HAND SIDE LAMP
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8230	A6	C260	INDICATOR FLASHER UNIT CONNECTOR
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8240	H25	C297	RIGHT HAND EXTREMITY
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8260	H26	C298	LEFT HAND EXTREMITY
29	8410-8700	WORK LAMPS	8415	H27	C084	LEFT HAND UPPER FRONT WORKLAMP
29	8410-8700	WORK LAMPS	8430	H28	C085	RIGHT HAND UPPER FRONT WORKLAMP
29	8410-8700	WORK LAMPS	8450	F29 - 30A		FUSE - ECU WORKLAMP
29	8410-8700	WORK LAMPS	8450	H29	C383	WORKLAMP - REAR LH
29	8410-8700	WORK LAMPS	8460	H30	C384	WORKLAMP - REAR RH
29	8410-8700	WORK LAMPS	8470	F28 - 15A		FUSE - ECU WORKLAMP
29	8410-8700	WORK LAMPS	8470	H31	C064	RIGHT HAND FRONT LOWER WORKLAMP
29	8410-8700	WORK LAMPS	8480	H32	C065	LEFT HAND FRONT LOWER WORKLAMP
29	8410-8700	WORK LAMPS	8490	A7	C105	WORKLAMP MODULE CONNECTOR
29	8410-8700	WORK LAMPS	8505	E3	C097	LEFT HAND BEACON
29	8410-8700	WORK LAMPS	8510	F31 - 15A		FUSE - ECU WORKLAMP
29	8410-8700	WORK LAMPS	8510	MF5 - 80A		MAXI FUSE - LIGHTING

29	8410-8700	WORK LAMPS	8525	E4	C098	RIGHT HAND BEACON
29	8410-8700	WORK LAMPS	8545	K15		RELAY - WORKLAMP LOWER FRONT
29	8410-8700	WORK LAMPS	8550	F27 - 15A		FUSE - FRONT WORKLAMPS (FRONT HOOD)
29	8410-8700	WORK LAMPS	8575	K16		RELAY - WORKLAMP LOWER REAR
29	8410-8700	WORK LAMPS	8580	F30 - 15A		FUSE - REAR/LOWER WORKLAMPS
29	8410-8700	WORK LAMPS	8615	H33	C613	CORNER LAMP LH
29	8410-8700	WORK LAMPS	8630	H34	C058	LEFT HAND WORKLAMP
29	8410-8700	WORK LAMPS	8650	H35	C061	RIGHT HAND WORKLAMP
29	8410-8700	WORK LAMPS	8665	H36	C614	CORNER LAMP RH
30	8710-9000	TRAILER BRAKES	8710	K10		RELAY - TRAILER BRAKE SUPPLY - PNEUMATIC
30	8710-9000	TRAILER BRAKES	8740	K11		RELAY - TRAILER BRAKE SUPPLY - HYDRAULIC
30	8710-9000	TRAILER BRAKES	8750	S59	C136	HANDBRAKE SWITCH
30	8710-9000	TRAILER BRAKES	8800	X15	C050	TRAILER BRAKE CONNECTOR
30	8710-9000	TRAILER BRAKES	8815	Y48	C408	ITALIAN TRAILER BRAKE - SOLENOIDS
30	8710-9000	TRAILER BRAKES	8830	S60	C409	ITALIAN TRAILER BRAKE - PUMP PRESSURE SWITCH
30	8710-9000	TRAILER BRAKES	8830	S61	C410	ITALIAN TRAILER BRAKE - LINE PRESSURE SWITCH
30	8710-9000	TRAILER BRAKES	8835	Y49	C408	ITALIAN TRAILER BRAKE - SOLENOIDS
30	8710-9000	TRAILER BRAKES	8890	S62	C407	AIR BRAKE PRESSURE SWITCH
30	8710-9000	TRAILER BRAKES	8920	X16	C055	TRAILER SOCKET
30	8710-9000	TRAILER BRAKES	8940	X17	C144	AIR BRAKE CONNECTOR
30	8710-9000	TRAILER BRAKES	8945	Y50	C406	AIR BRAKE SOLENOID
30	8710-9000	TRAILER BRAKES	8970	Y51	C576	BRAKE DE-ICER
30	8710-9000	TRAILER BRAKES	8990	Y52	C577	PARK BRAKE SOLENOID
31	9010-9300	SENSORS	9020	B33	C022	FUEL TANK SENDER
31	9010-9300	SENSORS	9060	F21 - 15A		FUSE - GRID HEATER, WIF SENSOR, BRAKE FLUID LEVEL SW
31	9010-9300	SENSORS	9060	S63	C007	BRAKE FLUID RESERVOIR SWITCH
31	9010-9300	SENSORS	9110	B34	C068	RADAR
31	9010-9300	SENSORS	9150	S64	C174	PAS PRESSURE SWITCH
31	9010-9300	SENSORS	9175	B35	C014	STEERING SENSOR

31	9010-9300	SENSORS	9250	X18	C366	RADAR SOCKET HARNESS CONNECTOR
32	9310-9600	WIPERS	9340	M5	C088	FRONT WIPER MOTOR
32	9310-9600	WIPERS	9400	S65	C073	WINDSHIELD WIPER SWITCH
32	9310-9600	WIPERS	9410	F11 - 10A		FUSE - FRONT + REAR WINDSHIELD WIPER
32	9310-9600	WIPERS	9450	M6	C140	REAR WASHER MOTOR
32	9310-9600	WIPERS	9480	M7	C139	FRONT WASHER MOTOR
32	9310-9600	WIPERS	9510	K1/K2		RELAY - FRONT WINDSHIELD WIPER MODULE
32	9310-9600	WIPERS	9540	F12 - 10A		FUSE - WIPER SWITCH + REAR WIPER PARK
32	9310-9600	WIPERS	9590	M8	C109	REAR WIPER MOTOR
33	9610-9900	DIAGNOSTICS 1	9620	X19	C375	ADIC DIAGNOSTIC CONNECTOR
33	9610-9900	DIAGNOSTICS 1	9660	F33 - 25A		FUSE - DIAGNOSTIC CONNECTOR + ENGINE ECU
33	9610-9900	DIAGNOSTICS 1	9680	X20	C445	SELECT CAN DIAG
33	9610-9900	DIAGNOSTICS 1	9700	X21	C278	ECM DIAGNOSTIC CONNECTOR
33	9610-9900	DIAGNOSTICS 1	9770	X22	C553	ISO BUS CAN EXTENSION
33	9610-9900	DIAGNOSTICS 1	9810	X23	C620	SPARE 1
33	9610-9900	DIAGNOSTICS 1	9830	X24	C621	SPARE 2
33	9610-9900	DIAGNOSTICS 1	9870	X25	C556	TECU CAN SPARE
34	9910-10200	DIAGNOSTICS 2	10040	X26	C443	EHR CAN
34	9910-10200	DIAGNOSTICS 2	10130	X27	C444	TRANS CAN
35	10210-10500	SWCD / VT SCREEN	10220	X28	C594	REAR VIEW CAMERA
35	10210-10500	SWCD / VT SCREEN	10340	A8	C595	SWCD / VT UNIT
35	10210-10500	SWCD / VT SCREEN 1	10475	X29	C600	BREAK AWAY 2
36	10510-10800	SWCD / VT SCREEN 2	10535	X30	C552	NON TECU POWER 2
36	10510-10800	SWCD / VT SCREEN 2	10555	X31	C555	NON TECU POWER 1
37	10810-11100	PROCESSORS 1	10845	A10	C100	TCM CON 1
37	10810-11100	PROCESSORS 1	10845	A9	C324	XCM CN1A (CENTRAL CONTROLLER)
37	10810-11100	PROCESSORS 1	10890	MF3 - 80A		MAXI FUSE - B+ KAM ADIC, ENGINE ECU, TRANSMISSION ECU
37	10810-11100	PROCESSORS 1	10920	F35 - 10A		FUSE - DC MEM + BCM + OCM
37	10810-11100	PROCESSORS 1	10975	K17		RELAY - ELECTRONICS SUPPLY

37	10810-11100	PROCESSORS 1	11025	F41 - 15A		FUSE - FRONT SUSPENSION / PTO (+ EHR LEVERS)
37	10810-11100	PROCESSORS 1	11035	F37 - 15A		FUSE - TRANSMISSION IGNITION
37	10810-11100	PROCESSORS 1	11045	F38 - 10A		FUSE - REAR PTO SWITCH/LAMP, HPL, BCM, GROUND SPEED PTO, DOG CONN.
37	10810-11100	PROCESSORS 1	11055	F36 - 10A		FUSE - INSTRUMENT CLUSTER IGNITION
37	10810-11100	PROCESSORS 1	11070	F34 - 10A		FUSE - INSTRUMENT CLUSTER
37	10810-11100	PROCESSORS 1	11095	A11	C079	INST PANEL A
38	11110-11400	PROCESSORS 2	11120	A12	C554	TECU -CN1
38	11110-11400	PROCESSORS 2	11120	A16	C081	INST PANEL C
38	11110-11400	PROCESSORS 2	11160	A13	C560	AIR CON EARTH
38	11110-11400	PROCESSORS 2	11260	A14	C593	ENCODER AND SWITCHES
38	11110-11400	PROCESSORS 2	11390	A15	C239	FPS 3RD PROCESSOR CONNECTOR
39	11410-11700	AIR CON 1	11420	E5	C010	AIR CON COMPRESSOR
39	11410-11700	AIR CON 1	11425	K19		RELAY - COMPRESSOR CLUTCH FEED
39	11410-11700	AIR CON 1	11460	F3 - 10A		FUSE - A/C CLUTCH
39	11410-11700	AIR CON 1	11480	F5 - 30A		FUSE - BLOWER MOTOR
39	11410-11700	AIR CON 1	11480	MF6 - 80A		MAXI FUSE - ACCESSORIES CAB
39	11410-11700	AIR CON 1	11500	F44 - 25A		FUSE - FRONT B+
39	11410-11700	AIR CON 1	11520	F18 - 15A		FUSE - BLOWER MOTOR + SEAT
39	11410-11700	AIR CON 1	11520	K6		RELAY - BLOWER MOTOR
39	11410-11700	AIR CON 1	11630	S66	C011	AIR CON PRESSURE SWITCH
40	11710-12000	AIR CON 2 - AUTO	11720	M9	C119	HEATER / AIRCON CONNECTOR
40	11710-12000	AIR CON 2 - AUTO	11740	A17	C119	HEATER / AIRCON CONNECTOR
40	11710-12000	AIR CON 2 - AUTO	11760	B36	C119	HEATER / AIRCON CONNECTOR
40	11710-12000	AIR CON 2 - AUTO	11780	B37	C119	HEATER / AIRCON CONNECTOR
40	11710-12000	AIR CON 2 - AUTO	11820	A18	C628	AUTO TEMP CONTROL
40	11710-12000	AIR CON 2 - AUTO	11830	B38	C630	HVAC UNIT

40	11710-12000	AIR CON 2 - AUTO	11860	B39	C630	HVAC UNIT
40	11710-12000	AIR CON 2 - AUTO	11880	S67	C630	HVAC UNIT
40	11710-12000	AIR CON 2 - AUTO	11900	Y53	C630	HVAC UNIT
40	11710-12000	AIR CON 2 - AUTO	11970	B40	C627	TEMP CTRL
40	11710-12000	AIR CON 2 - AUTO	11970	S68	C362	HEATER BLOWER SWITCH
40	11710-12000	AIR CON 2 - AUTO	11970	S69	C629	AIR CON SWITCH
41	11710-12000	AIR CON 3 - MANUAL	11780	M9	C119	HEATER / AIRCON CONNECTOR
41	11710-12000	AIR CON 3 - MANUAL	11970	S70	C627	LOW PRESSURE SWITCH
41	11710-12000	AIR CON 3 - MANUAL	11970	S71	C627	LOW TEMPERATURE (FREEZE) SAFETY SWITCH
41	11710-12000	AIR CON 3 - MANUAL	11970	S68	C362	HEATER BLOWER SWITCH
41	11710-12000	AIR CON 3 - MANUAL	11970	S69	C629	AIR CON SWITCH

Wiring harness - Overview

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Wire Colour Codes							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		

Wire Code References

CIRC	COLOUR	DESCRIPTION
1	R	BATTERY SUPPLY
10	G	STOPLAMP SWITCH FEED
11	G	IGNITION SUPPLY (2ND)
12	U	MAIN BEAM HEADLAMP FUSE SUPPLY
13	U	DIP BEAM HEADLAMP FUSE SUPPLY
15	U	LIGHTING SWITCH SUPPLY
28	Y	WIPER MOTOR (PARK RETURN)
29	G	MAIN FUEL SENDER SIGNAL
31	Y	ENGINE OIL PRESSURE SENDER SIGNAL
39	G	TEMPERATURE GAUGE SIGNAL
44	L	FLASHER UNIT (49A)
49	G	RIGHT HAND TURN SIGNAL
50	G	LEFT HAND TURN SIGNAL
56	W	WIPER MOTOR-HIGH
57	B	EARTH (ALL)
58	R	WIPER MOTOR-LOW
60	B	SENSOR GROUND
61	B	CASE GROUND
63	U	WIPER MOTOR-PARK FEED
65	W	DUAL POWER/4 WHEEL DRIVE SWITCH FEED
71	W	IGNITION SWITCHED FEEDS (UNFUSED)
84	G	WINDSHIELD WASHER SWITCH FEED
90	G	DUAL POWER / FOUR WHEEL DRIVE SWITCH
97	L	WINDSHIELD WASHER FEED
137	W	RADIO FEED
138	P	RADIO KAM
150	N	BATTERY FEED (UNFUSED)(ALL)
155	G	BATTERY FEED (FUSED)
160	U	BATTERY SUPPLY ELECTRONICS
170	K/	BATTERY ISOLATOR CONTROL SWITCH
171	W	BATTERY ISOLATOR RELAY COIL
172	W	BATTERY ISOLATOR RELAY COIL (OFF)
181	G	BLOWER MOTOR FEED
182	P	THERMOSTATIC SWITCH FEED
249	LG	SMV LAMPS RH
250	LG	SMV LAMPS LH
252	N	ALTERNATOR FIELD
349	LN	TRAILER TURN LAMPS RH
350	LN	TRAILER TURN LAMPS LH
365	G	LOW FUEL WARNING LAMP (DELAY ON)

366	O	LOW FUEL WARNING LAMP (DELAY SWITCH)
376	P	HORN FEED
587	LG	W1NDSHIELD WIPER INTERMITTENT DELAY
649	O	COOLANT TEMPERATURE SWITCH
650	TQ	COOLANT LEVEL SWITCH
666	P	DOMELAMP SWITCH FEED
787	G	AUXILIARY FUEL PUMP SUPPLY
810	G	STOPLAMPS
820	R	STOPLAMP SWITCH LH
830	U	STOPLAMP SWITCH RH
840	G	R & L STOPLAMP SIGNAL
976	W	LICENCE PLATE LAMP / WORKLAMP DIODE
978	W	LICENCE PLATE LAMP
979	S	BLOWER MOTOR HIGH SPEED (4th)
980	N	THERMOSTAT SWITCH SUPPLY
981	G	A/C CLUTCH RELAY FEED
982	G	BLOWER MOTOR FEED
984	P	TEMPERATURE CONTROL POT. INPUT
986	P	TEMPERATURE CONTROL POT. OUTPUT
989	P	BLOWER MOTOR MEDIUM SPEED (2nd)
996	P	BLOWER MOTOR HIGH SPEED (3RD)
997	G	WORK LAMP-REAR FEED (OUTER)
998	G	WORK LAMP-REAR FEED (INNER)
999	G	BLOWER MOTOR LOW SPEED (1st)
1000	W	SAFETY START SWITCH SUPPLY
1001	W	STARTER SOLENOID FEED
1002	P	IMPLEMENT LAMP SWITCH SUPPLY
1003	G	SUPPLY TO GAUGES
1004	G	SUPPLY TO HORN AND HEADLAMP FLASH
1005	S	AIR CLEANER WARNING LAMP
1006	N	ALTERNATOR WARNING LAMP
1007	W	ETHER START BUTTON SUPPLY
1008	N	ETHER START SOLENOID SUPPLY
1009	N	ALTERNATOR FIELD
1010	G	IGNITION RELAY (COIL)
1011	Y	SUPPLY TO FUSES
1012	R	ILLUMINATION
1013	R	RIGHT HAND LAMPS
1014	R	LEFT HAND LAMPS
1015	P	DOME LAMP SWITCH FEED
1016	P	HORN FEED
1017	LG	AIR CON. THERMOSTATIC SWITCH FEED
1018	LG	AIR CONDITIONER CLUTCH
1019	G	WINDSHIELD WIPER FEED
1020	G	HAZARD SWITCH SUPPLY
1021	P	HAZARD SWITCH SUPPLY (BATTERY)
1022	N	THERMOSTART
1023	N	LIGHT SWITCH FEED
1024	R	RIGHT & LEFT HAND SIDELAMP FEED
1025	G	HZD SWITCH IGN FEED
1026	U	HIGH BEAM INDICATOR LAMP
1027	U	HEADLAMP MAIN BEAM
1028	U	HEADLAMP MAIN BEAM FUSE
1029	U	HEADLAMP DIP BEAM FUSE
1030	U	HEADLAMP DIP BEAM
1031	R	INSTRUMENT ILLUMINATION
1032	LG	TURN SIGNAL WARNING LAMP (TERM C)

1033	LG	TURN SIGNAL WARNING LAMP (TERM C2)
1034	LG	TURN SIGNAL WARNING LAMP (TERM C3)
1035	W	ENGINE OIL PRESSURE WARNING LAMP
1036	N	IGNITION SWITCH (BATTERY)
1037	LG	FLASHER UNIT (TERM 49A)
1038	LN	WINDSHIELD WIPER FEED-REAR
1040	LG	FLASHER SWITCH TO RELAY-RHS CUT OUT
1041	LG	FLASHER SWITCH TO RELAY-LHS CUT OUT
1042	U	RELAY FEED ELECTRONICS
1043	U	RELAY FEED TO FUSES
1044	W	GRID HEATER FEEDBACK
1050	G	ACCESSORY FEED
1051	Y	SIDE LIGHTS RELAY COIL FEED
1052	Y	GET YOU HOME LIGHTS RELAY
1070	R	FRONT WORKLAMP SWITCH FEED
1071	P	WORKLAMP FRONT FEED
1072	P	WORKLAMP FRONT RELAY SUPPLY
1073	P	WORKLAMP FRONT FEED
1090	R	REAR WORKLAMP RELAY SIGNAL
1091	R	FRONT WORKLAMP LOWER RELAY SIGNAL
1092	R	FRONT WORKLAMP RELAY SIGNAL
1093	R	FENDER WORKLAMP RELAY SIGNAL
1096	R	WORKLAMP FENDER MOUNTED
1097	R	FEED FRONT WORKLAMP OUTER
1098	W	FRONT WORKLAMP RELAY GROUND
1099	R	FEED FRONT WORKLAMP INNER
1119	G	RR WINDSHIELD WIPER
1120	G	RR WINDSHIELD WIPER PARK RETURN
1121	G	RR WINDSHIELD WASH
1130	N	ENGINE HEATER CONTROL TO IGN SWITCH
1135	G	THERMOSTART WARNING LAMP
1140	K	THERMOSTART INITIATE SIGNAL TO RELAY
1141	N	GRID HEATER +
1142	N	GRID HEATER FUSE TO PWR. RELAY
1143	N	POWER RELAY TO GRID HEATER
1150	N	CAL/SEL SWITCH
1160	R	REVERSE ALARM
2001	N	BATTERY TEMPERATURE SENSOR
2002	N	BATTERY TEMP SENSOR (ALT OUTPUT)
2003	W	STARTER SOLENOID FEED
2005	O	AIR CON CLUTCH RELAY
2006	U	DE-ICING SWITCH - AIR CONDITIONER
2007	Y	AIR CONDITIONER LOW PRESSURE
2008	N	LIFT PUMP SUPPLY
2009	G	FUEL PUMP SUPPLY
2010	LG	AIRCON PLUG TO DE-ICING SWITCH
2011	P	HORN RETURN
2012	Y	TRANS OIL PRESSURE WARNING LAMP
2013	Y	PTO OVERSPEED WARNING LAMP
2014	G	ENGINE OIL PRESSURE SENDER (+5 VOLT)
2015	W	TACHOMETER SENSOR-SIGNAL
2016	Y	REAR AXLE SPEED SENSOR-SIGNAL
2017	P	BULB TEST (EIC)
2018	R	RADAR PRESENT
2019	K	ENGINE RPM (TACHO MODULE TO TPM)
2020	Y	ENGINE SHUT DOWN (TACHO MODULE TO TPM)
2021	Y	AXLE GROUND SPEED (TACHO MODULE TO TPM)

2022	Y	PTO 540/1000 RPM (TACHO MODULE TO TPM)
2023	S	TPM TO EIC (AXLE SPEED DRIVE)
2024	S	RADAR SIGNAL DRIVE
2025	S	AUDIO ALARM CONTROL
2026	S	IMPLEMENT SWITCH SIGNAL
2027	R	RADAR ASSEMBLY (GUN) POWER
2028	G	RADAR ASSEMBLY (GUN) SIGNAL
2029	P	INSTRUMENT MEMORY SUPPLY
2030	N	ELECTRONIC DRAFT CONTROL
2031	Y	RADAR PRESENT
2040	LG	WATER IN FUEL SENSOR
2041	P	FUEL SHUT OFF
2042	O	PTO SOLENOID-REAR
2043	O	PTO SOLENOID-FRONT
2044	O	PTO SOLENOID-FRONT RETURN(-)
2045	O	PTO SWITCH TO MODULE
2046	O	PTO SWITCH (VCC)
2047	O	PTO SWITCH (VCCO)
2048	O	PTO SWITCH (VCCS)
2049	OP	PTO SWITCH 1000RPM WARNING LAMP
2050	G	PTO SUPPLY / DOG SUPPLY
2051	O	PTO SOLENOID RETURN (-)
2052	W	PTO LUBE SOL
2053	P	PTO LUBE SOL RETURN
2055	W	PTO SYNCHRO GROUND SPEED ENGAGED
2056	W	PTO FENDER PTO SWITCH ON
2057	W	PTO FENDER SWITCH LH - RH LINK
2059	W	FENDER PTO SWITCH INPUT
2060	O	PTO 540/1000 SWITCH
2062	W	PTO TWIST SENSOR
2065	N	PTO ENGAGED
2068	N	PTO SOFT START
2069	U	PTO MANAGEMENT ON
2070	O	ENGINE SHUT OFF RELAY +12V
2080	O	ENGINE SHUT OFF RELAY
2087	O	EXHAUST BRAKE SOLENOID
2090	W	STARTER RELAY TO START INHIBIT SWITCH
2095	G	INSTRUMENT SIGNAL GROUND
2100	G	A/C CONDENSER MOTOR FEED
2120	LN	PTO BRAKE SIGNAL
2130	N	PTO BRAKE SOLENOID
2140	O	PTO SPEED SENSOR
2150	P	PTO EXT. SWITCH OFF
2200	G	SERVICE MODE INITIATE
2245	K	PTO FRONT - SWITCH TO MODULE (MOM)
2248	K	PTO FRONT - SWITCH (VCCS)
2250	K	PTO FRONT - SUPPLY
2260	O	PTO FRONT - SPEED SIGNAL
2270	O	PTO FRONT - WARNING LAMP
2300	P	THEORETICAL GROUND SPEED ISO 11786 SKT.PIN#2
2310	P	IN/OUT OF WORK-HPL MODE ISO11786 SKT.PIN#4
2320	P	TRUE GROUND SPEED ISO 11786 SKT.PIN#1
2330	P	PTO SPEED ISO11876 SKT.PIN#3
2500	N	FRONT HITCH SOLENOID
2510	N	FRONT HITCH POSITION SIGNAL
2520	N	FRONT HITCH SET POSITION SIGNAL
2530	N	FRONT HITCH V REF

2540	N	FRONT HITCH +12v IGN
2550	N	FRONT HITCH OVERIDE SWITCH
2556	N	FRONT HITCH SWITCH COMMON RAIL
2560	N	FRONT HITCH 0v REF
2570	R	FRONT HITCH RAISE SOLENOID
2571	S	FRONT HITCH RAISE SOLENOID RETURN(-)
2580	R	FRONT HITCH LOWER SOLENOID
2581	S	FRONT HITCH LOWER SOLENOID RETURN (-)
2582	LG	STEYR - EXT SWITCHES
2583	LN	STEYR - EXT SWITCHES.
2584	W	OILMOTOR MODE
2585	LN	EFH RAISE SWITCH
2586	LN	EFH WORK SWITCH
2587	N	EFH EXTERNAL SWITCH +
2588	P	EFH EXTERNAL SWITCH UP
2589	R	EFH EXTERNAL SWITCH DOWN
2590	LN	EXTERNAL SWITCH FHPL UP
2591	LN	EXTERNAL SWITCH FHPL DOWN
2592	N	EFH VALVE DOWN +
2593	N	EFH VALVE DOWN -
2594	O	EFH POSITION SENSOR +
2595	P	EFH POSITION SENSOR SIGNAL
2596	R	EFH POSITION SENSOR -
2597	LN	EFH PRESSURE SENSOR SIGNAL
2598	S	EFH ACCUMULATOR 14 BAR
2599	N	EFH ACCUMULATOR 40 BAR
2600	Y	REAR AXLE SPEED MONITOR
3000	G	FLASHER UNIT SUPPLY (TERMINAL 49)
3001	G	LEFT HAND FLASHER CIRCUIT
3002	G	RIGHT HAND FLASHER CIRCUIT
3003	W	RADIO FEED
3004	G	RIGHT HAND TURN SIGNAL WARNING LAMP
3005	G	LEFT HAND TURN SIGNAL WARNING LAMP
3006	G	AUXILIARY FUEL TANK SENDER
3007	G	FUEL GAUGE FEED
3008	U	WORKLAMP WARNING LIGHT
3009	G	FLASHER UNIT SUPPLY B+
3010	R	FOGLAMP FEED
3011	R	FOGLAMP FEED
3012	G	HANDBRAKE WARNING FEED
3013	LG	AUXILIARY FUEL TANK SIGNAL
3014	R	HANDBRAKE WARNING LAMP SIGNAL
3015	P	ACCESSORY SOCKET (POWER)
3016	S	NOT KNOWN
3018	G	FLASHER UNIT BUZZER FEED
3020	Y	DUAL POWER SOLENOID SUPPLY
3022	Y	DUAL POWER (HIGH) WARNING LAMP
3024	Y	NOT KNOWN
3025	Y	FOUR WHEEL DRIVE SOLENOID (MANUAL)
3026	Y	NOT KNOWN
3027	Y	FOUR WHEEL DRIVE SOLENOID (AUTO)
3028	Y	BRAKE PEDAL SWITCH LEFT
3030	W	ACCESSORY RELAY SIGNAL
3045	Y	FOUR WHEEL DRIVE WARNING LAMP
3050	P	AUXILIARY FEED CONNECTOR SUPPLY
3051	P	CIGAR LIGHTER SUPPLY
3052	P	DOME LAMP TO DOOR SWITCH
3053	S	SPEAKER RIGHT HAND

3054	S	SPEAKER NEGATIVE RH
3055	S	SPEAKER LEFT HAND
3056	N	SPEAKER NEGATIVE LH
3060	P	IMPLEMENT SOCKET RELAY
3061	P	IMPLEMENT SOCKET
3062	P	IMPLEMENT SOCKET SWITCH
3070	P	'B' PILLAR SKT SUPPLY
3075	O	TRAILER SOCKET (ACCESSORY FEED)
3076	O	ACCESSORY SWITCH FEED
3077	Y	RADIO +12VB
3078	O	RADIO +12V ILLUMINATION
3079	R	RADIO +12V IGNITION
3080	P	CONSOLE LAMP
3090	Y	SEAT PUMP SUPPLY
3091	P	SPEAKER RR-RHS +
3092	P	SPEAKER RR-RHS -
3093	S	SPEAKER FRT-RHS +
3094	S	SPEAKER FRT-RHS -
3095	W	SPEAKER FRT-LHS +
3096	S	SPEAKER FRT-LHS -
3097	G	SPEAKER RR-LHS +
3098	G	SPEAKER RR-LHS -
3100	G	STEERING SENSOR +5v
3120	K	STEERING SENSOR SIGNAL
3140	LG	STEERING SENSOR GROUND
3150	W	HANDBRAKE SWITCH (N.C CONTACT) OFF SIG
3155	W	HANDBRAKE TRANS INTERLOCK
3160	O	AUTO GUIDANCE STEERING PRESS SENSOR SIGNAL
3161	O	AUTO GUIDANCE STEERING PRESS SENSOR RETURN
3163	O	AUTO GUIDANCE STEERING SOLENOID VLV R FEED
3164	O	AUTO GUIDANCE STEERING SOLENOID VLV R RETURN
3165	O	AUTO GUIDANCE STEERING SOLENOID VLV L FEED
3166	O	AUTO GUIDANCE STEERINGSOLENOID VLV L RETURN
3167	O	AUTO GUIDANCE STEERING PRESSURE SENSOR +5V REF
3168	O	AUTO GUIDANCE DUMP SOLENOID FEED (HSD)
3169	O	AUTO GUIDANCE DUMP SOLENOID RETURN (CURSEN)
3170	O	FAST STEER SYSTEM (FSS)- ENABLE
3171	O	FSS - LAMP
3172	L	FSS - STEERING PROXIMITY SENSOR POSITION
3173	R	FSS - HYD. VALVE HIGH SIDE DRIVER
3174	G	FSS - HYD. VALVE LOW SIDE DRIVER
3175	W	FSS - POSITION SENSOR PRIMARY POSITIVE
3176	B	FSS - POSITION SENSOR PRIMARY NEGATIVE
3177	U	FSS - POSITION SENSOR SECONDARY COMMON
3178	G	FSS - POSITION SENSOR SECONDARY POSITIVE
3179	N	FSS - POSITION SENSOR SECONDARY NEGATIVE
3180	B	FSS - SAFETY SWITCH
3181	S	AUTO GUIDANCE PPS SIGNAL INPUT TO GPS
3185	N	AUTO GUIDANCE REMOTE ENGAGE
3187	N	AUTO GUIDANCE ROADING SELECT
3200	O	SUSPENSION SWITCH FEED
3210	U	SUSPENSION SWITCH RETURN
3215	U	SUSPENSION LAMP
3220	O	AXLE HEIGHT SENSOR 5V REF
3230	U	AXLE HEIGHT SENSOR POSITION
3235	O	ACCELEROMETER SIGNAL
3240	O	RAISE SOLENOID PWR
3250	O	RAISE SOLENOID RET

3260	O	LOWER SOLENOID PWR
3270	O	LOWER SOLENOID RET
3271	U	LOADER RELAY FEED
3272	O	LOADER VALVE #1 OUT
3273	O	LOADER VALVE #1 RETURN
3274	R	LOADER VALVE #2 OUT
3275	R	LOADER VALVE #2 RETURN
3276	G	LOADER VALVE
3277	U	LOADER VALVE #3 COIL
3278	U	LOADER VALVE #3 RELAY
3280	O	SUSPENSION LOCKOUT SOLENOID UPPER
3281	LN	SUSPENSION LOCKOUT SOLENOID UPPER RETURN (-)
3285	LN	SUSPENSION LOCKOUT SOLENOID LOWER
3286	LN	SUSPENSION LOCKOUT SOLENOID LOWER RETURN (-)
3290	O	SUSPENSION LOCKOUT LAMP (OR SOLENOID RET)
3295	LN	FRONT SUSPENSION PRESSURE SWITCH SIGNAL
3300	O	SENSE LINE CONTROL SOLENOID
3310	U	RAISE LOCKOUT SOLENOID
3500	W	POWER STEERING PRESSURE SIGNAL
4001	R	TRANSMISSION OIL WARNING LAMP (TEMP)
4002	R	TRANSMISSION OIL WARNING LAMP SWITCH
4010	N	RETURN TO DIG
4011	P	ROTATING BEACON SWITCH SUPPLY
4012	P	ROTATING BEACON FEED
4013	U	TRANS CONTROL FEED
4014	U	FORWARD CLUTCH SOLENOID FEED
4015	U	REVERSE CLUTCH SOLENOID FEED
4016	U	TORQUE CONVERTOR LOCK-UP RELAY FEED
4017	U	TORQUE CONVERTOR LOCK-UP LAMP
4018	S	TORQUE CONVERTOR LOCK-UP SOLENOID FEED
4019	S	HYDRAULIC FILTER BY-PASS SWITCH FEED
4020	S	HYDRAULIC FILTER BY-PASS LAMP
4021	S	BACK-UP ALARM RELAY FEED
4022	S	BACK-UP ALARM FEED
4025	Y	4 IN 1 BUCKET FEED
4040	G	LINK LEVEL SWITCH SUPPLY
4050	W	LINK LEVEL RAISE
4051	W	LINK LEVEL LOWER
4052	W	LINK LEVEL EXTEND SIDE
4053	W	LINK LEVEL RETRACT SIDE
4054	W	LINK LEVEL SAFETY VALVE (DUMP)
4055	W	LINK LEVEL TOP LINK EXTEND SOLENOID
4056	W	LINK LEVEL TOP LINK RETRACT SOLENOID
4057	W	LINK LEVEL RIGHT LINK RAISE SOLENOID
4058	W	LINK LEVEL RIGHT LINK LOWER SOLENOID
4060	W	HYDRAULIC SELECT FRONT
4061	W	HYDARAULIC SELECT REAR
4100	TQ	TRANS RANGE ENABLE SWITCH SUPPLY
4101	TQ	TRANS RANGE ENABLE
4120	P	BEACON RELAY COIL
5000	P	EDC MEMORY POWER
5005	N	EDC KEY SWITCH FEED
5010	B/W	EDC EARTH
5011	B	EDC EARTH CASE RFI
5015	R	EDC CONTROLS BACKLIGHTING
5020	LN	EDC PROC +5V REF VOLTAGE DROP POSN/RATE
5021	K	EDC PROCESSOR REF VOLT (+5V) ROCKSHAFT
5022	K	EDC PROCESSOR REF VOLT +5V QUADRANT

5023	K	EDC PROCESSOR REF VOLT +5V HEIGHT LIMIT
5025	LN	EDC LOWER SIGNAL
5030	LN	EDC RAISE SIGNAL
5035	LN	EDC RETURN REF. VOLTAGE EARTH
5040	LN	EDC DRAFT POSITION
5045	LN	EDC DROP RATE
5050	LN	EDC QUADRANT
5055	LN	EDC CLOCK LINE TO DISPLAY
5060	LN	SERIAL DATA TO CLUSTER
5065	LN	EDC RIGHT PIN
5070	LN	EDC LEFT PIN
5075	K	EDC VOLTAGE TO PINS
5080	K	EDC ROCKSHAFT
5085	K	EDC VALVE UP
5087	K	EDC VALVE UP RETURN
5090	K	EDC VALVE DOWN
5095	K	EDC EXTERNAL SWITCH DOWN
5097	K	EDC VALVE DOWN RETURN
5100	K	EDC EXTERNAL SWITCH UP
5105	S	EDC IMPLEMENT STATUS SWITCH
5110	K	EDC LAMP SIGNAL
5115	K	EDC SLIP SIGNAL
5120	K	EDC HEIGHT LIMIT SIGNAL
5125	TQ	EDC RAISE SIGNAL-RAISE WORK SWITCH
5130	TQ	EDC WORK SIGNAL-RAISE WORK SWITCH
5132	TQ	EDC FLOAT
5133	TQ	EDC STOP
5135	TQ	EDC +WHEEL SPEED SIGNAL
5140	TQ	EDC -WHEEL SPEED SIGNAL
5145	TQ	EDC SLIP LIMIT POT
5150	G	EDC EXTERNAL SWITCH SUPPLY
5155	U	EDC LOWER LIMIT POT
5160	TQ	EDC HEIGHT LIMIT POT FEED
5170	LN	SERIAL DATA FROM CLUSTER
5175	R	ADIC KEY PAD DISABLE
5180	TQ	EDC SLIP INDICATOR LAMP
5190	R	HPL INTERLOCK / LIFT-O-MATIC
5200	N	EDC VALVE SUPPLY
5210	N	EDC VALVE ENABLE
5220	Y	EDC RAISE LAMP
5230	Y	EDC LOWER LAMP
5240	O	EDC RAISE SIGNAL-RAISE WORK SWITCH No.2
5250	O	EDC WORK SIGNAL-RAISE WORK SWITCH No.2
5260	LN	HYDRAULIC MASTER SW #1
5265	LN	HYDRAULIC MASTER SW #2
5300	K	ECU FLASH PROGRAM SIGNAL
5400	Y	CAN H
5420	G	CAN L
5500	Y	EHR CAN HIGH
5510	G	EHR CAN LOW
5515	S	EHR +12V IGN.
5520	LG	EHR 5V Ref
5521	LG	EHR Motor #1
5522	LG	EHR Motor #2
5523	LG	EHR Motor #3
5524	LG	EHR Motor #4
5531	LG	EHR NEUTRAL SWITCH VALVE #1
5532	G	EHR NEUTRAL SWITCH VALVE #2

5533	K	EHR NEUTRAL SWITCH VALVE #3
5534	LG	EHR NEUTRAL SWITCH VALVE #4
5535	LG	EHR FLOAT SWITCH VALVE#1
5536	LN	EHR FLOAT SWITCH VALVE#2
5537	N	EHR FLOAT SWITCH VALVE#3
5538	O	EHR FLOAT SWITCH VALVE#4
5541	O	EHR MAX.FLOW SWITCH VALVE #1
5542	P	EHR MAX.FLOW SWITCH VALVE #2
5543	S	EHR MAX.FLOW SWITCH VALVE #3
5544	TQ	EHR MAX.FLOW SWITCH VALVE #4
5551	O	EHR POTENTIOMETER SIGNAL VALVE#1
5552	U	EHR POTENTIOMETER SIGNAL VALVE#2
5553	W	EHR POTENTIOMETER SIGNAL VALVE#3
5554	U	EHR POTENTIOMETER SIGNAL VALVE#4
5561	O	EHR TIMED FLOW SWITCH #1
5562	O	EHR TIMED FLOW SWITCH #2
5563	O	EHR TIMED FLOW SWITCH #3
5564	P	EHR TIMED FLOW SWITCH #4
5591	P	EHR WARNING LAMP#1
5592	P	EHR WARNING LAMP#2
5593	P	EHR WARNING LAMP#3
5594	P	EHR WARNING LAMP#4
5595	S	EHR MASTER STOP SWITCH
5596	S	EHR MASTER STOP LAMP
5597	S	EHR MASTER ENABLE
5600	R	HTS LIVE SIGNAL
5610	R	HTS PROGRAM
5620	R	HTS ON/OFF SWITCH
5625	R	LIFT-O-MATIC SWITCH
5630	R	HTS MANUAL SWITCH
5640	R	HTS AUTO SWITCH
5700	W	EHR J-STICK X+
5710	W	EHR J-STICK X ACTIVE SWITCH
5720	W	EHR J-STICK X FULL FLOW SWITCH
5730	W	EHR J-STICK X FLOAT SWITCH
5740	W	EHR J-STICK Y+
5750	W	EHR J-STICK Y ACTIVE SWITCH
5760	W	EHR J-STICK Y FULL FLOW SWITCH
5770	W	EHR J-STICK Y FLOAT SWITCH
5820	S	EDC ROCKSHAFT POT
5830	S	HIGH FLOW PUMP LINK
5835	S	HYDRAULIC MASTER SWITCH HIGH FLOW PUMP LINK
5900	G	ISO BUS CAN SIGNAL LOW
5910	Y	ISO BUS CAN SIGNAL HIGH
5915	B	ISO BUS CAN SUPPLY GROUND
5920	R	ISO BUS CAN SUPPLY POSITIVE
5955	B/LN	RS232 INPUT T.E.C.U.
5960	W/LN	RS232 OUTPUT T.E.C.U.
5970	O	ISO BUS ECU SIGNAL
5980	U	ISO BUS IMPLEMENT SIGNAL
6000	K	ENGINE SPEED SIGNAL
6001	B	ENGINE ECU RESISTOR #1
6002	W	ENGINE ECU RESISTOR #2
6003	R	ENGINE ECU RESISTOR #3
6004	G	ENGINE ECU RESISTOR #4
6057	Y	ENGINE STARTER RELAY GROUND
6010	TQ	THROTTLE POSITION SWITCH
6100	U	ENGINE COLD ADVANCE CONTROL

6200	R	MANIFOLD (GRID) HEATER SUPPLY
6300	N	FAN SPEED
6310	N	FAN SOLENOID
6320	N	FAN 5V REF.
6355	N	+5V LOW POWER REFERENCE
6400	LN	ECU BATTERY SUPPLY
6401	G	ECU TO THROTTLE POT.+5V
6402	G	ECU TO THROTTLE POT. VAR
6403	G	ECU TO THROTTLE POT.-
6404	G	THROTTLE POT. TO LOW IDLE SWITCH
6405	G	ECU TO THROTTLE POT. SWITCH
6407	O	ENGINE SHUTDOWN SIGNAL (EDC16)
6408	G	FUSED B+ TO ECU (1)
6409	G	FUSED B+ TO ECU (2)
6410	G	FUSED B+ TO ECU (3)
6411	G	FUSED B+ TO ECU (4)
6414	G	FUSED IGN.+ TO ECU
6415	G	ECU TO J1939 TERFACE CAN#1 CONN.(HI)
6416	G	ECU TO J1939 TERFACE CAN#1 CONN.(LO)
6417	NOT REQD.	SCREEN BRAID FOR 6415 & 6416
6418	K	ECU TO J1941(ISO) INTERFACE #2 CONNECTOR ISO K
6419	K	ECU TO J1941(ISO) INTERFACE #2 CONNECTOR ISO L
6420	K	ECU SINK DRIVER#6 TO DIAGNOSTIC LAMP
6421	K	ECU SINK DRIVER#6 TO DIAGNOSTIC LAMP
6422	K	ENGINE MOUNTED B- TO ECU (1)
6423	K	ENGINE MOUNTED B- TO ECU (2)
6424	K	ENGINE MOUNTED B- TO ECU (3)
6425	K	ENGINE MOUNTED B- TO ECU (4)
6427	K	ECU TO MULTIPLE STATE SWITCH (PASS.INPUT#06)
6428	K	ECU TO MULTIPLE STATE SWITCH (PASS.INPUT#06)
6431	K	ECU TO DIAGNOSTIC REQUEST SWITCH (DIG 15)
6432	K	ECU SWITCHED BATT OUTPUT TO DIAGNOSTIC REQUEST SWITCH
6440	S	HAND THROTTLE POSITION 1
6450	S	HAND THROTTLE POSITION 2
6460	S	HAND THROTTLE SWITCH (NOT IDLE)
6500	N	CONSTANT ERPM ON/OFF
6510	N	CONSTANT ERPM SET 1
6520	N	CONSTANT ERPM SET 2
6530	N	CONSTANT ERPM INCREASE
6540	N	CONSTANT ERPM DECREASE
6550	N	CONSTANT ERPM SET LAMP
6560	U	ECU TO FUEL FILTER HEATER
6570	G	ECU TO FUEL FILTER HEATER RETURN
6580	K/	ECU TO GRID HEATER RELAY#1
6585	O	ECU TO GRID HEATER RELAY#2
6586	P	ECU TO GRID HEATER RELAY RETURN
6590	LG	ECU DIGITAL GROUND
6600	LN	ECU BATTERY SUPPLY
6610	N	ECU IGNITION SUPPLY
6620	O	ECU COOLANT TEMP. SIGNAL
6630	O	ECU COOLANT TEMP. GROUND
6640	O	ECU AC PRESSURE NOT HIGH SWITCH
6650	O	ECU BOOST GROUND
6660	O	ECU BOOST TEMP.
6670	O	ECU 5V BOOST
6680	O	ECU BOOST PRESSURE
6690	O	ECU SOLENOID VALVE SHUT OFF

6700	O	ECU CRANK SHAFT OUTPUT SHAFT
6710	O	ECU ENGINE SPEED
7000	U	TRANS CONTROL SUPPLY
7001	U	TRANS DISPLAY ILLUMINATION
7002	U	TRANS MAIN CLUTCH SOL (C3/C4)
7003	U	TRANS DUMP SOL
7004	UB	TRANS FRONT CLUTCH SOL (C1/C2)
7005	U	TRANS CREEPER GR SOL
7007	R	TRANS DUAL POWER PRESSURE SWITCH HIGH
7008	R	TRANS DUAL POWER PRESSURE SWITCH LOW
7009	W	TRANS RANGE DISABLE SWITCH
7010	U	TRANS RANGE INDICATOR SWITCH (GR 1-4)
7020	U	TRANS RANGE INDICATOR SWITCH (GR 5-8)
7025	R	TRANS DISPLAY ENABLE
7030	U	TRANS RANGE INDICATOR SWITCH COMMON
7035	N	TRANS DUMP SOLEN0ID FEED
7040	N	TRANS CREEPER SWITCH
7050	R	TRANS RELAY SUPPLY - RUN
7060	R	TRANS RELAY SUPPLY - START
7068	U	TRANS CVT POWER SUPPLY (CVT)
7070	R	TRANS FEED (IGN +)
7071	N	FEED HYD FILTER RESTRICTION IND LAMP
7080	LG	DIFF-LOCK SOLENOID FEED
7090	LG	DIFF-LOCK SWITCH TO BRAKE SWITCH
7100	N	DIFF-LOCK RELAY TO BRAKE SWITCH
7110	R	PTO INHIBITOR SWITCH TO TRANS
7120	Y	DIFF-LOCK WNG LP (MAUAL)
7125	LG	DIFF-LOCK WNG LP (AUTO)
7126	LG	DIFF LOCK PRESSURE SWITCH
7130	N	HYD FILTER WNG LP
7140	OB	DIFF-LOCK OFF SOLENOID
7150	S	LOW OIL PRESSURE WRN FEED
7160	R	HYD LOW CHARGE WARNING
7170	W	DIFF LOCK SWITCH (AUTO ON)
7175	Y	DIFF LOCK SWITCH (MANUAL ON)
7180	U	CREEPER SWITCH MOM SIGNAL
7190	K	TRANS SOLENOID VALVE SUPPLY
7195	K	TRANS SOLENOID VALVE RETURN
7196	Y	TRANS FR/REV LOW SIDE RETURN (CVT)
7197	Y	TRANS RANGE LOW SIDE RETURN (CVT)
7198	U	TRANS HYROSTATIC LOW SIDE RETURN (CVT
7200	S	TRANSMISSION SHIFT DOWN
7210	S	TRANSMISSION SHIFT UP
7220	S	TRANSMISSION HIGH RANGE
7225	W	TRANS HI RANGE SOL - RET
7230	S	TRANSMISSION LOW RANGE
7235	Y	TRANS LOW RANGE SOL - RET
7240	S	TRANSMISSION DISPLAY SWITCH
7245	LN	DEADMAN
7250	S	TRANSMISSION FORWARD SIGNAL
7260	S	TRANSMISSION REVERSE SIGNAL
7265	K	TRANS NEUTRAL SWITCH TO PROCESSOR (GR.SW 1)
7267	LG	TRANS NEUTRAL SWITCH 2 TO PROCESSOR
7270	R	TCM SERIAL DATA IN-DISPLY DATA OUT
7275	W	TCM SERIAL DATA OUT-DISPLY DATA IN
7280	W	LIMP HOME SWITCH 18x18 TRANS.
7290	W	DIRECTIONAL INTERRUPT RELAY TO SOLENOID

7300	W	SOLENOID 1 18x9 TRANSMISSION
7301	Y	SOLENOID 1 18x9 RETURN
7320	W	SOLENOID 2 18x9 TRANSMISSION
7321	P	SOLENOID 2 18x9 RETURN
7330	W	SOLENOID 3 18x9 TRANSMISSION
7331	Y	SOLENOID 3 18x9 RETURN
7340	W	SOLENOID F1 18x9 TRANSMISSION
7341	Y	SOLENOID F1 18x9 RETURN
7350	W	SOLENOID F2 18x9 TRANSMISSION
7351	S	SOLENOID F2 18x9 RETURN
7355	S	SOLENOID R 18x9 TRANSMISSION
7356	U	SOLENOID R 18x9 RETURN
7360	W	SOLENOID A 18x9 TRANSMISSION
7361	P	SOLENOID A 18x9 RETURN
7370	Y	SOLENOID B 18x9 TRANSMISSION
7371	P	SOLENOID B 18x9 RETURN
7380	Y	SOLENOID C 18x9 TRANSMISSION
7381	P	SOLENOID C 18x9 RETURN
7390	Y	SOLENOID PMW (F1) 18x9 TRANSMISSION
7391	P	SOLENIOD PWM (F1) 18x9 RETURN
7392	O	SOLENOID PWM (F2) 18x9 TRANSMISSION
7393	O	SOLENOID PWM (F2) 18x9 RETURN
7395	P	SOLENOID CREEP 18x9 TRANSMISSION
7396	P	SOLENOID CREEP 18x9 RETURN
7400	Y	TRANS RPM SPEED SENSOR TO TCM INPUT
7401	P	TRANS RPM SPEED SENSOR
7402	Y	TRANS WHLSP FORWARD (CVT)
7403	Y	TRANS WHLSP REVERSE (CVT)
7404	Y	TRANS HYDROSTAT FORWARD (CVT)
7405	Y	TRANS HYDROSTAT REVERSE (CVT)
7406	LG	TRANS BI-DI SPEED SENSOR RET (CVT)
7410	Y	TRANS RPM SPEED SENSOR TO TCM OUTPUT
7411	Y	TRANS HYDROSTATINPUT SPEED SENSOR (CVT)
7420	Y	TCM TO CLUTCH POSITION SWITCH
7430	Y	CLUTCH POSITION SIGNAL
7431	TQ	CLUTCH 'A' SUPPY
7440	Y	TCM TO TRACTOR EIC-AXLE OUTPUT
7450	W	TRANS CREEPER INTERLOCK SUPPLY
7460	W	TRANS CREEPER CLUTCH ENGAGED
7470	S	TRANS CREEPER CLUTCH DISENGAGED
7475	R	TRANS AUTO OFF
7476	R	TRANS AUTO ON
7480	G	TRANS AUTO FUNCTION 1
7482	G	TRANS AUTO ON/INCREASE
7485	K	TRANS AUTO FUNCTION LAMP 1
7490	G	TRANS AUTO FUNCTION 2
7492	G	TRANS AUTO OFF/DECREASE
7495	K	TRANS AUTO FUNCTION LAMP 2
7500	G	TRANS OIL TEMP. SENSOR
7520	G	TRANS SENSOR SUPPLY 8v
7525	G	TRANS SENSOR SUPPLY 5v
7560	G	TRANS WARNING LAMP
7570	B/W	SIGNAL GROUND
7580	U	CREEPER SOLENOID MONITOR
7581	O	CREEPER POSITION SIGNAL
7582	U	CREEPER RAIL SWITCH NOT
7586	U	PARKLOCK SOLENOID

7590	O	TRANS CREEPER GEAR STATUS LAMP
7600	N	TRANS FEATHERING SOLENOID
7620	N	TRANS FEATHERING SOL. MONITOR
7630	N	TRANS MAIN CLUTCH PRESSURE SWITCH
7640	LN	DIAGNOSTIC PLUG RS232 IN
7650	W	DIAGNOSTIC PLUG RS232 OUT
7655	Y	RS232 GROUND
7660	R	TRANS CLUTCH DISCONNECT
7670	R	TRANS FRONT SYNCHRO POSITION
7700	LN	TRANS SHUTTLE DUMP SWITCH
7710	LN	TRANS OIL TEMPERATURE SWITCH
7735	LN	TRANS MID SPEED SIGNAL +
7740	LN	TRANS MID SPEED SIGNAL -
7750	R	TCM TO DOG 30/40 KPH SELECT
7755	P	DOG ENABLE
7760	W	TORQUE SENSOR
7770	U	TRANS FORWARD PRESSURE SWITCH
7780	U	TRANS FORWARD PRESSURE SWITCH
7790	TQ	TRANS RANGE INPUT DIGITAL FEEDBACK (CVT)
7800	TQ	TRANS FR / REV INPUT DIGITAL FEEDBACK (CVT)
7810	K	TRANS PWM SOLENOID C1
7815	K	TRANS PWM SOLENOID C1 RETURN
7820	K	TRANS PWM SOLENOID C2
7825	K	TRANS PWM SOLENOID C2 RETURN
7830	K	TRANS PWM SOLENOID C3
7835	K	TRANS PWM SOLENOID C3 RETURN
7840	K	TRANS PWM SOLENOID C4
7845	K	TRANS PWM SOLENOID C4 RETURN
7846	TQ	TRANS BRAKE SOLENOID (CVT)
7847	TQ	TRANS HYROSTATIC - POSITIVE SOLENOID (CVT)
7848	TQ	TRANS HYROSTATIC - NEGATIVE SOLENOID (CVT)
7850	G	TRANS DIAGNOSTIC PROGRAM VOLTAGE
7855	G	TRANS DIAGNOSTIC EA
7860	G	TRANS DIAGNOSTIC RCV
7865	G	TRANS DIAGNOSTIC XMT
7870	G	TRANS DIAGNOSTIC RTS
7875	K	TRANS DIAGNOSTIC CTS
7880	B/W	T C M SIGNAL GROUND
7890	TQ	TRANS L-LINE DIAGNOSTIC (CVT)
7900	TQ	CLUTCH 'A' SIGNAL
7910	TQ	CLUTCH 'B' SIGNAL
7915	P	TCM CLUTCH B RETURN
7920	TQ	CLUTCH 'C' SIGNAL
7925	P	TCM CLUTCH C RETURN
7930	TQ	CLUTCH 'D' SIGNAL
7935	P	TCM CLUTCH D RETURN
7940	TQ	CLUTCH 'E' SIGNAL
7945	P	TCM CLUTCH E RETURN
7950	TQ	CLUTCH SUPPLY
7960	P	TRANS SLOW/FAST
7965	P	HI/LO SYNCHRO SIGNAL
7970	P	TRANS MED/REV
7980	K	TRANS MED RANGE
7982	W	TRANS MED RANGE RET
7985	G	TRANS REVERSE RANGE
7990	K	TRANS BRAKE
7995	K	BRAKE FLUID LEVEL
7996	R	BRAKE PEDALS UNLATCHED SIGNAL

8000	N	TRAILER BRAKE SOLENOID
8010	LN	TRAILER BRAKE PRESSURE
8020	LN	TRAILER BRAKE PRESSURE
8030	LG	TRANS FWD SOLENIOD
8035	P	TRANS FWD SOL RET
8040	LG	TRANS REV SOLENIOD
8045	P	TRANS REV SOL RET
8050	R	TRANS REV PRESSURE
8060	U	TRAILER BRAKE SUPPLY
8070	P	TRAILER PARK BRAKE SOLENOID
9000	LN	DIVERTER VALVE
9010	LN	DIVERTER VALVE SUPPLY
9020	LN	HYDRAULIC REMOTE VALVE SOL
9025	LN	HYDRAULIC REMOTE VALVE SWITCH
9026	W	NOT USED
9027	W	NOT USED
9028	W	NOT USED
9029	W	NOT USED
9030	W	NOT USED
9031	P	NOT USED
9032	Y	IGN.+ TO POWER SKT.
9033	LN	50KPH SOLENOID+
9034	LN	50KPH SOLENOID-
9035	LN	50KPH DUMP SOLENOID
9036	LN	50KPH DUMP SOLENOID RETURN

Index to Wiring Harnesses

Transmission Harness		
CONNECTOR NUMBER	CONNECTOR NAME	CONNECTOR LOCATION
C019	EXTENSION HARNESS CONNECTOR 1 (ELECTRONIC)	
C020	EXTENSION HARNESS CONNECTOR 2 (CAB)	
C022	FUEL TANK SENDER	
C023	TRANSMISSION OIL TEMPERATURE SENSOR	
C024	CLUTCH E SOLENOID	
C025	CLUTCH D SOLENOID	
C026	CLUTCH C SOLENOID	
C027	CLUTCH B SOLENOID	
C028	CLUTCH A SOLENOID	
C031	MEDIUM RANGE SOLENOID	
C032	LOW RANGE SOLENOID	
C033	PTO BRAKE SOLENOID	
C034	FOUR WHEEL DRIVE SOLENOID	
C035	4WD SWITCH 1	
C036	PRESSURE SWITCH 1 & 2 TRANSMISSION OIL	
C037	MIS SPEED SENSOR OUTPUT SPEED P.U.	
C039	HIGH RANGE SOLENOID	
C040	REVERSE RANGE SOLENOID	
C041	PTO SOLENOID	
C042	DIFFERENTIAL LOCK SOLENOID	
C043	DIFFERENTIAL LOCK OP SWITCH	
C047	LEFT HAND DRAFT PIN	

C048	RIGHT HAND DRAFT PIN	
C050	TRAILER BRAKE CONNECTOR	
C052	ROCKSHAFT POTENTIOMETER	
C054	PRO SPEED SENSOR	
C055	TRAILER SOCKET	
C144	AIR BRAKE CONNECTOR	
C173	LOW CHARGE PRESSURE SWITCH S2	
C174	PAS PRESSURE SWITCH	
C175	HYDRAULIC BLOCKED FILTER SWITCH	
C176	TRANSMISSION OIL TEMPERATURE SENDER	
C217	EDC RAISE SOLENOID	
C218	EDC DOWN SOLENOID	
C243	HIGH RANGE PRESSURE SWITCH	
C244	MEDIUM RANGE PRESSURE SWITCH	
C245	LOW RANGE PRESSURE SWITCH	
C246	REVERSELOW RANGE PRESSURE SWITCH	
C248	FRONT SUSPENSION CONNECTOR	
C255	ENGINE SPEED / P.U.TORQUE SENSOR	
C279	EHR VALVE CONNECTOR 1	
C280	EHR VALVE CONNECTOR 2	
C281	EHR VALVE CONNECTOR 3	
C282	EHR VALVE CONNECTOR 4	
C283	EHR VALVE CONNECTOR 5	
C284	LINK LEVEL (EXTERNAL CONNECTION)	
C286	CREEPER	
C288	PTO TWIST SENSOR	
C289	19TH GEAR DUMP SOLENOID	
C510	HIGH FLOW PUMP	
C539	FAST STEER - HARNESS CONNECTOR	
C602	PARK LOCK SOLENOID	

Cab Harness

CONNECTOR NUMBER	CONNECTOR NAME	CONNECTOR LOCATION
C001	MAIN HARNESS CONNECTOR E1 (ENGINE TO CAB)	
C019	EXTENSION HARNESS CONNECTOR 1 (ELECTRONIC)	
C020	EXTENSION HARNESS CONNECTOR 2 (CAB)	
C062	RIGHT HAND STOP LAMP SWITCH	
C063	LEFT HAND STOP LAMP SWITCH	
C072	KEY START SWITCH	
C073	WINDSHIELD WIPER SWITCH	
C075	SHUTTLED LEVER SWITCH	
C076	CLUTCH SWITCH	
C077	CLUTCH POTENTIOMETER	

C079	INSTRUMENT CLUSTER 'A'	
C080	INSTRUMENT CLUSTER 'B'	
C081	INSTRUMENT CLUSTER 'C'	
C100	TCM - TRANSMISSION CONTROL MODULE (CN1a)	
C101	TCM - TRANSMISSION CONTROL MODULE (CN1b)	
C103	GEAR SHIFT CONNECTOR	
C104	GEAR SHIFT INDICATOR - DOG CONNECTOR	
C113	FRONT HITCH IN CAB CONTROL POTENTIOMETER	
C114	FRONT PTO ENGAGED LAMP	
C115	FRONT PTO SWITCH	
C116	REAR PTO SWITCH	
C117	REAR PTO LAMP	
C118	REAR PTO BRAKE SWITCH	
C119	HEATER / AIR CONDITIONING CONNECTOR	
C127	TCM - TRANSMISSION CONTROL MODULE (CN3a)	
C128	TCM - TRANSMISSION CONTROL MODULE (CN3b)	
C136	HANDBRAKE	
C138	SEAT AIR PUMP	
C139	FRONT WASHER MOTOR	
C140	RIGHT REAR WASHER MOTOR	
C143	REAR IMPLEMENT CONNECTOR	
C146	LIFT-O-MATIC	
C184	RADAR	
C190	MAIN LAMPS SWITCH	
C193	CIGAR LIGHTER	
C235	30 AP POWER SCOKER AND STUDS	
C239	TCM - TRANSMISSION CONTROL MODULE (CN2)	
C260	INDICATOR FLASHER UNIT	
C269	CAB TO ENGINE MAIN CONNECTOR E2	
C278	ECM DIAGNOSTIC CONNECTOR	
C293	RIGHT HAND FENDER 1	
C294	RIGHT HAND FENDER 2	
C295	LEFT HAND FENDER 1	
C296	LEFT HAND FENDER 2	
C297	RIGHT HAND EXTREMITY LAMP	
C298	LEFT HAND EXTREMITY LAMP	
C314	HAND THROTTLE	
C324	XCM CN1A (CENTRAL CONTROLLER)	
C325	XCM CN1B (CENTRAL CONTROLLER)	
C326	XCM CN2 (CENTRAL CONTROLLER)	
C327	XCM CN3A (CENTRAL CONTROLLER)	
C328	XCM CN3B (CENTRAL CONTROLLER)	

C329	XCM CN4 (CENTRAL CONTROLLER)	
C350	MAIN POWER (FUSE) 1	
C351	MAIN POWER (FUSE) 2	
C352	MAIN POWER (FUSE) 3	
C362	HEATER BLOWER SWITCH	
C365	8 AMP POWER SOCKET	
C366	RADAR SOCKET HARNESS CONNECTOR	
C367	GRID HEATER	
C368	DIODE CONNECTOR	
C369	JOYSTICK	
C370	COMMAND ARM	
C373	INSTRUMENT CLUSTER KEYPAD	
C374	HAZARD SWITCH HARNESS CONNECTOR	
C375	ADIC DIAGNOSITIC CONNECTOR	
C376	FOOT THROTTLE ELECTRONIC	
C378	RIGHT HAND CONSOLE SWITCH GROUP CONNECTOR	
C392	EHR TO MAIN REAR CONNECTOR 1	
C424	LOADER POWER	
C425	AUXILLARY HEADLAMP SWITCH	
C441	LOADER VALVE 1	
C442	LOADER VALVE 2	
C443	EHR SELECT CAN	
C444	TRANS CAN	
C445	SELECT CAN DIAGNOSTIC	
C500	BATTERY ISOLATOR 1	
C504	BATTERY ISOLATOR DIODE	
C532	ROOF TO CAB HARNESS - ROOF	
C544	VT CONNECTOR 1	
C545	VT CONNECTOR 2	
C546	SIDE LINK SWITCH	
C547	TOP LINK SWITCH	
C548	EHR SELECT SWITCH	
C549	FRONT HITCH DETECT	
C550	DIVERTER SWITCH	
C552	NON TECU POWER 2	
C553	ISO BUS CAN EXTENSION	
C554	TECU PROCESSOR	
C555	NON TECU POWER 1	
C556	TECU CAN SPARE	
C557	AIR CONDITIONING CONTROL	
C559	AIR CONDITIONING POWER	

Fender Harness

CONNECTOR NUMBER	CONNECTOR NAME	CONNECTOR LOCATION
C093	STOP/TAIL LIGHT LEFT HAND	
C094	STOP/TAIL LIGHT RIGHT HAND	

C129	WORKLAMP RIGHT HAND	
C130	WORKLAMP LEFT HAND	
C131	LICENCE PLATE LAMP	
C134	HPL SWITCH RIGHT HAND	
C135	HPL SWITCH LEFT HAND	
C257	PTO SWITCH LEFT HAND	
C258	PTO SWITCH RIGHT HAND	
C293	RIGHT HAND FENDER 1	
C294	RIGHT HAND FENDER 2	
C295	LEFT HAND FENDER 1	
C296	LEFT HAND FENDER 2	

Switch Panel Harness

CONNECTOR NUMBER	CONNECTOR NAME	CONNECTOR LOCATION
C182	4WD SWITCH	
C183	DIFF LOCK SWITCH	
C192	CREEPER GEAR SWITCH	
C247	SUSPENSION LOCK SWITCH	
C262	AUTO TRANS SWITCH & CAL SEL	
C301	ENGINE INC/DEC SWITCH	
C302	HTS SWITCH	
C309	CERPM CRUISE AUTO SWITCH	
C378	RIGHT HAND CONSOLE SWITCH GROUP CONNECTOR	
C401	CONSTANT ENGINE SPEED PROG SWITCH (SET ERPM)	
C422	PTO MANAGEMENT SWITCH	

Engine Harness - Electrical Connectors

CONNECTOR NUMBER	CONNECTOR NAME	CONNECTOR LOCATION
C315	ECU-A	
C427	OIL PRESSURE/TEMPERATURE SENSOR (EDC 7)	
C428	BOOST PRESSURE/ TEMPERATURE SENSOR (EDC 7)	
C429	RAIL PRESSURE SENSOR (EDC 7)	
C430	COOLANT TEMPERATURE SENSOR	
C431	FUEL TEMPERATURE SENSOR	
C432	CRANKSHAFT SPEED SENSOR	
C433	CAM SPEED SENSOR - EDC 7	
C434	CYL INJECTOR 1 (EDC 7)	
C435	CYL INJECTOR 2 (EDC 7)	
C436	CYL INJECTOR3 (EDC 7)	
C437	CYL INJECTOR 4 (EDC 7)	
C438	CYL INJECTOR 5 (EDC 7)	
C439	CYL INJECTOR 6 (EDC 7)	
C440	FUEL METERING UNIT	

Engine Harness - 6 Cylinder Connectors

CONNECTOR NUMBER	CONNECTOR NAME	CONNECTOR LOCATION
C001	MAIN HARNESS CONNECTOR E1 (ENGINE TO CAB)	
C006	START SOLENOID	
C007	BRAKE FLUID LEVEL SWITCH	
C009	AIR CLEANER VACUUM SWITCH	
C010	AIR CONDITIONING COMPRES-SOR CONNECTOR	
C011	AIR CONDITIONING PRESSURE SWITCH	
C013	ALTERNATOR CONNECTOR	
C014	STEERING SENSOR	
C017	WATER IN FUEL SENSOR	
C056	ENGINE TO LIGHTING HARNESS SOCKET	
C068	RADAR GUN	
C242	MAIN PROCESSOR CONNECTOR	
C253	AXLE HEIGHT SENSOR	
C254	FRONT HITCH / FRONT PTO CONNECTOR	
C269	CAB TO ENGINE MAIN CONNECTOR E2	
C276	VISTRONIC FAN	
C353	DE-GAS BOTTLE	
C413	LOADER VALVE 1	
C414	LOADER VALVE 2	
C501	BATTERY ISOLATOR 2	
C605	SUSPENSION ACCELOROMETER	

Electronic Remotes Harness

CONNECTOR NUMBER	CONNECTOR NAME	CONNECTOR LOCATION
C313	HYDRAULIC STOP (EHR STOP SWITCH)	
C390	EHR - 1-2 LEVER ASSEMBLY	
C391	LAMP 1	
C392	EHR TO MAIN REAR CONNECTOR 1	
C394	EHR - SWITCH 1/2 TIME/FLOW	
C395	EHR - SWITCH 3/4 TIME/FLOW	
C396	LAMP 2	
C397	LAMP 3	
C398	LAMP 4	
C399	MASTER LAMP	
C400	3-4 LEVER ASSEMBLY	

Roof Harness

CONNECTOR NUMBER	CONNECTOR NAME	CONNECTOR LOCATION
C064	GRAB RAIL WORKLAMP RIGHT HAND	
C065	GRAB RAIL WORKLAMP LEFT HAND	

C066	GRAB RAIL SIDELAMP RIGHT HAND	
C067	GRAB RAIL SIDELAMP LEFT HAND	
C084	UPPER FRONT WORKLAMP LEFT HAND	
C085	UPPER FRONT WORKLAMP RIGHT HAND	
C088	FRONT WIPER MOTOR	
C090	DOOR SWITCH LEFT HAND	
C091	DOOR SWITCH RIGHT HAND	
C092	CONSOLE LAMP LEFT HAND	
C095	REAR LICENCE PLATE WORKLAMP LEFT HAND	
C096	REAR LICENCE PLATE WORKLAMP RIGHT HAND	
C097	BEACON LEFT HAND	
C098	BEACON RIGHT HAND	
C099	INTERIOR LAMP	
C105	WORKLAMP ECU	
C106	RADIO CONNECTOR 1	
C107	RADIO CONNECTOR 2	
C109	REAR WIPER MOTOR	
C110	FRONT RIGHT HAND SPEAKER	
C111	FRONT LEFT HAND SPEAKER	
C377	DIODE	
C379	SMV LAMP LEFT FRONT	
C380	SMV LAMP LEFT REAR	
C381	SMV LAMP RIGHT FRONT	
C382	SMV LAMP RIGHT REAR	
C383	WORKLAMP LEFT REAR	
C384	WORKLAMP RIGHT REAR	
C385	SPEAKER - REAR LEFT HAND	
C386	SPEAKER - REAR RIGHT HAND	
C387	CONSOLE LAMP RIGHT HAND	
C388	PUDDLE LAMP LEFT HAND	
C389	PUDDLE LAMP RIGHT HAND	
C532	ROOF TO CAB HARNESS - ROOF	
C551	HEATED MIRROR SWITCH	
C608	ELECTRIC MIRROR RIGHT HAND	
C609	MIRROR CONTROL	

Hood Harness

CONNECTOR NUMBER	CONNECTOR NAME	CONNECTOR LOCATION
C057	HORN	
C058	LEFT HAND WORKLAMP	
C059	RIGHT HAND HEADLAMP	
C060	LEFT HAND HEADLAMP	
C061	RIGHT HAND WORKLAMP	

Wiring harness - Electrical schematic frame 01 Starting and Charging System

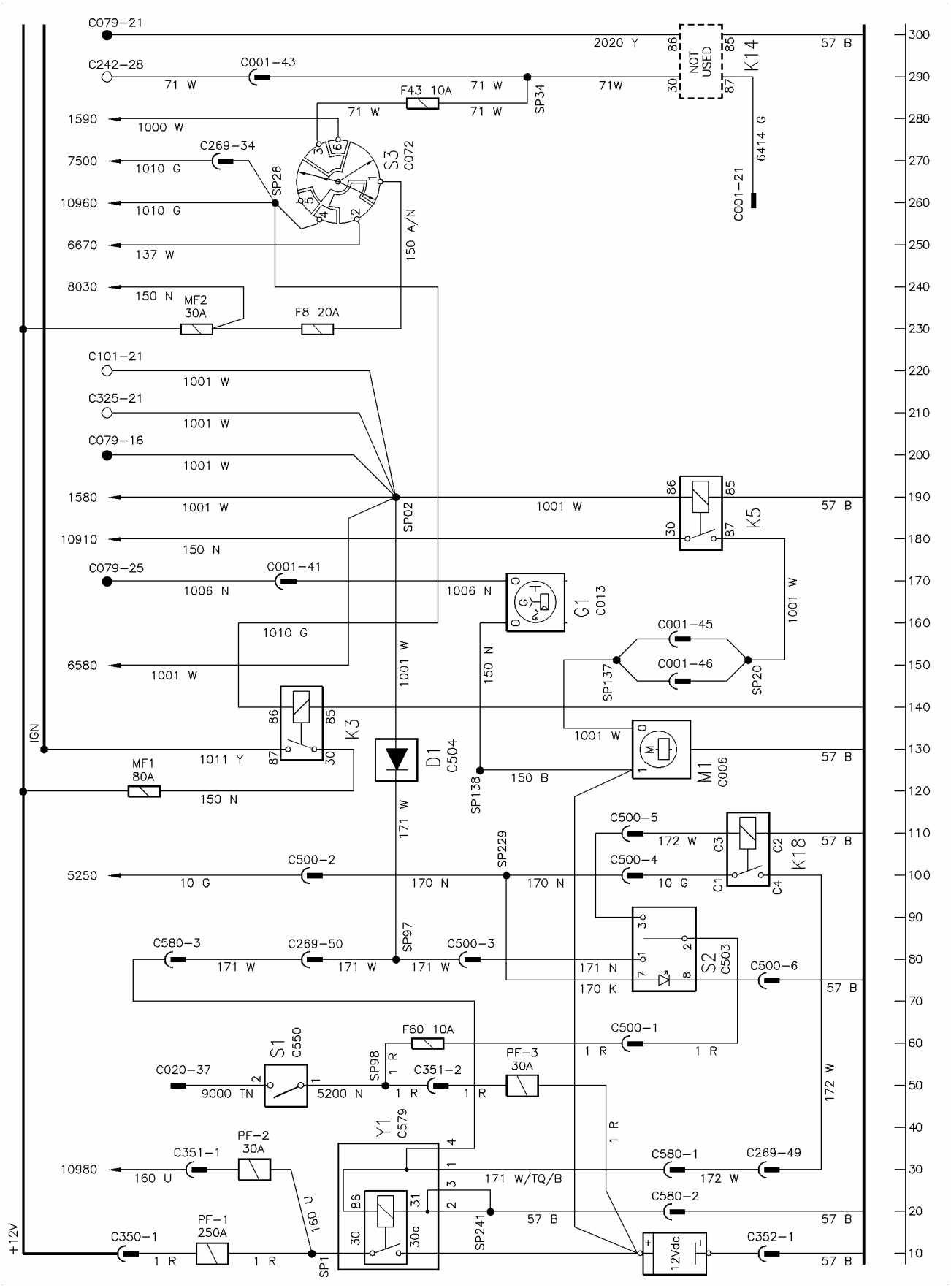
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
1	0-300	STARTING / CHARGING	10	PF1 - 250A		POWER FUSE - ELECTRONICS SUPPLY
1	0-300	STARTING / CHARGING	20	Y1	**C579**	BATTERY SW SOL
1	0-300	STARTING / CHARGING	30	PF2 - 30A		POWER FUSE - MAIN SUPPLY
1	0-300	STARTING / CHARGING	50	PF3 - 30A		POWER FUSE - IMPLEMENT SOCKET FRONT
1	0-300	STARTING / CHARGING	50	S1	**C550**	DIVERTER SWITCH
1	0-300	STARTING / CHARGING	60	F60 - 10A		FUSE - BATTERY ISOLATOR RELAY
1	0-300	STARTING / CHARGING	80	S2	**C503**	ISO CONTROL RELAY SWITCH
1	0-300	STARTING / CHARGING	100	K18		RELAY - BATTERY ISOLATOR
1	0-300	STARTING / CHARGING	120	MF1 - 80A		MAXI FUSE - ENGINE IGNITION RELAY
1	0-300	STARTING / CHARGING	130	D1	**C504**	DIODE
1	0-300	STARTING / CHARGING	130	M1	**C006**	START SOLENOID
1	0-300	STARTING / CHARGING	140	K3		RELAY - IGNITION
1	0-300	STARTING / CHARGING	170	G1	**C013**	ALTERNATOR
1	0-300	STARTING / CHARGING	190	K5		RELAY - STARTER CRANK
1	0-300	STARTING / CHARGING	230	F8 - 20A		FUSE - STARTER SWITCH
1	0-300	STARTING / CHARGING	230	MF2 - 30A		MAXI FUSE - LIGHTING, IGN SW, RADIO, WORKLAMP ECU
1	0-300	STARTING / CHARGING	260	S3	**C072**	STARTER SWITCH
1	0-300	STARTING / CHARGING	285	F43 - 10A		FUSE - STARTER SWITCH (RUN POSITION)
1	0-300	STARTING / CHARGING	290	K14		RELAY - FUEL SHUT OFF

NOTE: *Additional Connectors* ***C001***, ***C079***, ***C101***, ***C242***, ***C269***, ***C325***, ***C351***, ***C500***, ***C580***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White

LN	Light Brown	Y	Yellow	TQ	Turquoise	
S	Slate	G	Green	P	Purple	


C079-21
2020 Y
NOT USED
K14
57 B
C242-28
C001-43
71 W
F43 10A
71 W
SP34
71W
1590
1000 W
C269-34
7500
1010 G
SP26
S3
C072
10960
1010 G
6670
137 W
150 A/N
6414 G
C001-21
8030
150 N
MF2 30A
F8 20A
C101-21
1001 W
C325-21
1001 W
C079-16
1001 W
1580
1001 W
SP02
1001 W
K5
10910
150 N
C079-25
C001-41
1006 N
1006 N
G1
C013
1010 G
C001-45
C001-46
6580
1001 W
SP137
SP20
IGN
K3
D1
C504
1011 Y
MF1 80A
150 N
SP138
150 B
M1
C006
C500-5
172 W
C3
C2
K18
C500-2
5250
10 G
170 N
SP229
170 N
C500-4
10 G
C1
C4
C580-3
171 W
C269-50
171 W
SP97
C500-3
171 W
171 N
170 K
S2
C503
C500-6
57 B
F60 10A
C500-1
1 R
1 R
S1
C550
C020-37
9000 TN
SP98
1 R
C351-2
1 R
PF-3 30A
5200 N
Y1
C579
PF-2 30A
C351-1
10980
160 U
C580-1
C269-49
172 W
171 W/TQ/B
C580-2
57 B
57 B
+12V
PF-1 250A
C350-1
1 R
1 R
160 U
SP1
SP241
12Vdc
C352-1
57 B
172 W

FRAME 1A 1

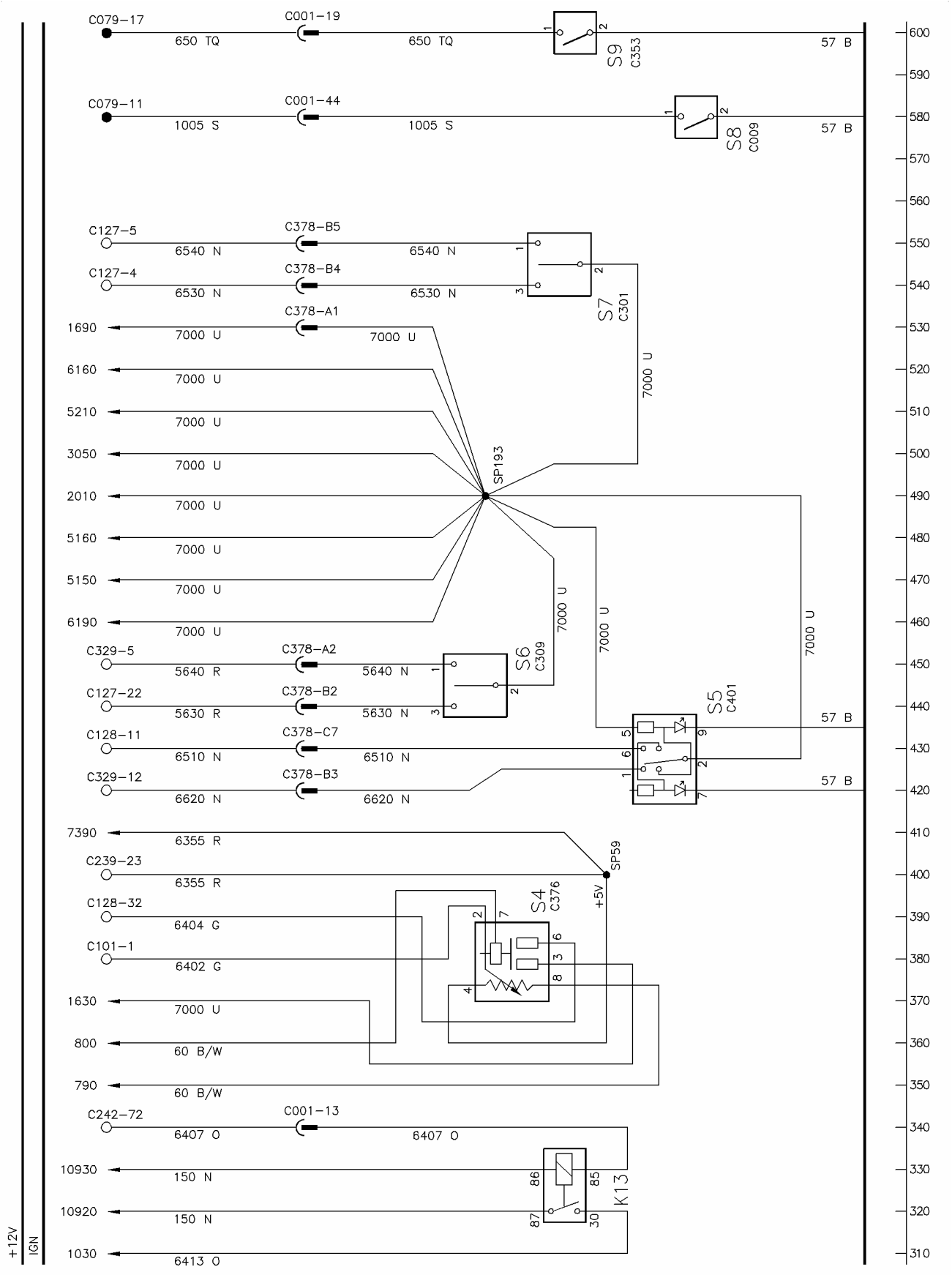
Wiring harness - Electrical schematic frame 02 Engine System (1)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
2	310-600	ENGINE 1	320	K13		ENGINE RELAY
2	310-600	ENGINE 1	380	S4	**C376**	FOOT THROTTLE - ELECTRONIC
2	310-600	ENGINE 1	430	S5	**C401**	CONSTANT ENGINE SPEED PROG SWITCH
2	310-600	ENGINE 1	450	S6	**C309**	CERPM CRUISE AUTO SWITCH
2	310-600	ENGINE 1	550	S7	**C301**	ENGINE INC/DEC SWITCH
2	310-600	ENGINE 1	580	S8	**C009**	VACUUM SWITCH
2	310-600	ENGINE 1	600	S9	**C353**	DE-GAS BOTTLE

NOTE: *Additional Connectors* ***C001****,* ***C079****,* ***C101****,* ***C127****,* ***C128****,* ***C239****,* ***C329****,* ***C378****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		



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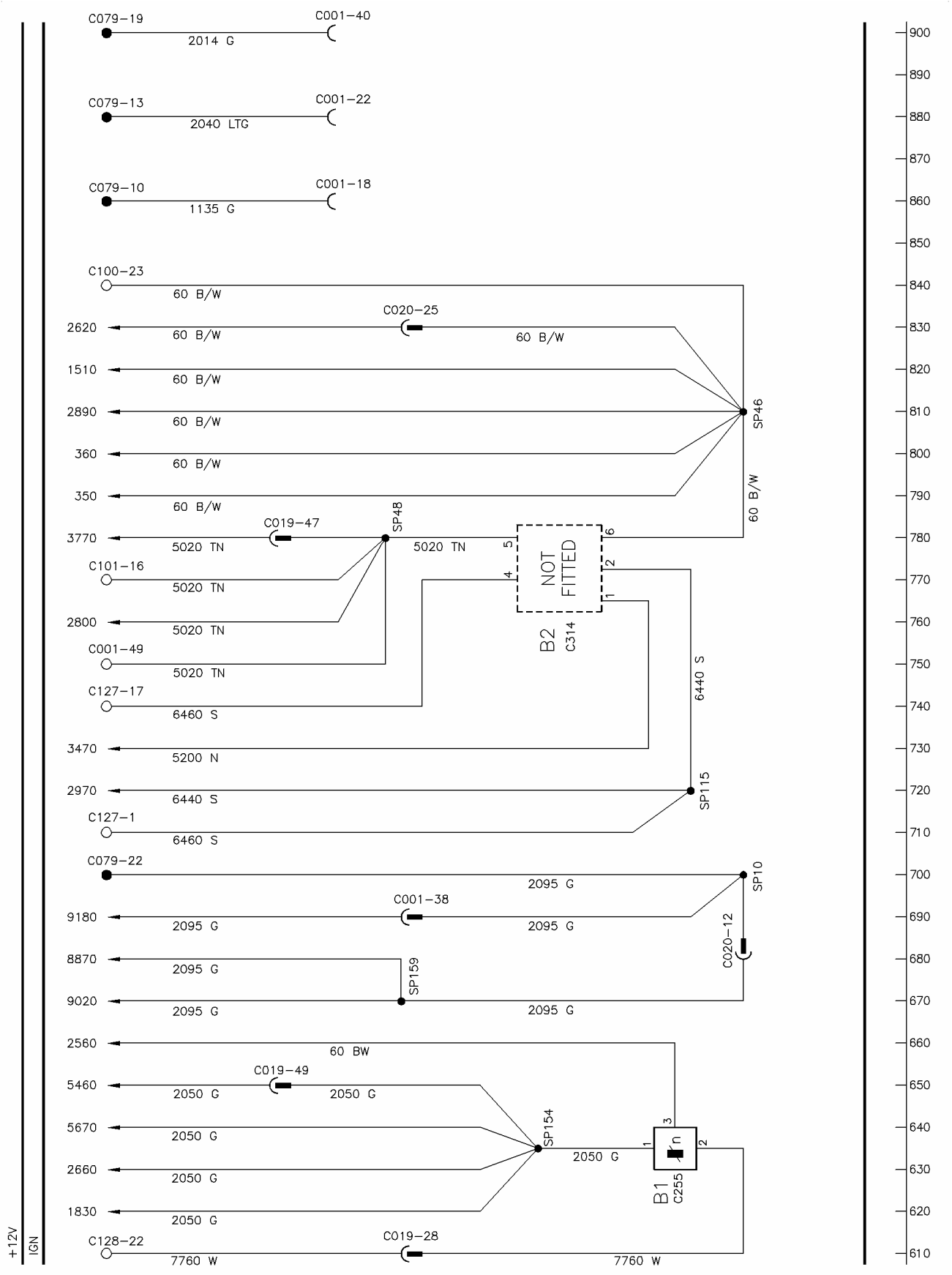
Wiring harness - Electrical schematic frame 03 Engine Systems (2)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
3	610-900	ENGINE 2	635	B1	**C255**	ENGINE SPEED SENSOR
3	610-900	ENGINE 2	770	B2	**C314**	HAND THROTTLE

NOTE: *Additional Connectors* ***C001***, ***C019***, ***C020 C079***, ***C100 C101***, ***C127***, ***C128***, .

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C079-19
2014 G
C001-40
C079-13
2040 LTG
C001-22
C079-10
1135 G
C001-18
C100-23
60 B/W
C020-25
2620
1510
2890
360
350
SP46
3770
C019-47
SP48
5020 TN
C101-16
2800
C001-49
C127-17
6460 S
3470
5200 N
NOT FITTED
B2
C314
6440 S
SP115
2970
C127-1
C079-22
2095 G
SP10
9180
C001-38
C020-12
8870
SP159
9020
2560
60 BW
C019-49
5460
2050 G
5670
2660
1830
SP154
B1
C255
C128-22
C019-28
7760 W
+12V
IGN
900
890
880
870
860
850
840
830
820
810
800
790
780
770
760
750
740
730
720
710
700
690
680
670
660
650
640
630
620
610

FRAME 3A 1

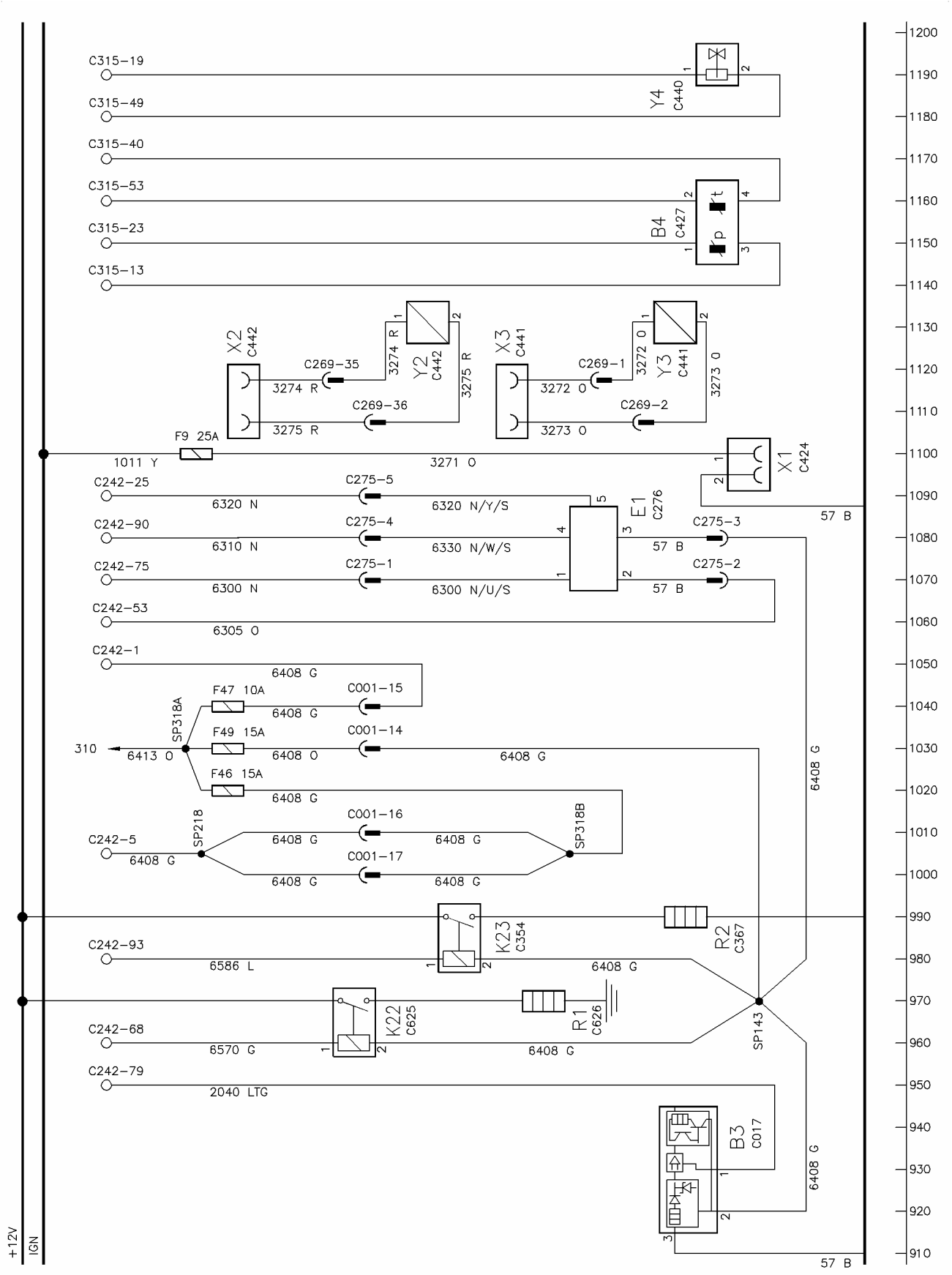
Wiring harness - Electrical schematic frame 04 Engine Systems (3)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
4	910-1200	ENGINE 3	930	B3	**C017**	H2O WATER IN FUEL SENSOR
4	910-1200	ENGINE 3	960	K22	**C625**	RELAY - FUEL HEATER
4	910-1200	ENGINE 3	970	R1	**C626**	FUEL HEATER
4	910-1200	ENGINE 3	980	K23	**C354**	RELAY - GRID HEATER
4	910-1200	ENGINE 3	990	R2	**C367**	GRID HEATER
4	910-1200	ENGINE 3	1020	F46 - 15A		FUSE - ECU BATTERY +
4	910-1200	ENGINE 3	1030	F49 - 15A		FUSE - ENGINE SENSOR SUPPLY
4	910-1200	ENGINE 3	1040	F47 - 10A		FUSE - ECU BATTERY +
4	910-1200	ENGINE 3	1080	E1	**C276**	VISTRONIC FAN
4	910-1200	ENGINE 3	1100	F9 - 25A		FUSE - LOADER
4	910-1200	ENGINE 3	1100	X1	**C424**	LOADER POWER CONNECTOR
4	910-1200	ENGINE 3	1110	X2	**C442**	LOADER VALVE 2 - MAIN HARNESS
4	910-1200	ENGINE 3	1110	X3	**C441**	LOADER VALVE 1 - MAIN HARNESS
4	910-1200	ENGINE 3	1120	Y2	**C442**	LOADER VALVE 2
4	910-1200	ENGINE 3	1120	Y3	**C441**	LOADER VALVE 1
4	910-1200	ENGINE 3	1150	B4	**C427**	BOOST PRESSURE/ TEMP SENSOR - EDC 7
4	910-1200	ENGINE 3	1190	Y4	**C440**	FUEL METERING UNIT - EDC 7

NOTE: *Additional Connectors* ***C001****,* ***C242****,* ***C269****,* ***C275****,* ***C315****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C315-19
C315-49
C315-40
C315-53
C315-23
C315-13
Y4 C440
B4 C427
X2 C442
Y2 C442
X3 C441
Y3 C441
C269-35
C269-36
C269-1
C269-2
3274 R
3275 R
3272 O
3273 O
F9 25A
1011 Y
3271 O
X1 C424
57 B
C242-25
C242-90
C242-75
C242-53
C275-5
C275-4
C275-1
6320 N
6310 N
6300 N
6305 O
6320 N/Y/S
6330 N/W/S
6300 N/U/S
E1 C276
C275-3
C275-2
C242-1
6408 G
F47 10A
F49 15A
F46 15A
C001-15
C001-14
C001-16
C001-17
SP318A
SP318B
SP218
310
6413 O
6408 O
C242-5
C242-93
C242-68
C242-79
6586 L
6570 G
2040 LTG
K23 C354
K22 C625
R2 C367
R1 C626
SP143
B3 C017
+12V
IGN
1200
1190
1180
1170
1160
1150
1140
1130
1120
1110
1100
1090
1080
1070
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1010
1000
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970
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FRAME 4A 1

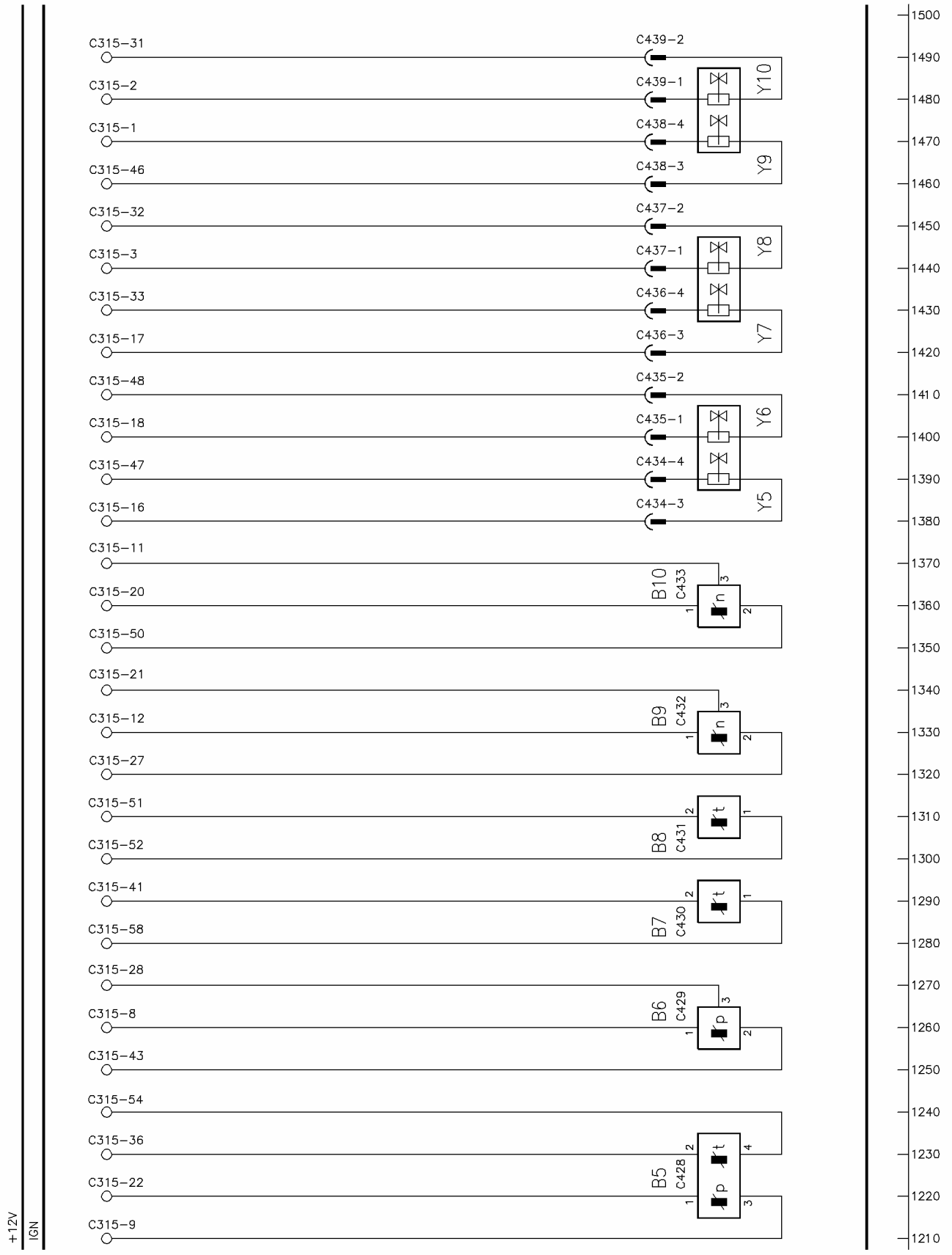
Wiring harness - Electrical schematic frame 05 Engine Systems (4)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
5	1210-1500	ENGINE 4	1220	B5	**C428**	OIL PRESSURE/ TEMP SENSOR - EDC 7
5	1210-1500	ENGINE 4	1260	B6	**C429**	RAIL PRESSURE SENSOR - EDC 7
5	1210-1500	ENGINE 4	1290	B7	**C430**	COOLANT TEMP SENSOR - EDC 7
5	1210-1500	ENGINE 4	1310	B8	**C431**	FUEL TEMP SENDER - EDC 7
5	1210-1500	ENGINE 4	1330	B9	**C432**	CRANK SPEED SENSOR - EDC 7
5	1210-1500	ENGINE 4	1360	B10	**C433**	CAM SPEED SENSOR - EDC 7
5	1210-1500	ENGINE 4	1390	Y5	**C434**	CYL INJECTOR 1 - EDC 7
5	1210-1500	ENGINE 4	1400	Y6	**C435**	CYL INJECTOR 2 - EDC 7
5	1210-1500	ENGINE 4	1430	Y7	**C436**	CYL INJECTOR 3 - EDC 7
5	1210-1500	ENGINE 4	1440	Y8	**C437**	CYL INJECTOR 4 - EDC 7
5	1210-1500	ENGINE 4	1470	Y9	**C438**	CYL INJECTOR 5 - EDC 7
5	1210-1500	ENGINE 4	1480	Y10	**C439**	CYL INJECTOR 6 - EDC 7

NOTE: *Additional Connectors* ***C315****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C315-31
C315-2
C315-1
C315-46
C315-32
C315-3
C315-33
C315-17
C315-48
C315-18
C315-47
C315-16
C315-11
C315-20
C315-50
C315-21
C315-12
C315-27
C315-51
C315-52
C315-41
C315-58
C315-28
C315-8
C315-43
C315-54
C315-36
C315-22
C315-9
C439-2
C439-1
C438-4
C438-3
C437-2
C437-1
C436-4
C436-3
C435-2
C435-1
C434-4
C434-3
Y10
Y9
Y8
Y7
Y6
Y5
B10 C433
B9 C432
B8 C431
B7 C430
B6 C429
B5 C428
1500
1490
1480
1470
1460
1450
1440
1430
1420
1410
1400
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1210

FRAME 5A 1

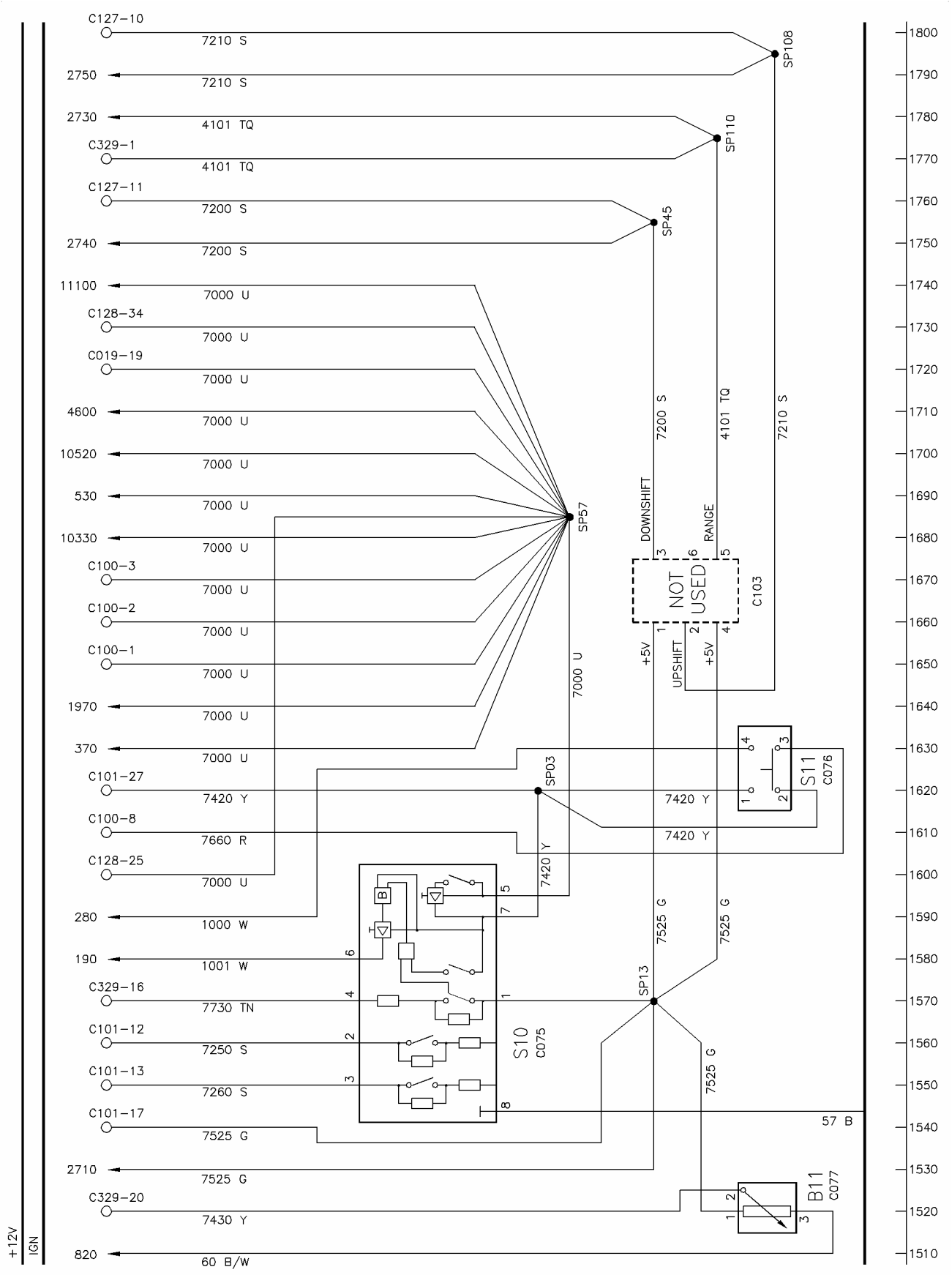
Wiring harness - Electrical schematic frame 06 Tansmission Systems (1)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
6	1510-1800	TRANSMISSION 1	1520	B11	**C077**	CLUTCH POT
6	1510-1800	TRANSMISSION 1	1570	S10	**C075**	SHUTTLE SWITCH
6	1510-1800	TRANSMISSION 1	1620	S11	**C076**	CLUTCH SWITCH
6	1510-1800	TRANSMISSION 1	1670	(NO CODE)	**C103**	GEARSHIFT LEVER - NOT USED

NOTE: *Additional Connectors* ***C019***, ***C100***, ***C101***, ***C127***, ***C128***, ***C329***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C127-10
7210 S
2750
7210 S
SP108
2730
4101 TQ
C329-1
4101 TQ
SP110
C127-11
7200 S
2740
7200 S
SP45
11100
7000 U
C128-34
7000 U
C019-19
7000 U
4600
7000 U
10520
7000 U
530
7000 U
10330
7000 U
C100-3
7000 U
C100-2
7000 U
C100-1
7000 U
1970
7000 U
370
7000 U
SP57
DOWNSHIFT
RANGE
NOT USED
C103
+5V
UPSHIFT
+5V
7200 S
4101 TQ
7210 S
7000 U
C101-27
7420 Y
SP03
7420 Y
7420 Y
S11
C076
C100-8
7660 R
C128-25
7000 U
280
1000 W
190
1001 W
C329-16
7730 TN
C101-12
7250 S
C101-13
7260 S
C101-17
7525 G
S10
C075
7420 Y
7525 G
7525 G
SP13
7525 G
57 B
2710
7525 G
C329-20
7430 Y
B11
C077
820
60 B/W
+12V
IGN
1800
1790
1780
1770
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FRAME 6A 1

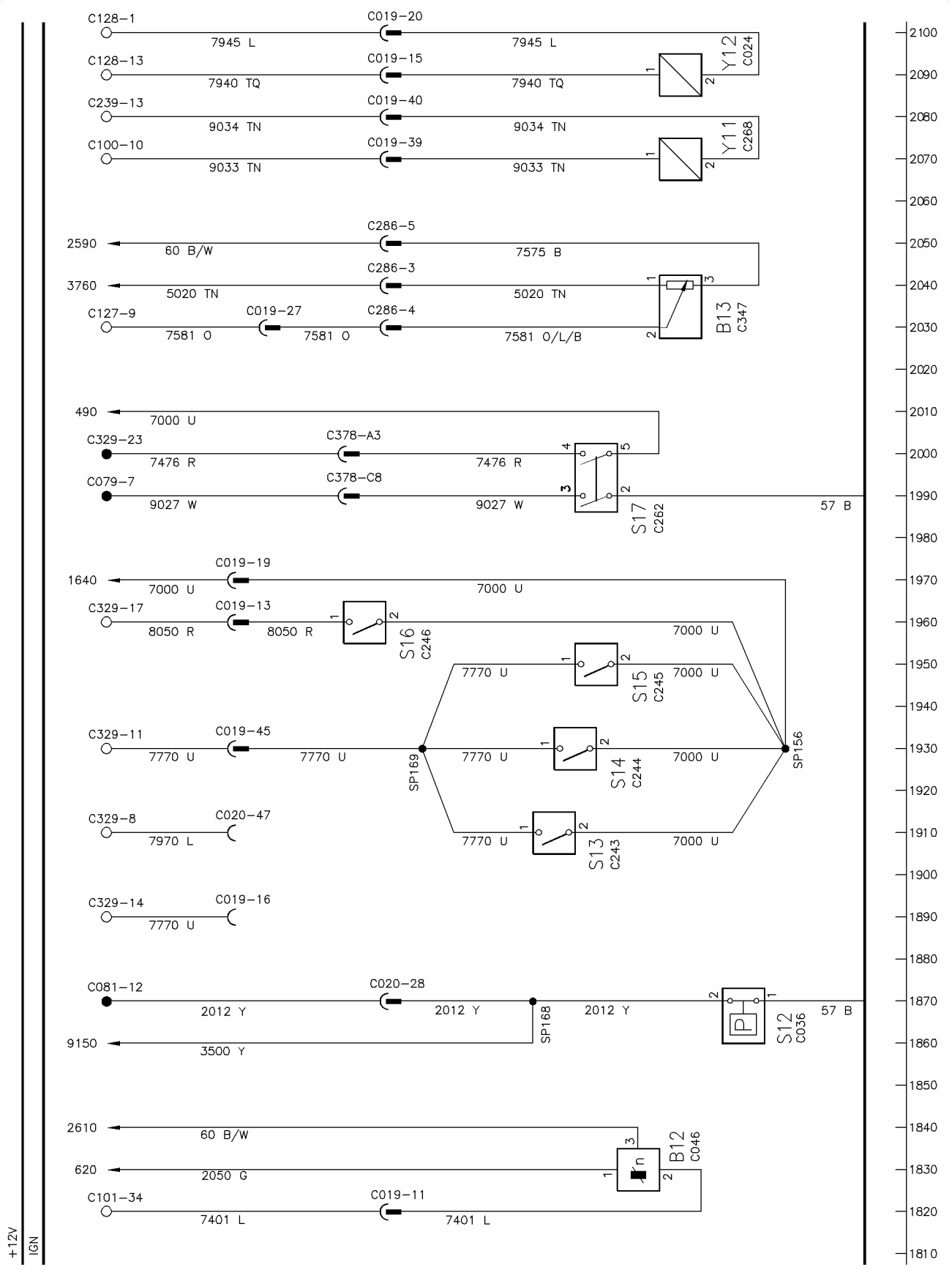
Wiring harness - Electrical schematic frame 07 Transmission Systems (2)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
7	1810-2100	TRANSMISSION 2	1830	B12	**C046**	AXLE SPEED SENSOR
7	1810-2100	TRANSMISSION 2	1870	S12	**C036**	TRANS OIL PRESSURE SWITCH
7	1810-2100	TRANSMISSION 2	1910	S13	**C243**	FPS HI RANGE PRESS SWITCH
7	1810-2100	TRANSMISSION 2	1930	S14	**C244**	FPS MED PRESS SWITCH
7	1810-2100	TRANSMISSION 2	1950	S15	**C245**	FPS LOW PRESSURE SWITCH
7	1810-2100	TRANSMISSION 2	1960	S16	**C246**	FPS REV PRESSURE SWITCH
7	1810-2100	TRANSMISSION 2	1990	S17	**C262**	TRANS AUTO FUNCTION SWITCH
7	1810-2100	TRANSMISSION 2	2030	B13	**C347**	CREEPER POT
7	1810-2100	TRANSMISSION 2	2070	Y11	**C268**	FPS 19TH GEAR SOLENOID
7	1810-2100	TRANSMISSION 2	2090	Y12	**C024**	CLUTCH E SOLENOID

NOTE: *Additional Connectors* ***C019***, ***C081***, ***C100***, ***C101***, ***C127***, ***C128***, ***C239***, ***C286***, ***C329***, ***C378***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C128-1
C019-20
7945 L
7945 L
Y12 C024
C128-13
C019-15
7940 TQ
7940 TQ
C239-13
C019-40
9034 TN
9034 TN
Y11 C268
C100-10
C019-39
9033 TN
9033 TN
2590
C286-5
60 B/W
7575 B
3760
C286-3
5020 TN
5020 TN
B13 C347
C127-9
C019-27
C286-4
7581 O
7581 O
7581 O/L/B
490
7000 U
C329-23
C378-A3
7476 R
7476 R
C079-7
C378-C8
9027 W
9027 W
S17 C262
57 B
1640
C019-19
7000 U
7000 U
C329-17
C019-13
8050 R
8050 R
S16 C246
7000 U
7770 U
S15 C245
7000 U
C329-11
C019-45
7770 U
7770 U
SP169
7770 U
S14 C244
7000 U
SP156
C329-8
C020-47
7970 L
7770 U
S13 C243
7000 U
C329-14
C019-16
7770 U
C081-12
C020-28
2012 Y
2012 Y
SP168
2012 Y
S12 C036
57 B
9150
3500 Y
2610
60 B/W
B12 C046
620
2050 G
C101-34
C019-11
7401 L
7401 L
+12V
IGN
2100
2090
2080
2070
2060
2050
2040
2030
2020
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FRAME 7A 1

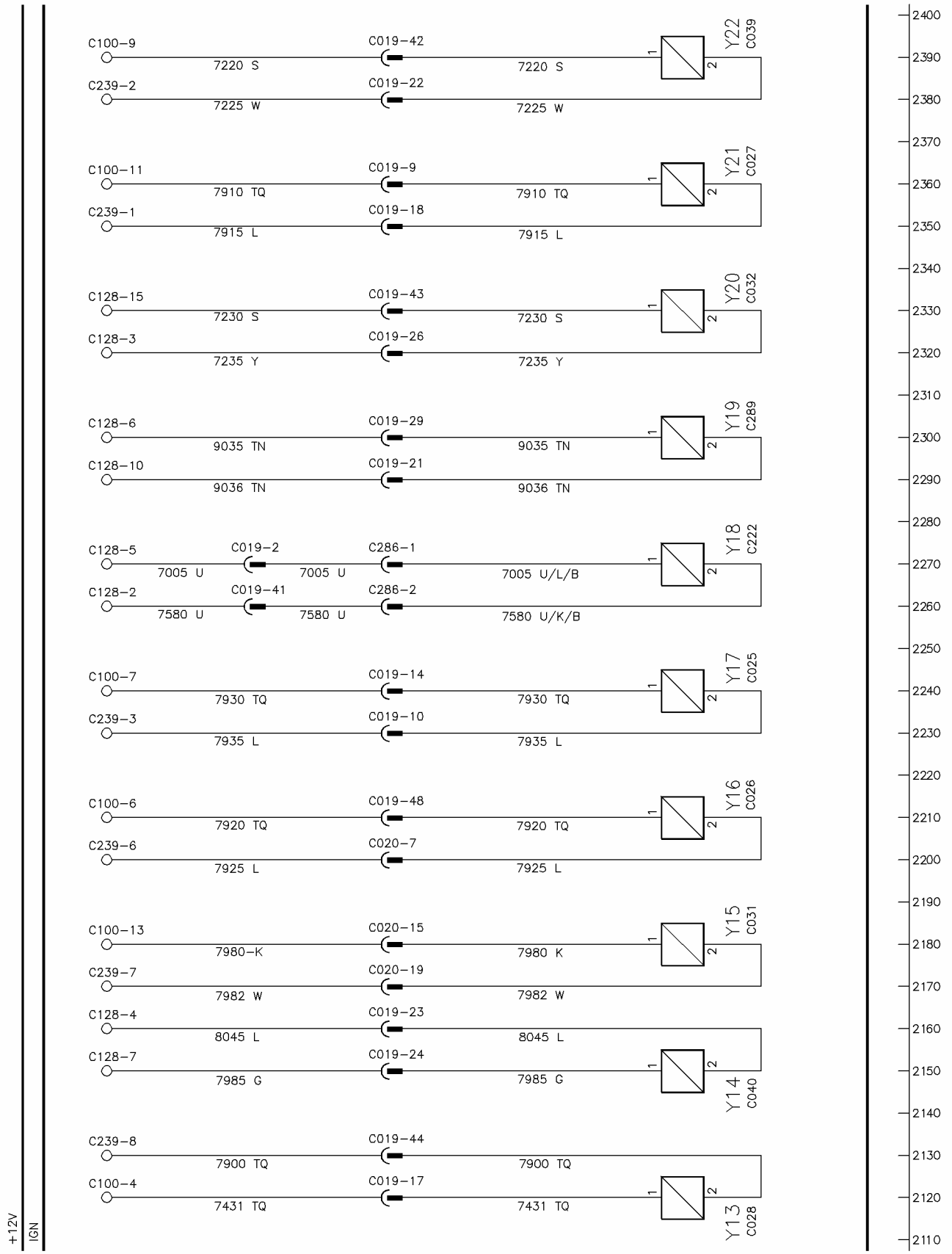
Wiring harness - Electrical schematic frame 08 Transmission Systems (3)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
8	2110-2400	TRANSMISSION 3	2120	Y13	**C028**	CLUTCH A SOLENOID
8	2110-2400	TRANSMISSION 3	2150	Y14	**C040**	REVERSE RANGE SOLENOID
8	2110-2400	TRANSMISSION 3	2180	Y15	**C031**	MED RANGE SOLENOID
8	2110-2400	TRANSMISSION 3	2210	Y16	**C026**	CLUTCH C SOLENOID
8	2110-2400	TRANSMISSION 3	2240	Y17	**C025**	CLUTCH D SOLENOID
8	2110-2400	TRANSMISSION 3	2270	Y18	**C222**	CREEPER SOLENOID
8	2110-2400	TRANSMISSION 3	2300	Y19	**C289**	19TH GEAR DUMP SOLENOID
8	2110-2400	TRANSMISSION 3	2330	Y20	**C032**	LOW RANGE SOLENOID
8	2110-2400	TRANSMISSION 3	2360	Y21	**C027**	CLUTCH B SOLENOID
8	2110-2400	TRANSMISSION 3	2390	Y22	**C039**	HIGH RANGE SOLENOID

NOTE: *Additional Connectors* ***C019***, ***C020***, ***C100***, ***C128***, ***C239***, ***C286***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C100-9
7220 S
C019-42
7220 S
C239-2
7225 W
C019-22
7225 W
Y22 C039
C100-11
7910 TQ
C019-9
7910 TQ
C239-1
7915 L
C019-18
7915 L
Y21 C027
C128-15
7230 S
C019-43
7230 S
C128-3
7235 Y
C019-26
7235 Y
Y20 C032
C128-6
9035 TN
C019-29
9035 TN
C128-10
9036 TN
C019-21
9036 TN
Y19 C289
C128-5
7005 U
C019-2
7005 U
C286-1
7005 U/L/B
C128-2
7580 U
C019-41
7580 U
C286-2
7580 U/K/B
Y18 C222
C100-7
7930 TQ
C019-14
7930 TQ
C239-3
7935 L
C019-10
7935 L
Y17 C025
C100-6
7920 TQ
C019-48
7920 TQ
C239-6
7925 L
C020-7
7925 L
Y16 C026
C100-13
7980-K
C020-15
7980 K
C239-7
7982 W
C020-19
7982 W
C128-4
8045 L
C019-23
8045 L
C128-7
7985 G
C019-24
7985 G
Y14 C040
C239-8
7900 TQ
C019-44
7900 TQ
C100-4
7431 TQ
C019-17
7431 TQ
Y13 C028
2400
2390
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2370
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2110

FRAME 8A 1

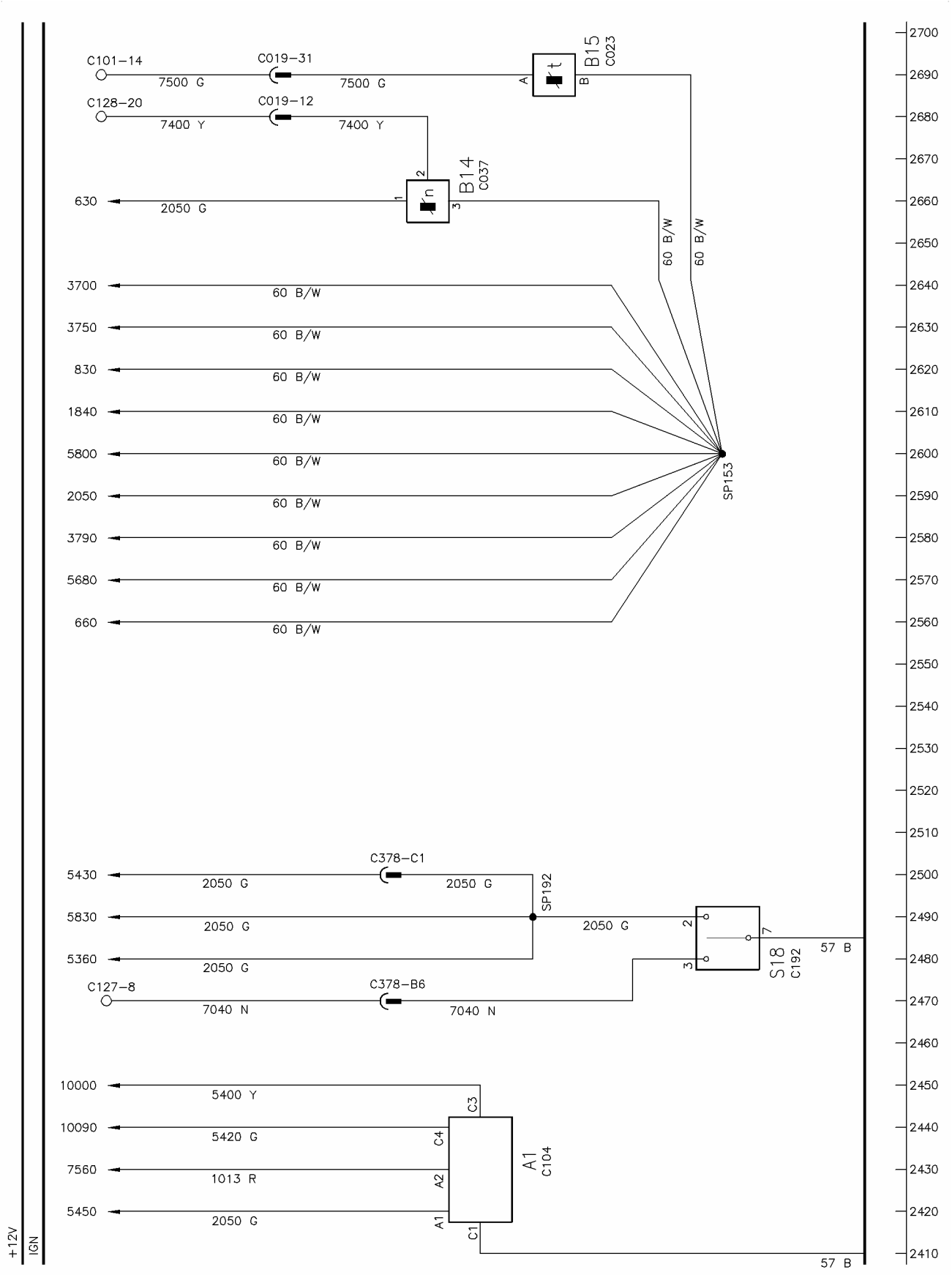
Wiring harness - Electrical schematic frame 09 Transmission Systems (4)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
9	2410-2700	TRANSMISSION 4	2430	A1	**C104**	GEARSHIFT INDICATOR - DOG
9	2410-2700	TRANSMISSION 4	2485	S18	**C192**	CREEPER GEAR SWITCH
9	2410-2700	TRANSMISSION 4	2660	B14	**C037**	INTERMEDIATE SPEED PICK UP
9	2410-2700	TRANSMISSION 4	2690	B15	**C023**	TRANS OIL TEMP SENDER

NOTE: *Additional Connectors* ***C019****,* ***C101****,* ***C127 C128****,* ***C378****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C101–14
7500 G
C019–31
7500 G
B15
C023
C128–20
7400 Y
C019–12
7400 Y
B14
C037
630
2050 G
60 B/W
60 B/W
3700
3750
830
1840
5800
2050
3790
5680
660
60 B/W
SP153
C378–C1
5430
2050 G
2050 G
SP192
5830
2050 G
2050 G
5360
2050 G
S18
C192
57 B
C127–8
7040 N
C378–B6
7040 N
10000
5400 Y
10090
5420 G
7560
1013 R
5450
2050 G
A1
C104
+12V
IGN
57 B
2700
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FRAME 9A 1

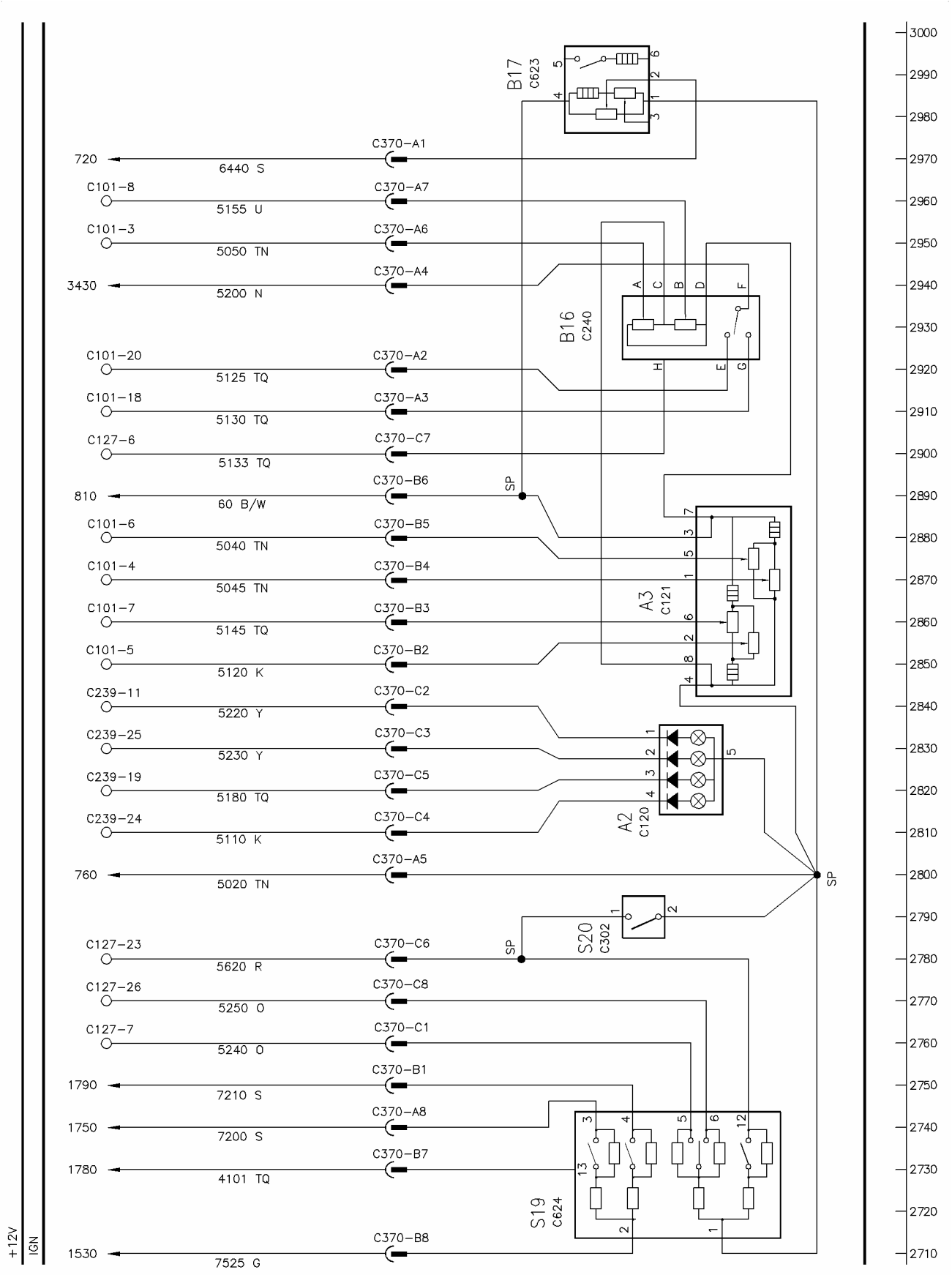
Wiring harness - Electrical schematic frame 10 Command Arm

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
10	2710-3000	COMMAND ARM	2730	S19	**C624**	TRANS CONTROL - COMMAND ARM
10	2710-3000	COMMAND ARM	2790	S20	**C302**	HTS RECORD SWITCH
10	2710-3000	COMMAND ARM	2820	A2	**C120**	EDC CONTROL PANEL 1
10	2710-3000	COMMAND ARM	2860	A3	**C121**	EDC CONTROL PANEL 2
10	2710-3000	COMMAND ARM	2930	B16	**C240**	EDC MOUSE CONNECTOR
10	2710-3000	COMMAND ARM	2990	B17	**C623**	HAND THROTTLE - COMMAND ARM

NOTE: *Additional Connectors* ***C101****,* ***C127****,* ***C239****,* ***C370****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
B17
C623
B16
C240
A3
C121
A2
C120
S20
C302
S19
C624
SP
720
6440 S
C370-A1
C101-8
5155 U
C370-A7
C101-3
5050 TN
C370-A6
3430
5200 N
C370-A4
C101-20
5125 TQ
C370-A2
C101-18
5130 TQ
C370-A3
C127-6
5133 TQ
C370-C7
810
60 B/W
C370-B6
C101-6
5040 TN
C370-B5
C101-4
5045 TN
C370-B4
C101-7
5145 TQ
C370-B3
C101-5
5120 K
C370-B2
C239-11
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C370-C2
C239-25
5230 Y
C370-C3
C239-19
5180 TQ
C370-C5
C239-24
5110 K
C370-C4
760
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C370-A5
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5620 R
C370-C6
C127-26
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C370-C8
C127-7
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C370-C1
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7210 S
C370-B1
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FRAME 10A 1

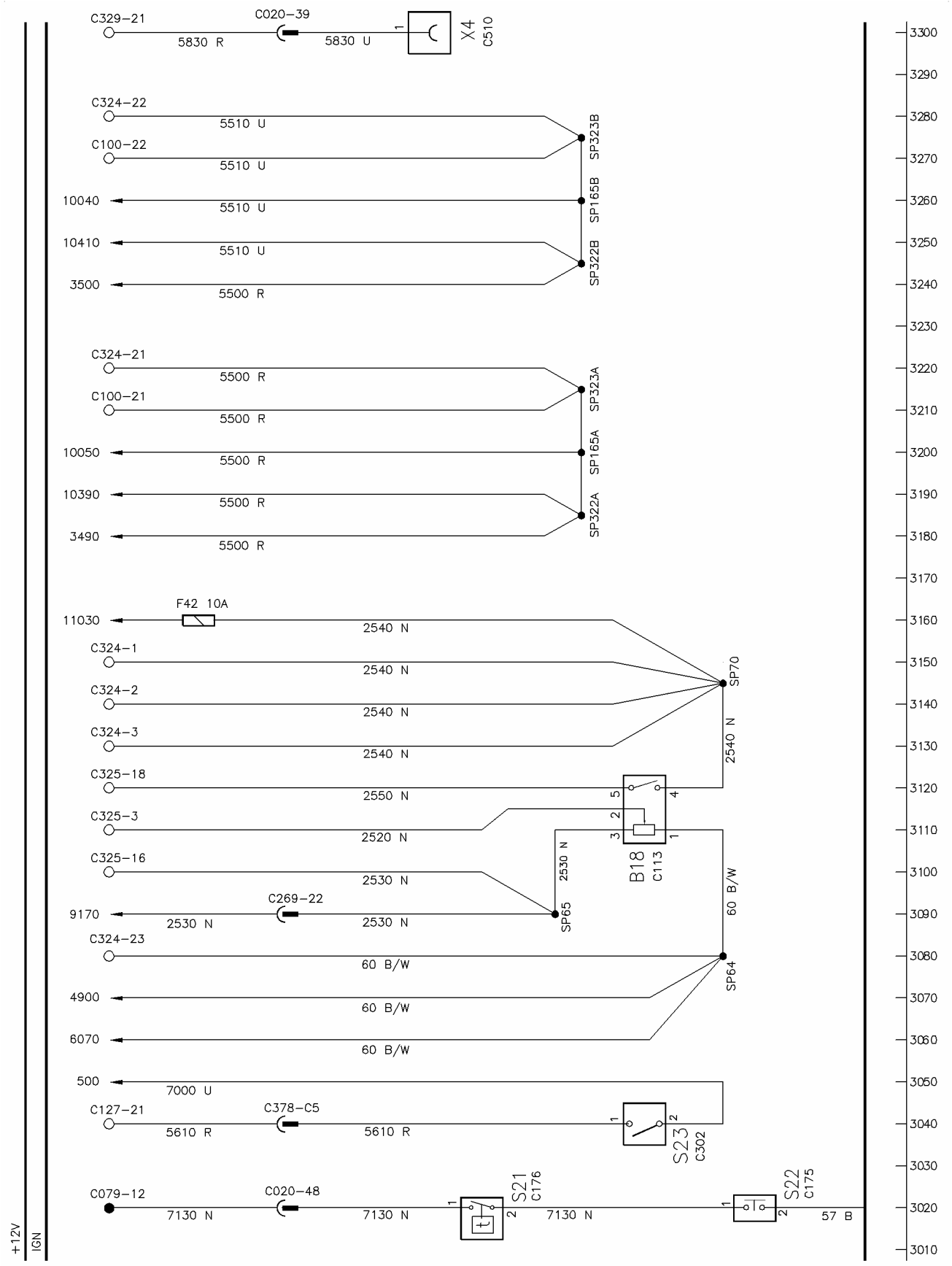
Wiring harness - Electrical schematic frame 11 Electronic Draft Control / Hydraulic Systems (1)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
11	3010-3300	EDC/HYDRAULICS 1	3020	S21	**C176**	HYDRAULIC TEMP SWITCH
11	3010-3300	EDC/HYDRAULICS 1	3020	S22	**C175**	HYDRAULIC BLOCKED FILTER SWITCH
11	3010-3300	EDC/HYDRAULICS 1	3040	S23	**C302**	HTS RECORD SWITCH
11	3010-3300	EDC/HYDRAULICS 1	3110	B18	**C113**	FRONT HITCH POT
11	3010-3300	EDC/HYDRAULICS 1	3160	F42 - 10A		FUSE - FRONT SUSPENSION
11	3010-3300	EDC/HYDRAULICS 1	3300	X4	**C510**	HI-FLOW PUMP CONNECTOR - CIRCUIT 5830

NOTE: *Additional Connectors* ***C020****,* ***C079****,* ***C100****,* ***C127****,* ***C269****,* ***C324****,* ***C325****,* ***C329****,* ***C378****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C329-21
5830 R
C020-39
5830 U
X4
C510
C324-22
5510 U
C100-22
5510 U
10040
5510 U
10410
5510 U
3500
5500 R
SP323B
SP165B
SP322B
C324-21
5500 R
C100-21
5500 R
10050
5500 R
10390
5500 R
3490
5500 R
SP323A
SP165A
SP322A
F42 10A
11030
2540 N
C324-1
2540 N
C324-2
2540 N
C324-3
2540 N
C325-18
2550 N
C325-3
2520 N
C325-16
2530 N
C269-22
9170
2530 N
2530 N
C324-23
60 B/W
4900
60 B/W
6070
60 B/W
SP70
2540 N
B18
C113
2530 N
SP65
60 B/W
SP64
500
7000 U
C127-21
5610 R
C378-C5
5610 R
S23
C302
C079-12
7130 N
C020-48
7130 N
S21
C176
7130 N
S22
C175
57 B
+12V
IGN
3300
3290
3280
3270
3260
3250
3240
3230
3220
3210
3200
3190
3180
3170
3160
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FRAME 11A 1

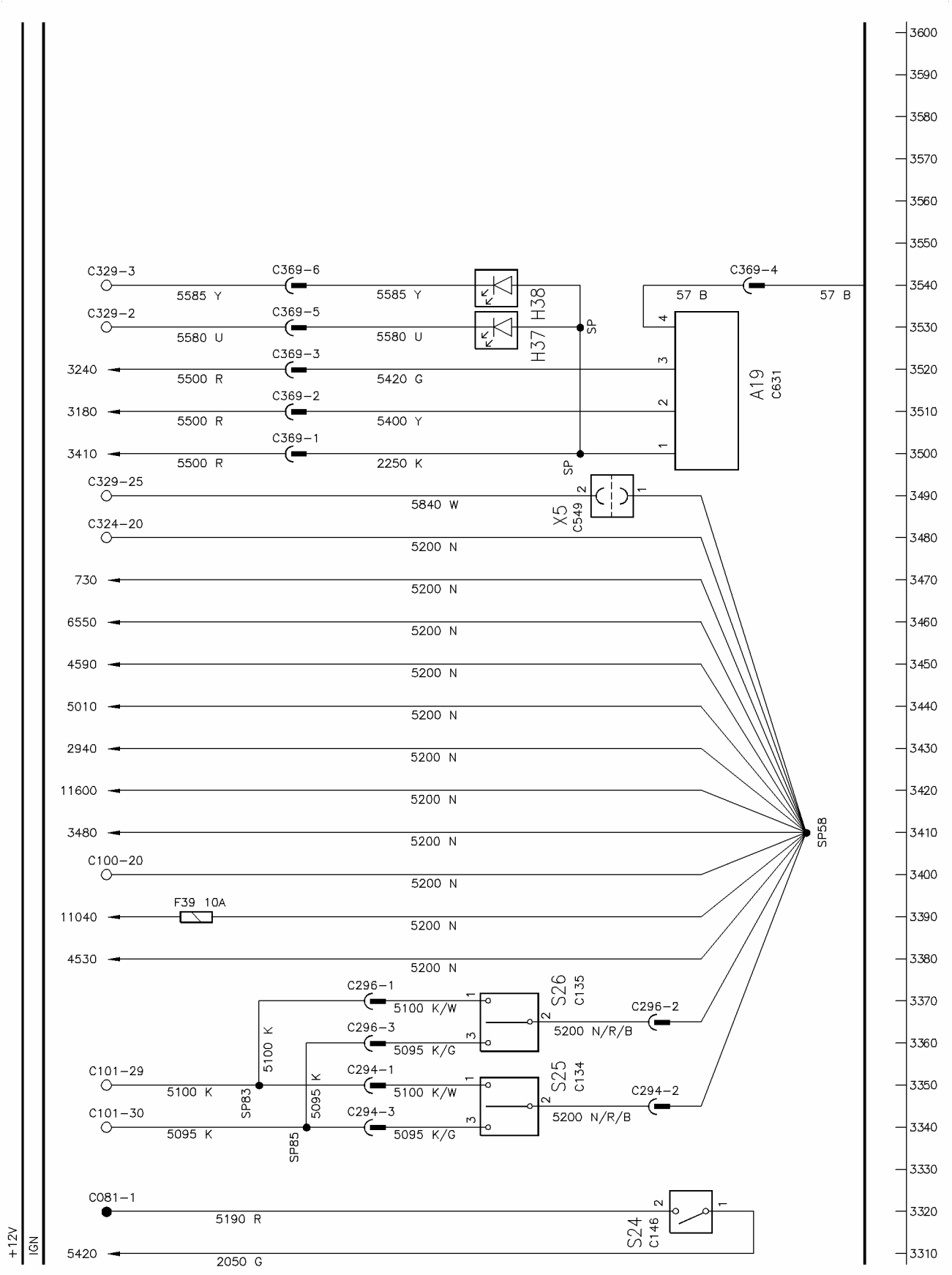
Wiring harness - Electrical schematic frame 12 Electronic Draft Control / Hydraulic systems (2)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
12	3310-3600	EDC/HYDRAULICS 2	3320	S24	**C146**	LIFT-O-MATIC SWITCH
12	3310-3600	EDC/HYDRAULICS 2	3345	S25	**C134**	HPL EXTERNAL RIGHT HAND SWITCH
12	3310-3600	EDC/HYDRAULICS 2	3365	S26	**C135**	HPL EXTERNAL LEFT HAND SWITCH
12	3310-3600	EDC/HYDRAULICS 2	3390	F39 - 10A		FUSE - HPL, SEAT, ARMREST, EDC, EHR LEVERS
12	3310-3600	EDC/HYDRAULICS 2	3490	X5	**C549**	FRINT HITCH DETECT
12	3310-3600	EDC/HYDRAULICS 2	3510	A19	**C631**	JOYSTICK CAN
12	3310-3600	EDC/HYDRAULICS 2	3530	H37		JOYSTICK INDICATOR LAMP - FRONT
12	3310-3600	EDC/HYDRAULICS 2	3540	H38		JOYSTICK INDICATOR LAMP - REAR

NOTE: *Additional Connectors* ***C081***, ***C100***, ***C101***, ***C294***, ***C296***, ***C324***, ***C329***, ***C369***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C329-3
5585 Y
C369-6
5585 Y
C329-2
5580 U
C369-5
5580 U
H37 H38
SP
C369-4
57 B
57 B
3240
5500 R
C369-3
5420 G
3180
5500 R
C369-2
5400 Y
3410
5500 R
C369-1
2250 K
A19
C631
C329-25
5840 W
X5
C549
C324-20
5200 N
730
6550
4590
5010
2940
11600
3480
C100-20
11040
F39 10A
4530
SP58
C296-1
5100 K/W
S26
C135
C296-2
5200 N/R/B
C296-3
5095 K/G
5100 K
C101-29
5100 K
SP83
5095 K
C294-1
5100 K/W
S25
C134
C294-2
5200 N/R/B
C101-30
5095 K
SP85
C294-3
5095 K/G
C081-1
5190 R
S24
C146
5420
2050 G
3600
3590
3580
3570
3560
3550
3540
3530
3520
3510
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FRAME 12A 1

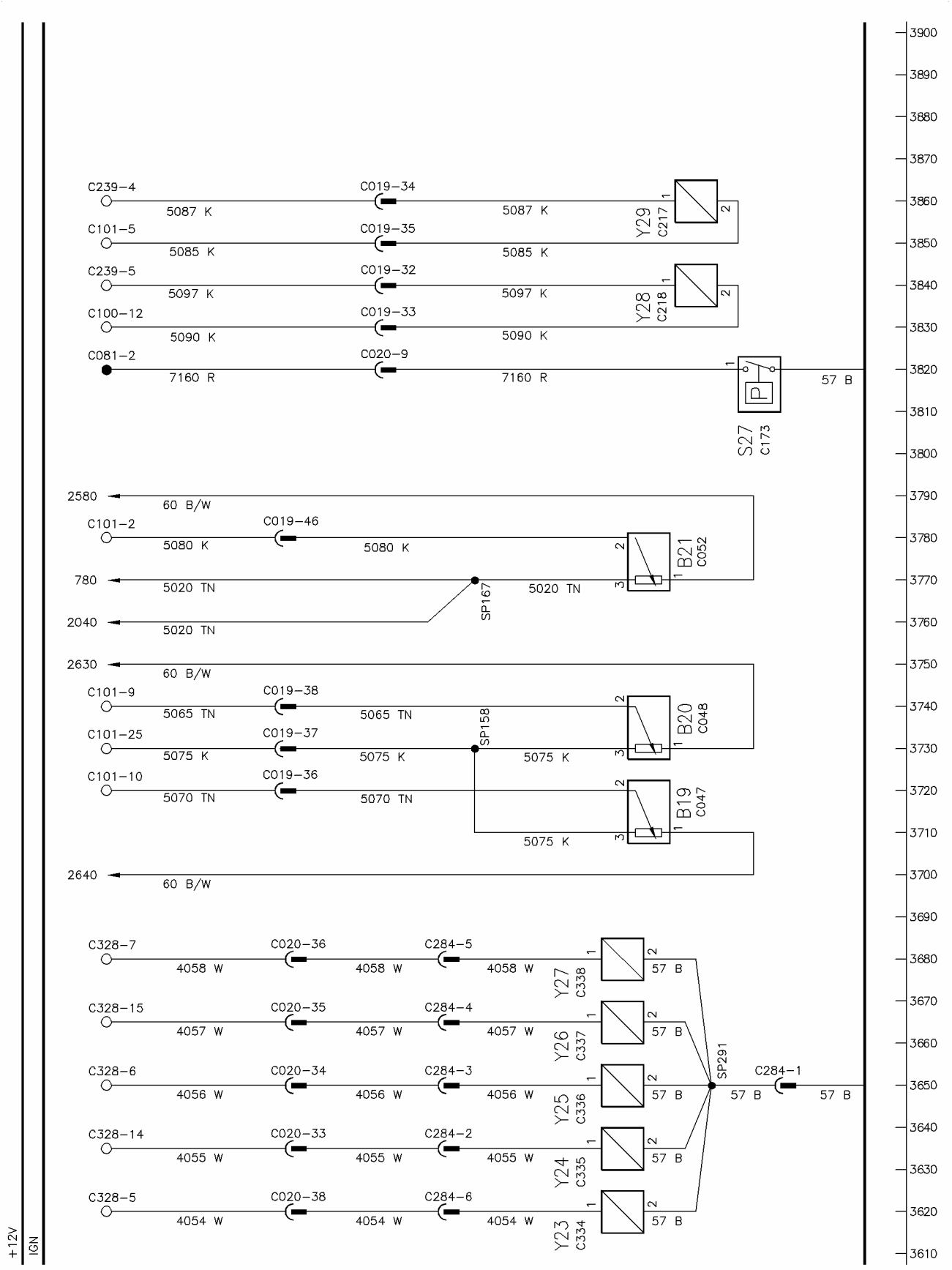
Wiring harness - Electrical schematic frame 13 Electronic Draft Control / Hydraulic systems (3)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
13	3610-3900	EDC/HYDRAULICS 3	3620	Y23	**C334**	EXTEND TOP A
13	3610-3900	EDC/HYDRAULICS 3	3635	Y24	**C335**	RETRACT TOP B
13	3610-3900	EDC/HYDRAULICS 3	3650	Y25	**C336**	EXTEND SIDE C
13	3610-3900	EDC/HYDRAULICS 3	3665	Y26	**C337**	RETRACT SIDE D
13	3610-3900	EDC/HYDRAULICS 3	3680	Y27	**C338**	SAFETY VALVE DUMP - LIFT LINK CIRCUIT
13	3610-3900	EDC/HYDRAULICS 3	3710	B19	**C047**	LH DRAFT PIN
13	3610-3900	EDC/HYDRAULICS 3	3730	B20	**C048**	RH DRAFT PIN
13	3610-3900	EDC/HYDRAULICS 3	3770	B21	**C052**	ROCKSHAFT POTENTIOMETER
13	3610-3900	EDC/HYDRAULICS 3	3820	S27	**C173**	LOW CHARGE PRESSURE SWITCH S2
13	3610-3900	EDC/HYDRAULICS 3	3840	Y28	**C216**	TEMPERATURE SWITCH
13	3610-3900	EDC/HYDRAULICS 3	3860	Y29	**C217**	EDC UP SOLENOID

NOTE: *Additional Connectors* ***C019****,* ***C020****,* ***C081****,* ***C100****,* ***C101****,* ***C239****,* ***C284****,* ***C328****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C239-4
5087 K
C019-34
5087 K
C101-5
5085 K
C019-35
5085 K
Y29
C217
C239-5
5097 K
C019-32
5097 K
C100-12
5090 K
C019-33
5090 K
Y28
C218
C081-2
7160 R
C020-9
7160 R
57 B
S27
C173
2580
60 B/W
C101-2
5080 K
C019-46
5080 K
B21
C052
780
5020 TN
5020 TN
SP167
2040
5020 TN
2630
60 B/W
C101-9
5065 TN
C019-38
5065 TN
B20
C048
C101-25
5075 K
C019-37
5075 K
SP158
5075 K
C101-10
5070 TN
C019-36
5070 TN
B19
C047
5075 K
2640
60 B/W
C328-7
4058 W
C020-36
4058 W
C284-5
4058 W
Y27
C338
57 B
C328-15
4057 W
C020-35
4057 W
C284-4
4057 W
Y26
C337
57 B
C328-6
4056 W
C020-34
4056 W
C284-3
4056 W
Y25
C336
57 B
SP291
C284-1
57 B
57 B
C328-14
4055 W
C020-33
4055 W
C284-2
4055 W
Y24
C335
57 B
C328-5
4054 W
C020-38
4054 W
C284-6
4054 W
Y23
C334
57 B
3900
3890
3880
3870
3860
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FRAME 13A 1

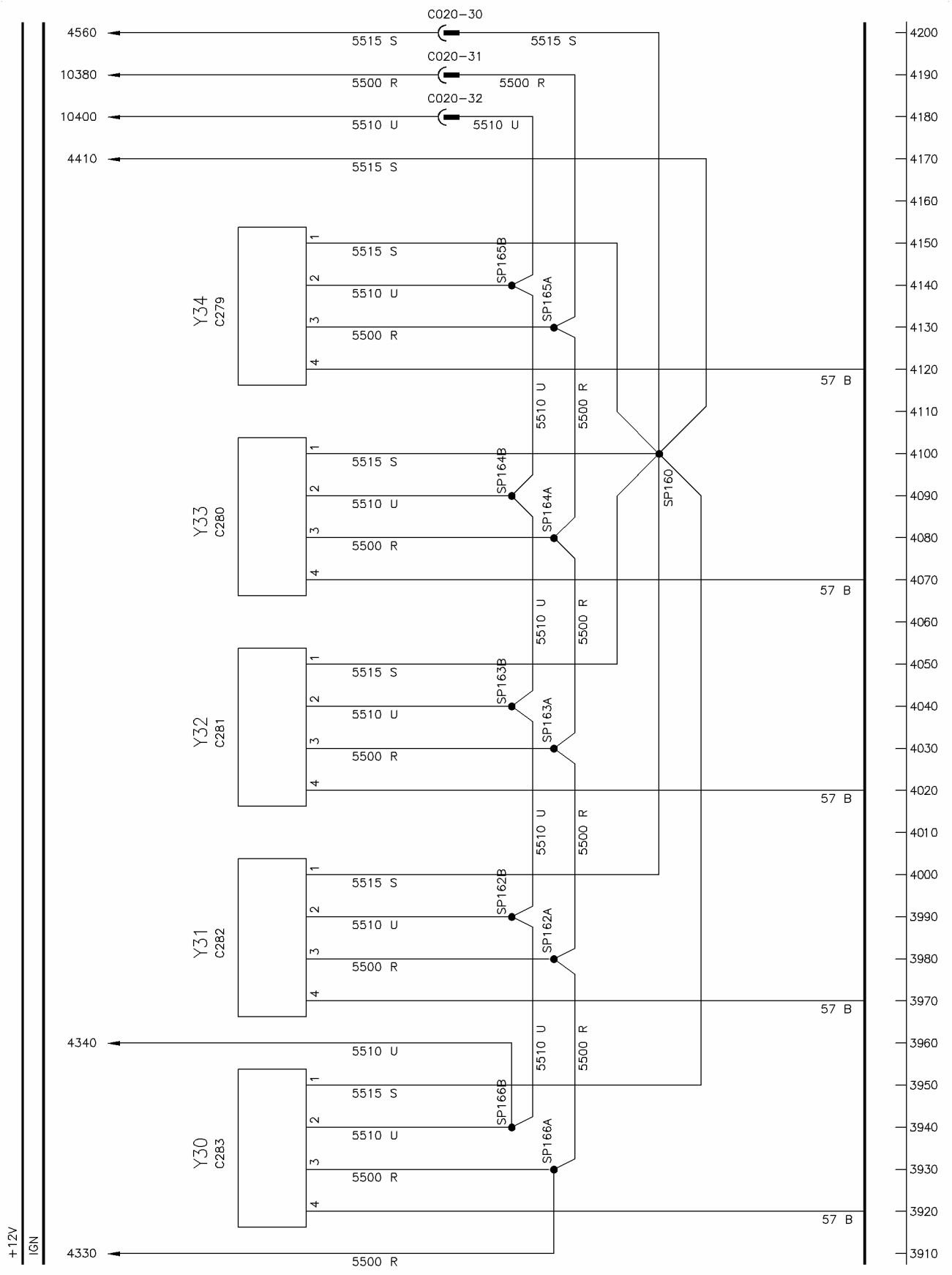
Wiring harness - Electrical schematic frame 14 Electro-Hydraulic Remotes / Hydraulic Systems (1)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
14	3910-4200	EHR/HYDRAULICS 1	3930	Y30	**C283**	EHR VALVE CONNECTOR 5
14	3910-4200	EHR/HYDRAULICS 1	3980	Y31	**C282**	EHR VALVE CONNECTOR 4
14	3910-4200	EHR/HYDRAULICS 1	4030	Y32	**C281**	EHR VALVE CONNECTOR 3
14	3910-4200	EHR/HYDRAULICS 1	4080	Y33	**C280**	EHR VALVE CONNECTOR 2
14	3910-4200	EHR/HYDRAULICS 1	4130	Y34	**C279**	EHR VALVE CONNECTOR 1

NOTE: *Additional Connectors* ***C020****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C020-30
C020-31
C020-32
4560
10380
10400
4410
4340
4330
5515 S
5500 R
5510 U
Y34 C279
Y33 C280
Y32 C281
Y31 C282
Y30 C283
SP165B
SP165A
SP164B
SP164A
SP163B
SP163A
SP162B
SP162A
SP166B
SP166A
SP160
57 B
+12V
IGN
4200
4190
4180
4170
4160
4150
4140
4130
4120
4110
4100
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4080
4070
4060
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3920
3910

FRAME 14A 1

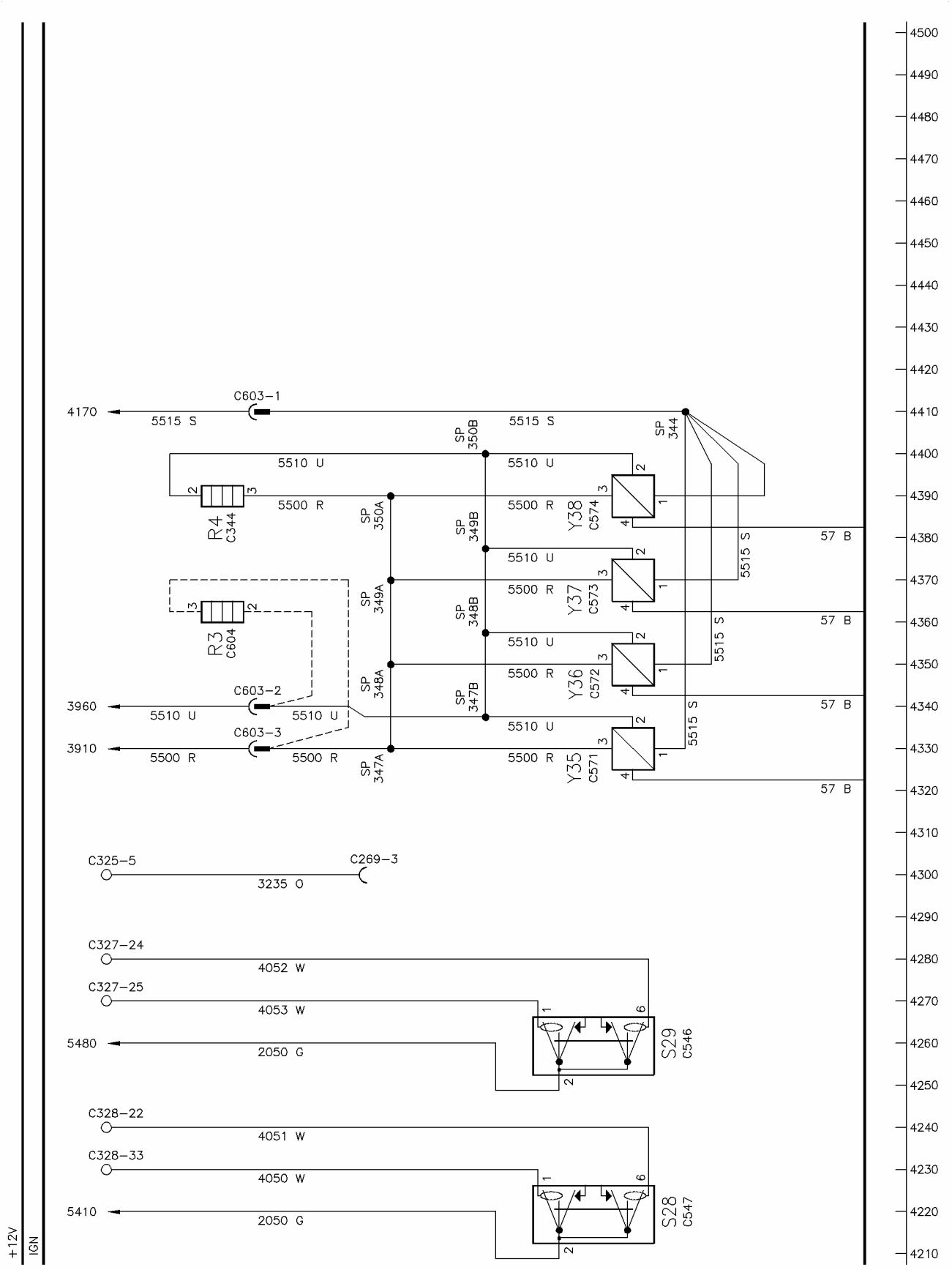
Wiring harness - Electrical schematic frame 15 Electro-Hydraulic Remotes / Hydraulic Systems (2)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
15	4210-4500	EHR/HYDRAULICS 2	4220	S28	**C547**	TOP LINK SWITCH
15	4210-4500	EHR/HYDRAULICS 2	4260	S29	**C546**	SIDE LINK SWITCH
15	4210-4500	EHR/HYDRAULICS 2	4330	Y35	**C571**	EHR 7
15	4210-4500	EHR/HYDRAULICS 2	4350	Y36	**C572**	EHR 8
15	4210-4500	EHR/HYDRAULICS 2	4360	R3	**C604**	BUS TERNINATION RESISTOR
15	4210-4500	EHR/HYDRAULICS 2	4370	Y37	**C573**	EHR 9
15	4210-4500	EHR/HYDRAULICS 2	4390	R4	**C344**	TERMINATING RESISTOR 1A FPS SWB
15	4210-4500	EHR/HYDRAULICS 2	4390	Y38	**C574**	EHR 10

NOTE: *Additional Connectors* ***C269***, ***C325***, ***C327***, ***C328***, ***C603***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
4170
C603-1
5515 S
SP 350B
SP 344
5510 U
5500 R
R4 C344
SP 350A
SP 349B
Y38 C574
57 B
SP 349A
SP 348B
Y37 C573
R3 C604
SP 348A
SP 347B
Y36 C572
3960
C603-2
3910
C603-3
SP 347A
Y35 C571
C325-5
C269-3
3235 O
C327-24
4052 W
C327-25
4053 W
5480
2050 G
S29 C546
C328-22
4051 W
C328-33
4050 W
5410
S28 C547
4500
4490
4480
4470
4460
4450
4440
4430
4420
4410
4400
4390
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FRAME 15A 1

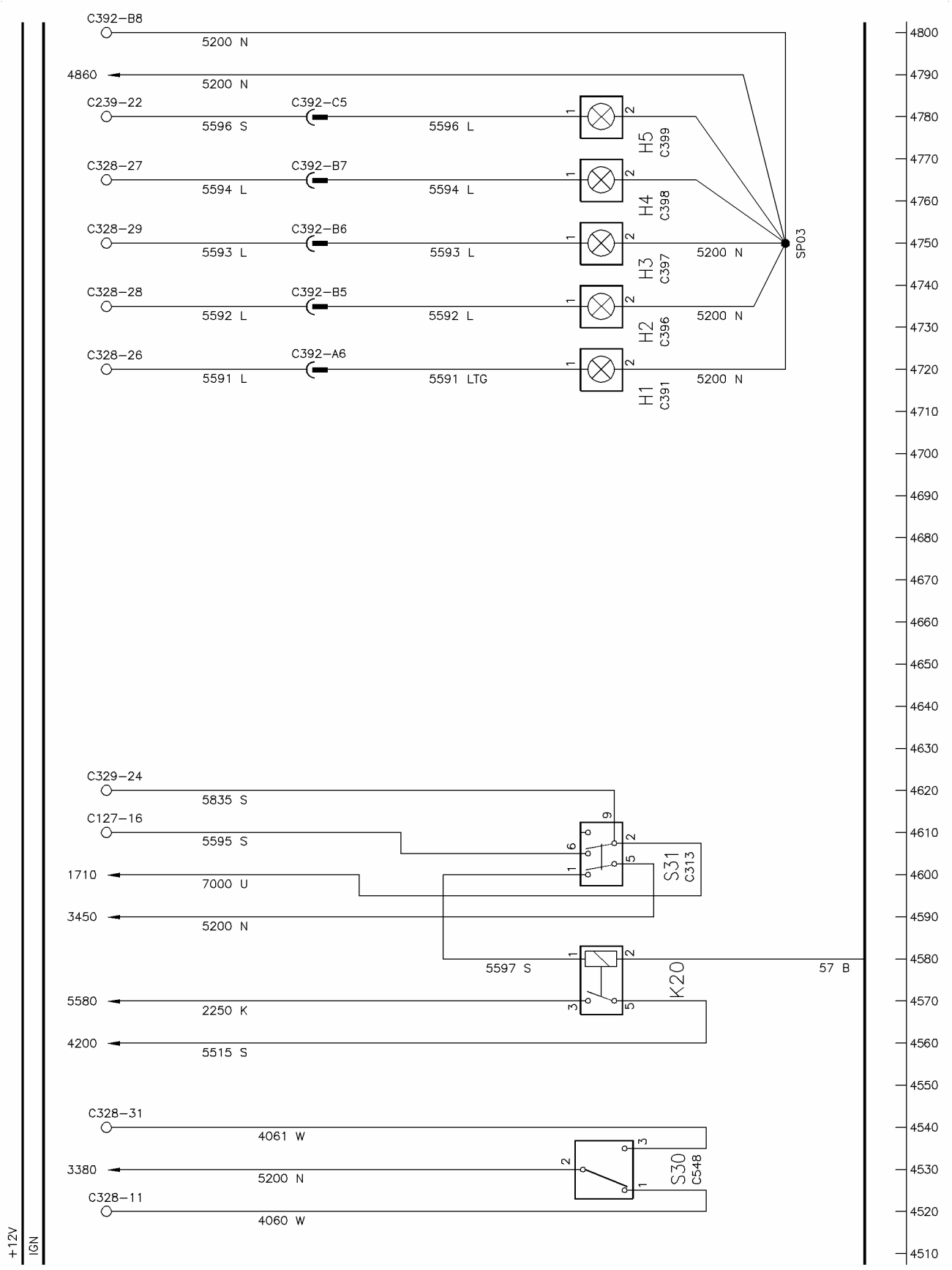
Wiring harness - Electrical schematic frame 16 Electro_Hydraulic Remotes / Hydraulic Systems (3)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
16	4510-4800	EHR/HYDRAULICS 3	4530	S30	**C548**	EHR SELECT SWITCH
16	4510-4800	EHR/HYDRAULICS 3	4570	K20		RELAY - EHR POWER
16	4510-4800	EHR/HYDRAULICS 3	4600	S31	**C313**	HYDRALIC STOP (EHR STOP SWITCH)
16	4510-4800	EHR/HYDRAULICS 3	4720	H1	**C391**	LAMP 1
16	4510-4800	EHR/HYDRAULICS 3	4735	H2	**C396**	LAMP 2
16	4510-4800	EHR/HYDRAULICS 3	4750	H3	**C397**	LAMP 3
16	4510-4800	EHR/HYDRAULICS 3	4765	H4	**C398**	LAMP 4
16	4510-4800	EHR/HYDRAULICS 3	4780	H5	**C399**	MASTER LAMP

NOTE: *Additional Connectors* ***C127***, ***C239***, ***C328***, ***C392***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C392-B8
5200 N
4860
5200 N
C239-22
C392-C5
5596 S
5596 L
H5 C399
C328-27
C392-B7
5594 L
5594 L
H4 C398
C328-29
C392-B6
5593 L
5593 L
H3 C397
5200 N
SP03
C328-28
C392-B5
5592 L
5592 L
H2 C396
5200 N
C328-26
C392-A6
5591 L
5591 LTG
H1 C391
5200 N
C329-24
5835 S
C127-16
5595 S
1710
7000 U
3450
5200 N
S31 C313
5597 S
57 B
K20
5580
2250 K
4200
5515 S
C328-31
4061 W
3380
5200 N
S30 C548
C328-11
4060 W
+12V
IGN
4800
4790
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4690
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FRAME 16A 1

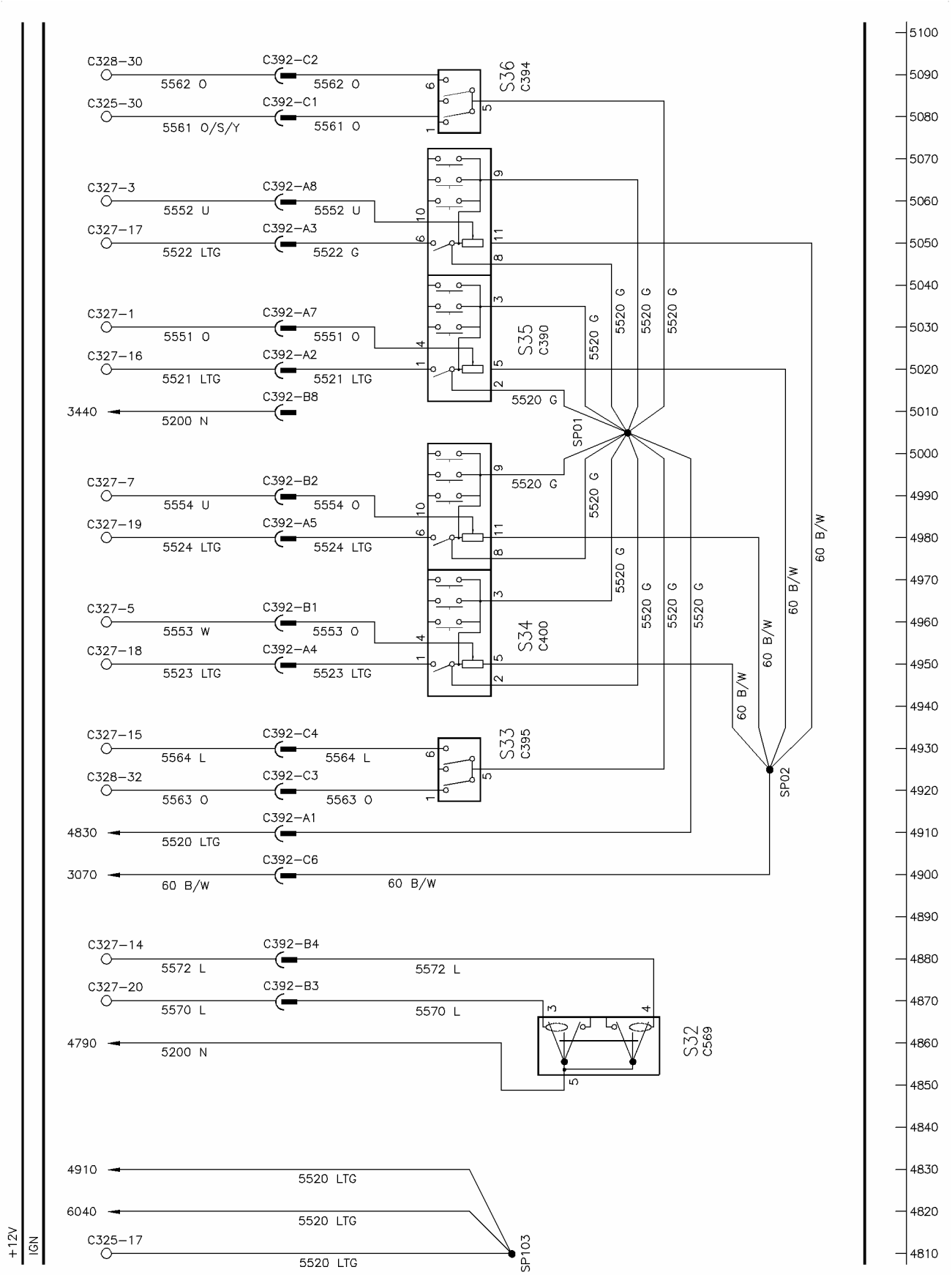
Wiring harness - Electrical schematic frame 17 Electro-Hydraulic Remotes / Hydraulic Systems (4)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
17	4810-5100	EHR/HYDRAULICS 4	4860	S32	**C569**	5TH REMOTE SWITCH
17	4810-5100	EHR/HYDRAULICS 4	4920	S33	**C395**	EHR 3/4 TIME/FLOW SWITCH
17	4810-5100	EHR/HYDRAULICS 4	4970	S34	**C400**	EHR 3-4 LEVER ASSY
17	4810-5100	EHR/HYDRAULICS 4	5050	S35	**C390**	EHR 1-2 LEVER ASSY
17	4810-5100	EHR/HYDRAULICS 4	5085	S36	**C394**	EHR 1/2 TIME/FLOW SWITCH

NOTE: *Additional Connectors* ***C325****,* ***C327****,* ***C328****,* ***C392****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C328-30
5562 O
C392-C2
5562 O
S36
C394
C325-30
5561 O/S/Y
C392-C1
5561 O
C327-3
5552 U
C392-A8
5552 U
C327-17
5522 LTG
C392-A3
5522 G
C327-1
5551 O
C392-A7
5551 O
S35
C390
C327-16
5521 LTG
C392-A2
5521 LTG
3440
5200 N
C392-B8
5520 G
SP01
C327-7
5554 U
C392-B2
5554 O
C327-19
5524 LTG
C392-A5
5524 LTG
C327-5
5553 W
C392-B1
5553 O
S34
C400
C327-18
5523 LTG
C392-A4
5523 LTG
C327-15
5564 L
C392-C4
5564 L
S33
C395
C328-32
5563 O
C392-C3
5563 O
4830
5520 LTG
C392-A1
3070
60 B/W
C392-C6
60 B/W
SP02
C327-14
5572 L
C392-B4
5572 L
C327-20
5570 L
C392-B3
5570 L
4790
5200 N
S32
C569
4910
5520 LTG
6040
5520 LTG
C325-17
5520 LTG
SP103
+12V
IGN
5100
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5010
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FRAME 17A 1

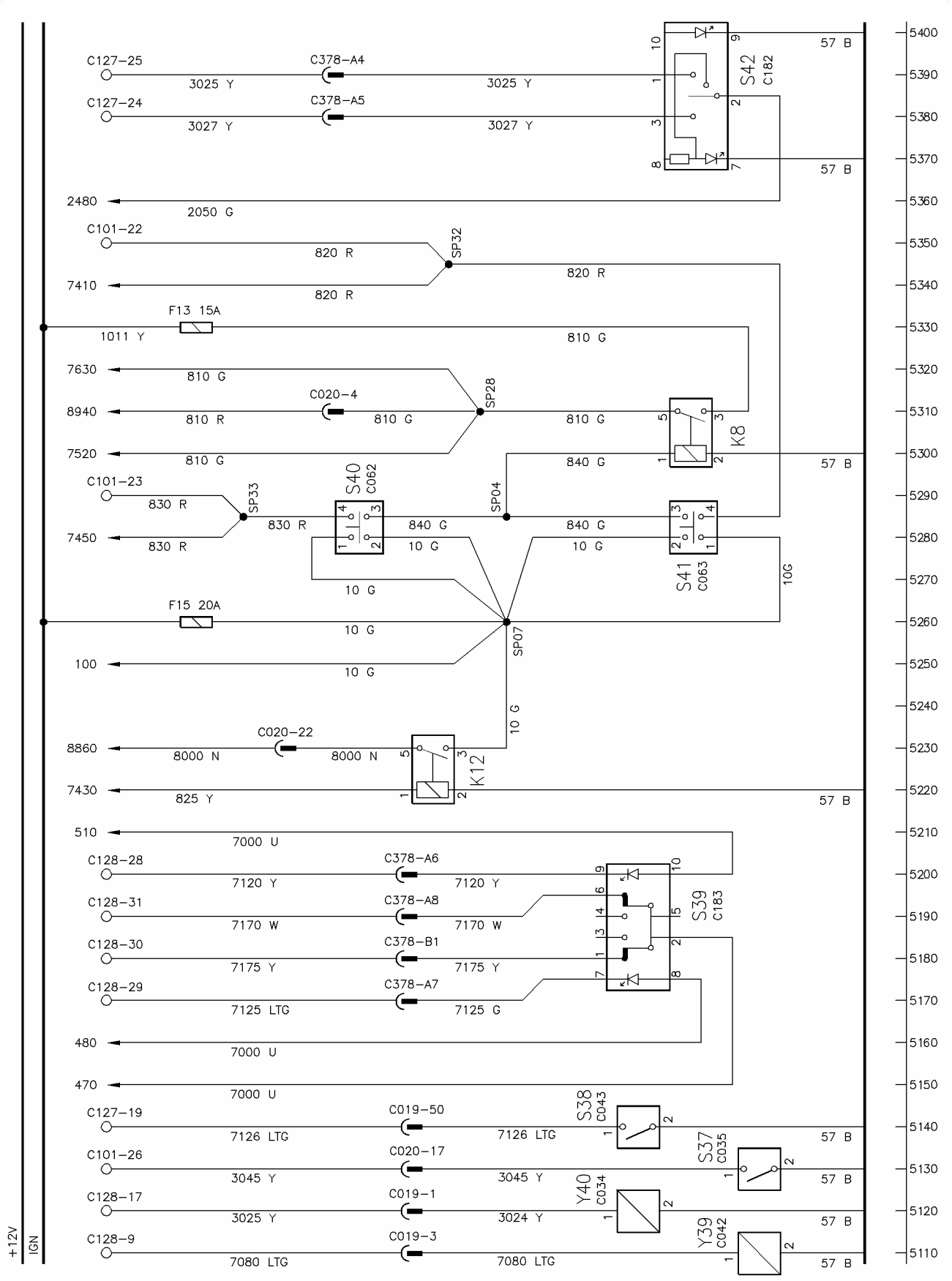
Wiring harness - Electrical schematic frame 18 Four Wheel Drive and Differential Lock

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
18	5110-5400	FWD & DIFF LOCK	5110	Y39	**C042**	DIFF LOCK SOLENOID
18	5110-5400	FWD & DIFF LOCK	5120	Y40	**C034**	FWD SOLENOID
18	5110-5400	FWD & DIFF LOCK	5130	S37	**C035**	FWD SWITCH
18	5110-5400	FWD & DIFF LOCK	5140	S38	**C043**	DIFF LOCK OP SWITCH
18	5110-5400	FWD & DIFF LOCK	5190	S39	**C183**	DIFF LOCK SWITCH
18	5110-5400	FWD & DIFF LOCK	5220	K12		RELAY - STOPLAMPS SWITCH, AIR BRAKES
18	5110-5400	FWD & DIFF LOCK	5260	F15 - 20A		FUSE - STOPLAMP SWITCH AND PEDAL LATCH
18	5110-5400	FWD & DIFF LOCK	5280	S40	**C062**	RIGHT HAND STOPLAMP SWITCH
18	5110-5400	FWD & DIFF LOCK	5280	S41	**C063**	LEFT HAND STOPLAMP SWITCH
18	5110-5400	FWD & DIFF LOCK	5300	K8		RELAY - STOPLAMPS
18	5110-5400	FWD & DIFF LOCK	5330	F13 - 15A		FUSE - STOPLAMPS
18	5110-5400	FWD & DIFF LOCK	5380	S42	**C182**	4WD SWITCH

NOTE: *Additional Connectors* ***C019***, ***C020***, ***C101***, ***C127***, ***C128***, ***C378***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C127-25
C378-A4
3025 Y
3025 Y
C127-24
C378-A5
3027 Y
3027 Y
S42
C182
57 B
57 B
2480
2050 G
C101-22
820 R
SP32
7410
820 R
820 R
820 R
F13 15A
1011 Y
810 G
7630
810 G
C020-4
8940
810 R
810 G
SP28
810 G
810 G
K8
7520
810 G
840 G
57 B
C101-23
830 R
SP33
S40
C062
SP04
7450
830 R
830 R
840 G
840 G
10 G
10 G
S41
C063
10G
10 G
F15 20A
10 G
SP07
100
10 G
10 G
C020-22
8860
8000 N
8000 N
K12
7430
825 Y
57 B
510
7000 U
C128-28
C378-A6
7120 Y
7120 Y
C128-31
C378-A8
7170 W
7170 W
S39
C183
C128-30
C378-B1
7175 Y
7175 Y
C128-29
C378-A7
7125 LTG
7125 G
480
7000 U
470
7000 U
C127-19
C019-50
7126 LTG
7126 LTG
S38
C043
57 B
C101-26
C020-17
3045 Y
3045 Y
S37
C035
57 B
C128-17
C019-1
3025 Y
3024 Y
Y40
C034
57 B
C128-9
C019-3
7080 LTG
7080 LTG
Y39
C042
57 B
5400
5390
5380
5370
5360
5350
5340
5330
5320
5310
5300
5290
5280
5270
5260
5250
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5110

FRAME 18A 1

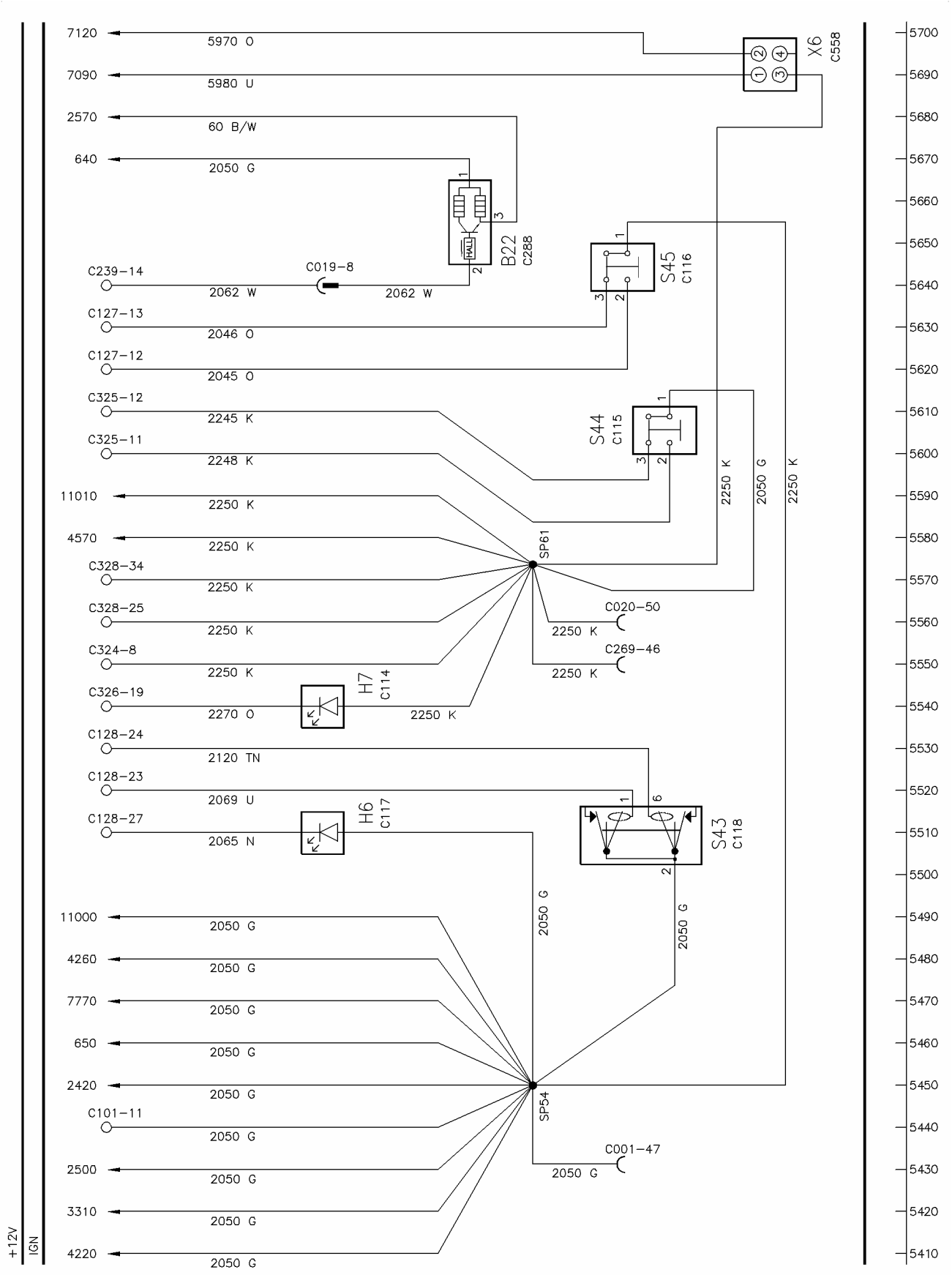
Wiring harness - Electrical schematic frame 19 Power Take Off Systems (1)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
19	5410-5700	POWER TAKE OFF 1	5510	H6	**C117**	REAR PTO ENGAGE LAMP
19	5410-5700	POWER TAKE OFF 1	5510	S43	**C118**	REAR PTO BRAKE SWITCH AND LAMP
19	5410-5700	POWER TAKE OFF 1	5540	H7	**C114**	FRONT PTO ENGAGE LAMP
19	5410-5700	POWER TAKE OFF 1	5605	S44	**C115**	FRONT PTO SWITCH
19	5410-5700	POWER TAKE OFF 1	5645	S45	**C116**	REAR PTO SWITCH
19	5410-5700	POWER TAKE OFF 1	5650	B22	**C288**	PTO SHAFT TWIST SENSOR
19	5410-5700	POWER TAKE OFF 1	5690	X6	**C558**	FRONT BREAK AWAY (OPTION)

NOTE: *Additional Connectors* ***C019****,* ***C020****,* ***C101****,* ***C127****,* ***C128****,* ***C239****,* ***C269****,* ***C324****,* ***C325****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


7120
5970 O
7090
5980 U
X6
C558
2570
60 B/W
640
2050 G
B22
C288
S45
C116
C239-14
2062 W
C019-8
2062 W
C127-13
2046 O
C127-12
2045 O
C325-12
2245 K
C325-11
2248 K
S44
C115
11010
2250 K
4570
2250 K
SP61
C328-34
2250 K
C328-25
2250 K
C020-50
2250 K
C324-8
2250 K
C269-46
2250 K
C326-19
2270 O
H7
C114
2250 K
C128-24
2120 TN
C128-23
2069 U
C128-27
2065 N
H6
C117
S43
C118
2050 G
2050 G
11000
2050 G
4260
2050 G
7770
2050 G
650
2050 G
2420
2050 G
SP54
C101-11
2050 G
C001-47
2050 G
2500
2050 G
3310
2050 G
4220
2050 G
2250 K
2050 G
2250 K
+12V
IGN
5700
5690
5680
5670
5660
5650
5640
5630
5620
5610
5600
5590
5580
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5410

FRAME 19A 1

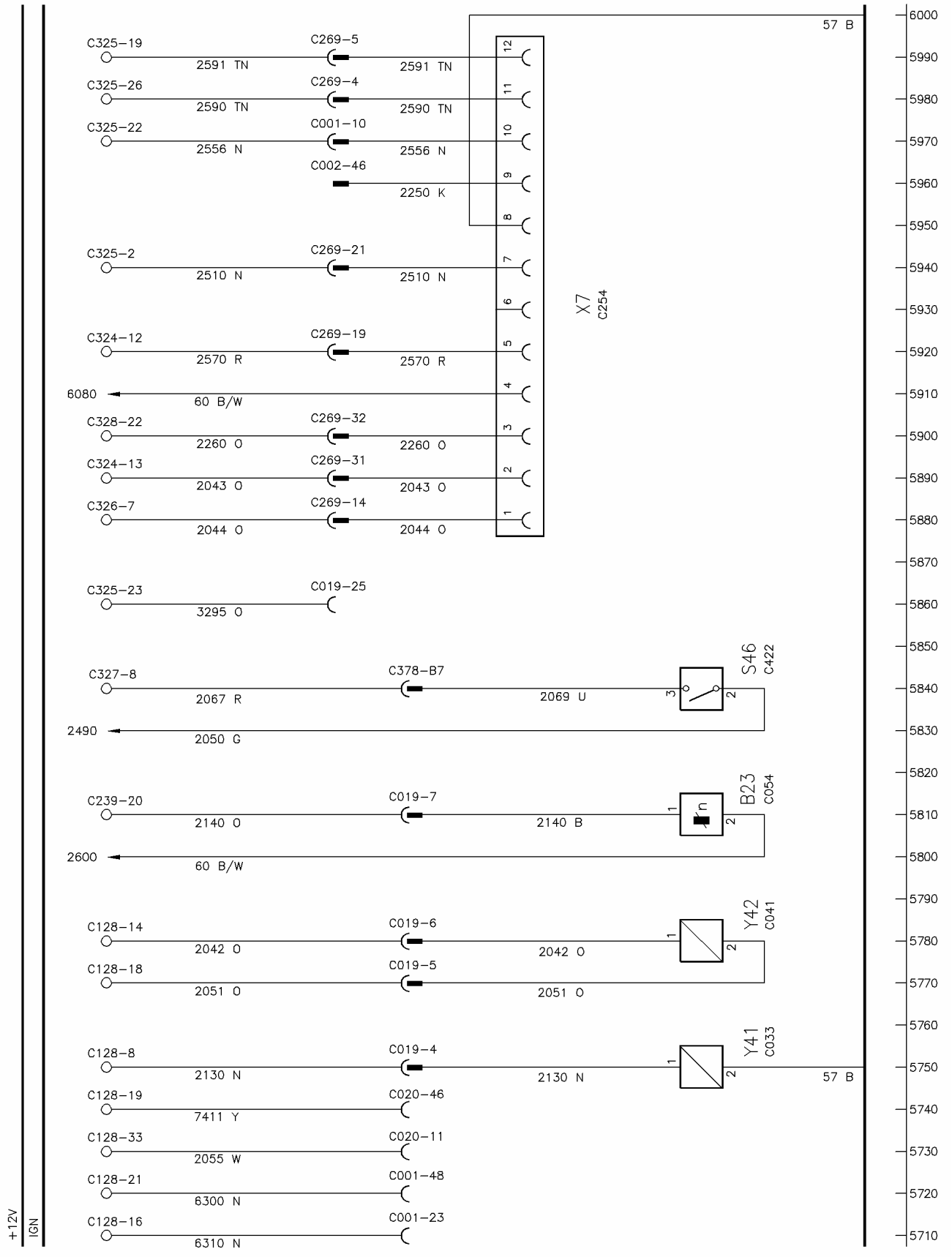
Wiring harness - Electrical schematic frame 20 Power Take Off Systems (2)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
20	5710-6000	POWER TAKE OFF 2	5750	Y41	**C033**	PTO BRAKE
20	5710-6000	POWER TAKE OFF 2	5780	Y42	**C041**	PTO SOLENOID
20	5710-6000	POWER TAKE OFF 2	5810	B23	**C054**	PTO SPEED SENSOR
20	5710-6000	POWER TAKE OFF 2	5840	S46	**C422**	PTO MGT SWITCH
20	5710-6000	POWER TAKE OFF 2	5930	X7	**C254**	FRONT HITCH/PTO EXTENSION CONNECTOR

NOTE: *Additional Connectors* ***C001****,* ***C002****,* ***C019****,* ***C128****,* ***C239****,* ***C269****,* ***C324****,* ***C325****,* ***C326****,* ***C327****,* ***C328****,* ***C378****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
57 B
X7
C254
C325-19
2591 TN
C269-5
C325-26
2590 TN
C269-4
C325-22
2556 N
C001-10
C002-46
2250 K
C325-2
2510 N
C269-21
C324-12
2570 R
C269-19
6080
60 B/W
C328-22
2260 O
C269-32
C324-13
2043 O
C269-31
C326-7
2044 O
C269-14
C325-23
3295 O
C019-25
S46
C422
C327-8
2067 R
C378-B7
2069 U
2490
2050 G
B23
C054
C239-20
2140 O
C019-7
2140 B
2600
60 B/W
Y42
C041
C128-14
2042 O
C019-6
C128-18
2051 O
C019-5
Y41
C033
C128-8
2130 N
C019-4
C128-19
7411 Y
C020-46
C128-33
2055 W
C020-11
C128-21
6300 N
C001-48
C128-16
6310 N
C001-23
6000
5990
5980
5970
5960
5950
5940
5930
5920
5910
5900
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5720
5710

FRAME 20A 1

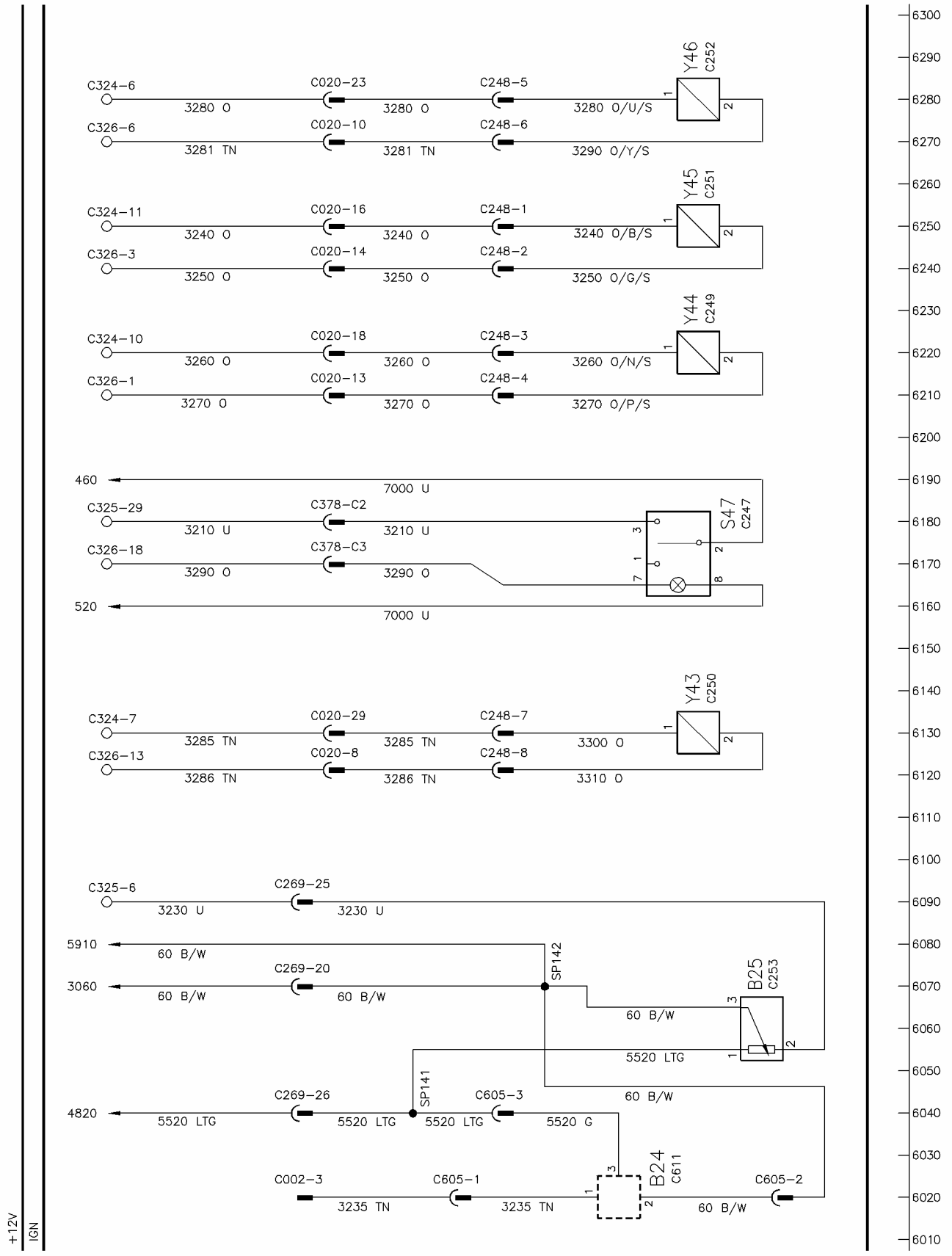
Wiring harness - Electrical schematic frame 21 Front Suspension

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
21	6010-6300	FRONT SUSPENSION	6020	B24	**C611**	ACCELEROMETER
21	6010-6300	FRONT SUSPENSION	6060	B25	**C253**	FRONT SUSPENSION POT
21	6010-6300	FRONT SUSPENSION	6130	Y43	**C250**	SUSPENSION LOWER LOCKOUT SOLENOID
21	6010-6300	FRONT SUSPENSION	6170	S47	**C247**	FRONT SUSPENSION SWITCH
21	6010-6300	FRONT SUSPENSION	6220	Y44	**C249**	SUSPENSION LOWER SOLENOID
21	6010-6300	FRONT SUSPENSION	6250	Y45	**C251**	SUSPENSION RAISE SOLENOID
21	6010-6300	FRONT SUSPENSION	6280	Y46	**C252**	SUSPENSION RAISE LOCKOUT SOLENOID

NOTE: *Additional Connectors* ***C002****,* ***C020****,* ***C248****,* ***C269****,* ***C324****,* ***C325****,* ***C326****,* ***C378****,* ***C605****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C324-6
C020-23
C248-5
3280 O
3280 O
3280 O/U/S
Y46 C252
C326-6
C020-10
C248-6
3281 TN
3281 TN
3290 O/Y/S
C324-11
C020-16
C248-1
3240 O
3240 O
3240 O/B/S
Y45 C251
C326-3
C020-14
C248-2
3250 O
3250 O
3250 O/G/S
C324-10
C020-18
C248-3
3260 O
3260 O
3260 O/N/S
Y44 C249
C326-1
C020-13
C248-4
3270 O
3270 O
3270 O/P/S
460
7000 U
C325-29
C378-C2
3210 U
3210 U
C326-18
C378-C3
3290 O
3290 O
S47 C247
520
7000 U
C324-7
C020-29
C248-7
3285 TN
3285 TN
3300 O
Y43 C250
C326-13
C020-8
C248-8
3286 TN
3286 TN
3310 O
C325-6
C269-25
3230 U
3230 U
5910
60 B/W
SP142
C269-20
3060
60 B/W
60 B/W
B25 C253
60 B/W
5520 LTG
SP141
C269-26
C605-3
4820
5520 LTG
5520 LTG
5520 LTG
5520 G
60 B/W
B24 C611
C002-3
C605-1
C605-2
3235 TN
3235 TN
60 B/W
6300
6290
6280
6270
6260
6250
6240
6230
6220
6210
6200
6190
6180
6170
6160
6150
6140
6130
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6100
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6080
6070
6060
6050
6040
6030
6020
6010

FRAME 21A 1

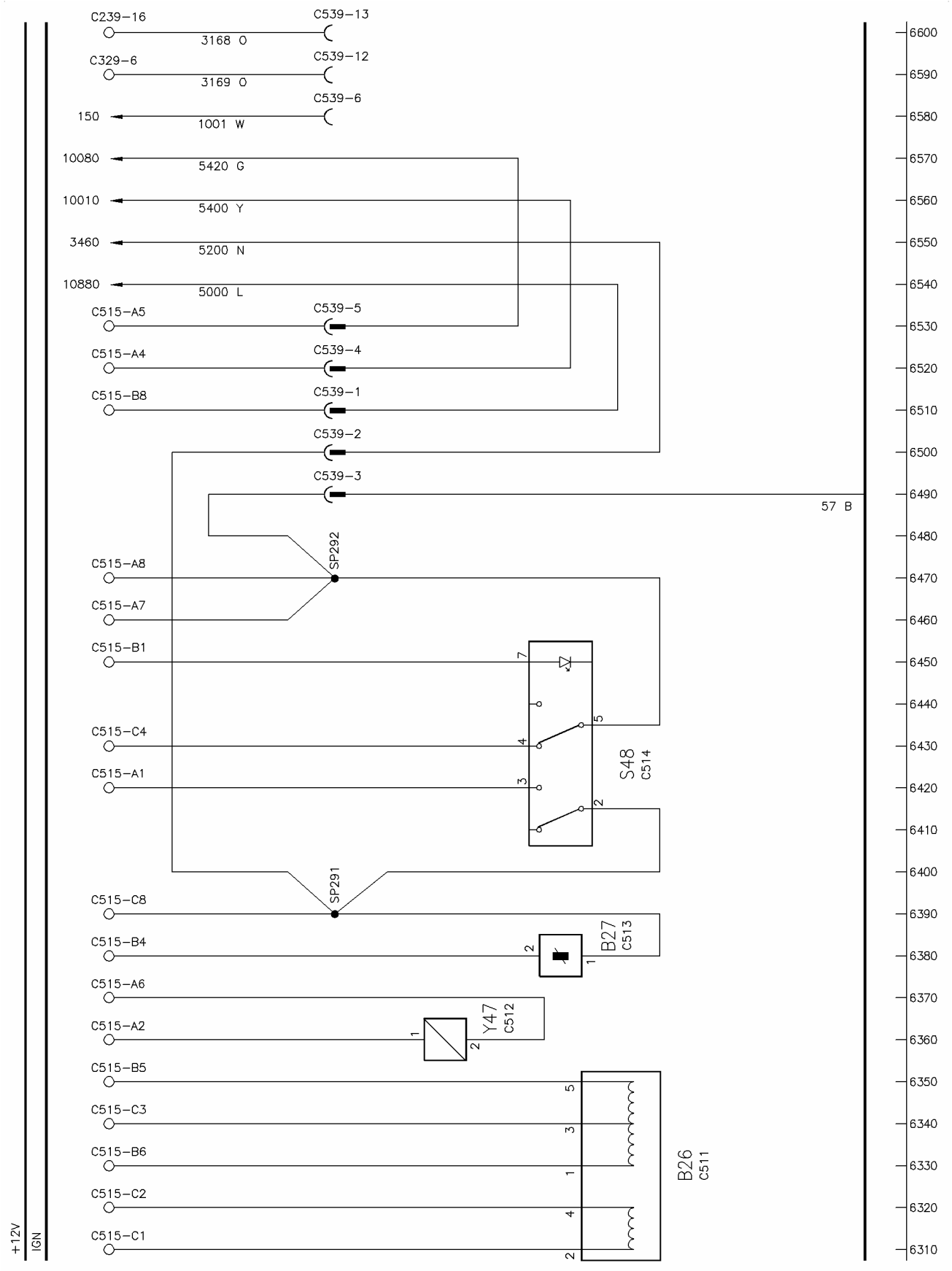
Wiring harness - Electrical schematic frame 22 Fast Steer System

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
22	6310-6600	FAST STEER SYSTEM	6330	B26	**C511**	FAST STEER - LVDT COILS
22	6310-6600	FAST STEER SYSTEM	6360	Y47	**C512**	FAST STEER SOLENOID VALVE
22	6310-6600	FAST STEER SYSTEM	6380	B27	**C513**	FAST STEER STEERING WHEEL SENSOR
22	6310-6600	FAST STEER SYSTEM	6430	S48	**C514**	FAST STEER STEERING WHEEL SWITCH

NOTE: *Additional Connectors* ***C239****,* ***C329****,* ***C515****,* ***C539****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C239-16
3168 O
C539-13
C329-6
3169 O
C539-12
150
1001 W
C539-6
10080
5420 G
10010
5400 Y
3460
5200 N
10880
5000 L
C515-A5
C539-5
C515-A4
C539-4
C515-B8
C539-1
C539-2
C539-3
57 B
SP292
C515-A8
C515-A7
C515-B1
C515-C4
C515-A1
S48
C514
SP291
C515-C8
C515-B4
B27
C513
C515-A6
C515-A2
Y47
C512
C515-B5
C515-C3
C515-B6
C515-C2
C515-C1
B26
C511
+12V
IGN
6600
6590
6580
6570
6560
6550
6540
6530
6520
6510
6500
6490
6480
6470
6460
6450
6440
6430
6420
6410
6400
6390
6380
6370
6360
6350
6340
6330
6320
6310

FRAME 22A 1

Wiring harness - Electrical schematic frame 23 Cab Accessories (1)

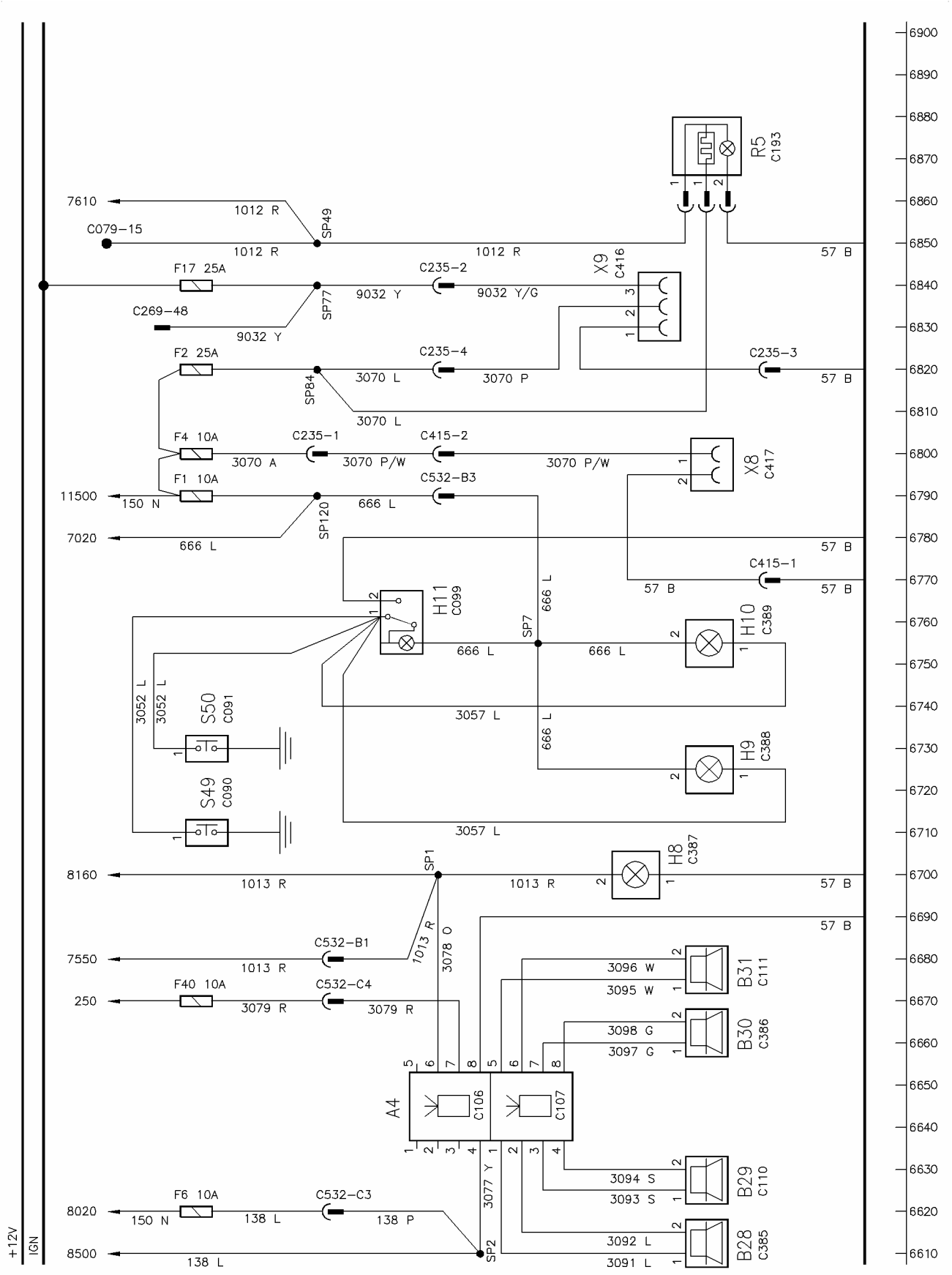
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
23	6610-6900	CAB ACCESSORIES 1	6610	B28	**C385**	SPEAKER - REAR LH
23	6610-6900	CAB ACCESSORIES 1	6620	F6 - 10A		FUSE - RADIO KAM & WORKLAMP ECU
23	6610-6900	CAB ACCESSORIES 1	6630	B29	**C110**	RIGHT HAND SPEAKER
23	6610-6900	CAB ACCESSORIES 1	6645	A4	**C106** / **C107**	RADIO A + RADIO B
23	6610-6900	CAB ACCESSORIES 1	6660	B30	**C386**	SPEAKER - REAR RH
23	6610-6900	CAB ACCESSORIES 1	6670	F40 - 10A		FUSE - RADIO
23	6610-6900	CAB ACCESSORIES 1	6680	B31	**C111**	LEFT HAND SPEAKER
23	6610-6900	CAB ACCESSORIES 1	6700	H8	**C387**	CONSOLE LAMP RH
23	6610-6900	CAB ACCESSORIES 1	6710	S49	**C090**	LEFT HAND DOOR SWITCH
23	6610-6900	CAB ACCESSORIES 1	6725	H9	**C388**	PUDDLE LAMP LH
23	6610-6900	CAB ACCESSORIES 1	6730	S50	**C091**	RIGHT HAND DOOR SWITCH
23	6610-6900	CAB ACCESSORIES 1	6755	H10	**C389**	PUDDLE LAMP RH
23	6610-6900	CAB ACCESSORIES 1	6760	H11	**C099**	INTERIOR LAMP
23	6610-6900	CAB ACCESSORIES 1	6790	F1 - 10A		FUSE - INTERIOR, PUDDLE LIGHTS, HANDBRAKE, HEATED MIRRORS
23	6610-6900	CAB ACCESSORIES 1	6800	F4 - 10A		FUSE - ACCESSORY SOCKETS
23	6610-6900	CAB ACCESSORIES 1	6800	X8	**C417**	8 AMP RING TERMINALS - 2 OFF
23	6610-6900	CAB ACCESSORIES 1	6820	F2 - 25A		FUSE - CIGAR LIGHTER, POWER STUDS
23	6610-6900	CAB ACCESSORIES 1	6830	X9	**C416**	20 AMP SOCKET - 3 PIN
23	6610-6900	CAB ACCESSORIES 1	6840	F17 - 25A		FUSE - ACCESSORY SOCKETS
23	6610-6900	CAB ACCESSORIES 1	6870	R5	**C193**	CIGAR LIGHTER

NOTE: *Additional Connectors* ***C079***, ***C235***, ***C269***, ***C415***, ***C532***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		

S	Slate	G	Green	P	Purple	


+12V
IGN
7610
1012 R
SP49
C079-15
1012 R
1012 R
57 B
R5
C193
F17 25A
C235-2
9032 Y
9032 Y/G
X9
C416
SP77
C269-48
9032 Y
F2 25A
C235-4
3070 L
3070 P
C235-3
57 B
SP84
3070 L
F4 10A
C235-1
C415-2
3070 A
3070 P/W
3070 P/W
X8
C417
F1 10A
C532-B3
11500
150 N
666 L
SP120
7020
666 L
57 B
C415-1
57 B
57 B
H11
C099
SP7
666 L
H10
C389
666 L
666 L
3052 L
3052 L
S50
C091
3057 L
666 L
H9
C388
S49
C090
3057 L
SP1
8160
1013 R
1013 R
H8
C387
57 B
57 B
C532-B1
7550
1013 R
1013 R
3078 O
F40 10A
C532-C4
250
3079 R
3079 R
3096 W
3095 W
B31
C111
3098 G
3097 G
B30
C386
A4
C106
C107
3077 Y
3094 S
3093 S
B29
C110
F6 10A
C532-C3
8020
150 N
138 L
138 P
3092 L
3091 L
B28
C385
SP2
8500
138 L
6900
6890
6880
6870
6860
6850
6840
6830
6820
6810
6800
6790
6780
6770
6760
6750
6740
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6690
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6660
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6640
6630
6620
6610

FRAME 23A 1

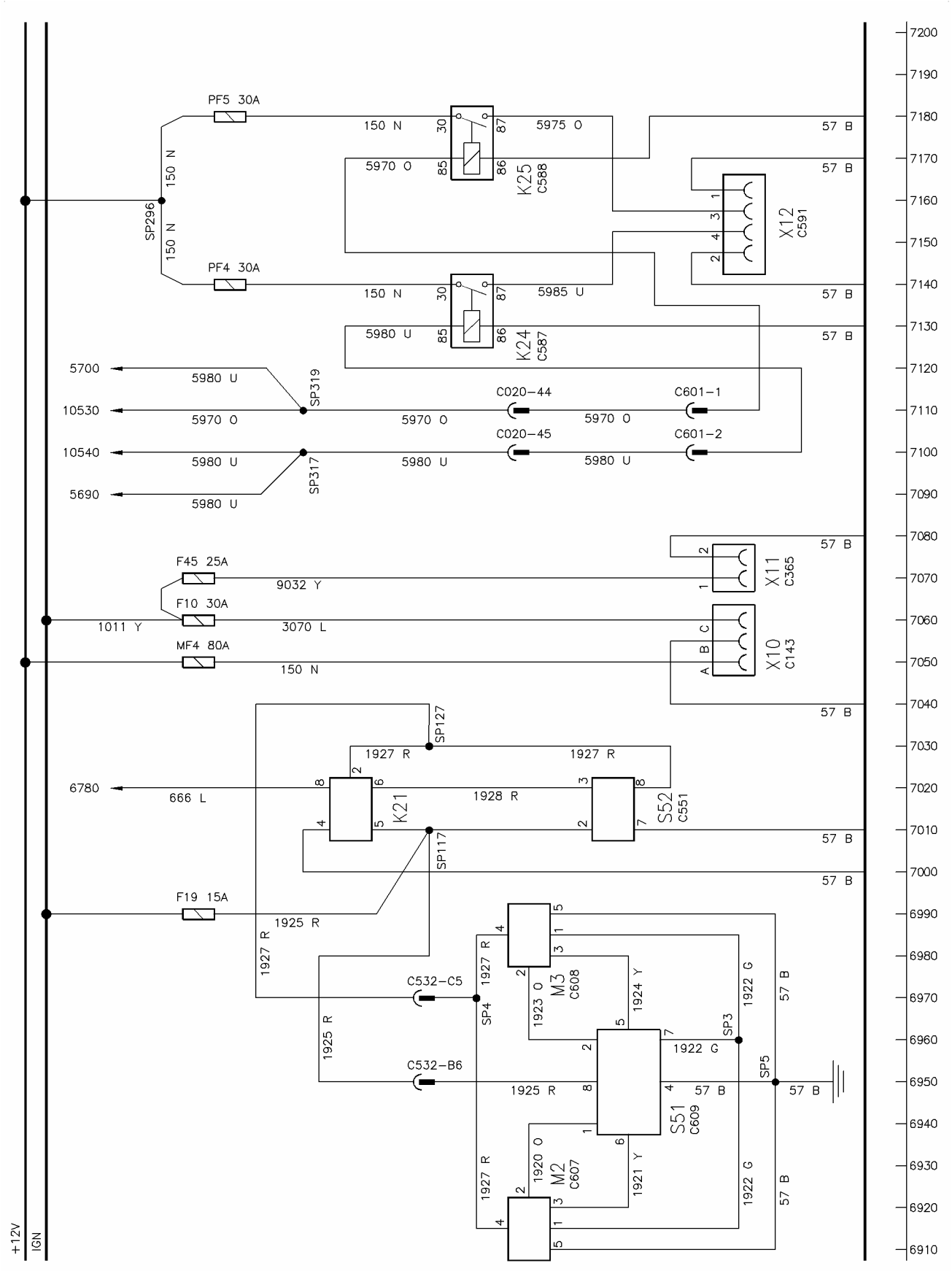
Wiring harness - Electrical schematic frame 24 Cab Accessories (2)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
24	6910-7200	CAB ACCESSORIES 2	6915	M2	**C607**	ELEC MIRROR LH
24	6910-7200	CAB ACCESSORIES 2	6950	S51	**C609**	MIRROR CONTROL SWITCH
24	6910-7200	CAB ACCESSORIES 2	6985	M3	**C608**	ELEC MIRROR RH
24	6910-7200	CAB ACCESSORIES 2	6990	F19 - 15A		FUSE - ELECTRIC MIRRORS
24	6910-7200	CAB ACCESSORIES 2	7010	S52	**C551**	HEATED MIRROR SWITCH
24	6910-7200	CAB ACCESSORIES 2	7015	K21		RELAY - HEATED MIRRORS
24	6910-7200	CAB ACCESSORIES 2	7050	MF4 - 80A		MAXI FUSE - IMPLEMENT SOCKET REAR
24	6910-7200	CAB ACCESSORIES 2	7050	X10	**C143**	IMPLEMENT SOCKET
24	6910-7200	CAB ACCESSORIES 2	7060	F10 - 30A		FUSE - REAR IMPLEMENT SOCKET
24	6910-7200	CAB ACCESSORIES 2	7070	F45 - 25A		FUSE - FRONT IGNITION, 8 AMP SOCKET
24	6910-7200	CAB ACCESSORIES 2	7070	X11	**C365**	8 AMP SOCKET
24	6910-7200	CAB ACCESSORIES 2	7130	K24	**C587**	RELAY - ISO 1
24	6910-7200	CAB ACCESSORIES 2	7140	PF4 - 30A		POWER FUSE - ISO RELAY 1
24	6910-7200	CAB ACCESSORIES 2	7155	X12	**C591**	BREAKAWAY
24	6910-7200	CAB ACCESSORIES 2	7170	K25	**C588**	RELAY - ISO 2
24	6910-7200	CAB ACCESSORIES 2	7180	PF5 - 30A		POWER FUSE - ISO RELAY 2

NOTE: *Additional Connectors* ***C020***, ***C532***, ***C601***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


PF5 30A
PF4 30A
150 N
SP296
5975 O
5970 O
5985 U
5980 U
K25 C588
K24 C587
X12 C591
57 B
5700
10530
10540
5690
SP319
SP317
C020-44
C020-45
C601-1
C601-2
F45 25A
F10 30A
MF4 80A
9032 Y
1011 Y
3070 L
X11 C365
X10 C143
SP127
SP117
1927 R
1928 R
6780
666 L
K21
S52 C551
F19 15A
1925 R
C532-C5
C532-B6
SP4
SP3
SP5
M3 C608
M2 C607
S51 C609
1923 O
1924 Y
1922 G
1920 O
1921 Y
+12V
IGN
7200
7190
7180
7170
7160
7150
7140
7130
7120
7110
7100
7090
7080
7070
7060
7050
7040
7030
7020
7010
7000
6990
6980
6970
6960
6950
6940
6930
6920
6910

FRAME 24A 1

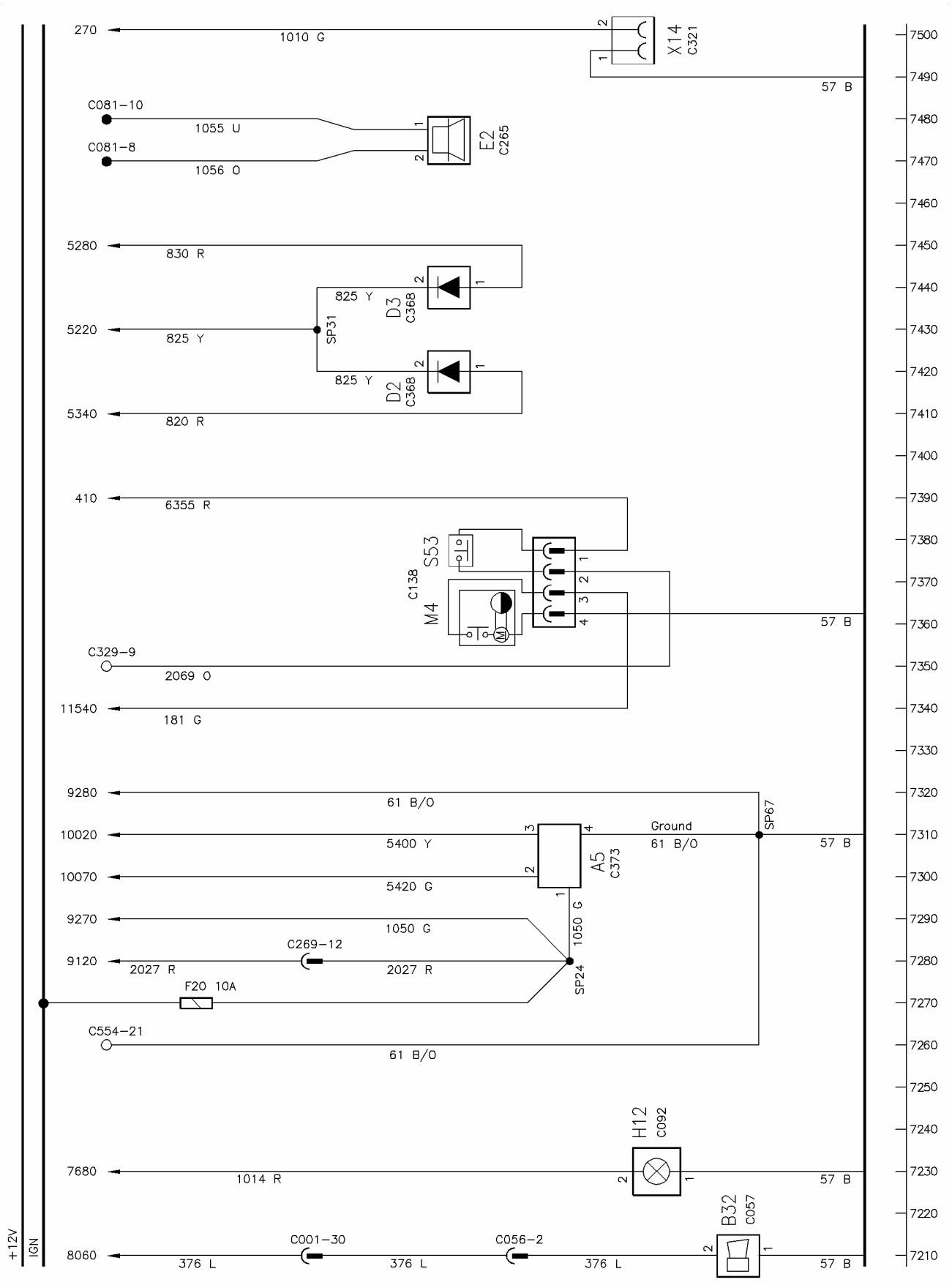
Wiring harness - Electrical schematic frame 25 Cab Accessories (3)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
25	7210-7500	CAB ACCESSORIES 3	7210	B32	**C057**	HORN
25	7210-7500	CAB ACCESSORIES 3	7230	H12	**C092**	CONSOLE LAMP
25	7210-7500	CAB ACCESSORIES 3	7270	F20 - 10A		FUSE - RADAR, DIAGS SOCKETS, ADIC KEYPAD, BACKUP ALARM
25	7210-7500	CAB ACCESSORIES 3	7300	A5	**C373**	INSTRUMENT CLUSTER KEYPAD
25	7210-7500	CAB ACCESSORIES 3	7360	M4	**C138**	SEAT PUMP (MOTOR)
25	7210-7500	CAB ACCESSORIES 3	7380	S53	**C138**	SEAT PUMP (SWITCH)
25	7210-7500	CAB ACCESSORIES 3	7420	D2	**C368**	DIODE CONNECTOR
25	7210-7500	CAB ACCESSORIES 3	7440	D3	**C368**	DIODE CONNECTOR
25	7210-7500	CAB ACCESSORIES 3	7475	E2	**C265**	BUZZER UNIT
25	7210-7500	CAB ACCESSORIES 3	7500	X14	**C321**	DIA HEADLAMP

NOTE: *Additional Connectors* ***C001****,* ***C056****,* ***C081****,* ***C269****,* ***C329****,* ***C554****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


270
1010 G
X14
C321
57 B
C081–10
1055 U
C081–8
1056 O
E2
C265
5280
830 R
825 Y
D3
C368
5220
825 Y
SP31
825 Y
D2
C368
5340
820 R
410
6355 R
S53
C138
M4
57 B
C329–9
2069 O
11540
181 G
9280
61 B/O
10020
5400 Y
Ground
61 B/O
SP67
57 B
10070
5420 G
A5
C373
9270
1050 G
1050 G
C269–12
9120
2027 R
2027 R
SP24
F20 10A
C554–21
61 B/O
H12
C092
7680
1014 R
57 B
B32
C057
+12V
IGN
8060
C001–30
376 L
376 L
C056–2
376 L
57 B
7500
7490
7480
7470
7460
7450
7440
7430
7420
7410
7400
7390
7380
7370
7360
7350
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7270
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7250
7240
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7210

FRAME 25A 1

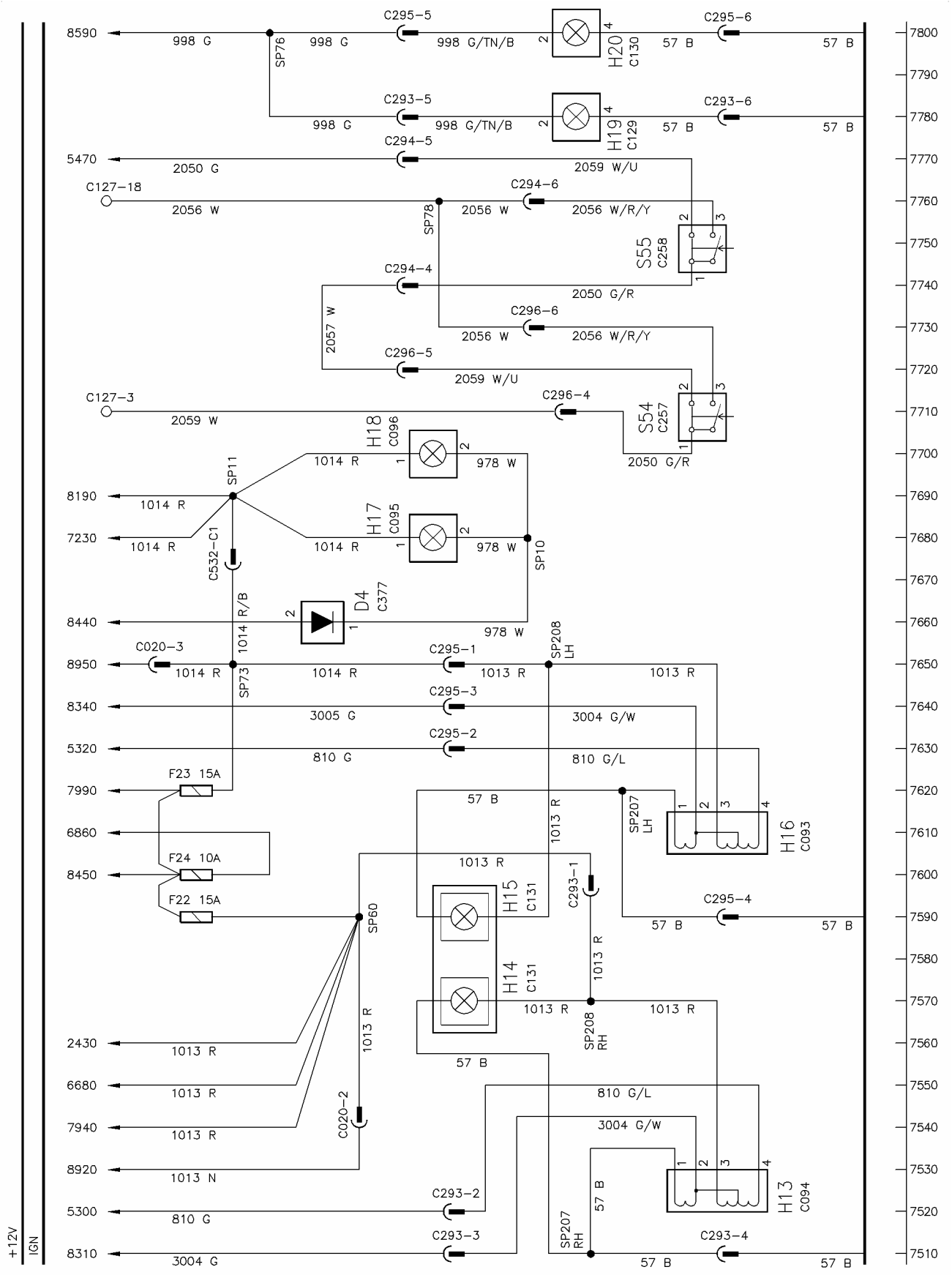
Wiring harness - Electrical schematic frame 26 Main Lamps and Indicators (1)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7525	H13	**C094**	RIGHT HAND NASO REAR FLASHER
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7570	H14	**C131**	LICENCE PLATE LAMP
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7590	F22 - 15A		FUSE - SIDELAMPS RH
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7590	H15	**C131**	LICENCE PLATE LAMP
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7600	F24 - 10A		FUSE - ILLUMINATION
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7610	H16	**C093**	LEFT HAND NASO REAR FLASHER
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7620	F23 - 15A		FUSE - SIDELAMPS LH
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7660	D4	**C377**	DIODE CONNECTOR
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7680	H17	**C095**	LEFT HAND REAR LICENCE WORKLAMP
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7700	H18	**C096**	RIGHT HAND REAR LICENCE WORKLAMP
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7710	S54	**C257**	LEFT HAND FENDER PTO SWITCH
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7750	S55	**C258**	RIGHT HAND FENDER PTO SWITCH
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7780	H19	**C129**	WORKLAMP RIGHT HAND FENDER
26	7510-7800	MAIN LAMPS/ INDICATORS 1	7800	H20	**C130**	WORKLAMP LEFT HAND FENDER

NOTE: *Additional Connectors* ***C020***, ***C127***, ***C293***, ***C294***, ***C295***, ***C296***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
8590
998 G
SP76
998 G
C295-5
998 G/TN/B
H20 C130
57 B
C295-6
57 B
C293-5
998 G
998 G/TN/B
H19 C129
C293-6
C294-5
5470
2050 G
2059 W/U
C127-18
2056 W
C294-6
SP78
2056 W/R/Y
S55 C258
C294-4
2050 G/R
2057 W
C296-6
2056 W/R/Y
C296-5
2059 W/U
C127-3
2059 W
C296-4
S54 C257
H18 C096
1014 R
978 W
SP11
8190
7230
H17 C095
SP10
C532-C1
D4 C377
8440
978 W
1014 R/B
C020-3
8950
SP73
C295-1
1013 R
SP208 LH
C295-3
8340
3005 G
3004 G/W
C295-2
5320
810 G
810 G/L
F23 15A
7990
6860
F24 10A
8450
F22 15A
SP60
SP207 LH
H16 C093
H15 C131
H14 C131
C293-1
C295-4
2430
6680
7940
8920
1013 N
C020-2
SP208 RH
C293-2
5300
C293-3
8310
3004 G
SP207 RH
H13 C094
7800
7790
7780
7770
7760
7750
7740
7730
7720
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7700
7690
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FRAME 26A 1

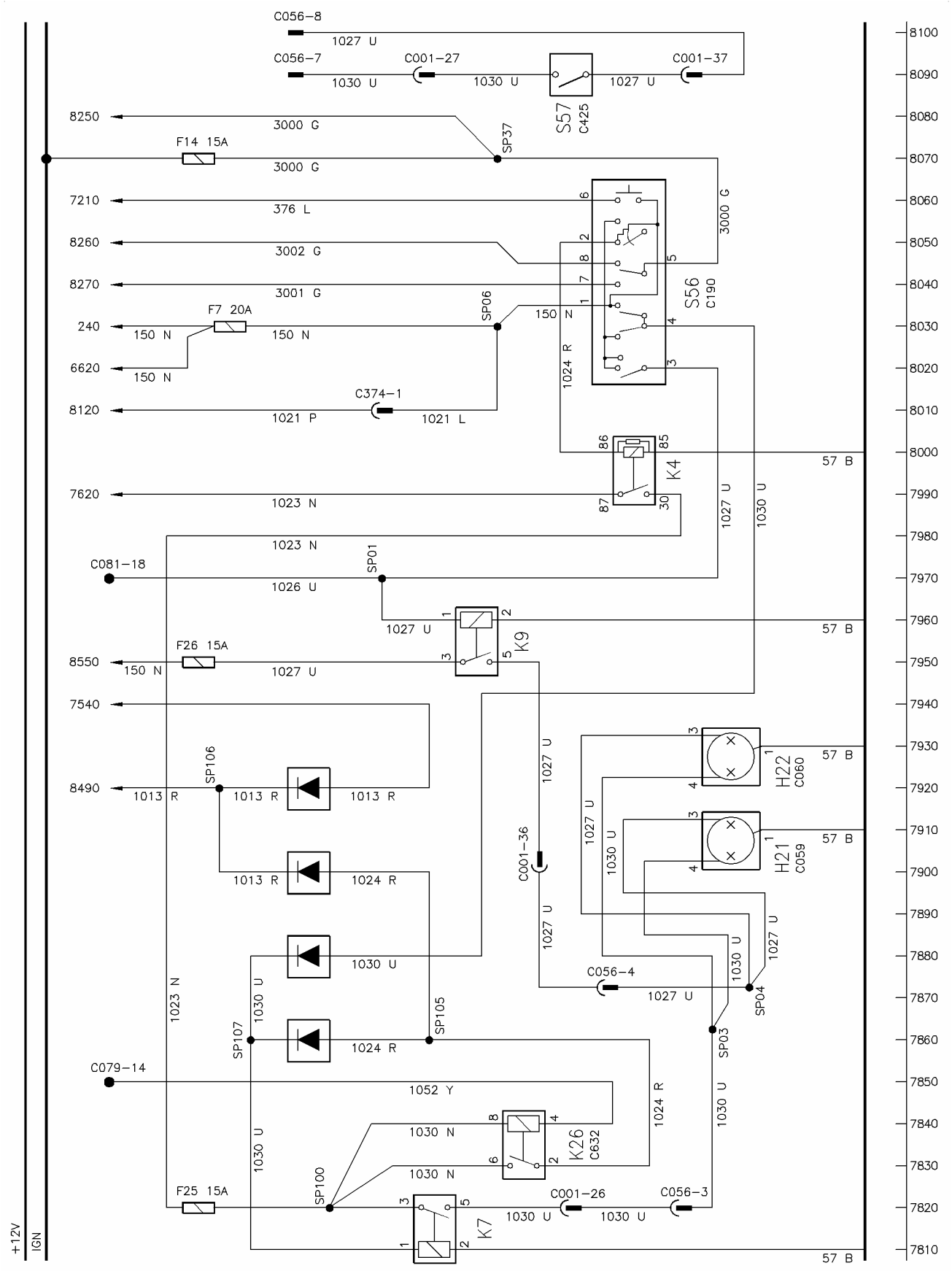
Wiring harness - Electrical schematic frame 27 Main Lamps and Indicators (2)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7810	K7		RELAY - DIP BEAM HEADLAMPS
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7820	F25 - 15A		FUSE - DIP BEAM HEADLAMPS
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7830	K26	**C632**	RELAY - SEE U HOME ....
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7910	H21	**C059**	RIGHT HAND HEADLAMP
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7930	H22	**C060**	LEFT HAND HEADLAMP
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7950	F26 - 15A		FUSE - MAIN BEAM HEADLAMPS
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7950	K9		RELAY - MAIN BEAM HEADLAMPS
27	7810-8100	MAIN LAMPS/ INDICATORS 2	7990	K4		RELAY - LIGHTS (SIDE AND ILLUMINATION)
27	7810-8100	MAIN LAMPS/ INDICATORS 2	8030	F7 - 20A		FUSE - MAIN LIGHTS AND HAZARD SWITCH
27	7810-8100	MAIN LAMPS/ INDICATORS 2	8040	S56	**C190**	MAIN LAMPS SWITCH
27	7810-8100	MAIN LAMPS/ INDICATORS 2	8070	F14 - 15A		FUSE - MAIN LIGHT SWITCH AND FLASHER UNIT
27	7810-8100	MAIN LAMPS/ INDICATORS 2	8090	S57	**C425**	AUX HEADLAMP SWITCH

NOTE: *Additional Connectors* ***C001***, ***C056***, ***C079***, ***C081***, ***C374***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C056-8
1027 U
C056-7
C001-27
C001-37
1030 U
1030 U
1027 U
S57
C425
8250
3000 G
F14 15A
SP37
3000 G
7210
376 L
8260
3002 G
8270
3001 G
S56
C190
240
F7 20A
SP06
150 N
150 N
150 N
6620
150 N
1024 R
C374-1
8120
1021 P
1021 L
K4
57 B
7620
1023 N
1027 U
1030 U
1023 N
C081-18
SP01
1026 U
1027 U
K9
57 B
F26 15A
8550
150 N
1027 U
7540
SP106
8490
1013 R
1013 R
1013 R
1013 R
1024 R
1030 U
H22
C060
H21
C059
57 B
C001-36
1027 U
1030 U
C056-4
1027 U
SP04
SP03
1023 N
1030 U
SP107
SP105
1024 R
C079-14
1052 Y
1030 N
1030 N
K26
C632
1024 R
1030 U
SP100
F25 15A
C001-26
C056-3
1030 U
1030 U
K7
57 B
+12V
IGN
8100
8090
8080
8070
8060
8050
8040
8030
8020
8010
8000
7990
7980
7970
7960
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7820
7810

FRAME 27A 1

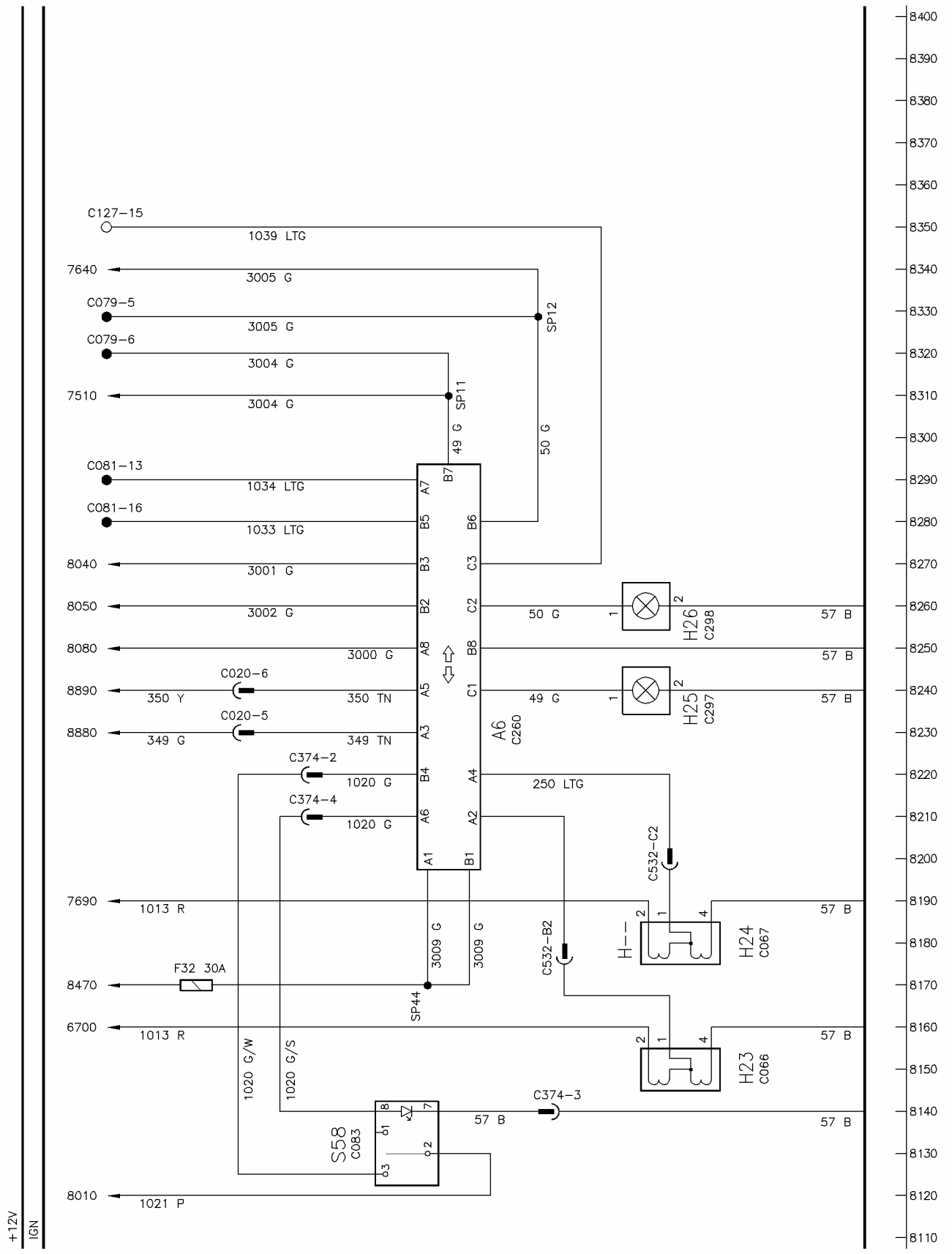
Wiring harness - Electrical schematic frame 28 Main Lamps and Indicators (3)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8130	S58	**C083**	HAZARD SWITCH
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8150	H23	**C066**	RIGHT HAND SIDE LAMP
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8170	F32 - 30A		FUSE - FLASHER UNIT
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8180	H24	**C067**	LEFT HAND SIDE LAMP
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8230	A6	**C260**	INDICATOR FLASHER UNIT CONNECTOR
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8240	H25	**C297**	RIGHT HAND EXTREMITY
28	8110-8400	MAIN LAMPS/ INDICATORS 3	8260	H26	**C298**	LEFT HAND EXTREMITY

NOTE: *Additional Connectors* ***C020****,* ***C079****,* ***C081****,* ***C127****,* ***C374****,* ***C532****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C127-15
1039 LTG
7640
3005 G
C079-5
3005 G
SP12
C079-6
3004 G
7510
3004 G
SP11
49 G
50 G
C081-13
1034 LTG
C081-16
1033 LTG
8040
3001 G
8050
3002 G
8080
3000 G
C020-6
8890
350 Y
350 TN
C020-5
8880
349 G
349 TN
A6
C260
C374-2
1020 G
C374-4
1020 G
250 LTG
C532-C2
7690
1013 R
57 B
H--
H24
C067
C532-B2
F32 30A
8470
3009 G
3009 G
SP44
6700
1013 R
1020 G/W
1020 G/S
H23
C066
C374-3
S58
C083
8010
1021 P
H26
C298
H25
C297
50 G
49 G
8400
8390
8380
8370
8360
8350
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8290
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8120
8110

FRAME 28A 1

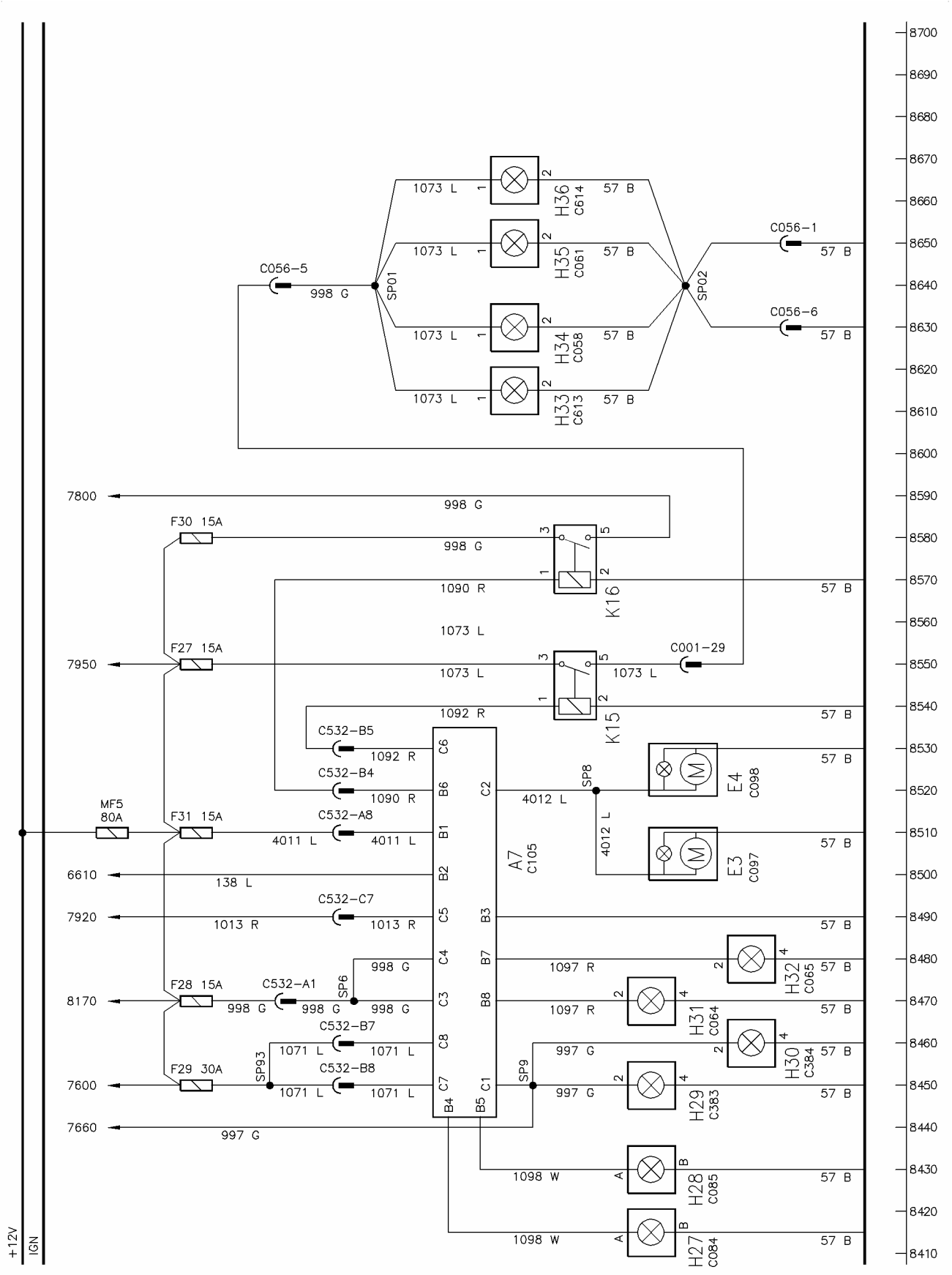
Wiring harness - Electrical schematic frame 29 Work Lamps

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
29	8410-8700	WORK LAMPS	8415	H27	**C084**	LEFT HAND UPPER FRONT WORKLAMP
29	8410-8700	WORK LAMPS	8430	H28	**C085**	RIGHT HAND UPPER FRONT WORKLAMP
29	8410-8700	WORK LAMPS	8450	F29 - 30A		FUSE - ECU WORKLAMP
29	8410-8700	WORK LAMPS	8450	H29	**C383**	WORKLAMP - REAR LH
29	8410-8700	WORK LAMPS	8460	H30	**C384**	WORKLAMP - REAR RH
29	8410-8700	WORK LAMPS	8470	F28 - 15A		FUSE - ECU WORKLAMP
29	8410-8700	WORK LAMPS	8470	H31	**C064**	RIGHT HAND FRONT LOWER WORKLAMP
29	8410-8700	WORK LAMPS	8480	H32	**C065**	LEFT HAND FRONT LOWER WORKLAMP
29	8410-8700	WORK LAMPS	8490	A7	**C105**	WORKLAMP MODULE CONNECTOR
29	8410-8700	WORK LAMPS	8505	E3	**C097**	LEFT HAND BEACON
29	8410-8700	WORK LAMPS	8510	F31 - 15A		FUSE - ECU WORKLAMP
29	8410-8700	WORK LAMPS	8510	MF5 - 80A		MAXI FUSE - LIGHTING
29	8410-8700	WORK LAMPS	8525	E4	**C098**	RIGHT HAND BEACON
29	8410-8700	WORK LAMPS	8545	K15		RELAY - WORKLAMP LOWER FRONT
29	8410-8700	WORK LAMPS	8550	F27 - 15A		FUSE - FRONT WORKLAMPS (FRONT HOOD)
29	8410-8700	WORK LAMPS	8575	K16		RELAY - WORKLAMP LOWER REAR
29	8410-8700	WORK LAMPS	8580	F30 - 15A		FUSE - REAR/LOWER WORKLAMPS
29	8410-8700	WORK LAMPS	8615	H33	**C613**	CORNER LAMP LH
29	8410-8700	WORK LAMPS	8630	H34	**C058**	LEFT HAND WORKLAMP
29	8410-8700	WORK LAMPS	8650	H35	**C061**	RIGHT HAND WORKLAMP
29	8410-8700	WORK LAMPS	8665	H36	**C614**	CORNER LAMP RH

NOTE: *Additional Connectors* ***C001***, ***C056***, ***C532***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
MF5 80A
F27 15A
F28 15A
F29 30A
F30 15A
F31 15A
7800
7950
8170
7600
6610
7920
7660
C056-5
C056-1
C056-6
C001-29
SP01
SP02
SP6
SP8
SP9
SP93
H36 C614
H35 C061
H34 C058
H33 C613
K16
K15
A7 C105
E4 C098
E3 C097
H32 C065
H31 C064
H30 C384
H29 C383
H28 C085
H27 C084
C532-A1
C532-A8
C532-B4
C532-B5
C532-B7
C532-B8
C532-C7
1073 L
57 B
998 G
1090 R
1092 R
4011 L
4012 L
1071 L
1013 R
138 L
997 G
1097 R
1098 W
8700
8690
8680
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8660
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FRAME 29A 1

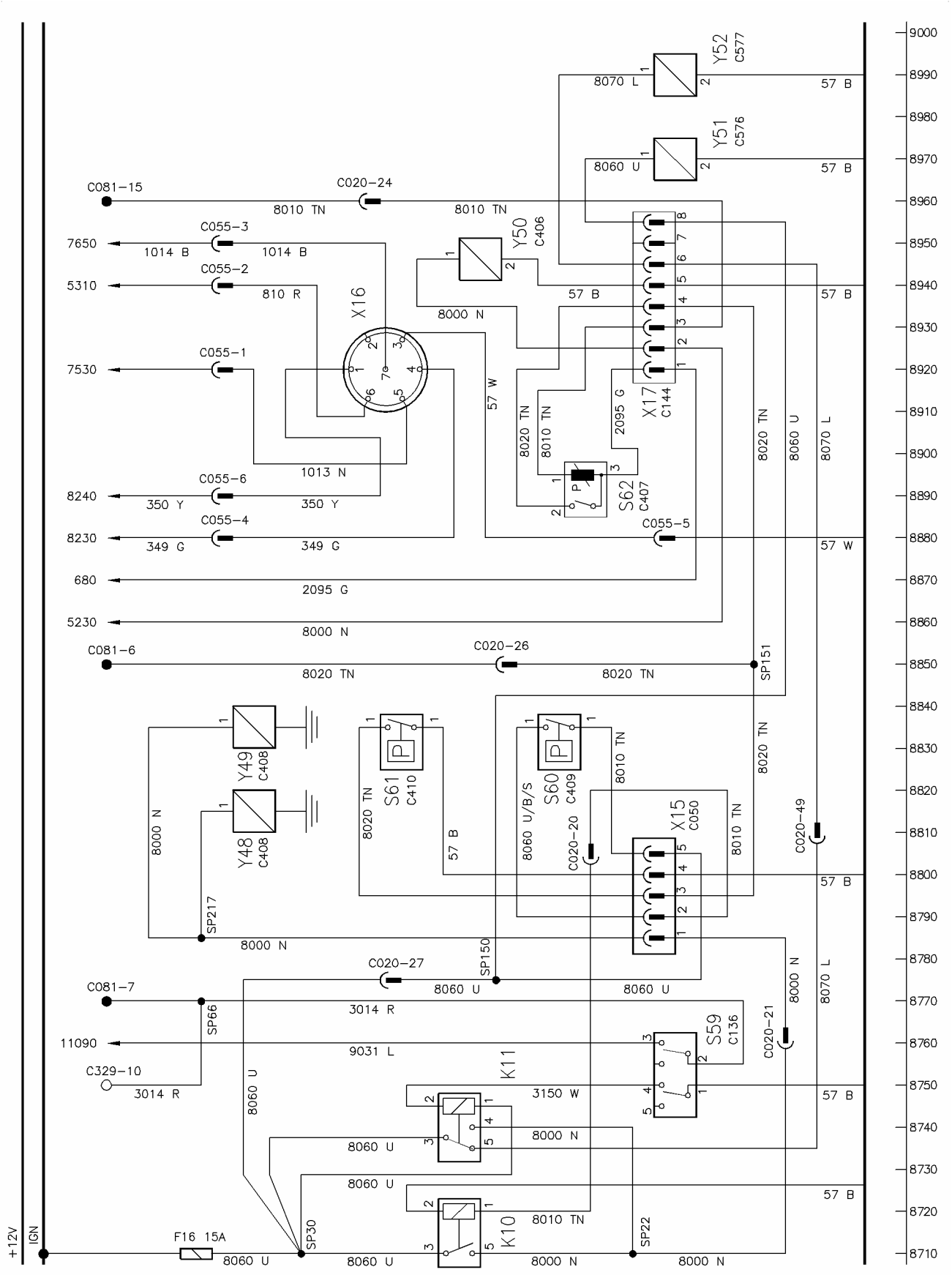
Wiring harness - Electrical schematic frame 30 Trailer Brakes

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
30	8710-9000	TRAILER BRAKES	8710	K10		RELAY - TRAILER BRAKE SUPPLY - PNEUMATIC
30	8710-9000	TRAILER BRAKES	8740	K11		RELAY - TRAILER BRAKE SUPPLY - HYDRAULIC
30	8710-9000	TRAILER BRAKES	8750	S59	**C136**	HANDBRAKE SWITCH
30	8710-9000	TRAILER BRAKES	8800	X15	**C050**	TRAILER BRAKE CONNECTOR
30	8710-9000	TRAILER BRAKES	8815	Y48	**C408**	ITALIAN TRAILER BRAKE - SOLENOIDS
30	8710-9000	TRAILER BRAKES	8830	S60	**C409**	ITALIAN TRAILER BRAKE - PUMP PRESSURE SWITCH
30	8710-9000	TRAILER BRAKES	8830	S61	**C410**	ITALIAN TRAILER BRAKE - LINE PRESSURE SWITCH
30	8710-9000	TRAILER BRAKES	8835	Y49	**C408**	ITALIAN TRAILER BRAKE - SOLENOIDS
30	8710-9000	TRAILER BRAKES	8890	S62	**C407**	AIR BRAKE PRESSURE SWITCH
30	8710-9000	TRAILER BRAKES	8920	X16	**C055**	TRAILER SOCKET
30	8710-9000	TRAILER BRAKES	8940	X17	**C144**	AIR BRAKE CONNECTOR
30	8710-9000	TRAILER BRAKES	8945	Y50	**C406**	AIR BRAKE SOLENOID
30	8710-9000	TRAILER BRAKES	8970	Y51	**C576**	BRAKE DE-ICER
30	8710-9000	TRAILER BRAKES	8990	Y52	**C577**	PARK BRAKE SOLENOID

NOTE: *Additional Connectors* ***C020***, ***C055***, ***C081***, ***C329***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


Y52 C577
Y51 C576
Y50 C406
X16
X17 C144
S62 C407
S61 C410
S60 C409
X15 C050
S59 C136
Y49 C408
Y48 C408
K11
K10
C081-15
C020-24
C055-3
C055-2
C055-1
C055-6
C055-4
C055-5
C081-6
C020-26
C020-27
C081-7
C329-10
C020-20
C020-21
C020-49
SP151
SP150
SP217
SP66
SP30
SP22
F16 15A
+12V
IGN
8070 L
8060 U
57 B
8010 TN
8000 N
57 W
8020 TN
2095 G
1014 B
810 R
1013 N
350 Y
349 G
680
5230
8240
8230
7650
5310
7530
11090
3014 R
9031 L
3150 W
8060 U/B/S
9000
8990
8980
8970
8960
8950
8940
8930
8920
8910
8900
8890
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8720
8710

FRAME 30A 1

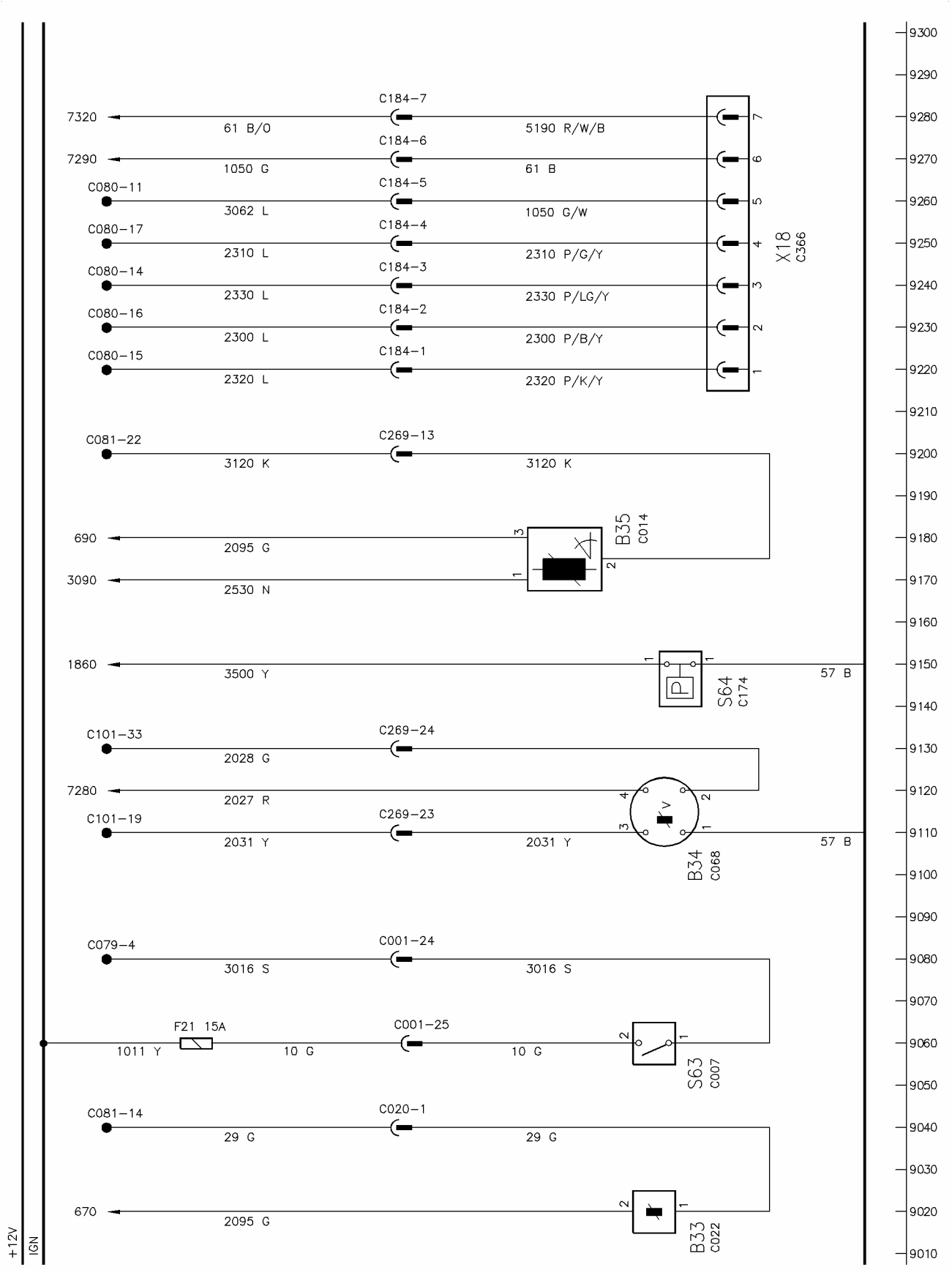
Wiring harness - Electrical schematic frame 31 Sensors

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
31	9010-9300	SENSORS	9020	B33	**C022**	FUEL TANK SENDER
31	9010-9300	SENSORS	9060	F21 - 15A		FUSE - GRID HEATER, WIF SENSOR, BRAKE FLUID LEVEL SW
31	9010-9300	SENSORS	9060	S63	**C007**	BRAKE FLUID RESERVOIR SWITCH
31	9010-9300	SENSORS	9110	B34	**C068**	RADAR
31	9010-9300	SENSORS	9150	S64	**C174**	PAS PRESSURE SWITCH
31	9010-9300	SENSORS	9175	B35	**C014**	STEERING SENSOR
31	9010-9300	SENSORS	9250	X18	**C366**	RADAR SOCKET HARNESS CONNECTOR

NOTE: *Additional Connectors* ***C001****,* ***C020****,* ***C079****,* ***C080****,* ***C101****,* ***C184****,* ***C269****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


9300
9290
9280
9270
9260
9250
9240
9230
9220
9210
9200
9190
9180
9170
9160
9150
9140
9130
9120
9110
9100
9090
9080
9070
9060
9050
9040
9030
9020
9010
7320
61 B/O
C184-7
5190 R/W/B
7290
1050 G
C184-6
61 B
C080-11
3062 L
C184-5
1050 G/W
C080-17
2310 L
C184-4
2310 P/G/Y
C080-14
2330 L
C184-3
2330 P/LG/Y
C080-16
2300 L
C184-2
2300 P/B/Y
C080-15
2320 L
C184-1
2320 P/K/Y
X18
C366
C081-22
3120 K
C269-13
3120 K
690
2095 G
3090
2530 N
B35
C014
1860
3500 Y
57 B
S64
C174
C101-33
2028 G
C269-24
7280
2027 R
C101-19
2031 Y
C269-23
2031 Y
57 B
B34
C068
C079-4
3016 S
C001-24
3016 S
F21 15A
1011 Y
10 G
C001-25
10 G
S63
C007
C081-14
29 G
C020-1
29 G
670
2095 G
B33
C022
+12V
IGN

FRAME 31A 1

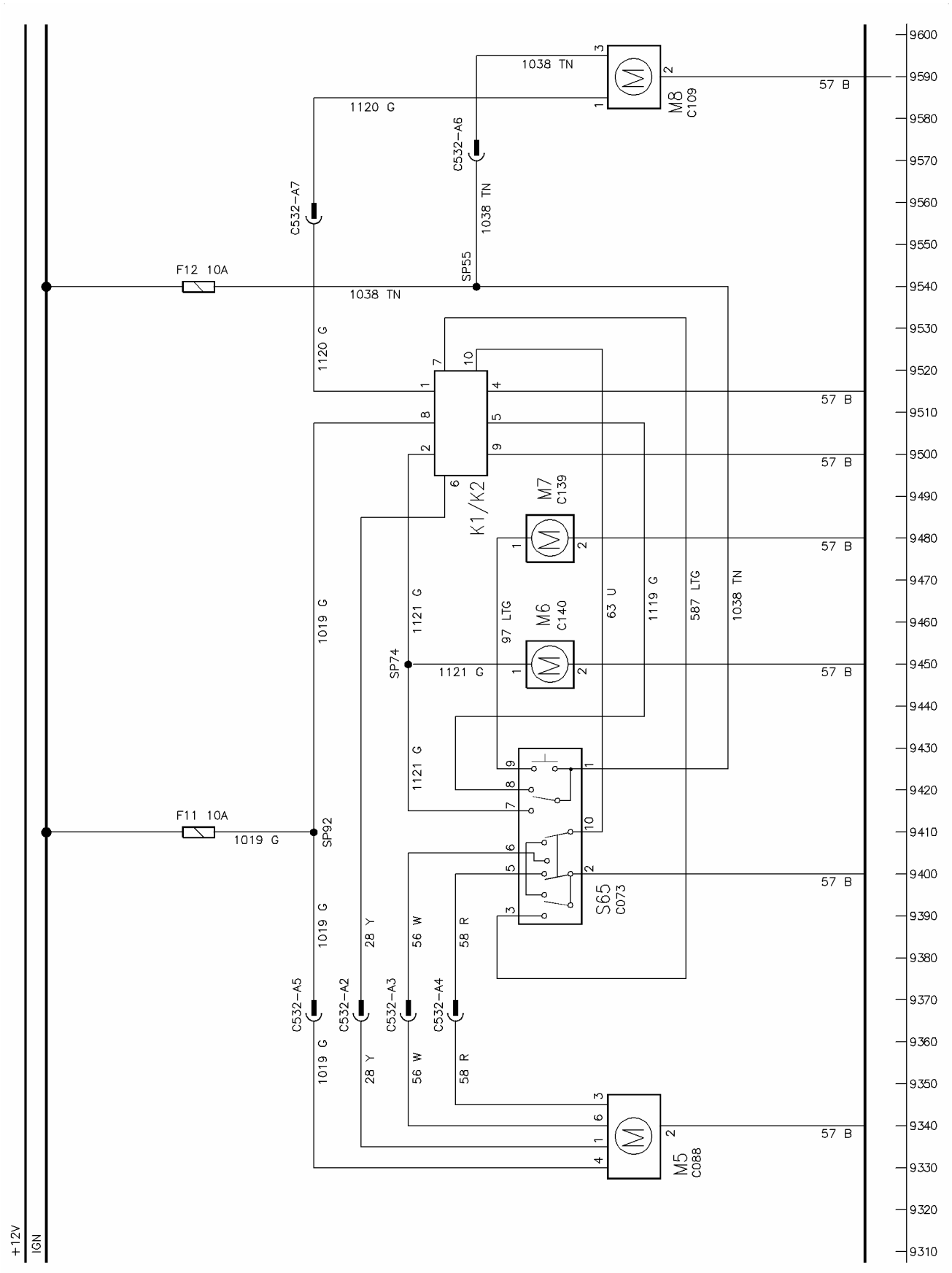
Wiring harness - Electrical schematic frame 32 Wipers

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
32	9310-9600	WIPERS	9340	M5	**C088**	FRONT WIPER MOTOR
32	9310-9600	WIPERS	9400	S65	**C073**	WINDSHIELD WIPER SWITCH
32	9310-9600	WIPERS	9410	F11 - 10A		FUSE - FRONT + REAR WINDSHIELD WIPER
32	9310-9600	WIPERS	9450	M6	**C140**	REAR WASHER MOTOR
32	9310-9600	WIPERS	9480	M7	**C139**	FRONT WASHER MOTOR
32	9310-9600	WIPERS	9510	K1/K2		RELAY - FRONT WINDSHIELD WIPER MODULE
32	9310-9600	WIPERS	9540	F12 - 10A		FUSE - WIPER SWITCH + REAR WIPER PARK
32	9310-9600	WIPERS	9590	M8	**C109**	REAR WIPER MOTOR

NOTE: *Additional Connectors* ***C532****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
F12 10A
F11 10A
1038 TN
1120 G
1019 G
1121 G
1119 G
97 LTG
63 U
587 LTG
28 Y
56 W
58 R
57 B
SP55
SP74
SP92
C532-A7
C532-A6
C532-A5
C532-A2
C532-A3
C532-A4
K1/K2
M8 C109
M7 C139
M6 C140
M5 C088
S65 C073
9600
9590
9580
9570
9560
9550
9540
9530
9520
9510
9500
9490
9480
9470
9460
9450
9440
9430
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9400
9390
9380
9370
9360
9350
9340
9330
9320
9310

FRAME 32A 1

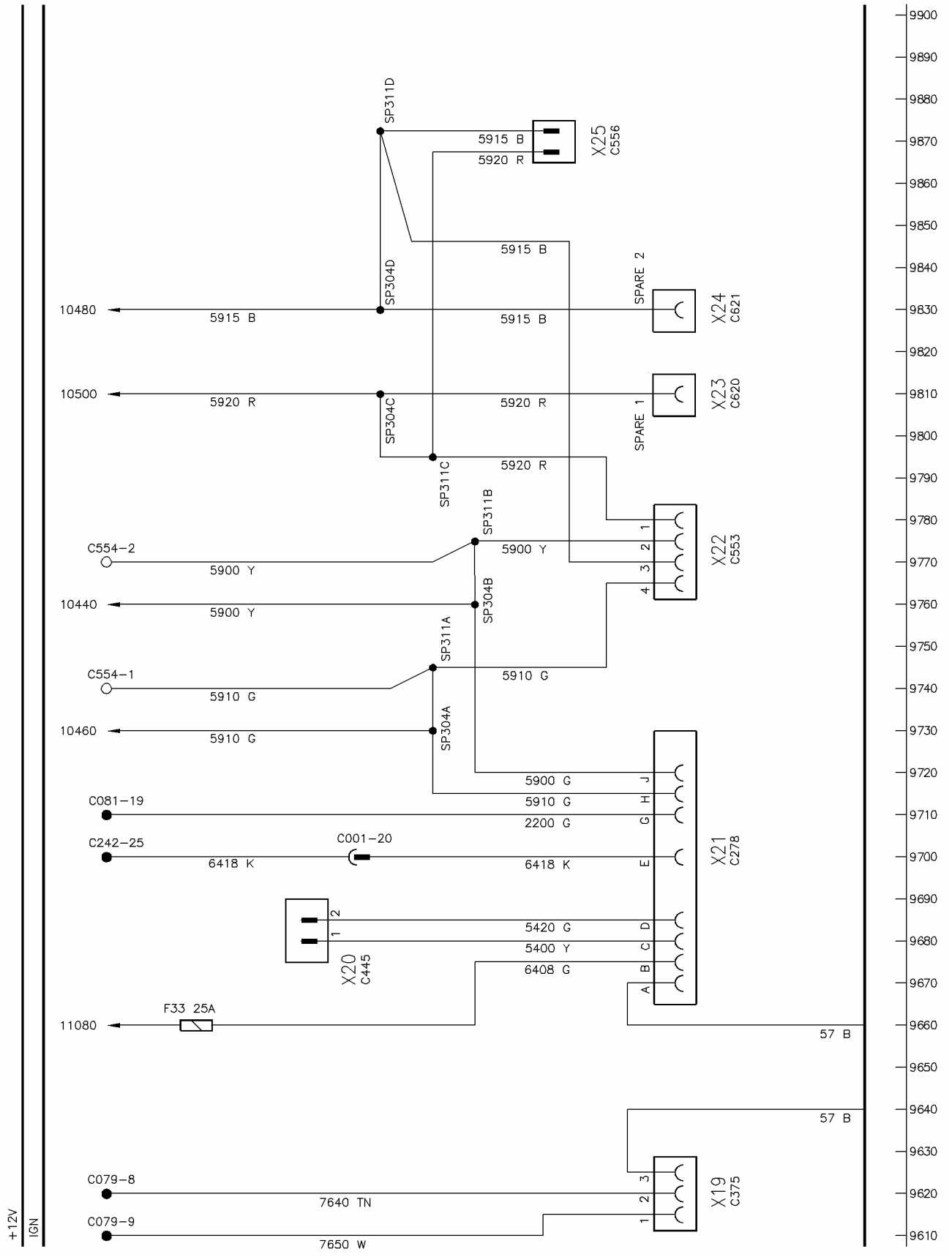
Wiring harness - Electrical schematic frame 33 Diagnostics (1)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
33	9610-9900	DIAGNOSTICS 1	9620	X19	**C375**	ADIC DIAGNOSTIC CONNECTOR
33	9610-9900	DIAGNOSTICS 1	9660	F33 - 25A		FUSE - DIAGNOSTIC CONNECTOR + ENGINE ECU
33	9610-9900	DIAGNOSTICS 1	9680	X20	**C445**	SELECT CAN DIAG
33	9610-9900	DIAGNOSTICS 1	9700	X21	**C278**	ECM DIAGNOSTIC CONNECTOR
33	9610-9900	DIAGNOSTICS 1	9770	X22	**C553**	ISO BUS CAN EXTENSION
33	9610-9900	DIAGNOSTICS 1	9810	X23	**C620**	SPARE 1
33	9610-9900	DIAGNOSTICS 1	9830	X24	**C621**	SPARE 2
33	9610-9900	DIAGNOSTICS 1	9870	X25	**C556**	TECU CAN SPARE

NOTE: *Additional Connectors* ***C001 C079****,* ***C081****,* ***C242****,* ***C554****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
9900
9890
9880
9870
9860
9850
9840
9830
9820
9810
9800
9790
9780
9770
9760
9750
9740
9730
9720
9710
9700
9690
9680
9670
9660
9650
9640
9630
9620
9610
SP311D
5915 B
5920 R
X25
C556
5915 B
SP304D
SPARE 2
X24
C621
10480
5915 B
5915 B
10500
5920 R
5920 R
SP304C
SPARE 1
X23
C620
5920 R
SP311C
SP311B
X22
C553
C554-2
5900 Y
5900 Y
10440
5900 Y
SP304B
SP311A
C554-1
5910 G
5910 G
10460
5910 G
SP304A
5900 G
C081-19
5910 G
2200 G
C242-25
C001-20
6418 K
6418 K
X21
C278
5420 G
5400 Y
6408 G
X20
C445
F33 25A
11080
57 B
57 B
C079-8
7640 TN
C079-9
7650 W
X19
C375

FRAME 33A 1

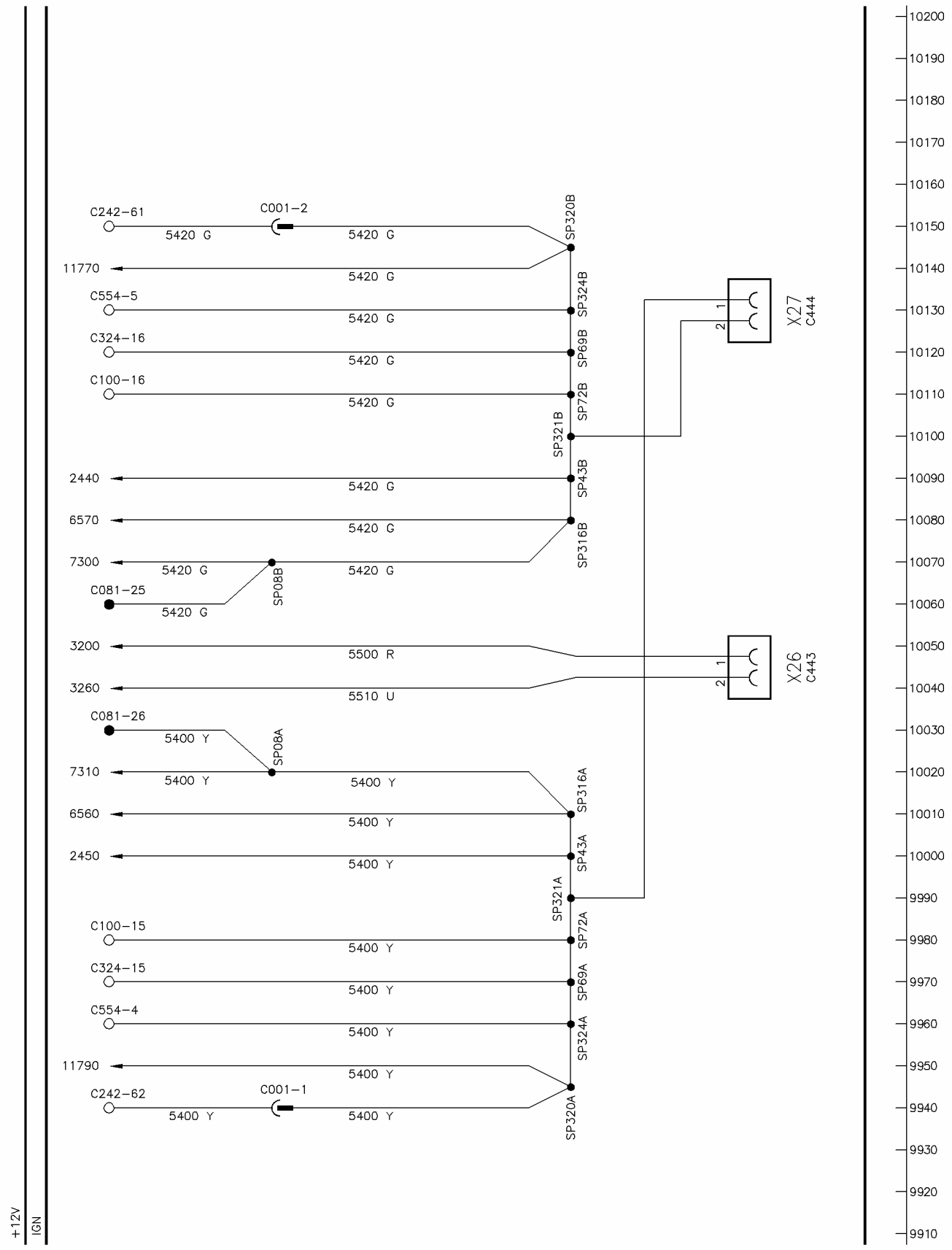
Wiring harness - Electrical schematic frame 34 Diagnostics (2)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
34	9910-10200	DIAGNOSTICS 2	10040	X26	**C443**	EHR CAN
34	9910-10200	DIAGNOSTICS 2	10130	X27	**C444**	TRANS CAN

NOTE: *Additional Connectors* ***C001****,* ***C081****,* ***C100****,* ***C242****,* ***C324****,* ***C554****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C242-61
5420 G
C001-2
5420 G
SP320B
11770
5420 G
C554-5
5420 G
SP324B
C324-16
5420 G
SP69B
C100-16
5420 G
SP72B
SP321B
X27
C444
2 1
2440
5420 G
SP43B
6570
5420 G
SP316B
7300
5420 G
5420 G
C081-25
5420 G
SP08B
3200
5500 R
3260
5510 U
X26
C443
2 1
C081-26
5400 Y
SP08A
7310
5400 Y
5400 Y
SP316A
6560
5400 Y
2450
5400 Y
SP43A
SP321A
C100-15
5400 Y
SP72A
C324-15
5400 Y
SP69A
C554-4
5400 Y
SP324A
11790
5400 Y
C242-62
5400 Y
C001-1
5400 Y
SP320A
10200
10190
10180
10170
10160
10150
10140
10130
10120
10110
10100
10090
10080
10070
10060
10050
10040
10030
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10010
10000
9990
9980
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9960
9950
9940
9930
9920
9910

FRAME 34A 1

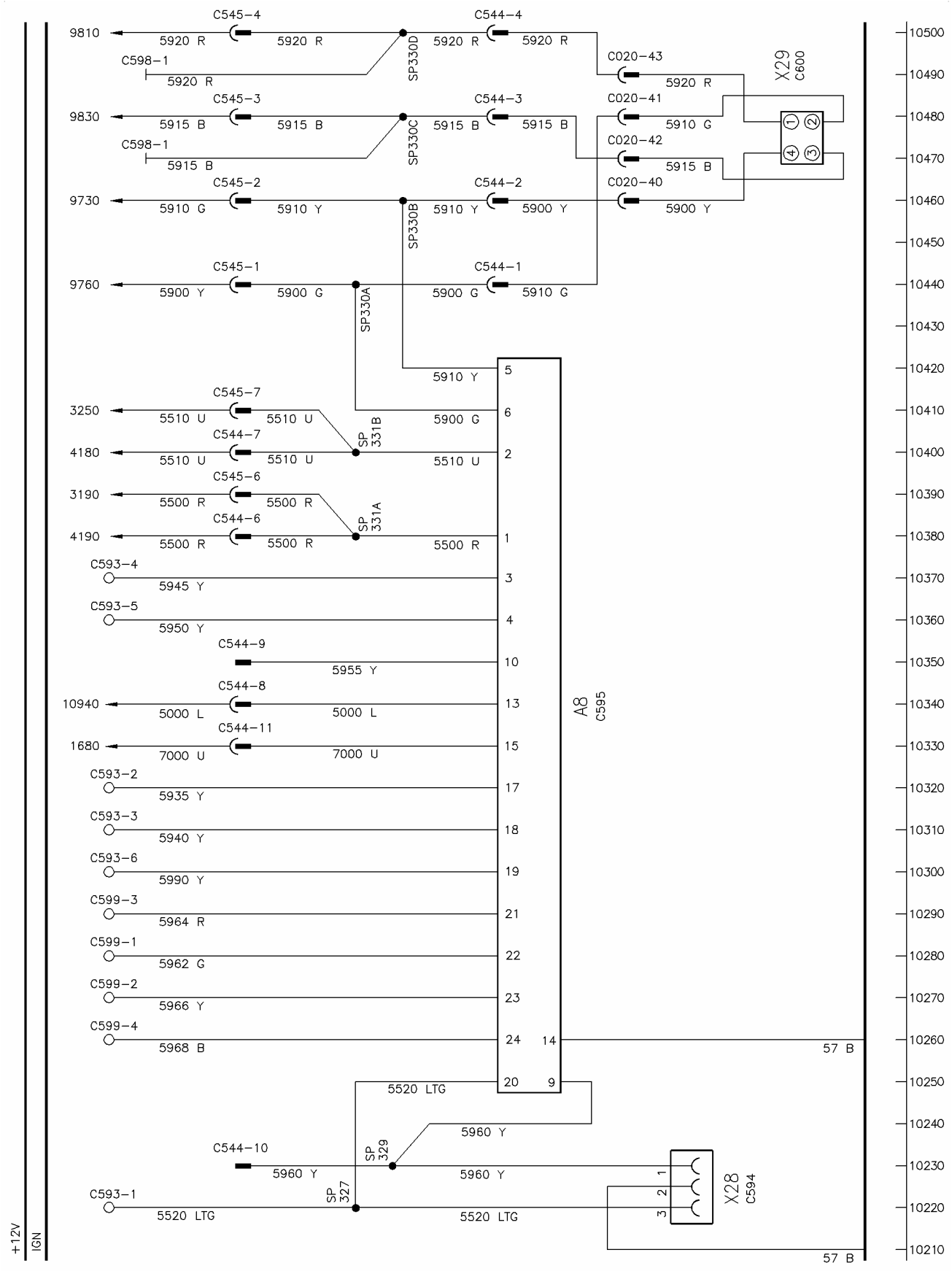
Wiring harness - Electrical schematic frame 35 SWCD / VT Screen (1)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
35	10210-10500	SWCD / VT SCREEN	10220	X28	**C594**	REAR VIEW CAMERA
35	10210-10500	SWCD / VT SCREEN	10340	A8	**C595**	SWCD / VT UNIT
35	10210-10500	SWCD / VT SCREEN 1	10475	X29	**C600**	BREAK AWAY 2

NOTE: *Additional Connectors* ***C020****,* ***C544****,* ***C545****,* ***C593****,* ***C596****,* ***C598****,* ***C599****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


9810
C545-4
5920 R
5920 R
C544-4
5920 R
5920 R
C598-1
5920 R
SP330D
C020-43
5920 R
X29
C600
9830
C545-3
5915 B
5915 B
C544-3
5915 B
5915 B
C020-41
5910 G
C598-1
5915 B
SP330C
C020-42
5915 B
9730
C545-2
5910 G
5910 Y
C544-2
5910 Y
5900 Y
C020-40
5900 Y
SP330B
9760
C545-1
5900 Y
5900 G
C544-1
5900 G
5910 G
SP330A
5910 Y
3250
C545-7
5510 U
5510 U
5900 G
SP 331B
4180
C544-7
5510 U
5510 U
5510 U
3190
C545-6
5500 R
5500 R
SP 331A
4190
C544-6
5500 R
5500 R
5500 R
C593-4
5945 Y
C593-5
5950 Y
C544-9
5955 Y
10940
C544-8
5000 L
5000 L
1680
C544-11
7000 U
7000 U
C593-2
5935 Y
C593-3
5940 Y
C593-6
5990 Y
C599-3
5964 R
C599-1
5962 G
C599-2
5966 Y
C599-4
5968 B
A8
C595
5
6
2
1
3
4
10
13
15
17
18
19
21
22
23
24
14
20
9
57 B
5520 LTG
5960 Y
C544-10
5960 Y
5960 Y
SP 329
C593-1
5520 LTG
SP 327
5520 LTG
X28
C594
1
2
3
57 B
+12V
IGN
10500
10490
10480
10470
10460
10450
10440
10430
10420
10410
10400
10390
10380
10370
10360
10350
10340
10330
10320
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10300
10290
10280
10270
10260
10250
10240
10230
10220
10210

FRAME 35A 1

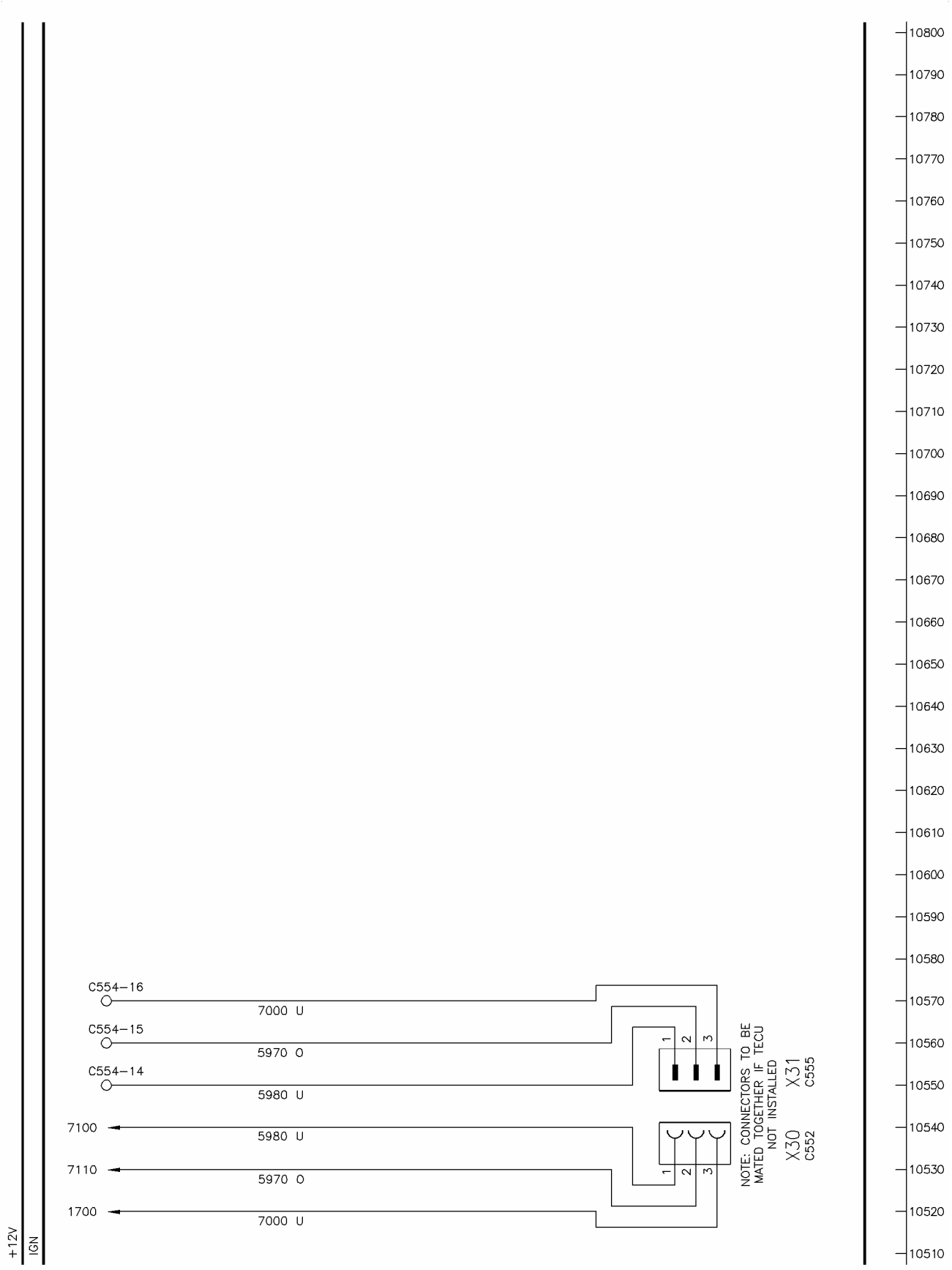
Wiring harness - Electrical schematic frame 36 SWCD / VT Screen (2)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
36	10510-10800	SWCD / VT SCREEN 2	10535	X30	**C552**	NON TECU POWER 2
36	10510-10800	SWCD / VT SCREEN 2	10555	X31	**C555**	NON TECU POWER 1

NOTE: *Additional Connectors* ***C554****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
10800
10790
10780
10770
10760
10750
10740
10730
10720
10710
10700
10690
10680
10670
10660
10650
10640
10630
10620
10610
10600
10590
10580
10570
10560
10550
10540
10530
10520
10510
C554-16
7000 U
C554-15
5970 O
C554-14
5980 U
7100
5980 U
7110
5970 O
1700
7000 U
1
2
3
X.31
C555
X.30
C552
NOTE: CONNECTORS TO BE MATED TOGETHER IF TECU NOT INSTALLED

FRAME 36A 1

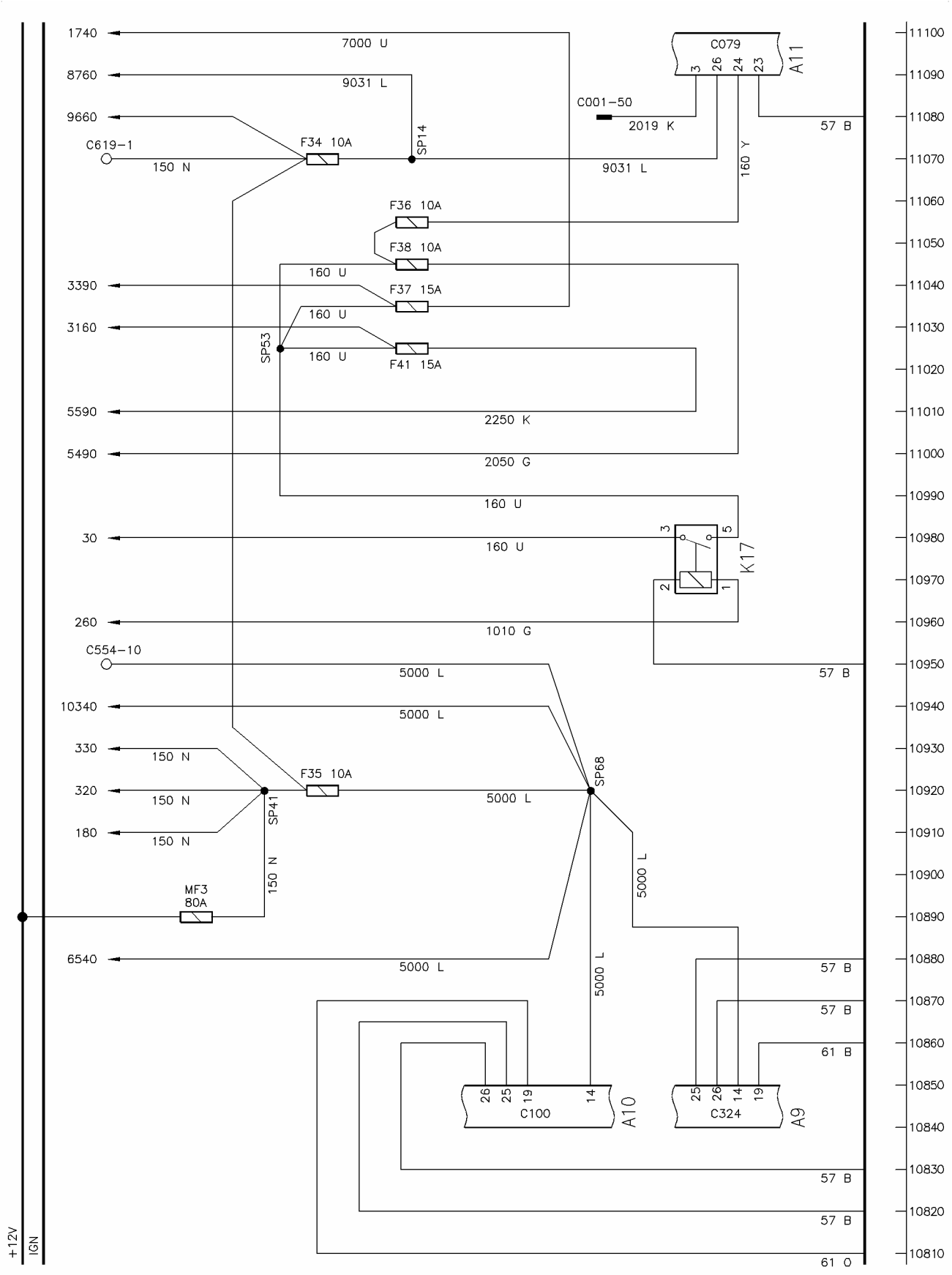
Wiring harness - Electrical schematic frame 37 Processors (1)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
37	10810-11100	PROCESSORS 1	10845	A10	**C100**	TCM CON 1
37	10810-11100	PROCESSORS 1	10845	A9	**C324**	XCM CN1A (CENTRAL CONTROLLER)
37	10810-11100	PROCESSORS 1	10890	MF3 - 80A		MAXI FUSE - B+ KAM ADIC, ENGINE ECU, TRANSMISSION ECU
37	10810-11100	PROCESSORS 1	10920	F35 - 10A		FUSE - DC MEM + BCM + OCM
37	10810-11100	PROCESSORS 1	10975	K17		RELAY - ELECTRONICS SUPPLY
37	10810-11100	PROCESSORS 1	11025	F41 - 15A		FUSE - FRONT SUSPENSION / PTO (+ EHR LEVERS)
37	10810-11100	PROCESSORS 1	11035	F37 - 15A		FUSE - TRANSMISSION IGNITION
37	10810-11100	PROCESSORS 1	11045	F38 - 10A		FUSE - REAR PTO SWITCH/LAMP, HPL, BCM, GROUND SPEED PTO, DOG CONN.
37	10810-11100	PROCESSORS 1	11055	F36 - 10A		FUSE - INSTRUMENT CLUSTER IGNITION
37	10810-11100	PROCESSORS 1	11070	F34 - 10A		FUSE - INSTRUMENT CLUSTER
37	10810-11100	PROCESSORS 1	11095	A11	**C079**	INST PANEL A

NOTE: *Additional Connectors* ***C001***, ***C554***, ***C619***.

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


1740
7000 U
8760
9031 L
9660
C619-1
150 N
F34 10A
SP14
C001-50
2019 K
C079
A11
57 B
160 Y
9031 L
F36 10A
F38 10A
160 U
3390
F37 15A
160 U
3160
SP53
160 U
F41 15A
5590
2250 K
5490
2050 G
160 U
30
160 U
K17
260
1010 G
C554-10
5000 L
57 B
10340
5000 L
330
150 N
320
150 N
180
150 N
F35 10A
SP41
SP68
5000 L
150 N
MF3
80A
6540
5000 L
5000 L
5000 L
57 B
57 B
61 B
C100
A10
C324
A9
57 B
57 B
61 O
+12V
IGN
11100
11090
11080
11070
11060
11050
11040
11030
11020
11010
11000
10990
10980
10970
10960
10950
10940
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10920
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10900
10890
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10870
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10840
10830
10820
10810

FRAME 37A 1

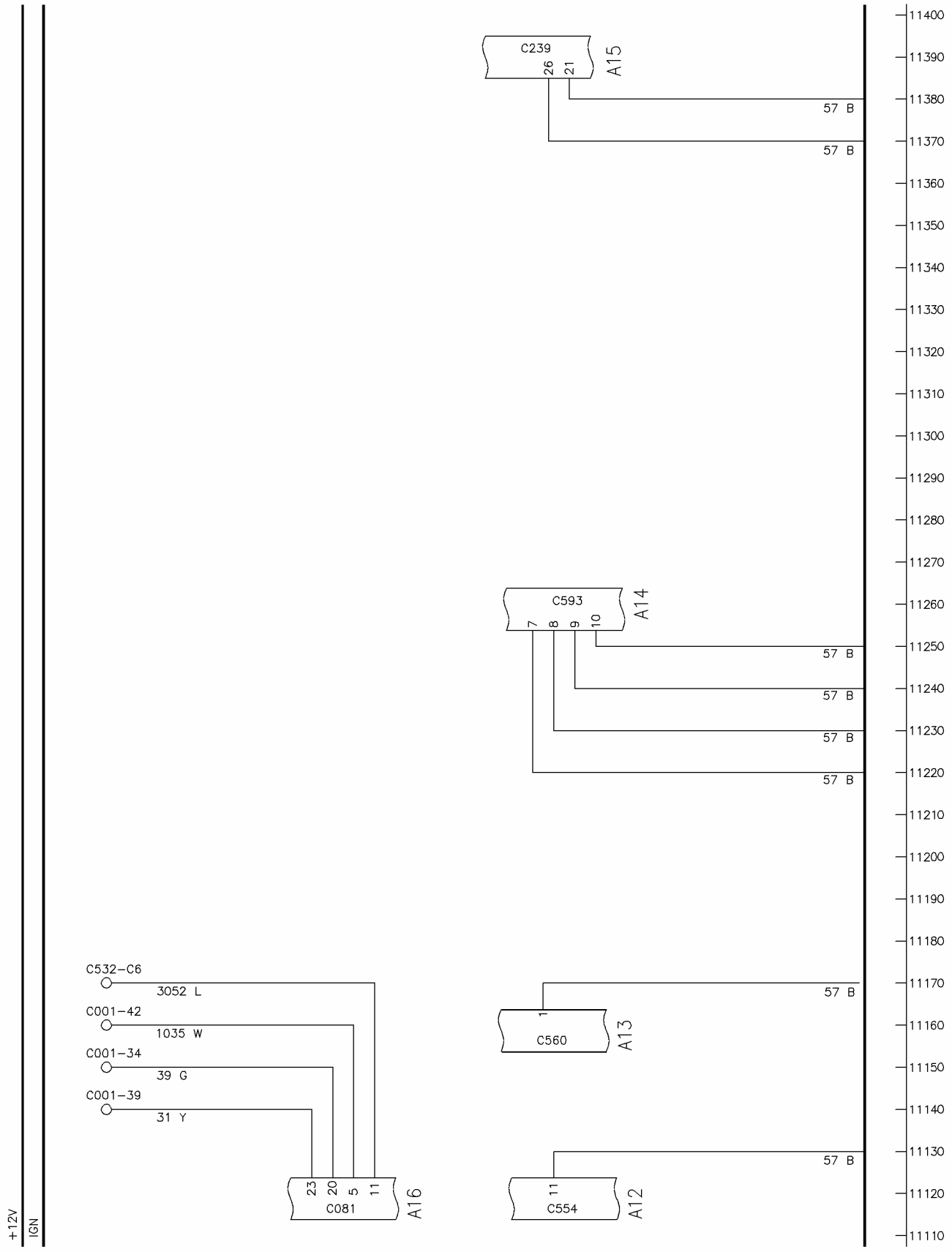
Wiring harness - Electrical schematic frame 38 Processors (2)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
38	11110-11400	PROCESSORS 2	11120	A12	**C554**	TECU -CN1
38	11110-11400	PROCESSORS 2	11120	A16	**C081**	INST PANEL C
38	11110-11400	PROCESSORS 2	11160	A13	**C560**	AIR CON EARTH
38	11110-11400	PROCESSORS 2	11260	A14	**C593**	ENCODER AND SWITCHES
38	11110-11400	PROCESSORS 2	11390	A15	**C239**	FPS 3RD PROCESSOR CONNECTOR

NOTE: *Additional Connectors* ***C001****,* ***C532****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C239
26
21
A15
57 B
57 B
C593
7
8
9
10
A14
57 B
57 B
57 B
57 B
C532-C6
3052 L
C001-42
1035 W
C001-34
39 G
C001-39
31 Y
23
20
5
11
C081
A16
1
C560
A13
57 B
11
C554
A12
57 B
11400
11390
11380
11370
11360
11350
11340
11330
11320
11310
11300
11290
11280
11270
11260
11250
11240
11230
11220
11210
11200
11190
11180
11170
11160
11150
11140
11130
11120
11110

FRAME 38A 1

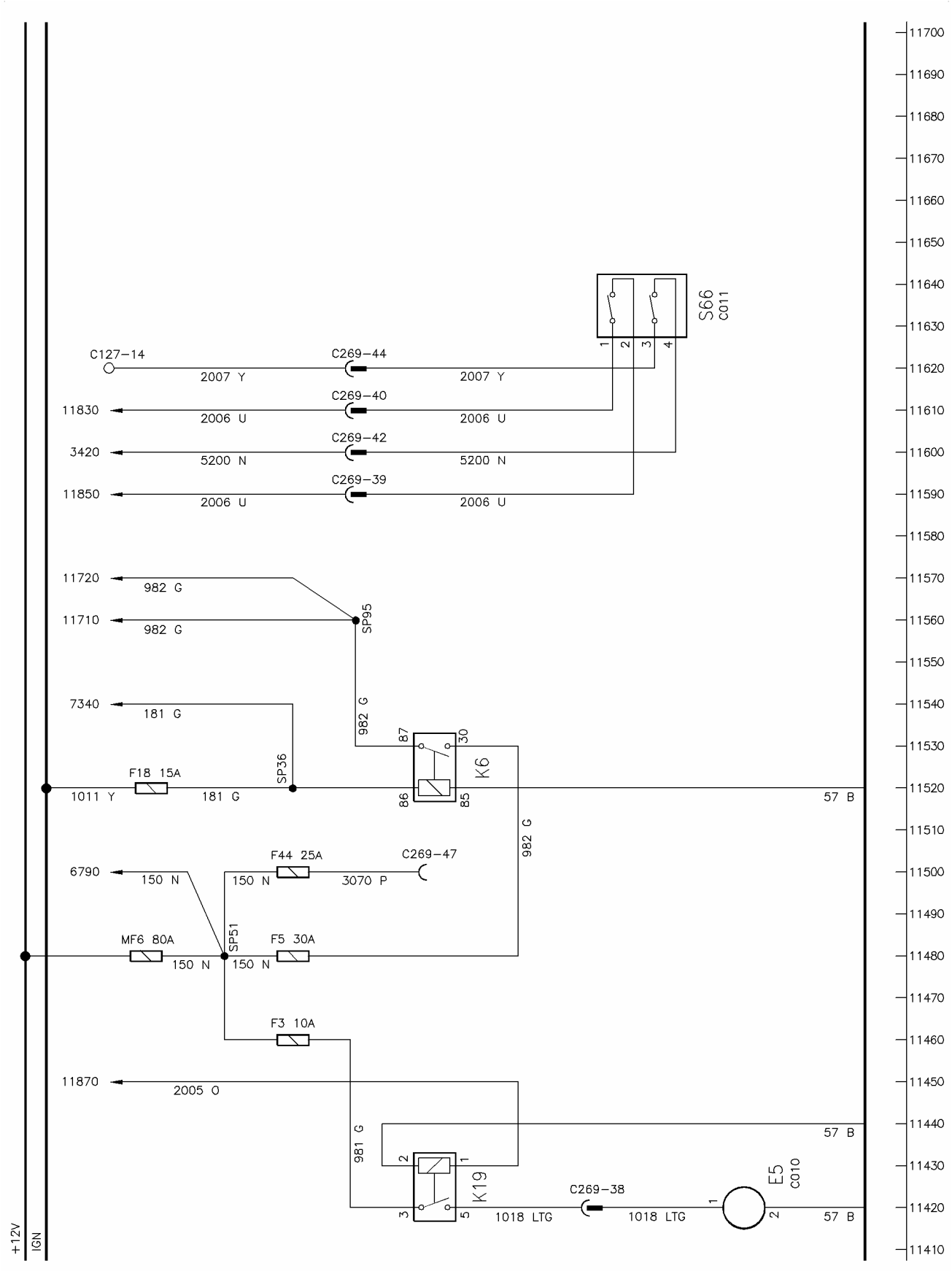
Wiring harness - Electrical schematic frame 39 Air Conditioning (1)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
39	11410-11700	AIR CON 1	11420	E5	**C010**	AIR CON COMPRESSOR
39	11410-11700	AIR CON 1	11425	K19		RELAY - COMPRESSOR CLUTCH FEED
39	11410-11700	AIR CON 1	11460	F3 - 10A		FUSE - A/C CLUTCH
39	11410-11700	AIR CON 1	11480	F5 - 30A		FUSE - BLOWER MOTOR
39	11410-11700	AIR CON 1	11480	MF6 - 80A		MAXI FUSE - ACCESSORIES CAB
39	11410-11700	AIR CON 1	11500	F44 - 25A		FUSE - FRONT B+
39	11410-11700	AIR CON 1	11520	F18 - 15A		FUSE - BLOWER MOTOR + SEAT
39	11410-11700	AIR CON 1	11520	K6		RELAY - BLOWER MOTOR
39	11410-11700	AIR CON 1	11630	S66	**C011**	AIR CON PRESSURE SWITCH

NOTE: *Additional Connectors* ***C127 C269****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


11700
11690
11680
11670
11660
11650
11640
11630
11620
11610
11600
11590
11580
11570
11560
11550
11540
11530
11520
11510
11500
11490
11480
11470
11460
11450
11440
11430
11420
11410
S66
C011
1
2
3
4
C127–14
C269–44
2007 Y
2007 Y
11830
C269–40
2006 U
2006 U
3420
C269–42
5200 N
5200 N
11850
C269–39
2006 U
2006 U
11720
982 G
11710
982 G
SP95
7340
181 G
982 G
87
30
K6
86
85
F18 15A
SP36
1011 Y
181 G
57 B
982 G
F44 25A
C269–47
6790
150 N
150 N
3070 P
SP51
MF6 80A
F5 30A
150 N
150 N
F3 10A
11870
2005 O
981 G
57 B
2
1
K19
3
5
C269–38
1018 LTG
1018 LTG
1
E5
C010
2
57 B
+12V
IGN

FRAME 39A 1

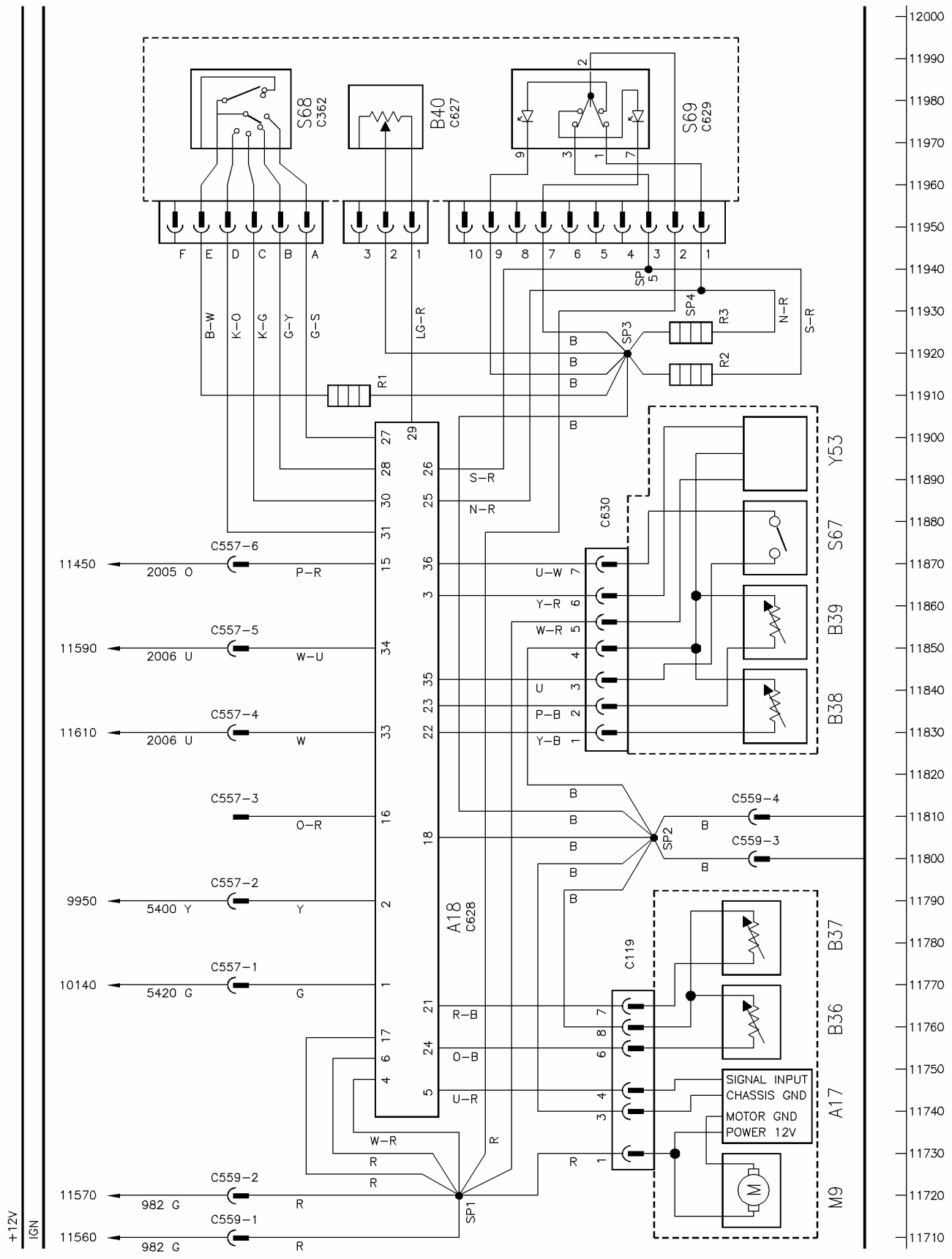
Wiring harness - Electrical schematic frame 40 Air Conditioning (2) - Automatic Temperature Control

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
40	11710-12000	AIR CON 2 - AUTO	11720	M9	**C119**	HEATER / AIRCON CONNECTOR
40	11710-12000	AIR CON 2 - AUTO	11740	A17	**C119**	HEATER / AIRCON CONNECTOR
40	11710-12000	AIR CON 2 - AUTO	11760	B36	**C119**	HEATER / AIRCON CONNECTOR
40	11710-12000	AIR CON 2 - AUTO	11780	B37	**C119**	HEATER / AIRCON CONNECTOR
40	11710-12000	AIR CON 2 - AUTO	11820	A18	**C628**	AUTO TEMP CONTROL
40	11710-12000	AIR CON 2 - AUTO	11830	B38	**C630**	HVAC UNIT
40	11710-12000	AIR CON 2 - AUTO	11860	B39	**C630**	HVAC UNIT
40	11710-12000	AIR CON 2 - AUTO	11880	S67	**C630**	HVAC UNIT
40	11710-12000	AIR CON 2 - AUTO	11900	Y53	**C630**	HVAC UNIT
40	11710-12000	AIR CON 2 - AUTO	11970	B40	**C627**	TEMP CTRL
40	11710-12000	AIR CON 2 - AUTO	11970	S68	**C362**	HEATER BLOWER SWITCH
40	11710-12000	AIR CON 2 - AUTO	11970	S69	**C629**	AIR CON SWITCH

NOTE: *Additional Connectors* ***C557****,* ***C559****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


S68 C362
B40 C627
S69 C629
F E D C B A
3 2 1
10 9 8 7 6 5 4 3 2 1
B-W
K-O
K-G
G-Y
G-S
LG-R
S-R
N-R
SP1
SP2
SP3
SP4
SP5
R1
R2
R3
A18 C628
C630
C119
Y53
S67
B39
B38
B37
B36
A17
M9
SIGNAL INPUT
CHASSIS GND
MOTOR GND
POWER 12V
C557-6
11450
2005 O
P-R
C557-5
11590
2006 U
W-U
C557-4
11610
2006 U
W
C557-3
O-R
C557-2
9950
5400 Y
Y
C557-1
10140
5420 G
G
C559-2
11570
982 G
R
C559-1
11560
982 G
R
C559-4
C559-3
U-W
Y-R
W-R
U
P-B
Y-B
R-B
O-B
U-R
W-R
+12V
IGN
12000
11990
11980
11970
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11950
11940
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11800
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11720
11710

FRAME 40A 1

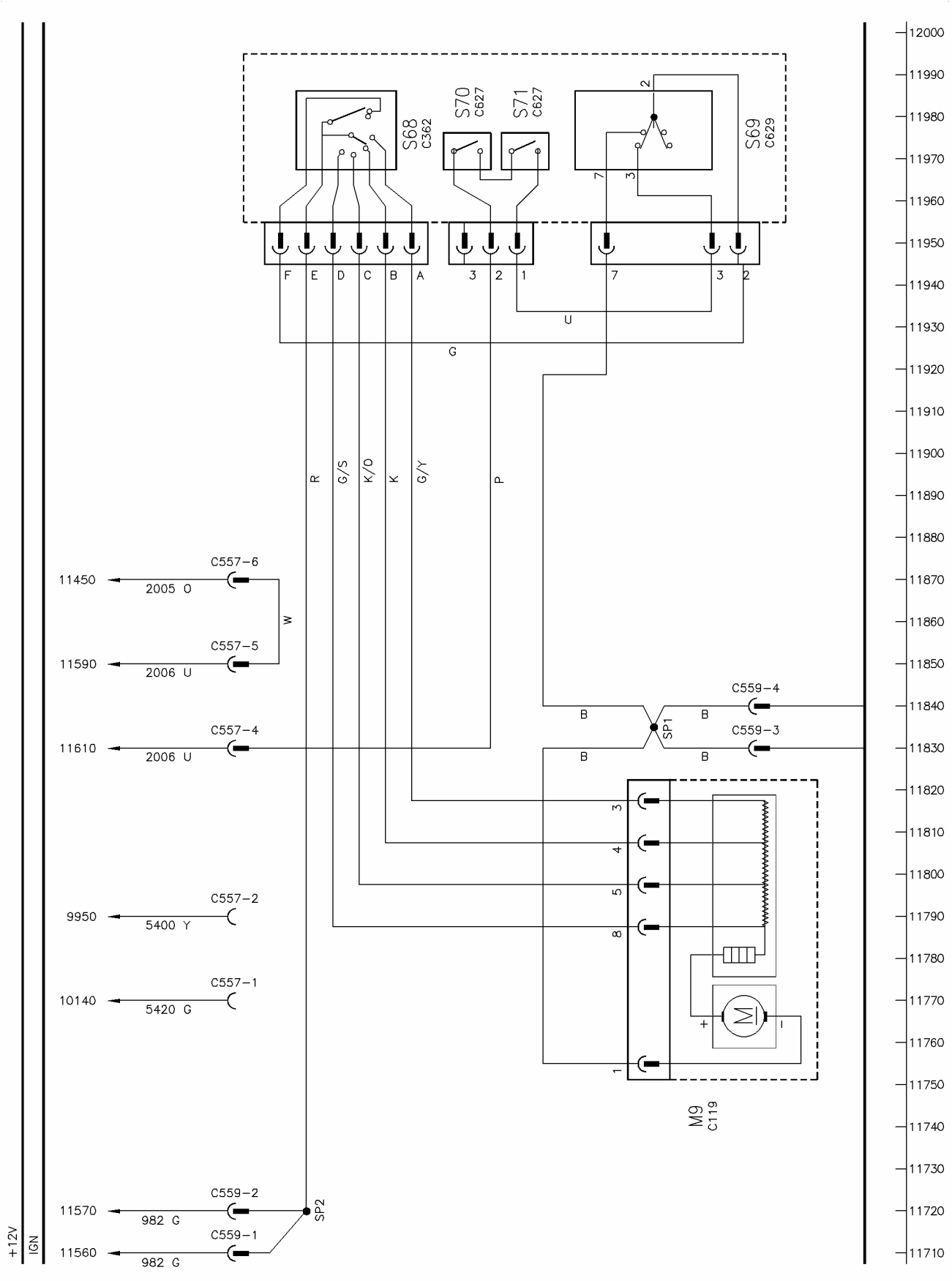
Wiring harness - Electrical schematic frame 41 Air Conditioning (3) - Manual Temperature Control

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

Frame	line Range	Frame Title	Line Number	Compo-nent	Connec-tor	Description
41	11710-12000	AIR CON 3 - MANUAL	11780	M9	**C119**	HEATER / AIRCON CONNECTOR
41	11710-12000	AIR CON 3 - MANUAL	11970	S70	**C627**	LOW PRESSURE SWITCH
41	11710-12000	AIR CON 3 - MANUAL	11970	S71	**C627**	LOW TEMPERATURE (FREEZE) SAFETY SWITCH
41	11710-12000	AIR CON 3 - MANUAL	11970	S68	**C362**	HEATER BLOWER SWITCH
41	11710-12000	AIR CON 3 - MANUAL	11970	S69	**C629**	AIR CON SWITCH

NOTE: *Additional Connectors* ***C557****,* ***C559****.*

WIRE COLOUR CODES							
B	Black	R	Red	LG	Light Green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light Brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


S68 C362
S70 C627
S71 C627
S69 C629
F E D C B A
3 2 1
7
3 2
U
G
R
G/S
K/O
K
G/Y
P
C557-6
11450
2005 O
W
C557-5
11590
2006 U
C557-4
11610
2006 U
C559-4
C559-3
SP1
B
C557-2
9950
5400 Y
C557-1
10140
5420 G
M9 C119
C559-2
11570
982 G
C559-1
11560
982 G
SP2
+12V
IGN
12000
11990
11980
11970
11960
11950
11940
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11910
11900
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11820
11810
11800
11790
11780
11770
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11750
11740
11730
11720
11710

FRAME 41A 1

Wiring harness - Electrical schema index

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Compo-nent	Designation	Line number
A001	GEAR DISPLAY	12240
A4	RADIO A + RADIO B	6645
A6	FLASHER CONNECTION PLUG	8230
A7	FLASHER WORK LAMP CONTROL UNIT (ECU)	8490
A8	SMALL COLOUR DISPLAY / VIRTUAL TERMINAL	10340
A9	MAIN CONTROL UNIT (CN1A)	10845
A9	MAIN CONTROL UNIT (CN2)	11350
A10	TRANSMISSION CONTROLLER PLUG 1	10845
A10	FULL POWERSHIFT TRANSMISSION PLUG 3RD CONTROL UNIT	11390
A11	ICU A	11095
A11	ICU C	11120
A12	TECU - CN1	11120
A17	PLUG CONNECTION HEATING / AIR CONDITIONING SYSTEM	11740
A18	AUTOMATIC CLIMATE CONTROL	11820
A030	PCB ARU	12450
A032	MULTICONTROLLER	12480
B1	ENGINE SPEED SENSOR	635
B3	FUEL FILTER WATER SENSOR	930
B4	CHARGING PRESSURE/TEMPERATURE SENSOR - EDC 16	1160
B5	OIL PRESSURE/TEMPERATURE SENSOR - EDC 16	1220
B6	RAIL PRESSURE SENSOR - EDC 16	1260
B7	COOLANT TEMPERATURE SENSOR - EDC 16	1290
B8	FUEL TEMPERATURE SENSOR - EDC 16	1310
B9	CRANKSHAFT SPEED SENSOR - EDC 16	1330
B10	CAMSHAFT SPEED SENSOR - EDC 16	1360
B11	CLUTCH PEDAL SENSOR	1520
B12	VEHICLE SPEED SENSOR	1830
B13	CRAWLER DRIVE POTENTIOMETER	2030
B14	SPEED SENSOR INTERMEDIATE SHAFT	2660
B15	TRANSMISSION OIL TEMPERATURE SENSOR	2690
B18	FRONT POWERLIFT POTENTIOMETER	3110
B19	FORCE MEASURING PIN LEFT	3710
B20	FORCE MEASURING PIN RIGHT	3730
B21	LIFTING SHAFT POTENTIOMETER	3770
B22	SPEED SENSOR FOR THE PTO STUB SHAFT	5650
B23	PTO SPEED SENSOR	5810
B24	ACCELEROMETER	6020
B25	POTENTIOMETER FOR FRONT AXLE SUSPENSION	6060
B26	FAST STEER SYSTEM - LVDT MAGNETIC SPOOLS	6330
B27	FAST STEER SYSTEM - STEERING WHEEL SENSOR	6380
B28	SPEAKER - REAR LEFT	6610
B29	SPEAKER RIGHT-HAND SIDE	6630
B30	SPEAKER - REAR RIGHT	6660
B31	SPEAKER LEFT-HAND SIDE	6680
B32	HORN	7210
B33	FUEL GAUGE SENSOR	9020
B34	RADAR SENSOR	9110
B35	STEERING ANGLE SENSOR	9175
B36	PLUG CONNECTION HEATING / AIR CONDITIONING SYSTEM	11760
B37	PLUG CONNECTION HEATING / AIR CONDITIONING SYSTEM	11780
B38	AIR CONDITIONING SYSTEM	11830

B39	AIR CONDITIONING SYSTEM	11860
B40	TEMPERATURE CONTROL	11980
B41	TRACTION POTENTIOMETER	2815
B42	EDC POSITION POTENTIOMETER	2870
B48	ARU - JOYSTICK, PUSH BUTTON	12830
B49	ARU - JOYSTICK, PUSH BUTTON	12860
B50	ARU - CONTROL LEVER EPC3	12890
B70	ARU - MULTICONTROLLER - FINGER WHEEL	12370
B71	ARU - HAND THROTTLE	12340
B72	SLIP CONTROL POTENTIOMETER	2715
B73	EDC - TRACTION SENSITIVITY POTENTIOMETER	2735
B74	LOWERING SPEED POTENTIOMETER	2775
B75	LIFT HEIGHT LIMIT POTENTIOMETER	2795
D1	DIODE	130
D2	DIODE PLUG CONNECTION	7420
D3	DIODE PLUG CONNECTION	7440
D4	DIODE PLUG CONNECTION	7660
E1	VISTRONIC FAN	1080
E2	BUZZER	7475
E3	ROTATING BEACON LEFT-HAND SIDE	8505
E4	ROTATING BEACON RIGHT-HAND SIDE	8525
F1 - 10A	FUSE - CEILING LIGHT, STEP LIGHT, HEATED MIRROR	6790
F2 - 25A	FUSE - CIGAR LIGHTER, POWER SOCKET IN CAB	6820
F3 - 10A	FUSE - AIR CONDITIONING COMPRESSOR COUPLING	11460
F4 - 10A	FUSE - SCREW TERMINAL RED	6800
F5 - 30A	FUSE - BLOWER MOTOR	11480
F6 - 10A	FUSE - STATION MEMORY FOR THE RADIO AND WORK LAMP CONTROL UNIT	6620
F7 - 20A	FUSE - MAIN HEADLIGHT SWITCH AND HAZARD LIGHT SWITCH	8030
F8 - 20A	FUSE - STARTER SWITCH	230
F9 - 25A	FUSE - FRONT LOADER	4850
F10 - 30A	FUSE - REAR POWER SOCKET	7060
F11 - 10A	FUSE - FRONT WINDSCREEN WIPER	9410
F12 - 10A	FUSE - WIPER SWITCH + INITIAL POSITION FOR THE REAR WINDSCREEN WIPERS / FRONT AND REAR WINDSCREEN WASHER UNIT	9540
F13 - 15A	FUSE - BRAKE LIGHT RELAY	5330
F14 - 15A	FUSE - HEADLIGHT SWITCH AND FLASHER	8070
F15 - 20A	FUSE - BRAKE LIGHT SWITCH, RELAY PNEUMATIC SYSTEM, RELAY BRAKE LIGHTS	5260
F16 - 15A	FUSE - TRAILER BRAKE	8710
F17 - 25A	FUSE - POWER SOCKET, CAB	6840
F18 - 15A	FUSE - BLOWER MOTOR RELAY + DRIVER'S SEAT	11520
F19 - 15A	FUSE - MIRROR HEATER	6990
F20 - 10A	FUSE - RADAR SENSOR, NORMSIGNAL SOCKET	7270
F21 - 15A	FUSE - WATER SENSOR FOR THE FUEL FILTER, BRAKE FLUID LEVEL SWITCH	9060
F22 - 15A	FUSE - SIDE MARKER LIGHTS RIGHT	7590
F23 - 15A	FUSE - SIDE MARKER LIGHTS LEFT, LICENCE PLATE LIGHTS	7620
F24 - 10A	FUSE - LIGHTING	7600
F25 - 15A	FUSE - DIPPED BEAM HEADLIGHTS, RELAY - STEPS LIGHTING	7820
F26 - 15A	FUSE - MAIN BEAM HEADLIGHTS	7950
F27 - 15A	FUSE - FRONT WORK LAMP (BONNET)	8550
F28 - 15A	FUSE - WORK LAMP CONTROL UNIT (ECU)	8470
F29 - 30A	FUSE - WORK LAMP CONTROL UNIT (ECU)	8450
F30 - 15A	FUSE - WORK LAMP C-PILLAR	8580
F31 - 15A	FUSE - WORK LAMP CONTROL UNIT (ECU)	8510
F32 - 30A	FUSE - FLASHER	8170

F33 - 25A	FUSE - DIAGNOSTICS PLUG	9660
F34 - 10A	FUSE - ICU A / HANDBRAKE SWITCH	11070
F35 - 10A	FUSE - POTENTIAL 30 FOR ELECTRONICS	10920
F36 - 10A	FUSE - ICU A VIA STARTER SWITCH	11060
F37 - 15A	FUSE - TRANSMISSION FUNCTIONS VIA STARTER SWITCH	11035
F38 - 10A	FUSE - REAR PTO SWITCH/LIGHT, POWERLIFT, BCM, GROUND DRIVE PTO, GEAR DISPLAYS PLUG CONNECTION	11045
F39 - 10A	FUSE - POWERLIFT, ARMREST, EPC, FAST STEER	3390
F40 - 10A	FUSE - RADIO	6670
F41 - 15A	FUSE - FRONT PTO (+ LEVER FOR THE ELECTROHYDR. REMOTE VALVE)	11025
F42 - 10A	FUSE - FRONT SUSPENSION / FRONT POWERLIFT POTENTIOMETER	3160
F43 - 10A	FUSE - STARTER SWITCH POTENTIAL 15 FOR ENGINE ELECTRONICS (POSITION ENGINE ON)	285
F44 - 25A	FUSE - FRONT B+, FRONT-MOUNTED EQUIPMENT	11500
F45 - 25A	FUSE - FRONT EQUIPMENT VIA STARTER SWITCH + 8A SOCKET	7070
F46 - 15A	FUSE - ENGINE CONTROL UNIT (ECU)	1020
F47 - 10A	FUSE - ENGINE CONTROL UNIT (ECU)	1040
F49 - 15A	FUSE - HEATER GRID, FUEL FILTER HEATER, FAN ELECTRONICS	1030
F60 - 10A	FUSE - BATTERY ISOLATOR SWITCH RELAY	60
G1	ALTERNATOR	170
H6	REAR PTO TELLTALE	5490
H7	FRONT PTO TELLTALE	5540
H8	CONSOLE LIGHT RIGHT	6700
H9	STEP LIGHT LEFT	6725
H10	STEP LIGHT RIGHT	6755
H11	INTERIOR LIGHT	6760
H13	INDICATOR REAR RIGHT (NORTH AMERICA)	7525
H14	LICENCE PLATE LIGHT	7570
H15	LICENCE PLATE LIGHT	7590
H16	INDICATOR REAR LEFT (NORTH AMERICA)	7610
H17	LICENCE PLATE LIGHT REAR RIGHT	7680
H18	LICENCE PLATE LIGHT REAR LEFT	7700
H19	WORK LAMP RIGHT C-PILLAR	7780
H20	WORK LAMP LEFT C-PILLAR	7800
H21	HEADLIGHT RIGHT-HAND SIDE	7910
H22	HEADLIGHT LEFT-HAND SIDE	7930
H23	SIDE MARKER LIGHT RIGHT-HAND SIDE	8150
H24	SIDE MARKER LIGHT LEFT-HAND SIDE	8180
H25	MARKER LIGHT RIGHT-HAND SIDE	8240
H26	MARKER LIGHT LEFT-HAND SIDE	8260
H27	UPPER WORK LAMP FRONT LEFT	8415
H28	UPPER WORK LAMP FRONT RIGHT	8430
H29	WORK LAMP - REAR LEFT	8450
H30	WORK LAMP - REAR RIGHT	8460
H31	LOWER WORK LAMP FRONT RIGHT	8470
H32	LOWER WORK LAMP FRONT LEFT	8480
H33	SIDE MARKER LIGHT LEFT	8615
H34	WORK LAMP LEFT-HAND SIDE	8630
H35	WORK LAMP RIGHT-HAND SIDE	8650
H36	SIDE MARKER LIGHT RIGHT	8665
H50	EDC - SLIP CONTROL	2910
H51	EDC - LOWER CONTROL	2920
H52	EDC - RAISE CONTROL	2930
H53	EDC - DIAGNOSTICS	2940
K1/K2	RELAY - FRONT WINDSCREEN WIPER SWITCH MODULE	9510

K3	RELAY - IGNITION	140
K4	RELAY - LAMPS (SIDE AND LIGHTING)	7990
K5	RELAY - STARTER MOTOR ON	190
K6	RELAY - BLOWER MOTOR	11520
K7	RELAY - DIPPED HEADLIGHTS	7810
K8	RELAY - BRAKE LIGHTS	5300
K9	RELAY - MAIN HEADLIGHTS	7950
K10	RELAY - POWER SUPPLY FOR THE HYDR. TRAILER BRAKE	8710
K11	RELAY - POWER SUPPLY FOR THE PNEUM. TRAILER BRAKE	8740
K12	RELAY - PNEUMATIC SYSTEM	5220
K13	ENGINE ELECTRONICS RELAY	320
K14	RELAY - STORAGE DEVICE	290
K15	RELAY - LOWER WORK LAMP BONNET	8545
K16	RELAY - WORK LAMP C-PILLAR	8575
K17	RELAY - VOLTAGE SUPPLY FOR THE ELECTRONICS	10975
K18	RELAY - BATTERY ISOLATOR SWITCH	100
K19	RELAY - POWER SUPPLY FOR THE COMPRESSOR COUPLING	11425
K20	POWER SUPPLY RELAY - ELECTROHYDR. REMOTE VALVE	4530
K21	RELAY - HEATED MIRROR	7010
K22	RELAY - FUEL PRE-HEATER	960
K23	RELAY - HEATER GRID	980
K24	RELAY - ISO 1	7130
K25	RELAY - ISO 2	7170
K26	RELAY - STEPS LIGHTING	7830
K30	RELAY FRONT LOADER SOLENOID VALVE 1	4890
K31	RELAY, FRONT LOADER D+	4840
K32	RELAY, FRONT LOADER SOLENOID VALVE 2	4870
K50	BATTERY ISOLATOR SWITCH RELAY	20
K51	TIME RELAY ELECTRICAL BATTERY ISOLATOR	230
M1	ENGAGING MAGNET	130
M2	ELECTR. MIRROR LEFT	6915
M3	ELECTR. MIRROR RIGHT	6985
M4	DRIVER'S SEAT PUMP (MOTOR)	7360
M5	WINDSCREEN WIPER MOTOR	9340
M6	REAR WINDSCREEN WASHER PUMP MOTOR	9450
M7	WINDSCREEN WASHER PUMP MOTOR	9480
M8	REAR WINDSCREEN WIPER MOTOR	9590
M9	PLUG CONNECTION HEATING / AIR CONDITIONING SYSTEM	11720
M9	PLUG CONNECTION HEATING / AIR CONDITIONING SYSTEM	11780
MF1 - 80A	MAXIFUSE FUSE - ENGINE IGNITION RELAY	120
MF2 - 30A	MAXIFUSE FUSE - LIGHTING, IGNITION, RADIO, WORK LAMP CONTROL UNIT	230
MF3 - 80A	MAXIFUSE FUSE - B+ BUFFER MEMORY FOR THE ICU, ENGINE CONTROLLER, TRANSMISSION CONTROLLER / STARTER RELAY / WORK LAMP C-PILLAR	10850
MF4 - 80A	MAXIFUSE FUSE - REAR POWER SOCKET, GRAB RAIL WORK LAMP, ROOF WORK LAMP	7050
MF5 - 80A	MAXIFUSE FUSE - LIGHTING / FLASHER / ROTATING BEACON	8510
MF6 - 80A	MAXIFUSE FUSE - ACCESSORIES FOR THE CAB / POWER SOCKET, CAB	11480
PF1 - 250A	MAIN FUSE - MAIN VOLTAGE SUPPLY	10
PF2 - 30A	MAIN FUSE - VOLTAGE SUPPLY FOR THE ELECTRONICS	30
PF3 - 10A	SUPPLY E-BOXES, ICU, ELECTRICAL BATTERY ISOLATOR	50
PF4 - 30A	MAIN FUSE - ISOBUS REAR RELAY 1	7140
PF5 - 30A	MAIN FUSE - ISOBUS REAR RELAY 2	7180
R1	FUEL PRE-HEATER	970
R2	HEATER GRID	990

R3	TERMINAL RESISTOR CAN-BUS EPC	4450
R4	TERMINAL RESISTOR CAN-BUS EPC WITH MID MOUNTS	4480
R5	CIGAR LIGHTER	6880
S2	ELECTRICAL BATTERY ISOLATOR	80
S3	STARTER SWITCH	260
S4	FOOT THROTTLE - ELECTRONIC	380
S5	PROGRAMMING SWITCH FOR CONSTANT SPEED	430
S6	CONSTANT SPEED CRUISE AUTO SWITCH	580
S7	INCREASE/DECREASE ENGINE SPEED SWITCH	1110
S8	VACUUM SWITCH	880
S10	SHUTTLE SWITCH	1570
S11	CLUTCH SWITCH	1640
S12	TRANSMISSION OIL PRESSURE SWITCH	1870
S13	FULL POWERSHIFT TRANSMISSION PRESSURE SWITCH GEAR GROUP H	1910
S14	FULL POWERSHIFT TRANSMISSION PRESSURE SWITCH GEAR GROUP M	1930
S15	FULL POWERSHIFT TRANSMISSION PRESSURE SWITCH GEAR GROUP L	1950
S16	FULL POWERSHIFT TRANSMISSION PRESSURE SWITCH REVERSE GEAR GROUP	1960
S18	CRAWLER GEAR SWITCH	2520
S21	HYDRAULIC OIL TEMPERATURE SWITCH	3020
S22	MAINTENANCE SWITCH FOR THE HYDRAULIC OIL FILTER	3020
S23	HEADLAND MANAGEMENT RECORD SWITCH	3040
S25	EXTERNAL POWERLIFT RIGHT-HAND SIDE	3335
S26	EXTERNAL POWERLIFT LEFT-HAND SIDE	3355
S27	CHARGE PRESSURE SWITCH S2	3820
S28	UPPER LINK SWITCH	4260
S29	LIFT LINK SWITCH	4350
S30	ELECTROHYDR. REMOTE VALVE SELECTION SWITCH	12720
S31	HYDRAULIC MASTER (ELECTROHYDR. REMOTE VALVE OFF SWITCH)	4580
S37	ALL-WHEEL DRIVE CONTROL SWITCH	5130
S38	DIFF. LOCK SWITCH	5140
S39	DIFFERENTIAL LOCK SWITCH	5190
S40	BRAKE LIGHT SWITCH RIGHT-HAND SIDE	5280
S41	BRAKE LIGHT SWITCH LEFT-HAND SIDE	5280
S42	ALL-WHEEL DRIVE CONTROL SWITCH	5380
S43	SWITCH AND LIGHT FOR THE REAR PTO BRAKE + MANAGEMENT	5510
S44	FRONT PTO SWITCH	5615
S45	REAR PTO SWITCH	5645
S47	SWITCH FOR THE FRONT AXLE SUSPENSION SYSTEM	6170
S48	FAST STEER SYSTEM - STEERING WHEEL SWITCH	6430
S49	DOOR CONTACT SWITCH LEFT-HAND SIDE	6710
S50	DOOR CONTACT SWITCH RIGHT-HAND SIDE	6730
S51	MIRROR CONTROL SWITCH	6950
S52	MIRROR HEATER SWITCH	7010
S53	DRIVER'S SEAT PUMP (SWITCH)	7380
S54	PTO SWITCH LEFT FENDER	7710
S55	PTO SWITCH RIGHT FENDER	7750
S56	HEADLIGHT SWITCH	8040
S57	AUXILIARY HEADLIGHT SWITCH	8090
S58	HAZARD SWITCH	8130
S59	HANDBRAKE SWITCH	8750
S60	TRAILER BRAKE (VERSION FOR ITALY) - PUMP PRESSURE SWITCH	8830
S61	TRAILER BRAKE (VERSION FOR ITALY) - CABLE PRESSURE SWITCH	8830
S62	PRESSURE SWITCH FOR AIR BRAKE SYSTEM	8890
S63	BRAKE FLUID LEVEL SWITCH	9060
S64	POWER STEERING PRESSURE SWITCH	9150
S65	SWITCH FOR THE FRONT WINDSCREEN WIPER	9400

S66	PRESSURE SWITCH AIR PRESSURE BUILT UP	11630
S67	AIR CONDITIONING SYSTEM	11880
S68	HEATER BLOWER SWITCH	11970
S68	HEATER BLOWER SWITCH	11980
S69	AC SWITCH	11970
S69	AC SWITCH	11980
S70	LP PRESSURE MONITOR	11970
S71	LOW TEMPERATURE SAFETY SWITCH (ANTI-FREEZE PROTECTION)	11970
S75	ARU - JOYSTICK, PUSH BUTTON	12780
S76	OIL MOTOR OPERATION SWITCH	4690
S87	ARU - SHIFT BUTTON	12410
S88	FORWARDS/REVERSE PUSH BUTTON	12430
S89	AUTO TRANS PUSH BUTTON	12450
S90	HEADLAND MANAGEMENT CONTROL SWITCH	12470
S91	PUSH BUTTON SPEED "+"	12490
S92	PUSH BUTTON SPEED "-"	12510
S93	PUSH BUTTON EPC RAISE	12520
S94	PUSH BUTTON EPC LOWER	12530
S95	PUSH BUTTON EDC CONTROL-TRANSPORT	12570
S106	ARU - JOYSTICK, PUSH BUTTON	12765
S107	ARU - JOYSTICK, PUSH BUTTON	12750
S108	CRAWLER GEAR / SUSPENDED FRONT AXLE	2440
S109	INSIDE ACTUATED POWERLIFT SWITCH	2970
X1	8A SCREW TERMINAL - BLACK	6790
X2	8A SCREW TERMINAL - RED	6800
X4	HI-FLOW OIL PUMP PLUG CONNECTION - CIRCUIT 5830	3300
X5	FRONT POWERLIFT DETECT-SIGNAL	3460
X6	FRONT SOCKET (OPTION)	5690
X7	PLUG FRONT POWERLIFT/FRONT PTO	5930
X9	20A SOCKET - 3 PIN	6830
X10	POWER SOCKET REAR	7050
X11	8A SOCKET	7070
X12	SOCKET	7155
X14	AUXILIARY HEADLIGHT	7500
X15	PLUG CONNECTION TRAILER BRAKE	8800
X16	TRAILER SOCKET	8920
X17	AIR BRAKE PLUG CONNECTION	8940
X18	CONNECTION CABLE CONNECTOR STANDARD SIGNAL SOCKET	9250
X19	DIAGNOSTICS LINK ANALOGUE-DIGITAL INSTRUMENT (ICU)	9620
X20	SELECT CAN DIAGNOSTICS	9980
X21	DIAGNOSTICS CONNECTOR	9700
X22	ISO BUS CAN EXTENSION	9770
X23	REPLACEMENT 1	9810
X24	REPLACEMENT 2	9830
X25	TRACTOR CONTROL UNIT CAN-BUS REPLACEMENT	9870
X26	CAN-BUS ELECTROHYDR. REMOTE VALVE	10050
X27	CAN-BUS TRANSMISSION	10120
X28	REVERSE VIEW CAMERA	10210
X29	SOCKET 2	10475
X30	NON TECU POWER 2	10535
X31	NON TECU POWER 1	10555
Y4	FUEL FLOW METER - EDC 16	1200
Y5	INJECTOR CYLINDER 1 / 2 EDC 16	1390
Y6	INJECTOR CYLINDER 1 / 2 EDC 16	1400
Y7	INJECTOR CYLINDER 3 / 4 EDC 16	1430
Y8	INJECTOR CYLINDER 3 / 4 EDC 16	1440

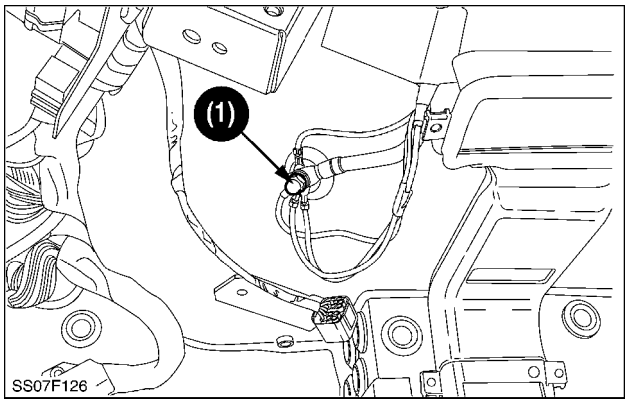
Y9	INJECTOR CYLINDER 5 / 6 EDC 16	1470
Y10	INJECTOR CYLINDER 5 / 6 EDC 16	1480
Y11	FULL POWERSHIFT TRANSMISSION MV 19TH GEAR	2070
Y12	SOLENOID VALVE COUPLING E	2090
Y13	SOLENOID VALVE COUPLING A	2120
Y14	SOLENOID VALVE REV GEAR GROUP	2150
Y15	SOLENOID VALVE GEAR GROUP M	2180
Y16	SOLENOID VALVE COUPLING C	2210
Y17	SOLENOID VALVE COUPLING D	2240
Y18	SOLENOID VALVE CRAWLER GROUP	2270
Y19	RELIEF SOLENOID VALVE 19TH GEAR	2300
Y20	SOLENOID VALVE GEAR GROUP L	2330
Y21	SOLENOID VALVE COUPLING B	2360
Y22	SOLENOID VALVE GEAR GROUP H	2390
Y23	EXTEND TOP A	3620
Y24	RETRACT TOP B	3635
Y25	EXTEND SIDE C	3650
Y26	RETRACT SIDE D	3665
Y27	SAFETY VALVE - LIFT LINK OIL CIRCUIT	3680
Y28	EPC LOWER SOLENOID	3840
Y29	EPC RAISE SOLENOID VALVE	3860
Y31	ELECTROHYDR. REMOTE VALVE PLUG CONNECTION 4	3980
Y32	ELECTROHYDR. REMOTE VALVE PLUG CONNECTION 3	4030
Y33	ELECTROHYDR. REMOTE VALVE PLUG CONNECTION 2	4080
Y34	ELECTROHYDR. REMOTE VALVE PLUG CONNECTION 1	4130
Y35	ELECTROHYDR. REMOTE VALVE 7	4420
Y36	ELECTROHYDR. REMOTE VALVE 8	4440
Y37	ELECTROHYDR. REMOTE VALVE 9	4460
Y38	ELECTROHYDR. REMOTE VALVE 10	4480
Y39	DIFFERENTIAL LOCK SOLENOID VALVE	5110
Y40	ALL-WHEEL DRIVE SOLENOID VALVE	5120
Y41	PTO BRAKE	5750
Y42	PTO SOLENOID VALVE	5780
Y43	SOLENOID VALVE LOWER LOCK FOR THE SUSPENSION	6130
Y44	LOWER SOLENOID VALVE FOR THE SUSPENSION	6220
Y45	RAISE SOLENOID VALVE FOR THE SUSPENSION	6250
Y46	SOLENOID VALVE UPPER LOCK FOR THE SUSPENSION	6280
Y47	FAST STEER SYSTEM - SOLENOID VALVES	6360
Y48	TRAILER BRAKE (VERSION FOR ITALY) - SOLENOID VALVES	8815
Y49	TRAILER BRAKE (VERSION FOR ITALY) - SOLENOID VALVES	8835
Y50	PNEUMATIC BRAKES SOLENOID VALVE	8945
Y51	ANTI-FREEZE PROTECTION FOR BRAKE SYSTEM	8970
Y52	SOLENOID VALVE PARKING BRAKE	8990
Y53	AIR CONDITIONING SYSTEM	11900
Y57	A/C COMPRESSOR	11420

Wiring harness - Overview Earth points

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

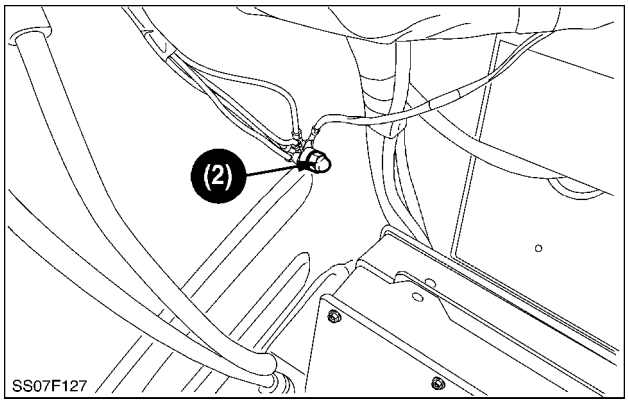
Screwed earth points

Earth point (1) cab
(in the cab on the right-hand wheel case)



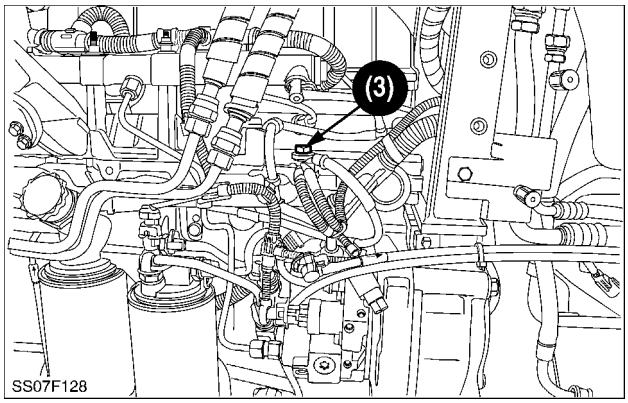
SS07F126 1

Earth point (2) cab
(in the cab on the rear right-hand wheel case)



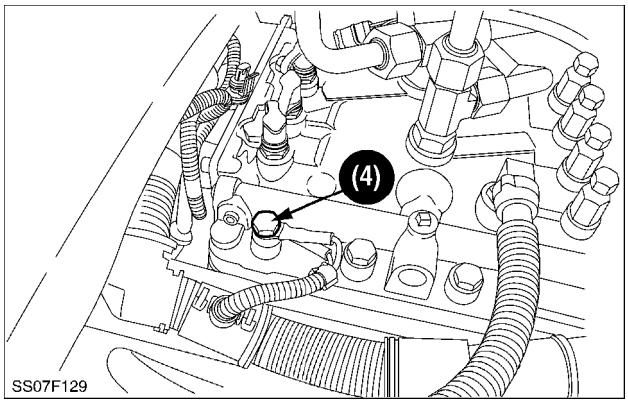
SS07F127 2

Earth point (3) engine
(on the left-hand engine block)



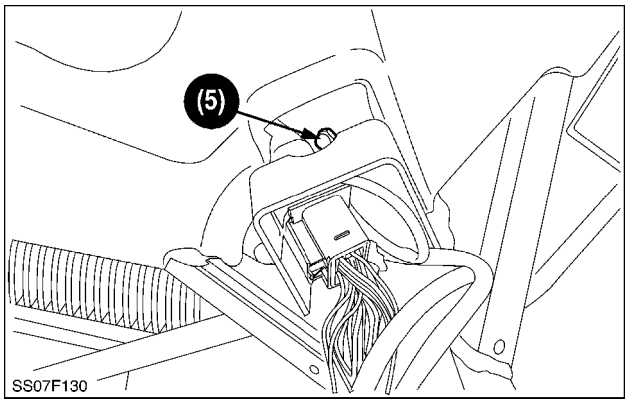
SS07F128 3

Earth point (4) transmission
(on the left-hand slide valve housing of the transmission controls)



SS07F129 4

Earth point (5) roof
(on the right-hand C-pillar)



SS07F130 5

Overview of welding points (earth)

Welding point	Sequence of the earth - welding points in the circuit diagram / paths	Screwed earth points
1	11835	(2)
2	11805	(2)
02	8640, 7210, 7930	(1)
3	11920	(2)
5	8160, 6700, 6950, 8430, 8510, 9340, 9590	(5)
12	7230, 6780, 8190, 8415, 8470	(5)
21	110, 300, 4530, 5220, 5300, 6490, 7480, 7810, 7960, 8725, 10260, 11520	(1)
67	7310	(2)
75	7030, 10830, 11130, 11340	(2)
82	6820, 7080, 8240, 8260	(2)
87	2530, 7000, 7360, 7510, 7590, 7780, 8540, 8570, 8750, 9450, 10950	(2)
89	4310, 4560, 7010	(2)
101	4640, 4860, 5500	(1)
102	190, 1570, 5990, 8140, 8250, 9500, 9660, 11080	(1)
109	11810, 11840	(2)
131	950	(3)
136	4640, 880, 900, 920, 5840, 8630	(1)
139	7490, 20, 5980, 9110, 11420	(1)
152	3650, 1870, 1980, 3020, 5120, 5750, 6110, 8800, 8940, 9150	(4)
161	4410, 4020	(4)
191	2530, 420, 1110, 2430, 2450, 2485, 3050, 4700, 5370, 5400	(2)
241	20	(1)
355	2900, 12300	(1)

Wiring harness - Electrical schematic frame 01 Starter and alternator system

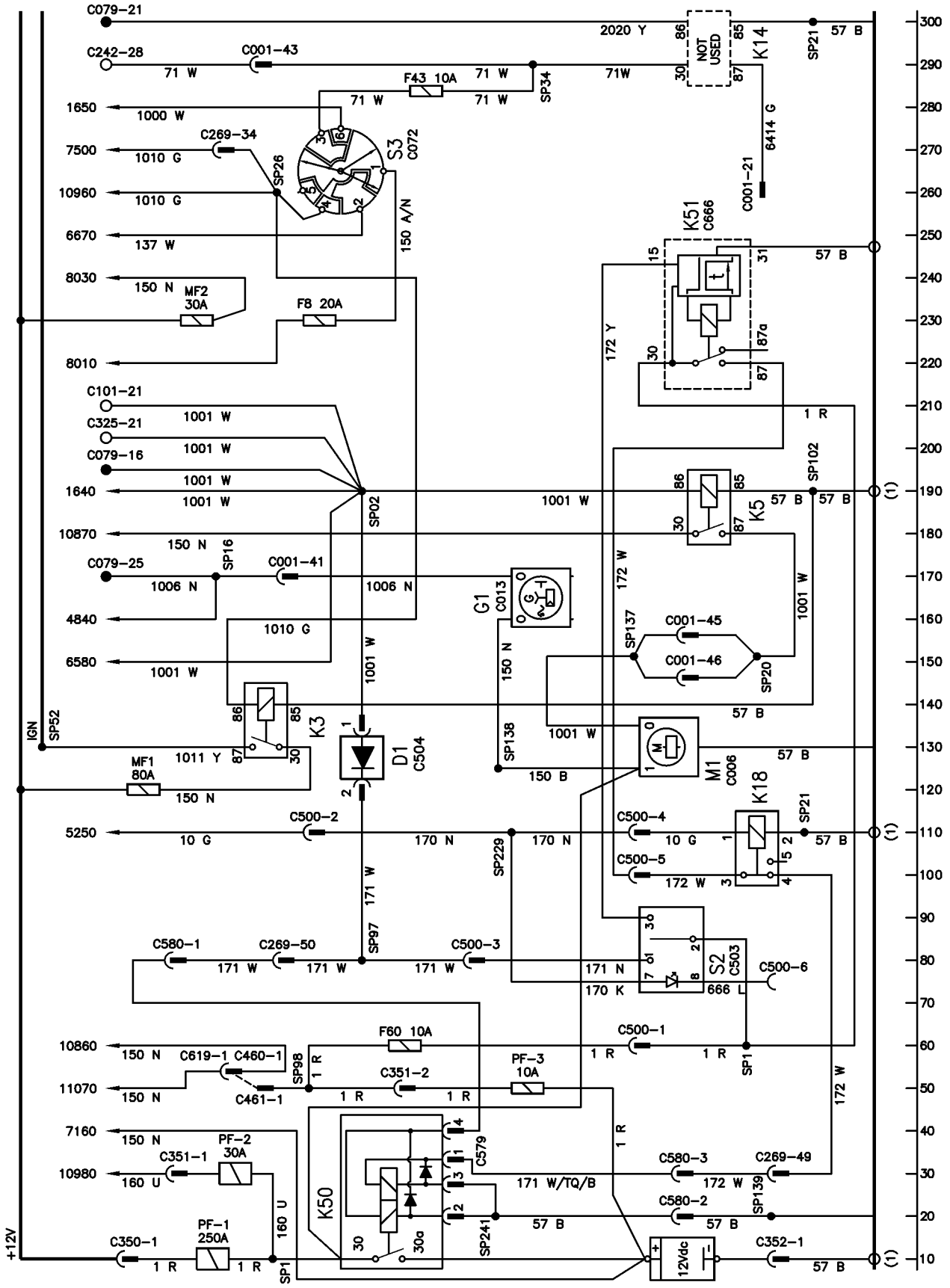
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 0-300

Line number	Compo-nent	Connector	Designation
10	PF1 - 250A		MAIN FUSE - MAIN SUPPLY
20	K50	**C579**	BATTERY MAIN SWITCH RELAY
30	PF2 - 30A		MAIN FUSE- SUPPLY FOR ELECTRONICS
50	PF3 - 10A		SUPPLY , E-COMPARTMENTS, ICU, ELECTRICAL BATTERY MAIN SWITCH
60	F60 -10A		FUSE - BATTERY ISOLATOR RELAY
80	S2	**C503**	ELECTRICAL BATTERY MAIN SWITCH
100	K18		RELAY - BATTERY ISOLATOR
120	MF1 - 80A		MAXIFUSE-FUSE - ENGINE IGNITION RELAY
130	D1	**C504**	DIODE
130	M1	**C006**	STARTING MAGNET
140	K3		RELAY - IGNITION
170	G1	**C013**	ALTERNATOR
190	K5		RELAY - STARTER MOTOR ON
230	F8 -20A		FUSE - START SWITCH
230	MF2 - 30A		MAXIFUSE-FUSE - LIGHTING, IGNITION SWITCH, RADIO, FIELD LIGHTS CONTROL UNIT
230	K51	**C666**	TIMER RELAY ELECTRICAL BATTERY MAIN SWITCH
260	S3	**C072**	START SWITCH
285	F43 -10A		FUSE - START SWITCH 15V SUPPLY FOR ENGINE ELECTRONICS (SWITCH POSITION ENGINE ON)
290	K14		RELAY - STOPPING DEVICE

NOTE: *Supplementary connector* ***C001****,* ***C079****,* ***C101****,* ***C242****,* ***C269****,* ***C325****,* ***C350****,* ***C351****,* ***C352****,* ***C460****,* ***C461****,* ***C500****,* ***C580****,* ***C619****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C079-21
2020 Y
NOT USED
K14
SP21
57 B
C242-28
C001-43
71 W
F43 10A
SP34
71W
1650
1000 W
7500
C269-34
1010 G
SP26
S3
C072
10960
1010 G
6670
137 W
150 A/N
C001-21
6414 G
K51
C666
8030
150 N
MF2
30A
F8 20A
8010
172 Y
1 R
C101-21
1001 W
C325-21
C079-16
1640
SP02
SP102
K5
10870
150 N
SP16
C079-25
C001-41
1006 N
4840
1010 G
G1
C013
SP137
C001-45
C001-46
SP20
6580
1001 W
K3
IGN
SP52
MF1
80A
1011 Y
D1
C504
SP138
150 B
M1
C006
K18
5250
10 G
C500-2
170 N
SP229
C500-4
C500-5
172 W
171 W
SP97
C580-1
C269-50
C500-3
171 W
S2
C503
C500-6
171 N
170 K
666 L
10860
C619-1
C460-1
SP98
F60 10A
C500-1
SP1
11070
C461-1
C351-2
PF-3
10A
7160
PF-2
30A
C351-1
10980
160 U
K50
C579
C580-3
C269-49
C580-2
SP139
SP241
+12V
C350-1
PF-1
250A
30
30a
12Vdc
C352-1
(1)

SS07F001 1

Wiring harness - Electrical schematic frame 02 Engine control system (1)

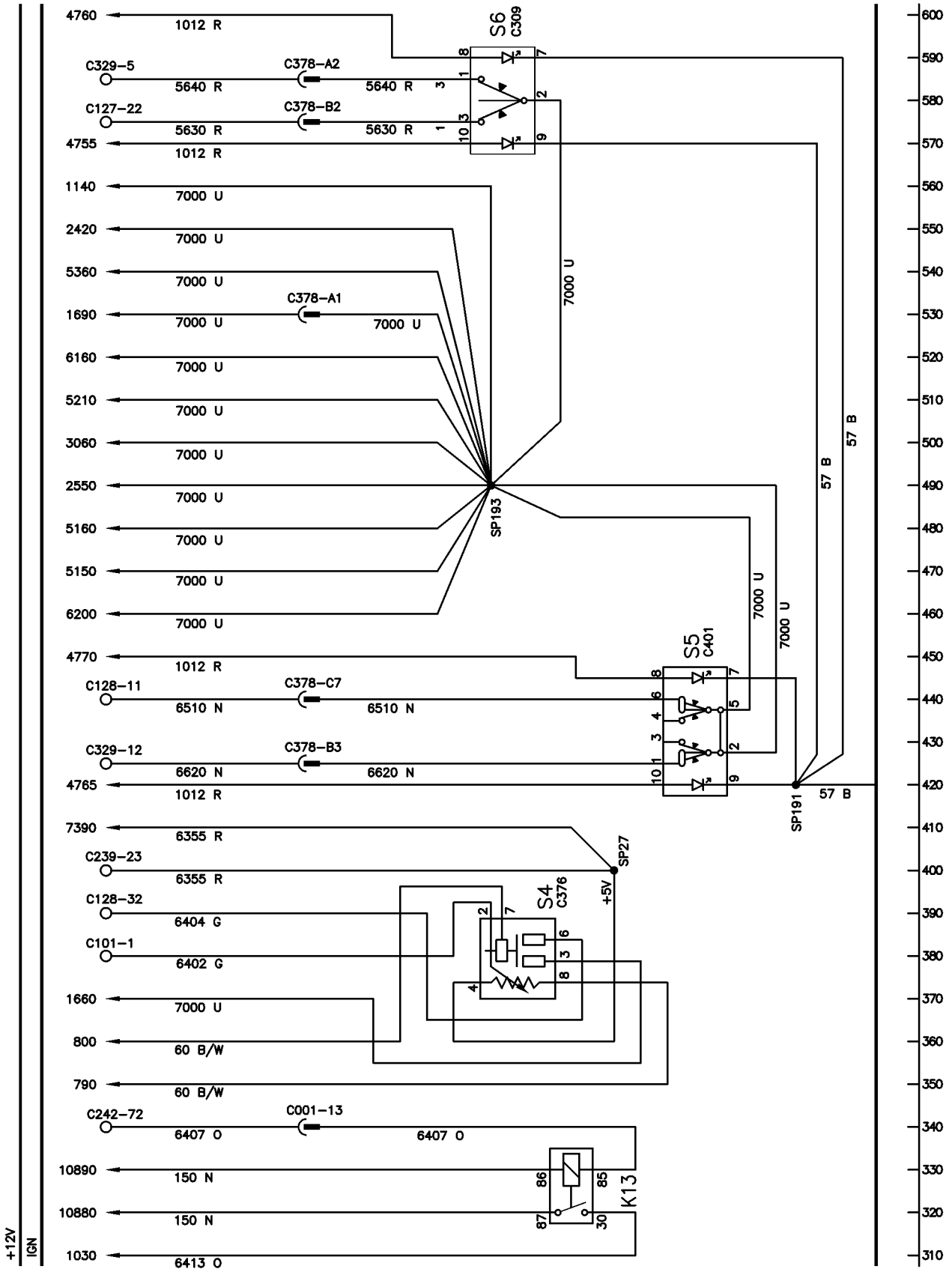
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 310-600

Line number	Compo-nent	Connector	Designation
320	K13		ENGINE ELECTRONICS RELAY
380	S4	**C376**	ACCELERATOR PEDAL - ELECTRONIC
430	S5	**C401**	CONSTANT SPEED PROGRAMMING SWITCH
580	S6	**C309**	CONSTANT SPEED CRUISE-AUTO SWITCH

NOTE: *Supplementary connector* ***C001****,* ***C101****,* ***C127****,* ***C128****,* ***C239****,* ***C242****,* ***C329****,* ***C378****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Grey	G	Green	P	Purple		


4760
1012 R
S6
C309
C329-5
C378-A2
5640 R
5640 R
C127-22
C378-B2
5630 R
5630 R
4755
1012 R
1140
7000 U
2420
7000 U
5360
7000 U
C378-A1
1690
7000 U
7000 U
6160
7000 U
5210
7000 U
3060
7000 U
2550
7000 U
5160
7000 U
5150
7000 U
6200
7000 U
SP193
7000 U
4770
1012 R
S5
C401
C128-11
C378-C7
6510 N
6510 N
C329-12
C378-B3
6620 N
6620 N
4765
1012 R
57 B
57 B
57 B
SP191
7390
6355 R
SP27
C239-23
6355 R
+5V
S4
C376
C128-32
6404 G
C101-1
6402 G
1660
7000 U
800
60 B/W
790
60 B/W
C242-72
C001-13
6407 O
6407 O
10890
150 N
K13
10880
150 N
1030
6413 O
+12V
IGN
600
590
580
570
560
550
540
530
520
510
500
490
480
470
460
450
440
430
420
410
400
390
380
370
360
350
340
330
320
310

SS07F002 1

Wiring harness - Electrical schematic frame 03 Engine control system (2)

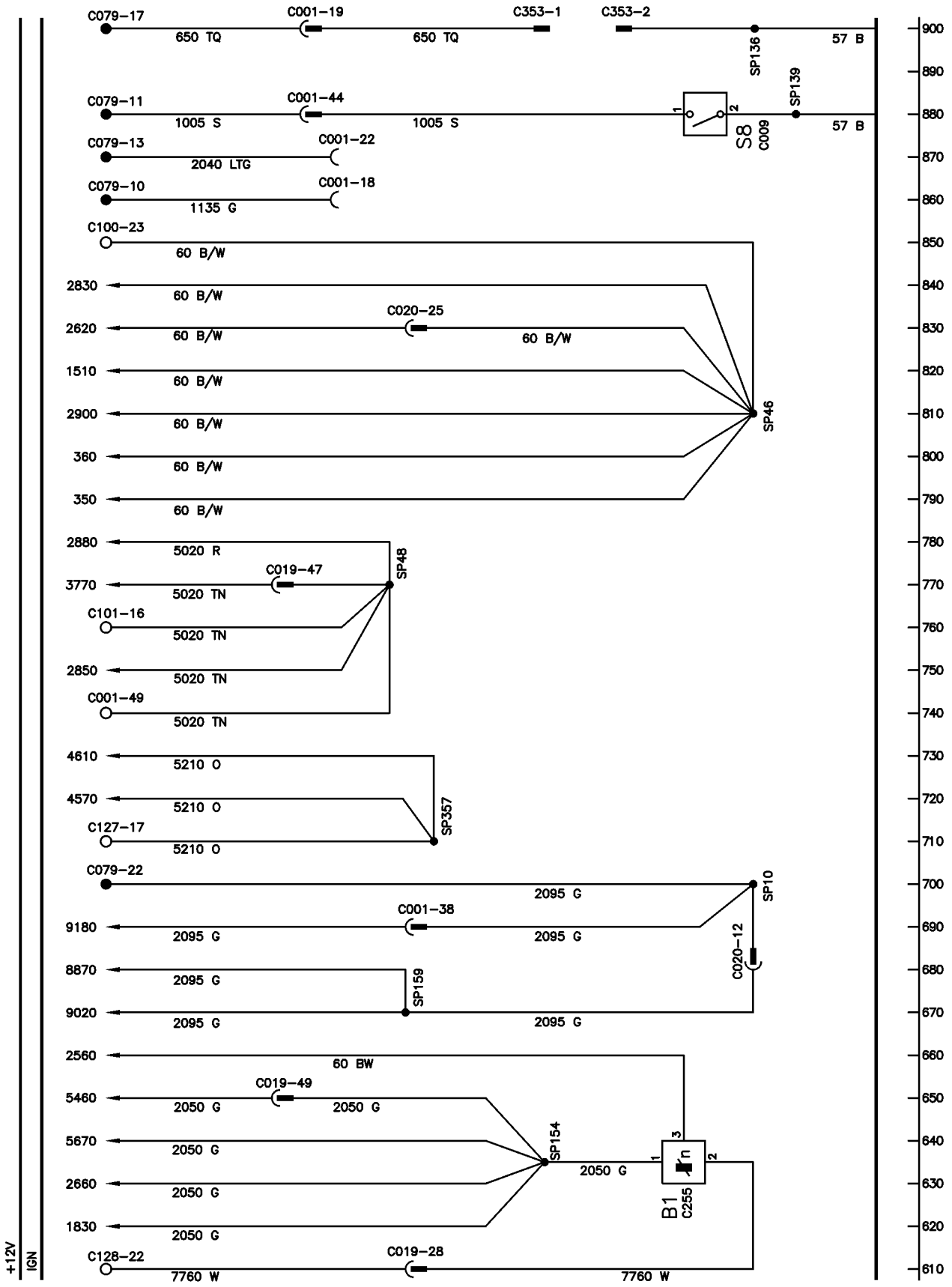
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 610-900

Line number	Compo-nent	Connector	Designation
635	B1	**C255**	ENGINE SPEED SENSOR
880	S8	**C009**	VACUUM SWITCH

NOTE: *Supplementary connector* ***C001****,* ***C019****,* ***C020****,* ***C079****,* ***C100****,* ***C101****,* ***C127****,* ***C128****,* ***C353****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C079-17
650 TQ
C001-19
650 TQ
C353-1
C353-2
SP136
57 B
SP139
C079-11
1005 S
C001-44
1005 S
S8
C009
57 B
C079-13
2040 LTG
C001-22
C079-10
1135 G
C001-18
C100-23
60 B/W
2830
60 B/W
C020-25
2620
60 B/W
60 B/W
1510
60 B/W
2900
60 B/W
SP46
360
60 B/W
350
60 B/W
2880
5020 R
SP48
C019-47
3770
5020 TN
C101-16
5020 TN
2850
5020 TN
C001-49
5020 TN
4610
5210 O
4570
5210 O
SP357
C127-17
5210 O
C079-22
2095 G
SP10
C001-38
9180
2095 G
2095 G
C020-12
8870
2095 G
SP159
9020
2095 G
2095 G
2560
60 BW
C019-49
5460
2050 G
2050 G
5670
2050 G
SP154
2660
2050 G
2050 G
1830
2050 G
B1
C255
C128-22
7760 W
C019-28
7760 W
+12V
IGN
900
890
880
870
860
850
840
830
820
810
800
790
780
770
760
750
740
730
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640
630
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610

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Wiring harness - Electrical schematic frame 04 Engine control system (3)

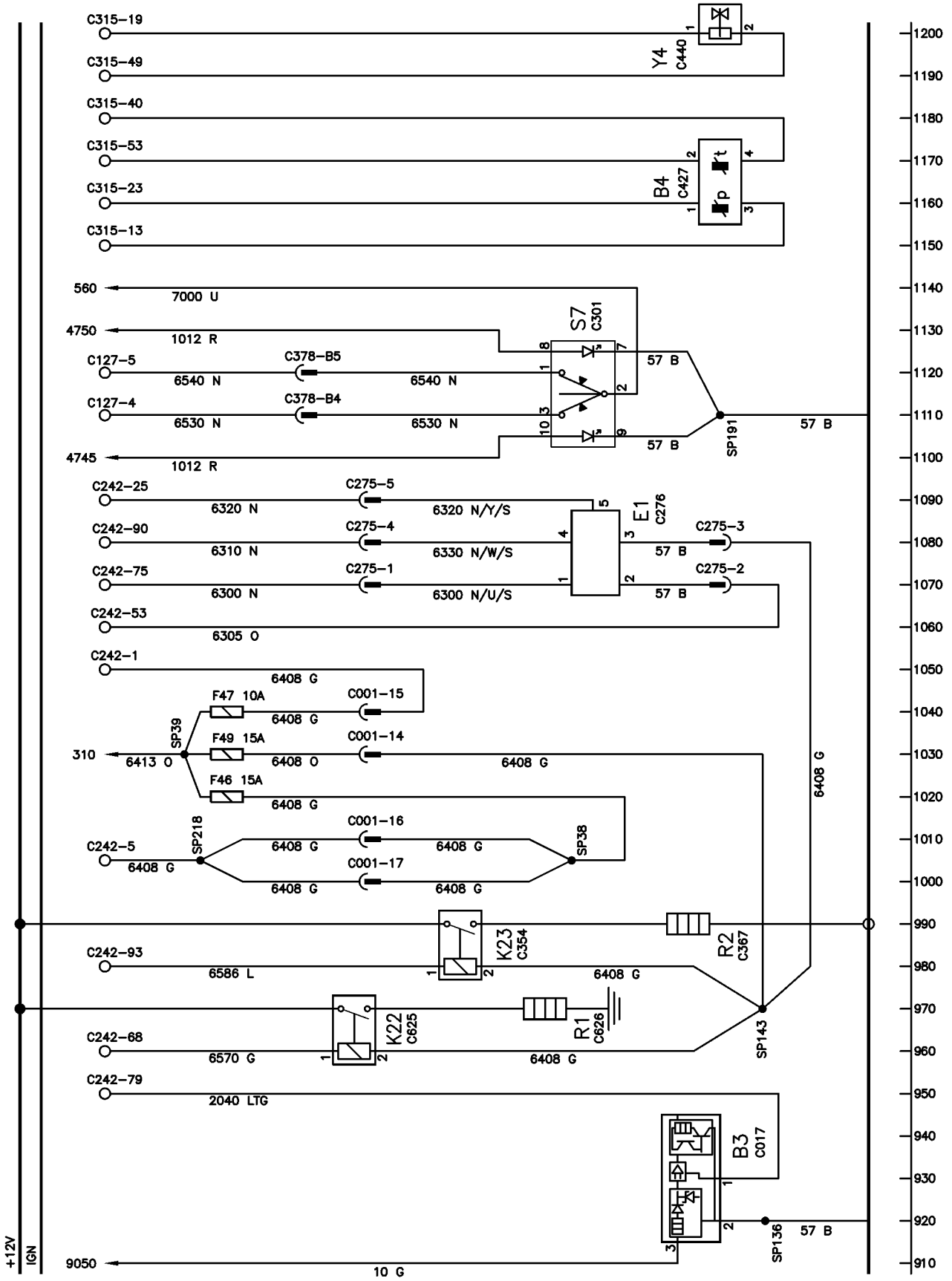
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 910-1200

Line number	Compo-nent	Connector	Designation
930	B3	**C017**	FUEL FILTER WATER SENSOR
960	K22	**C625**	RELAY - FUEL PREHEATER
970	R1	**C626**	FUEL PREHEATER
980	K23	**C354**	RELAY - HEATING ELEMENT
990	R2	**C367**	HEATING ELEMENT
1020	F46 -15A		FUSE - ENGINE CONTROL UNIT (ECU)
1030	F49 -15A		FUSE - HEATING ELEMENT, FUEL FILTER HEATING, FAN ELECTRONICS
1040	F47 -10A		FUSE - ENGINE CONTROL UNIT (ECU)
1080	E1	**C276**	VISTRONIC FAN
1110	S7	**C301**	INCREASE/REDUCE ENGINE SPEED SWITCH
1160	B4	**C427**	BOOST PRESSURE/TEMPERATURE SENSOR - EDC 16
1200	Y4	**C440**	FUEL FLOWMETER - EDC 16

NOTE: *Supplementary connector* ***C001****,* ***C127****,* ***C242****,* ***C275****,* ***C315****,* ***C378****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C315-19
C315-49
C315-40
C315-53
C315-23
C315-13
Y4
C440
B4
C427
560
7000 U
4750
1012 R
C127-5
6540 N
C378-B5
C127-4
6530 N
C378-B4
S7
C301
57 B
SP191
4745
C242-25
6320 N
C275-5
C242-90
6310 N
C275-4
C242-75
6300 N
C275-1
C242-53
6305 O
6320 N/Y/S
6330 N/W/S
6300 N/U/S
E1
C276
C275-3
C275-2
C242-1
6408 G
F47 10A
C001-15
SP39
F49 15A
C001-14
310
6413 O
F46 15A
C242-5
SP218
C001-16
C001-17
SP38
C242-93
6586 L
K23
C354
R2
C367
C242-68
6570 G
K22
C625
R1
C626
SP143
C242-79
2040 LTG
B3
C017
SP136
9050
10 G
+12V
IGN
1200
1190
1180
1170
1160
1150
1140
1130
1120
1110
1100
1090
1080
1070
1060
1050
1040
1030
1020
1010
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950
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930
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910

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Wiring harness - Electrical schematic frame 05 Engine control system (4)

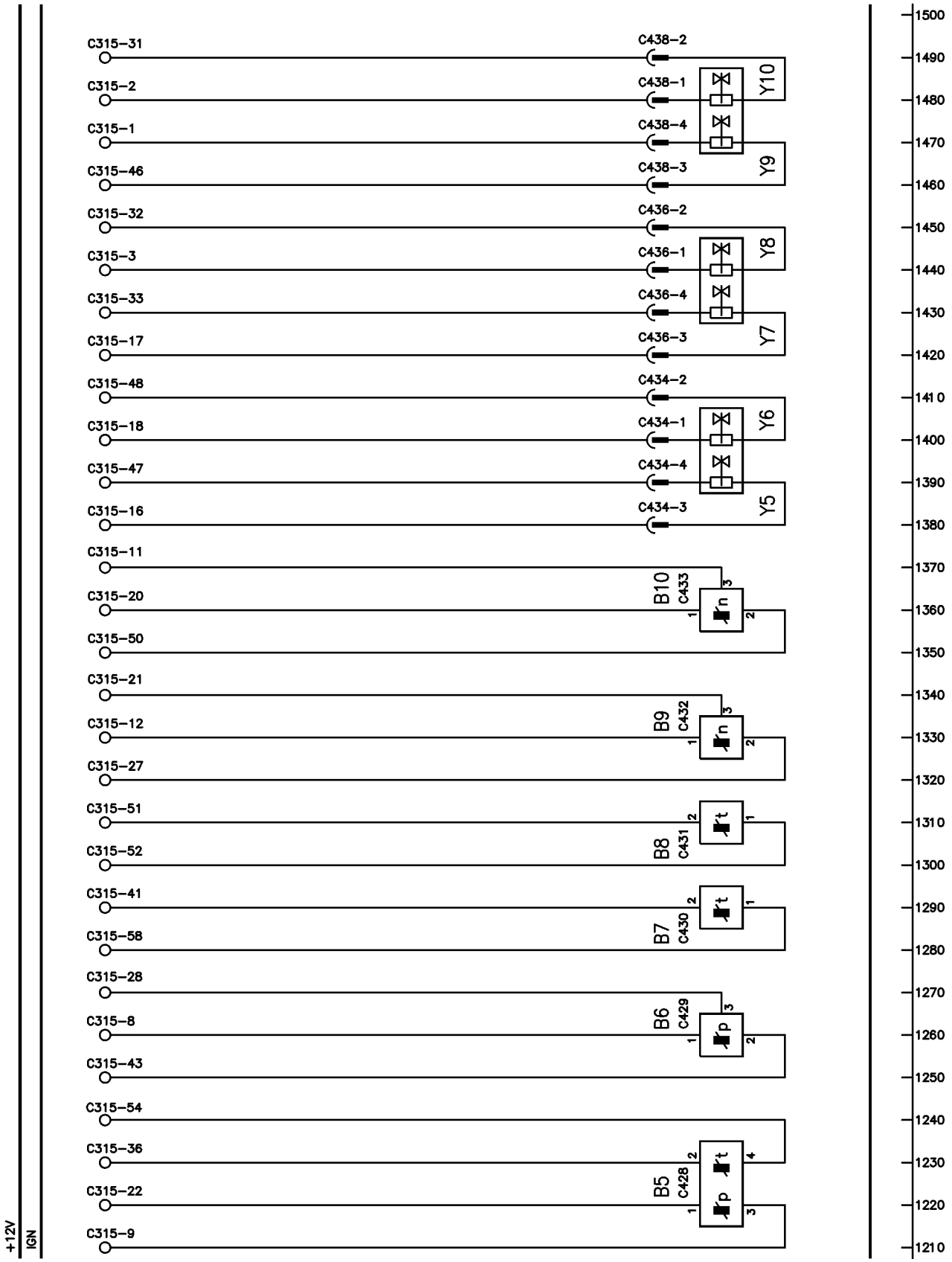
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 1210-1500

Line number	Compo-nent	Connector	Designation
1220	B5	**C428**	OIL PRESSURE/TEMPERATURE SENSOR - EDC 16
1260	B6	**C429**	RAIL PRESSURE SENSOR - EDC 16
1290	B7	**C430**	COOLANT TEMPERATURE SENSOR - EDC 16
1310	B8	**C431**	FUEL TEMPERATURE SENSOR - EDC 16
1330	B9	**C432**	CRANKSHAFT - SPEED SENSOR - EDC 16
1360	B10	**C433**	CAMSHAFT - SPEED SENSOR - EDC 16
1390	Y5	**C434**	INJECTOR CYLINDER 1 / 2 EDC 16
1400	Y6	**C434**	INJECTOR CYLINDER 1 / 2 EDC 16
1430	Y7	**C436**	INJECTOR CYLINDER 3 / 4 EDC 16
1440	Y8	**C436**	INJECTOR CYLINDER 3 / 4 EDC 16
1470	Y9	**C438**	INJECTOR CYLINDER 5 / 6 EDC 16
1480	Y10	**C438**	INJECTOR CYLINDER 5 / 6 EDC 16

NOTE: *Supplementary connector* ***C315****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C315–9
C315–22
C315–36
C315–54
C315–43
C315–8
C315–28
C315–58
C315–41
C315–52
C315–51
C315–27
C315–12
C315–21
C315–50
C315–20
C315–11
C315–16
C315–47
C315–18
C315–48
C315–17
C315–33
C315–3
C315–32
C315–46
C315–1
C315–2
C315–31
B5 C428
B6 C429
B7 C430
B8 C431
B9 C432
B10 C433
C438–2
C438–1
C438–4
C438–3
C436–2
C436–1
C436–4
C436–3
C434–2
C434–1
C434–4
C434–3
Y10
Y9
Y8
Y7
Y6
Y5
1500
1490
1480
1470
1460
1450
1440
1430
1420
1410
1400
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Wiring harness - Electrical schematic frame 06 Gearbox (1)

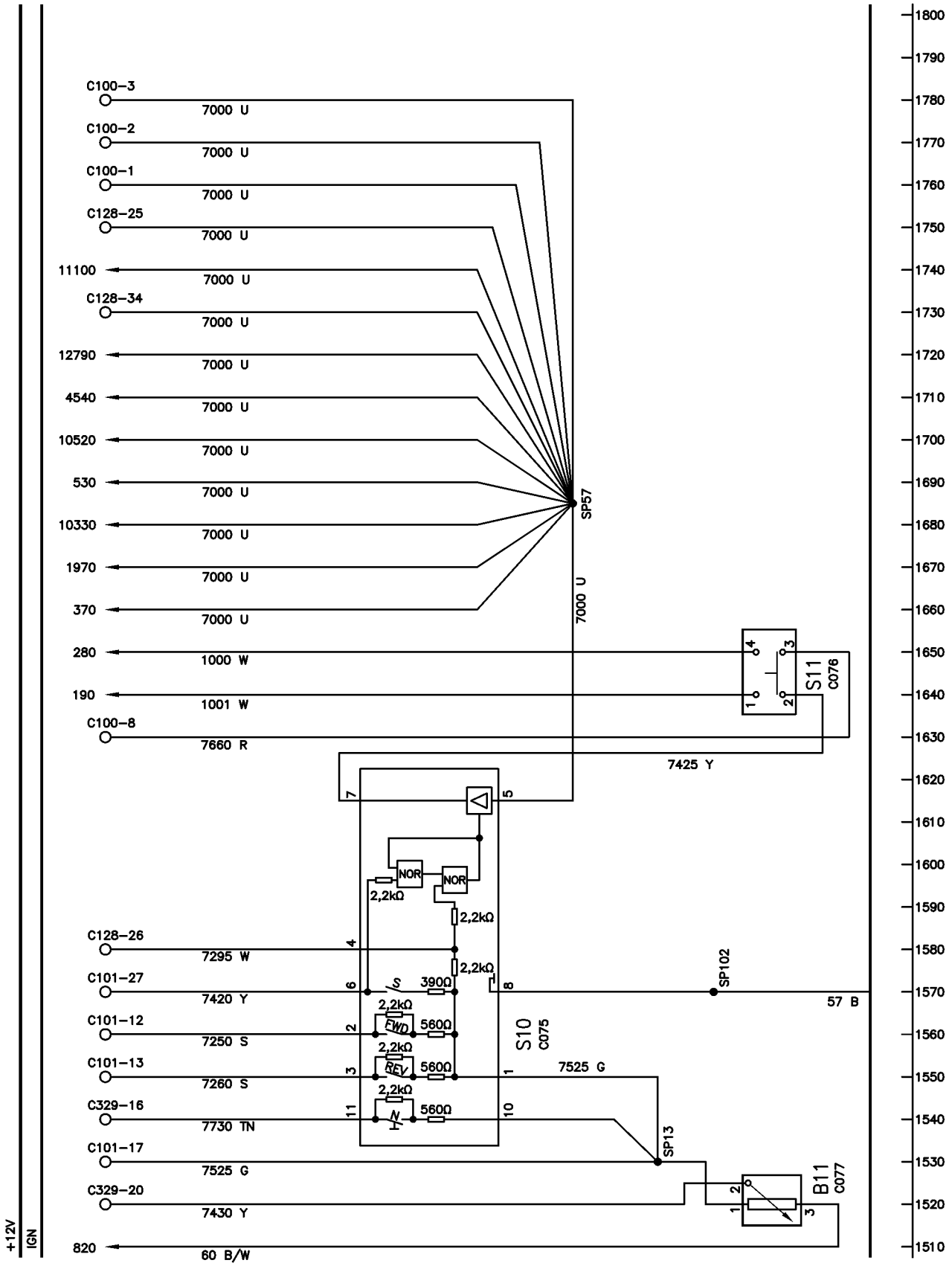
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 1510-1800

Line number	Compo-nent	Connector	Designation
1520	B11	**C077**	CLUTCH PEDAL SENSOR
1570	S10	**C075**	SHUTTLE SWITCH
1640	S11	**C076**	CLUTCH SWITCH

NOTE: *Supplementary connector* ***C100****,* ***C101****,* ***C128****,* ***C329****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C100-3
7000 U
C100-2
7000 U
C100-1
7000 U
C128-25
7000 U
11100
7000 U
C128-34
7000 U
12790
7000 U
4540
7000 U
10520
7000 U
530
7000 U
10330
7000 U
1970
7000 U
370
7000 U
SP57
7000 U
280
1000 W
190
1001 W
S11
C076
C100-8
7660 R
7425 Y
NOR
NOR
2,2kΩ
2,2kΩ
2,2kΩ
C128-26
7295 W
C101-27
7420 Y
390Ω
SP102
57 B
C101-12
7250 S
2,2kΩ
FWD
560Ω
S10
C075
C101-13
7260 S
2,2kΩ
REV
560Ω
7525 G
C329-16
7730 TN
2,2kΩ
N
560Ω
SP13
C101-17
7525 G
C329-20
7430 Y
B11
C077
820
60 B/W
+12V
IGN
1800
1790
1780
1770
1760
1750
1740
1730
1720
1710
1700
1690
1680
1670
1660
1650
1640
1630
1620
1610
1600
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1510

SS07F006 1

Wiring harness - Electrical schematic frame 07 Gearbox (2)

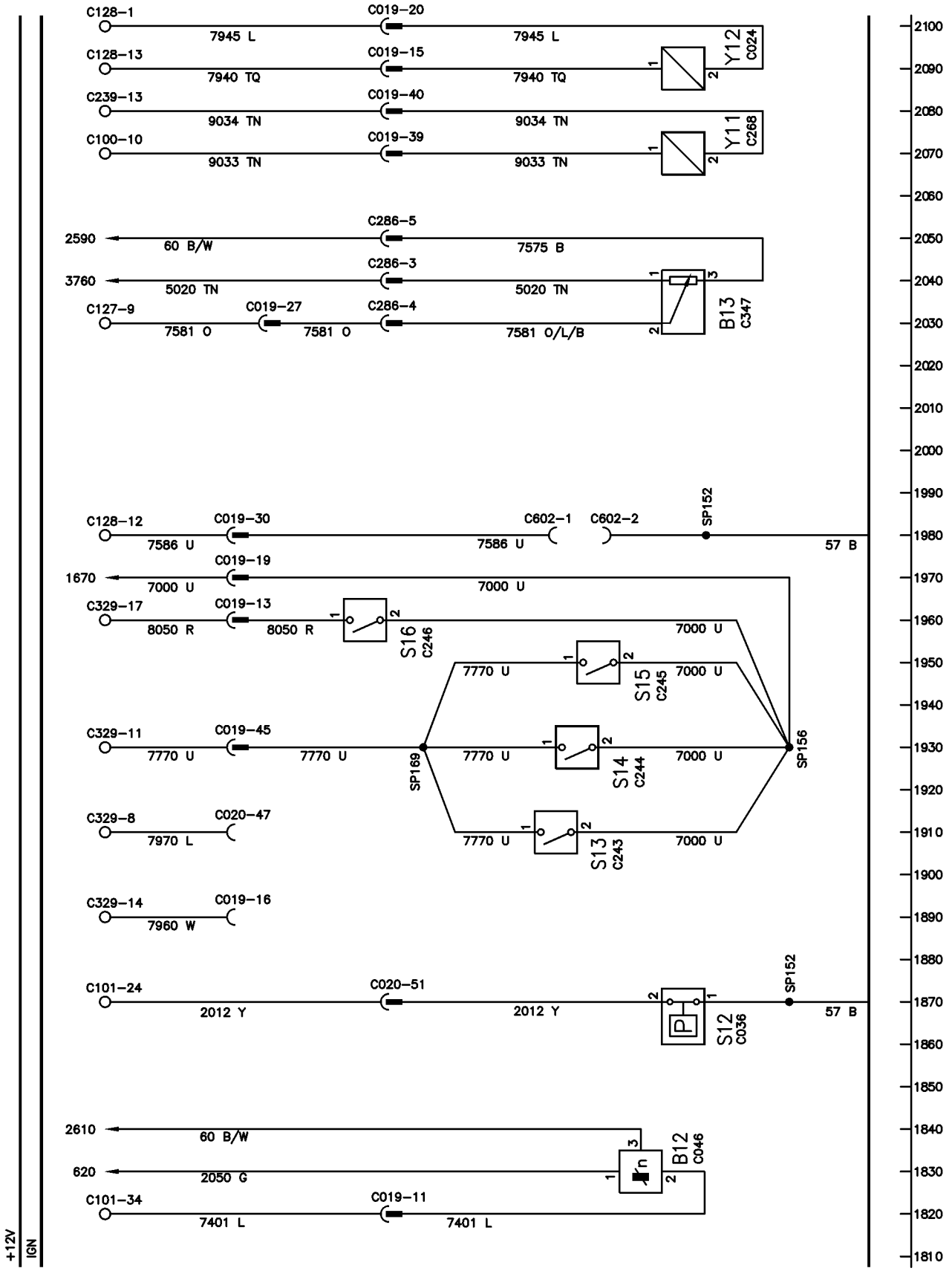
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 1810-2100

Line number	Compo-nent	Connector	Designation
1830	B12	**C046**	DRIVING SPEED SENSOR
1870	S12	**C036**	GEARBOX OIL PRESSURE SWITCH
1910	S13	**C243**	FULL POWER SHIFT PRESSURE SWITCH GEAR GROUP H
1930	S14	**C244**	FULL POWER SHIFT PRESSURE SWITCH GEAR GROUP M
1950	S15	**C245**	FULL POWER SHIFT PRESSURE SWITCH GEAR GROUP L
1960	S16	**C246**	FULL POWER SHIFT PRESSURE SWITCH RW GEAR GROUP
2030	B13	**C347**	CREEP SPEED GEAR POTENTIOMETER
2070	Y11	**C268**	FULL POWER SHIFT MV 19th GEAR
2090	Y12	**C024**	SOLENOID VALVE CLUTCH E

NOTE: *Supplementary connector* ***C019, C020, C100, C101, C127, C128, C239, C286, C329, C602****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C128-1
C019-20
7945 L
7945 L
Y12 C024
C128-13
C019-15
7940 TQ
7940 TQ
C239-13
C019-40
9034 TN
9034 TN
Y11 C268
C100-10
C019-39
9033 TN
9033 TN
C286-5
2590
60 B/W
7575 B
C286-3
3760
5020 TN
5020 TN
C127-9
C019-27
C286-4
7581 O
7581 O
7581 O/L/B
B13 C347
C128-12
C019-30
C602-1
C602-2
SP152
7586 U
7586 U
57 B
C019-19
1670
7000 U
7000 U
C329-17
C019-13
8050 R
8050 R
S16 C246
7000 U
7770 U
S15 C245
7000 U
C329-11
C019-45
7770 U
7770 U
SP169
7770 U
S14 C244
7000 U
SP156
C329-8
C020-47
7970 L
7770 U
S13 C243
7000 U
C329-14
C019-16
7960 W
C101-24
C020-51
SP152
2012 Y
2012 Y
S12 C036
57 B
2610
60 B/W
620
2050 G
B12 C046
C101-34
C019-11
7401 L
7401 L
+12V
IGN
2100
2090
2080
2070
2060
2050
2040
2030
2020
2010
2000
1990
1980
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1960
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1930
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1810

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Wiring harness - Electrical schematic frame 08 Gearbox (3)

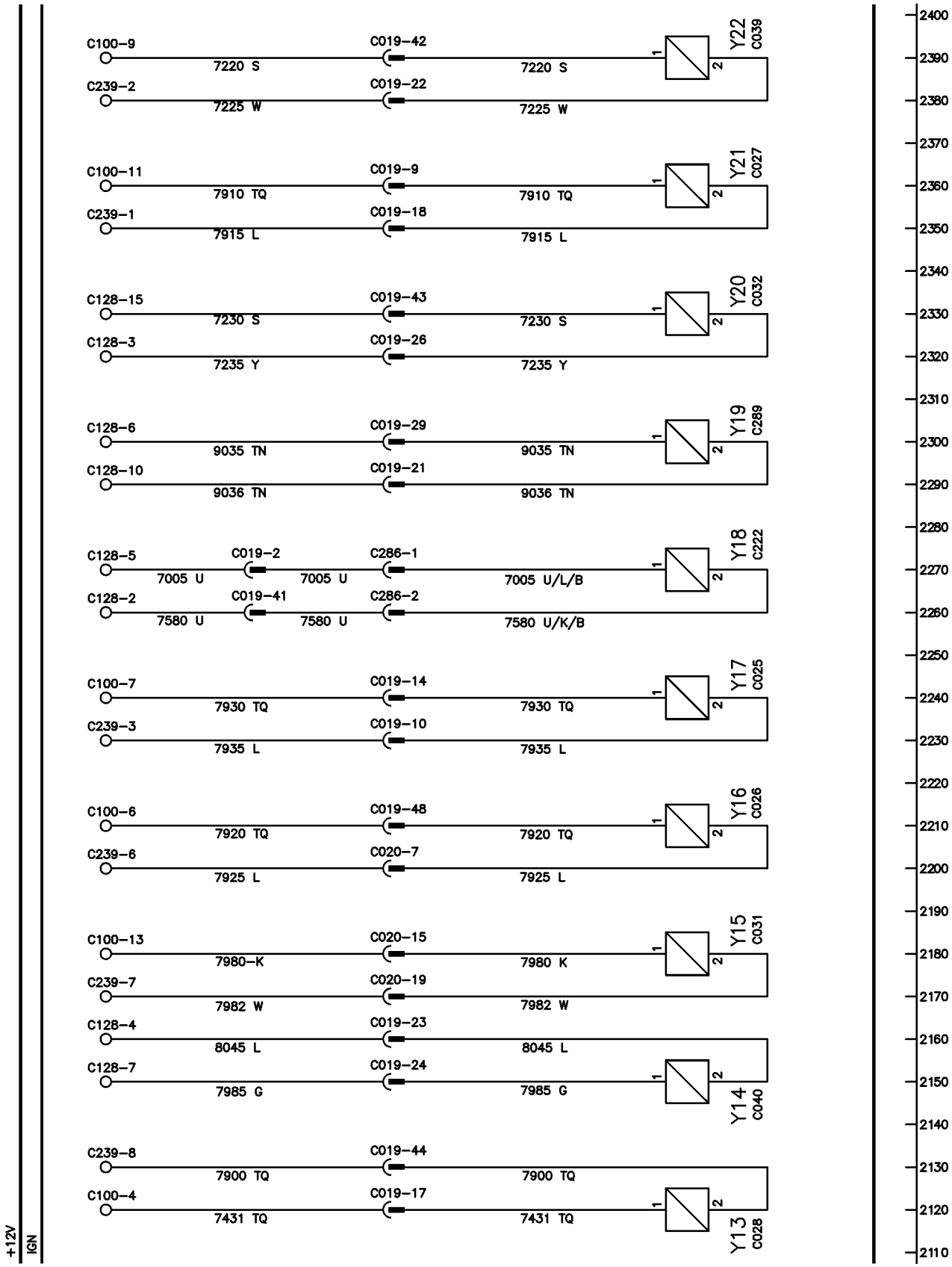
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 2110-2400

Line number	Compo-nent	Connector	Designation
2120	Y13	**C028**	SOLENOID VALVE CLUTCH A
2150	Y14	**C040**	SOLENOID VALVE RW-GEAR GROUP
2180	Y15	**C031**	SOLENOID VALVE GEAR GROUP M
2210	Y16	**C026**	SOLENOID VALVE CLUTCH C
2240	Y17	**C025**	SOLENOID VALVE CLUTCH D
2270	Y18	**C222**	SOLENOID VALVE CREEP GROUP
2300	Y19	**C289**	RELIEF SOLENOID VALVE 19th GEAR
2330	Y20	**C032**	SOLENOID VALVE GEAR GROUP L
2360	Y21	**C027**	SOLENOID VALVE CLUTCH B
2390	Y22	**C039**	SOLENOID VALVE GEAR GROUP H

NOTE: *Supplementary connector* ***C019****,* ***C020****,* ***C100****,* ***C128****,* ***C239****,* ***C286****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C100-9
7220 S
C019-42
7220 S
C239-2
7225 W
C019-22
7225 W
Y22 C039
C100-11
7910 TQ
C019-9
7910 TQ
C239-1
7915 L
C019-18
7915 L
Y21 C027
C128-15
7230 S
C019-43
7230 S
C128-3
7235 Y
C019-26
7235 Y
Y20 C032
C128-6
9035 TN
C019-29
9035 TN
C128-10
9036 TN
C019-21
9036 TN
Y19 C289
C128-5
7005 U
C019-2
7005 U
C286-1
7005 U/L/B
C128-2
7580 U
C019-41
7580 U
C286-2
7580 U/K/B
Y18 C222
C100-7
7930 TQ
C019-14
7930 TQ
C239-3
7935 L
C019-10
7935 L
Y17 C025
C100-6
7920 TQ
C019-48
7920 TQ
C239-6
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C020-7
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Y16 C026
C100-13
7980-K
C020-15
7980 K
C239-7
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C020-19
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C019-23
8045 L
C128-7
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C019-24
7985 G
Y14 C040
C239-8
7900 TQ
C019-44
7900 TQ
C100-4
7431 TQ
C019-17
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2300
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2270
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2110

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Wiring harness - Electrical schematic frame 09 Gearbox (4)

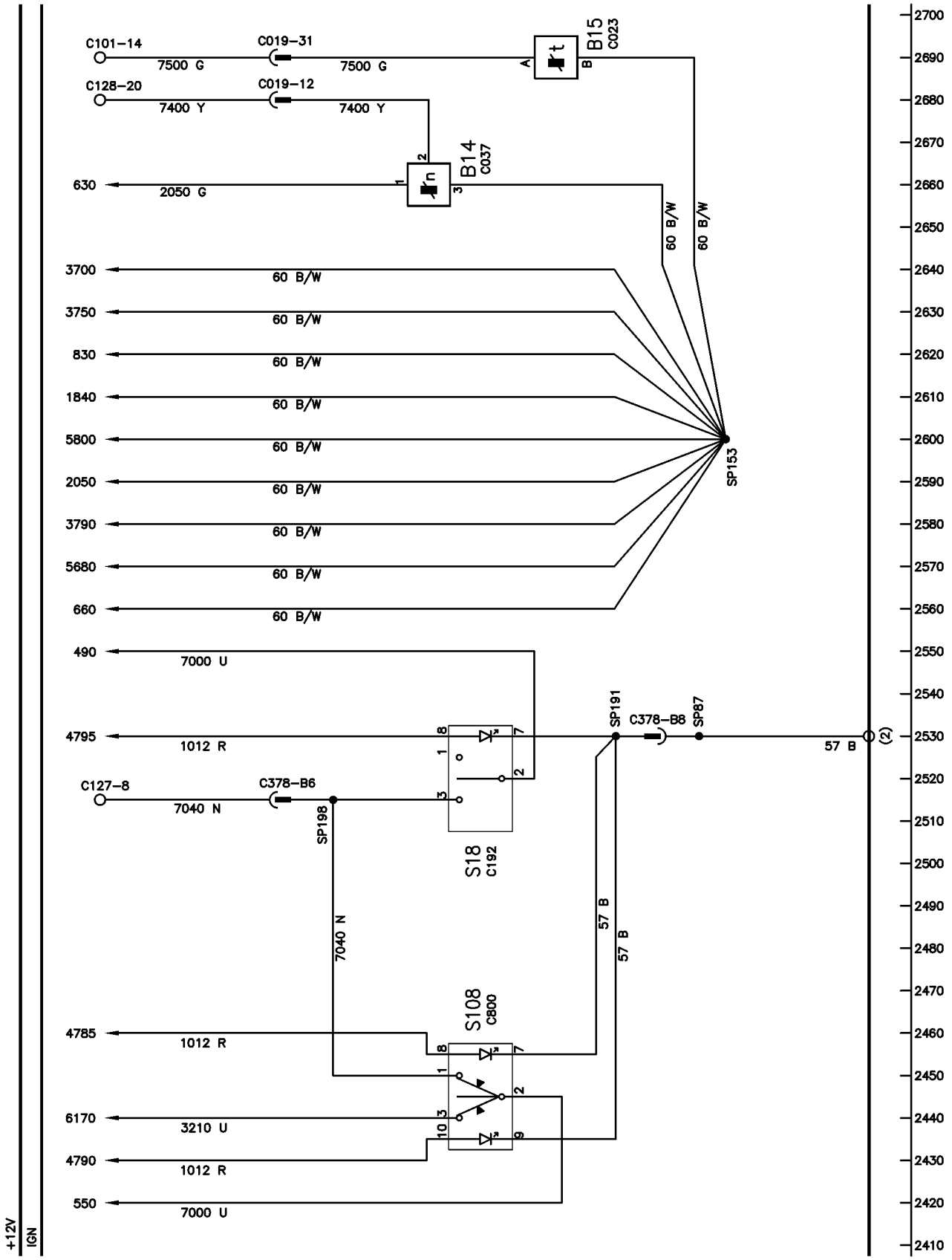
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 2410-2700

Line number	Compo-nent	Connector	Designation
2440	S108	**C800**	CREEP SPEED / ACTIVE SUSPENSION FRONT AXLE
2520	S18	**C192**	CREEP SPEED SWITCH
2660	B14	**C037**	INTERMEDIATE SHAFT SPEED SENSOR
2690	B15	**C023**	GEARBOX OIL TEMPERATURE TRANSMITTER

NOTE: *Supplementary connector* ***C019****,* ***C101****,* ***C127****,* ***C128****,* ***C378****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C101-14
7500 G
C019-31
7500 G
B15
C023
C128-20
7400 Y
C019-12
7400 Y
B14
C037
630
2050 G
60 B/W
SP153
3700
3750
830
1840
5800
2050
3790
5680
660
490
7000 U
4795
1012 R
SP191
C378-B8
SP87
57 B
(2)
C127-8
7040 N
C378-B6
SP198
S18
C192
7040 N
57 B
S108
C800
4785
6170
3210 U
4790
550
+12V
IGN
2700
2690
2680
2670
2660
2650
2640
2630
2620
2610
2600
2590
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Wiring harness - Electrical schematic frame 10 Armrest controller

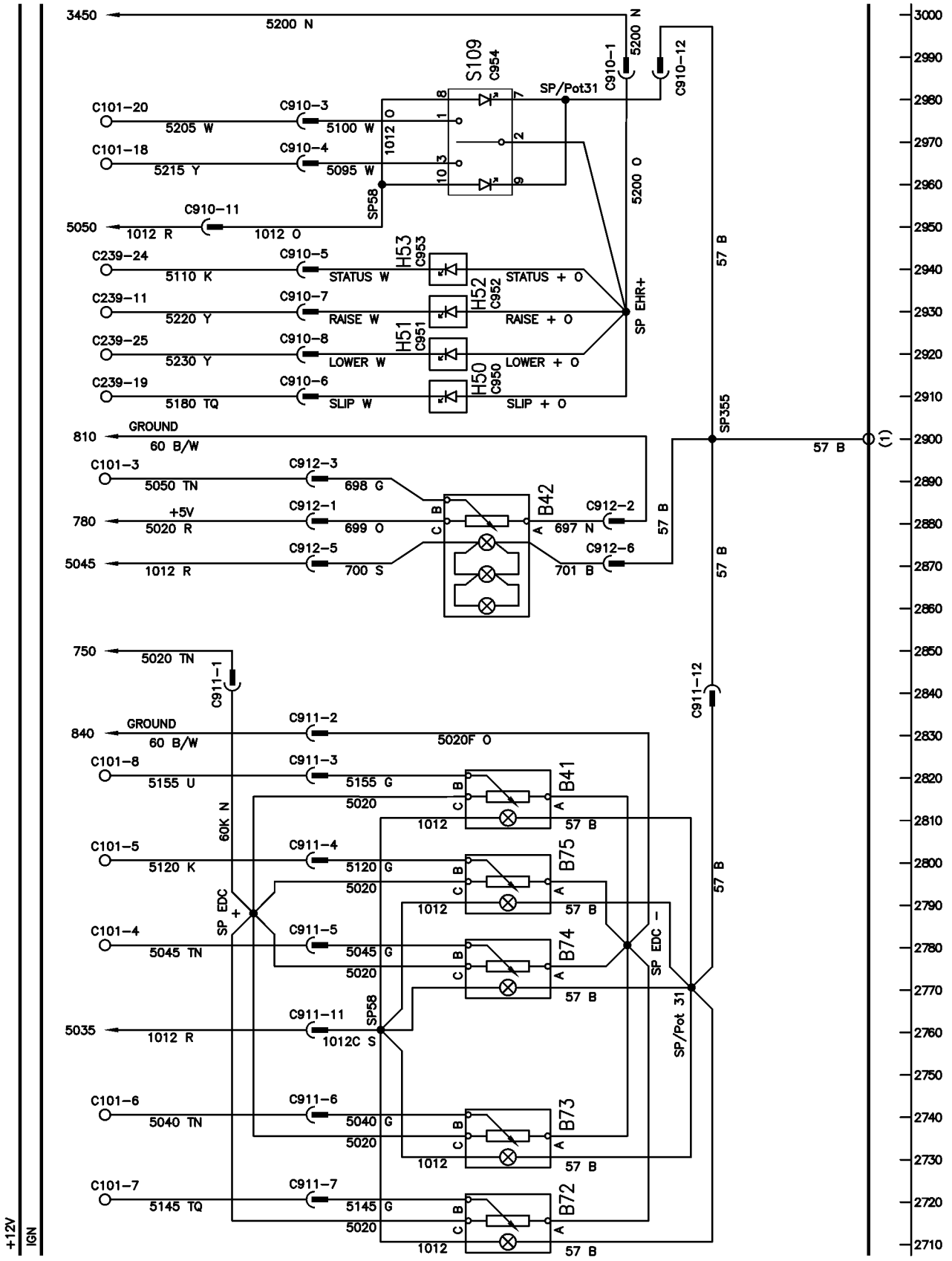
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 2710-3000

Line number	Compo-nent	Connector	Designation
2715	B72		SLIP LIMITING POTENTIOMETER
2735	B73		EDC - TRACTION SENSITIVITY POTENTIOMETER
2775	B74		LOWER SPEED POTENTIOMETER
2795	B75		LIFT LIMITING POTENTIOMETER
2815	B41		TRACTION POTENTIOMETER
2870	B42		EDC POSITION POTENTIOMETER
2910	H50	**C950**	EDC - SLIP CONTROL
2920	H51	**C951**	EDC - LOWER CONTROL
2930	H52	**C952**	EDC - RAISE CONTROL
2940	H53	**C953**	EDC - DIAGNOSTICS
2970	S109	**C954**	INTERNALLY OPERATED HITCH PUSHBUTTON

NOTE: *Supplementary connector* ***C101****,* ***C239****,* ***C910****,* ***C911****,* ***C912****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


3450
5200 N
S109
C954
C910-1
5200 N
C910-12
SP/Pot31
C101-20
C910-3
5205 W
5100 W
1012 O
C101-18
C910-4
5215 Y
5095 W
SP58
5200 O
C910-11
5050
1012 R
1012 O
H53
C953
C239-24
C910-5
5110 K
STATUS W
STATUS + O
H52
C952
C239-11
C910-7
5220 Y
RAISE W
RAISE + O
H51
C951
C239-25
C910-8
5230 Y
LOWER W
LOWER + O
H50
C950
C239-19
C910-6
5180 TQ
SLIP W
SLIP + O
SP EHR+
57 B
SP355
(1)
810
GROUND
60 B/W
C101-3
C912-3
5050 TN
698 G
780
+5V
5020 R
C912-1
699 O
B42
C912-2
697 N
5045
1012 R
C912-5
700 S
C912-6
701 B
750
5020 TN
C911-1
C911-12
840
GROUND
60 B/W
C911-2
5020F O
C101-8
C911-3
5155 U
5155 G
5020
1012
B41
60K N
C101-5
C911-4
5120 K
5120 G
B75
SP EDC +
C101-4
C911-5
5045 TN
5045 G
B74
SP EDC -
SP58
5035
1012 R
C911-11
1012C S
SP/Pot 31
C101-6
C911-6
5040 TN
5040 G
B73
C101-7
C911-7
5145 TQ
5145 G
B72
+12V
IGN
3000
2990
2980
2970
2960
2950
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2710

SS07F010 1

Wiring harness - Electrical schematic frame 11 Electronic-hydraulic hitch control / hydraulics (1)

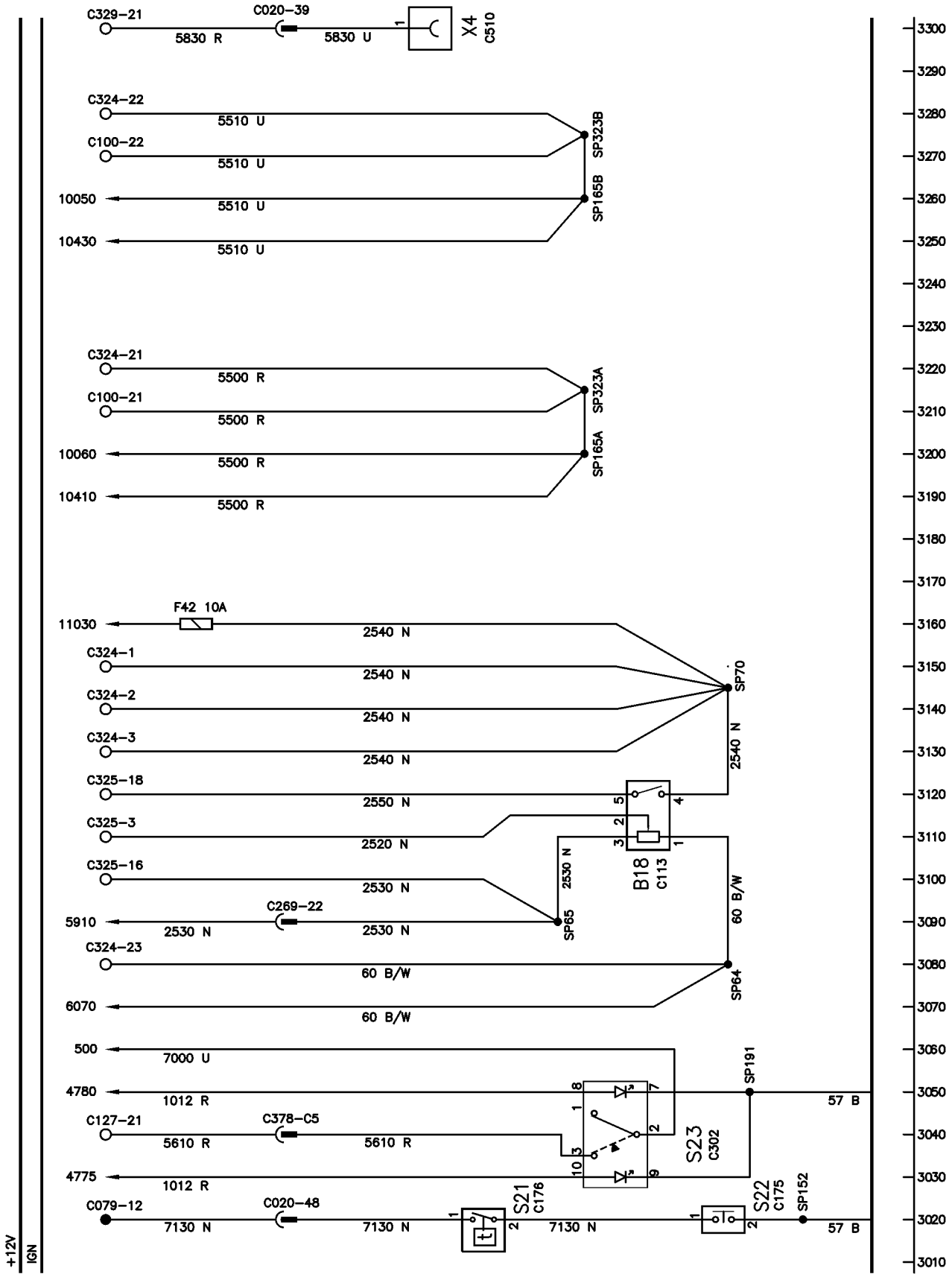
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 3010-3300

Line number	Compo-nent	Connector	Designation
3020	S21	**C176**	HYDRAULIC OIL TEMPERATURE SWITCH
3020	S22	**C175**	HYDRAULIC OIL FILTER MAINTENANCE SWITCH
3040	S23	**C302**	HEADLAND MANAGEMENT RECORDING SWITCH
3110	B18	**C113**	FRONT HITCH POTENTIOMETER
3160	F42 -10A		FUSE - FRONT AXLE SUSPENSION / FRONT HITCH POTENTIOMETER
3300	X4	**C510**	HI-FLOW OIL PUMPS CONNECTOR - CIRCUIT 5830

NOTE: *Supplementary connector* ***C020****,* ***C079****,* ***C100****,* ***C127****,* ***C269****,* ***C324****,* ***C325****,* ***C329****,* ***C378****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C329-21
C020-39
5830 R
5830 U
X4
C510
C324-22
5510 U
C100-22
5510 U
10050
5510 U
10430
5510 U
SP323B
SP165B
C324-21
5500 R
C100-21
5500 R
10060
5500 R
10410
5500 R
SP323A
SP165A
F42 10A
11030
2540 N
C324-1
2540 N
C324-2
2540 N
C324-3
2540 N
SP70
2540 N
C325-18
2550 N
C325-3
2520 N
C325-16
2530 N
2530 N
B18
C113
C269-22
5910
2530 N
2530 N
SP65
C324-23
60 B/W
6070
60 B/W
SP64
60 B/W
500
7000 U
4780
1012 R
SP191
57 B
C127-21
C378-C5
5610 R
5610 R
S23
C302
4775
1012 R
C079-12
C020-48
7130 N
7130 N
S21
C176
7130 N
S22
C175
SP152
57 B
+12V
IGN
3300
3290
3280
3270
3260
3250
3240
3230
3220
3210
3200
3190
3180
3170
3160
3150
3140
3130
3120
3110
3100
3090
3080
3070
3060
3050
3040
3030
3020
3010

SS07F011 1

Wiring harness - Electrical schematic frame 12 Electronic-hydraulic hitch control / hydraulics (2)

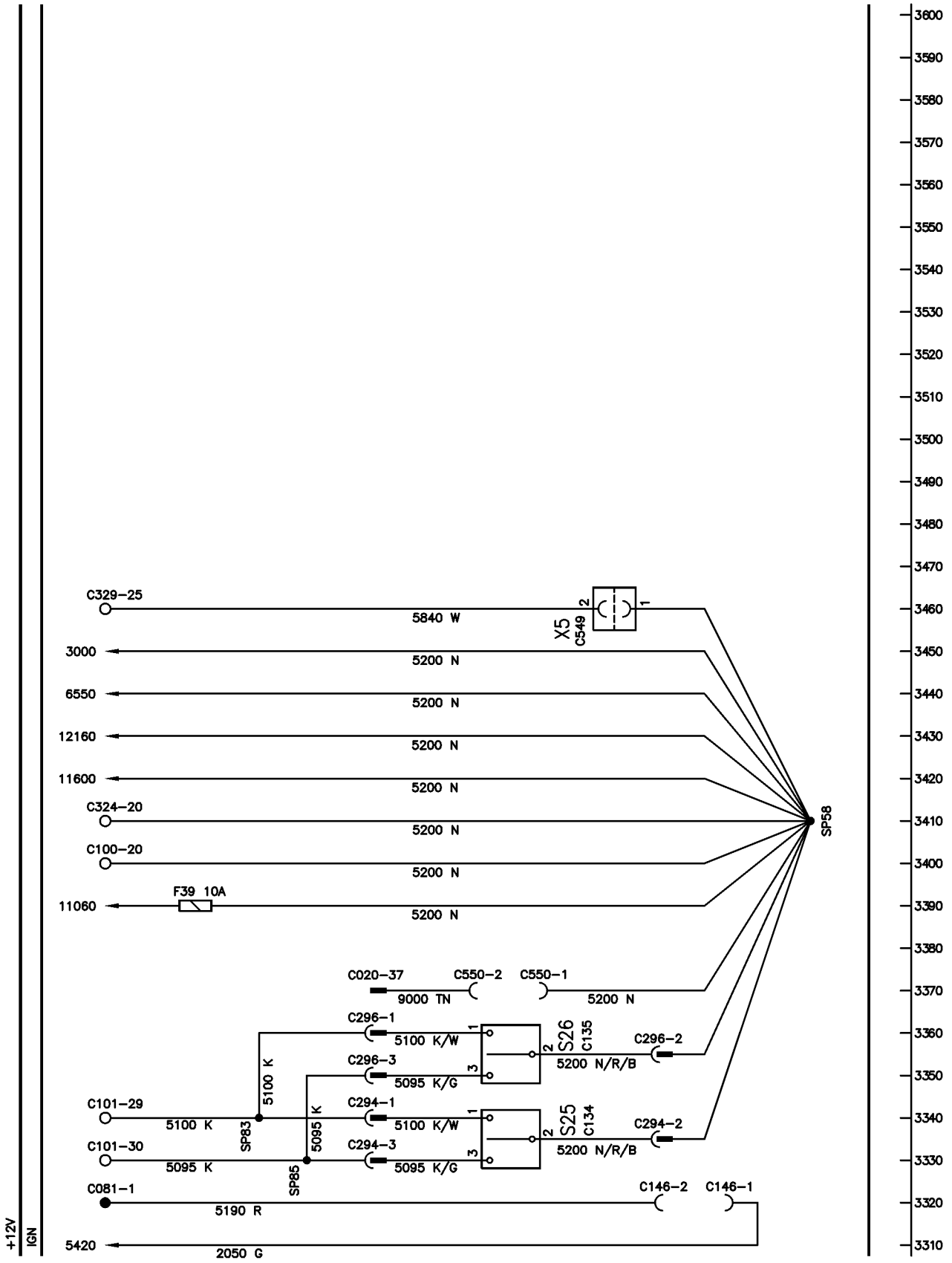
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 3310-3600

Line number	Compo-nent	Connector	Designation
3335	S25	**C134**	EXTERNAL HITCH SWITCH RIGHT SIDE
3355	S26	**C135**	EXTERNAL HITCH SWITCH LEFT SIDE
3390	F39 -10A		FUSE - HITCH, ARMREST, EDC, FAST STEER
3460	X5	**C549**	FRONT HITCH DETECT SIGNAL

NOTE: *Supplementary connector* ***C020****,* ***C081****,* ***C100****,* ***C101****,* ***C146****,* ***C294****,* ***C296****,* ***C324****,* ***C329****,* ***C550****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C329-25
5840 W
X5
C549
2
1
3000
5200 N
6550
5200 N
12160
5200 N
11600
5200 N
C324-20
5200 N
C100-20
5200 N
F39 10A
11060
5200 N
SP58
C020-37
9000 TN
C550-2
C550-1
5200 N
C296-1
5100 K/W
C296-3
5095 K/G
S26
C135
C296-2
5200 N/R/B
5100 K
C101-29
5100 K
SP83
C294-1
5100 K/W
C101-30
5095 K
SP85
5095 K
C294-3
5095 K/G
S25
C134
C294-2
5200 N/R/B
C081-1
5190 R
C146-2
C146-1
5420
2050 G
3600
3590
3580
3570
3560
3550
3540
3530
3520
3510
3500
3490
3480
3470
3460
3450
3440
3430
3420
3410
3400
3390
3380
3370
3360
3350
3340
3330
3320
3310

SS07F012 1

Wiring harness - Electrical schematic frame 13 Electronic-hydraulic hitch control / hydraulics (3)

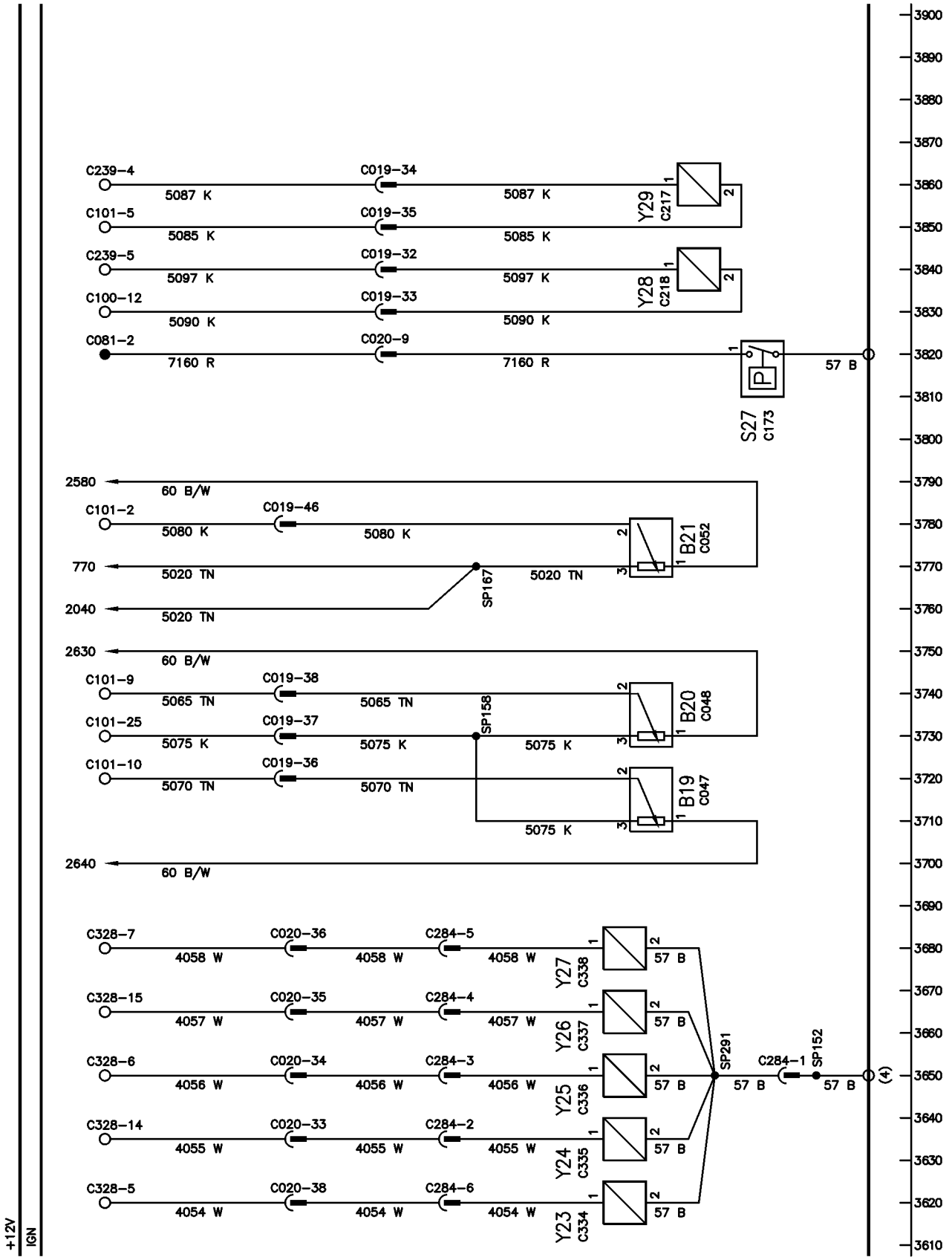
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 3610-3900

Line number	Compo-nent	Connector	Designation
3620	Y23	**C334**	EXTEND TOP A
3635	Y24	**C335**	RETRACT TOP B
3650	Y25	**C336**	EXTEND SIDE C
3665	Y26	**C337**	RETRACT SIDE D
3680	Y27	**C338**	SAFETY VALVE - LIFT RODS OIL CIRCUIT
3710	B19	**C047**	LOAD CELL BOLT L
3730	B20	**C048**	LOAD CELL BOLT R
3770	B21	**C052**	LIFT SHAFT POTENTIOMETER
3820	S27	**C173**	FEED PRESSURE SWITCH S2
3840	Y28	**C218**	EDC LOWER SOLENOID VALVE
3860	Y29	**C217**	EDC RAISE SOLENOID VALVE

NOTE: *Supplementary connector* ***C019****,* ***C020****,* ***C081****,* ***C100****,* ***C101****,* ***C239****,* ***C284****,* ***C328****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C239-4
5087 K
C019-34
5087 K
C101-5
5085 K
C019-35
5085 K
C239-5
5097 K
C019-32
5097 K
C100-12
5090 K
C019-33
5090 K
C081-2
7160 R
C020-9
7160 R
Y29 C217
Y28 C218
S27 C173
57 B
2580
60 B/W
C101-2
5080 K
C019-46
5080 K
B21 C052
770
5020 TN
2040
5020 TN
SP167
2630
C101-9
5065 TN
C019-38
5065 TN
C101-25
5075 K
C019-37
5075 K
C101-10
5070 TN
C019-36
5070 TN
SP158
B20 C048
B19 C047
2640
C328-7
4058 W
C020-36
C284-5
C328-15
4057 W
C020-35
C284-4
C328-6
4056 W
C020-34
C284-3
C328-14
4055 W
C020-33
C284-2
C328-5
4054 W
C020-38
C284-6
Y27 C338
Y26 C337
Y25 C336
Y24 C335
Y23 C334
SP291
C284-1
SP152
(4)
3900
3890
3880
3870
3860
3850
3840
3830
3820
3810
3800
3790
3780
3770
3760
3750
3740
3730
3720
3710
3700
3690
3680
3670
3660
3650
3640
3630
3620
3610

SS07F013 1

Wiring harness - Electrical schematic frame 14 Electrohydraulically operated supplementary controllers / hydraulics (1)

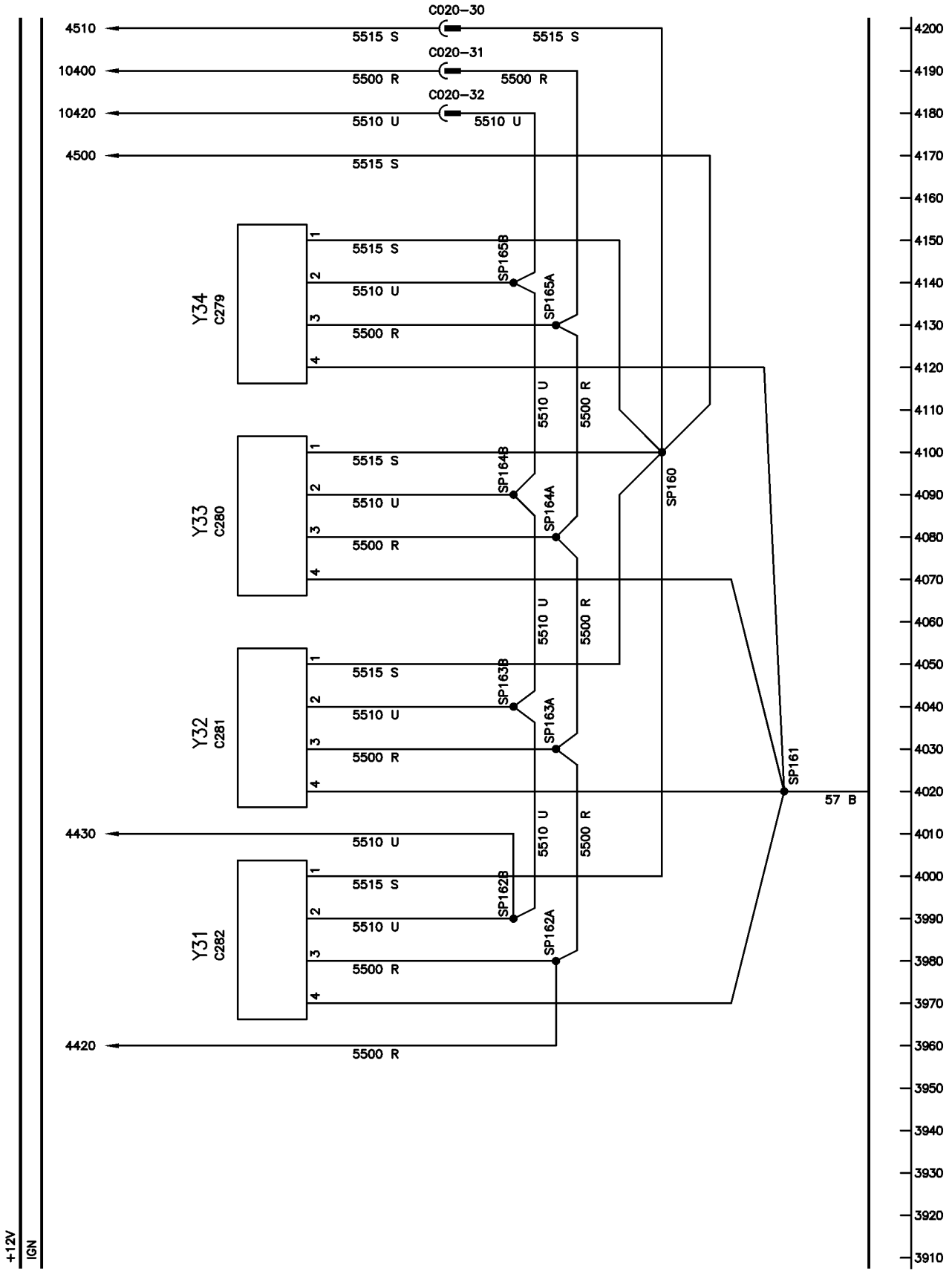
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 3910-4200

Line number	Compo-nent	Connector	Designation
3980	Y31	**C282**	ELECTROHYDR. SUPP. CONN. CONNECTOR 4
4030	Y32	**C281**	ELECTROHYDR. SUPP. CONN. CONNECTOR 3
4080	Y33	**C280**	ELECTROHYDR. SUPP. CONN. CONNECTOR 2
4130	Y34	**C279**	ELECTROHYDR. SUPP. CONN. CONNECTOR 1

NOTE: *Supplementary connector* ***C020****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
4510
5515 S
C020-30
5515 S
10400
5500 R
C020-31
5500 R
10420
5510 U
C020-32
5510 U
4500
5515 S
Y34
C279
1
2
3
4
5515 S
5510 U
5500 R
SP165B
SP165A
Y33
C280
SP164B
SP164A
Y32
C281
SP163B
SP163A
Y31
C282
SP162B
SP162A
5510 U
5500 R
SP160
SP161
57 B
4430
5510 U
4420
5500 R
4200
4190
4180
4170
4160
4150
4140
4130
4120
4110
4100
4090
4080
4070
4060
4050
4040
4030
4020
4010
4000
3990
3980
3970
3960
3950
3940
3930
3920
3910

SS07F014 1

Wiring harness - Electrical schematic frame 15 Electrohydraulically operated supplementary controllers / hydraulics (2)

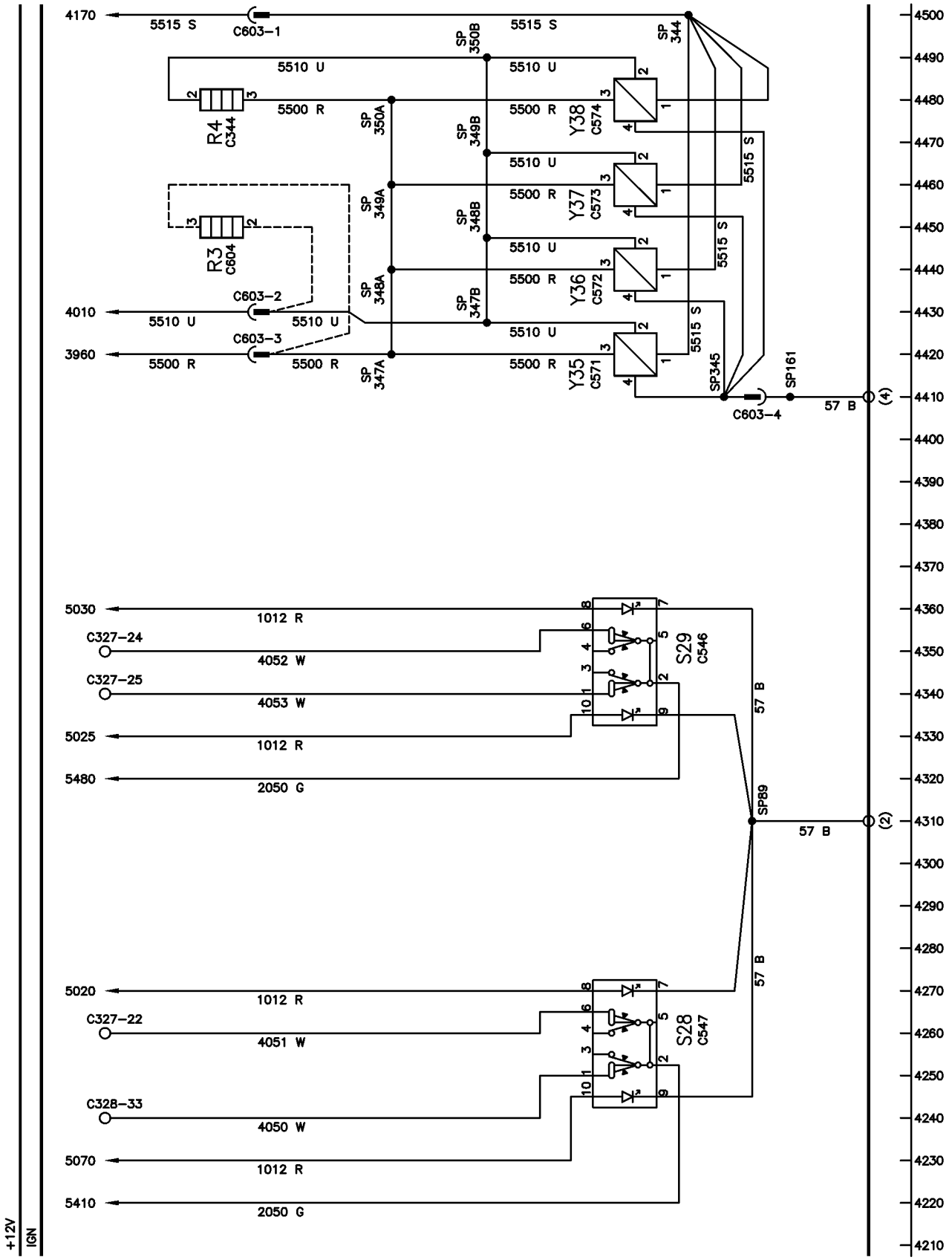
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 4210-4500

Line number	Compo-nent	Connector	Designation
4260	S28	**C547**	TOP LINK SWITCH
4350	S29	**C546**	LIFT RODS SWITCH
4420	Y35	**C571**	ELECTROHYDR. SUPP. CONN. 7
4440	Y36	**C572**	ELECTROHYDR. SUPP. CON. 8
4450	R3	**C604**	TERMINATING RESISTOR CAN-BUS EDC
4460	Y37	**C573**	ELECTROHYDR. SUPP. CON. 9
4480	R4	**C344**	TERMINATING RESISTOR CAN-BUS EDC WITH MID MOUNTS
4480	Y38	**C574**	ELECTROHYDR. SUPP. CON. 10

NOTE: *Supplementary connector* ***C327****,* ***C328****,* ***C603****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


4170
5515 S
C603–1
SP 350B
5515 S
SP 344
5510 U
5510 U
5500 R
5500 R
R4 C344
SP 350A
SP 349B
Y38 C574
5515 S
SP 349A
SP 348B
Y37 C573
R3 C604
5515 S
SP 348A
SP 347B
Y36 C572
C603–2
4010
5510 U
5510 U
5515 S
C603–3
3960
5500 R
5500 R
SP 347A
Y35 C571
SP345
SP161
C603–4
57 B
(4)
4500
4490
4480
4470
4460
4450
4440
4430
4420
4410
4400
4390
4380
4370
4360
4350
4340
4330
4320
4310
4300
4290
4280
4270
4260
4250
4240
4230
4220
4210
5030
1012 R
C327–24
4052 W
C327–25
4053 W
5025
1012 R
5480
2050 G
S29 C546
57 B
SP89
57 B
(2)
5020
1012 R
C327–22
4051 W
C328–33
4050 W
5070
1012 R
5410
2050 G
S28 C547
57 B
+12V
IGN

SS07F015 1

Wiring harness - Electrical schematic frame 16 Electrohydraulically operated supplementary controllers / hydraulics (3)

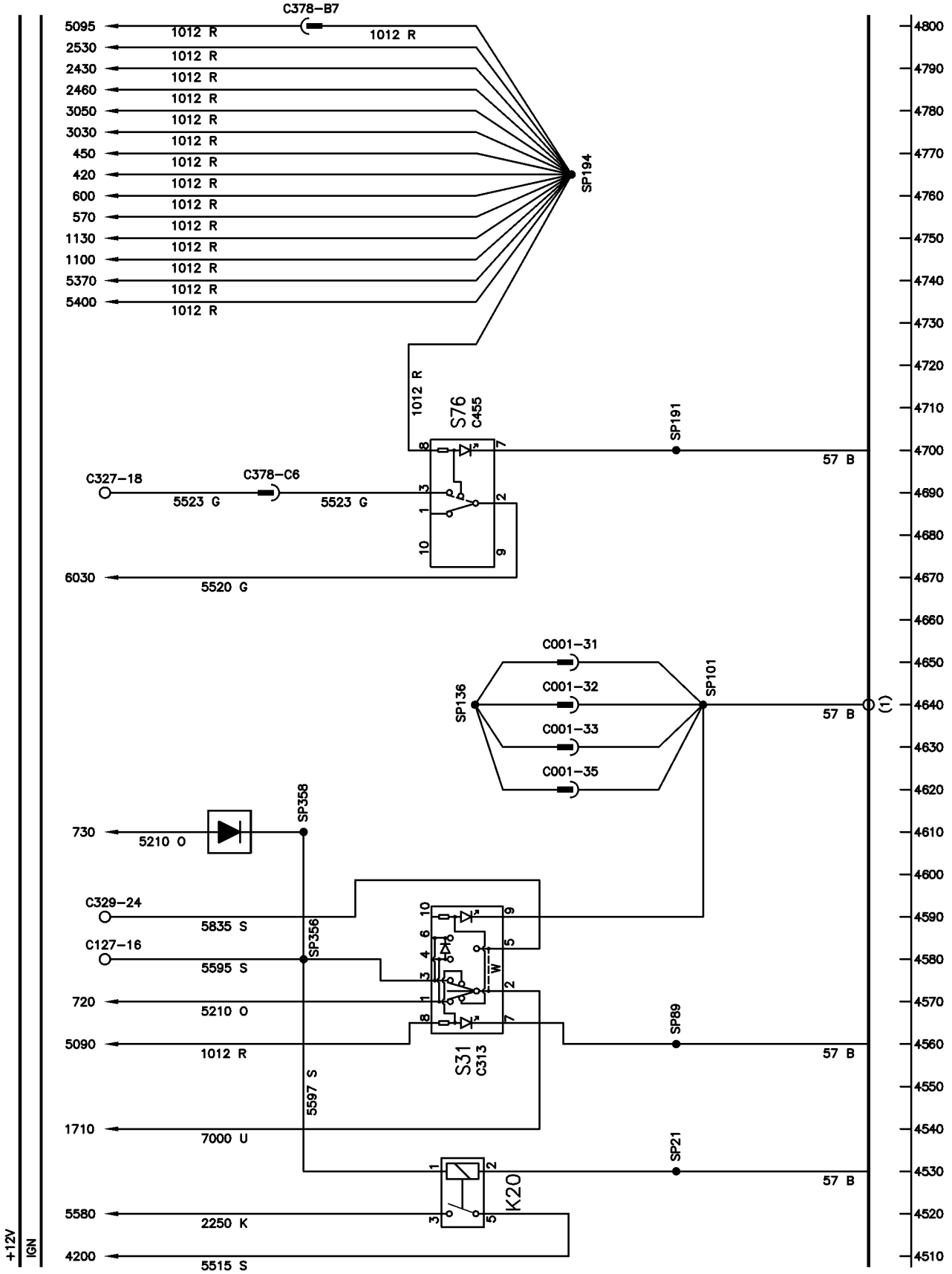
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 4510-4800

Line number	Compo-nent	Connector	Designation
4530	K20		SUPPLY RELAY - ELECTROHYDR. SUPP. CONN.
4580	S31	**C313**	HYDRAULIC MASTER (ELECTROHYDR. SUPP. CONN. OFF SWITCH)
4690	S76	**C455**	OIL MOTOR OPERATION SWITCH

NOTE: *Supplementary connector* ***C001****,* ***C127****,* ***C327****,* ***C329****,* ***C378****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C378-B7
5095
1012 R
1012 R
2530
1012 R
2430
1012 R
2460
1012 R
3050
1012 R
3030
1012 R
450
1012 R
420
1012 R
600
1012 R
570
1012 R
1130
1012 R
1100
1012 R
5370
1012 R
5400
1012 R
SP194
1012 R
S76
C455
SP191
57 B
C327-18
C378-C6
5523 G
5523 G
6030
5520 G
C001-31
C001-32
C001-33
C001-35
SP136
SP101
57 B
(1)
SP358
730
5210 O
C329-24
5835 S
SP356
C127-16
5595 S
720
5210 O
5090
1012 R
S31
C313
SP89
57 B
5597 S
1710
7000 U
SP21
57 B
K20
5580
2250 K
4200
5515 S
+12V
IGN
4800
4790
4780
4770
4760
4750
4740
4730
4720
4710
4700
4690
4680
4670
4660
4650
4640
4630
4620
4610
4600
4590
4580
4570
4560
4550
4540
4530
4520
4510

SS07F016 1

Wiring harness - Electrical schematic frame 17 Electrohydraulically operated supplementary controllers / hydraulics (4)

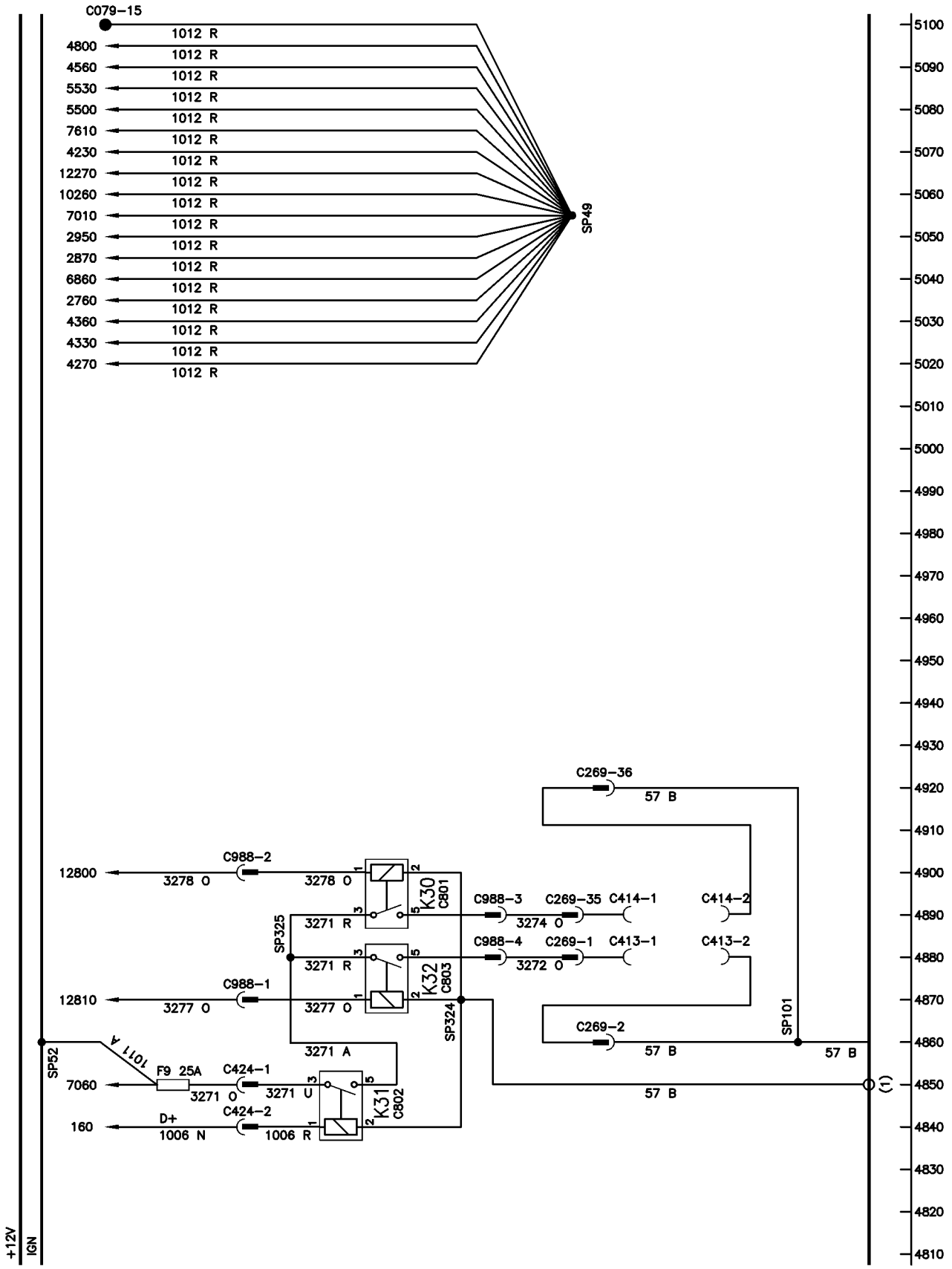
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 4810-5100

Line number	Compo-nent	Connector	Designation
4840	K31	**C802**	RELAY FRONT LOADER D+
4850	F9 -25A		FUSE - FRONT LOADER
4870	K32	**C803**	RELAY FRONT LOADER SOLENOID VALVE 2
4890	K30	**C801**	RELAY FRONT LOADER SOLENOID VALVE 1

NOTE: *Supplementary connector* ***C079****,* ***C269****,* ***C413****,* ***C414****,* ***C424****,* ***C988****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C079-15
1012 R
4800
4560
5530
5500
7610
4230
12270
10260
7010
2950
2870
6860
2760
4360
4330
4270
SP49
5100
5090
5080
5070
5060
5050
5040
5030
5020
5010
5000
4990
4980
4970
4960
4950
4940
4930
4920
4910
4900
4890
4880
4870
4860
4850
4840
4830
4820
4810
C269-36
57 B
C988-2
12800
3278 O
K30
C801
C988-3
C269-35
C414-1
C414-2
3274 O
SP325
3271 R
C988-4
C269-1
C413-1
C413-2
3272 O
K32
C803
C988-1
12810
3277 O
SP324
SP101
C269-2
SP52
1011 A
F9 25A
3271 A
C424-1
7060
3271 O
3271 U
K31
C802
D+
C424-2
160
1006 N
1006 R
(1)
+12V
IGN

SS07F017 1

Wiring harness - Electrical schematic frame 18 All-wheel drive and differential lock

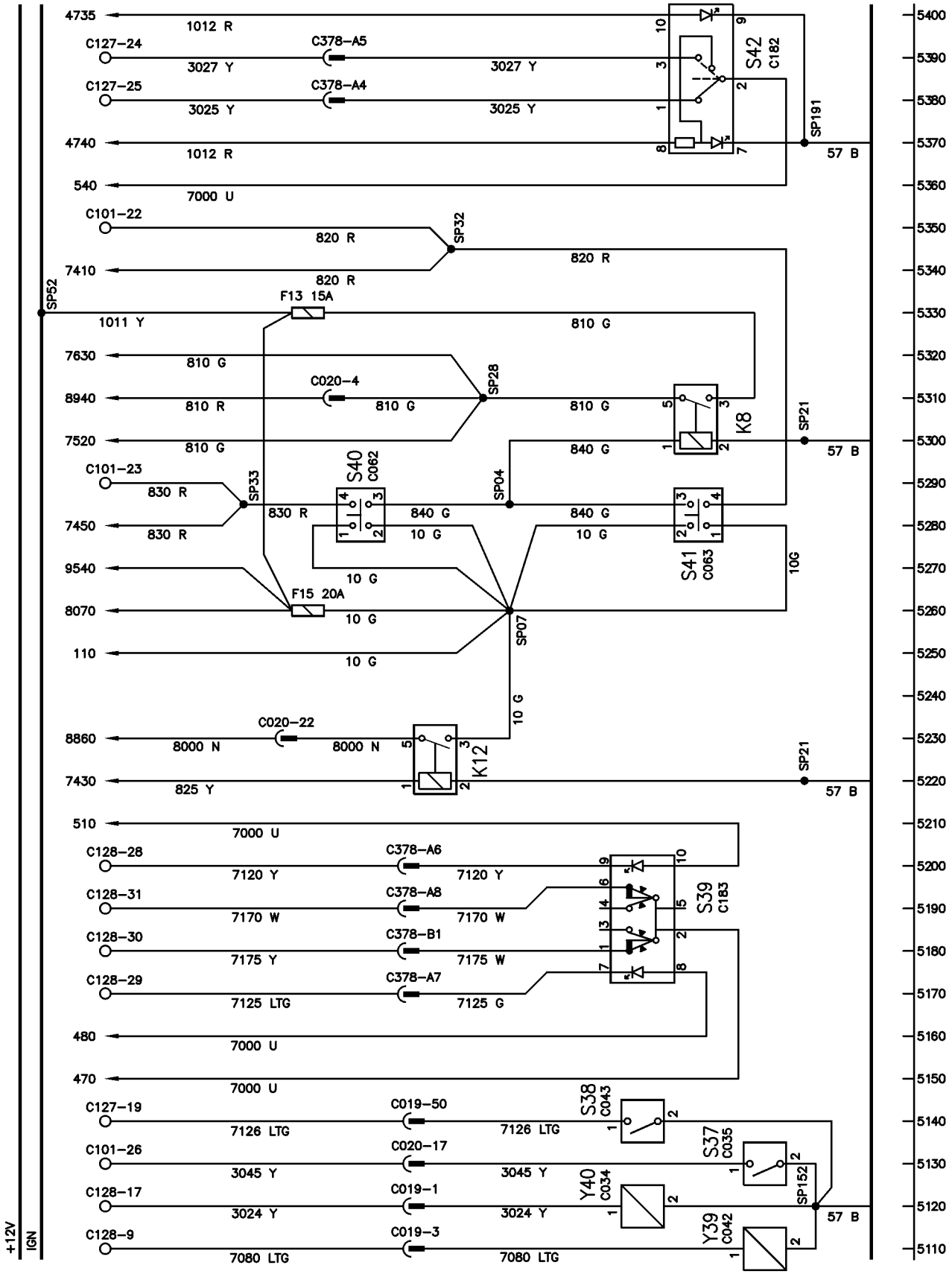
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 5110-5400

Line number	Compo-nent	Connector	Designation
5110	Y39	**C042**	DIFFERENTIAL LOCK SOLENOID VALVE
5120	Y40	**C034**	ALL-WHEEL DRIVE SOLENOID VALVE
5130	S37	**C035**	ALL-WHEEL DRIVE SWITCH
5140	S38	**C043**	DIFF. LOCK SWITCH
5190	S39	**C183**	DIFFERENTIAL LOCK SWITCH
5220	K12		RELAY - COMPRESSED AIR PLANT
5260	F15 -20A		FUSE - BRAKE LIGHT SWITCH, COMPRESSED AIR PLANT RELAY, BRAKE LIGHTS RELAY
5280	S40	**C062**	BRAKE LIGHT SWITCH RIGHT SIDE
5280	S41	**C063**	BRAKE LIGHT SWITCH LEFT SIDE
5300	K8		RELAY - BRAKE LIGHTS
5330	F13 -15A		FUSE - BRAKE LIGHTS RELAY
5380	S42	**C182**	ALL-WHEEL DRIVE SWITCH

NOTE: *Supplementary connector* ***C019****,* ***C020****,* ***C101****,* ***C127****,* ***C128****,* ***C378****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


4735
1012 R
C127-24
3027 Y
C378-A5
3027 Y
C127-25
3025 Y
C378-A4
3025 Y
S42
C182
4740
1012 R
SP191
57 B
540
7000 U
C101-22
820 R
SP32
7410
820 R
820 R
SP52
F13 15A
1011 Y
810 G
7630
810 G
C020-4
8940
810 R
810 G
SP28
810 G
K8
SP21
7520
810 G
840 G
57 B
C101-23
830 R
SP33
S40
C062
SP04
7450
830 R
830 R
840 G
840 G
10 G
10 G
S41
C063
10G
9540
10 G
F15 20A
8070
10 G
SP07
110
10 G
10 G
C020-22
8860
8000 N
8000 N
K12
SP21
7430
825 Y
57 B
510
7000 U
C128-28
7120 Y
C378-A6
7120 Y
C128-31
7170 W
C378-A8
7170 W
S39
C183
C128-30
7175 Y
C378-B1
7175 W
C128-29
7125 LTG
C378-A7
7125 G
480
7000 U
470
7000 U
C127-19
7126 LTG
C019-50
7126 LTG
S38
C043
S37
C035
C101-26
3045 Y
C020-17
3045 Y
C128-17
3024 Y
C019-1
3024 Y
Y40
C034
SP152
57 B
C128-9
7080 LTG
C019-3
7080 LTG
Y39
C042
+12V
IGN
5400
5390
5380
5370
5360
5350
5340
5330
5320
5310
5300
5290
5280
5270
5260
5250
5240
5230
5220
5210
5200
5190
5180
5170
5160
5150
5140
5130
5120
5110

SS07F018 1

Wiring harness - Electrical schematic frame 19 Power take-off (1)

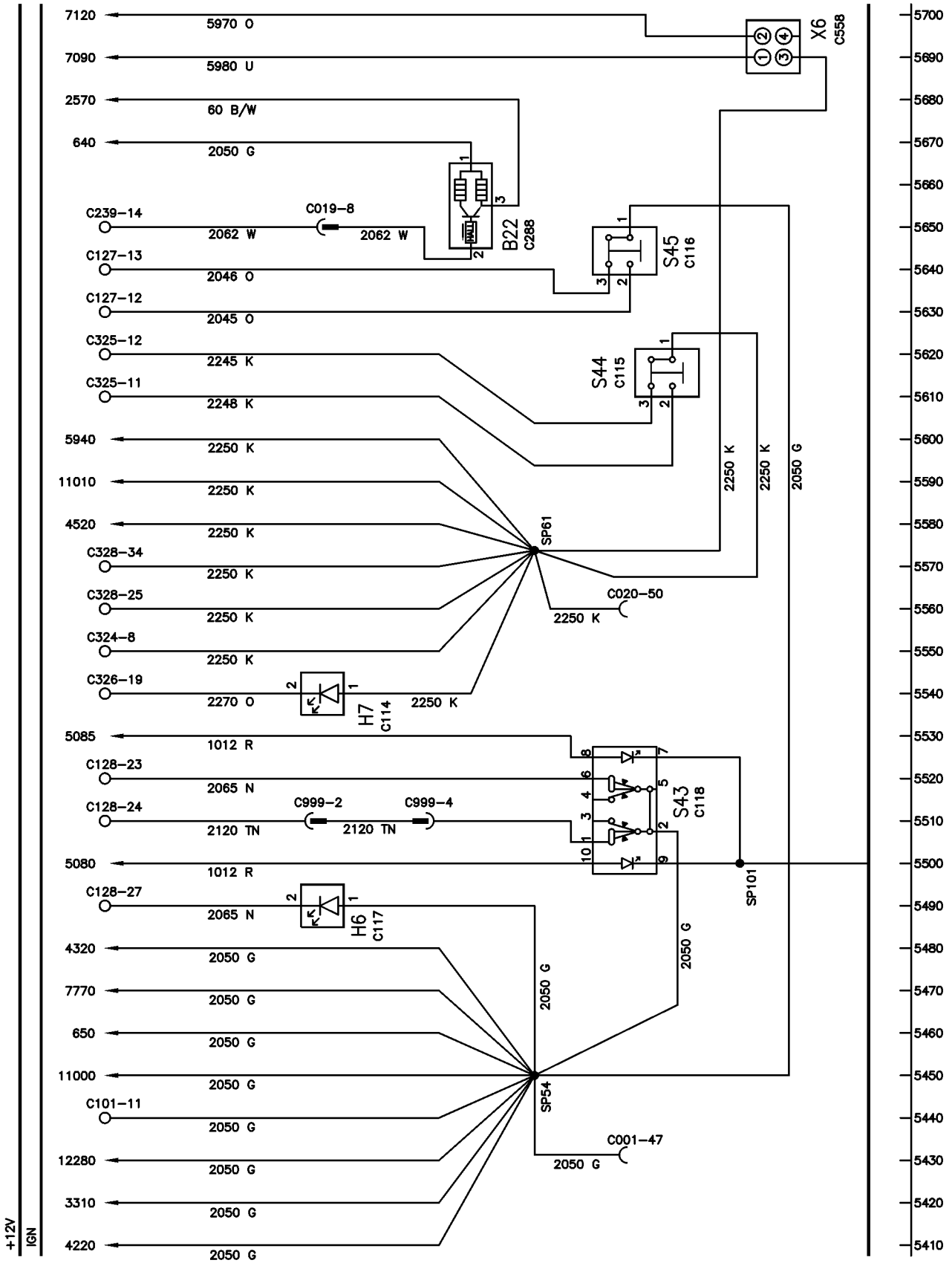
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 5410-5700

Line number	Compo-nent	Connector	Designation
5490	H6	**C117**	REAR POWER TAKE-OFF INDICATOR LIGHT
5510	S43	**C118**	SWITCH AND LIGHT FOR REAR POWER TAKE-OFF BRAKE + MANAGEMENT
5540	H7	**C114**	FRONT POWER TAKE-OFF INDICATOR LIGHT
5615	S44	**C115**	FRONT POWER TAKE-OFF SWITCH
5645	S45	**C116**	REAR POWER TAKE-OFF SWITCH
5650	B22	**C288**	SPEED SENSOR FOR POWER TAKE-OFF SHAFT
5690	X6	**C558**	FRONT SOCKET (OPTION)

NOTE: *Supplementary connector* ***C001***, ***C019***, ***C020***, ***C101***, ***C127***, ***C128***, ***C239***, ***C324***, ***C325***, ***C326***, ***C328***, ***C999***.

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


7120
5970 O
7090
5980 U
2570
60 B/W
640
2050 G
X6
C558
B22
C288
C239-14
2062 W
C019-8
2062 W
C127-13
2046 O
C127-12
2045 O
S45
C116
S44
C115
C325-12
2245 K
C325-11
2248 K
5940
2250 K
11010
2250 K
4520
2250 K
C328-34
2250 K
C328-25
2250 K
C324-8
2250 K
C326-19
2270 O
H7
C114
2250 K
SP61
C020-50
2250 K
2250 K
2250 K
2050 G
5085
1012 R
C128-23
2065 N
C128-24
2120 TN
C999-2
C999-4
2120 TN
S43
C118
5080
1012 R
SP101
C128-27
2065 N
H6
C117
4320
2050 G
7770
2050 G
650
2050 G
11000
2050 G
C101-11
2050 G
12280
2050 G
3310
2050 G
4220
2050 G
2050 G
2050 G
SP54
C001-47
2050 G
+12V
IGN
5700
5690
5680
5670
5660
5650
5640
5630
5620
5610
5600
5590
5580
5570
5560
5550
5540
5530
5520
5510
5500
5490
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5420
5410

SS07F019 1

Wiring harness - Electrical schematic frame 20 Power take-off (2)

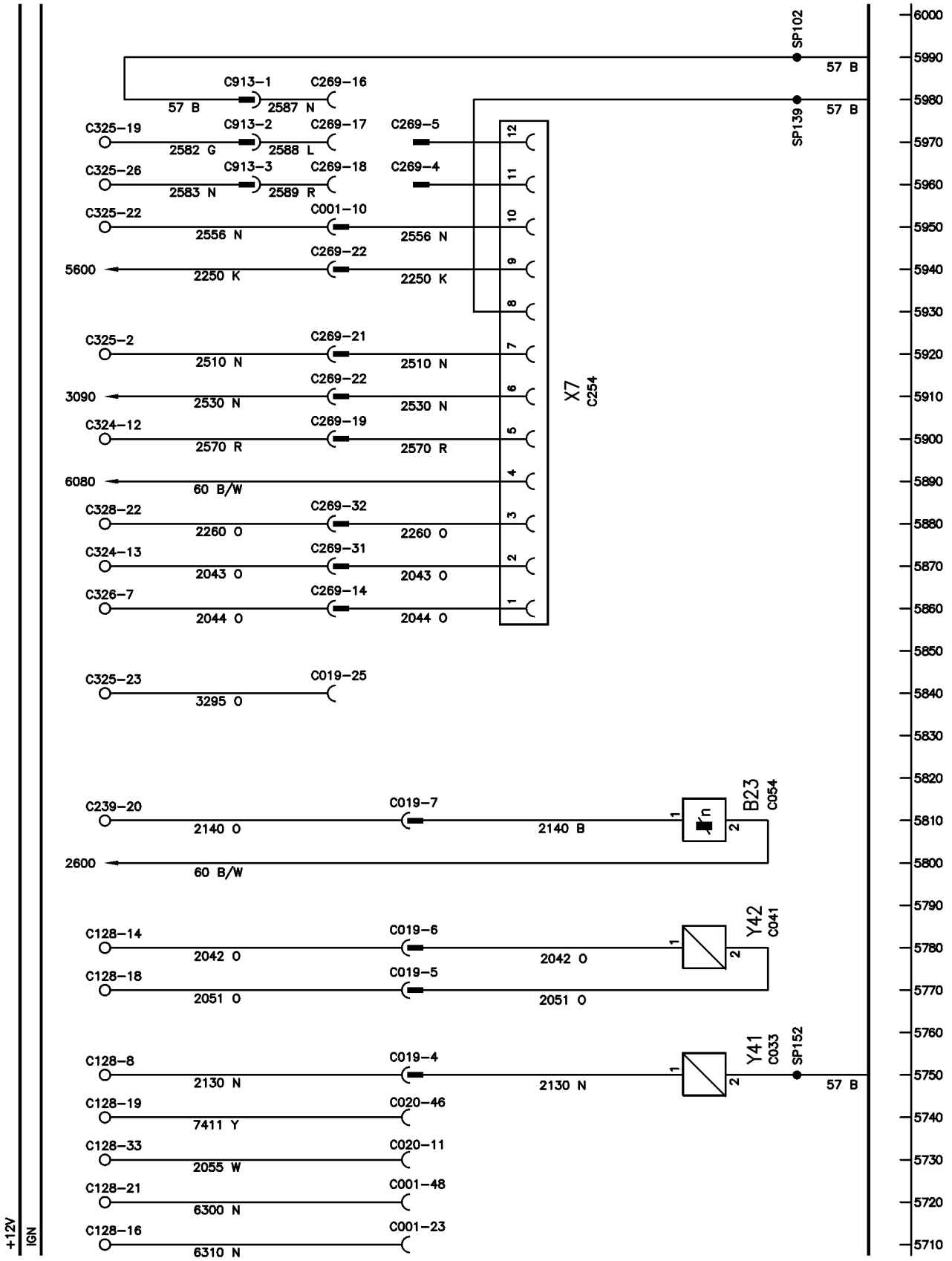
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 5710-6000

Line number	Compo-nent	Connector	Designation
5750	Y41	**C033**	POWER TAKE-OFF BRAKE
5780	Y42	**C041**	POWER TAKE-OFF SOLENOID VALVE
5810	B23	**C054**	PTO SPEED SENSOR
5930	X7	**C254**	CONNECTOR FRONT HITCH/FRONT POWER TAKE-OFF

NOTE: *Supplementary connector* ***C001****,* ***C019****,* ***C020****,* ***C128****,* ***C239****,* ***C269****,* ***C324****,* ***C325****,* ***C326****,* ***C328****,* ***C913****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
SP102
57 B
SP139
57 B
C913-1
C269-16
57 B
2587 N
C325-19
C913-2
C269-17
C269-5
2582 G
2588 L
C325-26
C913-3
C269-18
C269-4
2583 N
2589 R
C325-22
C001-10
2556 N
2556 N
5600
C269-22
2250 K
2250 K
X7
C254
C325-2
C269-21
2510 N
2510 N
3090
C269-22
2530 N
2530 N
C324-12
C269-19
2570 R
2570 R
6080
60 B/W
C328-22
C269-32
2260 O
2260 O
C324-13
C269-31
2043 O
2043 O
C326-7
C269-14
2044 O
2044 O
C325-23
C019-25
3295 O
C239-20
C019-7
2140 O
2140 B
B23
C054
2600
60 B/W
C128-14
C019-6
2042 O
2042 O
Y42
C041
C128-18
C019-5
2051 O
2051 O
C128-8
C019-4
2130 N
2130 N
Y41
C033
SP152
57 B
C128-19
C020-46
7411 Y
C128-33
C020-11
2055 W
C128-21
C001-48
6300 N
C128-16
C001-23
6310 N
6000
5990
5980
5970
5960
5950
5940
5930
5920
5910
5900
5890
5880
5870
5860
5850
5840
5830
5820
5810
5800
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5730
5720
5710

SS07F020 1

Wiring harness - Electrical schematic frame 21 Front axle suspension system

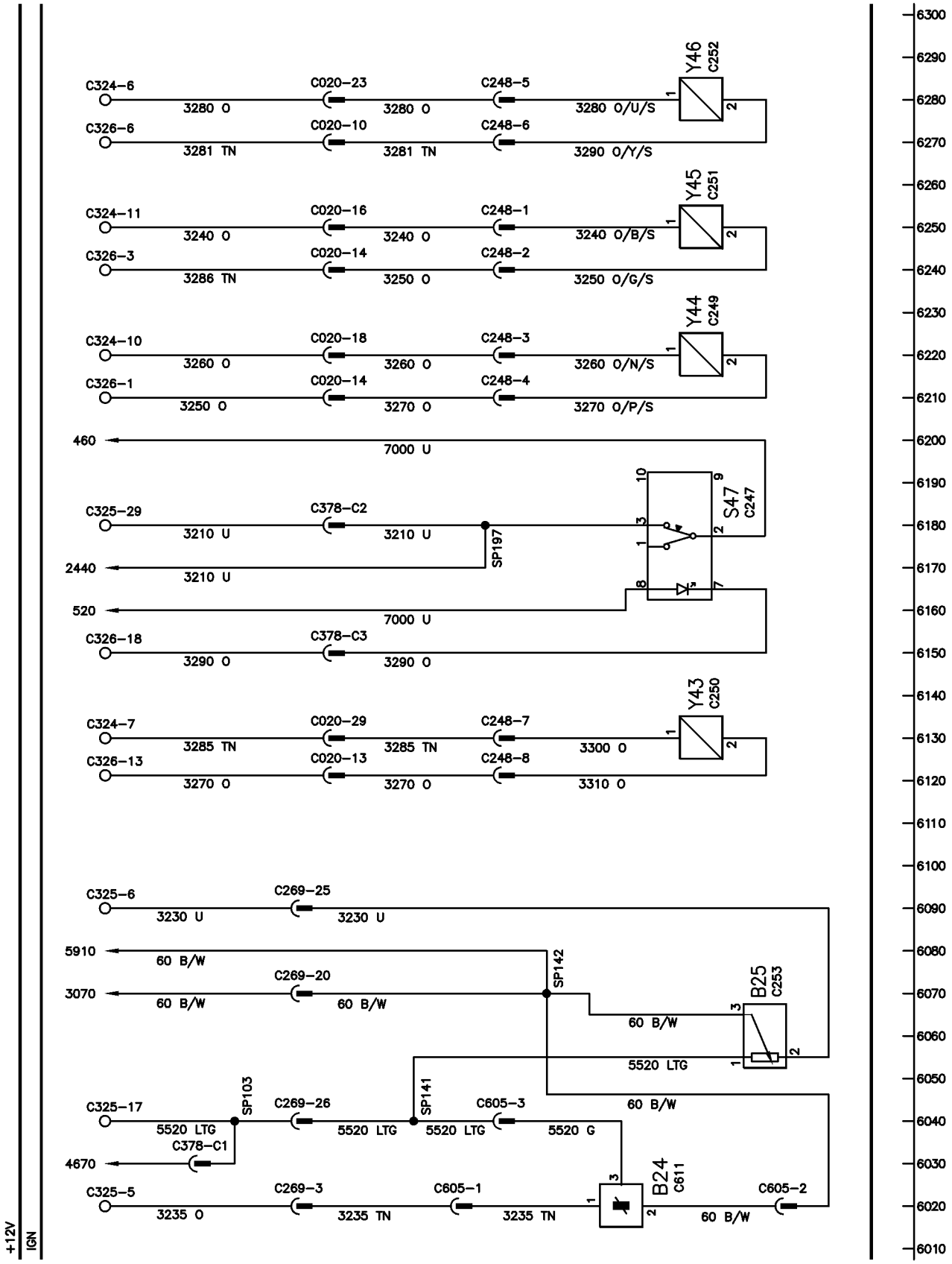
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 6010-6300

Line number	Compo-nent	Connector	Designation
6020	B24	**C611**	ACCELEROMETER
6060	B25	**C253**	POTENTIOMETER FOR FRONT AXLE SUSPENSION
6130	Y43	**C250**	SOLENOID VALVE UPPER LOCK FOR SUSPENSION
6170	S47	**C247**	SWITCH FOR FRONT AXLE SUSPENSION SYSTEM
6220	Y44	**C249**	LOWER SOLENOID VALVE FOR
6250	Y45	**C251**	RAISE SOLENOID VALVE FOR SUSPENSION
6280	Y46	**C252**	SOLENOID VALVE UPPER LOCK FOR SUSPENSION

NOTE: *Supplementary connector* ***C020****,* ***C248****,* ***C269****,* ***C324****,* ***C325****,* ***C326****,* ***C378****,* ***C605****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C324-6
3280 O
C020-23
3280 O
C248-5
3280 O/U/S
Y46
C252
C326-6
3281 TN
C020-10
3281 TN
C248-6
3290 O/Y/S
C324-11
3240 O
C020-16
3240 O
C248-1
3240 O/B/S
Y45
C251
C326-3
3286 TN
C020-14
3250 O
C248-2
3250 O/G/S
C324-10
3260 O
C020-18
3260 O
C248-3
3260 O/N/S
Y44
C249
C326-1
3250 O
C020-14
3270 O
C248-4
3270 O/P/S
460
7000 U
C325-29
3210 U
C378-C2
3210 U
SP197
2440
3210 U
S47
C247
520
7000 U
C326-18
3290 O
C378-C3
3290 O
C324-7
3285 TN
C020-29
3285 TN
C248-7
3300 O
Y43
C250
C326-13
3270 O
C020-13
3270 O
C248-8
3310 O
C325-6
3230 U
C269-25
3230 U
5910
60 B/W
SP142
C269-20
3070
60 B/W
60 B/W
B25
C253
60 B/W
5520 LTG
SP103
SP141
C325-17
5520 LTG
C269-26
5520 LTG
C605-3
5520 G
60 B/W
C378-C1
4670
C325-5
3235 O
C269-3
3235 TN
C605-1
3235 TN
B24
C611
C605-2
60 B/W
6300
6290
6280
6270
6260
6250
6240
6230
6220
6210
6200
6190
6180
6170
6160
6150
6140
6130
6120
6110
6100
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6020
6010

SS07F021 1

Wiring harness - Electrical schematic frame 22 Fast Steer System

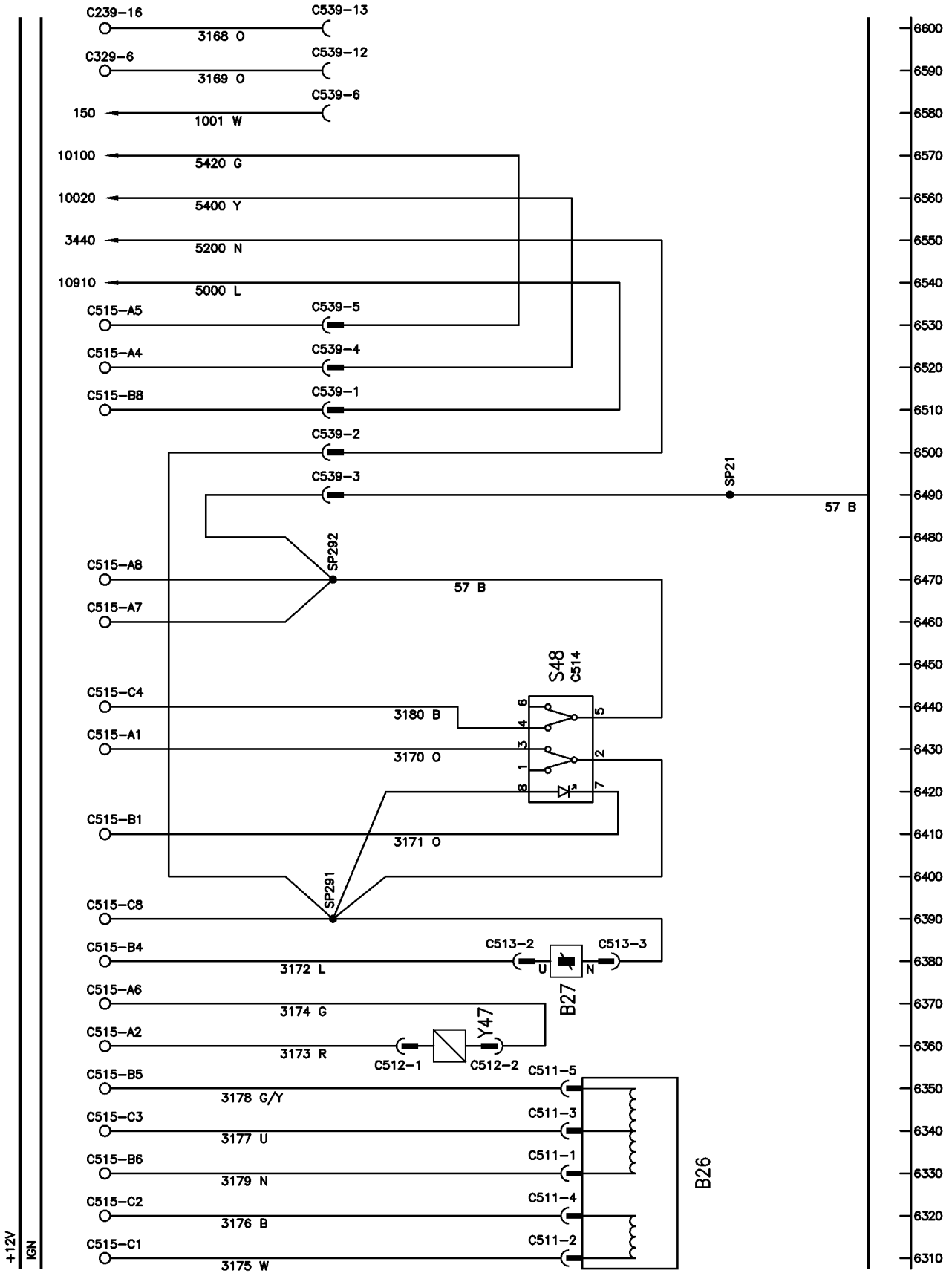
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 6310-6600

Line number	Compo-nent	Connector	Designation
6330	B26	**C511**	FAST STEER SYSTEM - LVDT SOLENOID
6360	Y47	**C512**	FAST STEER SYSTEM - SOLENOID VALVE
6380	B27	**C513**	FAST STEER SYSTEM - STEERING WHEEL SENSOR
6430	S48	**C514**	FAST STEER SYSTEM - STEERING WHEEL SWITCH

NOTE: *Supplementary connector* ***C239****,* ***C329****,* ***C515****,* ***C539****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C239-16
C539-13
3168 O
C329-6
C539-12
3169 O
C539-6
150
1001 W
10100
5420 G
10020
5400 Y
3440
5200 N
10910
5000 L
C515-A5
C539-5
C515-A4
C539-4
C515-B8
C539-1
C539-2
C539-3
SP21
57 B
SP292
C515-A8
57 B
C515-A7
S48
C514
C515-C4
3180 B
C515-A1
3170 O
C515-B1
3171 O
SP291
C515-C8
C515-B4
3172 L
C513-2
C513-3
U
N
B27
C515-A6
3174 G
C515-A2
3173 R
Y47
C512-1
C512-2
C515-B5
3178 G/Y
C511-5
C515-C3
3177 U
C511-3
C515-B6
3179 N
C511-1
C515-C2
3176 B
C511-4
C515-C1
3175 W
C511-2
B26
+12V
IGN
6600
6590
6580
6570
6560
6550
6540
6530
6520
6510
6500
6490
6480
6470
6460
6450
6440
6430
6420
6410
6400
6390
6380
6370
6360
6350
6340
6330
6320
6310

SS07F022 1

Wiring harness - Electrical schematic frame 23 Cab equipment (1)

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

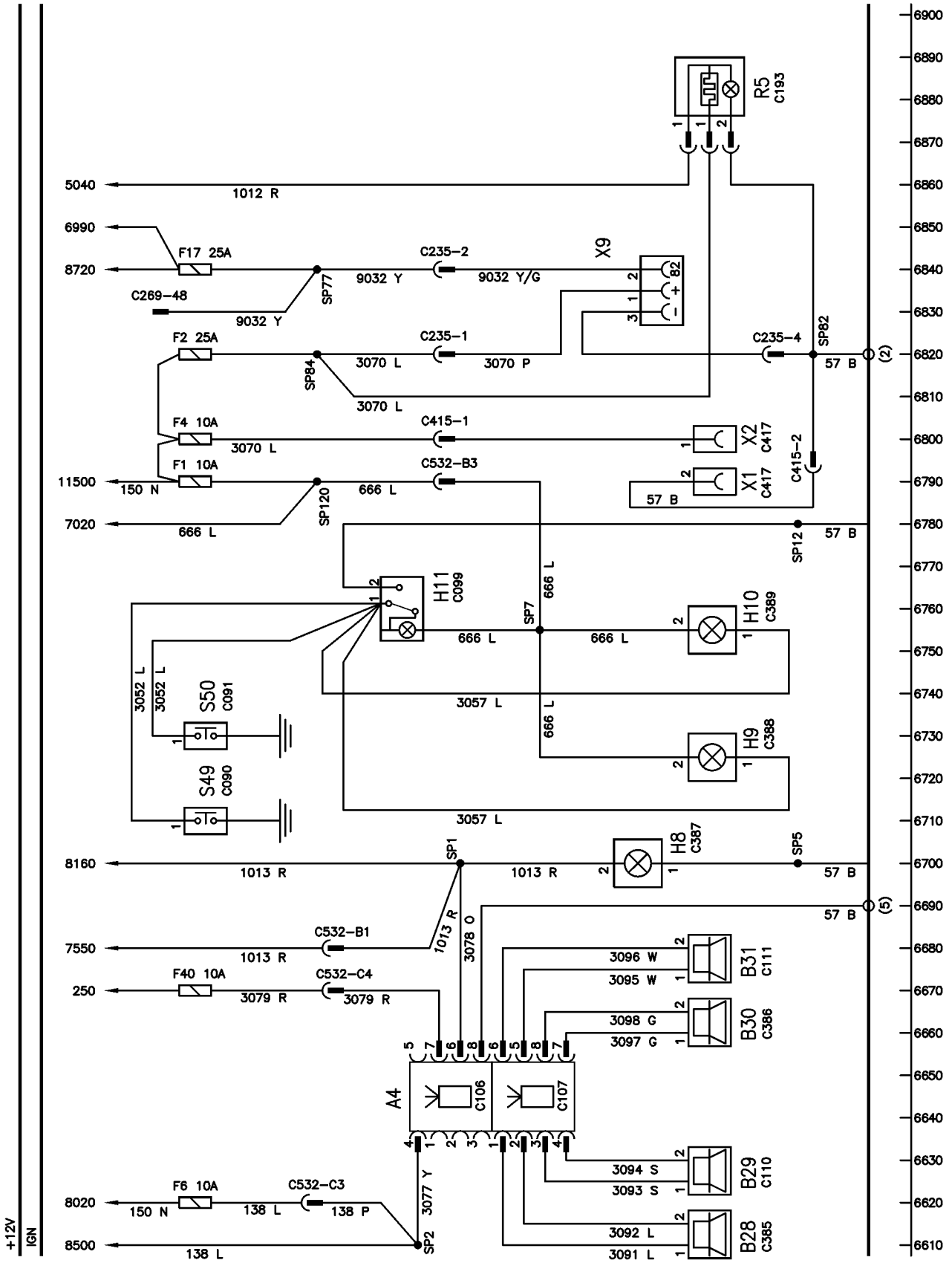
Line range 6610-6900

Version without electrical battery main switch - see illustration **1**.
Version with electrical battery main switch - see illustration **2**.

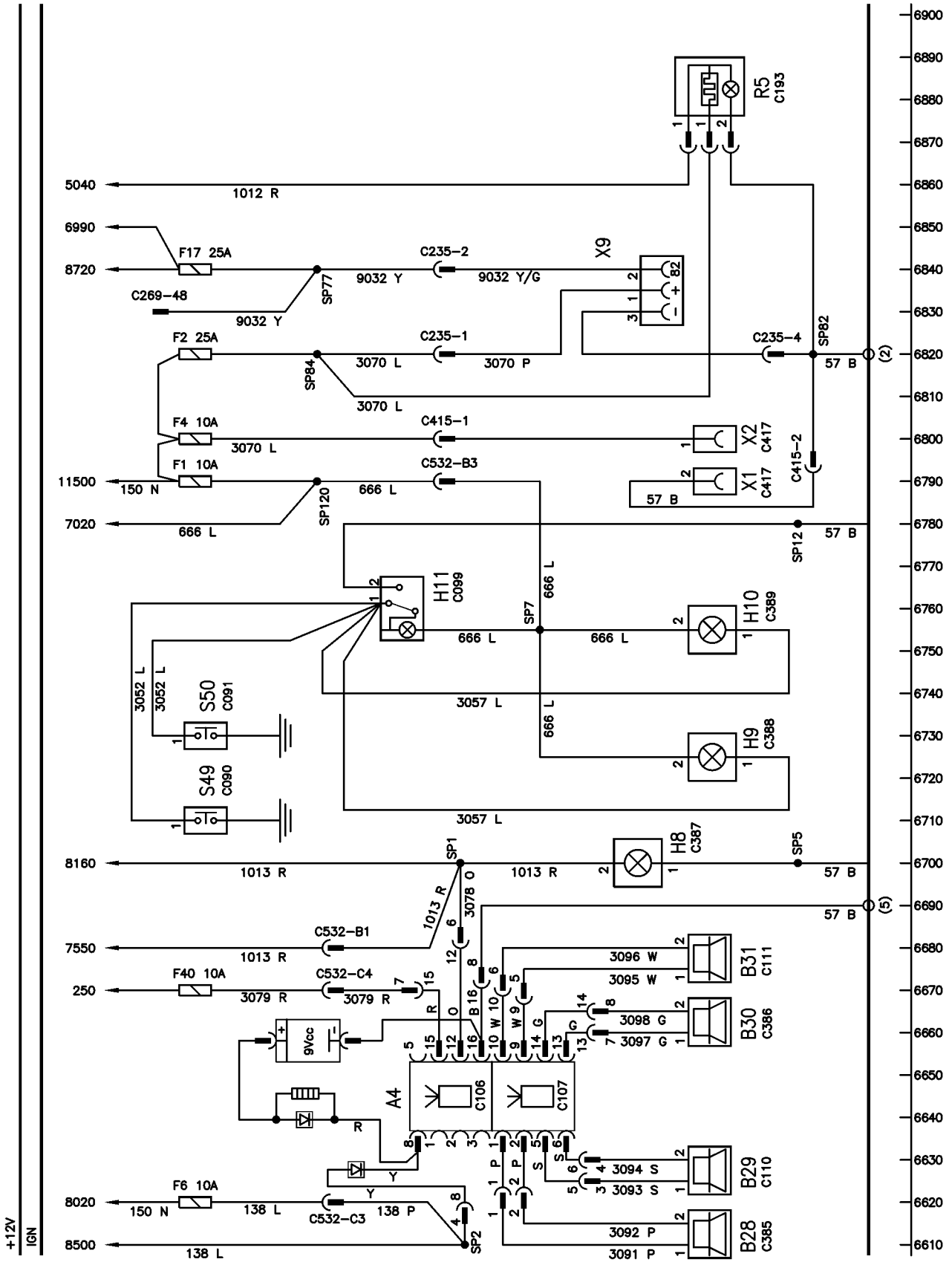
Line number	Compo-nent	Connector	Designation
6610	B28	**C385**	SPEAKER - REAR L
6620	F6 -10A		FUSE - TRANSMITTER MEMORY FOR RADIO AND FIELD LIGHTS CONTROLLER
6630	B29	**C110**	SPEAKER RIGHT SIDE
6645	A4	**C106** / **C107**	RADIO A + RADIO B
6660	B30	**C386**	SPEAKER - REAR R
6670	F40 -10A		FUSE - RADIO
6680	B31	**C111**	SPEAKER LEFT SIDE
6700	H8	**C387**	CONSOLE LIGHTING R
6710	S49	**C090**	DOOR SWITCH LEFT SIDE
6725	H9	**C388**	TREADBOARD LIGHTING L
6730	S50	**C091**	DOOR SWITCH RIGHT SIDE
6755	H10	**C389**	TREADBOARD LIGHTING R
6760	H11	**C099**	INTERIOR LIGHT
6790	F1 -10A		FUSE - CEILING LIGHT, TREADBOARD LIGHTING, HEATED MIRROR
6790	X1	**C417**	8-A-SCREW TERMINAL - BLACK
6800	F4 -10A		FUSE - SCREW TERMINAL RED
6800	X2	**C417**	8-A-SCREW TERMINAL - RED
6820	F2 -25A		FUSE - CIGAR LIGHTER, POWER SOCKET IN CAB
6830	X9		20-A-SOCKET - 3 PIN
6840	F17 -25A		FUSE - POWER SOCKET IN CAB
6880	R5	**C193**	CIGAR LIGHTER

NOTE: *Supplementary connector* ***C235, C269, C415, C532****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
5040
1012 R
6990
8720
F17 25A
C269-48
9032 Y
SP77
9032 Y
C235-2
9032 Y/G
X9
F2 25A
SP84
3070 L
C235-1
3070 P
C235-4
SP82
57 B
(2)
3070 L
F4 10A
3070 L
C415-1
X2
C417
F1 10A
11500
150 N
SP120
666 L
C532-B3
C415-2
X1
C417
57 B
7020
666 L
SP12
57 B
H11
C099
SP7
666 L
666 L
666 L
H10
C389
3052 L
3052 L
S50
C091
3057 L
666 L
H9
C388
S49
C090
3057 L
8160
1013 R
SP1
1013 R
H8
C387
SP5
57 B
(5)
57 B
7550
1013 R
C532-B1
1013 R
3078 O
F40 10A
250
3079 R
C532-C4
3079 R
3096 W
3095 W
B31
C111
3098 G
3097 G
B30
C386
A4
C106
C107
3094 S
3093 S
B29
C110
F6 10A
8020
150 N
138 L
C532-C3
138 P
3077 Y
SP2
8500
138 L
3092 L
3091 L
B28
C385
6900
6890
6880
6870
6860
6850
6840
6830
6820
6810
6800
6790
6780
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6720
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6700
6690
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6660
6650
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6620
6610

SS07F045 1


+12V
IGN
5040
1012 R
6990
8720
F17 25A
C269-48
9032 Y
SP77
9032 Y
C235-2
9032 Y/G
X9
F2 25A
3070 L
SP84
C235-1
3070 P
C235-4
SP82
57 B
(2)
F4 10A
3070 L
C415-1
X2
C417
F1 10A
11500
150 N
SP120
666 L
C532-B3
C415-2
X1
C417
7020
666 L
SP12
H11
C099
SP7
666 L
H10
C389
3052 L
S50
C091
3057 L
S49
C090
H9
C388
8160
1013 R
SP1
H8
C387
SP5
(5)
C532-B1
7550
1013 R
F40 10A
250
3079 R
C532-C4
3078 O
B31
C111
3096 W
3095 W
B30
C386
3098 G
3097 G
9Vcc
A4
C106
C107
B29
C110
3094 S
3093 S
F6 10A
8020
150 N
138 L
C532-C3
138 P
SP2
8500
138 L
B28
C385
3092 P
3091 P
6900
6890
6880
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SS07F023 2

Wiring harness - Electrical schematic frame 24 Cab equipment (2)

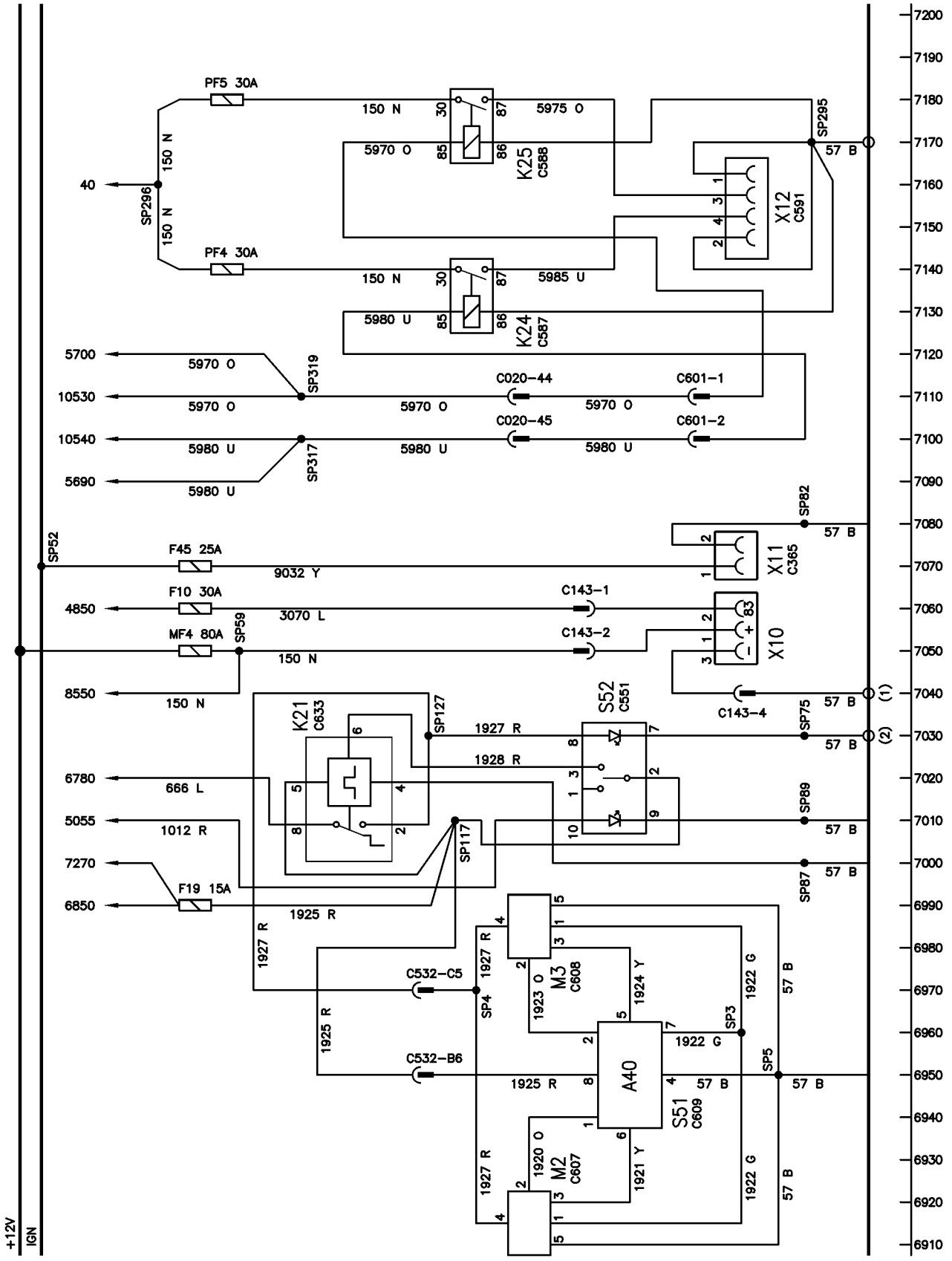
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 6910-7200

Line number	Compo-nent	Connector	Designation
6915	M2	**C607**	ELECTR. MIRROR L
6950	S51	**C609**	MIRROR CONTROL SWITCH
6985	M3	**C608**	ELECTR. MIRROR R
6990	F19 -15A		FUSE - HEATED MIRRORS
7010	S52	**C551**	HEATED MIRRORS SWITCH
7010	K21	**C633**	RELAY - HEATED MIRRORS
7050	MF4 - 80A		MAXIFUSE FUSE - POWER SOCKET REAR, FIELD LIGHT HANDRAIL, FIELD LIGHT ROOF
7050	X10	**C143**	POWER SOCKET REAR
7060	F10 -30A		FUSE - REAR POWER SOCKET
7070	F45 -25A		FUSE - FRONT EQUIPMENT VIA START SWITCH + 8-A SOCKET
7070	X11	**C365**	8-A SOCKET
7130	K24	**C587**	RELAY - ISO 1
7140	PF4 - 30A	**C586**	MAIN FUSE - ISOBUS REAR RELAY 1
7155	X12	**C591**	SOCKET
7170	K25	**C588**	RELAY - ISO 2
7180	PF5 - 30A	**C586**	MAIN FUSE - ISOBUS REAR RELAY 2

NOTE: *Supplementary connector* ***C020****,* ***C532****,* ***C601****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


PF5 30A
PF4 30A
F45 25A
F10 30A
MF4 80A
F19 15A
SP296
SP319
SP317
SP52
SP59
SP127
SP117
SP295
SP82
SP75
SP89
SP87
SP3
SP4
SP5
K25 C588
K24 C587
K21 C633
X12 C591
X11 C365
X10
S52 C551
S51 C609
A40
M3 C608
M2 C607
C020-44
C020-45
C601-1
C601-2
C143-1
C143-2
C143-4
C532-C5
C532-B6
150 N
5975 O
5970 O
5985 U
5980 U
5700
10530
10540
5690
4850
8550
6780
5055
7270
6850
9032 Y
3070 L
666 L
1012 R
1927 R
1928 R
1925 R
1923 O
1924 Y
1922 G
1920 O
1921 Y
57 B
(1)
(2)
+12V
IGN
7200
7190
7180
7170
7160
7150
7140
7130
7120
7110
7100
7090
7080
7070
7060
7050
7040
7030
7020
7010
7000
6990
6980
6970
6960
6950
6940
6930
6920
6910

SS07F024 1

Wiring harness - Electrical schematic frame 25 Cab equipment (3)

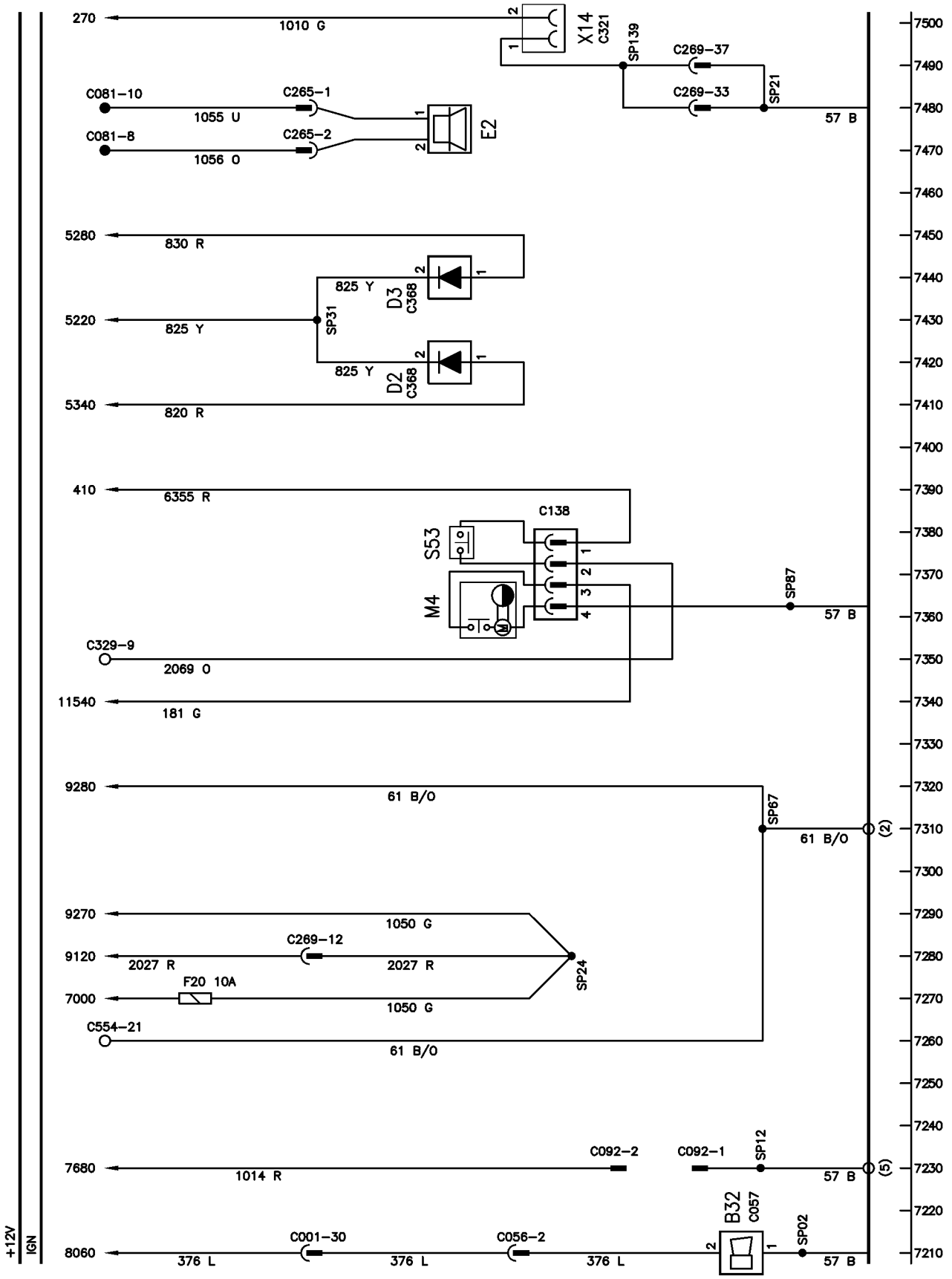
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 7210-7500

Line number	Compo-nent	Connector	Designation
7210	B32	**C057**	WARNING HORN
7270	F20 -10A		FUSE - RADAR SENSOR, STANDARD SIGNAL SOCKET
7360	M4	**C138**	DRIVER'S SEAT PUMP (MOTOR)
7380	S53	**C138**	DRIVER'S SEAT PUMP (SWITCH)
7420	D2	**C368**	DIODES PLUG CONNECTOR
7440	D3	**C368**	DIODES PLUG CONNECTOR
7475	E2	**C265**	BUZZER
7500	X14	**C321**	AUXILIARY HEADLIGHT

NOTE: *Supplementary connector* ***C001****,* ***C056****,* ***C081****,* ***C092****,* ***C269****,* ***C329****,* ***C554****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


270
1010 G
X14
C321
SP139
C269-37
C269-33
SP21
57 B
C081-10
1055 U
C265-1
C081-8
1056 O
C265-2
E2
5280
830 R
825 Y
D3
C368
5220
825 Y
SP31
825 Y
D2
C368
5340
820 R
410
6355 R
C138
S53
M4
SP87
57 B
C329-9
2069 O
11540
181 G
9280
61 B/O
SP67
61 B/O
(2)
9270
1050 G
C269-12
9120
2027 R
2027 R
SP24
F20 10A
7000
1050 G
C554-21
61 B/O
7680
1014 R
C092-2
C092-1
SP12
57 B
(5)
B32
C057
SP02
8060
376 L
C001-30
376 L
C056-2
376 L
57 B
+12V
IGN
7500
7490
7480
7470
7460
7450
7440
7430
7420
7410
7400
7390
7380
7370
7360
7350
7340
7330
7320
7310
7300
7290
7280
7270
7260
7250
7240
7230
7220
7210

SS07F025 1

Wiring harness - Electrical schematic frame 26 Headlights and indicators (1)

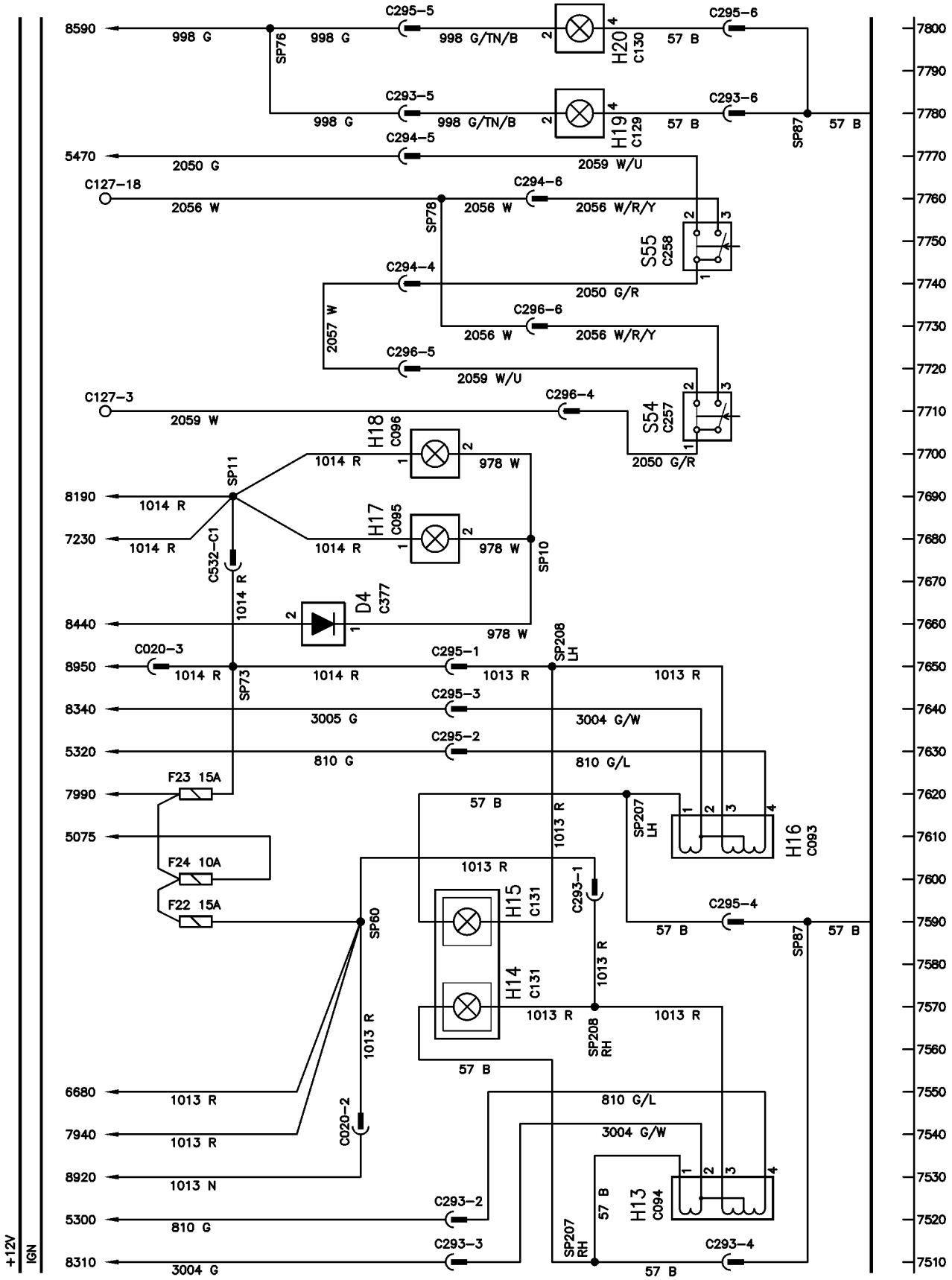
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 7510-7800

Line number	Compo-nent	Connector	Designation
7525	H13	**C094**	INDICATOR REAR RIGHT (NORTH AMERICA)
7570	H14	**C131**	NUMBER PLATE LIGHT
7590	F22 -15A		FUSE - SIDE MARKER LAMPS R
7590	H15	**C131**	NUMBER PLATE LIGHT
7600	F24 -10A		FUSE - LIGHTING
7610	H16	**C093**	INDICATOR REAR LEFT (NORTH AMERICA)
7620	F23 -15A		FUSE - SIDE MARKER LAMPS L, NUMBER PLATE LIGHTS
7660	D4	**C377**	DIODES PLUG CONNECTOR
7680	H17	**C095**	NUMBER PLATE LIGHT REAR RIGHT
7700	H18	**C096**	NUMBER PLATE LIGHT REAR LEFT
7710	S54	**C257**	POWER TAKE-OFF SWITCH LEFT FENDER
7750	S55	**C258**	POWER TAKE-OFF SWITCH RIGHT FENDER
7780	H19	**C129**	FIELD LIGHTS RIGHT C POST
7800	H20	**C130**	FIELD LIGHTS LEFT C POST

NOTE: *Supplementary connector* ***C020****,* ***C127****,* ***C293****,* ***C294****,* ***C295****,* ***C296****,* ***C532****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


8590
998 G
SP76
998 G
C295-5
998 G/TN/B
H20 C130
57 B
C295-6
7800
C293-5
998 G
998 G/TN/B
H19 C129
57 B
C293-6
SP87
57 B
7780
5470
2050 G
C294-5
2059 W/U
7770
C127-18
2056 W
C294-6
SP78
2056 W
2056 W/R/Y
S55 C258
7760
C294-4
2050 G/R
7740
2057 W
C296-6
2056 W
2056 W/R/Y
7730
C296-5
2059 W/U
7720
C127-3
2059 W
C296-4
S54 C257
2050 G/R
7710
H18 C096
1014 R
978 W
7700
8190
1014 R
SP11
H17 C095
7690
7230
1014 R
1014 R
978 W
SP10
C532-C1
1014 R
7680
D4 C377
8440
978 W
7660
C020-3
8950
1014 R
SP73
1014 R
C295-1
1013 R
SP208 LH
1013 R
7650
8340
3005 G
C295-3
3004 G/W
7640
5320
810 G
C295-2
810 G/L
7630
F23 15A
7990
57 B
1013 R
SP207 LH
H16 C093
7620
5075
1013 R
7610
F24 10A
F22 15A
SP60
H15 C131
C293-1
C295-4
57 B
SP87
57 B
7590
H14 C131
1013 R
1013 R
1013 R
SP208 RH
57 B
7570
6680
1013 R
810 G/L
7550
7940
1013 R
C020-2
3004 G/W
7540
8920
1013 N
7530
C293-2
5300
810 G
57 B
H13 C094
7520
SP207 RH
C293-3
C293-4
8310
3004 G
57 B
7510
+12V
IGN

SS07F026 1

Wiring harness - Electrical schematic frame 27 Headlights and indicators (2)

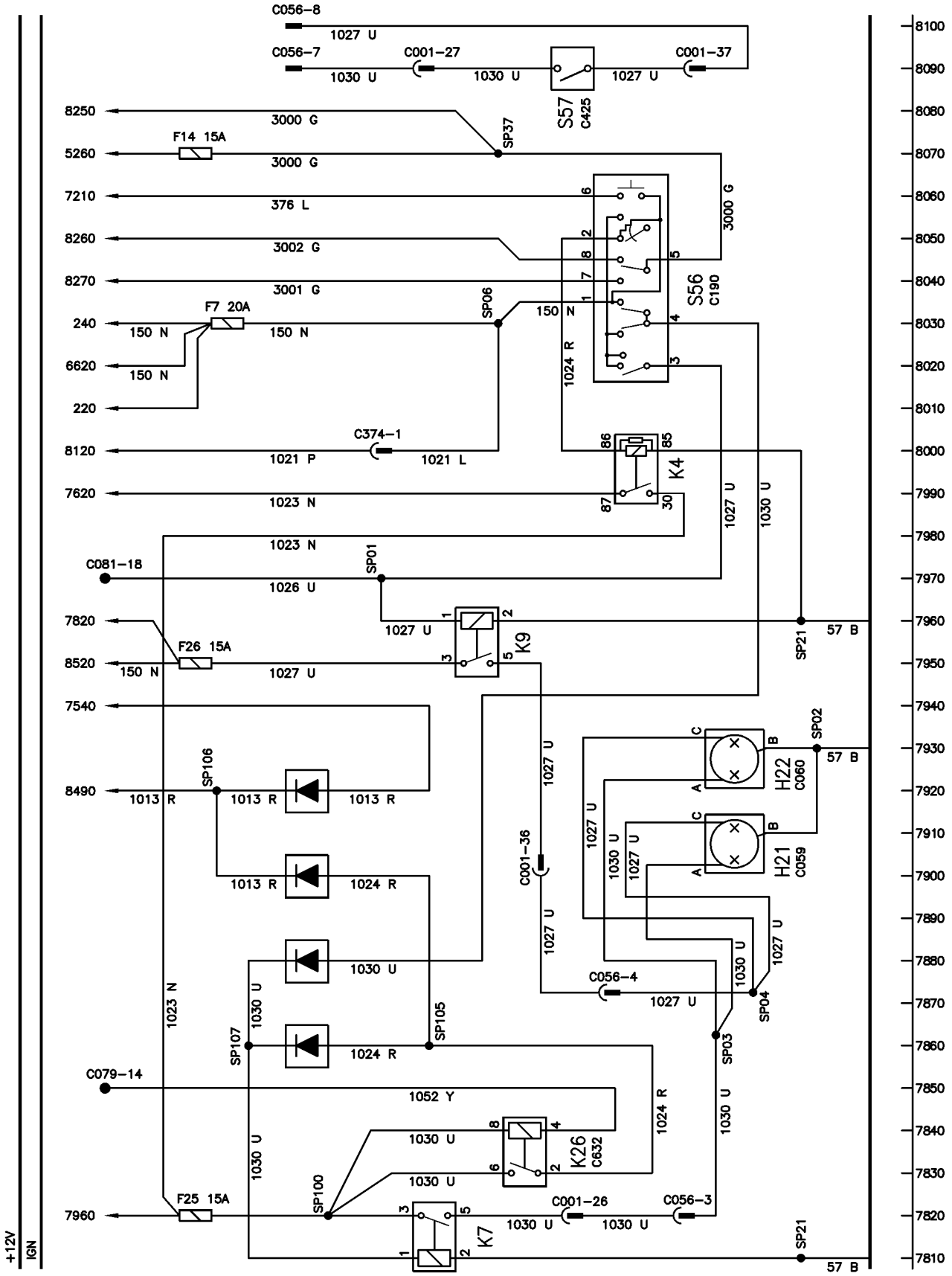
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 7810-8100

Line number	Compo-nent	Connector	Designation
7810	K7		RELAY - DIPPED HEADLIGHTS
7820	F25 -15A		FUSE - DIPPED HEADLIGHTS, RELAY TREADBOARD LIGHTING
7830	K26	**C632**	RELAY - TREADBOARD LIGHTING
7910	H21	**C059**	FRONT HEADLIGHTS RIGHT SIDE
7930	H22	**C060**	FRONT HEADLIGHTS LEFT SIDE
7950	F26 -15A		FUSE - MAIN BEAM HEADLIGHTS
7950	K9		RELAY - MAIN BEAM HEADLIGHTS
7990	K4		RELAY - LIGHTS (SIDE AND LIGHTING)
8030	F7 -20A		FUSE - MAIN BEAM HEADLIGHT SWITCH AND HAZARD WARNING SWITCH
8040	S56	**C190**	HEADLIGHT SWITCH
8070	F14 -15A		FUSE - HEADLIGHT SWITCH AND FLASHER UNIT
8090	S57	**C425**	AUXILIARY HEADLIGHT SWITCH

NOTE: *Supplementary connector* ***C001****,* ***C056****,* ***C079****,* ***C081****,* ***C374****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


C056-8
1027 U
C056-7
1030 U
C001-27
1030 U
C001-37
1027 U
S57
C425
SP37
F14 15A
3000 G
S56
C190
F7 20A
SP06
150 N
1024 R
3002 G
3001 G
376 L
C374-1
1021 P
1021 L
K4
1023 N
1027 U
1030 U
C081-18
1026 U
SP01
K9
F26 15A
SP21
57 B
SP02
H22
C060
H21
C059
C001-36
SP106
1013 R
1024 R
1030 U
1023 N
SP107
SP105
SP04
SP03
C056-4
C079-14
1052 Y
K26
C632
SP100
F25 15A
C001-26
C056-3
K7
+12V
IGN

SS07F027 1

Wiring harness - Electrical schematic frame 28 Headlights and indicators (3)

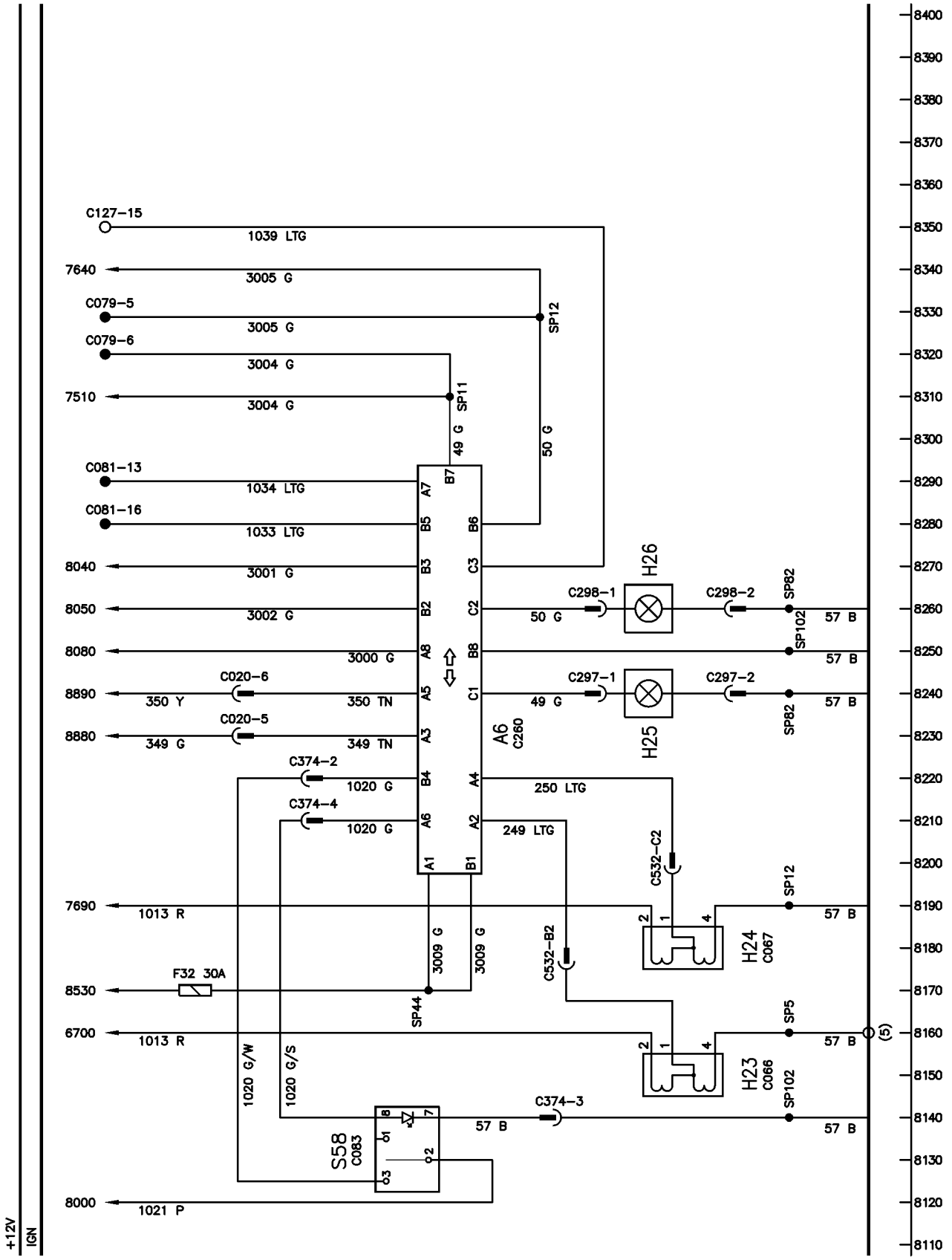
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 8110-8400

Line number	Compo-nent	Connector	Designation
8130	S58	**C083**	HAZARD WARNING SWITCH
8150	H23	**C066**	SIDE MARKER LAMP RIGHT SIDE
8170	F32 -30A		FUSE - FLASHER UNIT
8180	H24	**C067**	SIDE MARKER LAMP LEFT SIDE
8230	A6	**C260**	FLASHER UNIT PLUG CONNECTOR
8240	H25	**C297**	MARKER LAMP RIGHT SIDE
8260	H26	**C298**	MARKER LAMP LEFT SIDE

NOTE: *Supplementary connector* ***C020****,* ***C079****,* ***C081****,* ***C127****,* ***C374****,* ***C532****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C127-15
1039 LTG
7640
3005 G
C079-5
3005 G
SP12
C079-6
3004 G
7510
3004 G
SP11
49 G
50 G
C081-13
1034 LTG
C081-16
1033 LTG
8040
3001 G
8050
3002 G
8080
3000 G
8890
350 Y
C020-6
350 TN
8880
349 G
C020-5
349 TN
A6
C260
C374-2
1020 G
C374-4
1020 G
250 LTG
249 LTG
H26
C298-1
C298-2
SP82
50 G
57 B
SP102
C297-1
C297-2
49 G
H25
C532-C2
C532-B2
H24
C067
7690
1013 R
F32 30A
8530
3009 G
SP44
6700
1013 R
1020 G/W
1020 G/S
H23
C066
SP5
(5)
S58
C083
C374-3
8000
1021 P
8400
8390
8380
8370
8360
8350
8340
8330
8320
8310
8300
8290
8280
8270
8260
8250
8240
8230
8220
8210
8200
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8170
8160
8150
8140
8130
8120
8110

SS07F028 1

Wiring harness - Electrical schematic frame 29 Field light

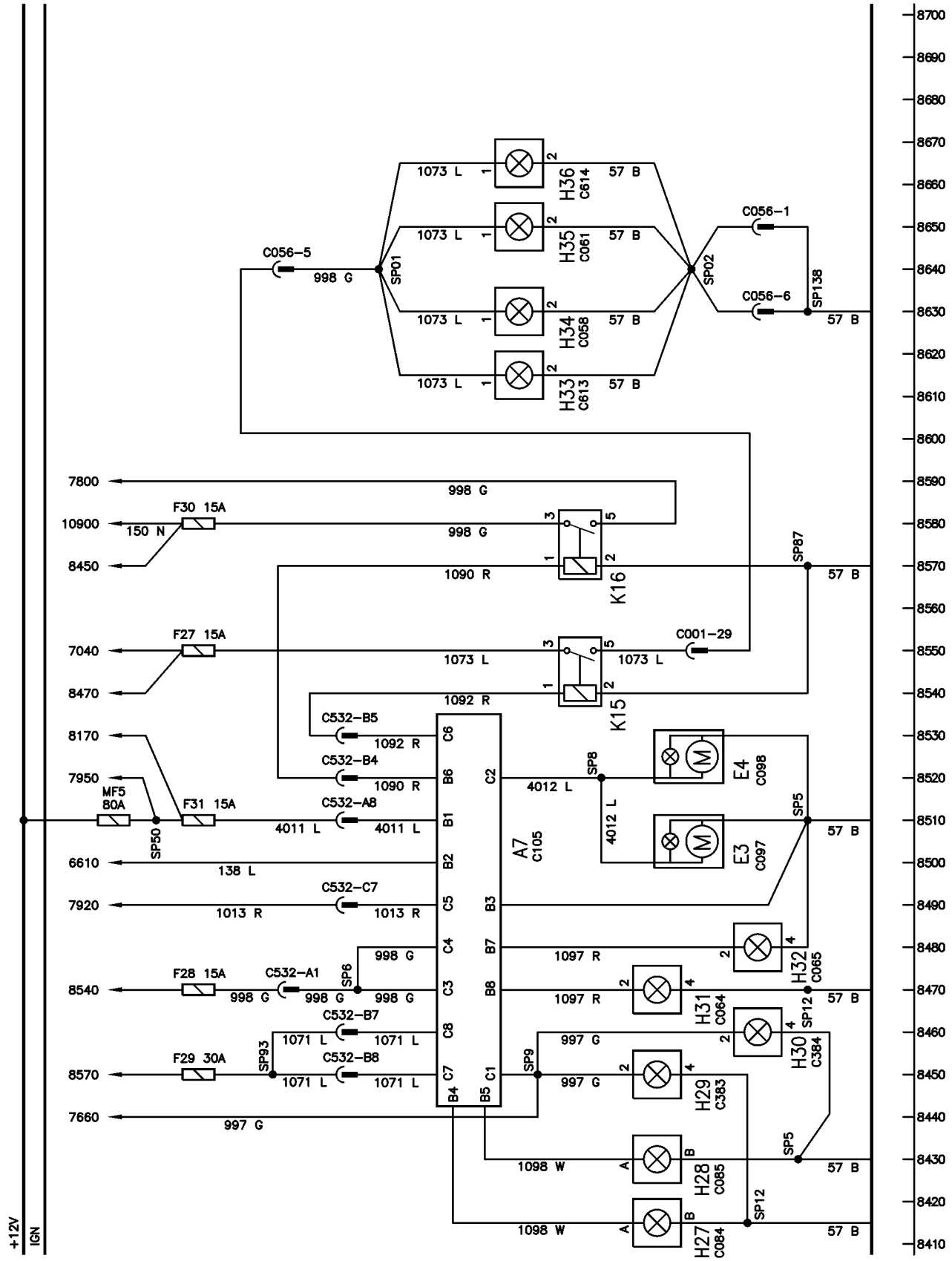
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 8410-8700

Line number	Compo-nent	Connector	Designation
8415	H27	**C084**	TOP FIELD LIGHT FRONT LEFT
8430	H28	**C085**	TOP FIELD LIGHT FRONT RIGHT
8450	F29 -30A		FUSE - FIELD LIGHT CONTROL UNIT (ECU)
8450	H29	**C383**	FIELD LIGHT - REAR L
8460	H30	**C384**	FIELD LIGHT - REAR R
8470	F28 -15A		FUSE - FIELD LIGHT CONTROL UNIT (ECU)
8470	H31	**C064**	BOTTOM FIELD LIGHT FRONT RIGHT
8480	H32	**C065**	BOTTOM FIELD LIGHT FRONT LEFT
8490	A7	**C105**	PLUG CONNECTOR - FIELD LIGHT CONTROL UNIT (ECU)
8505	E3	**C097**	ROTATING BEACON LEFT SIDE
8510	F31 -15A		FUSE - FIELD LIGHT CONTROL UNIT (ECU)
8510	MF5 - 80A		MAXIFUSE FUSE - LIGHTING / INDICATORS / ROTATING BEACON
8525	E4	**C098**	ROTATING BEACON RIGHT SIDE
8545	K15		RELAY - BOTTOM FIELD LIGHT BONNET
8550	F27 -15A		FUSE - FRONT FIELD LIGHT (BONNET)
8575	K16		RELAY - FIELD LIGHT C POST
8580	F30 -15A		FUSE - FIELD LIGHT C POST
8615	H33	**C613**	SIDE LIMITING LIGHT L
8630	H34	**C058**	FIELD LIGHT LEFT SIDE
8650	H35	**C061**	FIELD LIGHT RIGHT SIDE
8665	H36	**C614**	SIDE MARKER LAMP R

NOTE: *Supplementary connector* ***C001****,* ***C056****,* ***C532****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
H36 C614
H35 C061
H34 C058
H33 C613
1073 L
57 B
C056-5
998 G
SP01
SP02
C056-1
C056-6
SP138
7800
10900
8450
F30 15A
150 N
998 G
1090 R
K16
SP87
7040
8470
F27 15A
C001-29
1073 L
1092 R
K15
8170
7950
MF5 80A
F31 15A
SP50
6610
138 L
C532-B5
C532-B4
C532-A8
C532-C7
C532-A1
C532-B7
C532-B8
1092 R
1090 R
4011 L
1013 R
A7 C105
C6
B6
B1
B2
C5
B3
C4
B7
C3
B8
C8
C7
B4
B5
C1
C2
SP8
4012 L
E4 C098
E3 C097
SP5
7920
8540
8570
7660
F28 15A
F29 30A
SP6
SP93
SP9
998 G
1071 L
997 G
1097 R
H32 C065
H31 C064
H30 C384
H29 C383
H28 C085
H27 C084
SP12
1098 W
8700
8690
8680
8670
8660
8650
8640
8630
8620
8610
8600
8590
8580
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8420
8410

SS07F029 1

Wiring harness - Electrical schematic frame 30 Trailer braking system

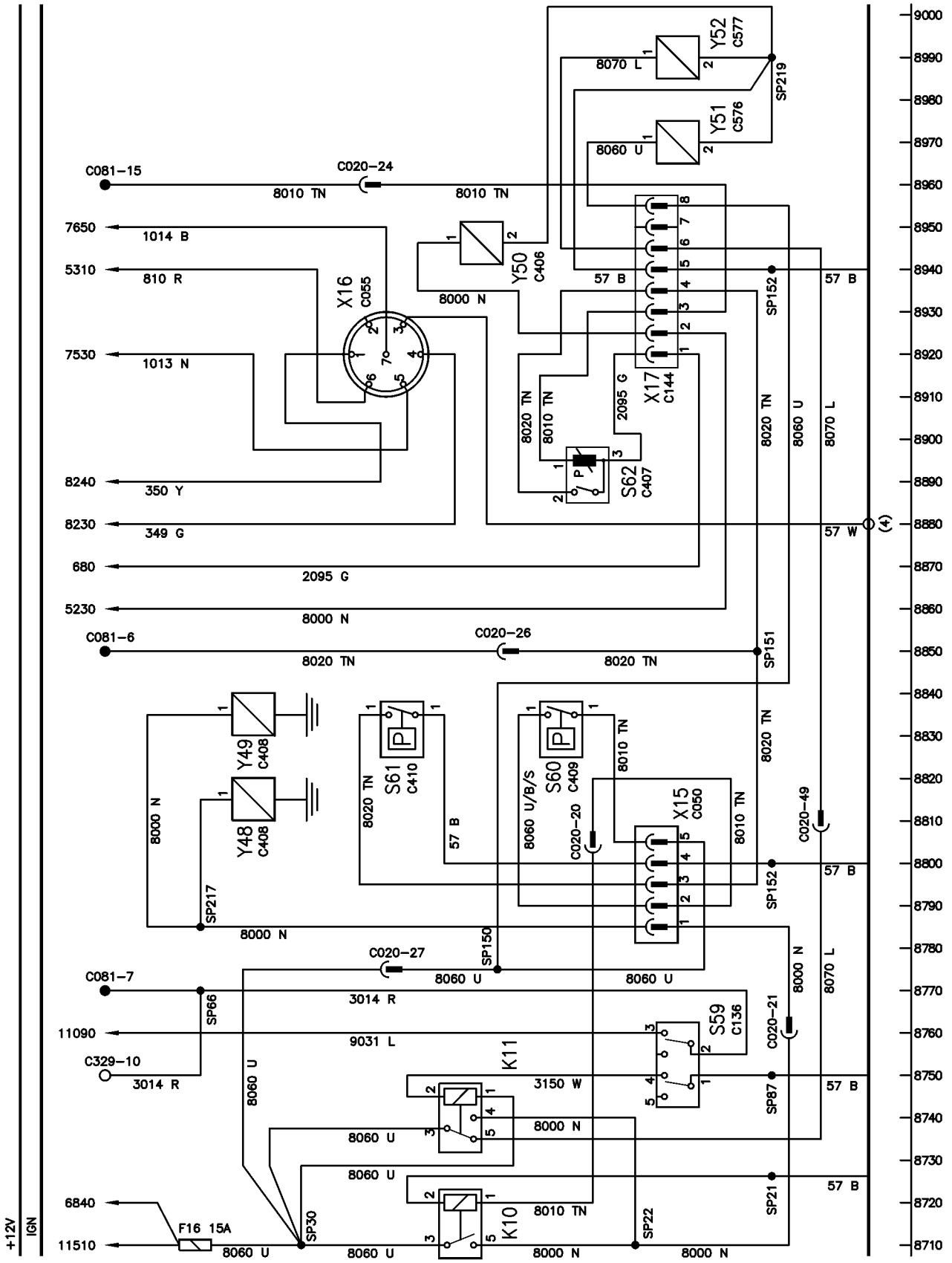
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 8710-9000

Line number	Compo-nent	Connector	Designation
8710	K10		RELAY - SUPPLY OF HYDR. TRAILER BRAKE
8710	F16 -15A		FUSE - TRAILER BRAKE
8740	K11		RELAY - SUPPLY OF PNEUM. TRAILER BRAKE
8750	S59	**C136**	HANDBRAKE SWITCH
8800	X15	**C050**	PLUG CONNECTOR TRAILER BRAKE
8815	Y48	**C408**	TRAILER BRAKE (NOT ITALY) - SOLENOID VALVES
8830	S60	**C409**	TRAILER BRAKE (NOT ITALY) - PUMP PRESSURE SWITCH
8830	S61	**C410**	TRAILER BRAKE (NOT ITALY) - LINE PRESSURE SWITCH
8835	Y49	**C408**	TRAILER BRAKE (NOT ITALY) - SOLENOID VALVES
8890	S62	**C407**	PRESSURE SWITCH FOR AIR BRAKING SYSTEM
8920	X16	**C055**	TRAILER SOCKET
8940	X17	**C144**	AIR BRAKES- PLUG CONNECTOR
8945	Y50	**C406**	AIR BRAKES - SOLENOID VALVE
8970	Y51	**C576**	BRAKING SYSTEM FROST PROTECTION
8990	Y52	**C577**	SOLENOID VALVE PARKING BRAKE

NOTE: *Supplementary connector* ***C020****,* ***C081****,* ***C329****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C081-15
C020-24
8010 TN
8010 TN
7650
1014 B
5310
810 R
7530
1013 N
8240
350 Y
8230
349 G
680
2095 G
5230
8000 N
C081-6
C020-26
8020 TN
8020 TN
C081-7
3014 R
11090
9031 L
C329-10
3014 R
6840
11510
F16 15A
8060 U
8060 U
8060 U
8060 U
8060 U
8060 U
8000 N
8000 N
8000 N
8000 N
8000 N
8000 N
8010 TN
8010 TN
8020 TN
8020 TN
8020 TN
8020 TN
8060 U/B/S
8070 L
8070 L
57 B
57 B
57 B
57 B
57 B
57 B
57 W
3150 W
2095 G
Y52 C577
Y51 C576
Y50 C406
Y49 C408
Y48 C408
X16 C055
X17 C144
X15 C050
S62 C407
S61 C410
S60 C409
S59 C136
K11
K10
SP219
SP152
SP151
SP150
SP217
SP66
SP30
SP22
SP87
SP21
C020-49
C020-21
C020-20
(4)
9000
8990
8980
8970
8960
8950
8940
8930
8920
8910
8900
8890
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SS07F030 1

Wiring harness - Electrical schematic frame 31 Sensors

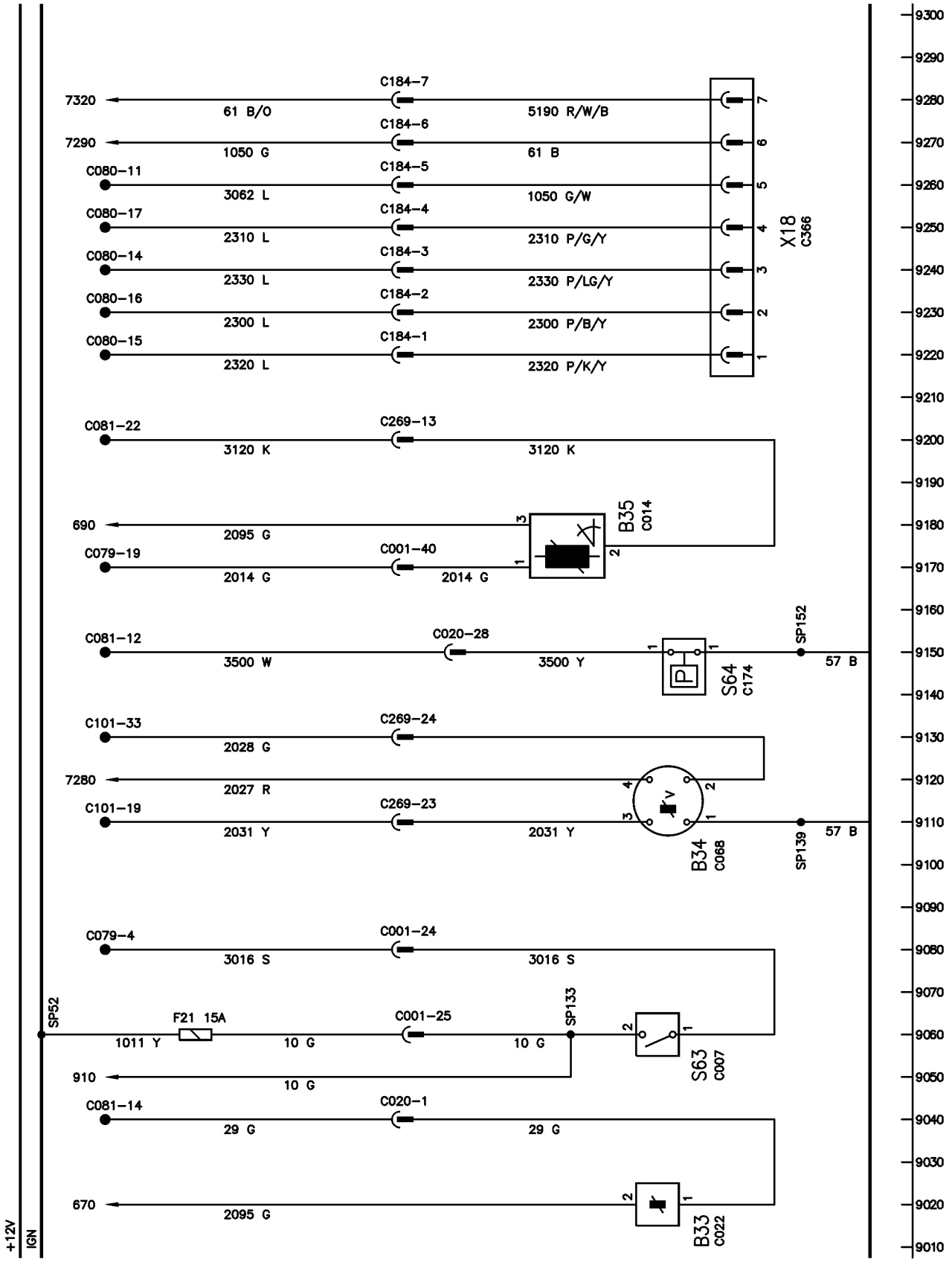
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 9010-9300

Line number	Compo-nent	Connector	Designation
9020	B33	**C022**	FUEL LEVEL TRANSMITTER
9060	F21 -15A		FUSE - WATER SENSOR FOR FUEL FILTER, BRAKE FLUID LEVEL SWITCH
9060	S63	**C007**	BRAKE FLUID LEVEL SWITCH
9110	B34	**C068**	RADAR SENSOR
9150	S64	**C174**	HYDRAULIC STEERING PRESSURE SWITCH
9175	B35	**C014**	STEERING ANGLE SENSOR
9250	X18	**C366**	CONNECTION CABLE PLUG STANDARD SIGNAL SOCKET

NOTE: *Supplementary connector* ***C001****,* ***C020****,* ***C079****,* ***C080****,* ***C081****,* ***C101****,* ***C184****,* ***C269****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


9300
9290
9280
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9240
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9220
9210
9200
9190
9180
9170
9160
9150
9140
9130
9120
9110
9100
9090
9080
9070
9060
9050
9040
9030
9020
9010
C184-7
7320
61 B/O
5190 R/W/B
C184-6
7290
1050 G
61 B
C080-11
C184-5
3062 L
1050 G/W
C080-17
C184-4
2310 L
2310 P/G/Y
C080-14
C184-3
2330 L
2330 P/LG/Y
C080-16
C184-2
2300 L
2300 P/B/Y
C080-15
C184-1
2320 L
2320 P/K/Y
X18
C366
C081-22
C269-13
3120 K
3120 K
690
2095 G
B35
C014
C079-19
C001-40
2014 G
2014 G
C081-12
C020-28
3500 W
3500 Y
SP152
57 B
S64
C174
C101-33
C269-24
2028 G
7280
2027 R
C101-19
C269-23
2031 Y
2031 Y
B34
C068
SP139
57 B
C079-4
C001-24
3016 S
3016 S
SP52
F21 15A
C001-25
SP133
1011 Y
10 G
10 G
910
10 G
S63
C007
C081-14
C020-1
29 G
29 G
670
2095 G
B33
C022
+12V
IGN

SS07F031 1

Wiring harness - Electrical schematic frame 32 Windshield wipers

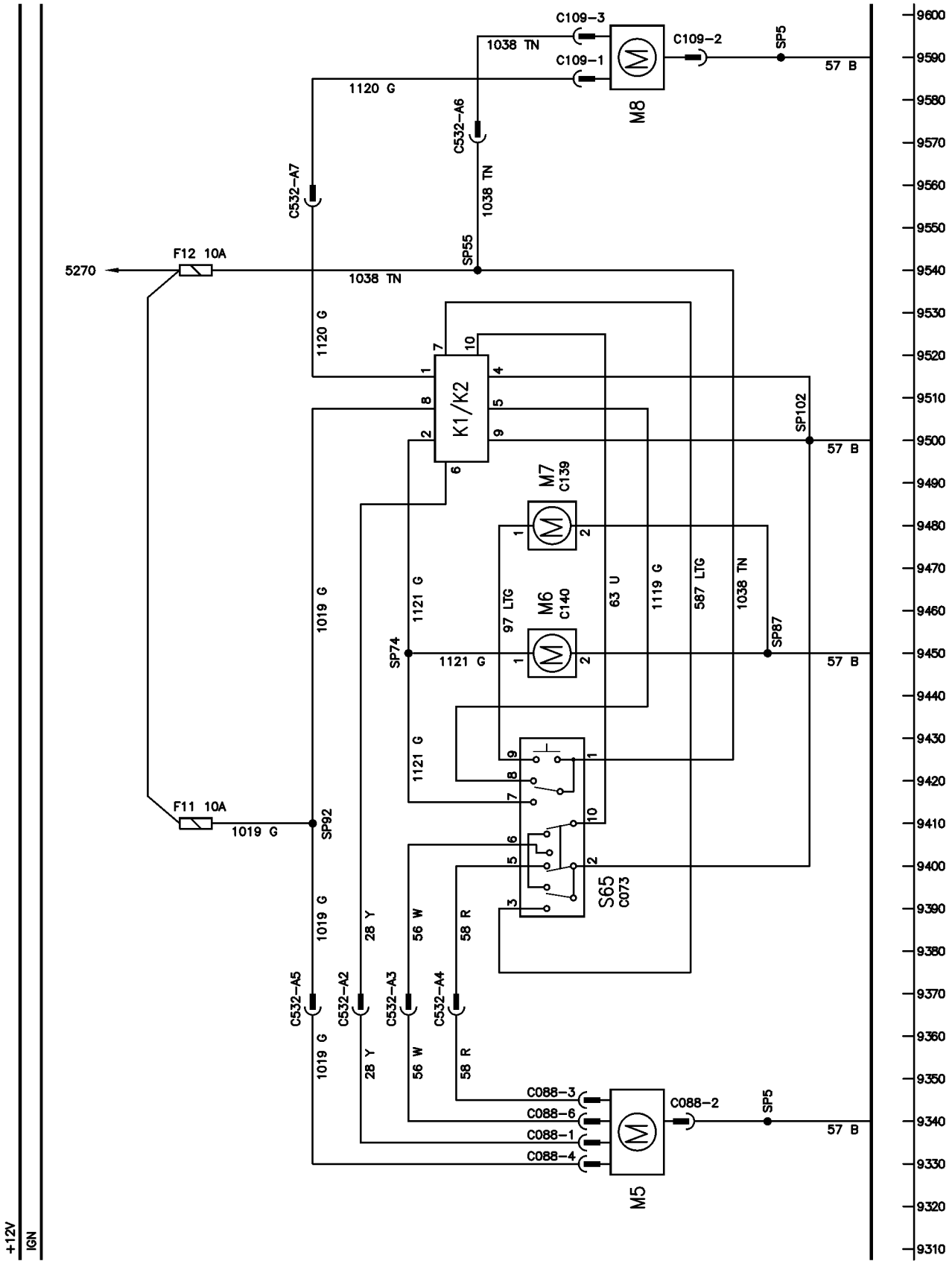
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 9310-9600

Line number	Compo-nent	Connector	Designation
9340	M5	**C088**	FRONT WINDSHIELD WIPER MOTOR
9400	S65	**C073**	SWITCH FOR FRONT WINDSHIELD WIPER
9410	F11 -10A		FUSE - FRONT WINDSHIELD WIPER
9450	M6	**C140**	REAR WINDSHIELD WASHER PUMP MOTOR
9480	M7	**C139**	FRONT WINDSHIELD WASHER PUMP MOTOR
9510	K1/K2		RELAY - FRONT WINDSHIELD WIPER SWITCHING MODULE
9540	F12 -10A		FUSE - WIPER SWITCH + START POSITION OF THE REAR WINDSHIELD WIPER / FRONT AND REAR WINDSHIELD WASHER SYSTEM
9590	M8	**C109**	REAR WINDSHIELD WIPER MOTOR

NOTE: *Supplementary connector* ***C532****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
F12 10A
5270
F11 10A
1019 G
SP92
1120 G
1038 TN
SP55
C532-A7
C532-A6
C109-3
C109-1
C109-2
M8
SP5
57 B
K1/K2
SP102
M7
C139
M6
C140
SP74
1121 G
97 LTG
63 U
1119 G
587 LTG
SP87
S65
C073
C532-A5
C532-A2
C532-A3
C532-A4
28 Y
56 W
58 R
C088-3
C088-6
C088-1
C088-4
C088-2
M5
9600
9590
9580
9570
9560
9550
9540
9530
9520
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9500
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9480
9470
9460
9450
9440
9430
9420
9410
9400
9390
9380
9370
9360
9350
9340
9330
9320
9310

SS07F032 1

Wiring harness - Electrical schematic frame 33 Diagnostics (1)

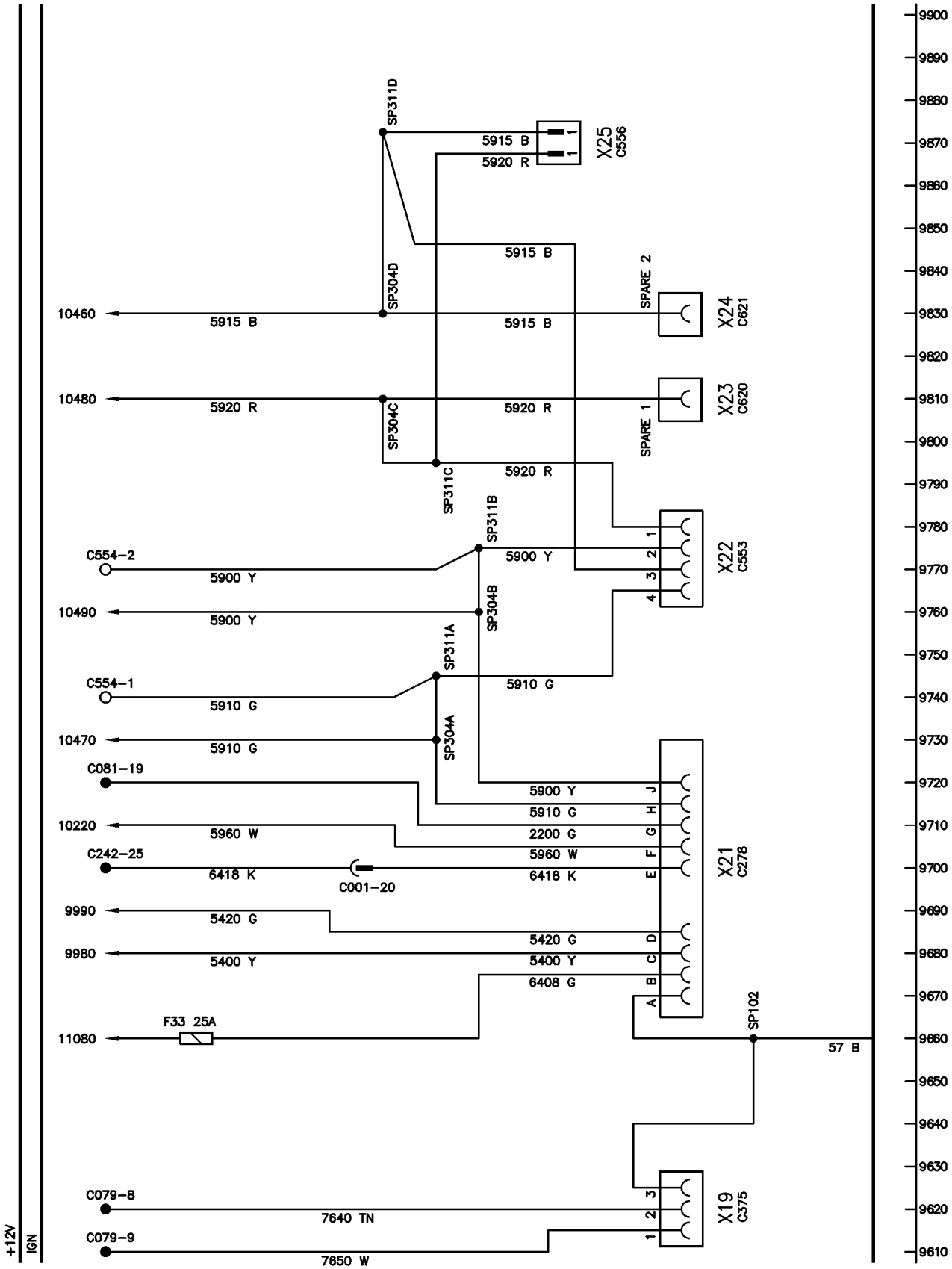
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 9610-9900

Line number	Compo-nent	Connector	Designation
9620	X19	**C375**	DIAGNOSTICS CONNECTION ANALOG-DIGITAL INSTRUMENT (ICU)
9660	F33 -25A		FUSE - DIAGNOSTICS PLUG
9700	X21	**C278**	DIAGNOSTICS PLUG
9770	X22	**C553**	ISOBUS CAN EXPANSION
9810	X23	**C620**	AUXILIARY 1
9830	X24	**C621**	AUXILIARY 2
9870	X25	**C556**	TRACTOR CONTROLLER CAN-BUS AUXILIARY

NOTE: *Supplementary controller* ***C001***, ***C079***, ***C081***, ***C242***, ***C554***.

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
SP311D
5915 B
5920 R
X25
C556
5915 B
SP304D
SPARE 2
X24
C621
10460
5915 B
5915 B
10480
5920 R
SP304C
5920 R
SPARE 1
X23
C620
SP311C
5920 R
SP311B
X22
C553
C554-2
5900 Y
5900 Y
10490
5900 Y
SP304B
SP311A
C554-1
5910 G
5910 G
10470
5910 G
SP304A
C081-19
5900 Y
5910 G
10220
5960 W
2200 G
C242-25
5960 W
6418 K
C001-20
6418 K
X21
C278
9990
5420 G
5420 G
9980
5400 Y
5400 Y
6408 G
F33 25A
11080
SP102
57 B
C079-8
7640 TN
C079-9
7650 W
X19
C375
9900
9890
9880
9870
9860
9850
9840
9830
9820
9810
9800
9790
9780
9770
9760
9750
9740
9730
9720
9710
9700
9690
9680
9670
9660
9650
9640
9630
9620
9610

SS07F033 1

Wiring harness - Electrical schematic frame 34 Diagnostics (2)

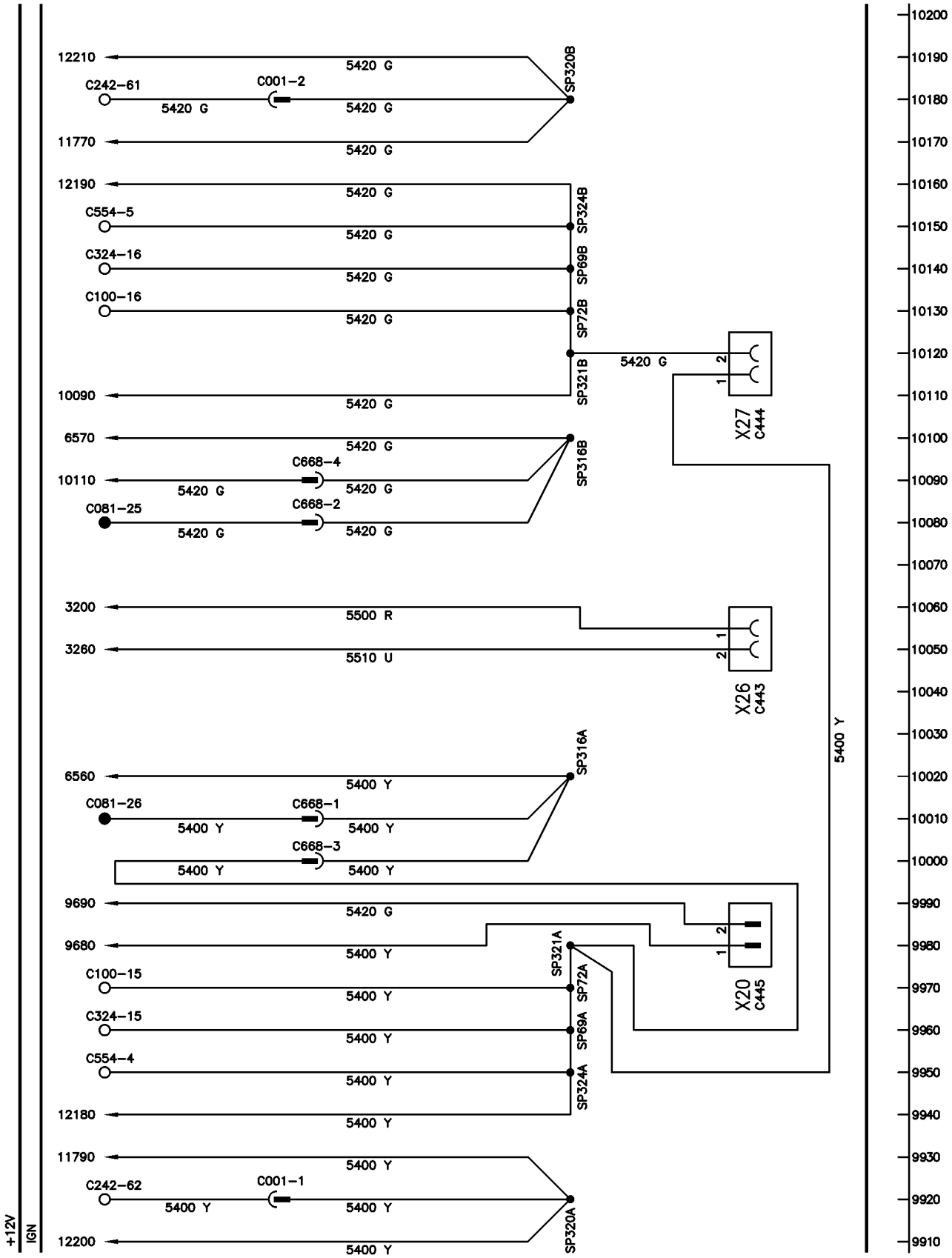
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 9910-10200

Line number	Compo-nent	Connector	Designation
9980	X20	**C445**	SELECT CAN DIAGNOSTICS
10050	X26	**C443**	CAN BUS ELECTROHYDR. SUPP. CONN.
10120	X27	**C444**	CAN BUS GEARBOX

NOTE: *Supplementary connector* ***C001, C081, C100, C242, C324, C554, C668****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
12210
5420 G
C242-61
C001-2
5420 G
5420 G
SP320B
11770
5420 G
12190
5420 G
C554-5
5420 G
SP324B
C324-16
5420 G
SP69B
C100-16
5420 G
SP72B
SP321B
5420 G
10090
5420 G
X27
C444
6570
5420 G
C668-4
10110
5420 G
5420 G
SP316B
C081-25
C668-2
5420 G
5420 G
3200
5500 R
3260
5510 U
X26
C443
5400 Y
6560
5400 Y
SP316A
C081-26
C668-1
5400 Y
5400 Y
C668-3
5400 Y
5400 Y
9690
5420 G
9680
5400 Y
SP321A
C100-15
5400 Y
SP72A
C324-15
5400 Y
SP69A
C554-4
5400 Y
SP324A
12180
5400 Y
X20
C445
11790
5400 Y
C242-62
C001-1
5400 Y
5400 Y
SP320A
12200
5400 Y
10200
10190
10180
10170
10160
10150
10140
10130
10120
10110
10100
10090
10080
10070
10060
10050
10040
10030
10020
10010
10000
9990
9980
9970
9960
9950
9940
9930
9920
9910

SS07F034 1

Wiring harness - Electrical schematic frame 35 Small colour display / virtual terminal screen (1)

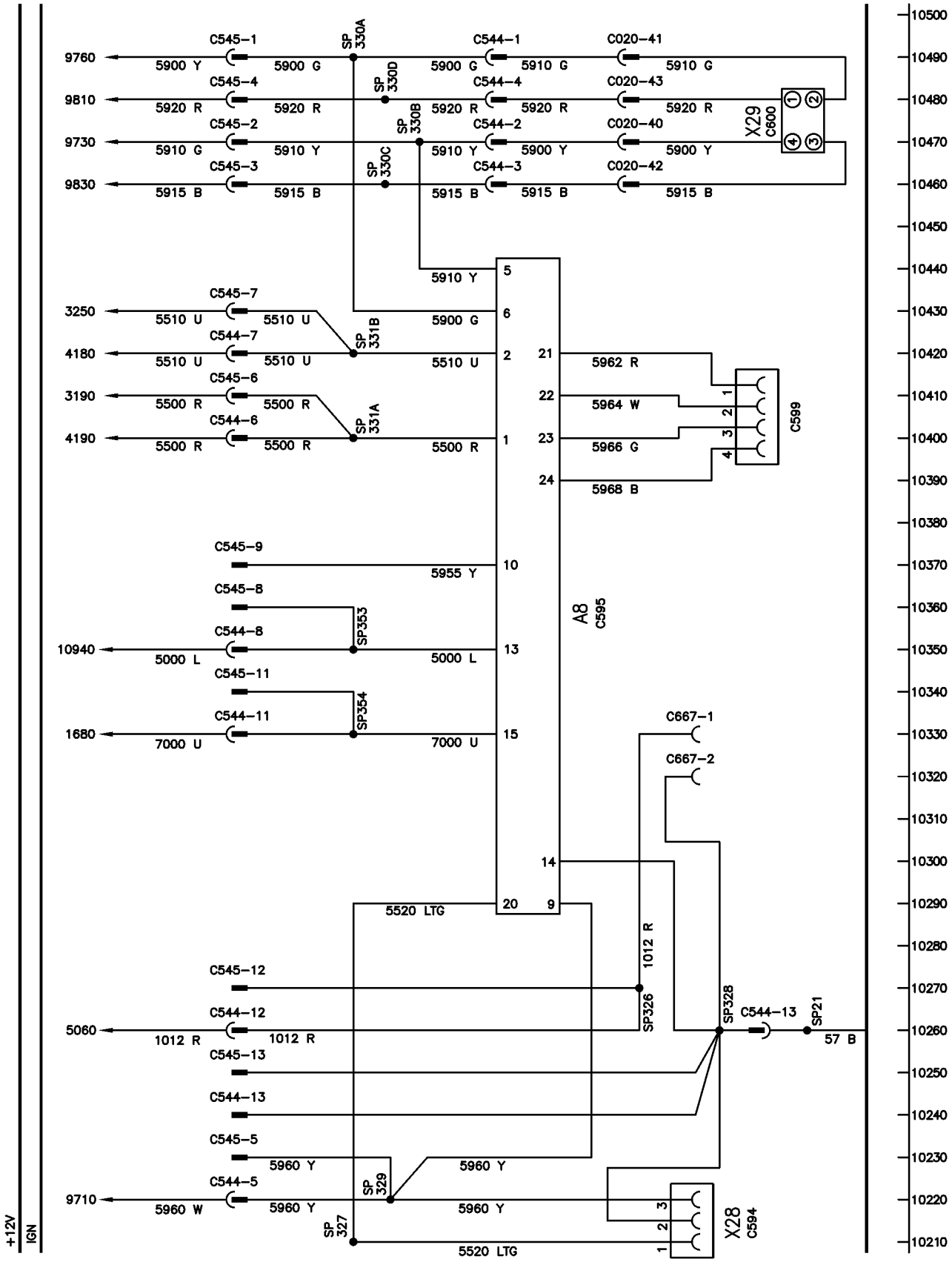
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 10210-10500

Line number	Compo-nent	Connector	Designation
10210	X28	**C594**	REAR-VIEW CAMERA
10340	A8	**C595**	SMALL COLOUR DISPLAY / VIRTUAL TERMINAL
10400		**C599**	USB CONNECTOR
10475	X29	**C600**	SOCKET 2

NOTE: *Supplementary connector* ***C020****,* ***C544****,* ***C545****,* ***C667****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
9760
9810
9730
9830
3250
4180
3190
4190
10940
1680
5060
9710
C545-1
C544-1
C020-41
C545-4
C544-4
C020-43
C545-2
C544-2
C020-40
C545-3
C544-3
C020-42
SP 330A
SP 330D
SP 330B
SP 330C
SP 331B
SP 331A
SP353
SP354
SP 329
SP 327
SP326
SP328
SP21
X29
C600
X28
C594
C599
A8
C595
C545-7
C544-7
C545-6
C544-6
C545-9
C545-8
C544-8
C545-11
C544-11
C667-1
C667-2
C545-12
C544-12
C545-13
C544-13
C545-5
C544-5
C544-13
5900 Y
5900 G
5910 G
5920 R
5910 Y
5915 B
5510 U
5500 R
5955 Y
5000 L
7000 U
1012 R
5960 Y
5960 W
5520 LTG
5962 R
5964 W
5966 G
5968 B
57 B
10500
10490
10480
10470
10460
10450
10440
10430
10420
10410
10400
10390
10380
10370
10360
10350
10340
10330
10320
10310
10300
10290
10280
10270
10260
10250
10240
10230
10220
10210

SS07F035 1

Wiring harness - Electrical schematic frame 36 Small colour display / virtual terminal screen (2)

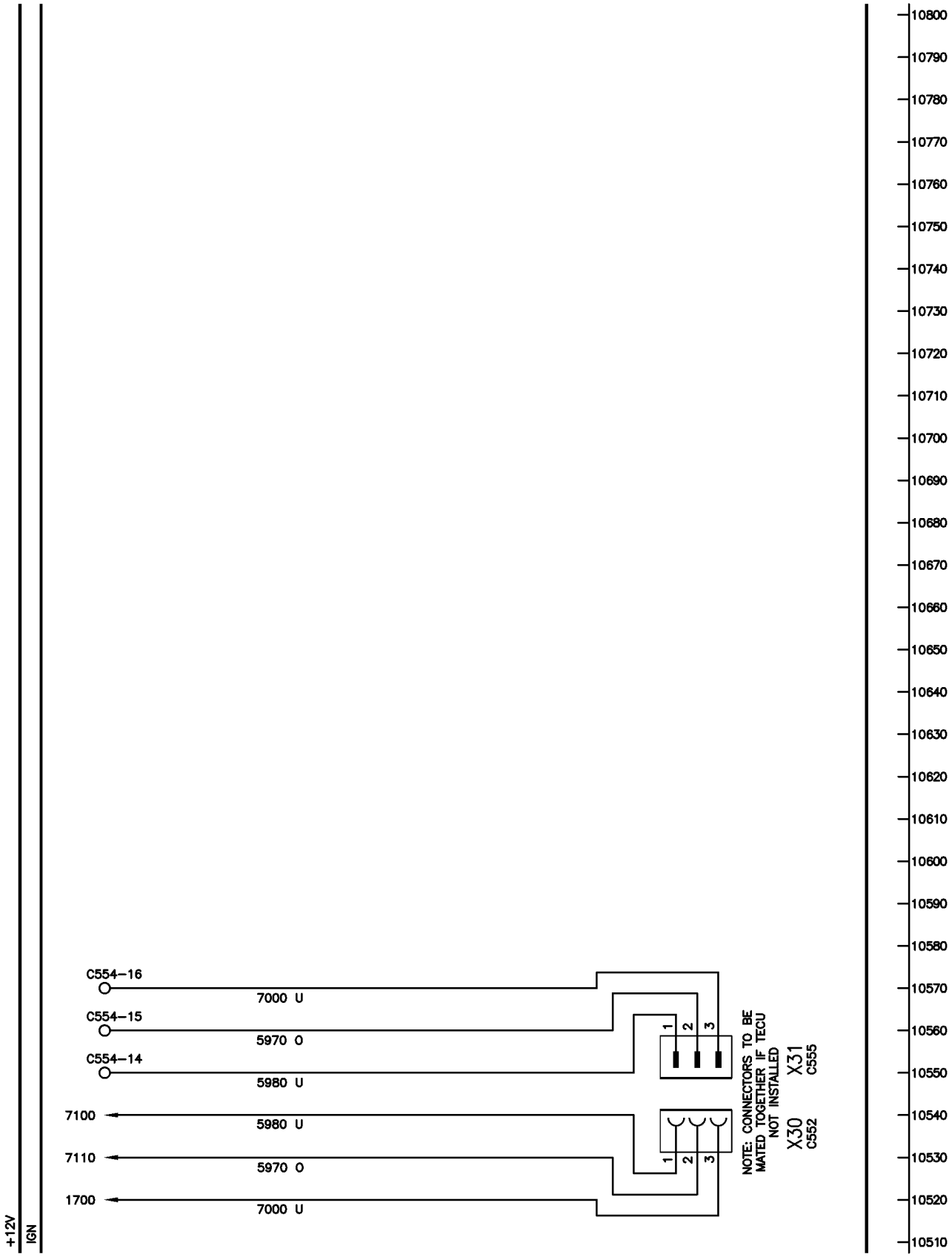
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 10510-10800

Line number	Compo-nent	Connector	Designation
10535	X30	**C552**	NON-TECU POWER 2
10555	X31	**C555**	NON- TECU POWER 1

NOTE: *Supplementary connector* ***C554****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
10800
10790
10780
10770
10760
10750
10740
10730
10720
10710
10700
10690
10680
10670
10660
10650
10640
10630
10620
10610
10600
10590
10580
10570
10560
10550
10540
10530
10520
10510
C554–16
7000 U
C554–15
5970 O
C554–14
5980 U
7100
5980 U
7110
5970 O
1700
7000 U
1
2
3
X31
C555
X30
C552
NOTE: CONNECTORS TO BE MATED TOGETHER IF TECU NOT INSTALLED

SS07F036 1

Wiring harness - Electrical schematic frame 37 Control units (1)

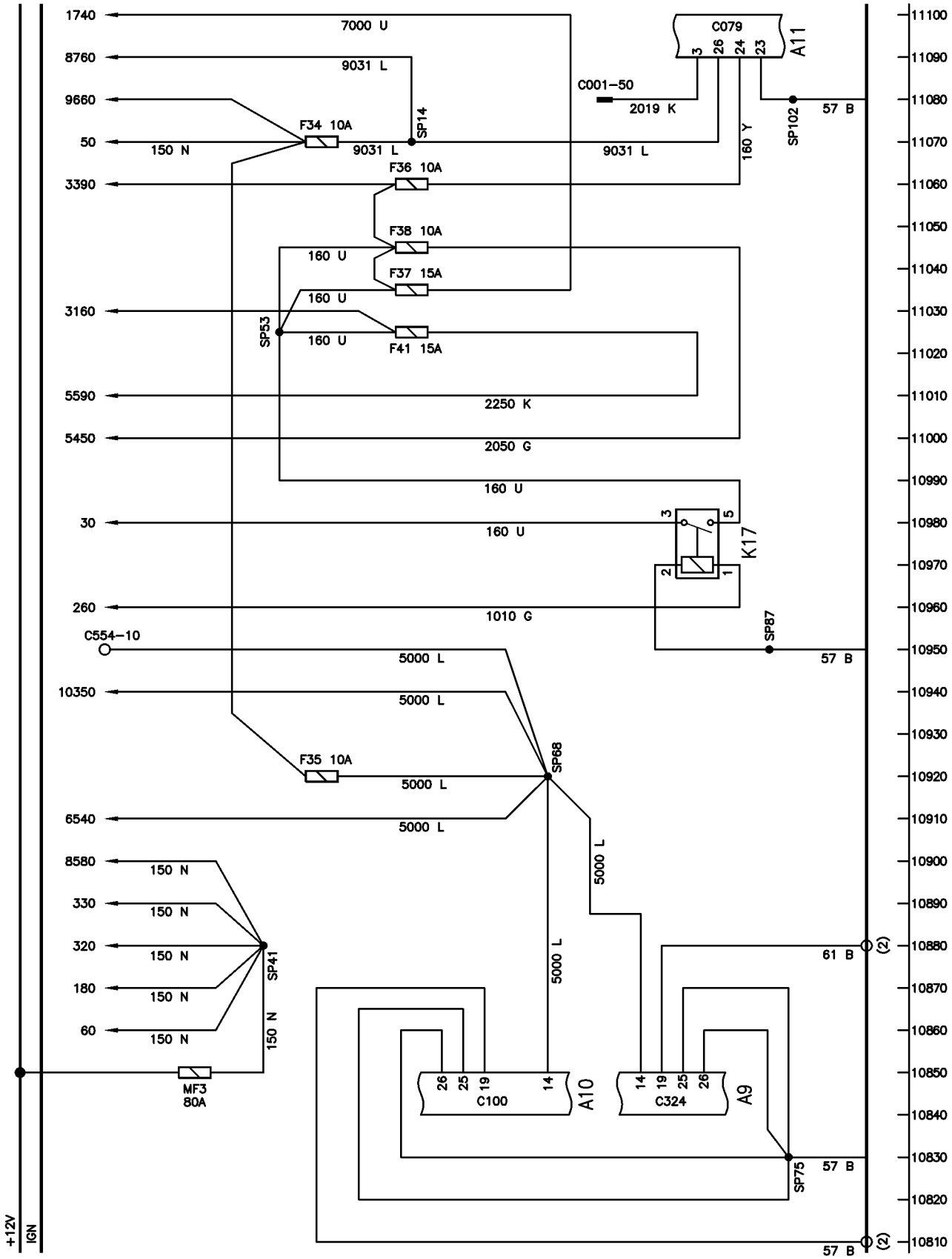
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 10810-11100

Line number	Compo-nent	Connector	Designation
10845	A10	**C100**	GEARBOX CONTROL UNIT PLUG 1
10845	A9	**C324**	MAIN CONTROL UNIT (CN1A)
10850	MF3 - 80A		MAXIFUSE FUSE - B+ BUFFER MEMORY FOR ICU, ENGINE CONTROL UNIT, GEARBOX CONTROL UNIT / STARTER RELAY / FIELD LIGHT C POST
10920	F35 -10A		FUSE - 30V SUPPLY FOR ELECTRONICS
10975	K17		RELAY- SUPPLY FOR ELECTRONICS
11025	F41 -15A		FUSE - FRONT POWER TAKE-OFF (+ LEVER FOR ELECTROHYDR. SUPP. CONN.
11035	F37 -15A		FUSE - GEARBOX FUNCTIONS VIA START SWITCH
11045	F38 -10A		FUSE - REAR POWER TAKE-OFF SWITCH/LIGHT, HITCH, BCM, GROUND SPEED PTO, SPEED INDICATOR PLUG CONNECTOR
11060	F36 -10A		FUSE - ICU A VIA START SWITCH
11070	F34 -10A		FUSE - ICU A /HANDBRAKE SWITCH
11095	A11	**C079**	ICU A

NOTE: *Supplementary connector* ***C001***, ***C554****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


1740
7000 U
8760
9031 L
9660
50
150 N
F34 10A
SP14
9031 L
3390
F36 10A
F38 10A
160 U
F37 15A
160 U
3160
SP53
160 U
F41 15A
5590
2250 K
5450
2050 G
160 U
30
160 U
260
1010 G
C554–10
5000 L
10350
5000 L
F35 10A
5000 L
6540
5000 L
8580
150 N
330
150 N
320
150 N
180
150 N
60
150 N
SP41
150 N
MF3
80A
+12V
IGN
SP68
5000 L
5000 L
C079
3
26
24
23
A11
C001–50
2019 K
SP102
57 B
160 Y
9031 L
K17
3
5
2
1
SP87
57 B
61 B
(2)
C100
26
25
19
14
A10
C324
14
19
25
26
A9
SP75
57 B
57 B
(2)
11100
11090
11080
11070
11060
11050
11040
11030
11020
11010
11000
10990
10980
10970
10960
10950
10940
10930
10920
10910
10900
10890
10880
10870
10860
10850
10840
10830
10820
10810

SS07F037 1

Wiring harness - Electrical schematic frame 38 Control units (2)

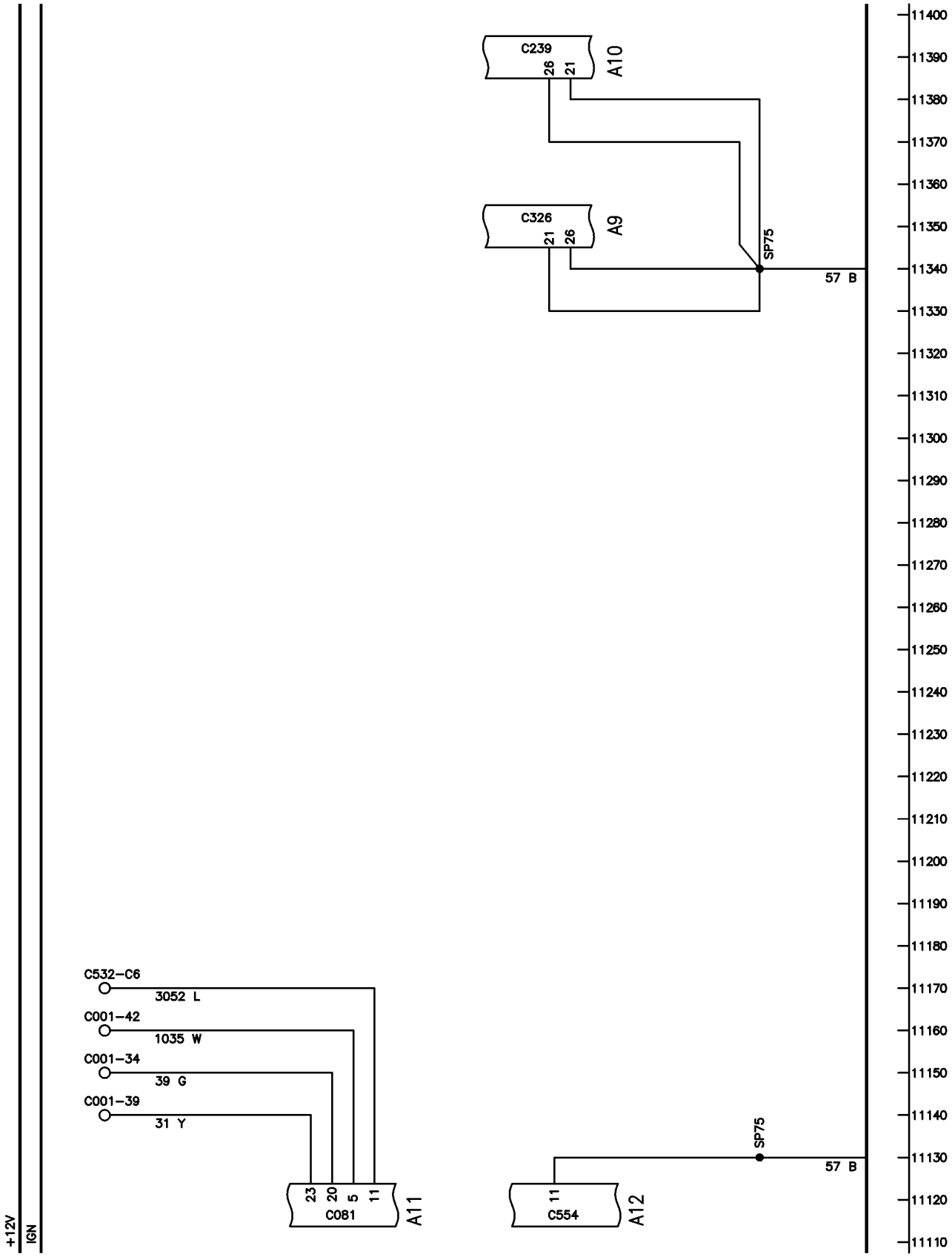
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 11110-11400

Line number	Compo-nent	Connector	Designation
11120	A12	**C554**	TECU - CN1
11120	A11	**C081**	ICU C
11350	A9	**C326**	MAIN CONTROL UNIT (CN2)
11390	A10	**C239**	FULL POWER SHIFT PLUG CONNECTOR 3RD CONTROL UNIT

NOTE: *Supplementary connector* ***C001****,* ***C532****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
C239
26
21
A10
C326
21
26
A9
SP75
57 B
C532-C6
3052 L
C001-42
1035 W
C001-34
39 G
C001-39
31 Y
23
20
5
11
C081
A11
SP75
57 B
11
C554
A12
11400
11390
11380
11370
11360
11350
11340
11330
11320
11310
11300
11290
11280
11270
11260
11250
11240
11230
11220
11210
11200
11190
11180
11170
11160
11150
11140
11130
11120
11110

SS07F038 1

Wiring harness - Electrical schematic frame 39 Air conditioning system (1)

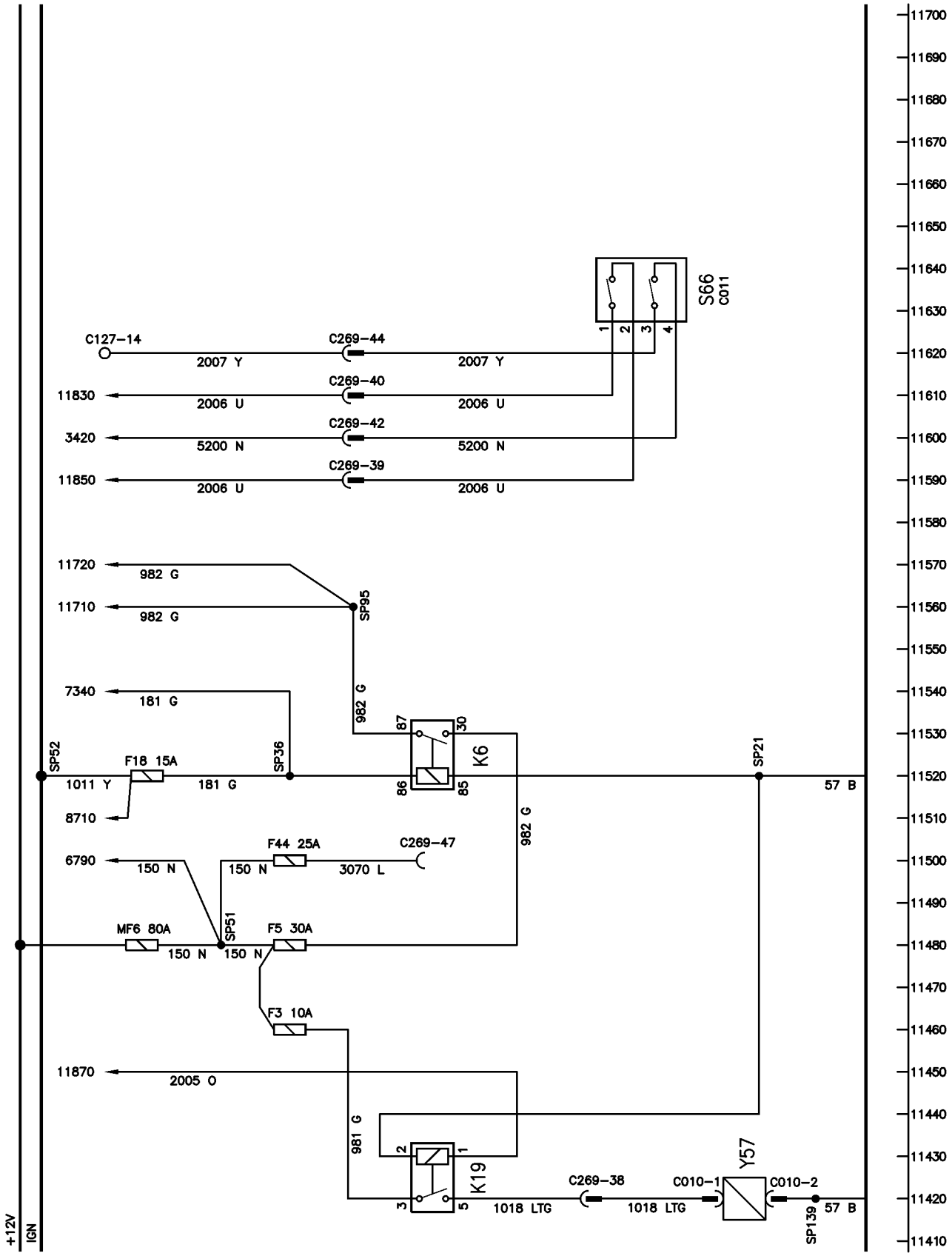
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 11410-11700

Line number	Compo-nent	Connector	Designation
11420	Y57	**C010**	A/C compressor
11425	K19		RELAY - SUPPLY FOR COMPRESSOR COUPLING
11460	F3 -10A		FUSE - A/C COMPRESSOR COUPLING
11480	F5 -30A		FUSE - BLOWER MOTOR
11480	MF6 - 80A		MAXIFUSE FUSE - SUPPLEMENTARY EQUIPMENT FOR CAB / CAB POWER SOCKET
11500	F44 -25A		FUSE - FRONT B+, FRONT ATTACHMENTS
11520	F18 -15A		FUSE - BLOWER MOTOR RELAY + DRIVER'S SEAT
11520	K6		RELAY - BLOWER MOTOR
11630	S66	**C011**	PRESSURE SWITCH AIR PRESSURE - SURFACE MOUNT

NOTE: *Supplementary connector* ***C127****,* ***C269****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


S66
C011
C127-14
C269-44
2007 Y
2007 Y
11830
C269-40
2006 U
2006 U
3420
C269-42
5200 N
5200 N
11850
C269-39
2006 U
2006 U
11720
982 G
11710
982 G
SP95
7340
181 G
982 G
SP52
F18 15A
SP36
1011 Y
181 G
8710
K6
SP21
57 B
982 G
6790
150 N
F44 25A
150 N
C269-47
3070 L
MF6 80A
150 N
SP51
150 N
F5 30A
F3 10A
11870
2005 O
981 G
K19
Y57
C269-38
1018 LTG
C010-1
1018 LTG
C010-2
SP139
57 B
+12V
IGN
11700
11690
11680
11670
11660
11650
11640
11630
11620
11610
11600
11590
11580
11570
11560
11550
11540
11530
11520
11510
11500
11490
11480
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11430
11420
11410

SS07F039 1

Wiring harness - Electrical schematic frame 40 Air conditioning (2) - automatic temperature control

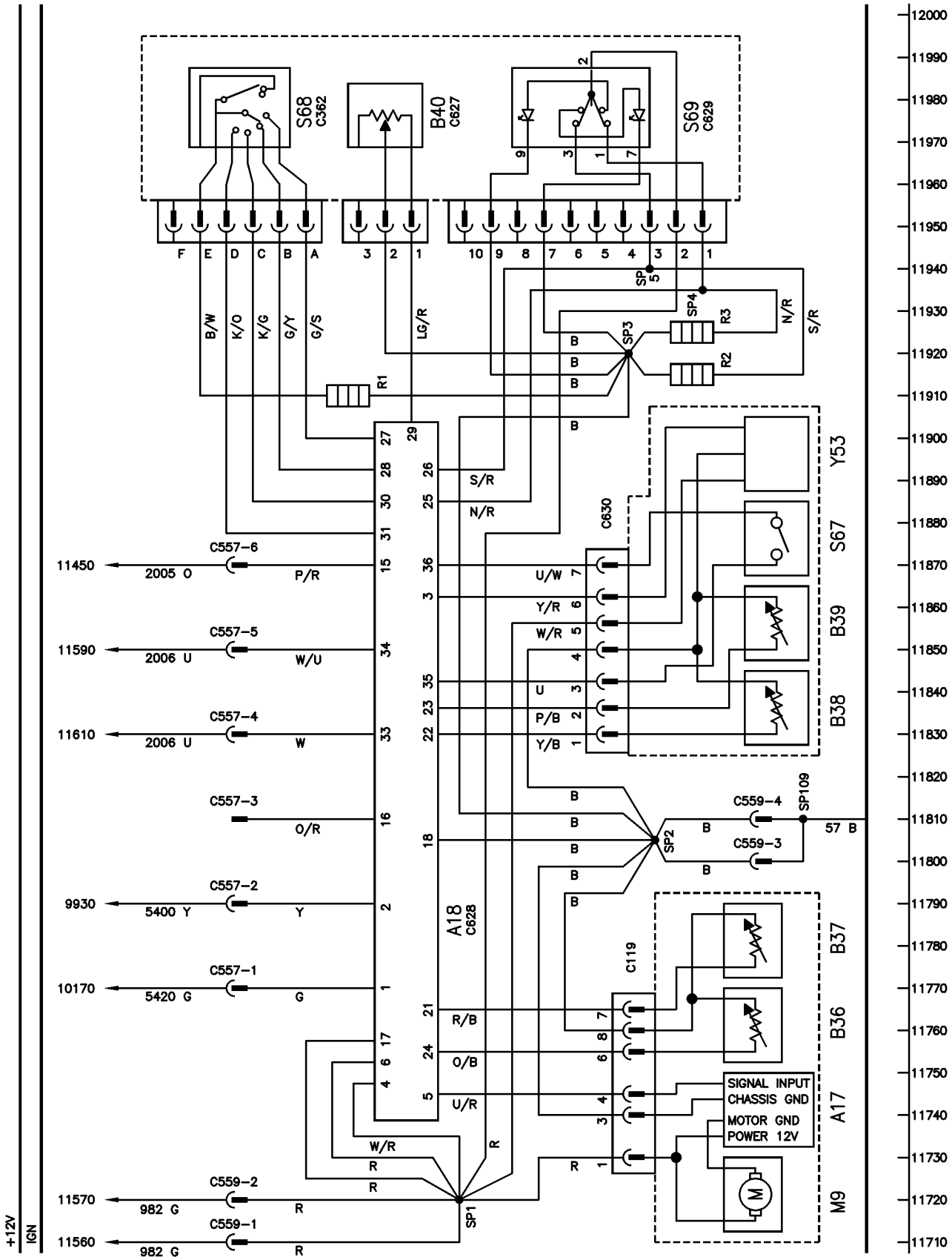
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 11710-12000

Line number	Compo-nent	Connector	Designation
11720	M9	**C119**	PLUG CONNECTOR HEATING /AIR CONDITIONING
11740	A17	**C119**	PLUG CONNECTOR HEATING /AIR CONDITIONING
11760	B36	**C119**	PLUG CONNECTOR HEATING /AIR CONDITIONING
11780	B37	**C119**	PLUG CONNECTOR HEATING /AIR CONDITIONING
11820	A18	**C628**	AUTOMATIC AIR CONDITIONING
11830	B38	**C630**	AIR CONDITIONING
11860	B39	**C630**	AIR CONDITIONING
11880	S67	**C630**	AIR CONDITIONING
11900	Y53	**C630**	AIR CONDITIONING
11980	B40	**C627**	TEMPERATURE CONTROL
11980	S68	**C362**	HEATER BLOWER SWITCH
11980	S69	**C629**	AIR CONDITIONING SWITCH

NOTE: *Supplementary connector* ***C557****,* ***C559****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


S68 C362
B40 C627
S69 C629
F E D C B A
3 2 1
10 9 8 7 6 5 4 3 2 1
B/W
K/O
K/G
G/Y
G/S
LG/R
SP5
SP4
SP3
R3
R2
R1
N/R
S/R
C557-6
11450
2005 O
P/R
C557-5
11590
2006 U
W/U
C557-4
11610
2006 U
W
C557-3
O/R
C557-2
9930
5400 Y
Y
C557-1
10170
5420 G
G
C559-2
11570
982 G
R
C559-1
11560
982 G
R
+12V
IGN
A18 C628
SP1
SP2
C630
U/W
Y/R
W/R
U
P/B
Y/B
Y53
S67
B39
B38
C559-4
C559-3
SP109
57 B
C119
R/B
O/B
U/R
W/R
SIGNAL INPUT
CHASSIS GND
MOTOR GND
POWER 12V
B37
B36
A17
M9
M
12000
11990
11980
11970
11960
11950
11940
11930
11920
11910
11900
11890
11880
11870
11860
11850
11840
11830
11820
11810
11800
11790
11780
11770
11760
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11720
11710

SS07F040 1

Wiring harness - Electrical schematic frame 41 Air conditioning (3) - manual temperature control

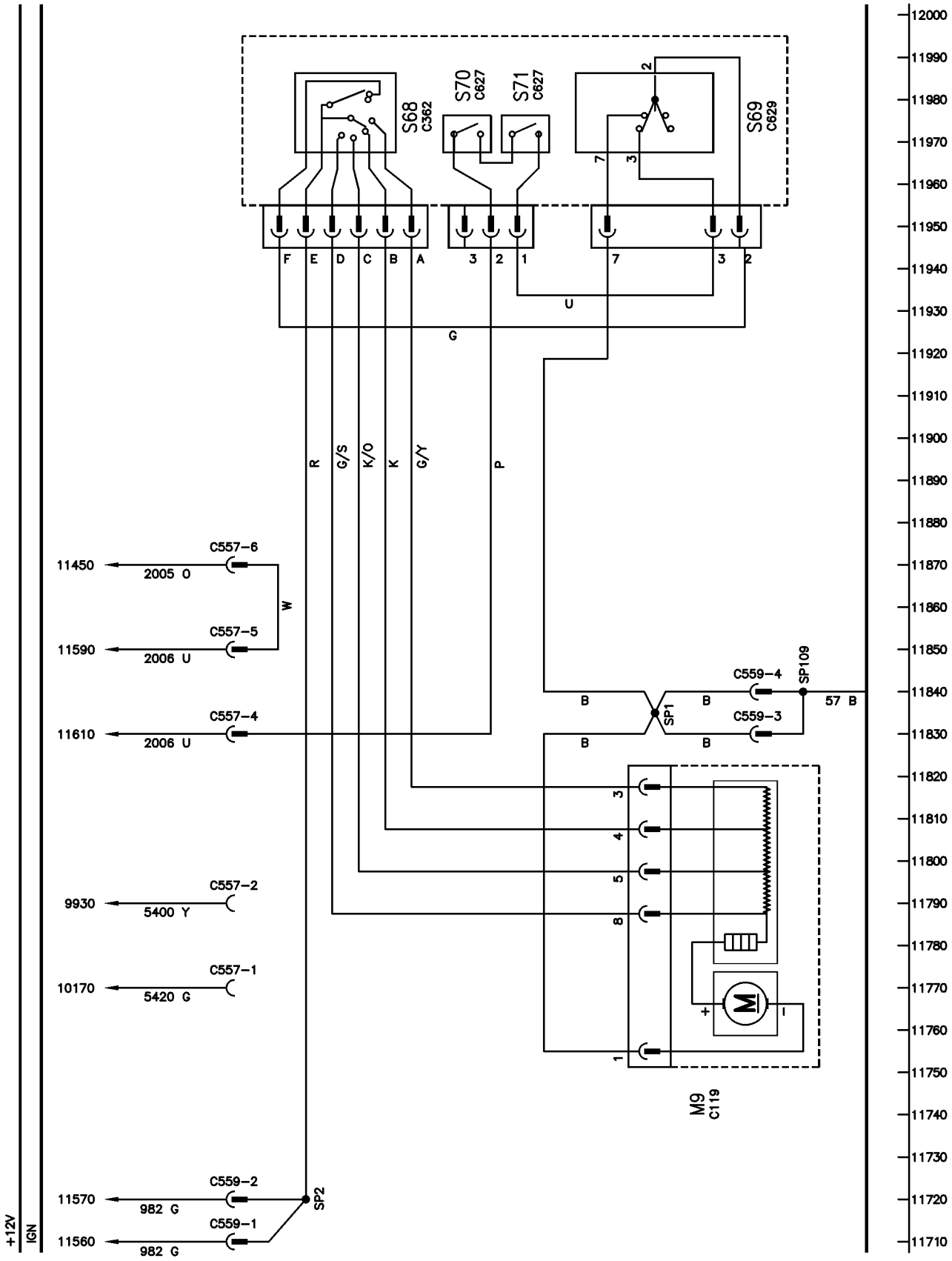
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 11710-12000

Line number	Compo-nent	Connector	Designation
11780	M9	**C119**	PLUG CONNECTOR HEATING /AIR CONDITIONING
11970	S70	**C627**	LP PRESSURE MONITOR
11970	S71	**C627**	LOW TEMPERATURE SAFETY SWITCH (FROST PROTECTION)
11970	S68	**C362**	HEATER BLOWER SWITCH
11970	S69	**C629**	AIR CONDITIONING SWITCH

NOTE: *Supplementary connector* ***C557****,* ***C559****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


S68 C362
S70 C627
S71 C627
S69 C629
F E D C B A
3 2 1
7 3 2
U
G
R
G/S
K/O
K
G/Y
P
C557-6
11450
2005 O
W
C557-5
11590
2006 U
C557-4
11610
2006 U
C557-2
9930
5400 Y
C557-1
10170
5420 G
C559-2
11570
982 G
C559-1
11560
982 G
SP2
C559-4
SP109
57 B
SP1
C559-3
B
M9 C119
+12V
IGN
12000
11990
11980
11970
11960
11950
11940
11930
11920
11910
11900
11890
11880
11870
11860
11850
11840
11830
11820
11810
11800
11790
11780
11770
11760
11750
11740
11730
11720
11710

SS07F041 1

Wiring harness - Electrical schematic frame 42 ARU (1) - Armrest controller

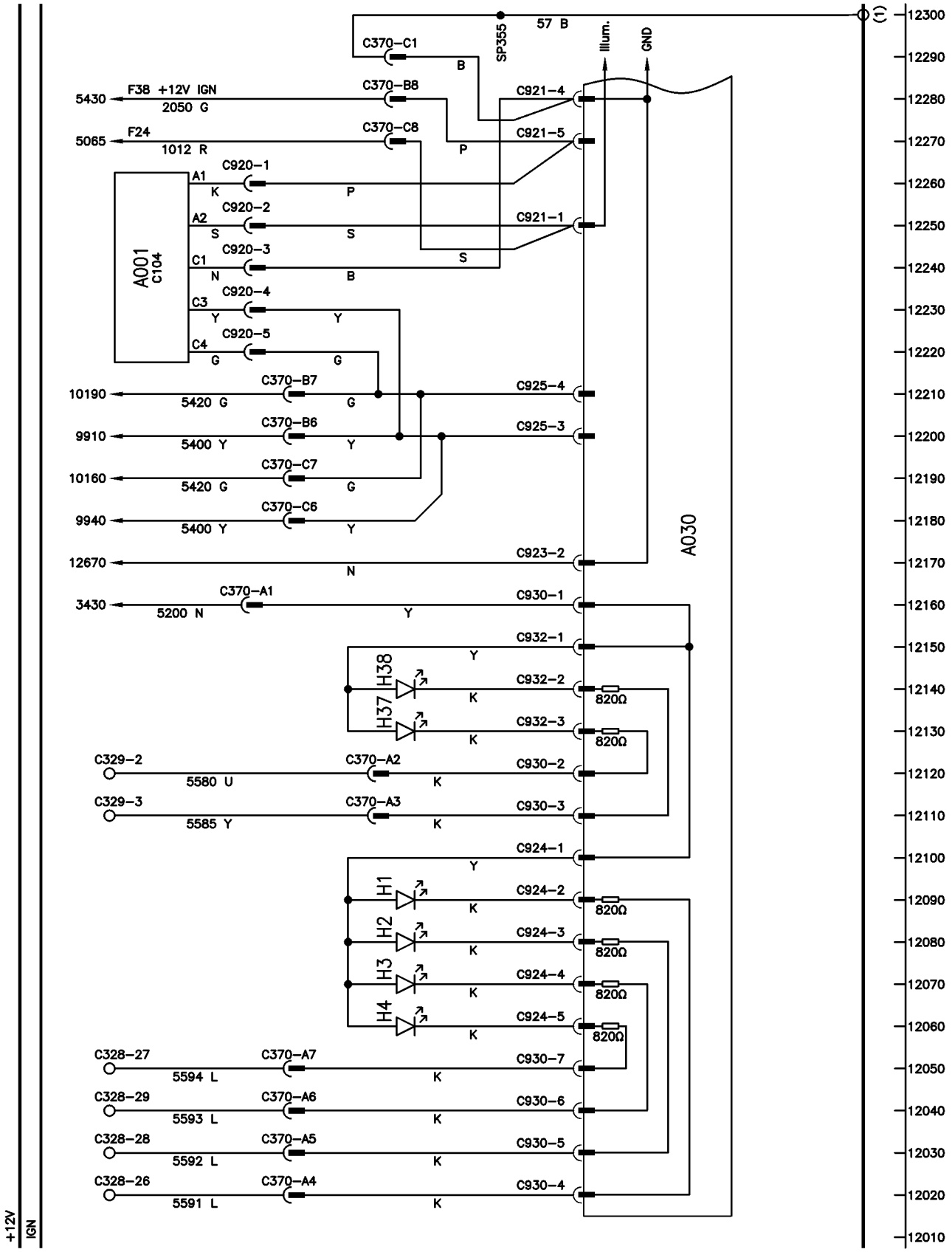
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 12010-12300

Line number	Compo-nent	Connector	Designation
12150	A030		PCB ARU
12240	A001	**C104**	SPEED INDICATOR

NOTE: *Supplementary connector* ***C328****,* ***C329****,* ***C370****,* ***C920****,* ***C921****,* ***C923****,* ***C924****,* ***C925****,* ***C930****,* ***C932****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
SP355
57 B
Illum.
GND
(1)
A001
C104
A030
F38 +12V IGN
2050 G
F24
1012 R
5430
5065
C370-C1
C370-B8
C370-C8
C920-1
C920-2
C920-3
C920-4
C920-5
A1
A2
C1
C3
C4
C921-4
C921-5
C921-1
C370-B7
C370-B6
C370-C7
C370-C6
10190
9910
10160
9940
5420 G
5400 Y
C925-4
C925-3
C923-2
12670
C370-A1
3430
5200 N
C930-1
C932-1
H38
H37
C932-2
C932-3
820Ω
C329-2
C329-3
5580 U
5585 Y
C370-A2
C370-A3
C930-2
C930-3
C924-1
H1
H2
H3
H4
C924-2
C924-3
C924-4
C924-5
C328-27
C328-29
C328-28
C328-26
5594 L
5593 L
5592 L
5591 L
C370-A7
C370-A6
C370-A5
C370-A4
C930-7
C930-6
C930-5
C930-4
12300
12290
12280
12270
12260
12250
12240
12230
12220
12210
12200
12190
12180
12170
12160
12150
12140
12130
12120
12110
12100
12090
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12020
12010

SS07F042 1

Wiring harness - Electrical schematic frame 43 ARU (2) - Armrest controller

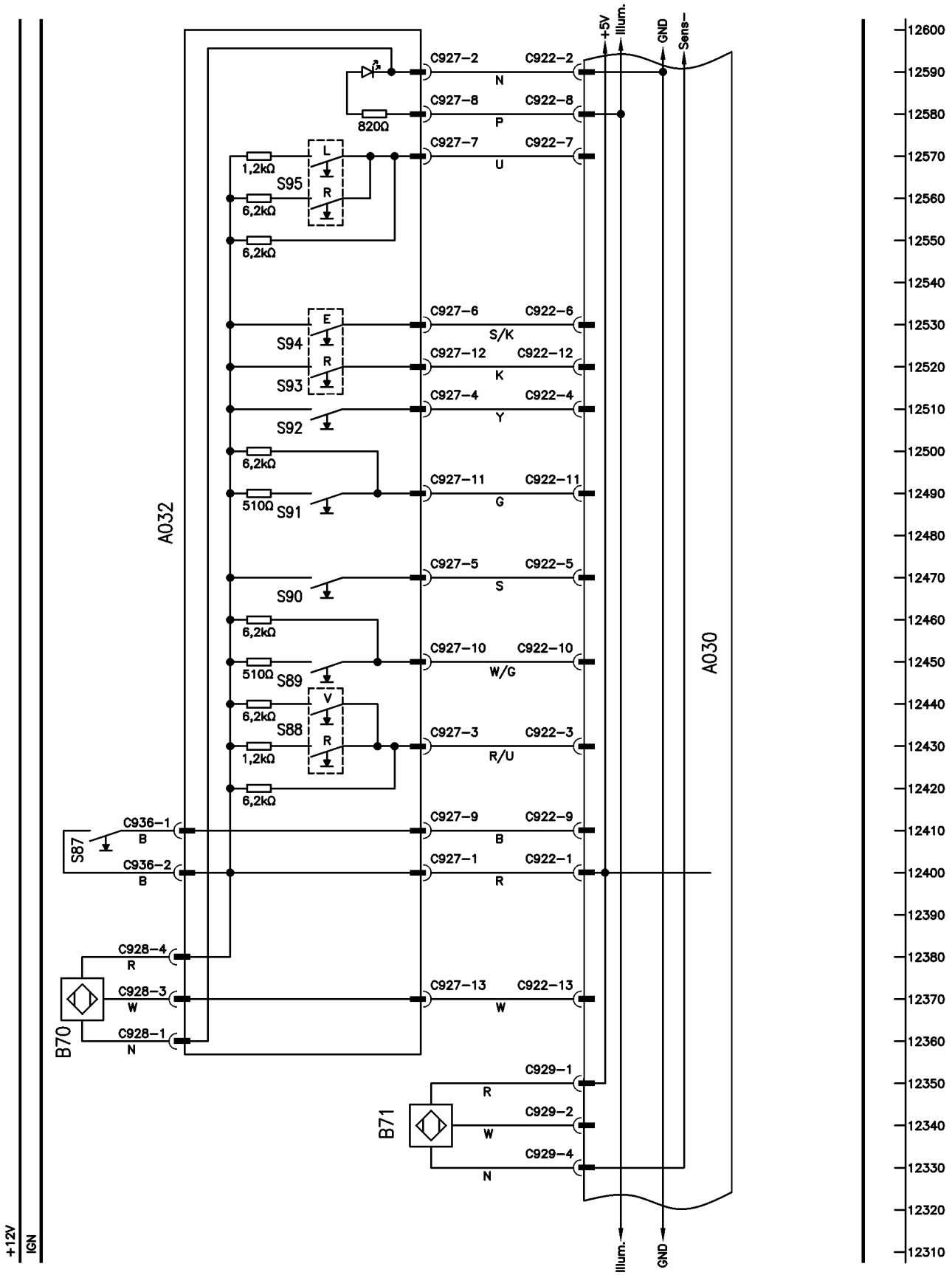
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 12310-12600

Line number	Compo-nent	Connector	Designation
12340	B71	**C929**	ARU - MANUAL ACCELERATOR SLIDER
12370	B70	**C928**	ARU - MULTICONTROLLER - FINGER WHEEL
12410	S87	**C936**	ARU - SHIFT PUSHBUTTON
12430	S88		FORWARDS/REVERSE PUSHBUTTON
12450	S89		AUTO TRANS PUSHBUTTON
12450	A030		PCB ARU
12470	S90		HEADLAND MANAGEMENT CONTROL PUSHBUTTON (FIELD MANAGEMENT)
12480	A032		MULTICONTROLLER
12490	S91		PUSH BUTTON SPEED "+"
12510	S92		PUSH BUTTON SPEED "-"
12520	S93		PUSH BUTTON EDC RAISE
12530	S94		PUSHBUTTON EDC LOWER
12570	S95		PUSHBUTTON EDC CONTROL-TRANSPORT

NOTE: *Supplementary connector* ***C922****,* ***C927****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
A032
A030
B70
B71
S87
S88
S89
S90
S91
S92
S93
S94
S95
820Ω
1,2kΩ
6,2kΩ
510Ω
L
R
E
V
+5V
Illum.
GND
Sens-
C927-2
C922-2
N
C927-8
C922-8
P
C927-7
C922-7
U
C927-6
C922-6
S/K
C927-12
C922-12
K
C927-4
C922-4
Y
C927-11
C922-11
G
C927-5
C922-5
S
C927-10
C922-10
W/G
C927-3
C922-3
R/U
C927-9
C922-9
B
C927-1
C922-1
R
C936-1
C936-2
C928-4
C928-3
C928-1
C927-13
C922-13
W
C929-1
C929-2
C929-4
12600
12590
12580
12570
12560
12550
12540
12530
12520
12510
12500
12490
12480
12470
12460
12450
12440
12430
12420
12410
12400
12390
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12370
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12340
12330
12320
12310

SS07F043 1

Wiring harness - Electrical schematic frame 44 ARU (3) - Armrest controller

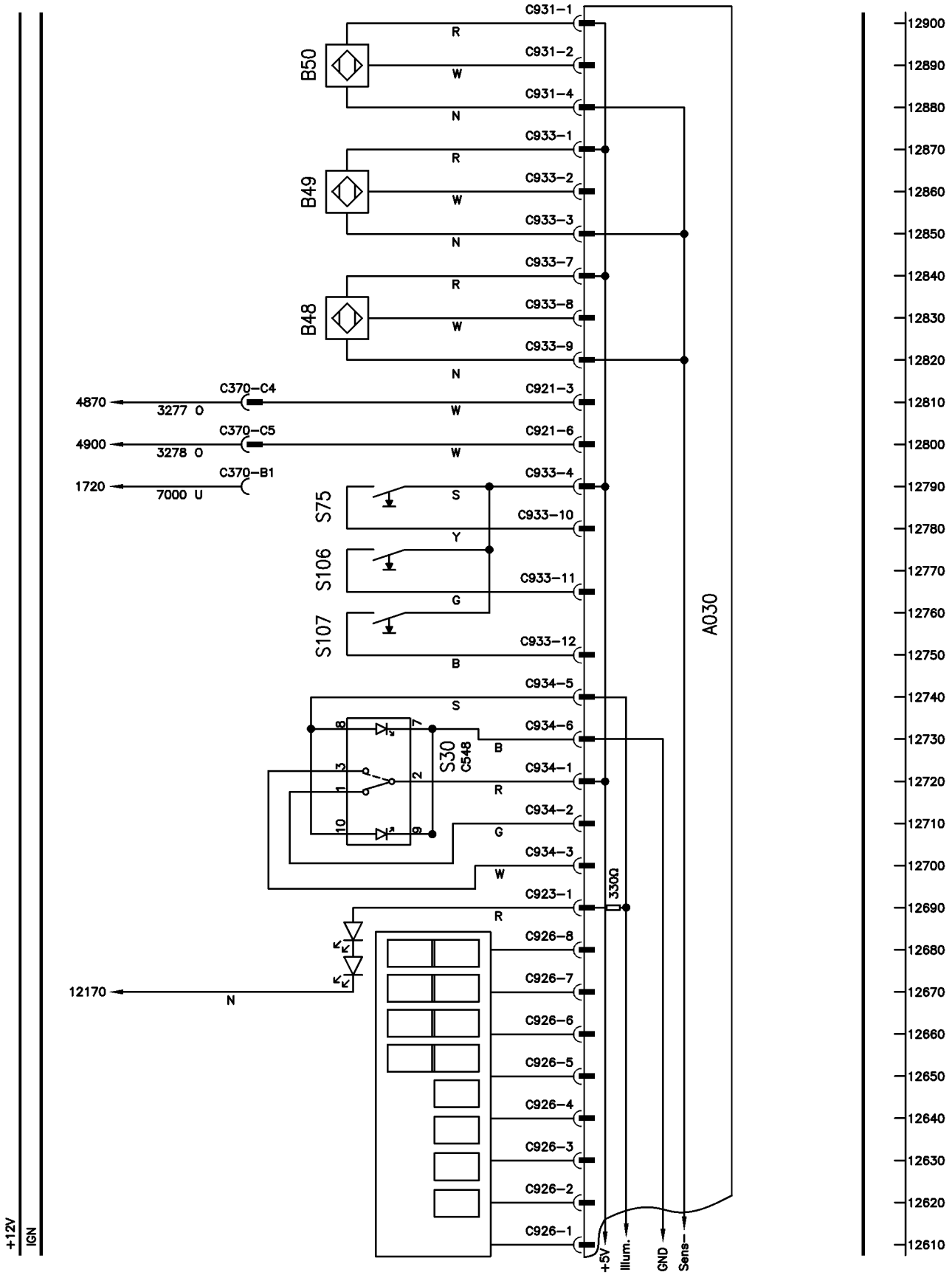
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Line range 12610-12900

Line number	Compo-nent	Connector	Designation
12720	S30	**C548**	ELECTROHYDR. SUPP. CONN. SELECTOR SWITCH
12740	A030		PCB ARU
12750	S107	**C933**	ARU - JOYSTICK, PUSHBUTTON
12765	S106	**C933**	ARU - JOYSTICK, PUSHBUTTON
12780	S75	**C933**	ARU - JOYSTICK, PUSHBUTTON
12830	B48	**C933**	ARU - JOYSTICK, PUSHBUTTON
12860	B49	**C933**	ARU - JOYSTICK, PUSHBUTTON
12890	B50	**C931**	ARU - CONTROL LEVER EDC3

NOTE: *Supplementary controller* ***C370****,* ***C921****,* ***C923****,* ***C926****,* ***C934****.*

CABLE COLOUR CODING							
B	Black	R	Red	LG	Light green	K	Pink
N	Brown	O	Orange	U	Blue	W	White
LN	Light brown	Y	Yellow	TQ	Turquoise		
S	Slate	G	Green	P	Purple		


+12V
IGN
B50
B49
B48
S75
S106
S107
S30
C548
A030
C931-1
C931-2
C931-4
C933-1
C933-2
C933-3
C933-7
C933-8
C933-9
C933-4
C933-10
C933-11
C933-12
C934-5
C934-6
C934-1
C934-2
C934-3
C923-1
330Ω
C926-8
C926-7
C926-6
C926-5
C926-4
C926-3
C926-2
C926-1
C370-C4
C370-C5
C370-B1
C921-3
C921-6
4870
3277 O
4900
3278 O
1720
7000 U
12170
N
R
W
N
S
Y
G
B
+5V
Illum.
GND
Sens-
12900
12890
12880
12870
12860
12850
12840
12830
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12700
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12610

SS07F044 1

Wiring harness - Component Diagram 00 Plug connections 00-09

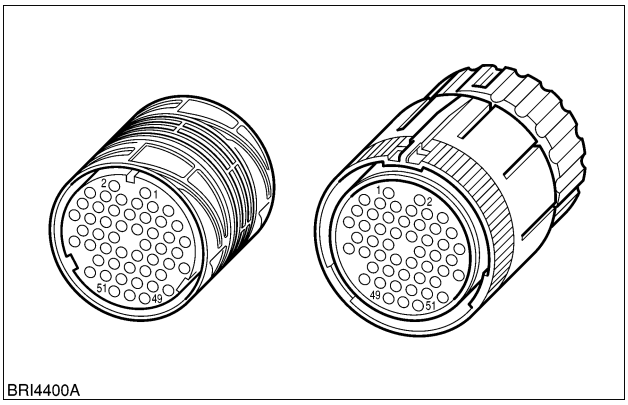
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C001 PLUG CONNECTION FOR THE MAIN WIRING HARNESS - E1 - ENGINE TO CAB

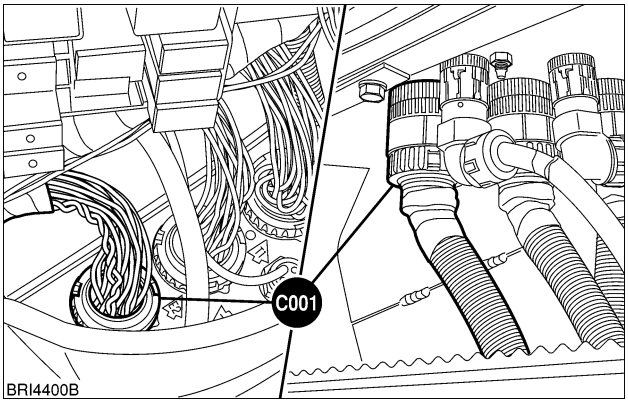
PLUG CONNECTION C001 PLUG CONNECTION FOR THE MAIN WIRING HARNESS - E1 - ENGINE TO CAB			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5400D (Y)	CAN H	
2	5420D (G)	FRONT POWER LIFT COMMON RAIL	
10	2556 (N)	FRONT POWER LIFT COMMON RAIL	
13	6407 (O)	SIGNAL FOR ENGINE SHUTDOWN (EDC16)	
14	6408D (O) /6408D (G)	FUSE-PROTECTED VOLTAGE B+ TO CONTROL UNIT (1)	
15	6408A (G)	FUSE-PROTECTED VOLTAGE B+ TO CONTROL UNIT (1)	
16	6408B (G)	FUSE-PROTECTED VOLTAGE B+ TO CONTROL UNIT (1)	
17	6408C (G)	FUSE-PROTECTED VOLTAGE B+ TO CONTROL UNIT (1)	
18	1135 (G)	WARNING LIGHT AUXILIARY START SYSTEM	
19	650 (TQ)	COOLANT GAUGE SENSOR	
20	6418 (K)	CONTROL UNIT TO J1941(ISO) INTERFACE 2 PLUG CONNECTION ISO K	
21	6414 (G)	FUSE-PROTECTED POWER SUPPLY VIA STARTER SWITCH+ TO CONTROL UNIT	
22	2040 (LTG)	WATER SENSOR FOR THE WATER SEPARATOR	
23	6310 (N)	FAN SOLENOID VALVE	
24	3016 (S)	BRAKE FLUID LEVEL SIGNAL	
25	10J (G) / 10H (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	
26	1030B (U)	HEADLAMP DIP BEAM	
27	1030A (U)	HEADLAMP DIP BEAM	
29	1073A (L)	POWER SUPPLY FRONT WORK LAMP	
30	376 (L)	POWER SUPPLY HORN	
31	57AH (B)	VEHICLE EARTH (ALL)	
32	57AJ (B)	VEHICLE EARTH (ALL)	
33	57AK (B)	VEHICLE EARTH (ALL)	
34	39B (G)	SIGNAL TEMPERATURE DISPLAY	
35	57AM (B)	VEHICLE EARTH (ALL)	
36	1027B (U)	MAIN BEAM	
37	1027A (U)	MAIN BEAM	
38	2095A (G) / 2095 (G)	EARTH SIGNAL INSTRUMENTS	
39	31 (Y)	SIGNAL ENGINE OIL PRESSURE SENSOR	
40	2014 (G)	ENGINE OIL PRESSURE SENSOR (+5 VOLT)	
41	1006A (N) / 1006 (N)	WARNING LIGHT 3-PHASE ALTERNATOR	
42	1035 (W)	WARNING LIGHT ENGINE OIL PRESSURE	

43	71C (W)	POWER SUPPLIES WHEN STARTER SWITCH SWITCHED ON (NOT PROTECTED BY FUSE)
44	1005 (S)	WARNING LIGHT AIR FILTER
45	1001S (W)	POWER SUPPLY ENGAGING MAGNET
46	1001T (W)	POWER SUPPLY ENGAGING MAGNET
47	2050AF (G)	POWER SUPPLY PTO / SHIFTING CLAW
48	6300 (N)	FAN SPEED
49	5020H (TN)	EPC CONTOLLER +5V REFERENCE VOLTAGE LOWERING SPEED
50	2019 (K)	ENGINE SPEED (TACHO MODULE TO PERFORMANCE MONITOR)

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4400B-01 1



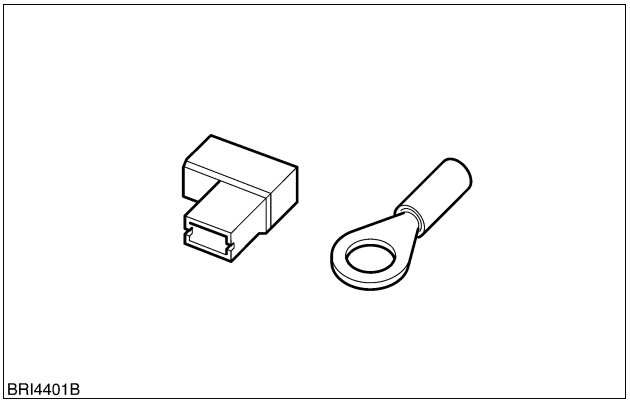
BRI4400B 2

RIGHT-HAND FRONT - CAB FLOOR

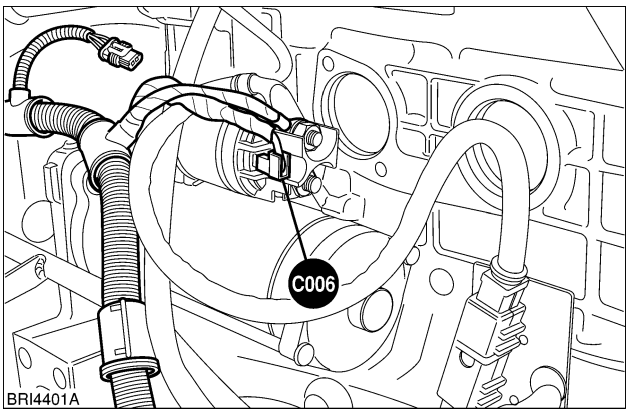
C006 ENGAGING MAGNET

PLUG CONNECTION C006 ENGAGING MAGNET			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
0	150B (B)	BATTERY POWER SUPPLY (NO FUSE) (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 01 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**
1	1001 (W)	POWER SUPPLY ENGAGING MAGNET	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4401B 3



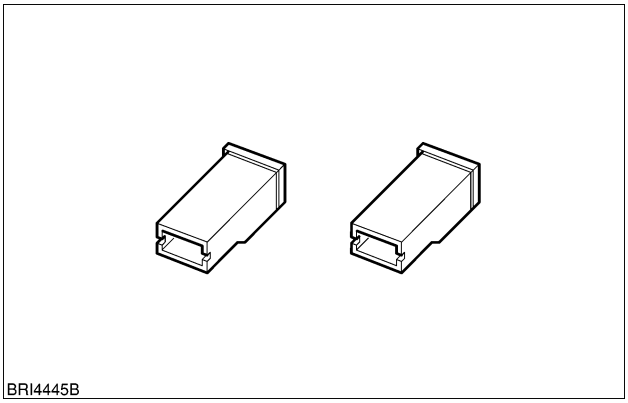
C006-BRI4401A 4

RIGHT-HAND SIDE REAR - ENGINE

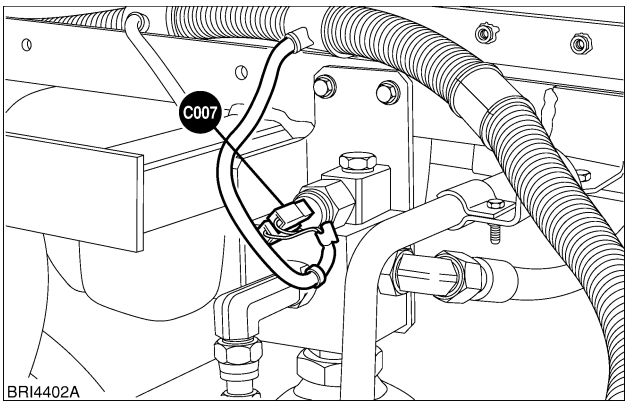
C007 BRAKE FLUID LEVEL SWITCH

PLUG CONNECTION C007 BRAKE FLUID LEVEL SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3016 (S) / 10H (G)	BRAKE FLUID LEVEL SIGNAL / VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 31 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 31 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4445B-03 5



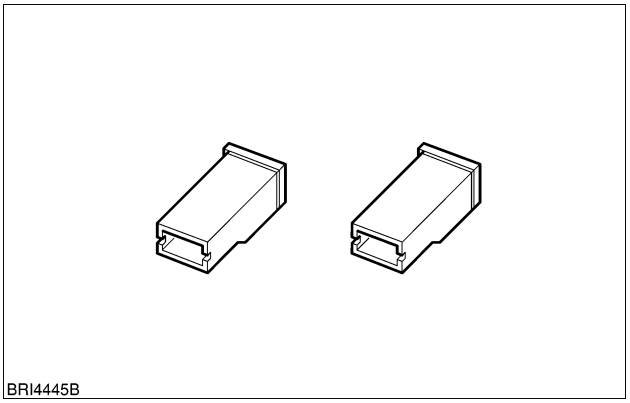
C007-BRI4402A-1 6

LEFT-HAND SIDE TOP - ENGINE

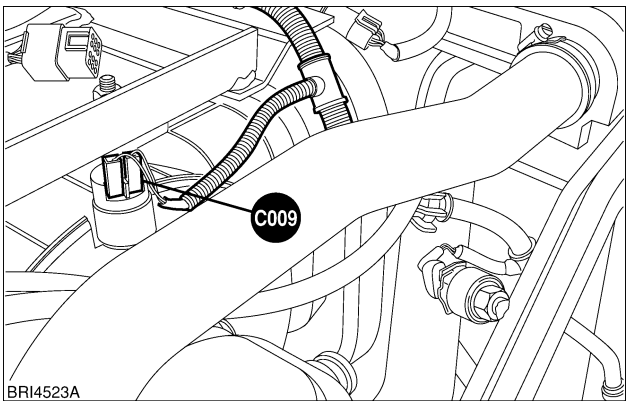
C009 AIR FILTER LOW PRESSURE SWITCH

PLUG CONNECTION C009 AIR FILTER LOW PRESSURE SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1005 (S) / 57JB (B)	AIR FILTER WARNING LIGHT / VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 02 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 03 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4445B-03 7



C009-BRI4523A 8

RIGHT-HAND SIDE TOP - ENGINE

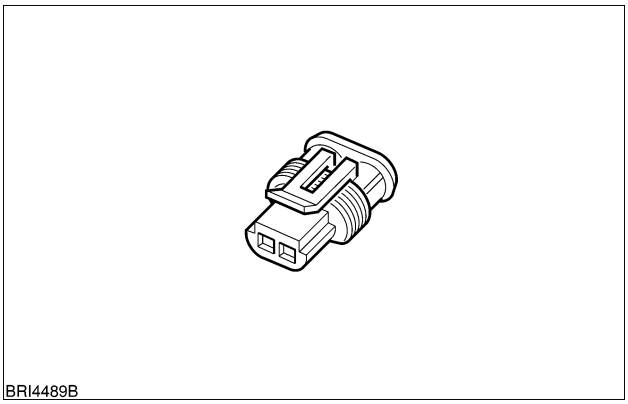
Wiring harness - Component diagram 01 Plug connections 10-19

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

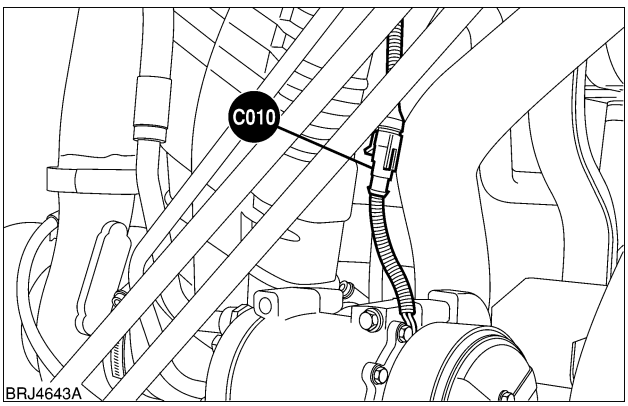
C010 AIR CON COMPRESSOR PLUG CONNECTION

PLUG CONNECTION C010 AIR CONDITIONING COMPRESSOR PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1018 (LTG)	AIR CONDITIONING COMPRESSOR COUPLING	PUMA Standard: **Wiring harness - Electrical schematic frame 39 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 39 (A.30.A)**
2	57JC (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 1



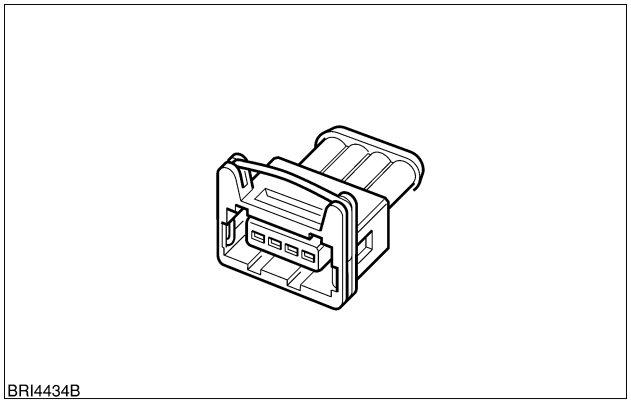
C010-BRJ4643A 2

RIGHT-HAND - ENGINE

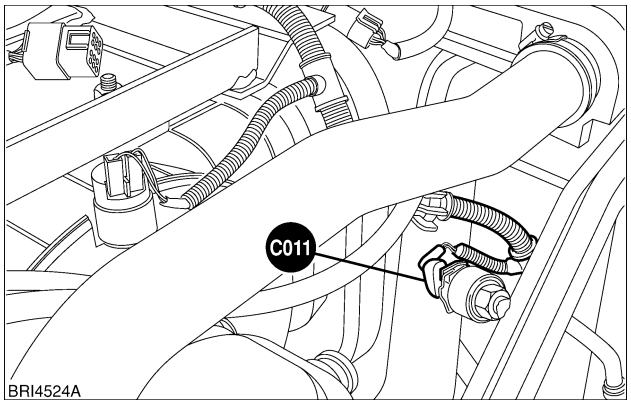
C011 AIR CONDITIONING PRESSURE SWITCH

PLUG CONNECTION C011 AIR CONDITIONING PRESSURE SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2006A (U)	DEICING SWITCH - AIR CONDITIONING	PUMA Standard: **Wiring harness - Electrical schematic frame 39 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 39 (A.30.A)**
2	2006B (U)	DEICING SWITCH - AIR CONDITIONING	
3	2007 (Y)	AIR CONDITIONING LOW PRESSURE	
4	5200AA (N)	POWER SUPPLY EPC CONTROL VALVE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4434B 3



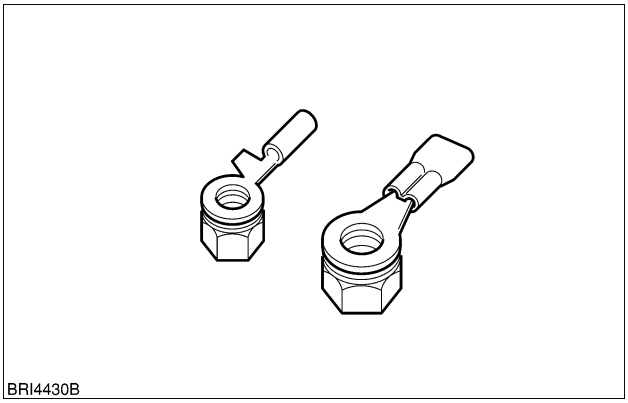
C011-BRI4524A 4

RIGHT-HAND SIDE FRONT TOP - ENGINE

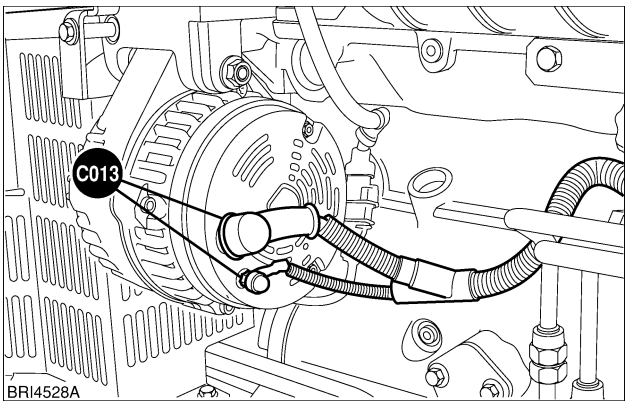
C013 GENERATOR PLUG CONNECTION

PLUG CONNECTION C013 GENERATOR PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
0	1006 (N) / 150 (N)	GENERATOR WARNING LIGHT / BATTERY POWER SUPPLY (NO FUSE) (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 01 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4430B 5



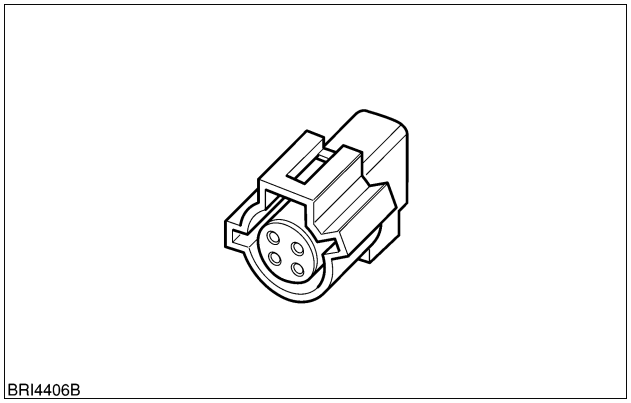
C013-BRI4528A 6

LEFT-HAND SIDE FRONT - ENGINE

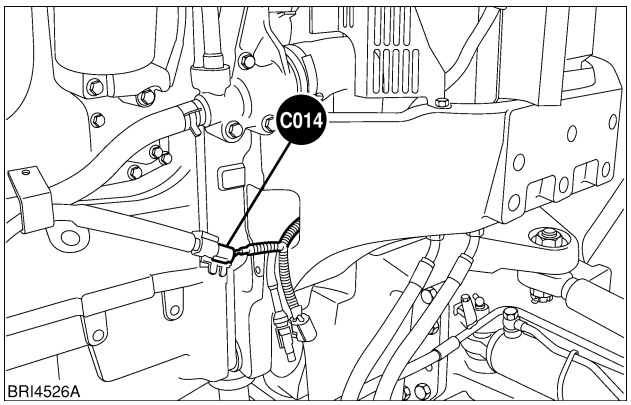
C014 STEERING ANGLE SENSOR

PLUG CONNECTION C014 STEERING ANGLE SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2530B (N)	V REF FRONT POWER LIFT	PUMA Standard: **Wiring harness - Electrical schematic frame 31 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 31 (A.30.A)**
2	3120 (K)	SIGNAL STEERING ANGLE SENSOR	
3	2095 (G)	EARTH SIGNAL INSTRUMENTS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4406B-01 7



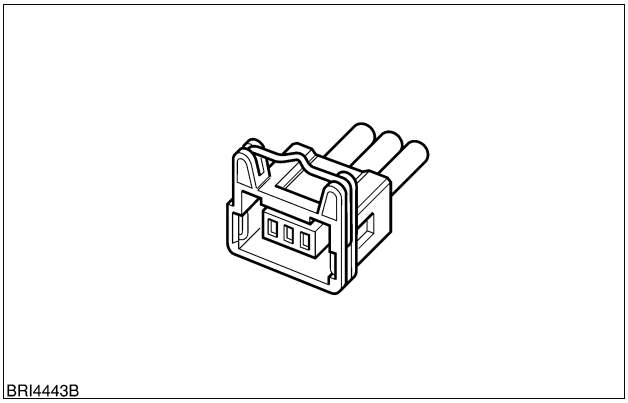
C014-BRI4526A 8

RIGHT-HAND FRONT BOTTOM - ENGINE

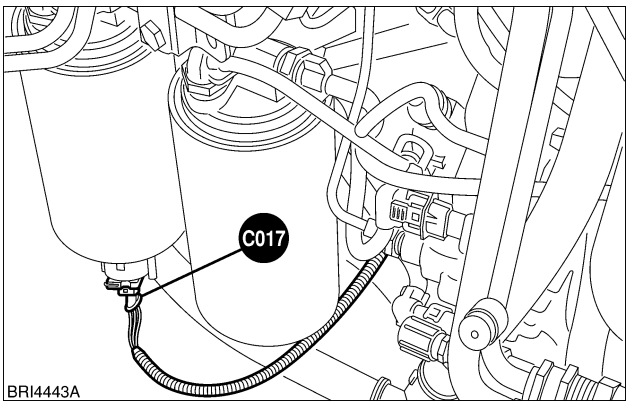
C017 WATER SENSOR OF WATER SEPARATOR

PLUG CONNECTION C017 WATER SENSOR FOR THE WATER SEPARATOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2040 (LTG)	WATER SENSOR FOR THE WATER SEPARATOR	PUMA Standard: **Wiring harness - Electrical schematic frame 04 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 04 (A.30.A)**
2	6408K (G)	FUSE-PROTECTED VOLTAGE B+ TO CONTROL UNIT (1)	
3	57JE (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C017-BRI4443A 10

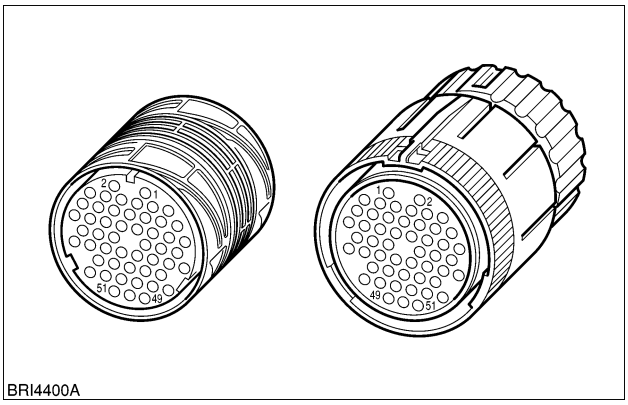
LEFT BACK BOTTOM - ENGINE

C019 WIRING HARNESS EXTENSION PLUG CONNECTION 1 (ELECTRONICS)

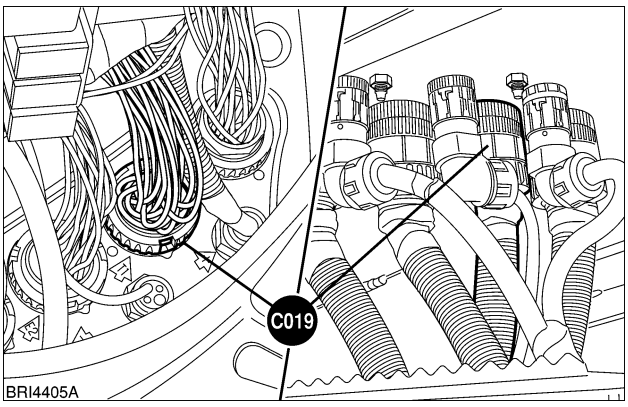
PLUG CONNECTION C019 WIRING HARNESS EXTENSION PLUG CONNECTION 1 (ELECTRONICS)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3024 (Y) / 3025 (Y)	SOLENOID VALVE REAR WHEEL DRIVE / SOLENOID VALVE FOR ALL WHEEL DRIVE (MANUAL)	
2	7005 (U)	MV CRAWLER GEAR TRANSMISSION	
3	7080 (LTG)	POWER SUPPLY SOLENOID VALVE DIFFERENTIAL LOCK	
4	2130 (N)	SOLENOID VALVE PTO BRAKE	
5	2051 (O)	PTO - MV RETURN SIGNAL (-)	
6	2042 (O)	REAR PTO SOLENOID VALVE	
7	2140 (O)	PTO SPEED SENSOR	
8	2062 (W)	PTO SPEED SENSOR	
9	7910 (TQ)	SIGNAL COUPLING B	
10	7935 (L)	TRANSMISSION CONTROLLER COUPLUNG D RETURN CIRCUIT	
11	7401 (L)	TRANSMISSION SPEED SENSOR	
12	7400 (Y)	TRANSMISSION SPEED SENSOR TO TRANSMISSION CONTROLLER INPUT	
13	8050 (R)	TRANSMISSION RETURN PRESSURE	
14	7930 (TQ)	SIGNAL COUPLING D	
15	7940 (TQ)	SIGNAL COUPLING E	
16	7960 (W)	TRANSMISSION GROUP L/H	
17	7431 (TQ)	POWER SUPPLY	
18	7915 (L)	TRANSMISSION CONTROLLER COUPLUNG B RETURN CIRCUIT	
19	7000P (U)	POWER SUPPLY TRANSMISSION CONTROLS	
20	7945 (L)	TRANSMISSION CONTROLLER COUPLUNG E RETURN CIRCUIT	
21	9036 (TN)	50 KM/H RELIEF SOLENOID VALVE RETURN SIGNAL	
22	7225 (W)	TRANSMISSION MV GROUP H - RETURN CIRCUIT	
23	8045 (L)	TRANSMISSION SOLENOID VALVE REV RETURN CIRCUIT	
24	7985 (G)	TRANSMISSION REVERSE GEARS	
25	3295 (O)	SIGNAL PRESSURE SWITCH FOR FRONT AXLE SUSPENSION	
26	7235 (Y)	TRANSMISSION MV GROUP L - RETURN CIRCUIT	
27	7581 (O)	CRAWLER DRIVE SETTING SIGNAL	
28	7760 (W)	TORQUE SENSOR	
29	9035 (TN)	50 KM/H RELIEF SOLENOID VALVE	
30	7586 (U)	PARK LOCK SOLENOID VALVE	
31	7500 (G)	TRANSMISSION OIL TEMPERATURE SENSOR	
32	5097 (K)	EPC CONTROL VALVE LOWER RETURN CIRCUIT	
33	5090 (K)	EPC CONTROL VALVE LOWER	
34	5087 (K)	EPC CONTROL VALVE RAISE RETURN CIRCUIT	
35	5085 (K)	EPC CONTROL VALVE RAISE	

36	5070 (TN)	EPC LEFT FORCE MEASURING PIN
37	5075 (K)	EPC VOLTAGE ON FORCE MEASURING PIN
38	5065 (TN)	EPC RIGHT FORCE MEASURING PIN
39	9033 (TN)	50 KM/H SOLENOID VALVE+
40	9034 (TN)	50 KM/H SOLENOID VALVE-
41	7580 (U)	OVERRIDE SOLENOID VALVE CRAWLER GROUP
42	7220 (S)	TRANSMISSION GROUP H
43	7230 (S)	TRANSMISSION GROUP L
44	7900 (TQ)	SIGNAL COUPLING A
45	7770 (U)	TRANSMISSION FORWARDS PRESSURE SWITCH
46	5080 (K)	EPC LIFTING SHAFT
47	5020A (TN)	EPC CONTOLLER +5V REFERENCE VOLTAGE LOWERING SPEED
48	7920 (TQ)	SIGNAL COUPLING C
49	2050L (G)	POWER SUPPLY PTO / SHIFTING CLAW
50	7126 (LTG)	DIFFERENTIAL LOCK PRESSURE SWITCH

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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RIGHT-HAND FRONT - CAB FLOOR

Wiring harness - Component diagram 02 Plug connections 20-29

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C020 WIRING HARNESS EXTENSION PLUG CONNECTION 2 (CAB)

PLUG CONNECTION C020 WIRING HARNESS EXTENSION PLUG CONNECTION 2 (CAB)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	29 (G)	SIGNAL FUEL GAUGE MAIN FUEL TANK	
2	1013D (N) / 1013D (R)	LIGHTS RIGHT-HAND SIDE	
3	1014E (B) / 1014E (R)	LIGHTS LEFT-HAND SIDE	
4	810A (R) / 810A (G)	BRAKE LIGHTS	
5	349 (TN) / 349 (G)	TRAILER INDICATORS RIGHT	
6	350 (TN) / 350 (Y)	TRAILER INDICATORS LEFT	
7	7925 (L)	TRANSMISSION CONTROLLER COUPLUNG C RETURN CIRCUIT	
8	3286 (TN)	SUSPENSION LOCK SOLENOID VALVE BOTTOM RETURN SIGNAL (-)	
9	7160 (R)	WARNING LOW FEED PRESSURE FOR HYDRAULICS	
10	3281 (TN)	SUSPENSION LOCK SOLENOID VALVE TOP RETURN SIGNAL (-)	
11	2055A (W)	GROUND DRIVE PTO SWITCHED ON	
12	2095B (G)	EARTH SIGNAL INSTRUMENTS	
13	3270 (O)	LOWER SOLENOID VALVE RETURN SIGNAL	
14	3250 (O)	RAISE SOLENOID VALVE RETURN SIGNAL	
15	7980 (K)	TRANSMISSION MIDDLE GEAR GROUP	
16	3240 (O)	RAISE SOLENOID VALVE POWER SUPPLY	
17	3045 (Y)	WARNING LIGHT ALL WHEEL DRIVE	
18	3260 (O)	LOWER SOLENOID VALVE POWER SUPPLY	
19	7982 (W)	TRANSMISSION GROUP M	
20	8010A (TN)	PRESSURE TRAILER BRAKE	
21	8000A (N)	SOLENOID VALVE TRAILER BRAKE	
22	8000X (N)	SOLENOID VALVE TRAILER BRAKE	
23	3280 (O)	SUSPENSION LOCK SOLENOID VALVE TOP	
24	8010 (TN)	PRESSURE TRAILER BRAKE	
25	60A (B/W)	EARTH SENSOR	
26	8020 (TN)	PRESSURE TRAILER BRAKE	
27	8060D (U)	POWER SUPPLY FOR TRAILER BRAKE	
28	2012 (Y)	WARNING LIGHT TRANSMISSION OIL PRESSURE	
29	3285 (TN)	SUSPENSION LOCK SOLENOID VALVE BOTTOM	
30	5515 (S)	ELECTROHYDR. REMOTE VALVE +12V SWITCHED	

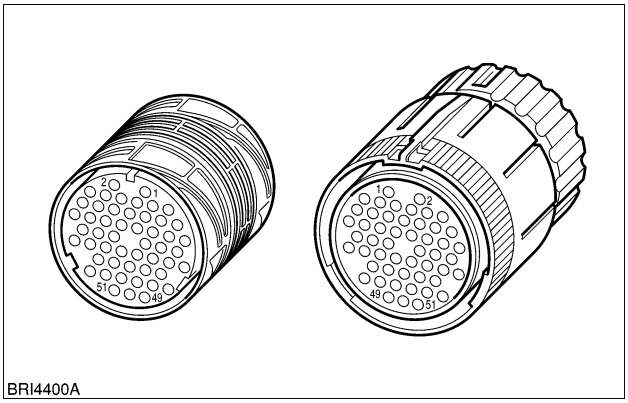
31	5500L (R) /5500A (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
32	5510L (U) / 5510A (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
33	4055 (W)	PRESSURE TRAILER BRAKE	
34	4056 (W)	HYDR. SHORTEN TOP LINK SOLENOID VALVE	
35	4057 (W)	HYDR. RIGHT LIFT LINK RAISE SOLENOID VALVE	
36	4058 (W)	HYDR. RIGHT LIFT LINK LOWER SOLENOID VALVE	
37	9000 (TN)	OIL FLOW DIVIDER	
38	4054 (W)	HYDR. TOP LINK/LIFT LINK RELIEF SOLENOID VALVE	
39	5830 (U) / 5830 (R)	CONNECTION HIGH-FLOW HYDROPUMP	
40	5900B (Y) / 5900 (Y)	ISO BUS CAN SIGNAL LOW	
41	5910B (G) / 5910 (G)	ISO BUS CAN SIGNAL HIGH	
42	5915B (B) / 5915(B)	ISO BUS CAN POWER SUPPLY EARTH	
43	5920B (R) / 5920 (R)	ISO BUS CAN POWER SUPPLY POSITIVE	
44	5970A (O)	ISO BUS ECU SIGNAL	
45	5980 (U)	ISO BUS IMPLEMENT SIGNAL	
46	7411 (Y)	TRANSMISSION HYDROSTAT INPUT SPEED SENSOR (CVT)	
47	7970 (L)	TRANSMISSION GEAR GROUP M/REVERSE GEARS	
48	7130 (N)	WARNING LIGHT HYDRAULIC OIL FILTER	
49	8070 (L)	TRAILER MV PARKING BRAKE	
50	2250N (K)	FRONT PTO - POWER SUPPLY	

PLUG CONNECTION C020 - in PUMA Multicontroller WIRING HARNESS EXTENSION PLUG CONNECTION 2 (CAB)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	29 (G)	SIGNAL FUEL GAUGE MAIN FUEL TANK	
2	1013D (N) / 1013D (R)	LIGHTS RIGHT-HAND SIDE	
3	1014E (B) / 1014E (R)	LIGHTS LEFT-HAND SIDE	
4	810A (R) / 810A (G)	BRAKE LIGHTS	
5	349 (TN) / 349 (G)	TRAILER INDICATORS RIGHT	
6	350 (TN) / 350 (Y)	TRAILER INDICATORS LEFT	
7	7925 (L)	TRANSMISSION CONTROLLER COUPLUNG C RETURN CIRCUIT	
8	3286 (TN)	SUSPENSION LOCK SOLENOID VALVE BOTTOM RETURN SIGNAL (-)	
9	7160 (R)	WARNING LOW FEED PRESSURE FOR HYDRAULICS	
10	3281 (TN)	SUSPENSION LOCK SOLENOID VALVE TOP RETURN SIGNAL (-)	
11	2055A (W)	GROUND DRIVE PTO SWITCHED ON	

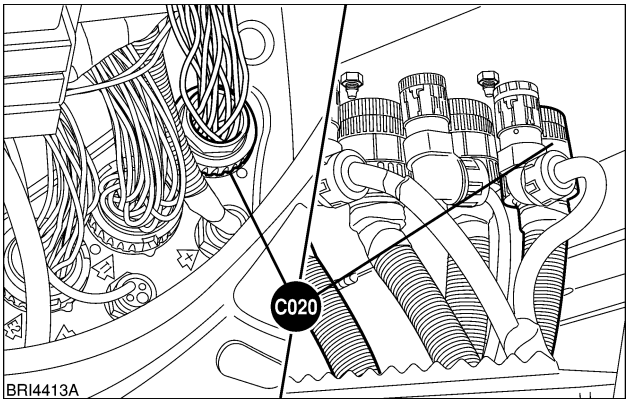
12	2095B (G)	EARTH SIGNAL INSTRUMENTS
13	3270 (O)	LOWER SOLENOID VALVE RETURN SIGNAL
14	3250 (O)	RAISE SOLENOID VALVE RETURN SIGNAL
15	7980 (K)	TRANSMISSION MIDDLE GEAR GROUP
16	3240 (O)	RAISE SOLENOID VALVE POWER SUPPLY
17	3045 (Y)	WARNING LIGHT ALL WHEEL DRIVE
18	3260 (O)	LOWER SOLENOID VALVE POWER SUPPLY
19	7982 (W)	TRANSMISSION GROUP M
20	8010A (TN)	PRESSURE TRAILER BRAKE
21	8000A (N)	SOLENOID VALVE TRAILER BRAKE
22	8000X (N)	SOLENOID VALVE TRAILER BRAKE
23	3280 (O)	SUSPENSION LOCK SOLENOID VALVE TOP
24	8010 (TN)	PRESSURE TRAILER BRAKE
25	60A (B/W)	EARTH SENSOR
26	8020 (TN)	PRESSURE TRAILER BRAKE
27	8060D (U)	POWER SUPPLY FOR TRAILER BRAKE
28	3500 (W)	STEERING PRESSURE SWITCH
29	3285 (TN)	SUSPENSION LOCK SOLENOID VALVE BOTTOM
30	5515 (S)	ELECTROHYDR. REMOTE VALVE +12V SWITCHED
31	5500L (R) /5500A (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH
32	5510L (U) / 5510A (U)	ELECTROHYDR. REMOTE VALVE CAN LOW
33	4055 (W)	PRESSURE TRAILER BRAKE
34	4056 (W)	HYDR. SHORTEN TOP LINK SOLENOID VALVE
35	4057 (W)	HYDR. RIGHT LIFT LINK RAISE SOLENOID VALVE
36	4058 (W)	HYDR. RIGHT LIFT LINK LOWER SOLENOID VALVE
37	9000 (TN)	OIL FLOW DIVIDER
38	4054 (W)	HYDR. TOP LINK/LIFT LINK RELIEF SOLENOID VALVE
39	5830 (U) / 5830 (R)	CONNECTION HIGH-FLOW HYDROPUMP
40	5900B (Y) / 5900 (Y)	ISO BUS CAN SIGNAL LOW
41	5910B (G) / 5910 (G)	ISO BUS CAN SIGNAL HIGH
42	5915B (B) / 5915(B)	ISO BUS CAN POWER SUPPLY EARTH
43	5920B (R) / 5920 (R)	ISO BUS CAN POWER SUPPLY POSITIVE
44	5970A (O)	ISO BUS ECU SIGNAL
45	5980 (U)	ISO BUS IMPLEMENT SIGNAL
46	7411 (Y)	TRANSMISSION HYDROSTAT INPUT SPEED SENSOR (CVT)
47	7970 (L)	TRANSMISSION GEAR GROUP M/REVERSE GEARS
48	7130 (N)	WARNING LIGHT HYDRAULIC OIL FILTER
49	8070 (L)	TRAILER MV PARKING BRAKE

50	2250N (K)	FRONT PTO - POWER SUPPLY
51	2012 (Y)	TRANSMISSION OIL PRESSURE SWITCHES

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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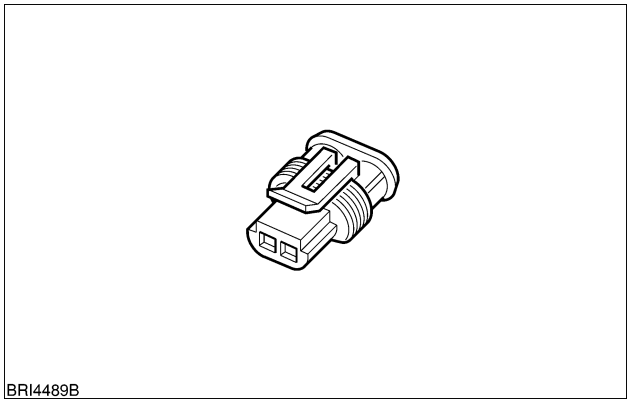
C020-BRI4413A 2

RIGHT-HAND FRONT - CAB FLOOR

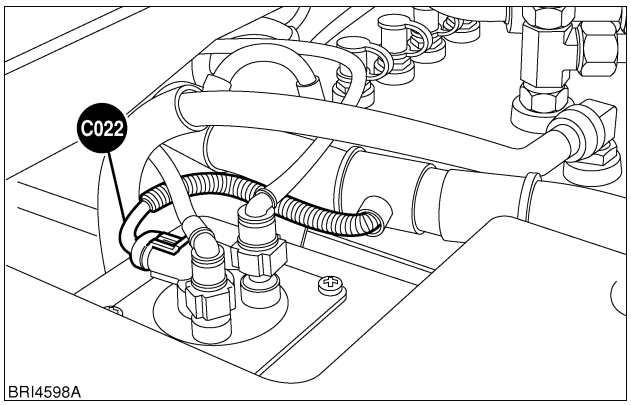
C022 FUEL GAUGE SENSOR

PLUG CONNECTION C022 FUEL GAUGE SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	29 (G)	SIGNAL FUEL GAUGE MAIN FUEL TANK	PUMA Standard: **Wiring harness - Electrical schematic frame 31 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 31 (A.30.A)**
2	2095D (G)	EARTH SIGNAL INSTRUMENTS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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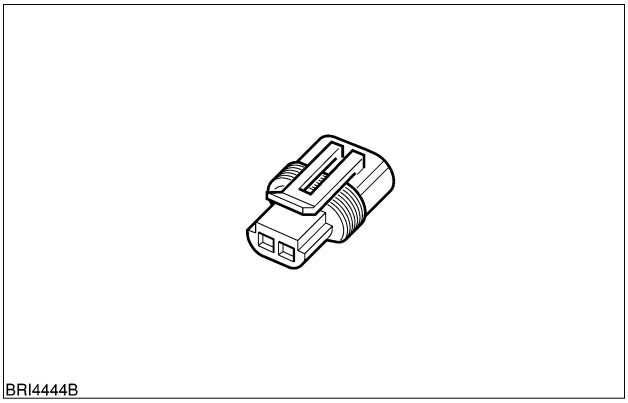
C022-BRI4598A 4

LEFT-HAND SIDE BEHIND STEPS OF DRIVER'S CAB

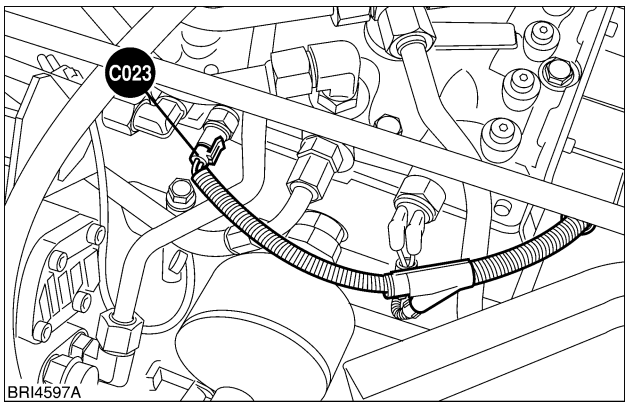
C023 TRANSMISSION OIL TEMPERATURE SENSOR

PLUG CONNECTION C023 TRANSMISSION OIL TEMPERATURE SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A	7500 (G)	TRANSMISSION OIL TEMP. Sensor	PUMA Standard: **Wiring harness - Electrical schematic frame 09 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 09 (A.30.A)**
B	60AT (B/W)	EARTH SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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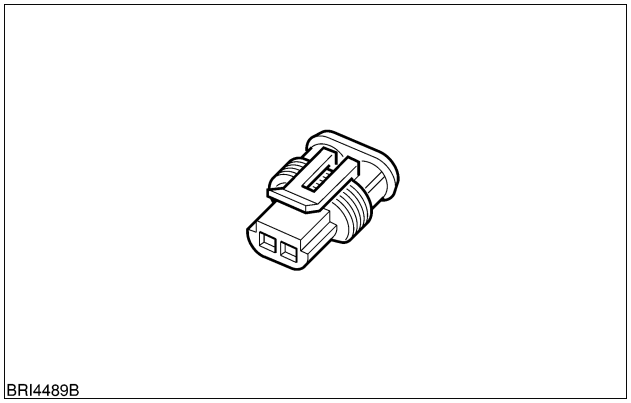
C023-BRI4597A 6

RIGHT-HAND SIDE SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

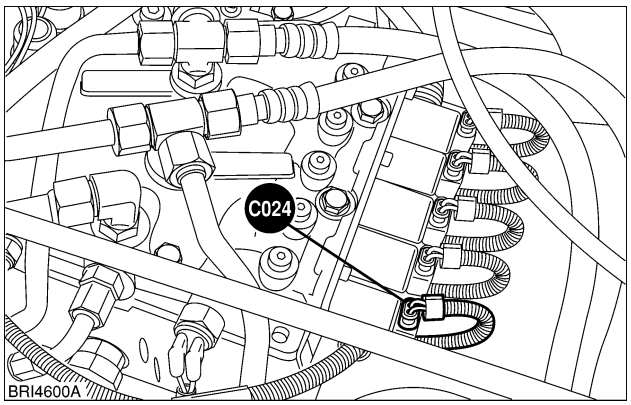
C024 SOLENOID VALVE COUPLING E

PLUG CONNECTION C024 SOLENOID VALVE COUPLING E			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7940 (TQ)	SIGNAL COUPLING E	PUMA Standard: **Wiring harness - Electrical schematic frame 07 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 07 (A.30.A)**
2	7945 (L)	TRANSMISSION CONTROLLER COUPLUNG E RETURN CIRCUIT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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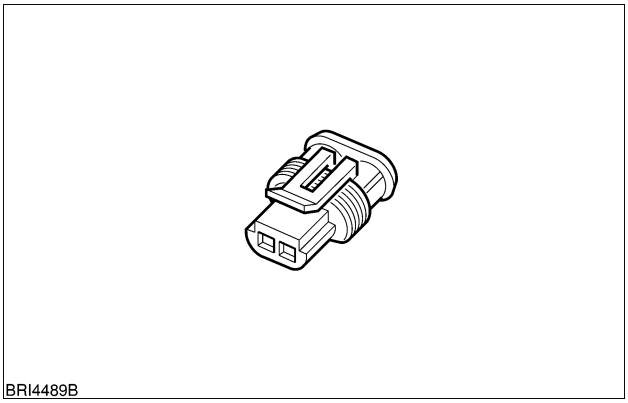
C024-BRI4600A 8

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

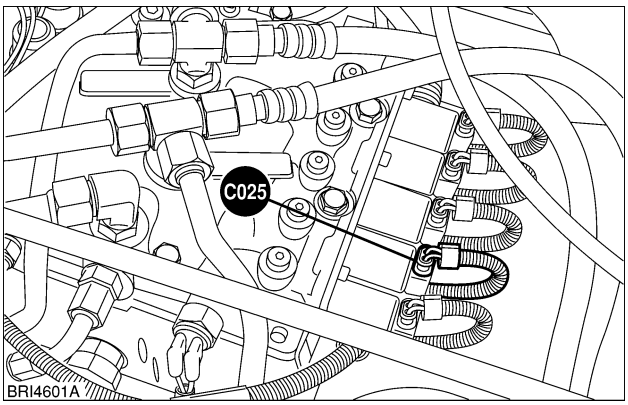
C025 SOLENOID VALVE COUPLING D

PLUG CONNECTION C025 SOLENOID VALVE COUPLING D			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7930 (TQ)	SIGNAL COUPLING D	PUMA Standard: **Wiring harness - Electrical schematic frame 08 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 08 (A.30.A)**
2	7935 (L)	TRANSMISSION CONTROLLER COUPLUNG D RETURN CIRCUIT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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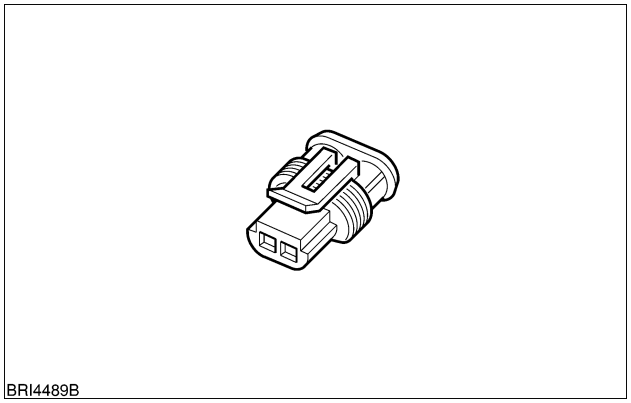
C025-BRI4601A 10

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

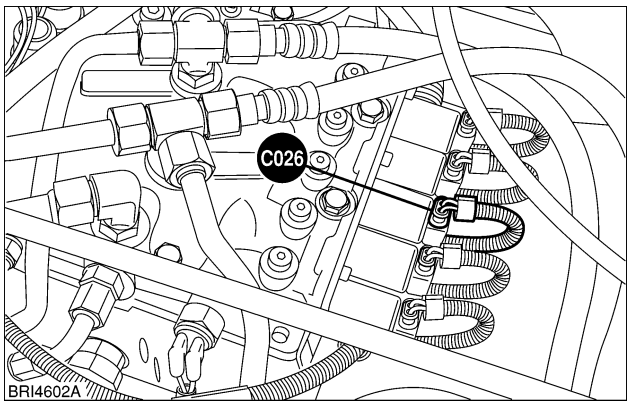
C026 SOLENOID VALVE COUPLING C

PLUG CONNECTION C026 SOLENOID VALVE COUPLING C			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7920 (TQ)	SIGNAL COUPLING C	PUMA Standard: **Wiring harness - Electrical schematic frame 08 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 08 (A.30.A)**
2	7925 (L)	TRANSMISSION CONTROLLER COUPLUNG C RETURN CIRCUIT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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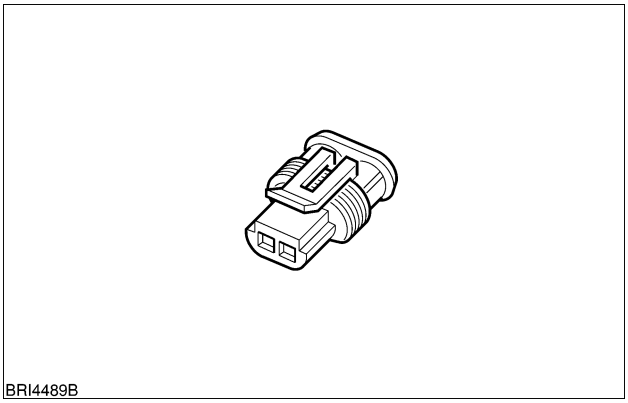
C026-BRI4602A 12

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

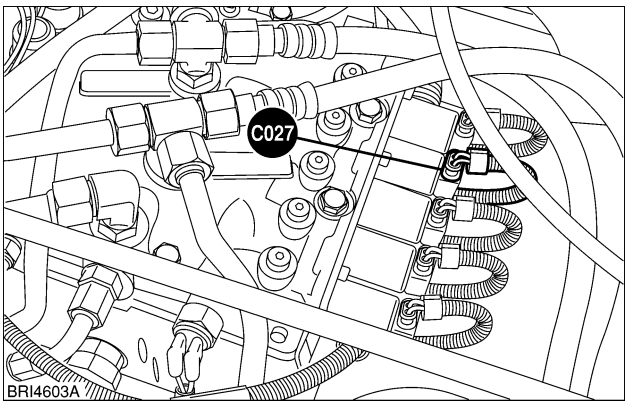
C027 SOLENOID VALVE COUPLING B

PLUG CONNECTION C027 SOLENOID VALVE COUPLING B			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7910 (TQ)	SIGNAL COUPLING B	PUMA Standard: **Wiring harness - Electrical schematic frame 08 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 08 (A.30.A)**
2	7915 (L)	TRANSMISSION CONTROLLER COUPLUNG B RETURN CIRCUIT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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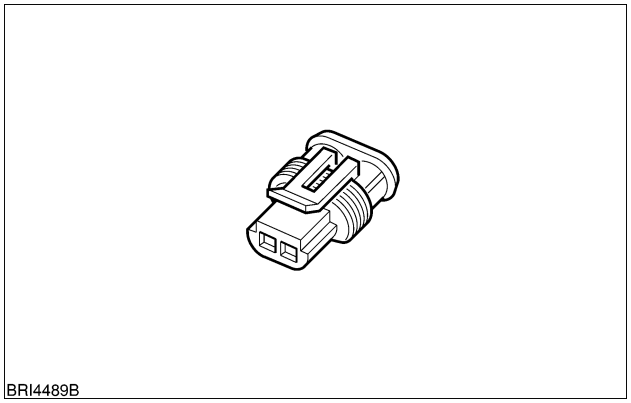
C027-BRI4603A 14

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

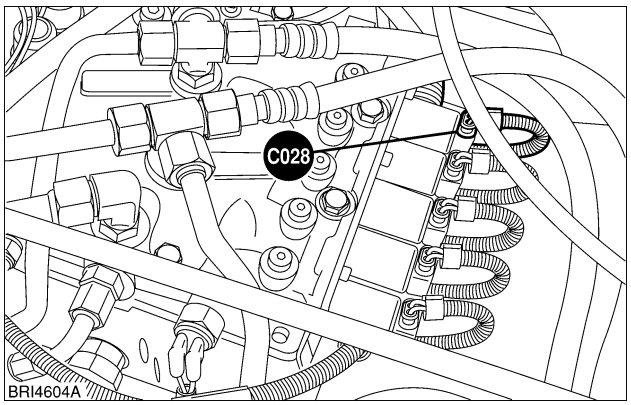
C028 SOLENOID VALVE COUPLING A

PLUG CONNECTION C028 SOLENOID VALVE COUPLING A			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7431 (TQ)	POWER SUPPLY	PUMA Standard: **Wiring harness - Electrical schematic frame 08 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 08 (A.30.A)**
2	7900 (TQ)	SIGNAL COUPLING A	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 15



C028-BRI4604A 16

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

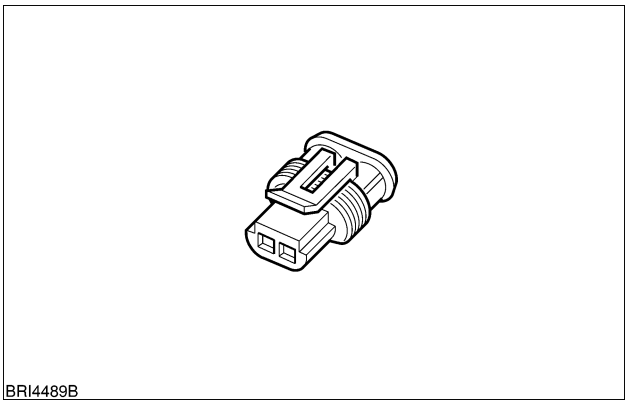
Wiring harness - Component diagram 03 Plug connections 30-39

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

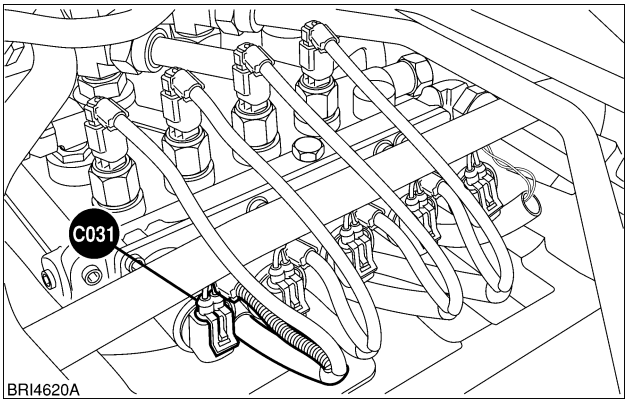
C031 SOLENOID VALVE GEAR GROUP M

PLUG CONNECTION C031 SOLENOID VALVE GEAR GROUP M			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7980 (K)	TRANSMISSION GROUP M	PUMA Standard: **Wiring harness - Electrical schematic frame 08 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 08 (A.30.A)**
2	7982 (W)	TRANSMISSION GROUP L/H	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 1



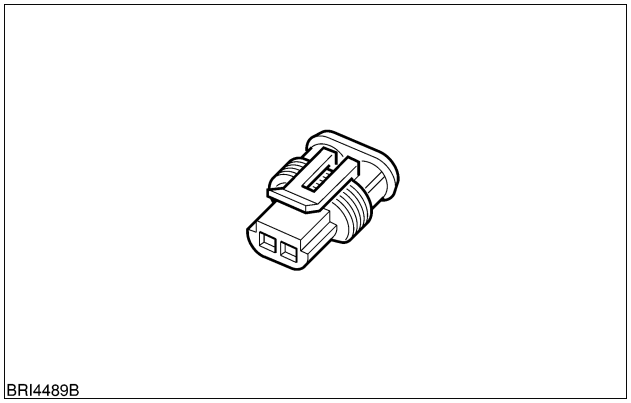
C031-BRI4620A 2

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

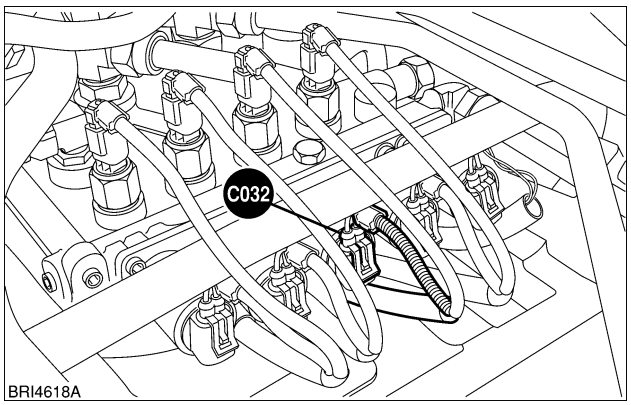
C032 SOLENOID VALVE GEAR GROUP L

PLUG CONNECTION C032 SOLENOID VALVE GEAR GROUP L			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7230 (S)	TRANSMISSION GROUP L	PUMA Standard: **Wiring harness - Electrical schematic frame 08 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 03 (A.30.A)**
2	7235 (Y)	TRANSMISSION FIELD GEARS MV - RETURN CIRCUIT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 3



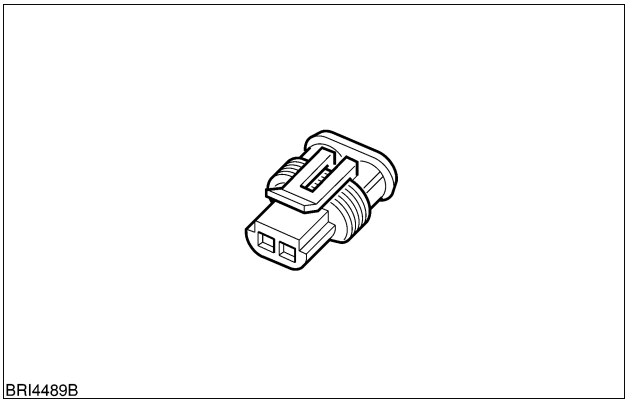
C032-BRI4618A 4

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

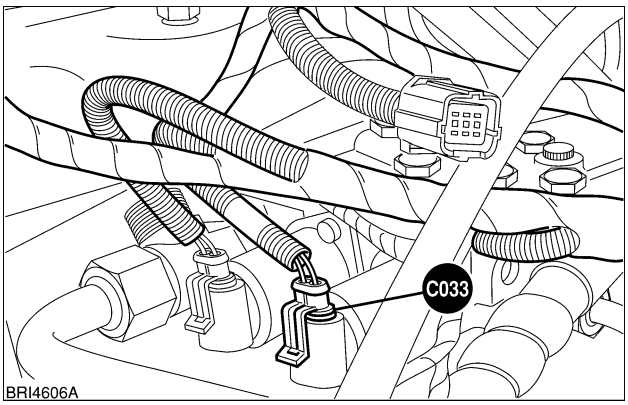
C033 SOLENOID VALVE OF THE PTO BRAKE

PLUG CONNECTION C033 SOLENOID VALVE PTO BRAKE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2130 (N)	SOLENOID VALVE PTO BRAKE	PUMA Standard: **Wiring harness - Electrical schematic frame 20 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 20 (A.30.A)**
2	57ET (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 5



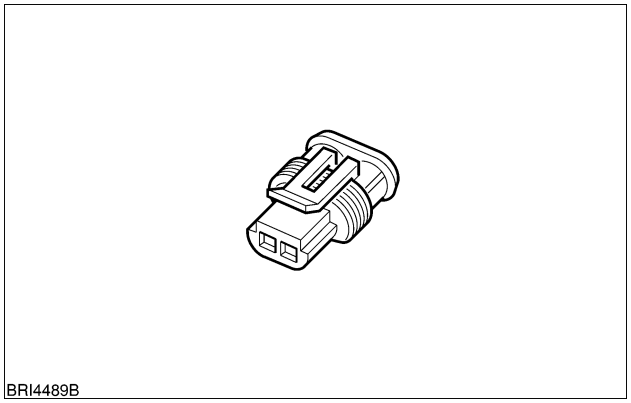
C033-BRI4606A 6

RIGHT-HAND BACK - TRANSMISSION

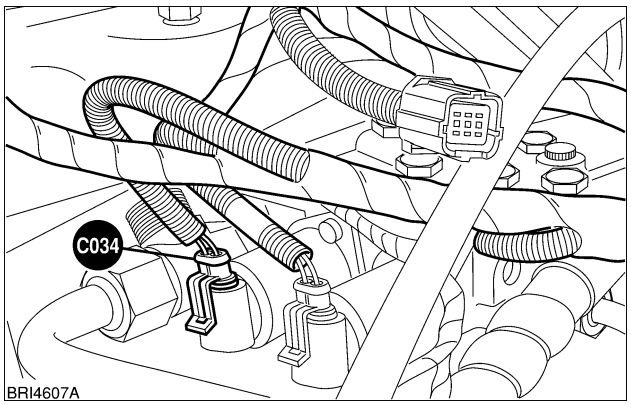
C034 SOLENOID VALVE ALL WHEEL DRIVE

PLUG CONNECTION C034 SOLENOID VALVE FOR ALL WHEEL DRIVE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3024 (Y)	SOLENOID VALVE REAR WHEEL DRIVE	PUMA Standard: **Wiring harness - Electrical schematic frame 18 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 18 (A.30.A)**
2	57EX (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 7



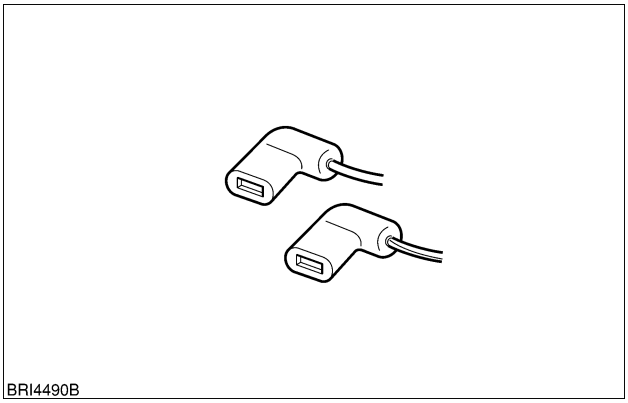
C034-BRI4607A 8

RIGHT-HAND BACK - TRANSMISSION

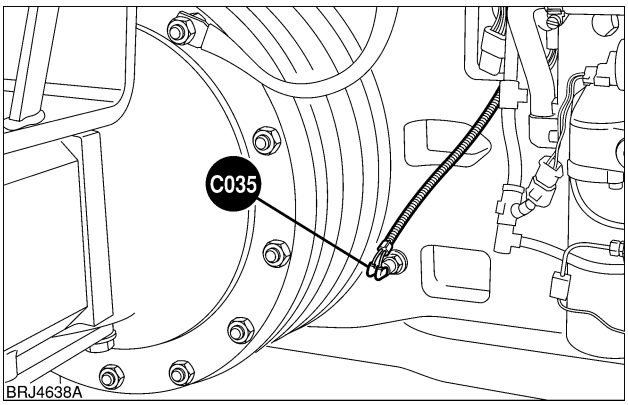
C035 ALL WHEEL SWITCH 1

PLUG CONNECTION C035 MFD CONTROL SWITCH 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3045 (Y)	WARNING LIGHT ALL WHEEL DRIVE	PUMA Standard: **Wiring harness - Electrical schematic frame 18 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 18 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4490B 9



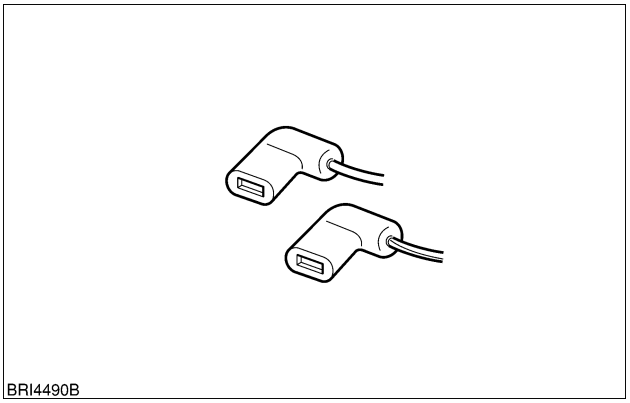
C035-BRJ4638A 10

RIGHT SIDE OF TRANSMISSION, IN FRONT OF REAR AXLE

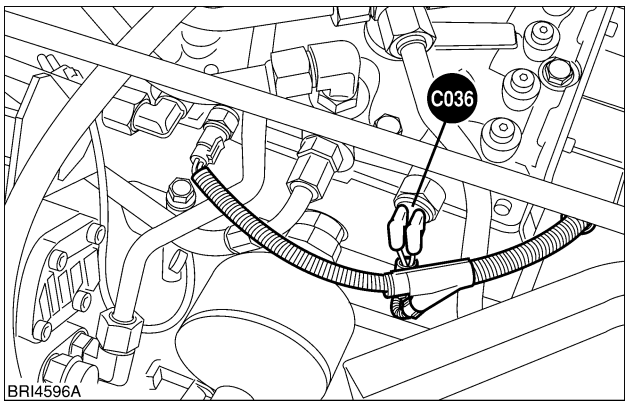
C036 TRANSMISSION OIL PRESSURE SWITCHES 1 AND 2

PLUG CONNECTION C036 TRANSMISSION OIL PRESSURE SWITCHES 1 AND 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2012A (Y) / 57EM (B)	TRANSMISSION OIL PRESSURE WARNIGN LIGHT / EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 07 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 07 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4490B 11



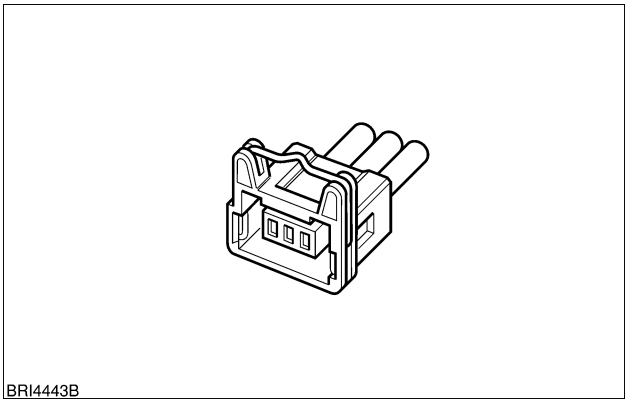
C036-BRI4596A 12

RIGHT-HAND SIDE SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS - TRANSMISSION

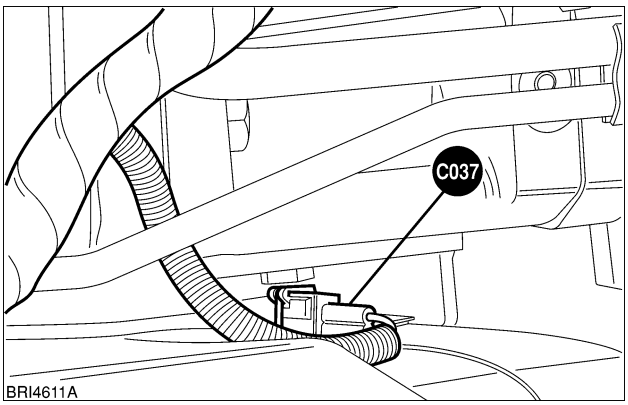
C037 GROUP TRANSMISSION SPEED SENSOR TRANSMISSION OUTPUT SPEED

PLUG CONNECTION C037 GROUP TRANSMISSION SPEED SENSOR TRANSMISSION OUTPUT SPEED			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2050AR (G)	POWER SUPPLY PTO / SHIFTING CLAW	PUMA Standard: **Wiring harness - Electrical schematic frame 09 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 09 (A.30.A)**
2	7400 (Y)	TRANSMISSION SPEED SENSOR TO TRANSMISSION CONTROLLER INPUT	
3	60BE (B/W)	EARTH SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4443B 13



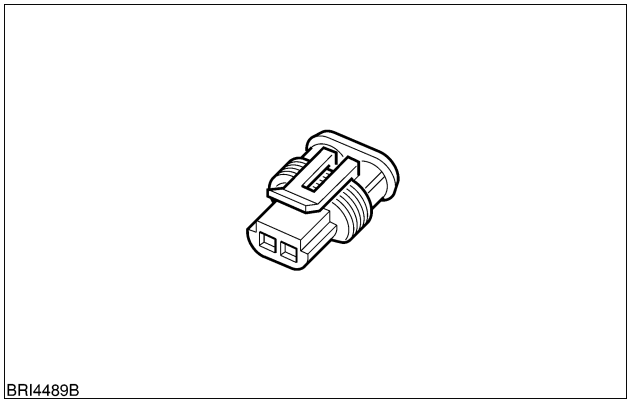
C037-BRI4611A 14

TRANSMISSION TOP

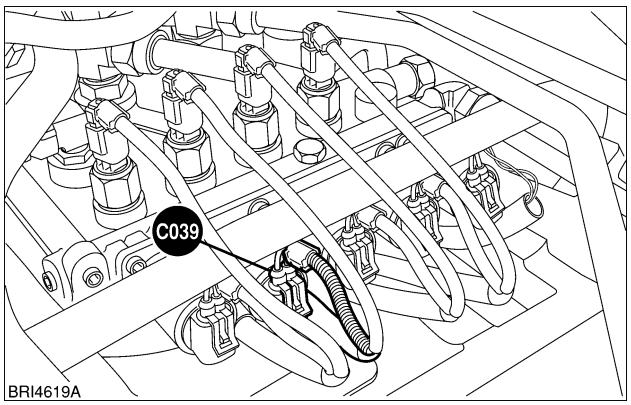
C039 SOLENOID VALVE GEAR GROUP H

PLUG CONNECTION C039 SOLENOID VALVE GEAR GROUP H			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7220 (S)	TRANSMISSION GROUP H	PUMA Standard: **Wiring harness - Electrical schematic frame 08 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 08 (A.30.A)**
2	7225 (W)	TRANSMISSION ROAD GEARS MV - RETURN CIRCUIT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 15



C039-BRI4619A 16

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

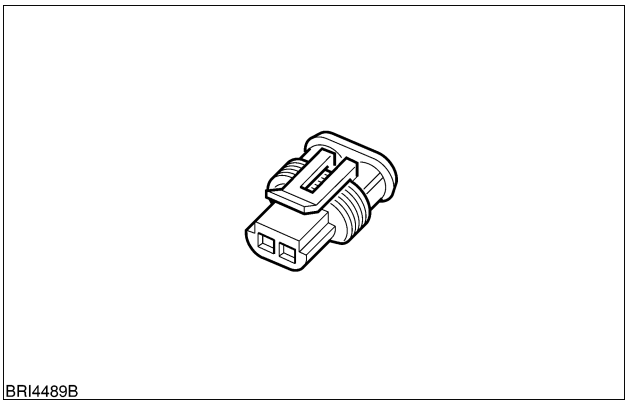
Wiring harness - Component diagram 04 Plug connections 40-49

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

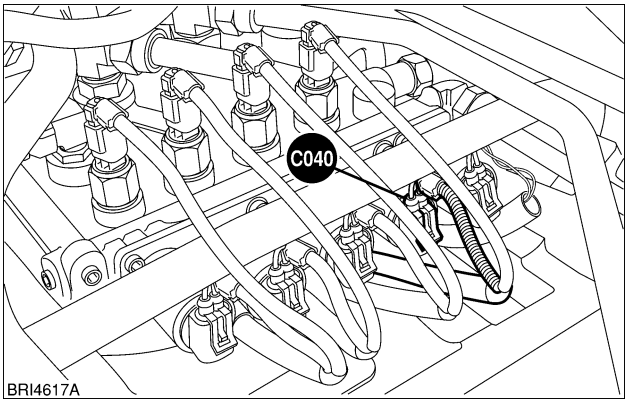
C040 SOLENOID VALVE REV GEAR GROUP

PLUG CONNECTION C040 SOLENOID VALVE REV GEAR GROUP			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7985 (G)	TRANSMISSION REVERSE GEARS	PUMA Standard: **Wiring harness - Electrical schematic frame 08 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 08 (A.30.A)**
2	8045 (L)	TRANSMISSION SOLENOID VALVE REV RETURN CIRCUIT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 1



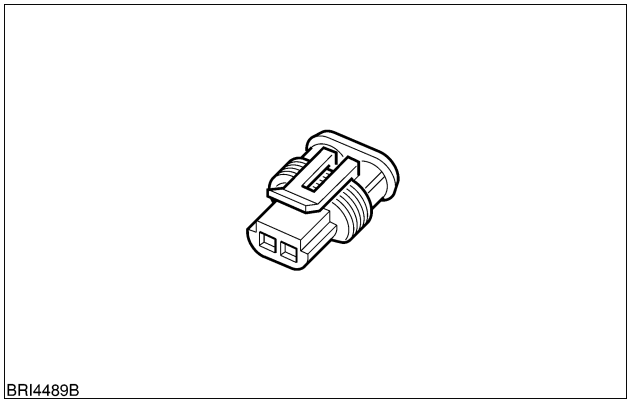
C040-BRI4617A 2

TRANSMISSION - SLIDE VALVE HOUSING

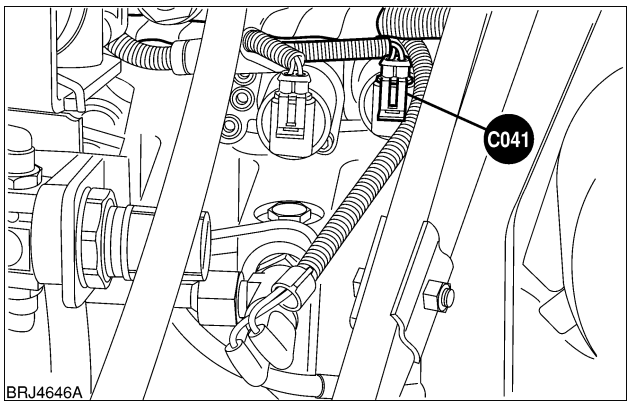
C041 PTO SOLENOID VALVE

PLUG CONNECTION C041 PTO SOLENOID VALVE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2042 (O)	REAR PTO SOLENOID VALVE	PUMA Standard: **Wiring harness - Electrical schematic frame 20 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 20 (A.30.A)**
2	2051 (O)	PTO - MV RETURN SIGNAL (-)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 3



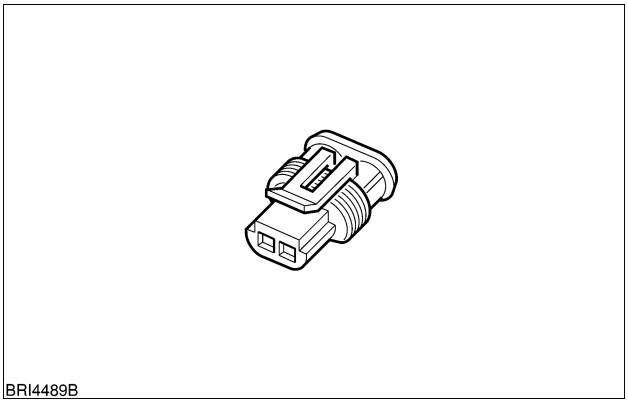
C041-BRJ4646A 4

TOP BACK - GEARBOX

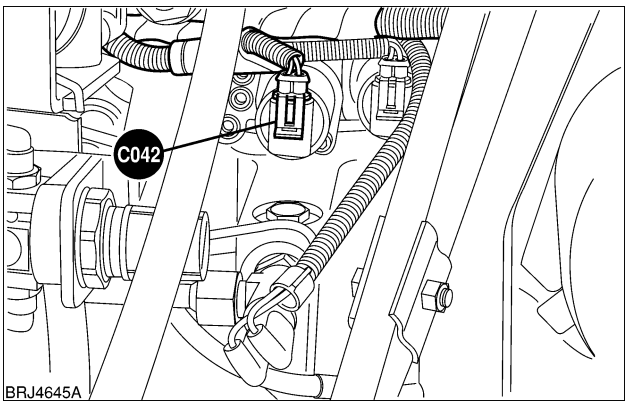
C042 SOLENOID VALVE D. DIFFERENTIAL LOCK

PLUG CONNECTION C042 SOLENOID VALVE DIFFERENTIAL LOCK			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7080 (LTG)	POWER SUPPLY SOLENOID VALVE DIFFERENTIAL LOCK	PUMA Standard: **Wiring harness - Electrical schematic frame 18 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 18 (A.30.A)**
2	57ES (B)	EARTH - ALL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 5



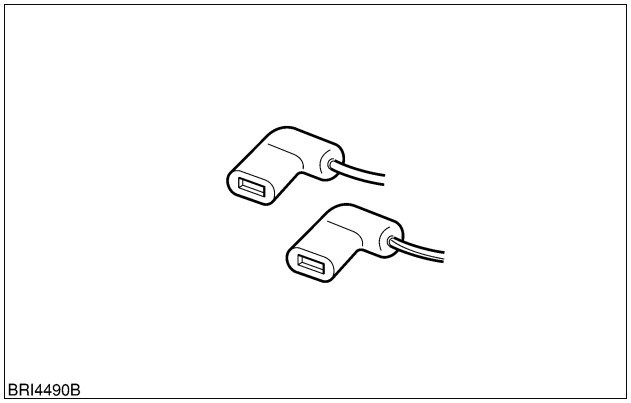
C042-BRJ4645A 6

TOP BACK - GEARBOX

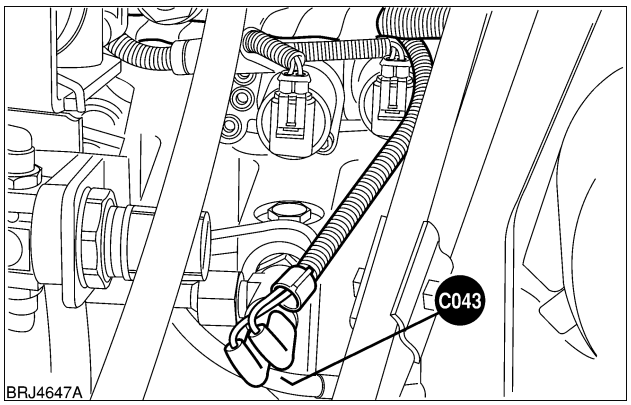
C043 DIFFERENTIAL LOCK ON/OFF SWITCH

PLUG CONNECTION C043 DIFFERENTIAL LOCK ON/OFF SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7126 (LTG)	DIFFERENTIAL LOCK PRESSURE SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 18 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 18 (A.30.A)**
2	57 (B)	EARTH - ALL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4490B-02 7



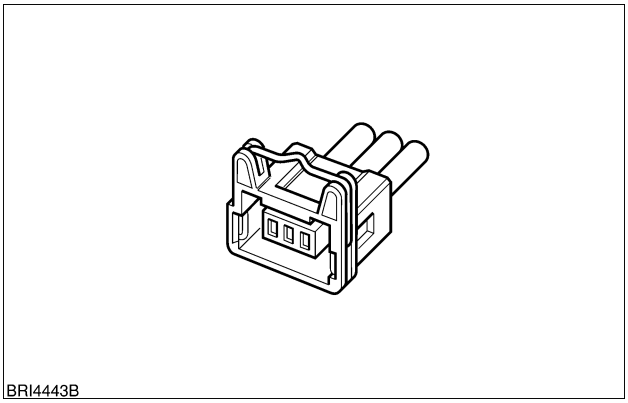
C043-BRJ4647A 8

TOP - TRANSMISSION

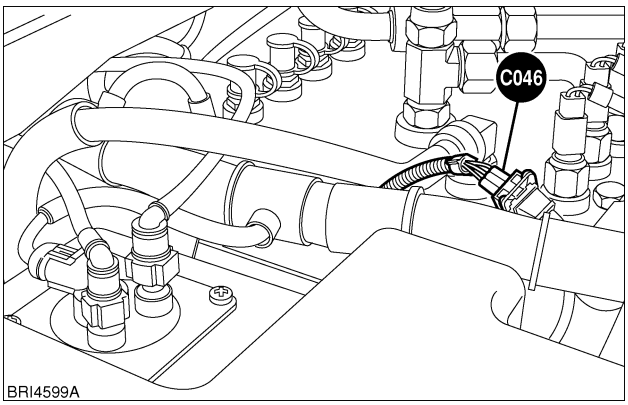
C046 AXLE SPEED SENSOR

PLUG CONNECTION C046 AXLE SPEED SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2050AH (G)	POWER SUPPLY PTO / GEAR DISPLAY	PUMA Standard: **Wiring harness - Electrical schematic frame 07 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 07 (A.30.A)**
2	7401 (L)	TRANSMISSION SPEED SENSOR	
3	60BC (B/W)	EARTH SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4443B-01 9



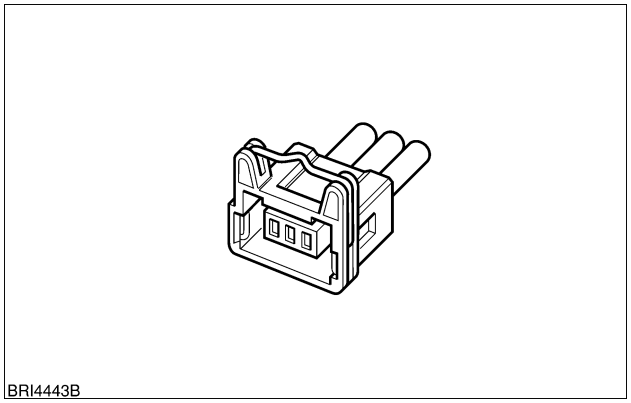
C046-BRI4599A 10

FUEL TANK

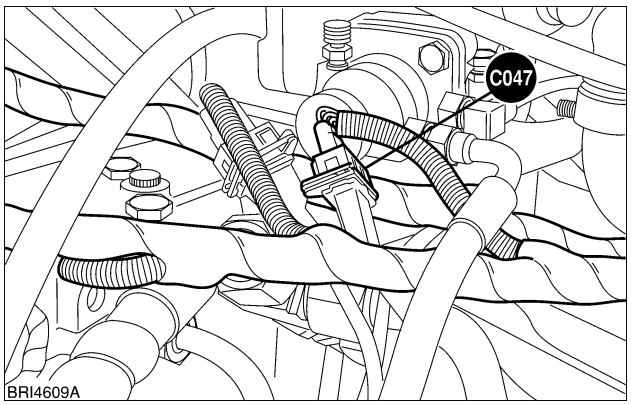
C047 FORCE MEASURING PIN LEFT-HAND SIDE

PLUG CONNECTION C047 FORCE MEASURING PIN LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	60BA (B/W)	EARTH SENSOR	PUMA Standard: **Wiring harness - Electrical schematic frame 13 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 13 (A.30.A)**
2	5070 (TN)	EPC LEFT FORCE MEASURING PIN	
3	5075B (K)	EPC VOLTAGE ON FORCE MEASURING PIN	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4443B-01 11



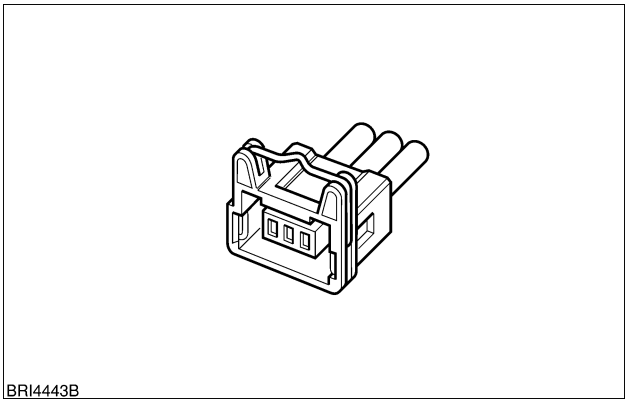
C047-BRI4609A 12

RIGHT-HAND BACK - GEARBOX

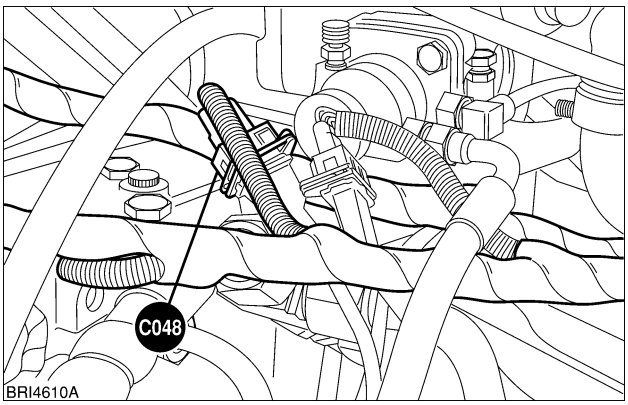
C048 FORCE MEASURING PIN RIGHT-HAND SIDE

PLUG CONNECTION C048 FORCE MEASURING PIN RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	60H (B/W)	EARTH SENSOR	PUMA Standard: **Wiring harness - Electrical schematic frame 13 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 13 (A.30.A)**
2	5065 (TN)	EPC RIGHT FORCE MEASURING PIN	
3	5075A (K)	EPC VOLTAGE ON FORCE MEASURING PIN	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4443B-01 13



C048-BRI4610A 14

RIGHT-HAND BACK - GEARBOX

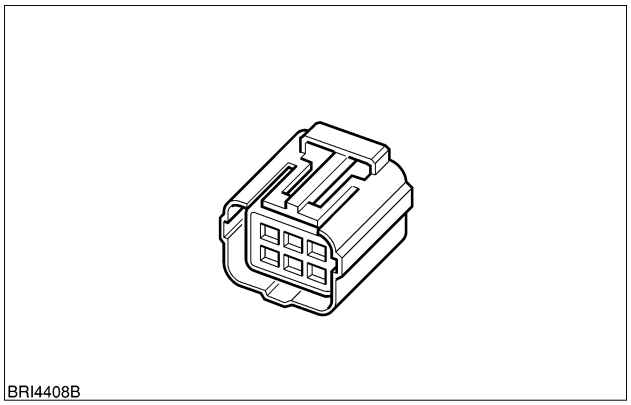
Wiring harness - Component diagram 05 Plug connections 50-59

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

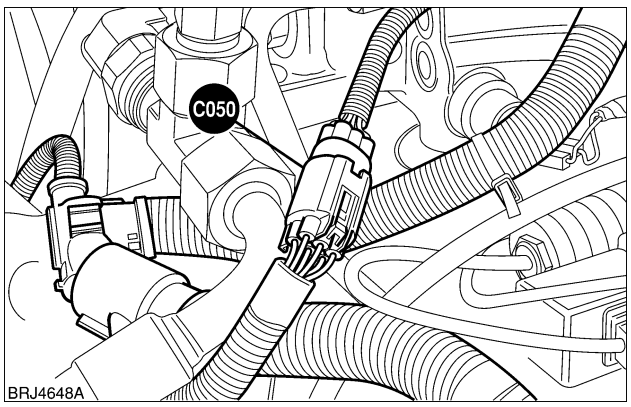
C050 PLUG CONNECTION OF TRAILER BRAKE

PLUG CONNECTION C050 PLUG CONNECTION FOR THE TRAILER BRAKE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	8000A (N)	SOLENOID VALVE TRAILER BRAKE	PUMA Standard: **Wiring harness - Electrical schematic frame 30 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 30 (A.30.A)**
2	8010A (TN)	PRESSURE TRAILER BRAKE	
3	8020A (TN)	PRESSURE TRAILER BRAKE	
4	57FA (B)	VEHICLE EARTH (ALL)	
5	8060E (U)	POWER SUPPLY FOR TRAILER BRAKE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4408B-04 1



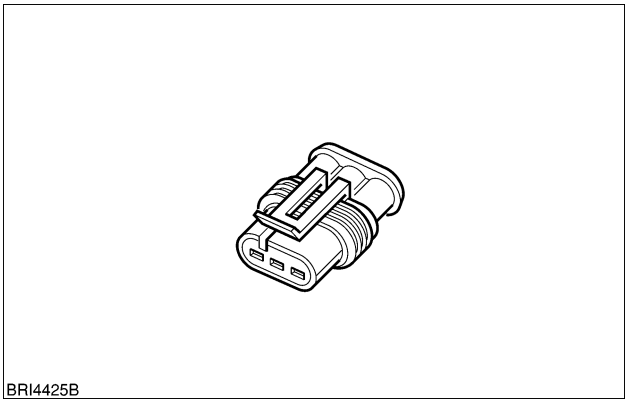
C050-BRJ4648A 2

RIGHT-HAND BACK - GEARBOX

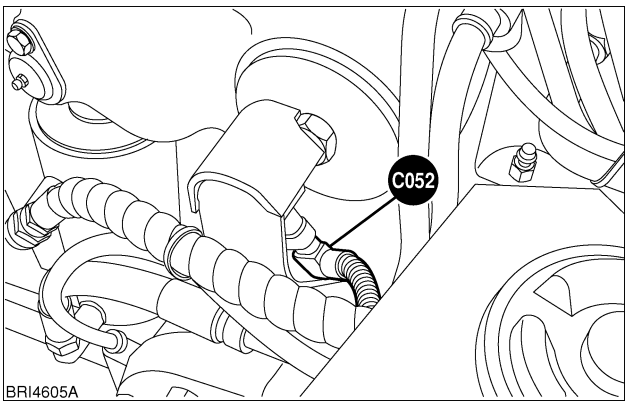
C052 LIFTING SHAFT POTENTIOMETER

PLUG CONNECTION C052 LIFTING SHAFT POTENTIOMETER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	60L (B/W)	EARTH SENSOR	PUMA Standard: **Wiring harness - Electrical schematic frame 13 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 13 (A.30.A)**
2	5080 (K)	EPC LIFTING SHAFT	
3	5020V (TN)	EPC CONTOLLER +5V REFERENCE VOLTAGE LOWERING SPEED	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4425B-02 3



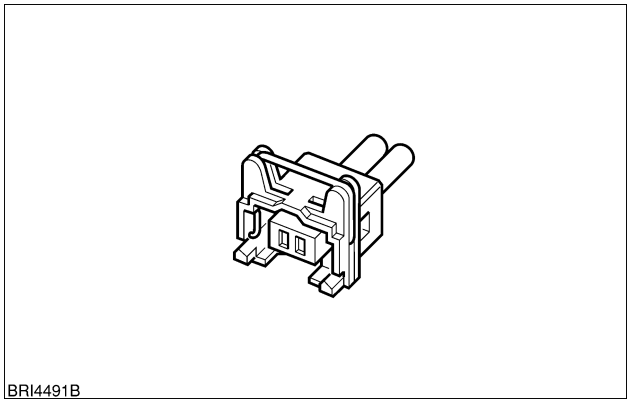
C052-BRI4605A 4

RIGHT-HAND BACK - GEARBOX

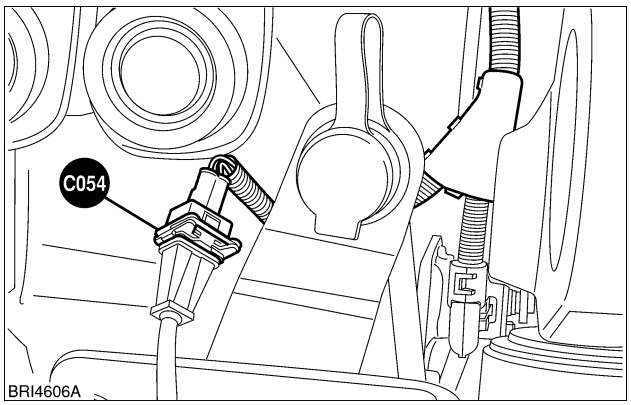
C054 PTO SPEED SENSOR

PLUG CONNECTION C054 PTO SPEED SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2140 (O)	PTO SPEED SENSOR	PUMA Standard: **Wiring harness - Electrical schematic frame 20 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 20 (A.30.A)**
2	60AS (B/W)	EARTH SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4491B 5



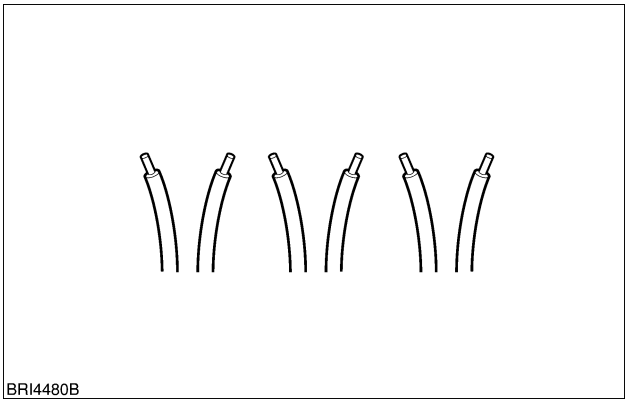
C054-BRI4606A 6

RIGHT-HAND BACK - GEARBOX

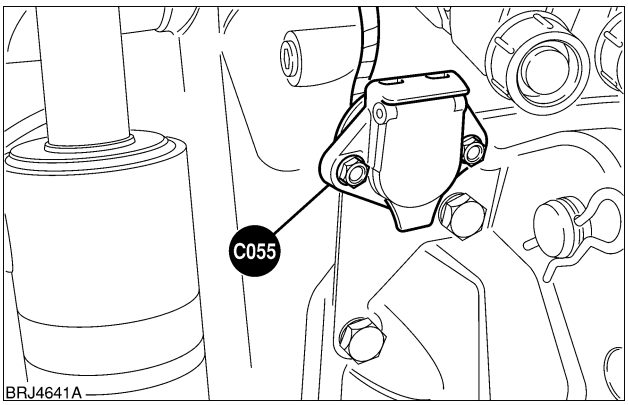
C055 TRAILER SOCKET

PLUG CONNECTION C055 TRAILER SOCKET			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1013D (N) / 57EG (B)	LIGHTS RIGHT-HAND SIDE / EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 30 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 30 (A.30.A)**
2	810A (R)	BRAKE LIGHTS	
3	1014E (B)	LIGHTS LEFT-HAND SIDE	
4	349 (G)	TRAILER INDICATORS RIGHT	
6	350 (Y)	TRAILER INDICATORS LEFT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4480B 7



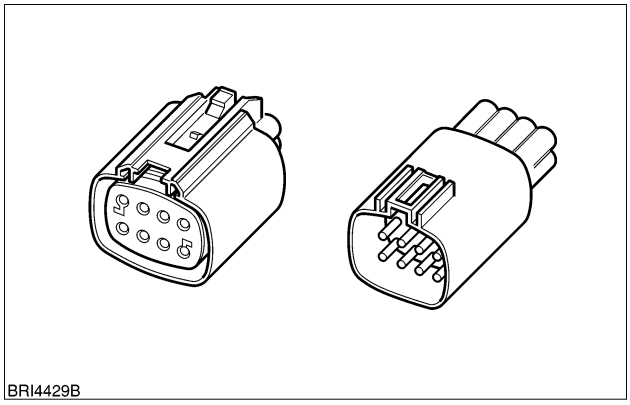
C055-BRJ4641A 8

RIGHT-HAND BACK - GEARBOX

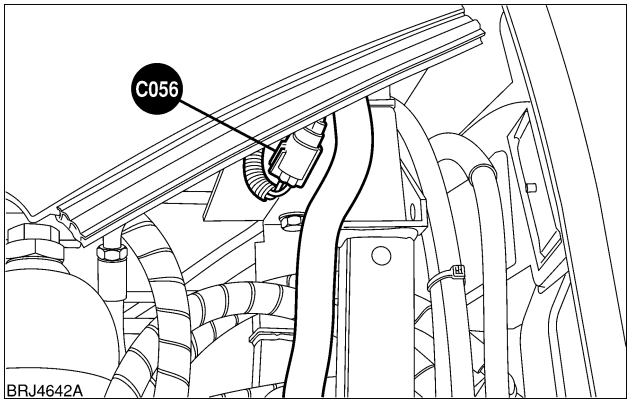
C056 - SOCKET WIRING HARNESS ENGINE TO LIGHTING

PLUG CONNECTION C056 SOCKET WIRING HARNESS ENGINE TO LIGHTING			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57A (B) / 57JF (B)	VEHICLE EARTH (ALL)	
2	376 (L)	POWER SUPPLY HORN	
3	1030B (U)	HEADLAMP DIP BEAM	
4	1027B (U)	MAIN BEAM	
5	1073 (L) / 1073A (L)	POWER SUPPLY FRONT WORK LAMP	
6	57B (B) / 57JG (B)	VEHICLE EARTH (ALL)	
7	1030A (U)	HEADLAMP DIP BEAM	
8	1027A (U)	MAIN BEAM	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4429B 9



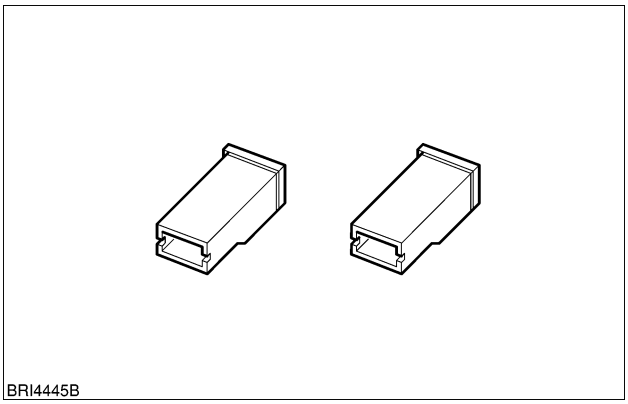
C056-BRJ4642A 10

TOP REAR - ENGINE

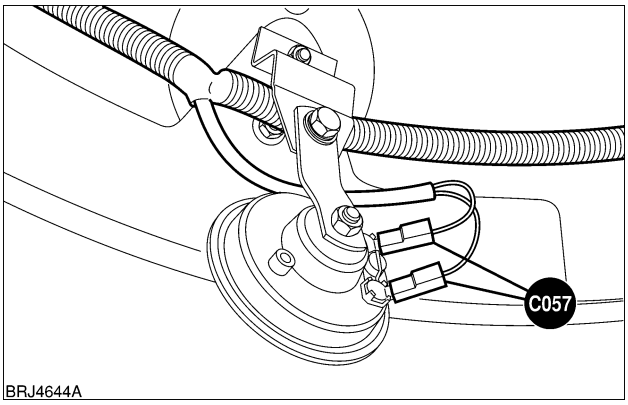
C057 HORN

PLUG CONNECTION C057 HORN			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57E (B) / 376 (L)	EARTH (ALL) / HORN POWER SUPPLY	PUMA Standard: **Wiring harness - Electrical schematic frame 25 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 25 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4445B 11



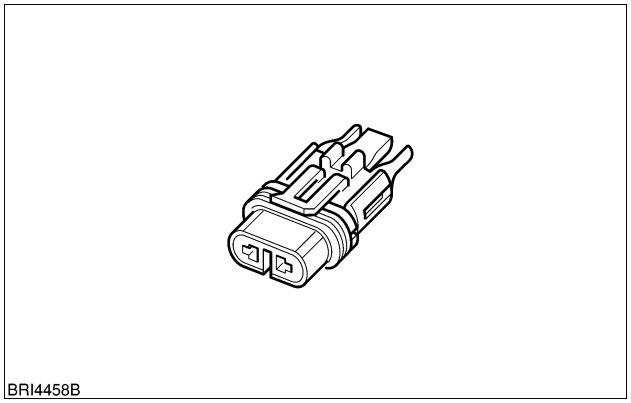
C057-BRJ4644A 12

BONNET

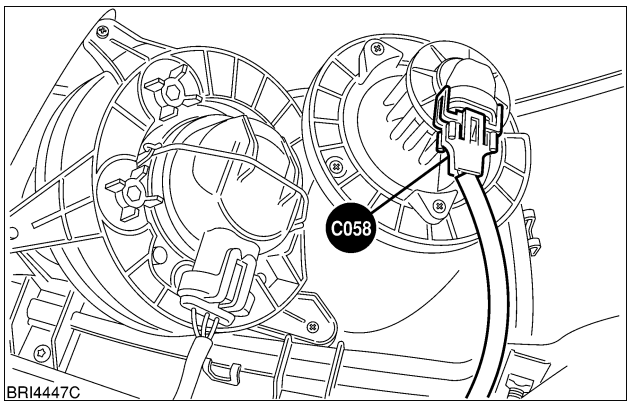
C058 WORK LAMP LEFT-HAND SIDE

PLUG CONNECTION C058 WORK LAMP LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1073D (L)	POWER SUPPLY FRONT WORK LAMP	PUMA Standard: **Wiring harness - Electrical schematic frame 29 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 29 (A.30.A)**
2	57 (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4458B-01 13



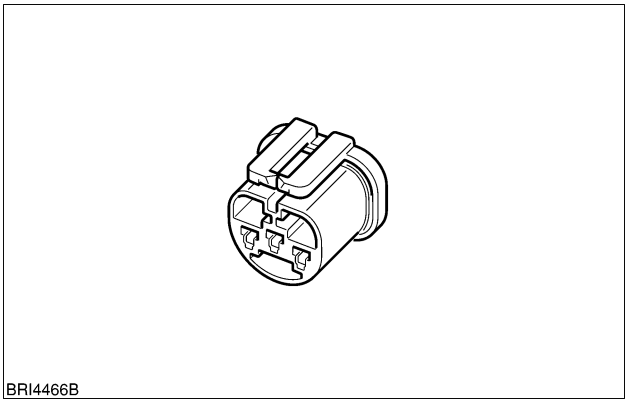
C058-BRI4447C 14

BONNET

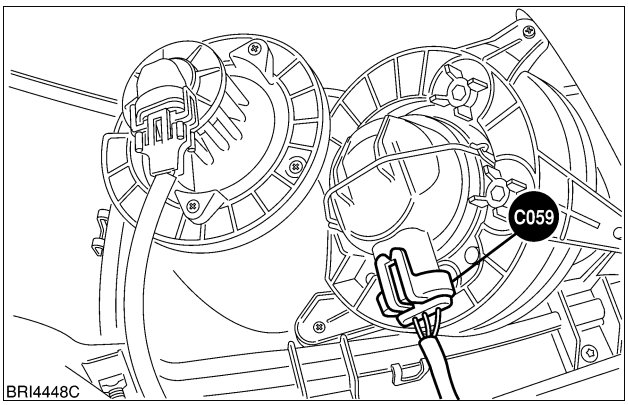
C059 RIGHT-HAND HEADLIGHT

PLUG CONNECTION C059 HEADLIGHT RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57D (B)	VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 27 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 27 (A.30.A)**
3	1027C (U)	MAIN BEAM	
4	1030C (U)	HEADLAMP DIP BEAM	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4466B-01 15



C059-BRI4448C-1 16

BONNET

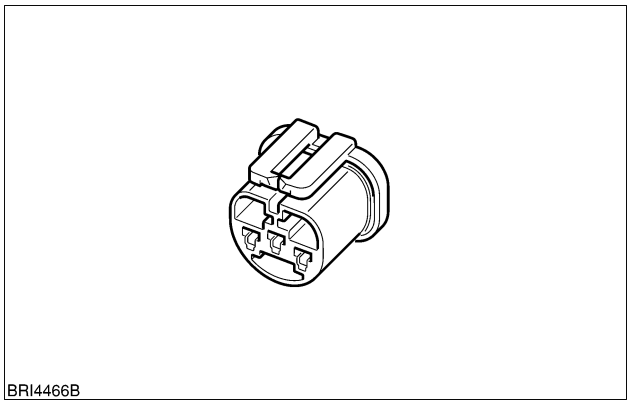
Wiring harness - Component diagram 06 Plug connections 60-69

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

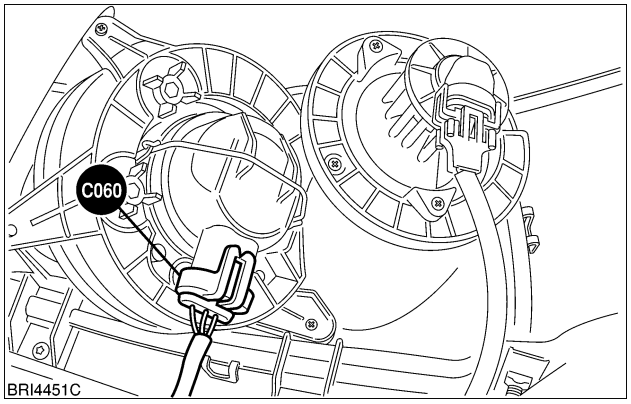
C060 HEADLIGHT LEFT-HAND SIDE

PLUG CONNECTION C060 HEADLIGHT LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57C (B)	VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 27 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 27 (A.30.A)**
3	1027D (U)	MAIN BEAM	
4	1030D (U)	HEADLAMP DIP BEAM	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4466B 1



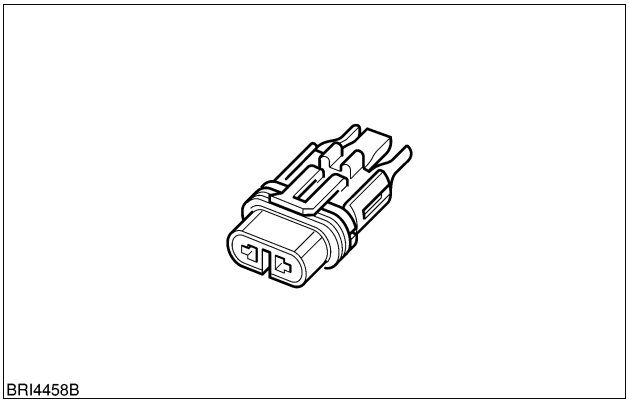
C060-BRI4451C 2

FRONT OF THE BONNENT

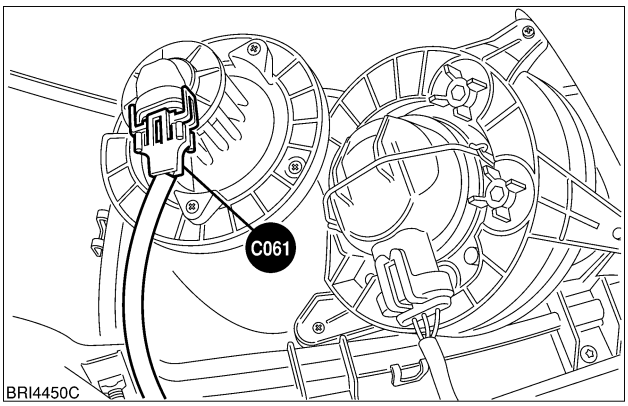
C061 WORK LAMP RIGHT-HAND SIDE

PLUG CONNECTION C061 WORK LAMP RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1073C (L)	POWER SUPPLY FRONT WORK LAMP	PUMA Standard: **Wiring harness - Electrical schematic frame 29 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 29 (A.30.A)**
2	57 (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4458B-01 3



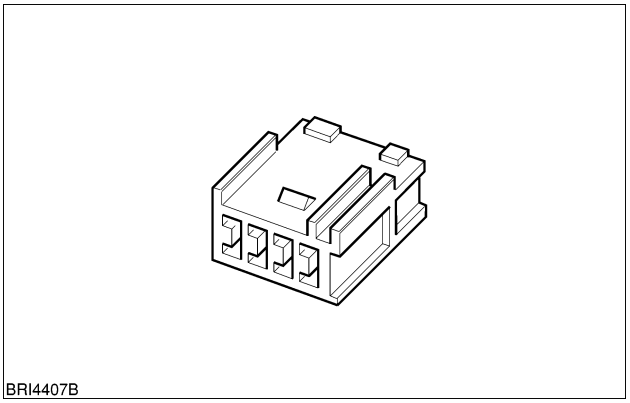
C061-BRI4450C 4

FRONT OF THE BONNENT

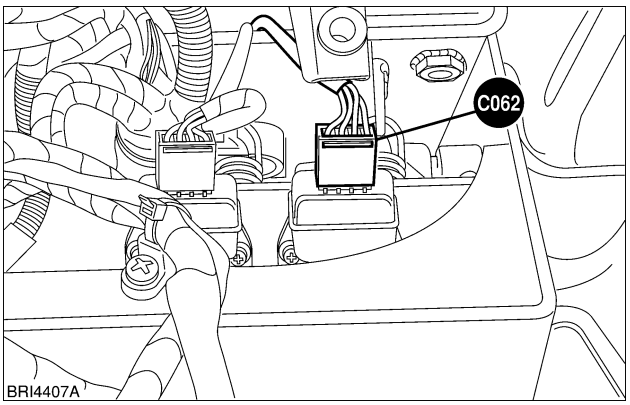
C062 SWITCH RIGHT-HAND BRAKE LIGHT

PLUG CONNECTION C062 SWITCH RIGHT-HAND BRAKE LIGHT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	10C (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 18 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 18 (A.30.A)**
2	10D (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	
3	840 (G)	BRAKE LIGHT SIGNAL RIGHT / LEFT	
4	830 (R)	BRAKE LIGHT SWITCH RIGHT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4407B 5



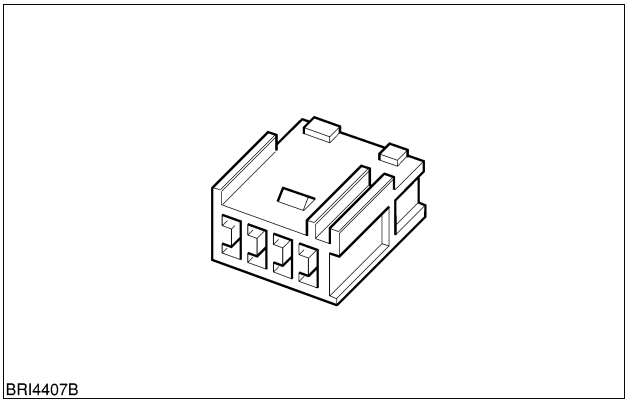
C062-BRI4407 6

BEHIND THE STEERING COLUMN CONSOLE

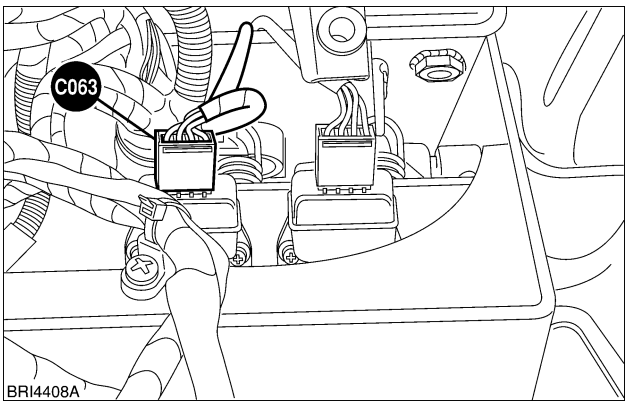
C063 SWITCH LEFT-HAND BRAKE LIGHT

PLUG CONNECTION C063 SWITCH LEFT-HAND BRAKE LIGHT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	10B (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 18 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 18 (A.30.A)**
2	10A (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	
3	840A (G)	BRAKE LIGHT SIGNAL RIGHT / LEFT	
4	820 (R)	BRAKE LIGHT SWITCH LEFT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4407B 7



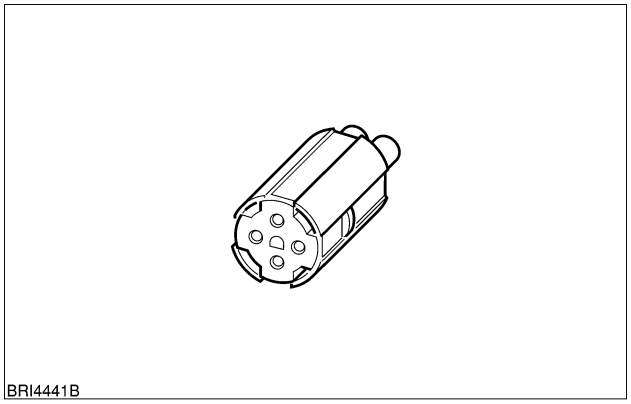
C063-BRI4408 8

BEHIND THE STEERING COLUMN CONSOLE

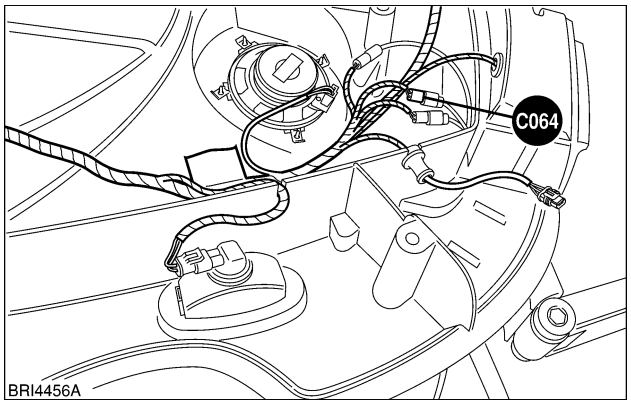
C064 GRAB RAIL WORK LAMP RIGHT-HAND SIDE

PLUG CONNECTION C064 GRAB RAIL WORK LAMP RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	1097B (R)	POWER SUPPLY OUTER FRONT WORK LAMP	PUMA Standard: **Wiring harness - Electrical schematic frame 29 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 29 (A.30.A)**
4	57L (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4441B 9



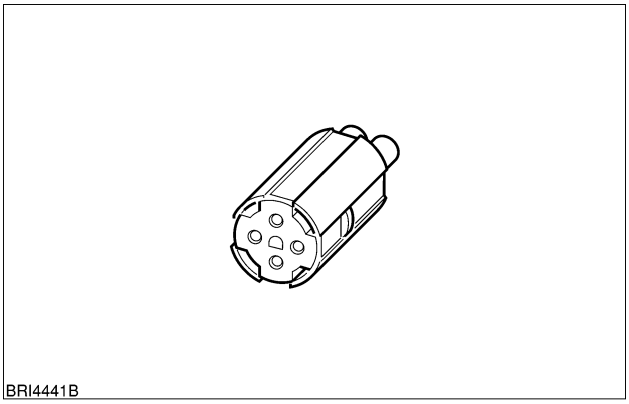
C064-BRI4456A 10

CAB ROOF RIGHT-HAND SIDE

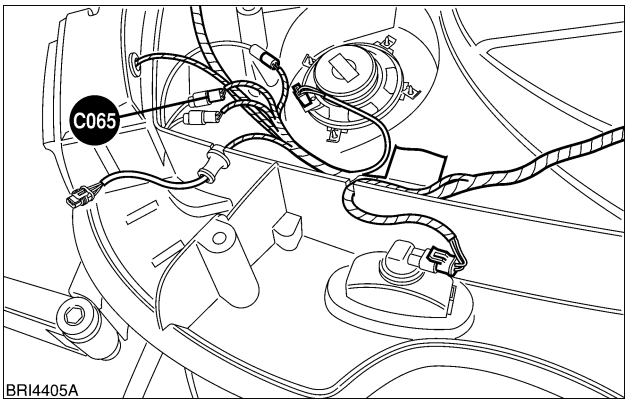
C065 GRAB RAIL WORK LAMP LEFT-HAND SIDE

PLUG CONNECTION C065 GRAB RAIL WORK LAMP LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	1097A (R)	POWER SUPPLY OUTER FRONT WORK LAMP	PUMA Standard: **Wiring harness - Electrical schematic frame 29 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 29 (A.30.A)**
4	57V (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4441B 11



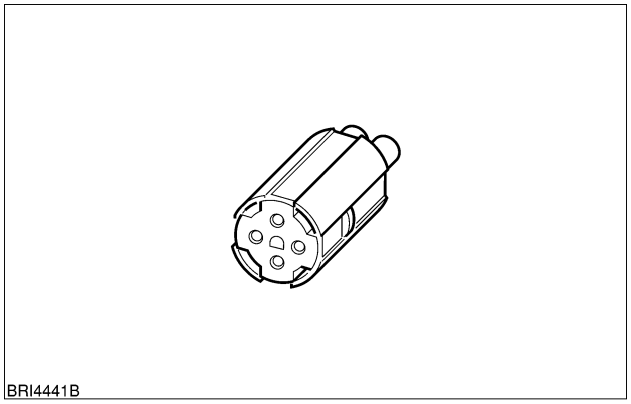
C065-BRI4405A 12

CAB ROOF LEFT-HAND SIDE

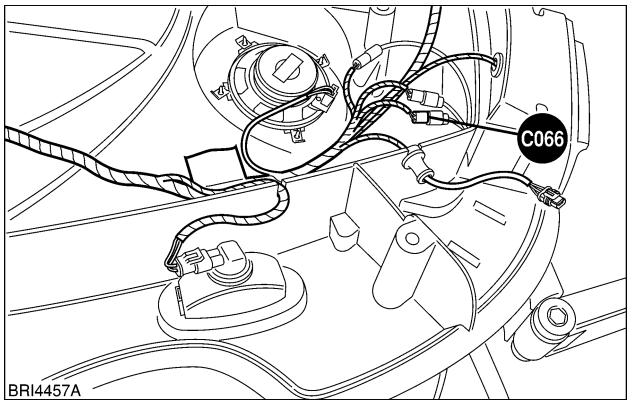
C066 GRAB RAIL SIDE LIGHT RIGHT

PLUG CONNECTION C066 GRAB RAIL SIDE LIGHT RIGHT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	249 (LTG)	SMV LIGHTS RIGHT	PUMA Standard: **Wiring harness - Electrical schematic frame 28 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 28 (A.30.A)**
2	1013C (R)	LIGHTS RIGHT-HAND SIDE	
4	57C (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4441B 13



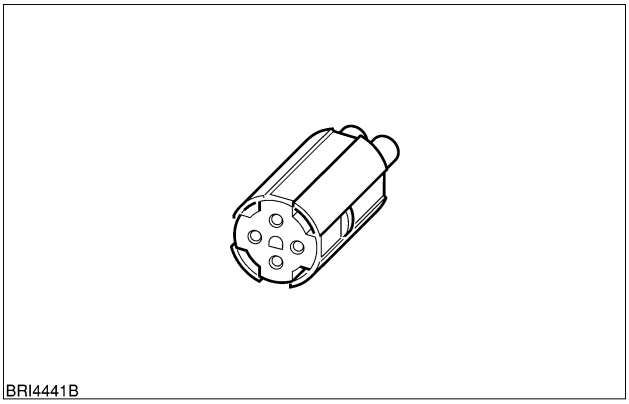
C066-BRI4457A 14

CAB ROOF RIGHT-HAND SIDE

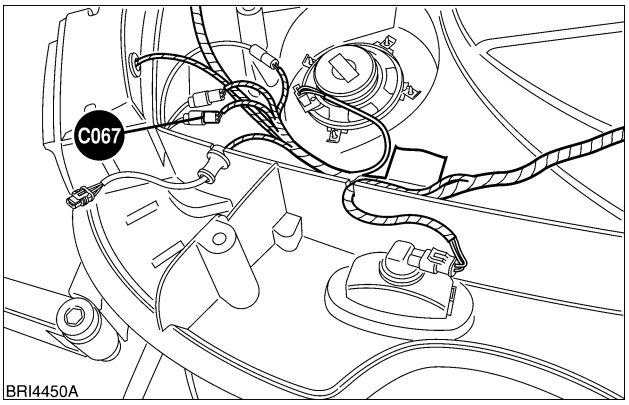
C067 GRAB RAIL SIDE LIGHT LEFT

PLUG CONNECTION C067 GRAB RAIL SIDE LIGHT LEFT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	250 (LTG)	SMV LIGHTS LEFT	PUMA Standard: **Wiring harness - Electrical schematic frame 28 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 28 (A.30.A)**
2	1014C (R)	LIGHTS LEFT-HAND SIDE	
4	57E (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4441B 15



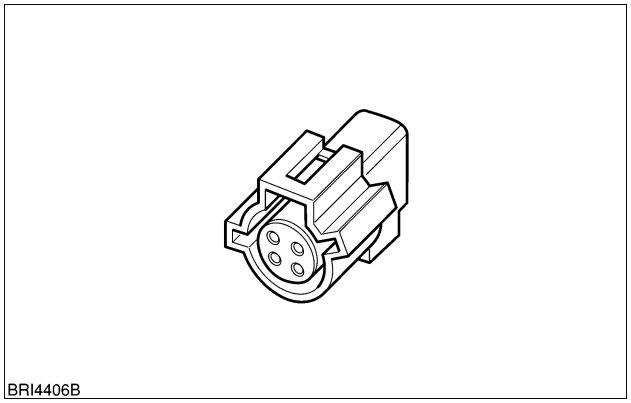
C067-BRI4450A 16

CAB ROOF LEFT-HAND SIDE

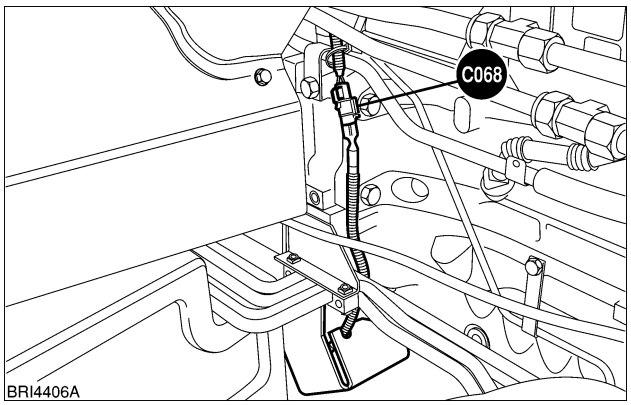
C068 RADAR SENSOR

PLUG CONNECTION C068 RADAR SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57JD (B)	VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 31 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 31 (A.30.A)**
2	2028B (G)	SIGNAL RADAR SENSOR	
3	2031 (Y)	RADAR PRESENT	
4	2027 (R)	POWER SUPPLY RADAR SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4406B 17



C068-BRI4406A 18

BACK OF ENGINE RIGHT

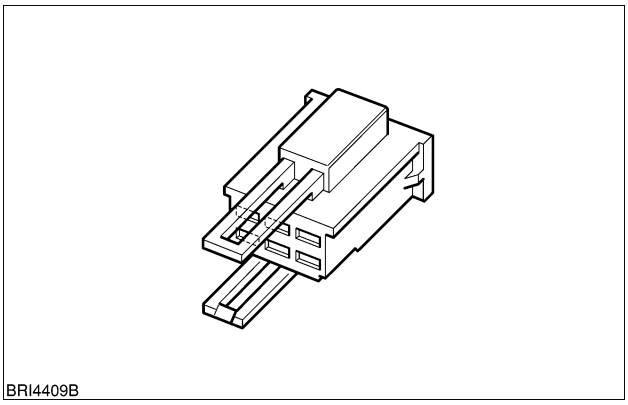
Wiring harness - Component diagram 07 Plug connections 70-79

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

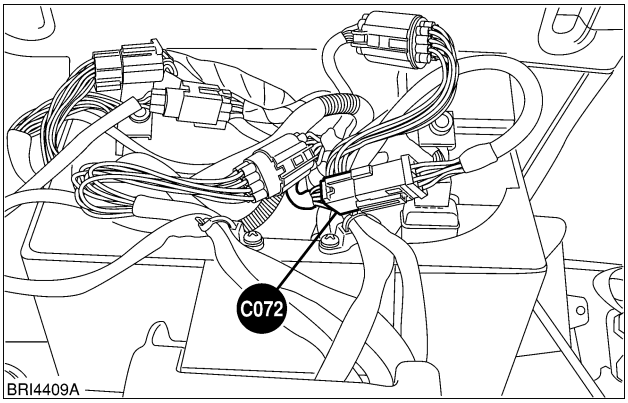
C072 STARTER SWITCH

PLUG CONNECTION C072 STARTER SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	150A (N)	BATTERY POWER SUPPLY (NO FUSE) (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 01 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**
2	137 (W)	POWER SUPPLY RADIO	
3	71 (W)	POWER SUPPLIES WHEN STARTER SWITCH SWITCHED ON (NOT PROTECTED BY FUSE)	
4	1010 (G)	IGNITION RELAY (MAGNETIC COIL)	
6	1000 (W)	POWER SUPPLY SAFETY SWITCH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4409B 1



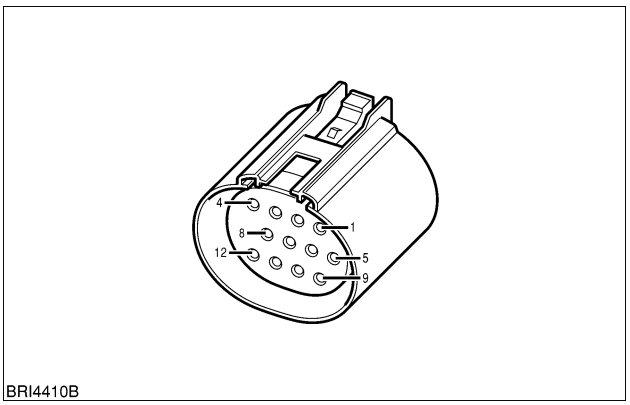
C072-BRI4409A-1 2

STEERING COLUMN CONSOLE

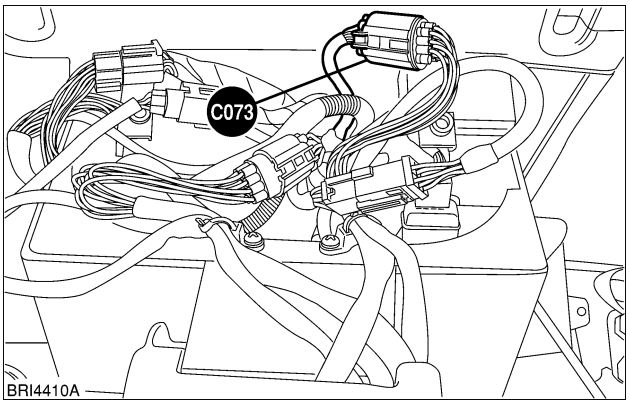
C073 SWITCH FOR FRONT WINDSCREEN WIPER

PLUG CONNECTION C073 SWITCH FOR FRONT WINDSCREEN WIPER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1038A (TN)	POWER SUPPLY FRONT WINDSCREEN WIPER - REAR	PUMA Standard: **Wiring harness - Electrical schematic frame 32 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 32 (A.30.A)**
2	57E (B)	VEHICLE EARTH (ALL)	
3	587 (LTG)	INTERMITTENT WIPER WINDSCREEN	
5	58 (R)	WIPER MOTOR - LOW	
6	56 (W)	WIPER MOTOR - HIGH	
7	1121 (G)	REAR WINDSCREEN WASHER	
8	1119 (G)	REAR WINDSCREEN WIPER	
9	97 (LTG)	POWER SUPPLY FRONT WINDSCREEN WASHER	
10	63 (U)	WIPER MOTOR - POWER SUPPLY INITIAL POSITION	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4410B 3



C073-BRI4410A 4

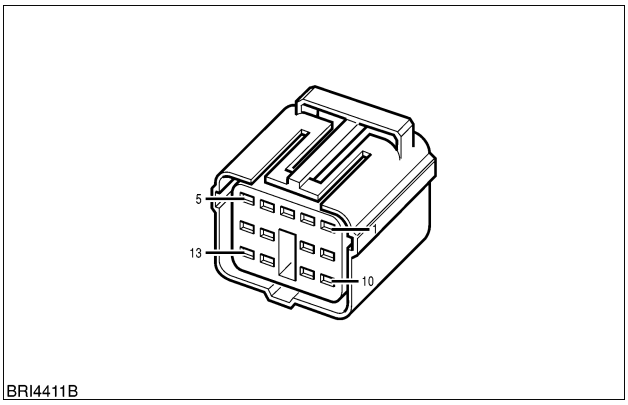
STEERING COLUMN CONSOLE

C075 SWITCH FOR SHUTTLE LEVER

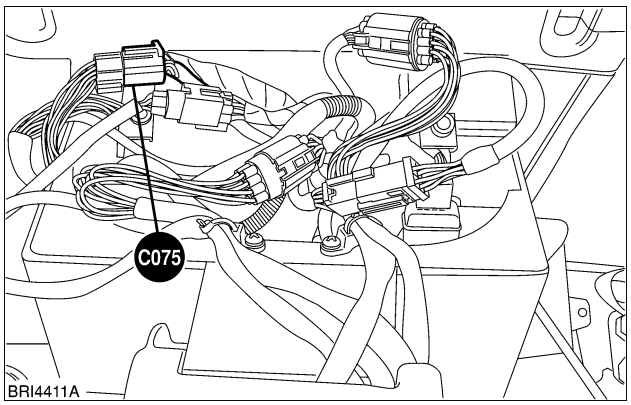
PLUG CONNECTION C075 SWITCH FOR SHUTTLE LEVER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7525C (G)	POWER SUPPLY TRANSMISSION SENSOR 5 V	**Wiring harness - Electrical schematic frame 06 (A.30.A)**
2	7250 (S)	TRANSMISSION SIGNAL FORWARD	
3	7260 (S)	TRANSMISSION SIGNAL REVERSE	
4	7730 (TN)		
5	7000B (U)	POWER SUPPLY TRANSMISSION CONTROLS	
6	1001X (W)	POWER SUPPLY ENGAGING MAGNET	
7	7420A (Y)	TRANSMISSION CONTROLLER TO SWITCH FOR COUPLING SETTING	
8	57SS (B)	VEHICLE EARTH (ALL)	

PLUG CONNECTION C075 - in PUMA Multicontroller SWITCH FOR SHUTTLE LEVER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7525C (G)	POWER SUPPLY TRANSMISSION SENSOR 5 V	**Wiring harness - Electrical schematic frame 06 (A.30.A)**
2	7250 (S)	TRANSMISSION SIGNAL FORWARD	
3	7260 (S)	TRANSMISSION SIGNAL REVERSE	
4	7295 (W)	SHUTTLE SWITCH SIGNAL - SWITCHED EARTH	
5	7000B (U)	POWER SUPPLY TRANSMISSION CONTROLS	
6	7420A (Y)	SHUTTLE SWITCH SIGNAL SAFETY	
7	7425 (Y)	CLUTCH SWITCH SIGNAL	
8	57SS (B)	VEHICLE EARTH (ALL)	
10	7525G (G)	POWER SUPPLY TRANSMISSION SENSOR 5V	
11	7730 (TN)	SHUTTLE SWITCH SIGNAL NEUTRAL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4411B 5



C075-BRI4411A 6

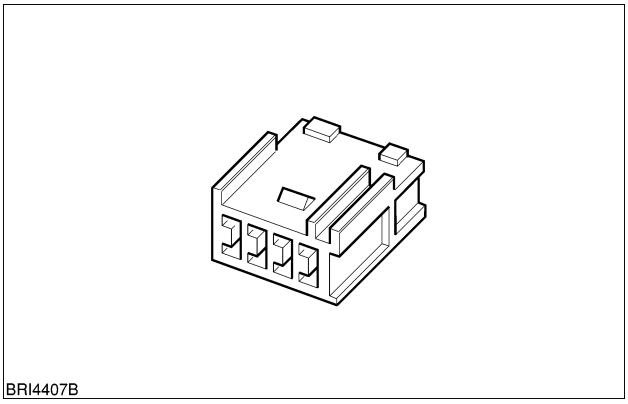
STEERING COLUMN CONSOLE

C076 CLUTCH SWITCH

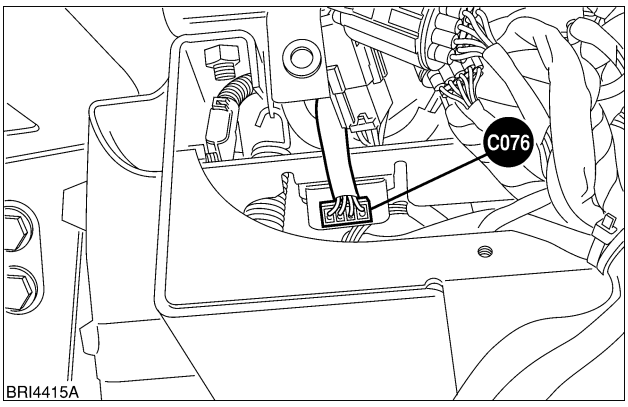
PLUG CONNECTION C076 CLUTCH SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7420B (Y)	TRANSMISSION CONTROLLER TO SWITCH FOR COUPLING SETTING	**Wiring harness - Electrical schematic frame 06 (A.30.A)**
2	7420C (Y)	TRANSMISSION CONTROLLER TO SWITCH FOR COUPLING SETTING	
3	7660 (R)	TRANSMISSION COUPLING DISENGAGEMENT	
4	1000 (W)	POWER SUPPLY SAFETY SWITCH	

PLUG CONNECTION C076 - in PUMA Multicontroller CLUTCH SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1001X (W)	POWER SUPPLY ENGAGING MAGNET	**Wiring harness - Electrical schematic frame 06 (A.30.A)**
2	7425 (Y)	CLUTCH SWITCH SIGNAL	
3	7660 (R)	TRANSMISSION COUPLING DISENGAGEMENT	
4	1000 (W)	POWER SUPPLY SAFETY SWITCH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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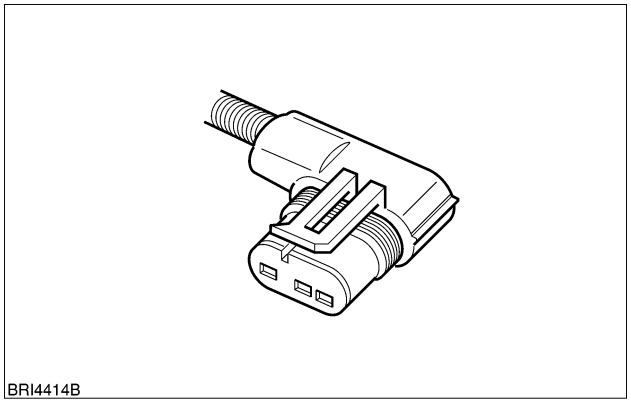
C076-BRI4415A 8

STEERING COLUMN CONSOLE

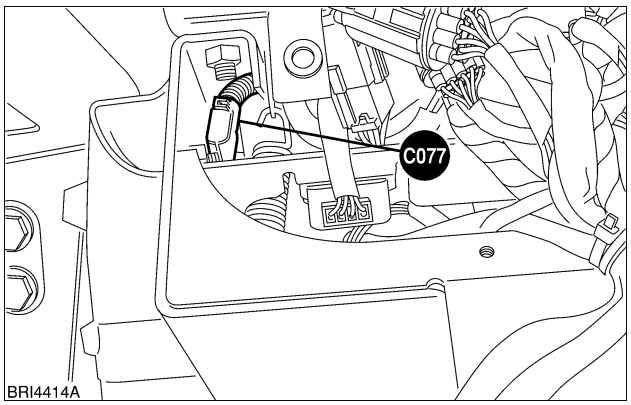
C077 CLUTCH POTENTIOMETER

PLUG CONNECTION C077 CLUTCH POTENTIOMETER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7525A (G)	POWER SUPPLY TRANSMISSION SENSOR 5 V	PUMA Standard: **Wiring harness - Electrical schematic frame 06 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 06 (A.30.A)**
2	7430 (Y)	SIGNAL COUPLING SETTING	
3	60B (B/W)	EARTH SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C077-BRI4414A 10

STEERING COLUMN CONSOLE

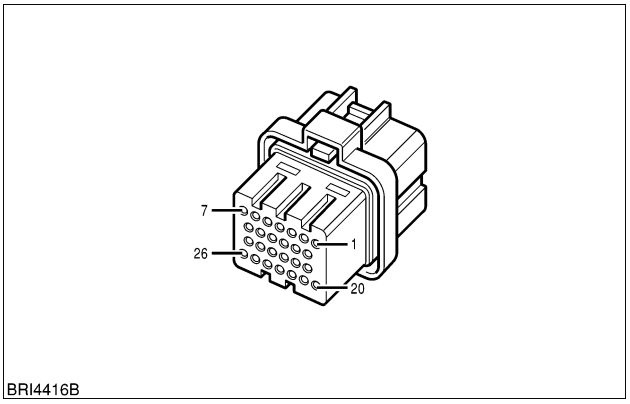
C079 ICU2

PLUG CONNECTION C079 ICU2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
3	2019 (K)	ENGINE SPEED (TACHO MODULE TO PERFORMANCE MONITOR)	**Wiring harness - Electrical schematic frame 37 (A.30.A)**
4	3016 (S)	BRAKE FLUID LEVEL SIGNAL	
5	3005 (G)	TELLTALE INDICATOR LEFT-HAND SIDE	
6	3004 (G)	TELLTALE INDICATOR RIGHT-HAND SIDE	
7	9027 (W)	CAL/SEL INPUT ANALOGUE-DIGITAL INSTRUMENT CLUSTER	
8	7640Z (TN)	DIAGNOSTICS PLUG RS232 IN	
9	7650Z (W)	DIAGNOSTICS PLUG RS232 OUT	
10	1135 (G)	WARNING LIGHT AUXILIARY START SYSTEM	
11	1005 (S)	WARNING LIGHT AIR FILTER	
12	7130 (N)	WARNING LIGHT HYDRAULIC OIL FILTER	
13	2040 (LTG)	WATER SENSOR FOR THE WATER SEPARATOR	
14	1052 (Y)	OUTSIDE LIGHTING RELAY	
15	1012E (R)	LIGHTING	
16	1001P (W)	POWER SUPPLY ENGAGING MAGNET	
17	650 (TQ)	COOLANT GAUGE SENSOR	
19	2014 (G)	ENGINE OIL PRESSURE SENSOR (+5 VOLT)	
21	2020 (Y)	ENGINE SHUTDOWN (TACHO MODULE TO PERFORMANCE MONITOR)	
22	2095 (G)	EARTH SIGNAL INSTRUMENTS	
23	57BE (B)	VEHICLE EARTH (ALL)	
24	160R (Y)	BATTERY POWER SUPPLY FOR ELECTRONICS	
25	1006A (N)	WARNING LIGHT 3-PHASE ALTERNATOR	
26	9031A (L)	ANALOGUE-DIGITAL INSTRUMENT CLUSTER MEMORY B+	

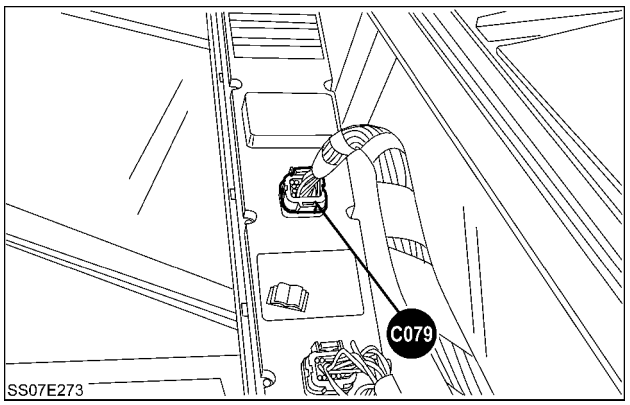
PLUG CONNECTION C079 - in PUMA Multicontroller ICU2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
3	2019 (K)	ENGINE SPEED (TACHO MODULE TO PERFORMANCE MONITOR)	**Wiring harness - Electrical schematic frame 37 (A.30.A)**
4	3016 (S)	BRAKE FLUID LEVEL SIGNAL	
5	3005 (G)	TELLTALE INDICATOR LEFT-HAND SIDE	
6	3004 (G)	TELLTALE INDICATOR RIGHT-HAND SIDE	
8	7640Z (TN)	DIAGNOSTICS PLUG RS232 IN	
9	7650Z (W)	DIAGNOSTICS PLUG RS232 OUT	
10	1135 (G)	WARNING LIGHT AUXILIARY START SYSTEM	
11	1005 (S)	WARNING LIGHT AIR FILTER	
12	7130 (N)	WARNING LIGHT HYDRAULIC OIL FILTER	
13	2040 (LTG)	WATER SENSOR FOR THE WATER SEPARATOR	
14	1052 (Y)	OUTSIDE LIGHTING RELAY	
15	1012E (R)	LIGHTING	

16	1001P (W)	POWER SUPPLY ENGAGING MAGNET
17	650 (TQ)	COOLANT GAUGE SENSOR
19	2014 (G)	ENGINE OIL PRESSURE SENSOR (+5 VOLT)
21	2020 (Y)	ENGINE SHUTDOWN (TACHO MODULE TO PERFORMANCE MONITOR)
22	2095 (G)	EARTH SIGNAL INSTRUMENTS
23	57BE (B)	VEHICLE EARTH (ALL)
24	160R (Y)	BATTERY POWER SUPPLY FOR ELECTRONICS
25	1006A (N)	WARNING LIGHT 3-PHASE ALTERNATOR
26	9031A (L)	ANALOGUE-DIGITAL INSTRUMENT CLUSTER MEMORY B+

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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SS07E273 12

BEHIND THE ICU2

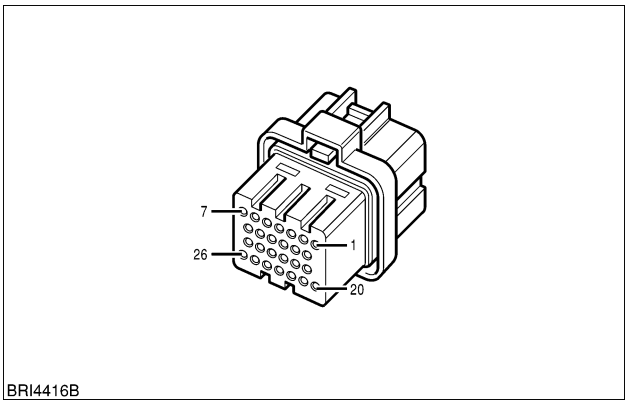
Wiring harness - Component diagram 08 Plug connections 80-89

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

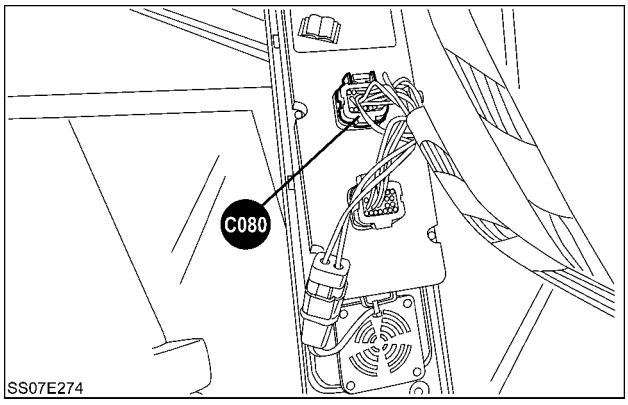
C080 ICU2

PLUG CONNECTION C080 ICU2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
11	3062 (L)	SWITCH IMPLEMENT SOCKET	PUMA Standard: **Wiring harness - Electrical schematic frame 31 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 31 (A.30.A)**
14	2330 (L)	PTO SPEED ISO 11876 SOCKET PIN 3	
15	2320 (L)	ACTUAL ROAD SPEED ISO 11786 SOCKET PIN 1	
16	2300 (L)	THEOR. ROAD SPEED ISO 11786 SOCKET PIN 2	
17	2310 (L)	LOWER/RAISE - POWER LIFT- MODE ISO 11786 SOCKET PIN 4	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4416B-01 1



SS07E274 2

BEHIND THE ICU2

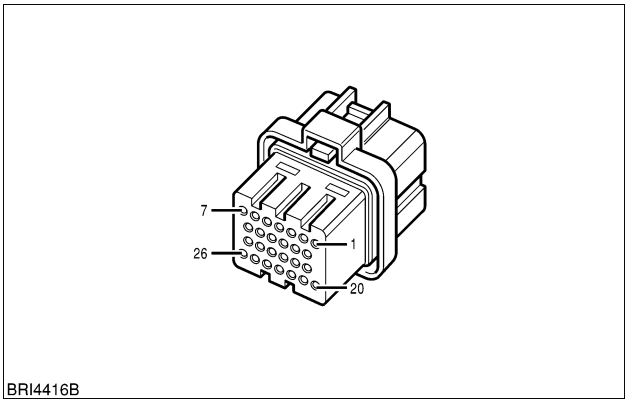
C081 ICU2

PLUG CONNECTION C081 ICU2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5190 (R)	POWER LIFT LOCK / LIFT-O-MATIC	**Wiring harness - Electrical schematic frame 38 (A.30.A)**
2	7160 (R)	WARNING LOW FEED PRESSURE FOR HYDRAULICS	
5	1035 (W)	WARNING LIGHT ENGINE OIL PRESSURE	
6	8020 (TN)	PRESSURE TRAILER BRAKE	
7	3014A (R)	SIGNAL WARNING LIGHT HAND BRAKE	
8	1056 (O)		
10	1055 (U)		
11	3052 (L)	INTERIOR LIGHT TO DOOR CONTACT SWITCH	
12	2012 (Y)	WARNING LIGHT TRANSMISSION OIL PRESSURE	
13	1034 (LTG)	TURN SIGNAL TELLTALE (TERMINAL C3)	
14	29 (G)	SIGNAL FUEL GAUGE MAIN FUEL TANK	
15	8010 (TN)	PRESSURE TRAILER BRAKE	
16	1033 (LTG)	TURN SIGNAL TELLTALE (TERMINAL C2)	
18	1026 (U)	TELLTALE MAIN BEAM	
19	2200Z (G)	SERVICE MODE INITIATION	
20	39B (G)	SIGNAL TEMPERATURE DISPLAY	
22	3120 (K)	SIGNAL STEERING ANGLE SENSOR	
23	31 (Y)	SIGNAL ENGINE OIL PRESSURE SENSOR	
25	5420G (G)	CAN L	
26	5400G (Y)	CAN H	

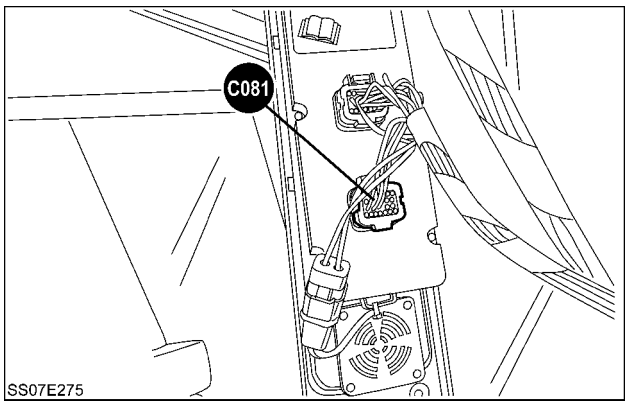
PLUG CONNECTION C081 - in PUMA Multicontroller ICU2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5190 (R)	POWER LIFT LOCK / LIFT-O-MATIC	**Wiring harness - Electrical schematic frame 38 (A.30.A)**
2	7160 (R)	WARNING LOW FEED PRESSURE FOR HYDRAULICS	
5	1035 (W)	WARNING LIGHT ENGINE OIL PRESSURE	
6	8020 (TN)	PRESSURE TRAILER BRAKE	
7	3014A (R)	SIGNAL WARNING LIGHT HAND BRAKE	
8	1056 (O)	BUZZER SIGNAL OUTPUT	
10	1055 (U)	BUZZER SIGNAL INPUT	
11	3052 (L)	INTERIOR LIGHT TO DOOR CONTACT SWITCH	
12	3500 (W)	POWER STEERING PRESSURE SIGNAL	
13	1034 (LTG)	TURN SIGNAL TELLTALE (TERMINAL C3)	
14	29 (G)	SIGNAL FUEL GAUGE MAIN FUEL TANK	
15	8010 (TN)	PRESSURE TRAILER BRAKE	
16	1033 (LTG)	TURN SIGNAL TELLTALE (TERMINAL C2)	
18	1026 (U)	TELLTALE MAIN BEAM	
19	2200Z (G)	SERVICE MODE INITIATION	

20	39B (G)	SIGNAL TEMPERATURE DISPLAY
22	3120 (K)	SIGNAL STEERING ANGLE SENSOR
23	31 (Y)	SIGNAL ENGINE OIL PRESSURE SENSOR
25	5420K (G)	CAN L
26	5400K (Y)	CAN H

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4416B-01 3



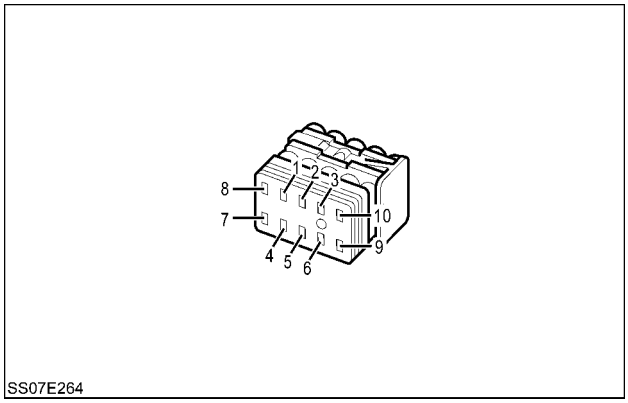
SS07E275 4

BEHIND THE ICU2

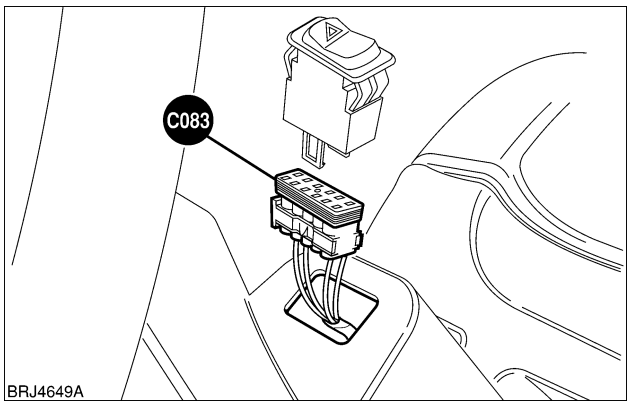
C083 HAZARD LIGHT SWITCH

PLUG CONNECTION C083 HAZARD LIGHT SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	1021 (P)	POWER SUPPLY HAZARD LIGHT SWITCH (STARTER BATTERY)	PUMA Standard: **Wiring harness - Electrical schematic frame 28 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 28 (A.30.A)**
3	1020A (G/W)	POWER SUPPLY HAZARD LIGHT SWITCH	
7	57BF (B)	VEHICLE EARTH (ALL)	
8	1020 (G/S)	POWER SUPPLY HAZARD LIGHT SWITCH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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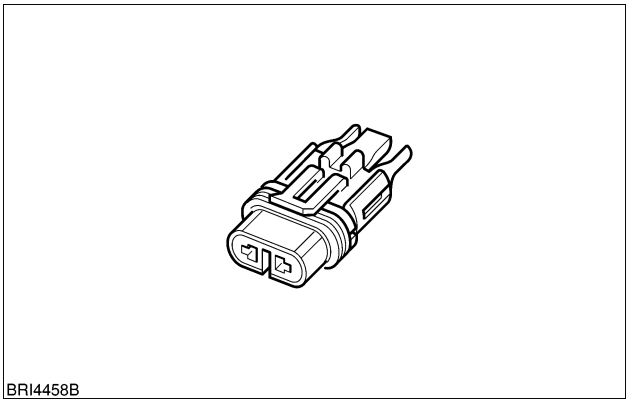
C083-BRJ4649A 6

BEHIND THE STEERING WHEEL

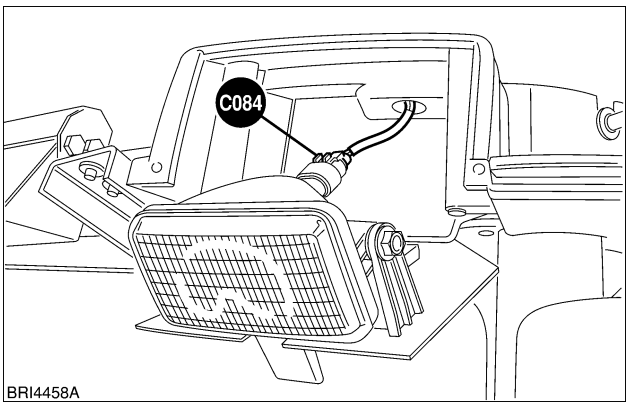
C084 TOP FRONT WORK LAMP LEFT-HAND SIDE

PLUG CONNECTION C084 UPPER FRONT WORK LAMP LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A	1098A (W)	EARTH RELAY FRONT WORK LAMP	PUMA Standard: **Wiring harness - Electrical schematic frame 29 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 29 (A.30.A)**
B	57AB (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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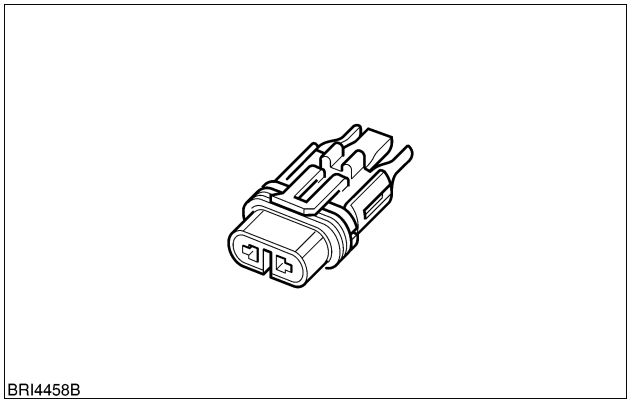
C084-BRI4458A 8

FRONT LEFT - CAB ROOF

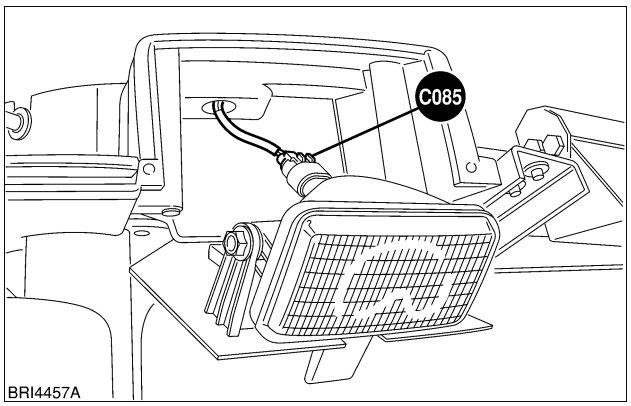
C085 TOP FRONT WORK LAMP LIGHT-HAND SIDE

PLUG CONNECTION C085 UPPER FRONT WORK LAMP RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A	1098B (W)	EARTH RELAY FRONT WORK LAMP	PUMA Standard: **Wiring harness - Electrical schematic frame 29 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 29 (A.30.A)**
B	57AA (B)	VEHICLE EARTH (ALL) / VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4458B 9



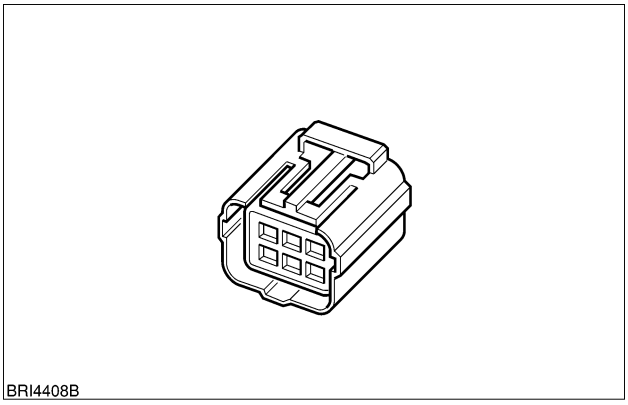
C085-BRI4457A 10

FRONT RIGHT - CAB ROOF

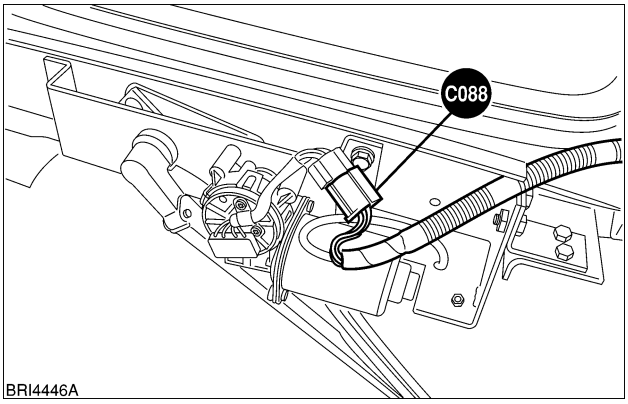
C088 WINDSCREEN WIPER MOTOR

PLUG CONNECTION C088 WINDSCREEN WIPER MOTOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	28 (Y)	WIPER MOTOR (RETURN TO INITIAL POSITION)	PUMA Standard: **Wiring harness - Electrical schematic frame 32 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 32 (A.30.A)**
2	57M (B)	VEHICLE EARTH (ALL)	
3	58 (R)	WIPER MOTOR - LOW	
4	1019 (G)	POWER SUPPLY FRONT WINDSCREEN WIPER	
6	56 (W)	WIPER MOTOR - HIGH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4408B 11



C088-BRI4446A 12

FRONT - CAB ROOF

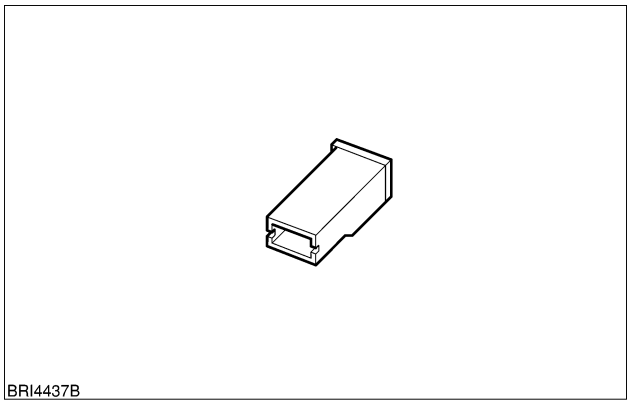
Wiring harness - Component diagram 09 Plug connections 90-99

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

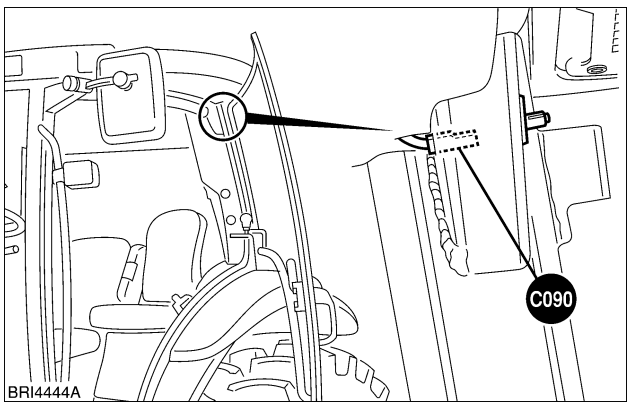
C090 DOOR CONTACT SWITCH LEFT-HAND SIDE

PLUG CONNECTION C090 DOOR CONTACT SWITCH LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3052B (L)	INTERIOR LIGHT TO DOOR CONTACT SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4437B 1



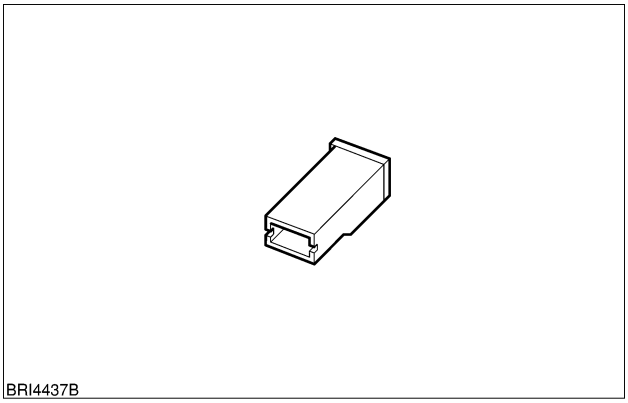
C090-BRI4444A 2

REAR TOP LEFT - CAB DOOR

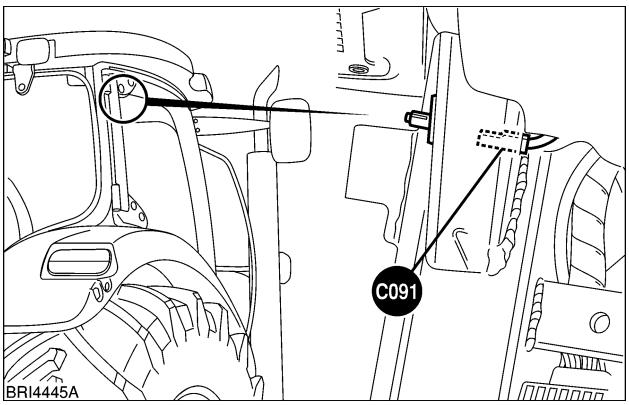
C091 DOOR CONTACT SWITCH RIGHT-HAND SIDE

PLUG CONNECTION C091 DOOR CONTACT SWITCH RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3052A (L)	INTERIOR LIGHT TO DOOR CONTACT SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4437B 3



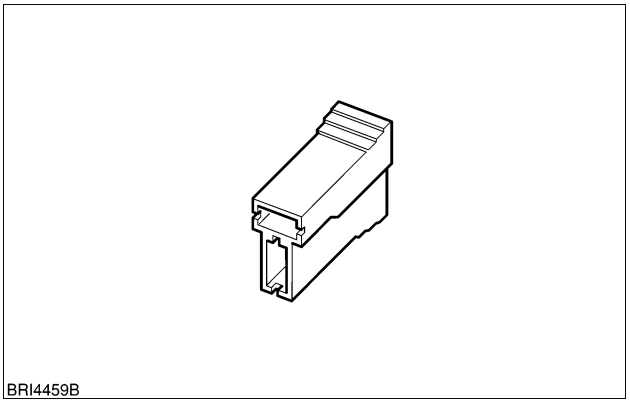
C091-BRI4445A 4

REAR TOP RIGHT - CAB DOOR

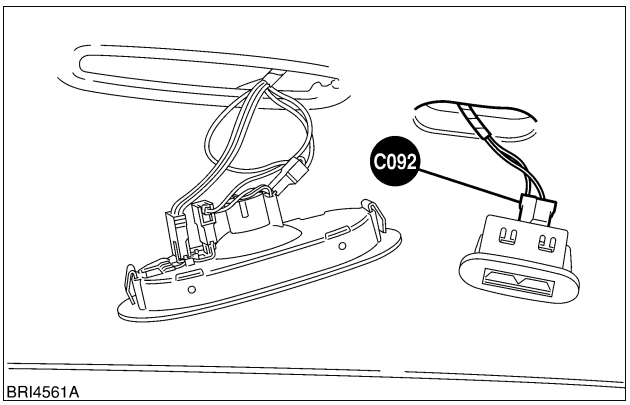
C092 CONSOLE LIGHTING LEFT-HAND SIDE

PLUG CONNECTION C092 CONSOLE LIGHTING LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57W (B)	VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 25 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 25 (A.30.A)**
2	1014D (R) / 1014 (R)	LIGHTS LEFT-HAND SIDE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4459B-01 5



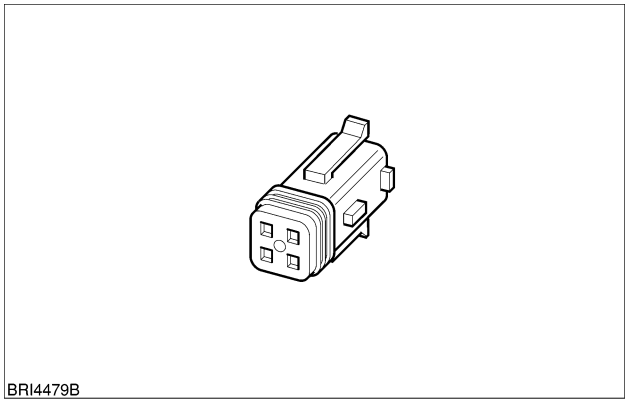
C092-BRI4561A 6

LEFT-HAND SIDE - CAB ROOF

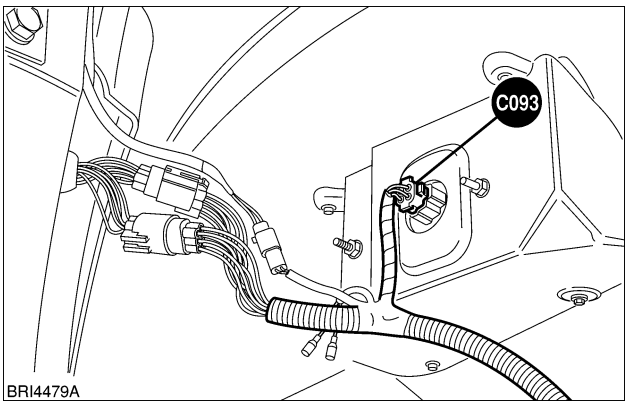
C093 BRAKE LIGHT/REAR LIGHT LEFT-HAND SIDE

PLUG CONNECTION C093 BRAKE LIGHT/REAR LIGHT LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57AX (B)	VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 26 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 26 (A.30.A)**
2	3004 (G/W)	TELLTALE INDICATOR RIGHT-HAND SIDE	
3	1013A (R)	LIGHTS RIGHT-HAND SIDE	
4	810 (G/L)	BRAKE LIGHTS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4479B 7



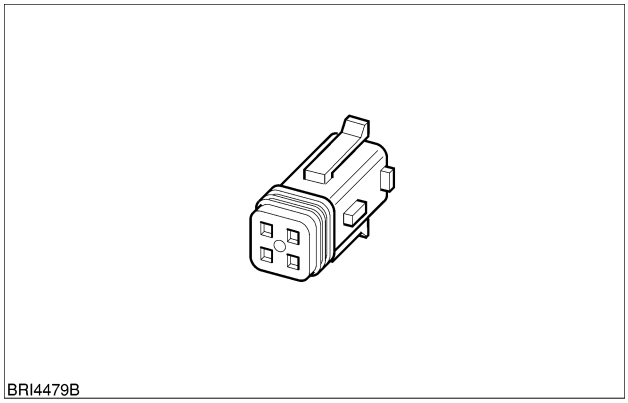
C093-BRI4479A 8

LEFT-HAND SIDE - REAR FENDER

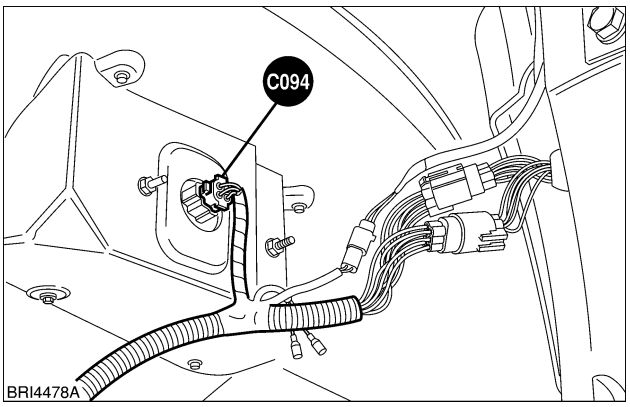
C094 BRAKE LIGHT/REAR LIGHT RIGHT-HAND SIDE

PLUG CONNECTION C094 BRAKE LIGHT/REAR LIGHT RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57AX (B)	VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 26 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 26 (A.30.A)**
2	3004 (G/W)	TELLTALE INDICATOR RIGHT-HAND SIDE	
3	1013A (R)	LIGHTS RIGHT-HAND SIDE	
4	810 (G/L)	BRAKE LIGHTS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4479B 9



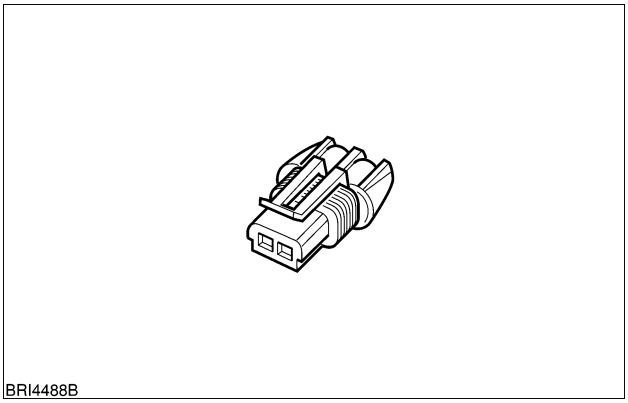
C094-BRI4478A 10

RIGHT-HAND SIDE - REAR FENDER

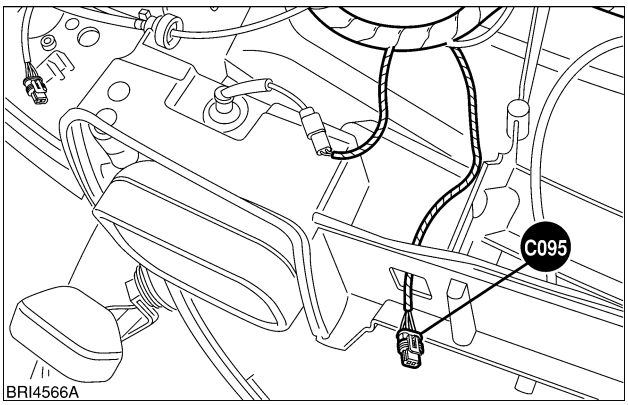
C095 REAR LICENCE PLATE LIGHT LEFT

PLUG CONNECTION C095 REAR LICENCE PLATE LIGHT LEFT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1014B (R)	LIGHTS LEFT-HAND SIDE	PUMA Standard: **Wiring harness - Electrical schematic frame 26 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 26 (A.30.A)**
2	978B (W)	LICENCE PLATE LIGHT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4488B 11



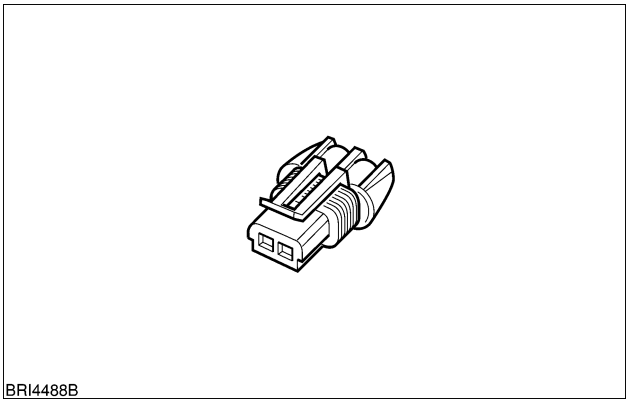
C095-BRI4566A 12

REAR LEFT - CAB ROOF

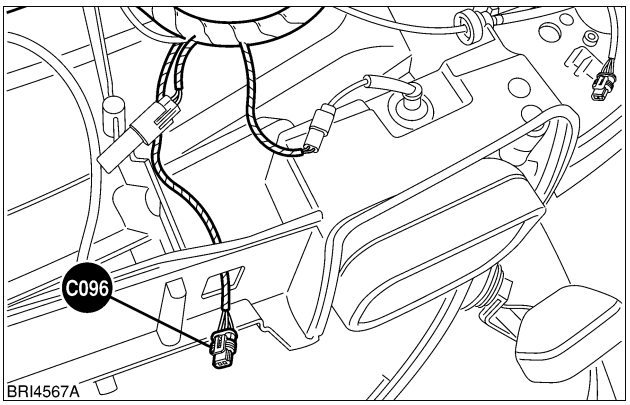
C096 REAR LICENCE PLATE / WORK LAMP RIGHT-HAND SIDE

PLUG CONNECTION C096 REAR LICENCE PLATE / WORK LAMP RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1014A (R)	LIGHTS LEFT-HAND SIDE	PUMA Standard: **Wiring harness - Electrical schematic frame 26 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 26 (A.30.A)**
2	978A (W)	LICENCE PLATE LIGHT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4488B 13



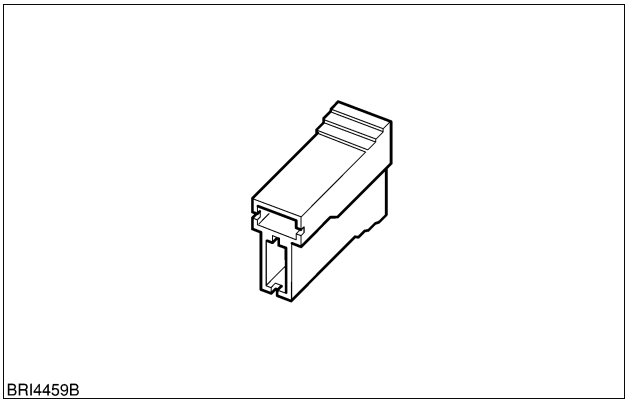
C096-BRI4567A 14

REAR RIGHT - CAB ROOF

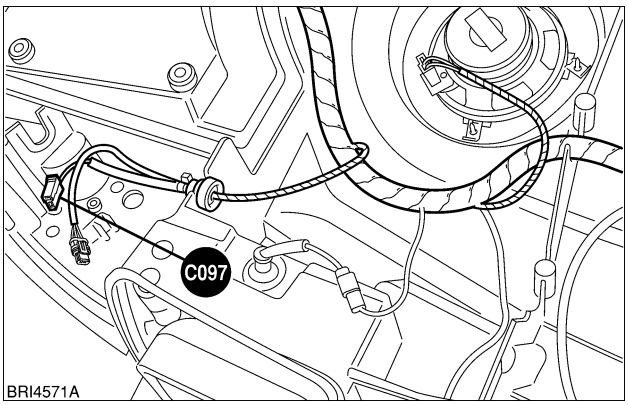
C097 ROTATING BEACON LEFT-HAND SIDE

PLUG CONNECTION C097 ROTATING BEACON LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	4012A (L)	POWER SUPPLY ROTATING BEACON	PUMA Standard: **Wiring harness - Electrical schematic frame 29 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 29 (A.30.A)**
2	57Z (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4459B-01 15



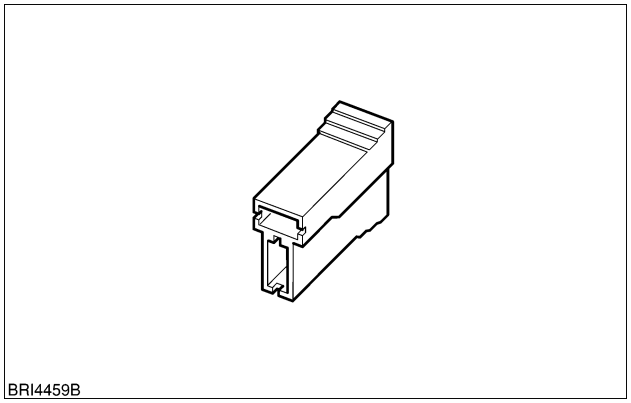
C097-BRI4571A 16

LEFT-HAND SIDE - CAB ROOF

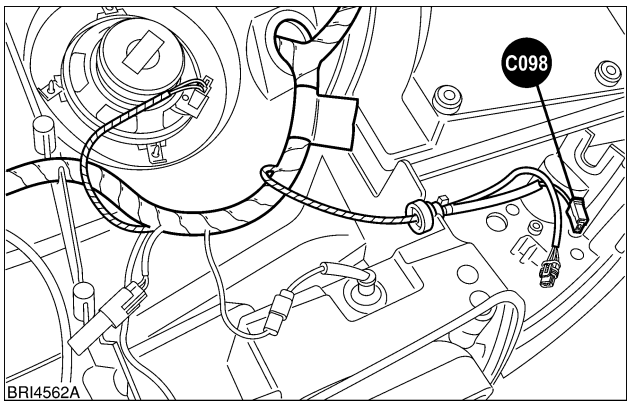
C098 ROTATING BEACON RIGHT-HAND SIDE

PLUG CONNECTION C098 ROTATING BEACON RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	4012B (L)	POWER SUPPLY ROTATING BEACON	PUMA Standard: **Wiring harness - Electrical schematic frame 29 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 29 (A.30.A)**
2	57Y (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4459B-01 17



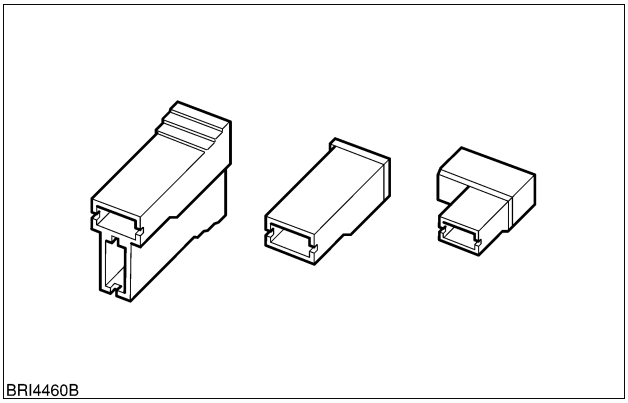
C098-BRI4562A 18

RIGHT-HAND - CAB ROOF

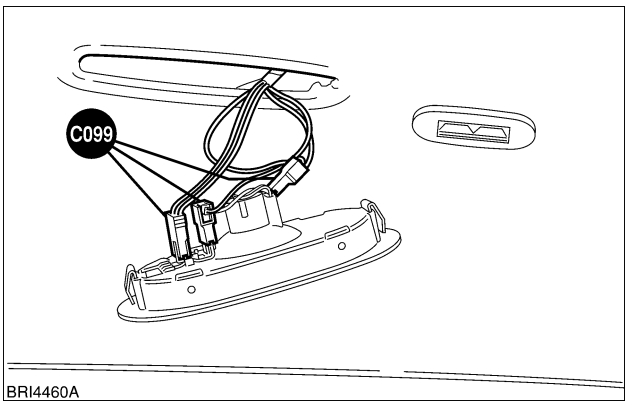
C099 INTERIOR LIGHT

PLUG CONNECTION C099 INTERIOR LIGHT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	666A (L) / 3052A (L) / 3052B (L) / 3057 (L)/ 3057A (L)	POWER SUPPLY SWITCH INTERIOR LIGHT / INTERIOR LIGHT TO DOOR CONTACT SWITCH /	PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	57R (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4460B 19



C099-BRI4460A 20

CAB ROOF

Wiring harness - Component diagram 10 Plug connections 100-109

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

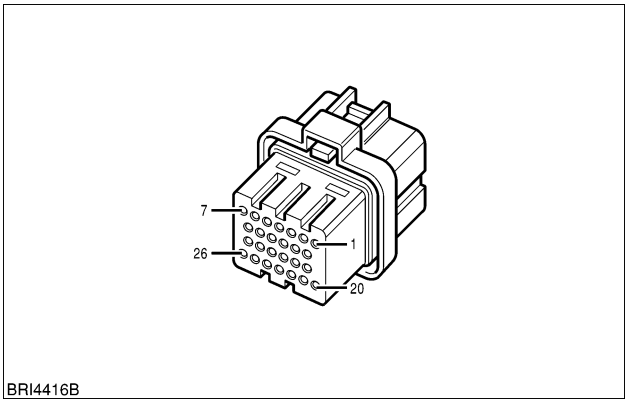
C100 TCM - ELECTRONIC TRANSMISSION CONTROLLER (CN1a)

PLUG CONNECTION C100 TCM - TRANSMISSION CONTROLLER (CN1a)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7000C (U)	POWER SUPPLY TRANSMISSION CONTROLS	**Wiring harness - Electrical schematic frame 37 (A.30.A)**
2	7000D (U)	POWER SUPPLY TRANSMISSION CONTROLS	
3	7000E (U)	POWER SUPPLY TRANSMISSION CONTROLS	
4	7431 (TQ)	POWER SUPPLY	
6	7920 (TQ)	SIGNAL COUPLING C	
7	7930 (TQ)	SIGNAL COUPLING D	
8	7660 (R)	TRANSMISSION COUPLING DISENGAGEMENT	
9	7220 (S)	TRANSMISSION GROUP H	
10	9033 (TN)	50 KM/H SOLENOID VALVE+	
11	7910 (TQ)	SIGNAL COUPLING B	
12	5090 (K)	EPC CONTROL VALVE LOWER	
13	7980 (K)	TRANSMISSION GROUP M	
14	5000A (L)	POWER SUPPLY EPC MEMORY	
15	5400T (Y)	CAN H	
16	5420T (G)	CAN L	
19	61 (O)	EARTH HOUSING	
20	5200A (N)	POWER SUPPLY EPC CONTROL VALVE	
21	5500H (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
22	5510H (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
23	60 (B/W)	EARTH SENSOR	
25	57Y (B)	VEHICLE EARTH (ALL)	
26	57Z (B)	VEHICLE EARTH (ALL)	

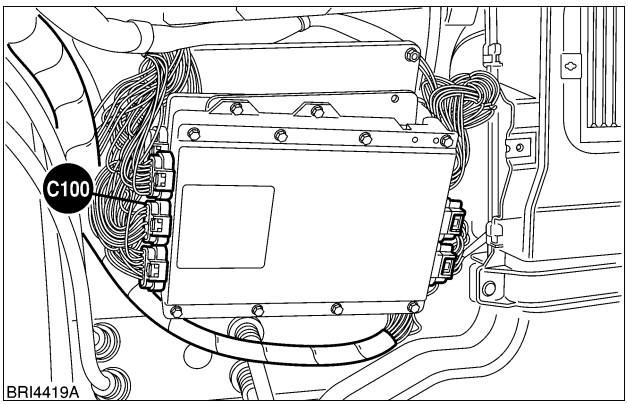
PLUG CONNECTION C100 - in PUMA Multicontroller TCM - TRANSMISSION CONTROLLER (CN1a)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7000C (U)	POWER SUPPLY TRANSMISSION CONTROLS	
2	7000D (U)	POWER SUPPLY TRANSMISSION CONTROLS	
3	7000E (U)	POWER SUPPLY TRANSMISSION CONTROLS	
4	7431 (TQ)	POWER SUPPLY	
5	5085 (K)	EPC - CONTROL VALVE RAISE	
6	7920 (TQ)	SIGNAL COUPLING C	
7	7930 (TQ)	SIGNAL COUPLING D	
8	7660 (R)	TRANSMISSION COUPLING DISENGAGEMENT	
9	7220 (S)	TRANSMISSION GROUP H	
10	9033 (TN)	50 KM/H SOLENOID VALVE+	

11	7910 (TQ)	SIGNAL COUPLING B	**Wiring harness - Electrical schematic frame 37 (A.30.A)**
12	5090 (K)	EPC CONTROL VALVE LOWER	
13	7980 (K)	TRANSMISSION GROUP M	
14	5000A (L)	POWER SUPPLY EPC MEMORY	
15	5400T (Y)	CAN H	
16	5420T (G)	CAN L	
19	61 (O)	EARTH HOUSING	
20	5200A (N)	POWER SUPPLY EPC CONTROL VALVE	
21	5500H (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
22	5510H (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
23	60 (B/W)	EARTH SENSOR	
25	57Y (B)	VEHICLE EARTH (ALL)	
26	57Z (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4416B-01 1



C100-BRI4419A 2

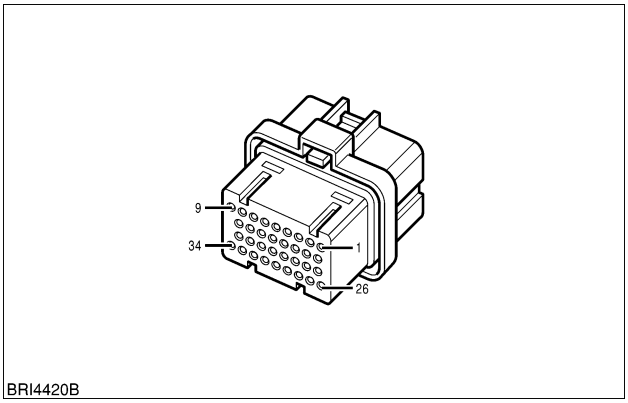
CAB BACK BEHIND THE DRIVER'S SEAT

C101 TCM - TRANSMISSION CONTROLLER (CN1b)

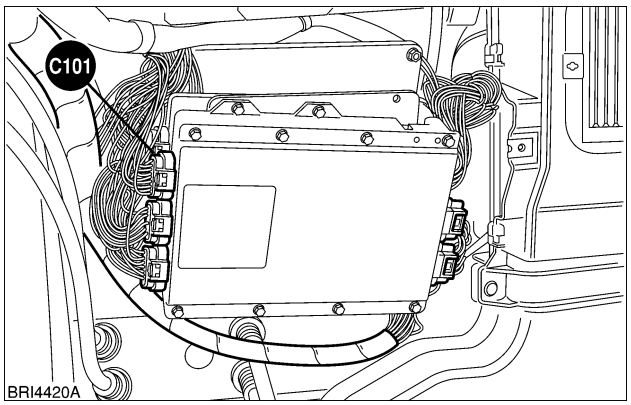
PLUG CONNECTION C101 TCM - TRANSMISSION CONTROLLER (CN1b)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6402 (G)	CONTROL UNIT TO ACCELERATOR PEDAL- POTENTIOMETER	
2	5080 (K)	EPC LIFTING SHAFT	
3	5050 (TN)	EPC CONTROL	
4	5045 (TN)	EPC LOWERING SPEED	
5	5120 (K) / 5085 (K)	EPC SIGNAL LIFT HEIGHT LIMIT / EPC CONTROL VALVE RAISE	
6	5040 (TN)	EPC TRACTION / POSITION CONTROL	
7	5145 (TQ)	EPC POTENTIOMETER SETPOINT SLIP CONTROL	
8	5155 (U)	EPC POTENTIOMETER WORKING DEPTH CONTROL	
9	5065 (TN)	EPC RIGHT FORCE MEASURING PIN	
10	5070 (TN)	EPC LEFT FORCE MEASURING PIN	
11	2050K (G)	POWER SUPPLY PTO / SHIFTING CLAW	
12	7250 (S)	TRANSMISSION SIGNAL FORWARD	
13	7260 (S)	TRANSMISSION SIGNAL REVERSE	
14	7500 (G)	TRANSMISSION OIL TEMP. SENSOR	
16	5020 (TN)	EPC CONTOLLER +5V REFERENCE VOLTAGE LOWERING SPEED	
17	7525 (G)	POWER SUPPLY TRANSMISSION SENSOR 5 V	
18	5130 (TQ)	EPC LOWER SIGNAL - RAPID CONTROL SWITCH	
19	2031 (Y)	RADAR PRESENT	
20	5125 (TQ)	EPC RAISE SIGNAL - RAPID CONTROL SWITCH	
21	1001 (W)	POWER SUPPLY ENGAGING MAGNET	
22	820B (R)	BRAKE LIGHT SWITCH LEFT	
23	830B (R)	BRAKE LIGHT SWITCH RIGHT	
25	5075 (K)	EPC VOLTAGE TO FORCE MEASURING PIN	
26	3045 (Y)	WARNING LIGHT ALL WHEEL DRIVE	
27	7420D (Y)	TRANSMISSION CONTROLLER TO SWITCH FOR COUPLING SETTING	
29	5100 (K)	EPC REMOTE RAISE SWITCH	
30	5095 (K)	EPC REMOTE LOWER SWITCH	
33	2028B (G)	SIGNAL RADAR (GUN)	
34	7401 (L)	TRANSMISSION SPEED SENSOR	

PLUG CONNECTION C101 - in PUMA Multicontroller TCM - TRANSMISSION CONTROLLER (CN1b)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6402 (G)	CONTROL UNIT TO ACCELERATOR PEDAL- POTENTIOMETER	
2	5080 (K)	EPC LIFTING SHAFT	
3	5050 (TN)	EPC CONTROL	
4	5045 (TN)	EPC LOWERING SPEED	
5	5120 (K)	EPC SIGNAL LIFT HEIGHT LIMIT	
6	5040 (TN)	EPC TRACTION / POSITION CONTROL	
7	5145 (TQ)	EPC POTENTIOMETER SETPOINT SLIP CONTROL	
8	5155 (U)	EPC POTENTIOMETER WORKING DEPTH CONTROL	
9	5065 (TN)	EPC RIGHT FORCE MEASURING PIN	
10	5070 (TN)	EPC LEFT FORCE MEASURING PIN	
11	2050K (G)	POWER SUPPLY PTO / SHIFTING CLAW	
12	7250 (S)	TRANSMISSION SIGNAL FORWARD	
13	7260 (S)	TRANSMISSION SIGNAL REVERSE	
14	7500 (G)	TRANSMISSION OIL TEMP. SENSOR	
16	5020 (TN)	EPC CONTOLLER +5V REFERENCE VOLTAGE LOWERING SPEED	
17	7525 (G)	POWER SUPPLY TRANSMISSION SENSOR 5 V	
18	5215 (Y)	EPC SIGNAL LOWER	
19	2031 (Y)	RADAR PRESENT	
20	5205 (W)	EPC SIGNAL RAISE	
21	1001 (W)	POWER SUPPLY ENGAGING MAGNET	
22	820B (R)	BRAKE LIGHT SWITCH LEFT	
23	830B (R)	BRAKE LIGHT SWITCH RIGHT	
24	2012 (Y)	WARNING LIGHT TRANSMISSION OIL PRESSURE	
25	5075 (K)	EPC VOLTAGE TO FORCE MEASURING PIN	
26	3045 (Y)	WARNING LIGHT ALL WHEEL DRIVE	
27	7420A (Y)	TRANSMISSION CONTROLLER TO SWITCH FOR COUPLING SETTING	
29	5100 (K)	EPC REMOTE RAISE SWITCH	
30	5095 (K)	EPC REMOTE LOWER SWITCH	
33	2028B (G)	SIGNAL RADAR (GUN)	
34	7401 (L)	TRANSMISSION SPEED SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4420B 3



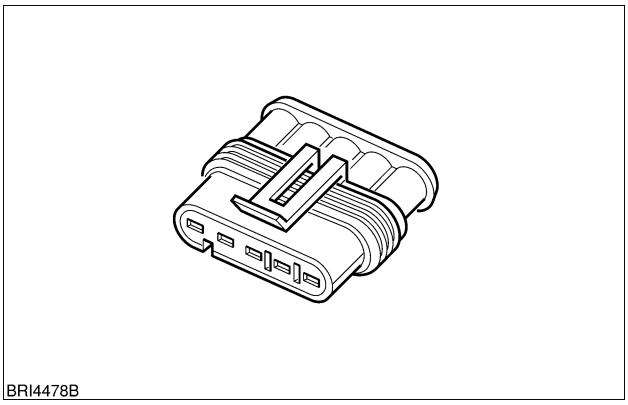
C101-BRI4420A 4

CAB BACK BEHIND THE DRIVER'S SEAT

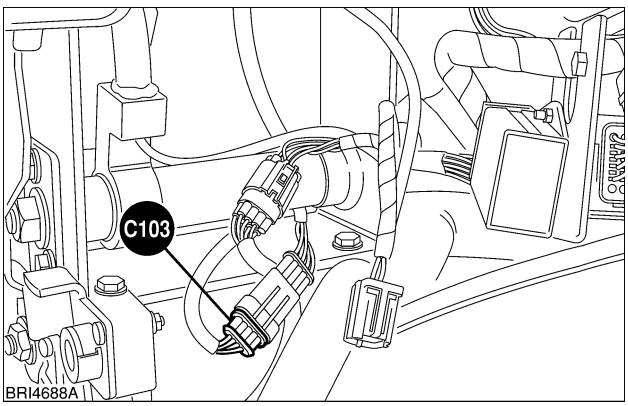
C103 GEAR SHIFT - PLUG CONNECTION (not used in PUMA Multicontroller)

PLUG CONNECTION C103 GEAR SHIFT - PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7525D (G)	POWER SUPPLY TRANSMISSION SENSOR 5 V	**Wiring harness - Electrical schematic frame 06 (A.30.A)**
2	7210A (S)	TRANSMISSION SHIFT UP	
3	7200A (S)	TRANSMISSION SHIFT DOWN	
4	7525E (G)	POWER SUPPLY TRANSMISSION SENSOR 5 V	
5	4101A (TQ)	GEAR RANGE ACTIVATED	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4478B 5



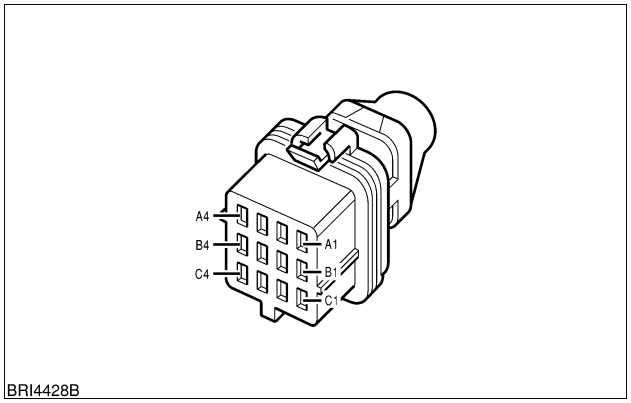
C103-BRJ4688A 6

RIGHT-HAND SIDE CONSOLE

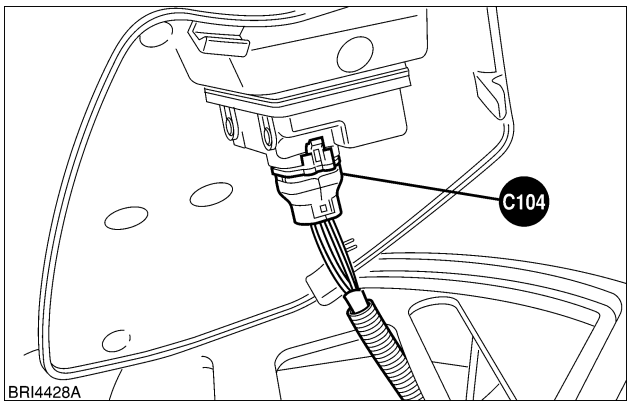
C104 GEAR DISPLAY - PLUG CONNECTION

PLUG CONNECTION C104 GEAR DISPLAY - PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A1	2050D (G)	POWER SUPPLY PTO / SHIFTING CLAW	PUMA Standard: **Wiring harness - Electrical schematic frame 09 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 42 (A.30.A)**
A2	1013 (R)	LIGHTS RIGHT-HAND SIDE	
C1	57AB (B)	VEHICLE EARTH (ALL)	
C3	5400F (Y)	CAN H	
C4	5420F (G)	CAN L	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

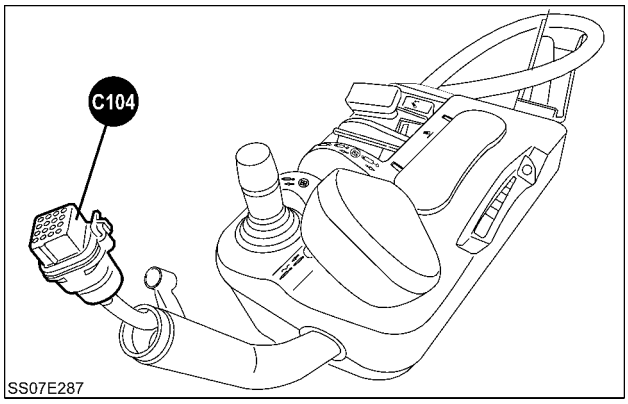


BRI4428B 7



C104-BRI4428A 8

RIGHT-HAND SIDE CONSOLE - in PUMA Standard



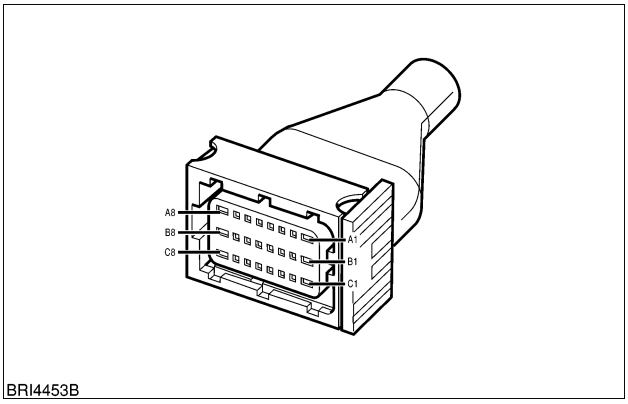
SS07E287 9

ARMREST- in PUMA Multicontroller

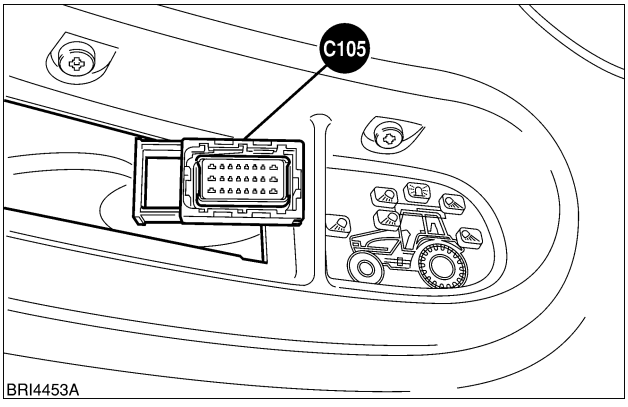
C105 WORK LAMP CONTROL UNIT

PLUG CONNECTION C105 WORK LAMP CONTROL UNIT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
B1	4011 (L)	POWER SUPPLY SWITCH ROTATING BEACON	PUMA Standard: **Wiring harness - Component diagram 29 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 29 (A.30.A)**
B2	138B (L	STATION MEMORY RADIO	
B3	57X (B)	VEHICLE EARTH (ALL)	
B4	1098A (W)	EARTH RELAY FRONT WORK LAMP	
B5	1098B (W	EARTH RELAY FRONT WORK LAMP	
B6	1090 (R)	SIGNAL RELAY REAR WORK LAMP	
B7	1097A (R)	POWER SUPPLY OUTER FRONT WORK LAMP	
B8	1097B (R)	POWER SUPPLY OUTER FRONT WORK LAMP	
C1	997 (G)	POWER SUPPLY WORK LAMP - REAR (OUTER)	
C2	4012 (L)	POWER SUPPLY ROTATING BEACON	
C3	998A (G)	POWER SUPPLY WORK LAMP - REAR (INNER)	
C4	998B (G)	POWER SUPPLY WORK LAMP - REAR (INNER)	
C5	1013AH (R)	LIGHTS RIGHT-HAND SIDE	
C6	1092 (R)	SIGNAL RELAY FRONT WORK LAMP	
C7	1071A (L)	POWER SUPPLY FRONT WORK LAMP	
C8	1071B (L)	POWER SUPPLY FRONT WORK LAMP	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4453B 10



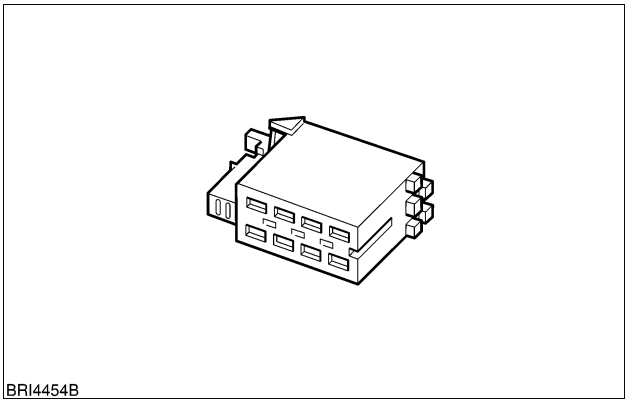
C105-BRI4453A 11

CAB ROOF

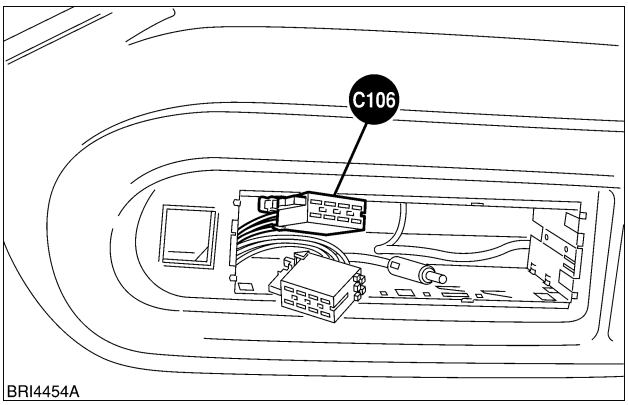
C106 RADIO PLUG 1

PLUG CONNECTION C106 RADIO PLUG 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
4	3077 (Y)	RADIO +12VB	PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**
6	3078 (O)	RADIO +12V LIGHTING	
7	3079 (R)	RADIO +12V IGNITION	
8	57 (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4454B 12



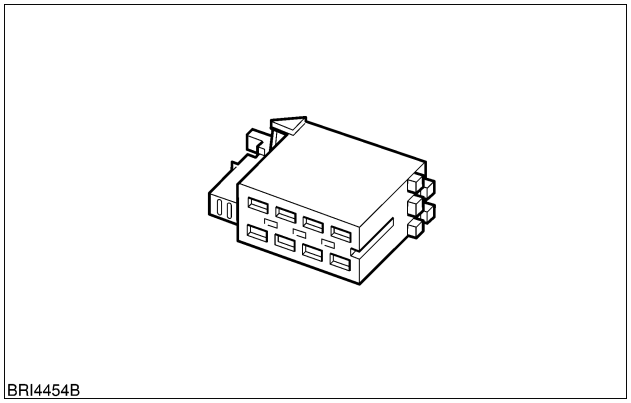
C106-BRI4454A 13

CAB ROOF

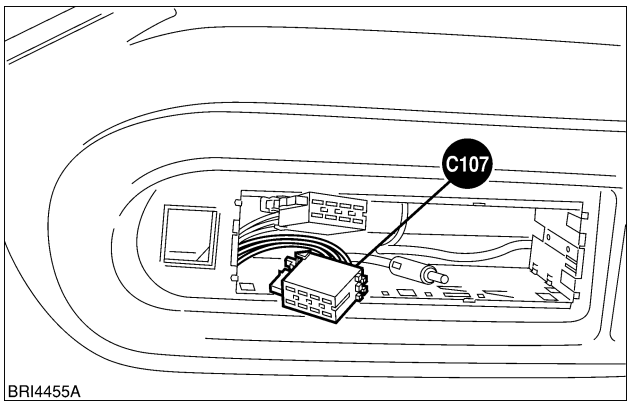
C107 RADIO PLUG 2

PLUG CONNECTION C107 RADIO PLUG 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3091 (L)	SPEAKER REAR - RIGHT +	PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	3092 (L)	SPEAKER REAR - RIGHT -	
3	3093 (S)	SPEAKER FRONT - RIGHT +	
4	3094 (S)	SPEAKER FRONT - RIGHT / SPEAKER FRONT - RIGHT -	
5	3095 (W)	SPEAKER FRONT - LEFT +	
6	3096 (W)	SPEAKER FRONT - LEFT -	
7	3097 (G)	SPEAKER REAR - LEFT +	
8	3098 (G)	SPEAKER REAR - LEFT -	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4454B 14



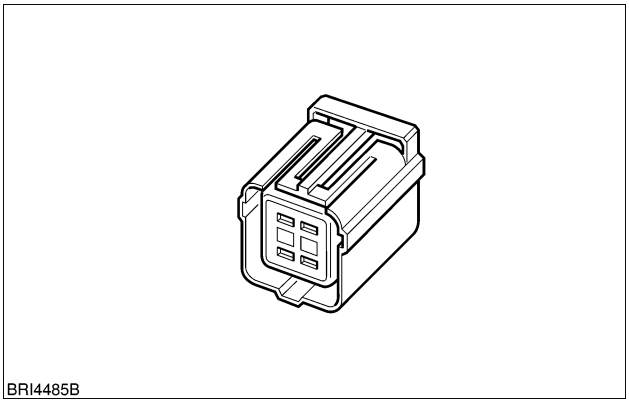
C107-BRI4455A 15

CAB ROOF

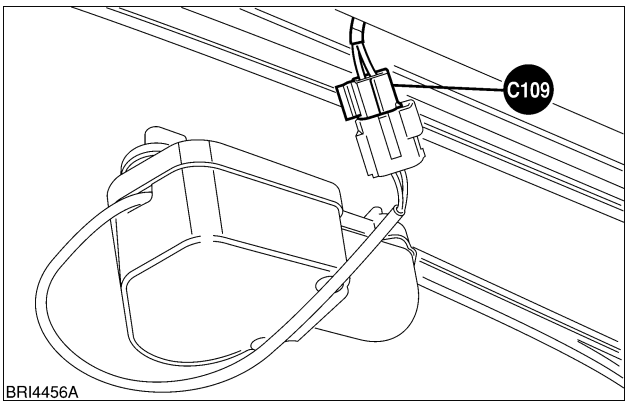
C109 REAR WINDSCREEN WIPER MOTOR

PLUG CONNECTION C109 REAR WINDSCREEN WIPER MOTOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1120 (G)	REAR WINDSCREEN WIPER RETURN TO INITIAL POSITION / REAR WINDSCREEN WIPER RETURN TO INITIAL POSITION	PUMA Standard: **Wiring harness - Electrical schematic frame 32 (A.30.A)**
2	57D (B)	VEHICLE EARTH (ALL)	
3	1038 (TN)	POWER SUPPLY FRONT WINDSCREEN WIPER - REAR	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 32 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4485B 16



C109-BRI4456A 17

CAB ROOF

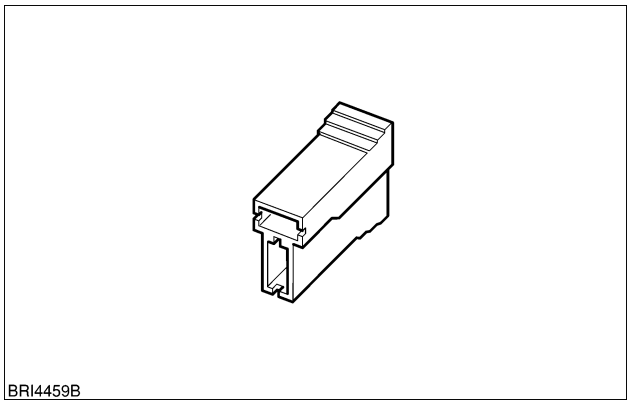
Wiring harness - Component diagram 11 Plug connections 110-119

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

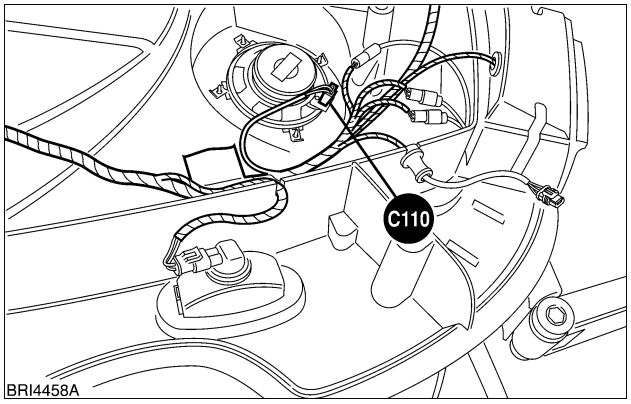
C110 SPEAKER FRONT RIGHT

PLUG CONNECTION C110 SPEAKER FRONT RIGHT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3093 (S)	SPEAKER FRONT - RIGHT +	PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	3094 (S)	SPEAKER FRONT - RIGHT -	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4459B-01 1



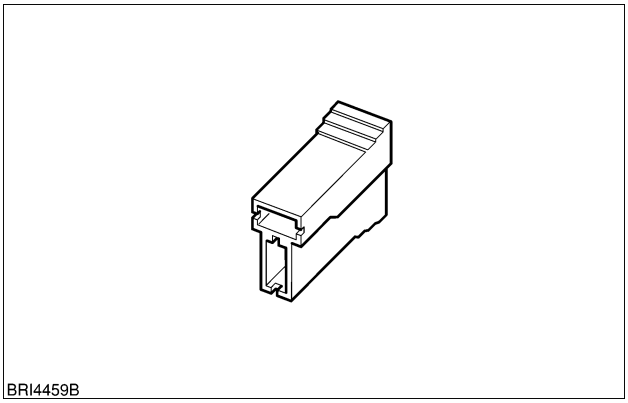
C110-BRI4458A 2

CAB ROOF - RIGHT-HAND SIDE

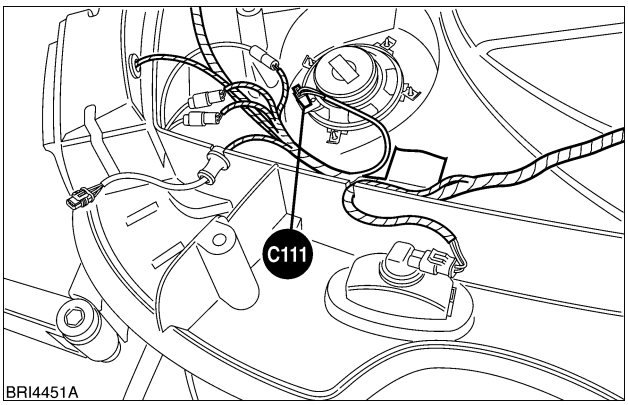
C111 SPEAKER FRONT LEFT

PLUG CONNECTION C111 SPEAKER FRONT LEFT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3095 (W)	SPEAKER FRONT - LEFT +	PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	3096 (W)	SPEAKER FRONT - LEFT - -	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4459B-01 3



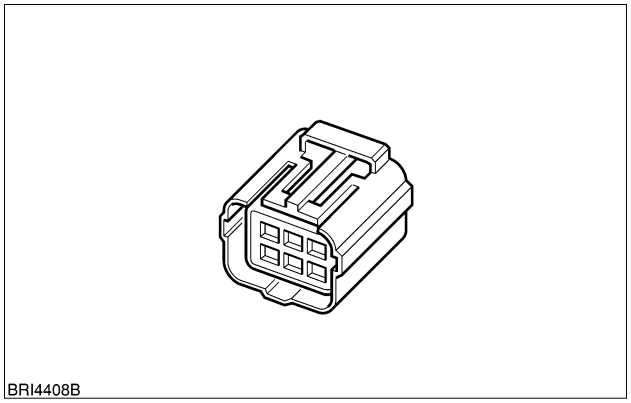
C111-BRI4451A 4

CAB ROOF - LEFT-HAND SIDE

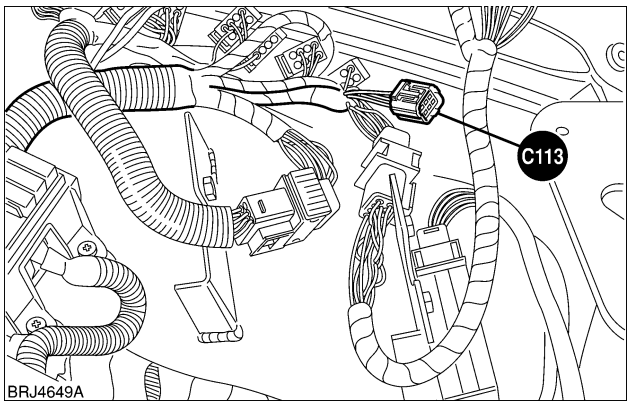
C113 FRONT POWER LIFT CONTROL KNOB IN THE CAB

PLUG CONNECTION C113 FRONT POWER LIFT CONTROL KNOB IN THE CAB			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	60AB (B/W)	EARTH SENSOR	PUMA Standard: **Wiring harness - Electrical schematic frame 11 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 11 (A.30.A)**
2	2520 (N)	FRONT POWER LIFT POSITION SETPOINT SIGNAL	
3	2530A (N)	FRONT POWER LIFT REF. VOLTAGE	
4	2540E (N)	FRONT POWER LIFT +12 V STARTER SWITCH	
5	2550 (N)	OVERRIDE SWITCH FRONT POWER LIFT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4408B 5



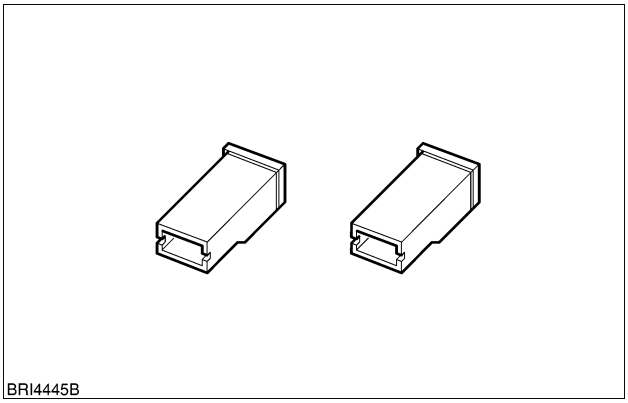
C113-BRJ4649A 6

RIGHT-HAND SIDE CONSOLE

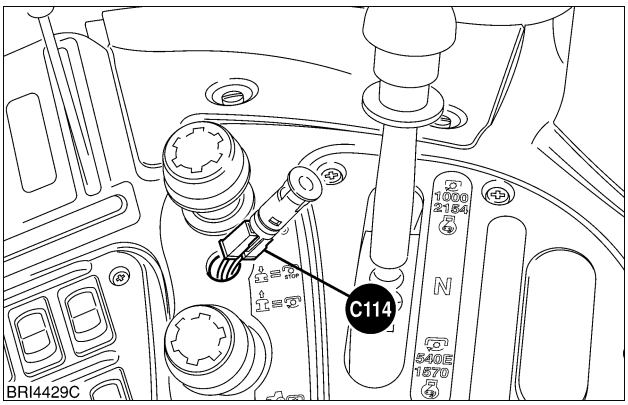
C114 FRONT PTO TELLTALE

PLUG CONNECTION C114 FRONT PTO TELLTALE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2250E (K) / 2270 (O)	FRONT PTO - POWER SUPPLY / FRONT PTO - WARNING LIGHT	PUMA Standard: **Wiring harness - Electrical schematic frame 19 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 19 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4445B-01 7



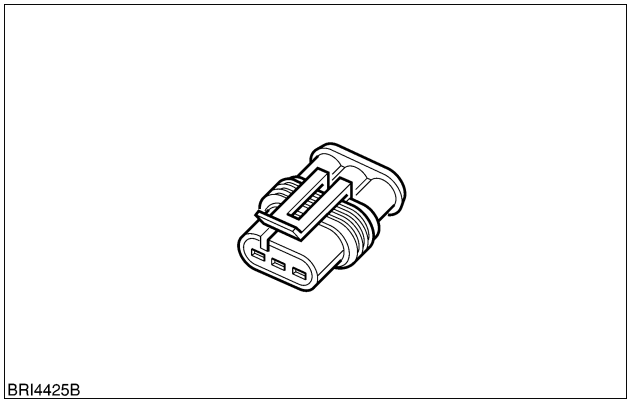
C114-BRI4429C 8

RIGHT-HAND SIDE CONSOLE

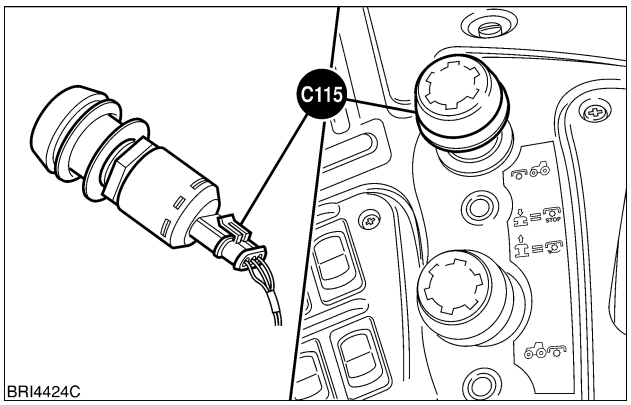
C115 FRONT PTO SWITCH

PLUG CONNECTION C115 FRONT PTO SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2250D (K)	FRONT PTO - POWER SUPPLY	PUMA Standard: **Wiring harness - Electrical schematic frame 19 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 19 (A.30.A)**
2	2248 (K)	FRONT PTO - SWITCH (VCCS)	
3	2245 (K)	FRONT PTO - SWITCH TO MODULE (PUSH BUTTON)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4425B 9



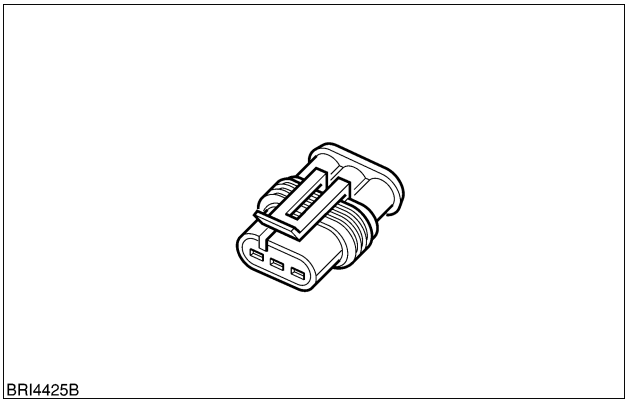
C115-BRI4424C 10

RIGHT-HAND SIDE CONSOLE

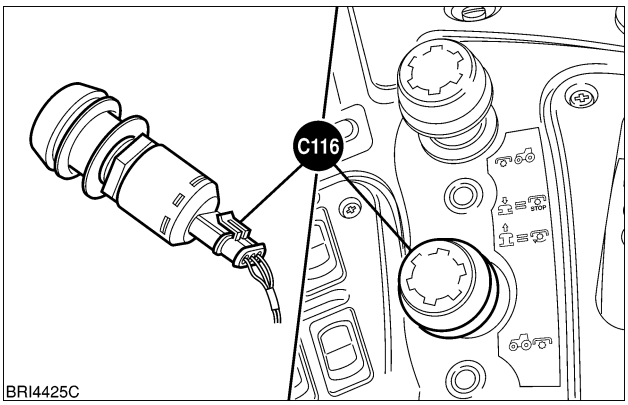
C116 REAR PTO SWITCH

PLUG CONNECTION C116 REAR PTO SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2050H (G)	POWER SUPPLY PTO / GEAR DISPLAY	PUMA Standard: **Wiring harness - Electrical schematic frame 19 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 19 (A.30.A)**
2	2045 (O)	PTO SWITCH TO THE MODULE	
3	2046 (O)	PTO SWITCH (VCC)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4425B 11



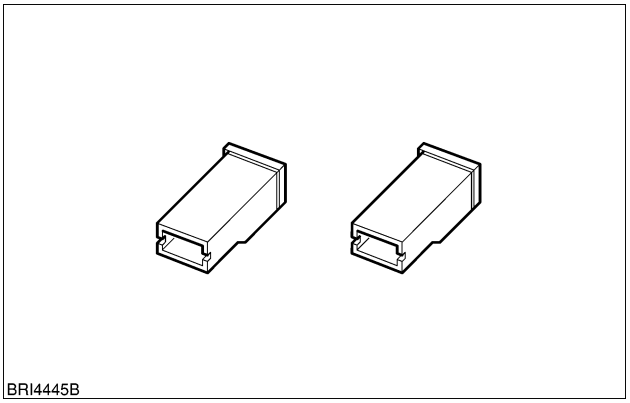
C116-BRI4425C 12

RIGHT-HAND SIDE CONSOLE

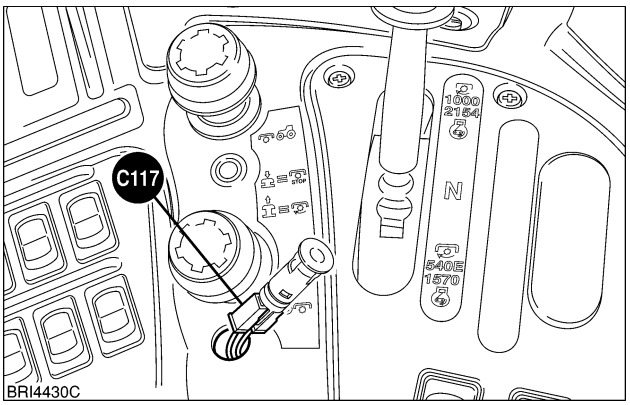
C117 REAR PTO TELLTALE

PLUG CONNECTION C117 REAR PTO TELLTALE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2065A (N) / 2050G (G)	PTO SWITCHED ON / POWER SUPPLY PTO / POWER SUPPLY GEAR DISPLAY	PUMA Standard: **Wiring harness - Electrical schematic frame 19 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 19 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4445B 13



C117-BRI4430C 14

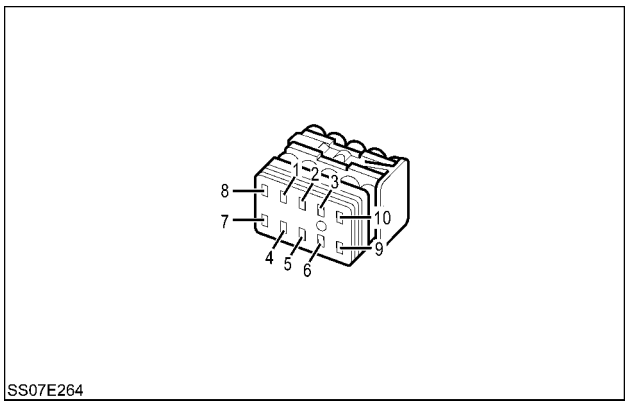
RIGHT-HAND SIDE CONSOLE

C118 SWITCH FOR THE REAR PTO BRAKE

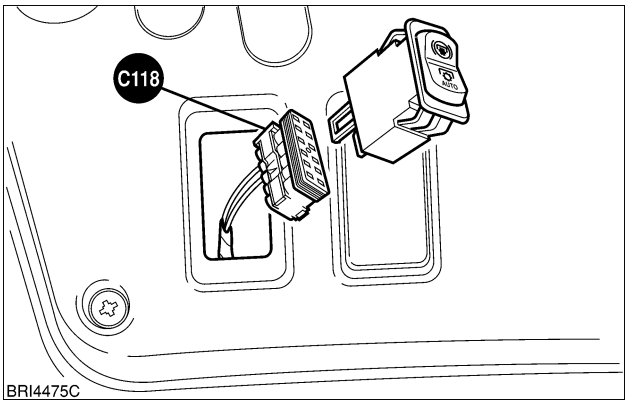
PLUG CONNECTION C118 SWITCH FOR REAR PTO BRAKE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2120 (TN)	SIGNAL PTO BRAKE	**Wiring harness - Electrical schematic frame 19 (A.30.A)**
2	2050J (G)	POWER SUPPLY PTO / GEAR DISPLAY	
6	2069 (U)	PTO MANAGEMENT ON	

PLUG CONNECTION C118 - in PUMA Multicontroller SWITCH FOR REAR PTO BRAKE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2120A (TN)	SIGNAL PTO BRAKE	**Wiring harness - Electrical schematic frame 19 (A.30.A)**
2	2050J (G)	POWER SUPPLY PTO / GEAR DISPLAY	
6	2065 (N)	PTO SWITCHED ON	
7	57RR (B)	VEHICLE EARTH (ALL)	
8	1012X (R)	LIGHTING	
9	57RS (B)	VEHICLE EARTH (ALL)	
10	1012Y (R)	LIGHTING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E264 15



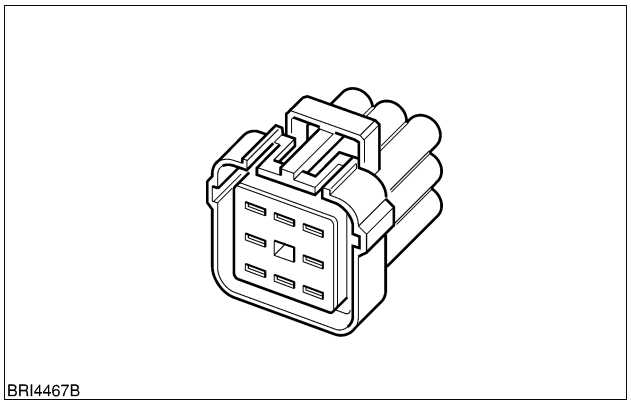
C118-BRI4475C 16

RIGHT-HAND SIDE CONSOLE

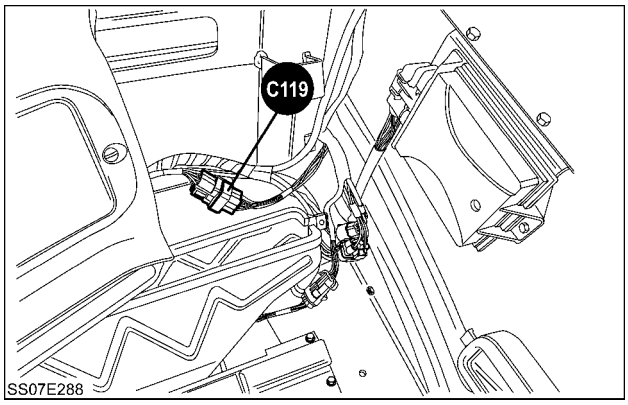
C119 HEATING/AIR CON PLUG CONNECTION

PLUG CONNECTION C119 HEATING/AIR CON PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(R)	POWER SUPPLY POTENTIAL 15	PUMA Standard: **Wiring harness - Electrical schematic frame 40 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 40 (A.30.A)**
3	(B)	VEHICLE EARTH (ALL)	
4	(U/R)	SIGNAL AIR CONDITIONING ELECTRONICS	
6	(O/B)	SIGNAL OUTSIDE TEMPERATURE SENSOR	
7	(R/B)	SIGNAL CAB TEMPERATURE SENSOR	
8	(B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4467B 17



SS07E288 18

CAB REAR LEFT-HAND SIDE

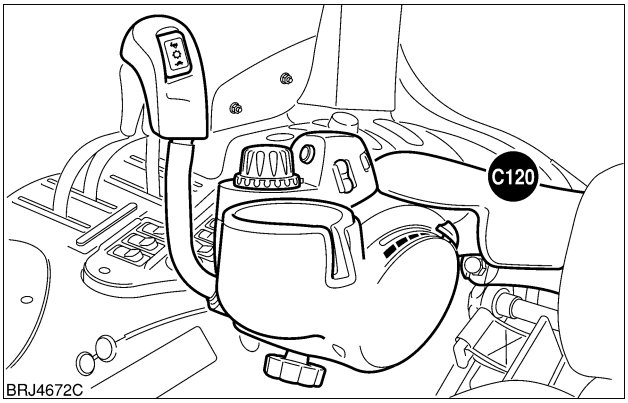
Wiring harness - Component diagram 12 Plug connections 120-129

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C120 EPC CONTROL PANEL 1 (not used in PUMA Multicontroller)

PLUG CONNECTION C120 EPC CONTROL PANEL 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
			Wiring harness - Electrical schematic frame 10 (A.30.A)

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



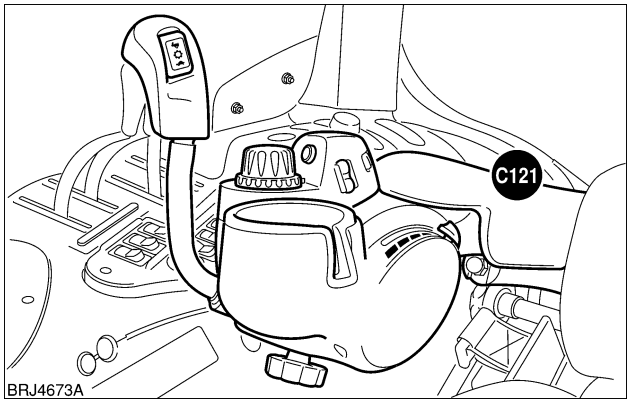
C120-BRJ4672C 1

OPERATOR CONTROL ARMREST

C121 EPC CONTROL PANEL 2 (not used in PUMA Multicontroller)

PLUG CONNECTION C121 EPC CONTROL PANEL 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
			Wiring harness - Electrical schematic frame 10 (A.30.A)

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



C121-BRJ4673C 2

OPERATOR CONTROL ARMREST

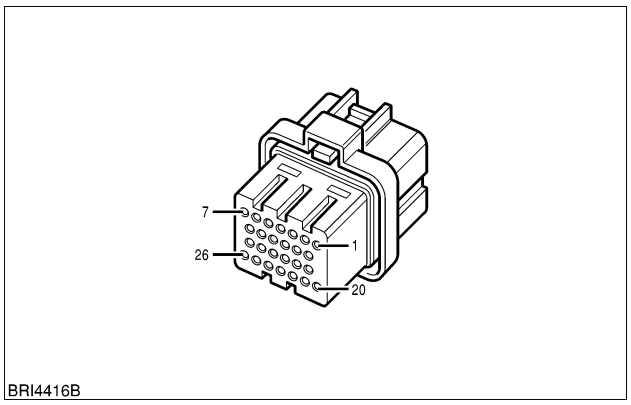
C127 TCM - ELECTRONIC TRANSMISSION CONTROLLER (CN3a)

PLUG CONNECTION C127 TCM - TRANSMISSION CONTROLLER (CN3a)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6440 (S)	HAND THROTTLE SETTING 1	
3	2059 (W)	PTO SWITCH ON FENDER INPUT SIGNAL	
4	6530 (N)	INCREASE CONSTANT SPEED	
5	6540 (N)	REDUCE CONSTANT SPEED	
6	5133 (TQ)	EPC STOP	
7	5240 (O)	EPC RAISE SIGNAL - RAPID CONTROL SWITCH 2	
8	7040 (N)	CRAWLER GROUP SWITCH	
9	7581 (O)	CRAWLER DRIVE SETTING SIGNAL	
10	7210 (S)	TRANSMISSION SHIFT UP	
11	7200 (S)	TRANSMISSION DOWN SHIFT	
12	2045 (O)	PTO SWITCH TO THE MODULE	
13	2046 (O)	PTO SWITCH (VCC)	
14	2007 (Y)	AIR CONDITIONING LOW PRESSURE	
15	1039 (LTG)	NASO LIGHTING	
16	5595 (S)	ELECTROHYDR. REMOTE VALVE MAIN SWITCH	
17	6460A (S)	HAND THROTTLE SWITCH (NO IDLE)	
18	2056 (W)	PTO SWITCH ON FENDER ON	
19	7126 (LTG)	DIFFERENTIAL LOCK PRESSURE SWITCH	
21	5610 (R)	PROGRAMMING SWITCH FOR HEADLAND MANAGEMENT	
22	5630 (R)	MANUAL MODE SWITCH FOR HEADLAND MANAGEMENT	
23	5620 (R)	HEADLAND MANAGEMENT ON/OFF SWITCH	
24	3027 (Y)	ALL WHEEL DRIVE SOLENOID VALVE (AUTO)	
25	3025 (Y) / 7000J (U)	ALL WHEEL DRIVE SOLENOID VALVE (MANUAL) / POWER SUPPLY FOR THE TRANSMISSION CONTROLS	
26	5250 (O)	EPC LOWER SIGNAL - RAPID CONTROL SWITCH 2	

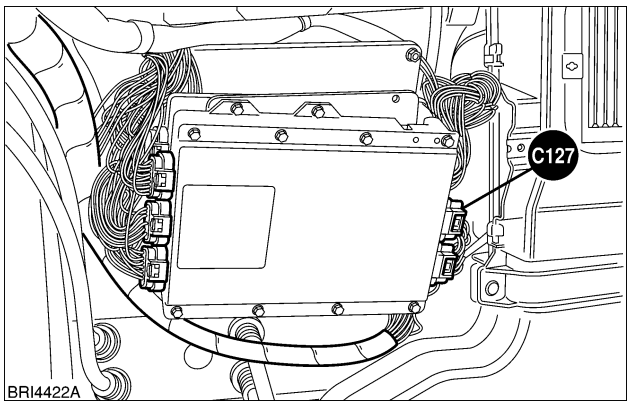
PLUG CONNECTION C127 - in PUMA Multicontroller TCM - TRANSMISSION CONTROLLER (CN3a)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
3	2059 (W)	PTO SWITCH ON FENDER INPUT SIGNAL	
4	6530 (N)	INCREASE CONSTANT SPEED	
5	6540 (N)	REDUCE CONSTANT SPEED	
8	7040 (N)	CRAWLER GROUP SWITCH	
9	7581 (O)	CRAWLER DRIVE SETTING SIGNAL	
12	2045 (O)	PTO SWITCH TO THE MODULE	
13	2046 (O)	PTO SWITCH (VCC)	
14	2007 (Y)	AIR CONDITIONING LOW PRESSURE	
15	1039 (LTG)	NASO LIGHTING	
16	5595 (S)	ELECTROHYDR. REMOTE VALVE MAIN SWITCH	

17	5210 (O)	EPC - CONTROL VALVE ENGAGEMENT
18	2056 (W)	PTO SWITCH ON FENDER ON
19	7126 (LTG)	DIFFERENTIAL LOCK PRESSURE SWITCH
21	5610 (R)	PROGRAMMING SWITCH FOR HEADLAND MANAGEMENT
22	5630 (R)	MANUAL MODE SWITCH FOR HEADLAND MANAGEMENT
24	3027 (Y)	ALL WHEEL DRIVE SOLENOID VALVE (AUTO)
25	3025 (Y) / 7000J (U)	ALL WHEEL DRIVE SOLENOID VALVE (MANUAL) / POWER SUPPLY FOR THE TRANSMISSION CONTROLS

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4416B-03 3



C127-BRI4422A 4

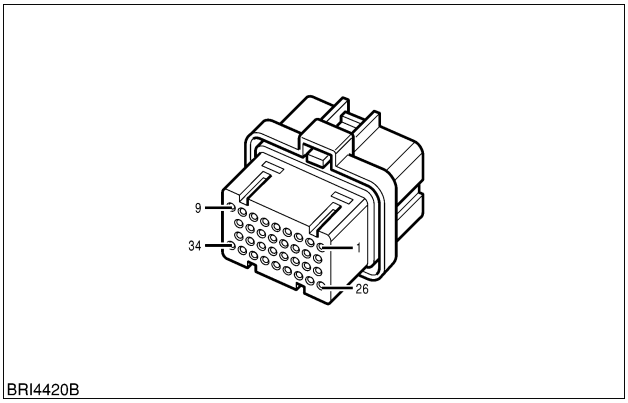
BEHIND THE DRIVER'S SEAT

C128 TCM - TRANSMISSION CONTROLLER (CN3b)

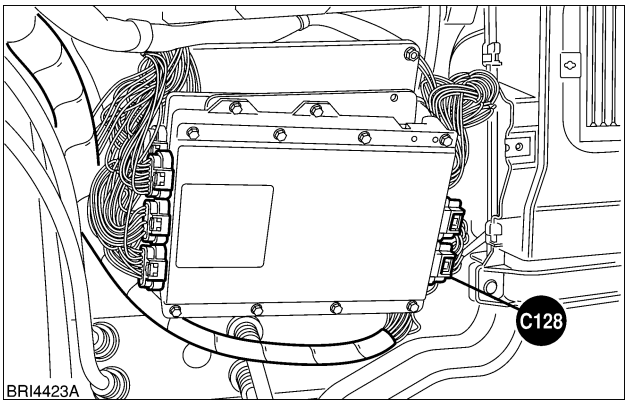
PLUG CONNECTION C128 TCM - TRANSMISSION CONTROLLER (CN3b)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7945 (L)	TRANSMISSION CONTROLLER COUPLUNG E RETURN CIRCUIT	
2	7580 (U)	OVERRIDE SOLENOID VALVE CRAWLER GROUP	
3	7235 (Y)	TRANSMISSION MV GROUP L - RETURN CIRCUIT	
4	8045 (L)	TRANSMISSION SOLENOID VALVE REV RETURN CIRCUIT	
5	7005 (U)	MV CRAWLER GEAR TRANSMISSION	
6	9035 (TN)	50 KM/H RELIEF SOLENOID VALVE	
7	7985 (G)	TRANSMISSION REVERSE GEARS	
8	2130 (N)	SOLENOID VALVE PTO BRAKE	
9	7080 (LTG)	POWER SUPPLY SOLENOID VALVE DIFFERENTIAL LOCK	
10	9036 (TN)	50 KM/H RELIEF SOLENOID VALVE RETURN SIGNAL	
11	6510 (N)	CONSTANT SPEED SETPOINT 1	
12	7586 (U)	PARK LOCK SOLENOID VALVE	
13	7940 (TQ)	SIGNAL COUPLING E	
14	2042 (O)	REAR PTO SOLENOID VALVE	
15	7230 (S)	TRANSMISSION GROUP L	
16	6310 (N)	FAN SOLENOID VALVE	
17	3025 (Y)	ALL WHEEL DRIVE SOLENOID VALVE (MANUAL)	
18	2051 (O)	PTO - MV RETURN SIGNAL (-)	
19	7411 (Y)	TRANSMISSION HYDROSTAT INPUT SPEED SENSOR (CVT)	
20	7400 (Y)	TRANSMISSION SPEED SENSOR TO TRANSMISSION CONTROLLER INPUT	
21	6300 (N)	FAN SPEED	
22	7760 (W)	TORQUE SENSOR	
23	2069 (U)	PTO MANAGEMENT ON	
24	2120 (TN)	SIGNAL PTO BRAKE	
27	2065A (N)	PTO SWITCHED ON	
28	7120 (Y)	DIFF. LOCK WARNING LIGHT (MANUAL)	
29	7125 (LTG)	DIFF. LOCK WARNING LIGHT (AUTO)	
30	7175 (Y)	DIFFERENTIAL LOCK SWITCH (MANUAL ON)	
31	7170 (W)	DIFFERENTIAL LOCK PRESSURE SWITCH (AUTO ON)	
32	6404 (G)	ACCELERATOR POT. TO THE SWITCH REDUCED IDLING SPEED	
33	2055A (W)	GROUND DRIVE PTO SWITCHED ON	
34	7000K (U)	POWER SUPPLY TRANSMISSION CONTROLS	

PLUG CONNECTION C128 - in PUMA Multicontroller TCM - TRANSMISSION CONTROLLER (CN3b)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7945 (L)	TRANSMISSION CONTROLLER COUPLUNG E RETURN CIRCUIT	
2	7580 (U)	OVERRIDE SOLENOID VALVE CRAWLER GROUP	
3	7235 (Y)	TRANSMISSION MV GROUP L - RETURN CIRCUIT	
4	8045 (L)	TRANSMISSION SOLENOID VALVE REV RETURN CIRCUIT	
5	7005 (U)	MV CRAWLER GEAR TRANSMISSION	
6	9035 (TN)	50 KM/H RELIEF SOLENOID VALVE	
7	7985 (G)	TRANSMISSION REVERSE GEARS	
8	2130 (N)	SOLENOID VALVE PTO BRAKE	
9	7080 (LTG)	POWER SUPPLY SOLENOID VALVE DIFFERENTIAL LOCK	
10	9036 (TN)	50 KM/H RELIEF SOLENOID VALVE RETURN SIGNAL	
11	6510 (N)	CONSTANT SPEED SETPOINT 1	
12	7586 (U)	PARK LOCK SOLENOID VALVE	
13	7940 (TQ)	SIGNAL COUPLING E	
14	2042 (O)	REAR PTO SOLENOID VALVE	
15	7230 (S)	TRANSMISSION GROUP L	
16	6310 (N)	FAN SOLENOID VALVE	
17	3024 (Y)	SOLENOID VALVE ALL-WHEEL OFF	
18	2051 (O)	PTO - MV RETURN SIGNAL (-)	
19	7411 (Y)	TRANSMISSION HYDROSTAT INPUT SPEED SENSOR (CVT)	
20	7400 (Y)	TRANSMISSION SPEED SENSOR TO TRANSMISSION CONTROLLER INPUT	
21	6300 (N)	FAN SPEED	
22	7760 (W)	TORQUE SENSOR	
23	2065 (N)	PTO SWITCHED ON	
24	2120 (TN)	SIGNAL PTO BRAKE	
25	7000J (U)	POWER SUPPLY TRANSMISSION CONTROLS	
26	7275 (W)	TRANSMISSION CONTROLLER SERIAL DATA LINES, OUT - DISPLAY DATA LINE IN	
27	2065A (N)	PTO SWITCHED ON	
28	7120 (Y)	DIFF. LOCK WARNING LIGHT (MANUAL)	
29	7125 (LTG)	DIFF. LOCK WARNING LIGHT (AUTO)	
30	7175 (Y)	DIFFERENTIAL LOCK SWITCH (MANUAL ON)	
31	7170 (W)	DIFFERENTIAL LOCK PRESSURE SWITCH (AUTO ON)	
32	6404 (G)	ACCELERATOR POT. TO THE SWITCH REDUCED IDLING SPEED	
33	2055A (W)	GROUND DRIVE PTO SWITCHED ON	
34	7000K (U)	POWER SUPPLY TRANSMISSION CONTROLS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4420B 5



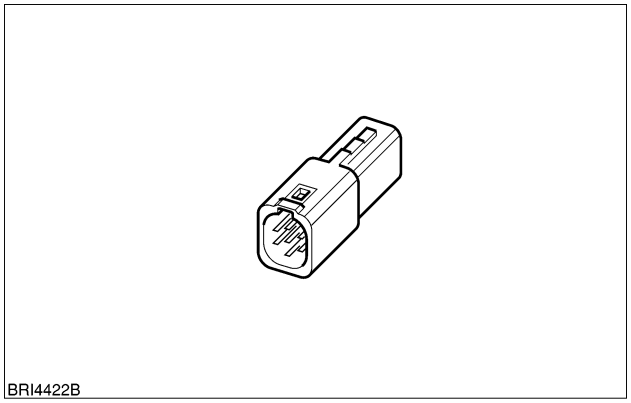
C128-BRI4423A 6

BEHIND THE DRIVER'S SEAT

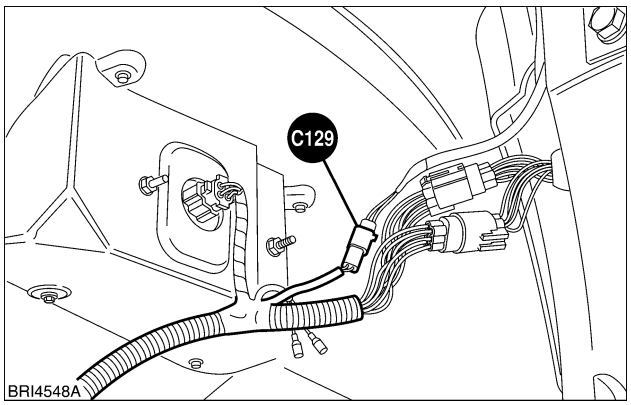
C129 WORK LAMP RIGHT-HAND SIDE

PLUG CONNECTION C129 WORK LAMP RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	998 (G/TN/B)	POWER SUPPLY WORK LAMP - REAR (INSIDE)	PUMA Standard: **Wiring harness - Electrical schematic frame 26 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 26 (A.30.A)**
4	57AP (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4422B 7



C129-BRI4548A 8

REAR FENDER RIGHT-HAND SIDE

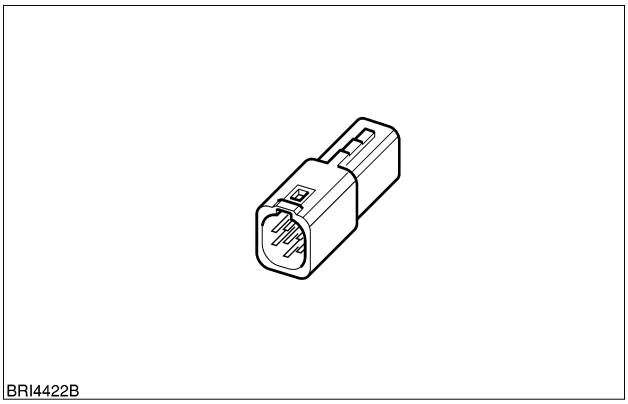
Wiring harness - Component diagram 13 Plug connections 130-139

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

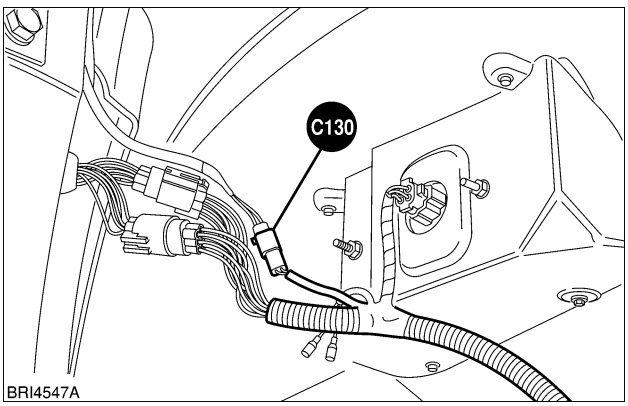
C130 WORK LAMP LEFT-HAND SIDE

PLUG CONNECTION C130 WORK LAMP LEFT-HAND SIDE			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	998 (G/TN/B)	POWER SUPPLY WORK LAMP - REAR (INNER)	PUMA Standard: **Wiring harness - Electrical schematic frame 26 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 26 (A.30.A)**
4	57AP (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4422B 1



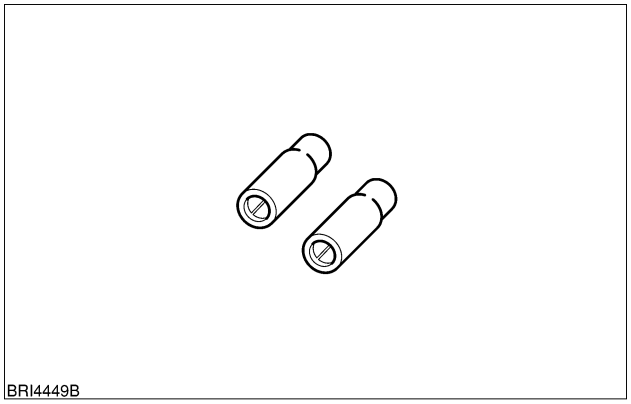
C130-BRI4547A 2

LEFT-HAND REAR FENDER

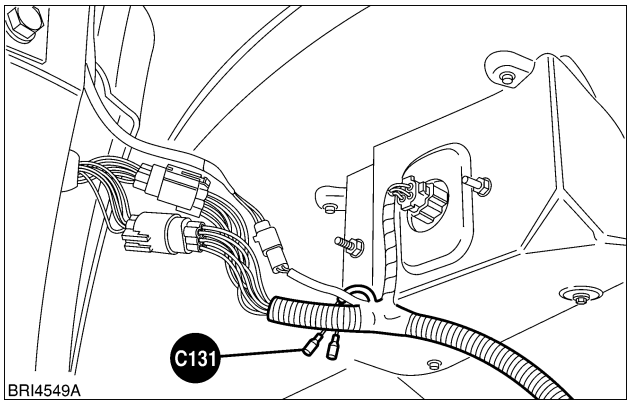
C131 LICENCE PLATE LIGHT

PLUG CONNECTION C131 LICENCE PLATE LIGHT			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1013B (R) / 57AW (B)	LIGHTS RIGHT-HAND SIDE / EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 26 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 26 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4449B 3



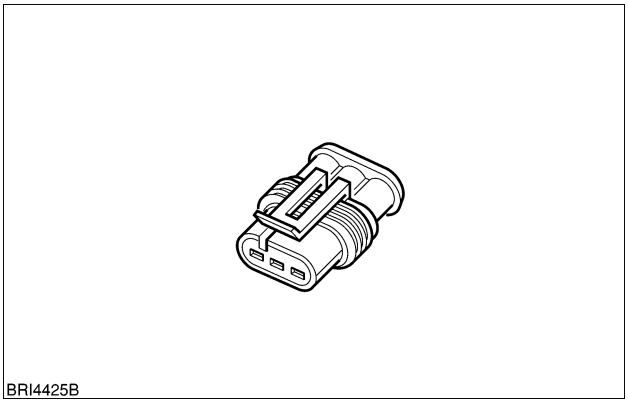
C131-BRI4549A 4

REAR FENDER

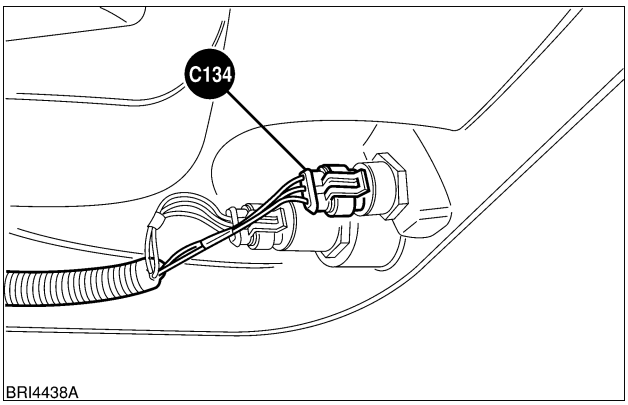
C134 POWER LIFT SWITCH RIGHT-HAND SIDE

PLUG CONNECTION C134 POWER LIFT SWITCH RIGHT-HAND SIDE			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5100 (K/W)	EPC REMOTE RAISE SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 12 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 12 (A.30.A)**
2	5200 (N/R/B)	POWER SUPPLY EPC CONTROL VALVE	
3	5095 (K/G)	EPC REMOTE LOWER SWITCH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4425B 5



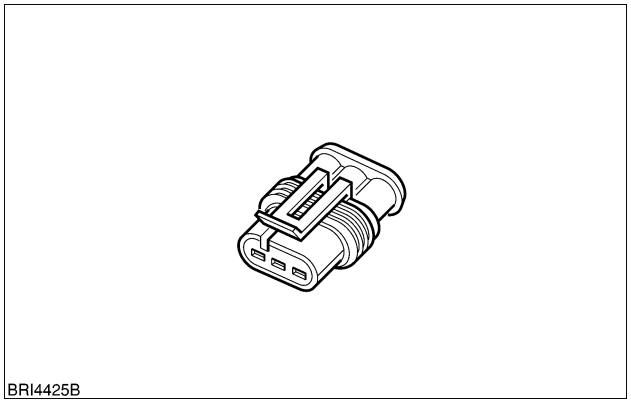
C134-BRI4438A 6

RIGHT-HAND REAR FENDER

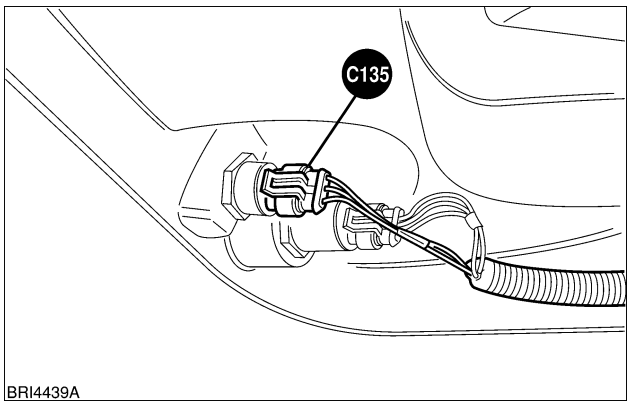
C135 POWER LIFT SWITCH LEFT-HAND SIDE

PLUG CONNECTION C135 POWER LIFT SWITCH LEFT-HAND SIDE			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5100 (K/W)	EPC REMOTE RAISE SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 12 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 12 (A.30.A)**
2	5200 (N/R/B)	POWER SUPPLY EPC CONTROL VALVE	
3	5095 (K/G)	EPC REMOTE LOWER SWITCH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4425B 7



C135-BRI4439A 8

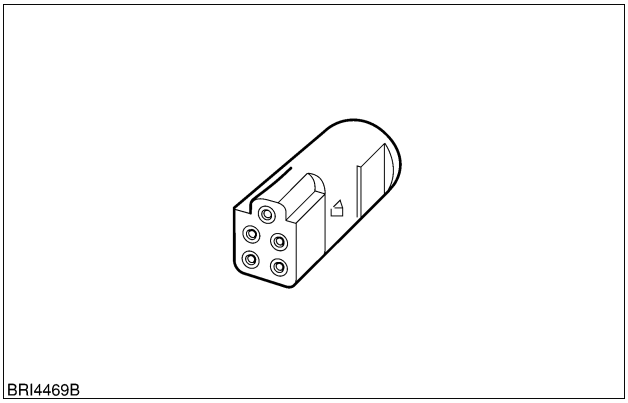
LEFT-HAND REAR FENDER

C136 HAND BRAKE

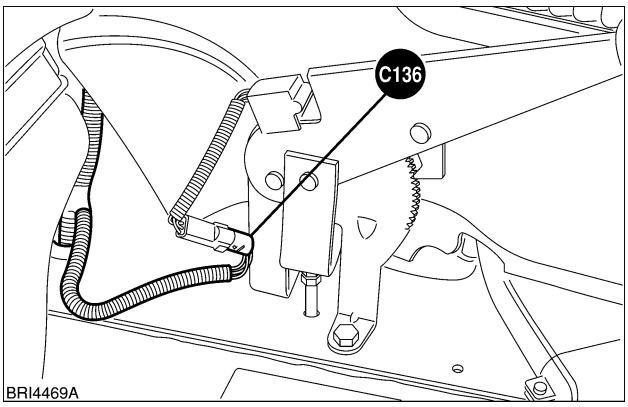
PLUG CONNECTION C136 HAND BRAKE			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57 (B)	VEHICLE EARTH (ALL)	**Wiring harness - Electrical schematic frame 30 (A.30.A)**
2	3014B (R)	SIGNAL WARNING LIGHT HAND BRAKE	
3	9031B (L)	ANALOGUE-DIGITAL INSTRUMENT CLUSTER MEMORY B+	
4	3150 (W)	HAND BRAKE SWITCH (BREAK CONTACT) SIGNAL OFF	

PLUG CONNECTION C136 - in PUMA Multicontroller HAND BRAKE			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57BL (B)	VEHICLE EARTH (ALL)	**Wiring harness - Electrical schematic frame 30 (A.30.A)**
2	3014B (R)	SIGNAL WARNING LIGHT HAND BRAKE	
3	9031B (L)	ANALOGUE-DIGITAL INSTRUMENT CLUSTER MEMORY B+	
4	3150 (W)	HAND BRAKE SWITCH (BREAK CONTACT) SIGNAL OFF	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4469B 9



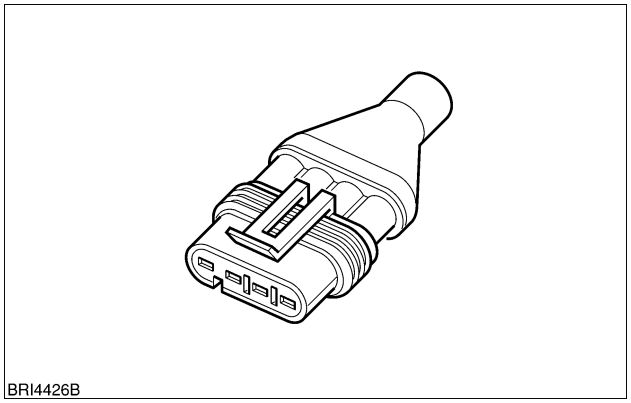
C136-BRI4469A 10

IN THE CAB - LEFT-HAND SIDE NEXT TO THE DRIVER'S SEAT

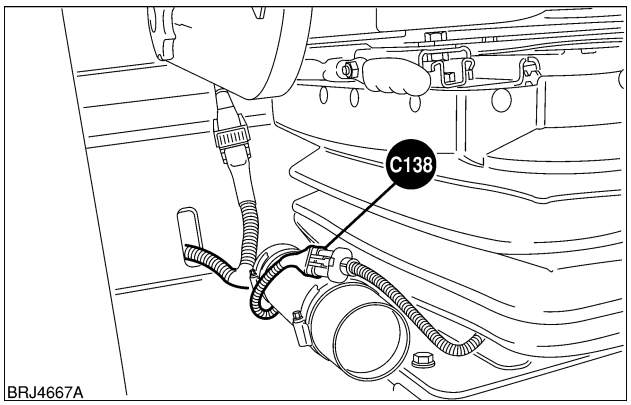
C138 DRIVER'S SEAT AIR PUMP

PLUG CONNECTION C138 DRIVER'S SEAT AIR PUMP			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6355A (R)	+5V LOW-SIGNAL REFERENCE VOLTAGE	PUMA Standard: **Wiring harness - Electrical schematic frame 25 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 25 (A.30.A)**
2	2069 (O)	PTO MANAGEMENT ON	
3	181K (G)	POWER SUPPLY BLOWER MOTOR	
4	57CN (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4426B 11



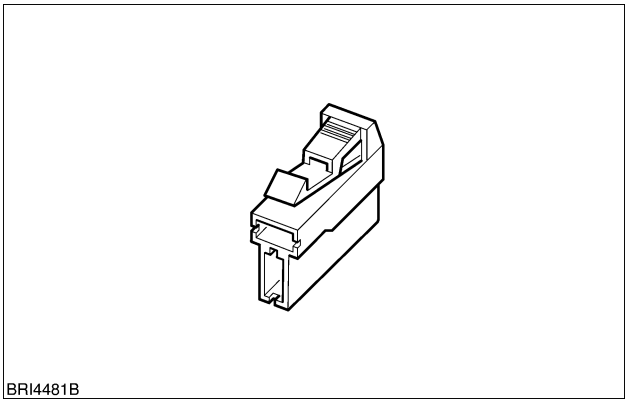
C138-BRJ4667A 12

IN THE CAB - RIGHT-HAND SIDE NEXT TO THE DRIVER'S SEAT

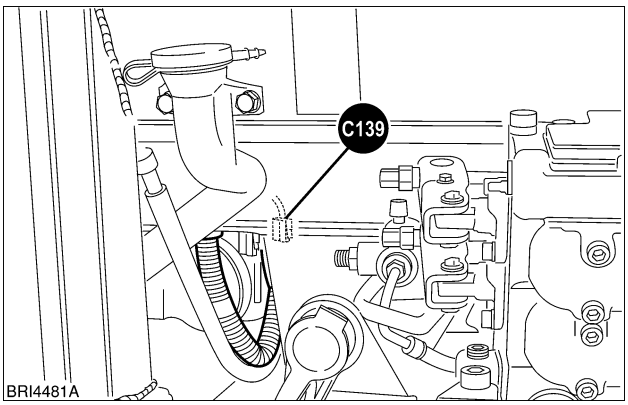
C139 WINDSCREEN WASHER PUMP MOTOR

PLUG CONNECTION C139 WINDSCREEN WASHER PUMP MOTOR			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	97 (LTG)	POWER SUPPLY FRONT WINDSCREEN WASHER	PUMA Standard: **Wiring harness - Electrical schematic frame 32 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 32 (A.30.A)**
2	57F (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4481B 13



C139-BRI4481A 14

TRACTOR REAR UNDER THE CAB

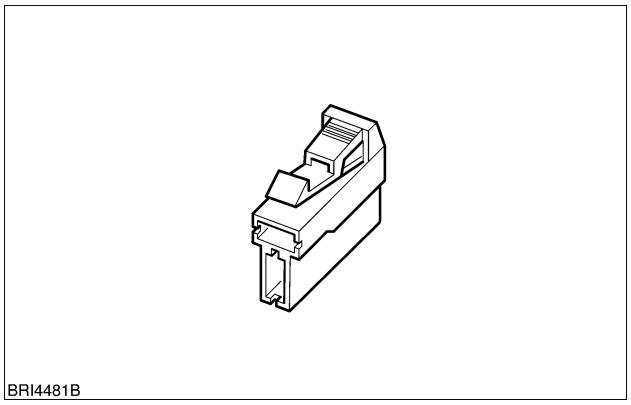
Wiring harness - Component diagram 14 Plug connections 140-149

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

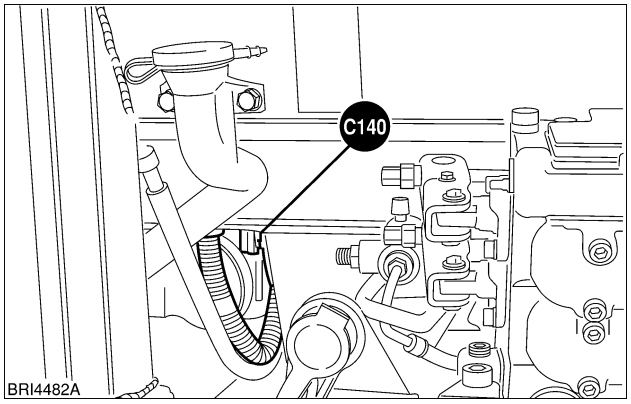
C140 RIGHT-HAND REAR WINDSCREEN WASHER PUMP MOTOR

PLUG CONNECTION C140 RIGHT-HAND REAR WINDSCREEN WASHER PUMP MOTOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1121A (G)	REAR WINDSCREEN WASHER	PUMA Standard: **Wiring harness - Electrical schematic frame 32 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 32 (A.30.A)**
2	57G (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4481B 1



C140-BRI4482A 2

TRACTOR REAR UNDER THE CAB

C143 REAR MOUNTED EQUIPMENT PLUG CONNECTION

PLUG CONNECTION C143 REAR MOUNTED EQUIPMENT PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A	150Y (N)	BATTERY POWER SUPPLY (NO FUSE) (ALL)	**Wiring harness - Electrical schematic frame 24 (A.30.A)**
B	57CR (B)	VEHICLE EARTH (ALL)	
D	3070D (L)	POWER SUPPLY SOCKET ON THE B-PILLAR	

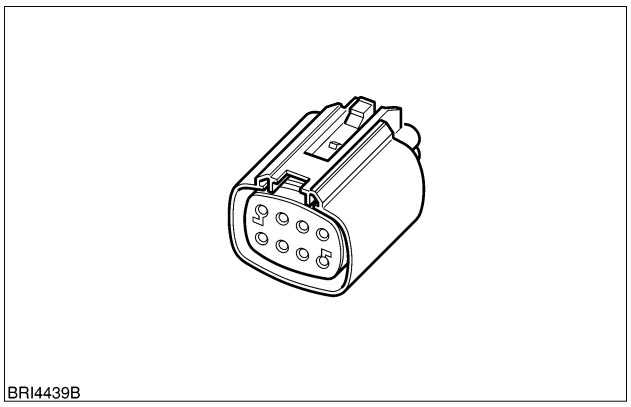
PLUG CONNECTION C143 - in PUMA Multicontroller REAR MOUNTED EQUIPMENT PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3070E (L)	POWER SUPPLY SOCKET ON THE B-PILLAR	**Wiring harness - Electrical schematic frame 24 (A.30.A)**
2	150BF (N)	BATTERY POWER SUPPLY (NO FUSE) (ALL)	
4	57CR (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C144 AIR BRAKE PLUG CONNECTION

PLUG CONNECTION C144 AIR BRAKE PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2095D (G) / 2095C (G)	EARTH SIGNAL INSTRUMENTS	PUMA Standard: **Wiring harness - Electrical schematic frame 30 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 30 (A.30.A)**
2	8000X (N)	SOLENOID VALVE TRAILER BRAKE	
3	8010 (TN)	PRESSURE TRAILER BRAKE	
4	8020B (TN)	PRESSURE TRAILER BRAKE	
5	57EH (B)	VEHICLE EARTH (ALL)	
6	8070 (L)	TRAILER MV PARKING BRAKE	
8	8060F (U)	POWER SUPPLY D. TRAILER BRAKE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



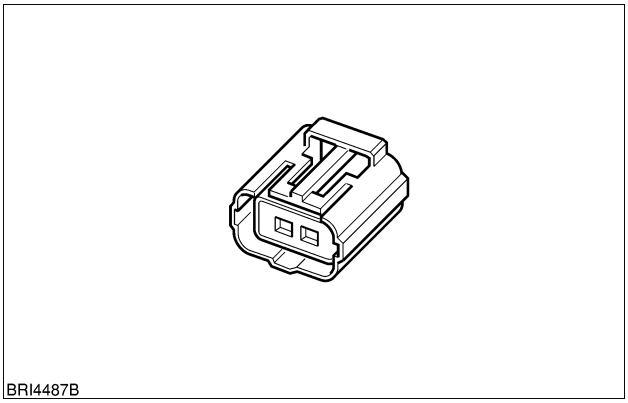
BRI4439B 3

TRANSMISSION - RIGHT-HAND SIDE

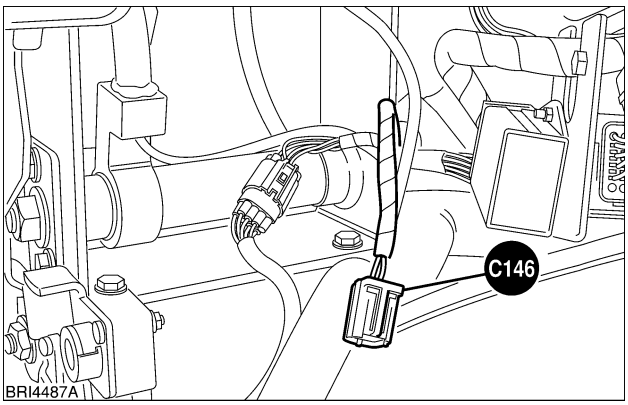
C146 LIFT-O-MATIC

PLUG CONNECTION C146 LIFT-O-MATIC			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2050N (G)	POWER SUPPLY PTO / SHIFTING CLAW	PUMA Standard: **Wiring harness - Electrical schematic frame 12 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 12 (A.30.A)**
2	5190 (R)	POWER LIFT LOCK / LIFT-O-MATIC	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4487B 4



C146-BRI4487A 5

RIGHT-HAND SIDE CONSOLE

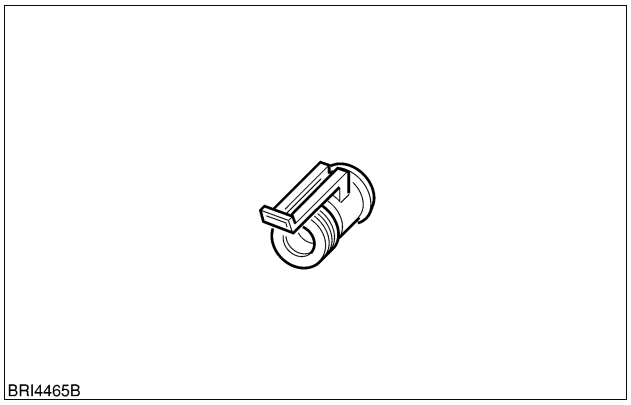
Wiring harness - Component diagram 17 Plug connections 170-179

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C173 CHARGE PRESSURE SWITCH S2

PLUG CONNECTION C173 CHARGE PRESSURE SWITCH S2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7160 (R)	WARNING LOW FEED PRESSURE FOR HYDRAULICS	PUMA Standard: **Wiring harness - Electrical schematic frame 13 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 13 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



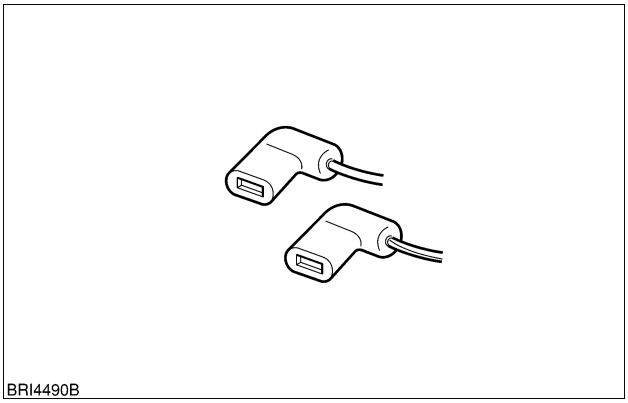
BRI4465B 1

TOP TRANSMISSION

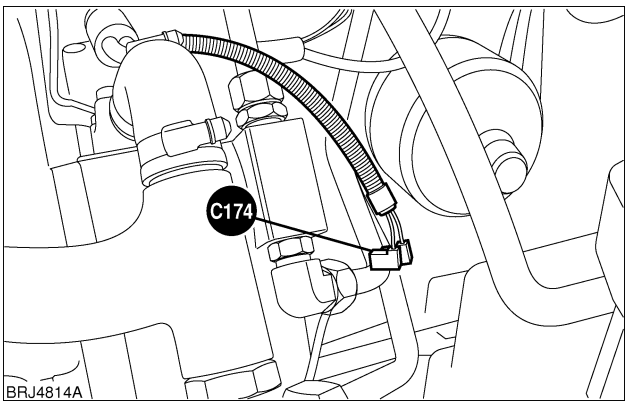
C174 POWER STEERING PRESSURE SWITCH

PLUG CONNECTION C174 POWER STEERING PRESSURE SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3500 (Y) / 57NZ (B)	POWER STEERING PRESSURE SIGNAL / VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 31 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 31 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4490B-03 2



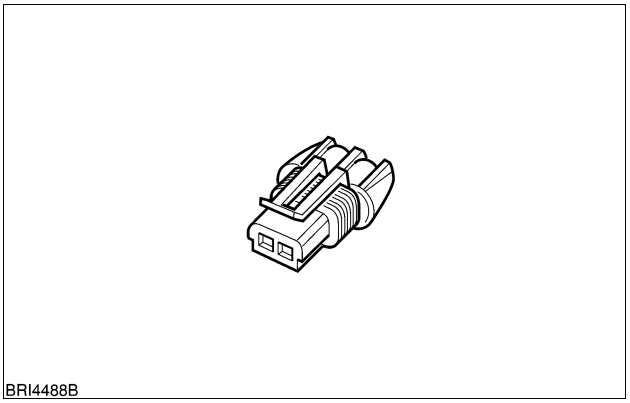
C174-BRJ4814A 3

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

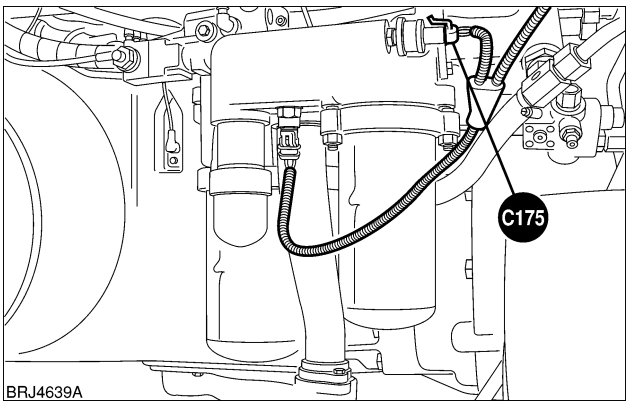
C175 MAINTENANCE SWITCH FOR THE HYDRAULIC OIL FILTER

PLUG CONNECTION C175 MAINTENANCE SWITCH FOR THE HYDRAULIC OIL FILTER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7130A (N)	WARNING LIGHT HYDRAULIC OIL FILTER	PUMA Standard: **Wiring harness - Electrical schematic frame 11 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 11 (A.30.A)**
2	57EV (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4488B-01 4



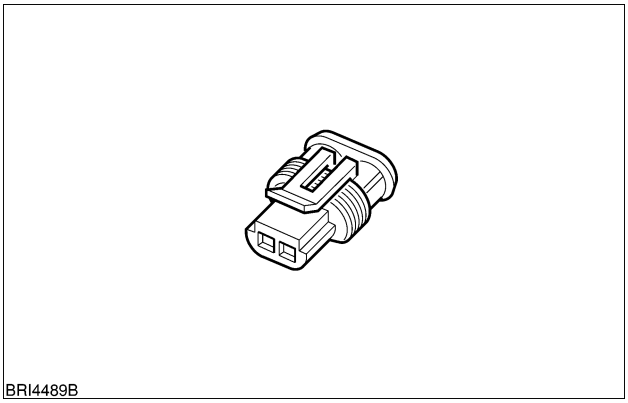
C175-BRJ4639A 5

TRANSMISSION - RIGHT-HAND SIDE

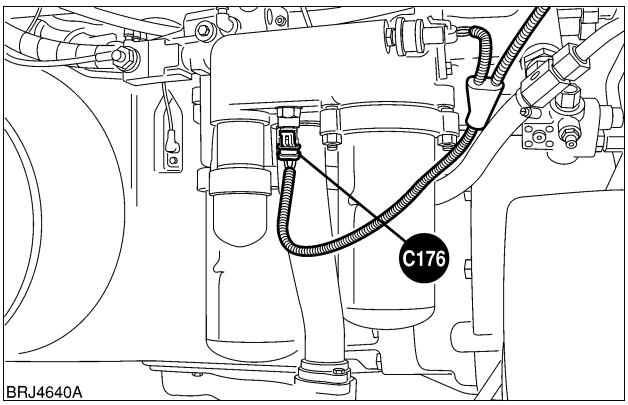
C176 TRANSMISION OIL TEMPERATURE SENSOR

PLUG CONNECTION C176 TRANSMISSION OIL TEMPERATURE SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7130 (N)	WARNING LIGHT HYDRAULIC OIL FILTER	PUMA Standard: **Wiring harness - Electrical schematic frame 11 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 11 (A.30.A)**
2	7130A (N)	WARNING LIGHT HYDRAULIC OIL FILTER	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 6



C176-BRJ4640A 7

TRANSMISSION - RIGHT-HAND SIDE

Wiring harness - Component diagram 18 Plug connections 180-189

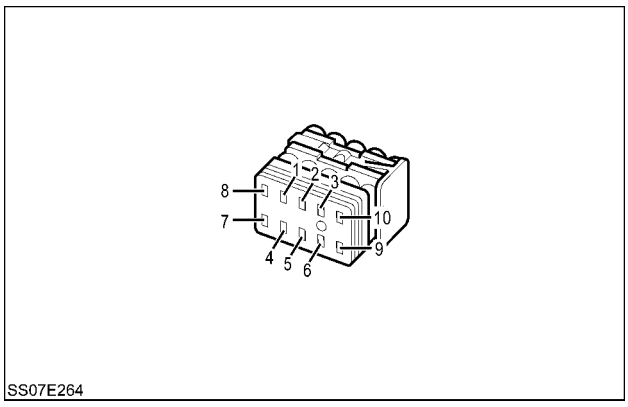
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C182 ALL WHEEL SWITCH

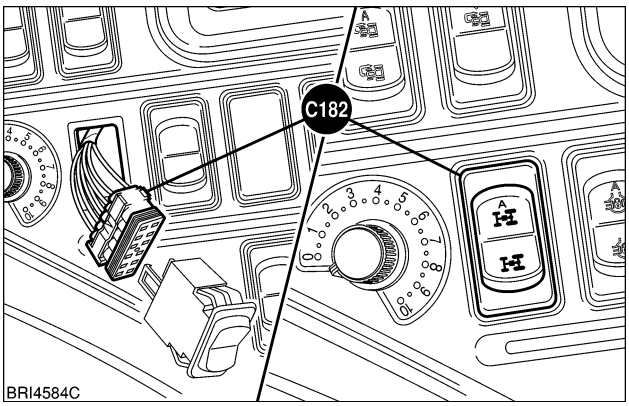
PLUG CONNECTION C182 FWD CONTROL SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3025 (Y) / 57EN (B)	SOLENOID VALVE FOR ALL WHEEL DRIVE (MANUAL) / VEHICLE EARTH (ALL)	**Wiring harness - Electrical schematic frame 18 (A.30.A)**
2	2050B (G)	POWER SUPPLY PTO / GEAR DISPLAY	
3	3027 (Y)	ALL WHEEL DRIVE SOLENOID VALVE (AUTO)	
7	57A (B)	VEHICLE EARTH (ALL)	
9	57B (B)	VEHICLE EARTH (ALL)	

PLUG CONNECTION C182 - in PUMA Multicontroller MFD CONTROL SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3025 (Y)	ALL WHEEL DRIVE SOLENOID VALVE (MANUAL)	**Wiring harness - Electrical schematic frame 18 (A.30.A)**
2	7000CB (U)	POWER SUPPLY TRANSMISSION CONTROLS	
3	3027 (Y)	ALL WHEEL DRIVE SOLENOID VALVE (AUTO)	
7	57KA (B)	VEHICLE EARTH (ALL)	
8	1012AC (R)	LIGHTING	
9	57KB (B)	VEHICLE EARTH (ALL)	
10	1012AH (R)	LIGHTING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C182-BRI4584C 2

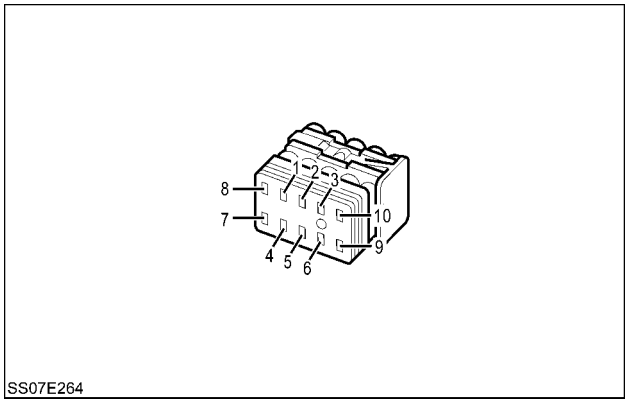
KEY PAD RIGHT-HAND SIDE CONSOLE

C183 DIFFERENTIAL LOCK SWITCH

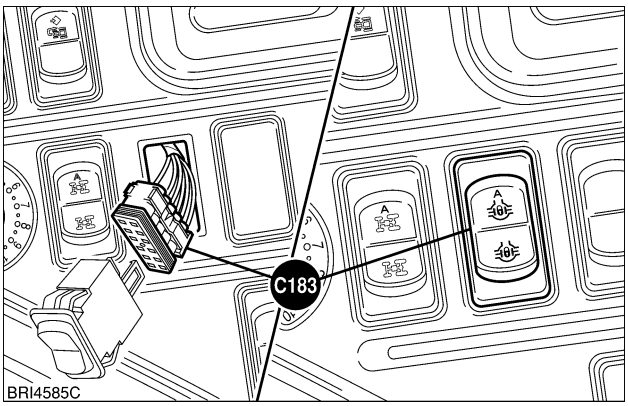
PLUG CONNECTION C183 DIFFERENTIAL LOCK SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7175 (Y) / 7126 (LTG) / 57FH (B)	DIFFERENTIAL LOCK SWITCH (MANUAL ON) / DIFFERENTIAL LOCK PRESSURE SWITCH / VEHICLE EARTH (ALL)	**Wiring harness - Electrical schematic frame 18 (A.30.A)**
2	7000A (U)	POWER SUPPLY TRANSMISSION CONTROLS	
6	7170 (W)	DIFFERENTIAL LOCK PRESSURE SWITCH (AUTO ON)	
7	7125 (G)	DIFF. LOCK WARNING LIGHT (AUTO)	
8	7000M (U)	POWER SUPPLY TRANSMISSION CONTROLS	
9	7120 (Y)	DIFF. LOCK WARNING LIGHT (MANUAL)	
10	7000L (U)	POWER SUPPLY TRANSMISSION CONTROLS	

PLUG CONNECTION C183 - in PUMA Multicontroller DIFFERENTIAL LOCK SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7175 (W)	DIFFERENTIAL LOCK SWITCH SIGNAL (AUTO ON)	**Wiring harness - Electrical schematic frame 18 (A.30.A)**
2	7000AA (U)	POWER SUPPLY TRANSMISSION CONTROLS	
6	7170 (W)	DIFFERENTIAL LOCK SWITCH (MANUAL ON)	
7	7125 (G)	DIFF. LOCK WARNING LIGHT (AUTO)	
8	7000AM (U)	POWER SUPPLY TRANSMISSION CONTROLS	
9	7120 (Y)	DIFF. LOCK WARNING LIGHT (MANUAL)	
10	7000AL (U)	POWER SUPPLY TRANSMISSION CONTROLS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C183-BRI4585C 4

KEY PAD RIGHT-HAND SIDE CONSOLE

C184 RADAR SENSOR

PLUG CONNECTION C184 RADAR SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2320 (P/K/Y)	ACTUAL VALUE ROAD SPEED ISO 11786 SOCKET PIN 1	**Wiring harness - Electrical schematic frame 31 (A.30.A)**
2	2300 (P/B/Y)	THEOR. ROAD SPEED ISO 11786 SOCKET PIN 2	
3	2330 (P/LG/Y)	PTO SPEED ISO 11876 SOCKET PIN 3	
4	2310 (P/G/Y)	LOWER/RAISE - POWER LIFT- MODE ISO 11786 SOCKET PIN 4	
5	1050 (G/W)	POWER SUPPLY ACCESSORY DEVICES	
6	61 (B)	EARTH HOUSING	
7	5190B (R/W/B)	POWER LIFT LOCK / LIFT-O-MATIC	

PLUG CONNECTION C184 - in PUMA Multicontroller RADAR SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2320 (L)	ACTUAL ROAD SPEED ISO 11786 SOCKET PIN 1	**Wiring harness - Electrical schematic frame 31 (A.30.A)**
2	2300 (L)	THEOR. ROAD SPEED ISO 11786 SOCKET PIN 2	
3	2330 (L)	PTO SPEED ISO 11786 SOCKET PIN 3	
4	2310 (L)	LOWER/RAISE - POWER LIFT- MODE ISO 11786 SOCKET PIN 4	
5	3062 (L)	SWITCH IMPLEMENT SOCKET	
6	1050A (G)	POWER SUPPLY ACCESSORY DEVICES	
7	61B (B/D)	EARTH HOUSING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

Wiring harness - Component diagram 19 Plug connections 190-199

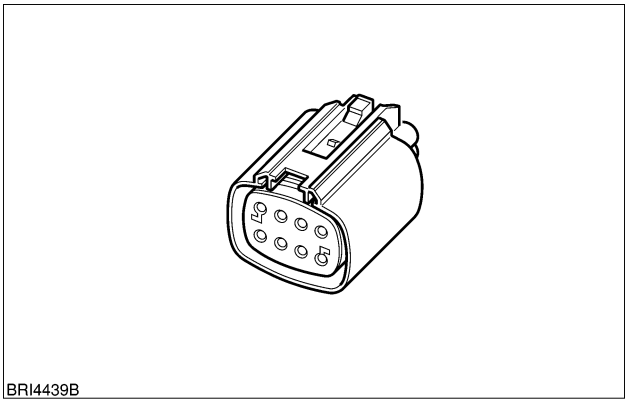
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C190 HEADLIGHT SWITCH

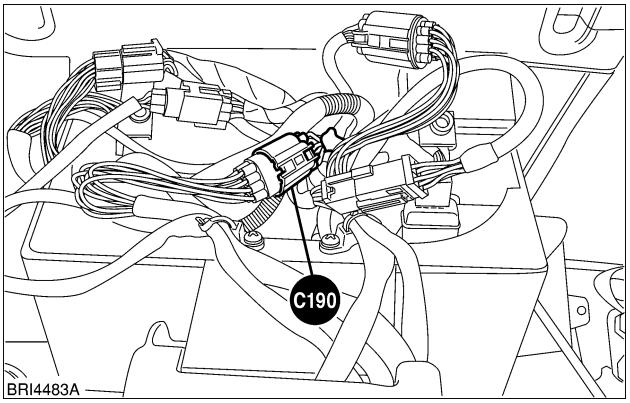
PLUG CONNECTION C190 HEADLIGHT SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	150AA (N)	BATTERY POWER SUPPLY (NO FUSE) (ALL)	**Wiring harness - Electrical schematic frame 27 (A.30.A)**
2	1024A (R)	POWER SUPPLY RIGHT-HAND AND LEFT-HAND SIDE MARKER LIGHT	
3	1027D (U)	MAIN BEAM	
4	1030C (U)	HEADLAMP DIP BEAM	
5	3000 (G)	POWER SUPPLY FLASHER (TERMINAL 49)	
6	376 (L)	POWER SUPPLY HORN	
7	3001 (G)	CIRCUIT INDICATOR LEFT-HAND SIDE	
8	3002 (G)	CIRCUIT INDICATOR RIGHT-HAND SIDE	

PLUG CONNECTION C190 - in PUMA Multicontroller HEADLIGHT SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	150AA (N)	BATTERY POWER SUPPLY (NO FUSE) (ALL)	**Wiring harness - Electrical schematic frame 27 (A.30.A)**
2	1024 (R)	POWER SUPPLY RIGHT-HAND AND LEFT-HAND SIDE MARKER LIGHT	
3	1027D (U)	MAIN BEAM	
4	1030C (U)	HEADLAMP DIP BEAM	
5	3000 (G)	POWER SUPPLY FLASHER (TERMINAL 49)	
6	376 (L)	POWER SUPPLY HORN	
7	3001 (G)	CIRCUIT INDICATOR LEFT-HAND SIDE	
8	3002 (G)	CIRCUIT INDICATOR RIGHT-HAND SIDE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4439B 1



C190-BRI4483A 2

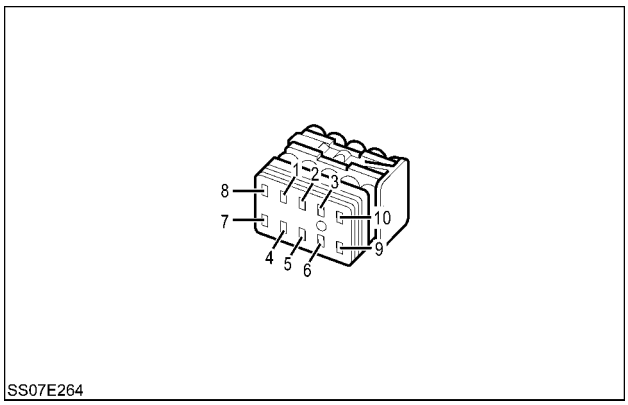
BEHIND THE STEERING COLUMN CONSOLE

C192 CRAWLER GEARS SWITCH

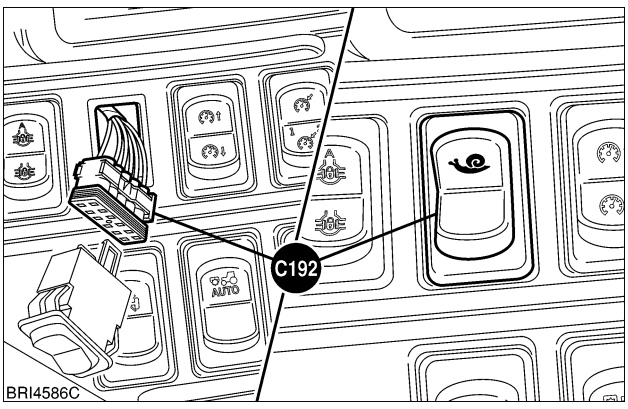
PLUG CONNECTION C192 CRAWLER DRIVE SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	2050A (G)	POWER SUPPLY PTO / GEAR DISPLAY	**Wiring harness - Electrical schematic frame 09 (A.30.A)**
3	7040 (N)	CRAWLER GROUP SWITCH	
7	57H (B)	VEHICLE EARTH (ALL)	

PLUG CONNECTION C192 - in PUMA Multicontroller CRAWLER DRIVE SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	7000CA (U)	POWER SUPPLY TRANSMISSION CONTROLS	**Wiring harness - Electrical schematic frame 09 (A.30.A)**
3	7040 (N)	CRAWLER GROUP SWITCH	
7	57KE (B)	VEHICLE EARTH (ALL)	
8	1012AJ (R)	LIGHTING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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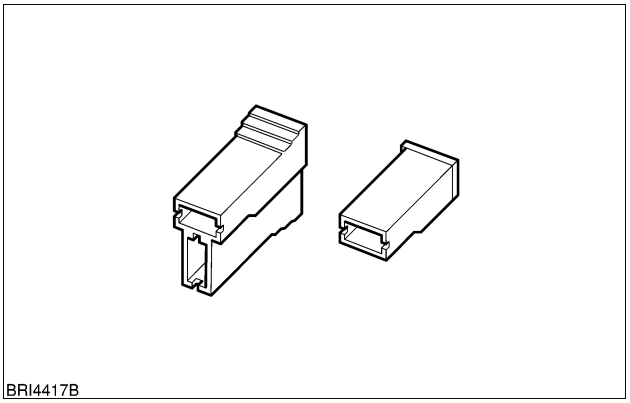
C192-BRI4586C 4

RIGHT-HAND SIDE CONSOLE - KEY PAD

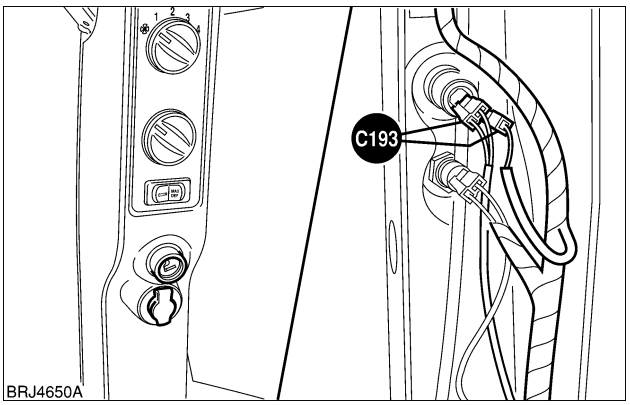
C193 CIGAR LIGHTER

PLUG CONNECTION C193 CIGAR LIGHTER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1012G (R) / 3070B (L)	LIGHTING / POWER SOCKET ON B-COLUMN	PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	57CV (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C193-BRJ4650A 6

LEFT-HAND SIDE C-PILLAR REAR

Wiring harness - Component diagram 21 Plug connections 210-219

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C216 TEMPERATURE SWITCH (not used in PUMA Multicontroller)

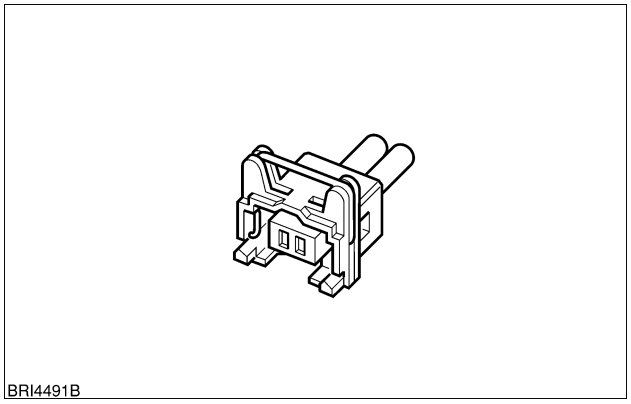
PLUG CONNECTION C216 TEMPERATURE SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
			Wiring harness - Electrical schematic frame 13 (A.30.A)

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

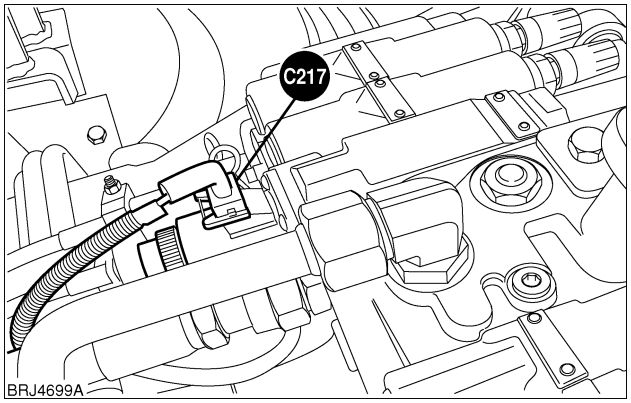
C217 EPC RAISE SOLENOID VALVE

PLUG CONNECTION C217 EPC RAISE SOLENOID VALVE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5085 (K)	EPC CONTROL VALVE RAISE	PUMA Standard: **Wiring harness - Electrical schematic frame 13 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 13 (A.30.A)**
2	5087 (K)	EPC CONTROL VALVE RAISE RETURN CIRCUIT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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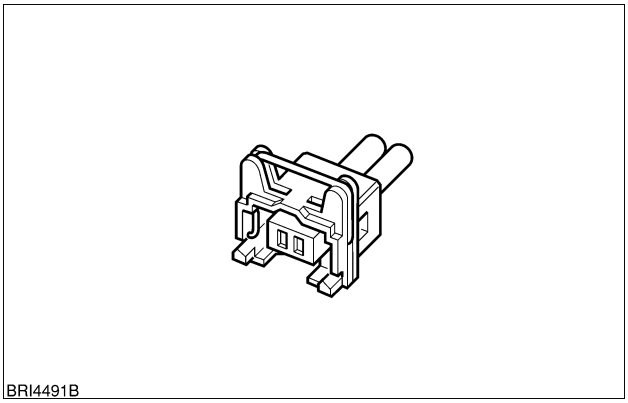
C217-BRI4699A 2

TRACTOR REAR - EPC CONTROL VALVE

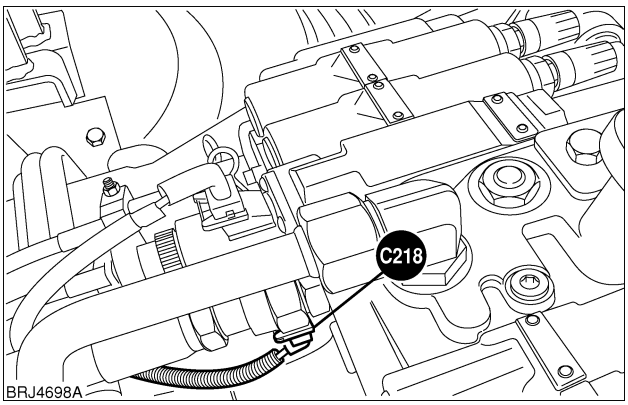
C218 EPC LOWER SOLENOID VALVE

PLUG CONNECTION C218 EPC LOWER SOLENOID VALVE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5090 (K)	EPC CONTROL VALVE LOWER	PUMA Standard: **Wiring harness - Electrical schematic frame 13 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 13 (A.30.A)**
2	5097 (K)	EPC CONTROL VALVE LOWER RETURN CIRCUIT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4491B-01 3



C218-BRI4698A 4

TRACTOR REAR - EPC CONTROL VALVE

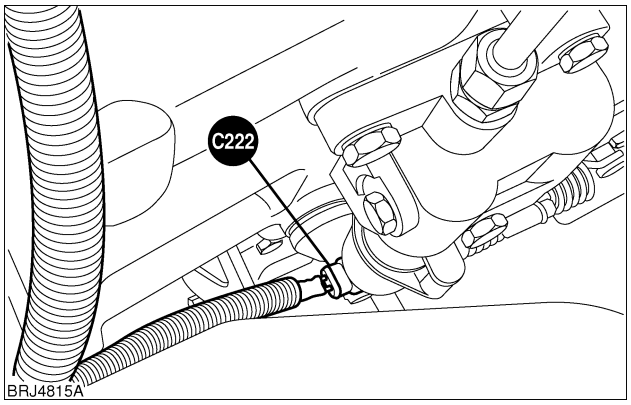
Wiring harness - Component diagram 22 Plug connections 220-229

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C222 SHIFT SOLENOID VALVE FOR THE CRAWLER GROUP

PLUG CONNECTION C222 SOLENOID VALVE CRAWLER GROUP			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7005 (U/L/B)	MV CRAWLER GEAR TRANSMISSION	PUMA Standard: **Wiring harness - Electrical schematic frame 08 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 08 (A.30.A)**
2	7580 (U/K/B)	OVERRIDE SOLENOID VALVE CRAWLER GROUP	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



C222-BRJ4815A 1

Wiring harness - Component diagram 23 Plug connections 230-239

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C235 30A SOCKET AND TERMINAL STUD

PLUG CONNECTION C235 30A SOCKET AND TERMINAL STUD			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3070 (P/W) / 3070A (L)	POWER SUPPLY SOCKET ON THE B-PILLAR	**Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	9032 (Y/G) / 57CX (B)	VEHICLE EARTH (ALL)	
3	57C (B)	VEHICLE EARTH (ALL)	
4	3070C (P)	POWER SUPPLY SOCKET ON THE B-PILLAR	
A	3070C (L)	POWER SUPPLY SOCKET ON THE B-PILLAR	
B	57CY (B)	VEHICLE EARTH (ALL)	
C	9032A (Y)	50 KM/H SOLENOID VALVE+ / VEHICLE EARTH (ALL)	

PLUG CONNECTION C235 - in PUMA Multicontroller 30A SOCKET AND TERMINAL STUD			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3070C (L)	POWER SUPPLY SOCKET ON THE B-PILLAR	**Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	9032A (Y)	POWER SUPPLY POTENTIAL 15	
4	57CW (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

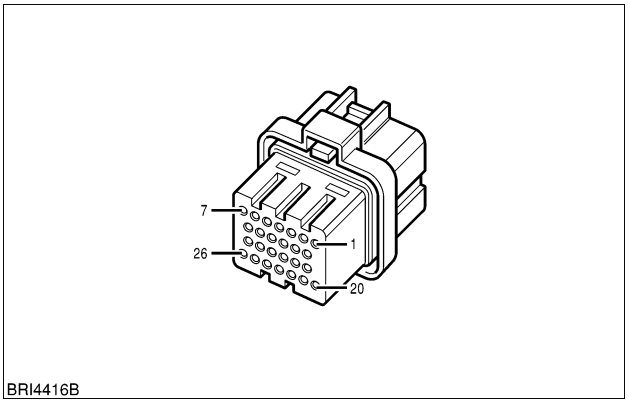
C239 TCM ELECTRONIC TRANSMISSION CONTROLLER (CN2)

PLUG CONNECTION C239 TCM - ELECTRONIC TRANSMISSION CONTROLLER (CN2)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7915 (L)	TRANSMISSION CONTROLLER COUPLUNG B RETURN CIRCUIT	**Wiring harness - Electrical schematic frame 38 (A.30.A)**
2	7225 (W)	TRANSMISSION MV GEAR GROUP H - RETURN CIRCUIT	
3	7935 (L)	TRANSMISSION CONTROLLER COUPLUNG D RETURN CIRCUIT	
4	5087 (K)	EPC CONTROL VALVE RAISE RETURN CIRCUIT	
5	5097 (K)	EPC CONTROL VALVE LOWER RETURN CIRCUIT	
6	7925 (L)	TRANSMISSION CONTROLLER COUPLUNG C RETURN CIRCUIT	
7	7982 (W)	TRANSMISSION GROUP M	
8	7900 (TQ)	SIGNAL COUPLING A	
11	5220 (Y)	EPC RAISE TELLTALE	
13	9034 (TN)	50 KM/H SOLENOID VALVE-	
14	2062 (W)	PTO SPEED SENSOR	
16	3168 (O)	POWER SUPPLY RELIEF SOLENOID VALVE AUTOMAT. VERSION (HSD)	
19	5180 (TQ)	EPC WHEEL SLIP WARNING LIGHT	
20	2140 (O)	PTO SPEED SENSOR	
21	57W (B)	VEHICLE EARTH (ALL)	
22	5596 (S)	ELECTROHYDR. REMOTE VALVE MAIN SWITCH TELLTALE	
23	6355 (R)	+5V LOW-SIGNAL REFERENZSPANNUNG	
24	5110 (K)	EPC SIGNAL TELLTALE	
25	5230 (Y)	EPC LOWER TELLTALE	
26	57X (B)	VEHICLE EARTH (ALL)	

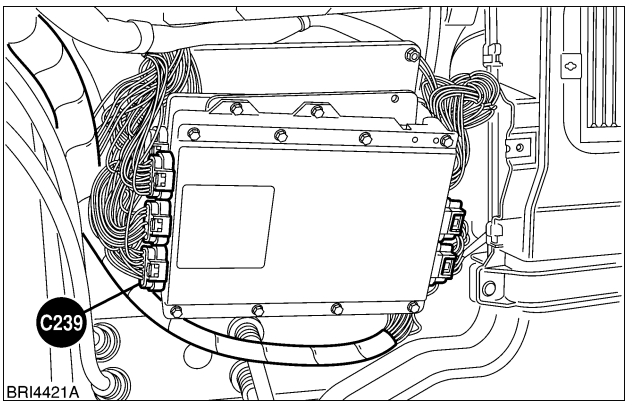
PLUG CONNECTION C239 - in PUMA Multicontroller TCM - ELECTRONIC TRANSMISSION CONTROLLER (CN2)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7915 (L)	TRANSMISSION CONTROLLER COUPLUNG B RETURN CIRCUIT	
2	7225 (W)	TRANSMISSION MV GEAR GROUP H - RETURN CIRCUIT	
3	7935 (L)	TRANSMISSION CONTROLLER COUPLUNG D RETURN CIRCUIT	
4	5087 (K)	EPC CONTROL VALVE RAISE RETURN CIRCUIT	
5	5097 (K)	EPC CONTROL VALVE LOWER RETURN CIRCUIT	
6	7925 (L)	TRANSMISSION CONTROLLER COUPLUNG C RETURN CIRCUIT	
7	7982 (W)	TRANSMISSION GROUP M	
8	7900 (TQ)	SIGNAL COUPLING A	
11	5220 (Y)	EPC RAISE TELLTALE	

13	9034 (TN)	50 KM/H SOLENOID VALVE-	**Wiring harness - Electrical schematic frame 38 (A.30.A)**
14	2062 (W)	PTO SPEED SENSOR	
16	3168 (O)	POWER SUPPLY RELIEF SOLENOID VALVE AUTOMAT. VERSION (HSD)	
19	5180 (TQ)	EPC WHEEL SLIP WARNING LIGHT	
20	2140 (O)	PTO SPEED SENSOR	
21	57W (B)	VEHICLE EARTH (ALL)	
23	6355 (R)	+5V LOW-SIGNAL REFERENZSPANNUNG	
24	5110 (K)	EPC SIGNAL TELLTALE	
25	5230 (Y)	EPC LOWER TELLTALE	
26	57X (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4416B-01 1



C239-BRI4421A 2

BEHIND THE DRIVER'S SEAT

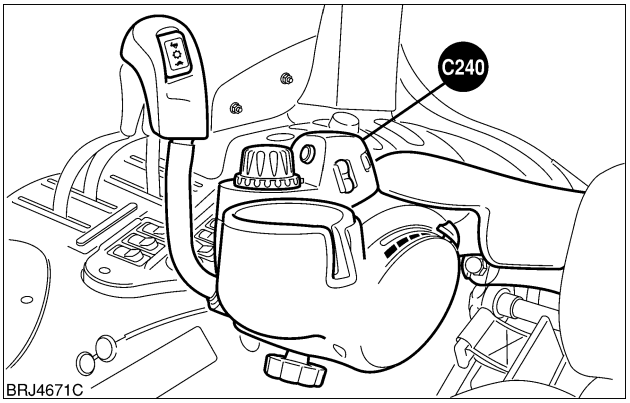
Wiring harness - Component diagram 24 Plug connections 240-249

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C240 PLUG CONNECTION EPC CONTROL (not used in PUMA Multicontroller)

PLUG CONNECTION C240 PLUG CONNECTION EPC CONTROL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
			Wiring harness - Electrical schematic frame 10 (A.30.A)

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



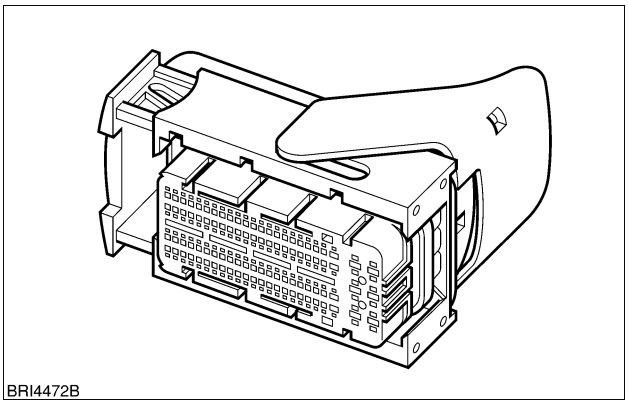
C240-BRJ4671C 1

OPERATOR CONTROL ARMREST

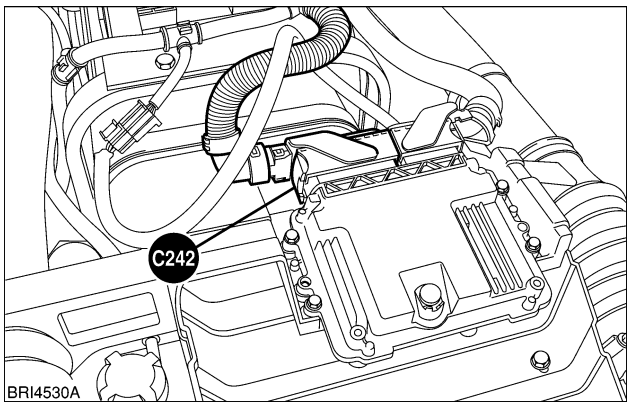
C242 PLUG CONNECTION MAIN ELECTRONICS BOX

PLUG CONNECTION C242 PLUG CONNECTION MAIN ELECTRONICS BOX			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6408A (G)	FUSE-PROTECTED VOLTAGE B+ TO CONTROL UNIT (1)	
2	57FC (B)	VEHICLE EARTH (ALL)	
4	57FE (B)	VEHICLE EARTH (ALL)	
5	6408F (G)	FUSE-PROTECTED VOLTAGE B+ TO CONTROL UNIT (1)	
6	57FD (B)	VEHICLE EARTH (ALL)	
24	6320 (N)	VENTILATOR 5V REF.	
25	6418 (K)	CONTROL UNIT TO J1941(ISO) INTERFACE 2 PLUG CONNECTION ISO K	
28	71C (W)	POWER SUPPLIES WHEN STARTER SWITCH SWITCHED ON (NOT PROTECTED BY FUSE)	
53	6305 (O)		
61	5420D (G)	CAN L	
62	5400D (Y)	CAN H	
68	6570 (G)	CONTROL UNIT TO FUEL FILTER HEATING RETURN SIGNAL	
72	6407 (O)	SIGNAL FOR ENGINE SHUTDOWN (EDC16)	
75	6300 (N)	FAN SPEED	
79	2040 (LTG)	WATER SENSOR FOR THE WATER SEPARATOR	
90	6310 (N)	FAN SOLENOID VALVE	
91	6586 (L)	CONTROL UNIT TO HEATER GRID RELAY RETURN SIGNAL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4472B 2



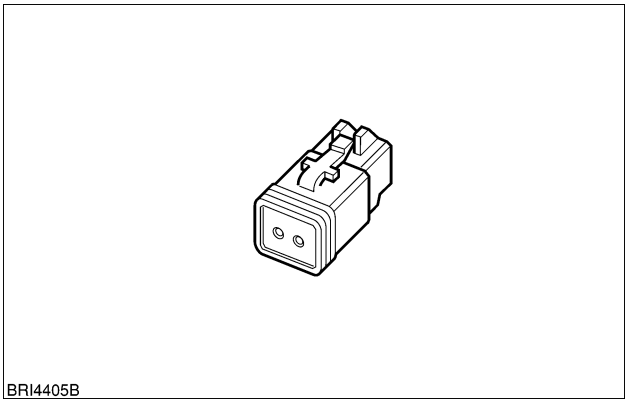
C242-BRI4530A 3

TOP ENGINE

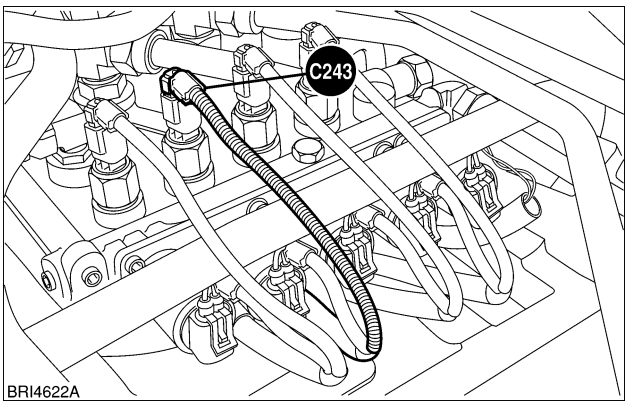
C243 PRESSURE SWITCH GEAR GROUP H

PLUG CONNECTION C243 PRESSURE SWITCH GEAR GROUP H			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7770A (U)	TRANSMISSION FORWARDS PRESSURE SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 07 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 07 (A.30.A)**
2	7000BE (U)	POWER SUPPLY TRANSMISSION CONTROLS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4405B 4



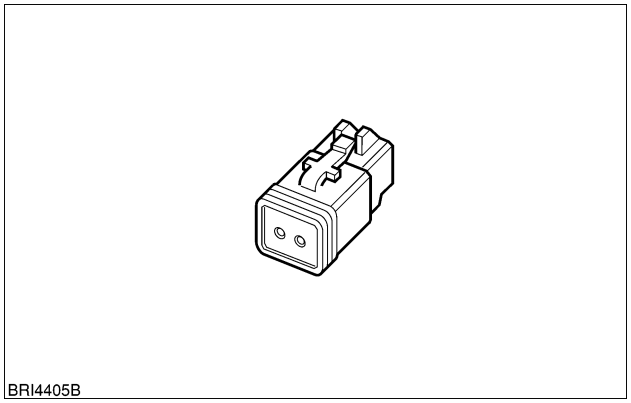
C243-BRI4622A 5

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

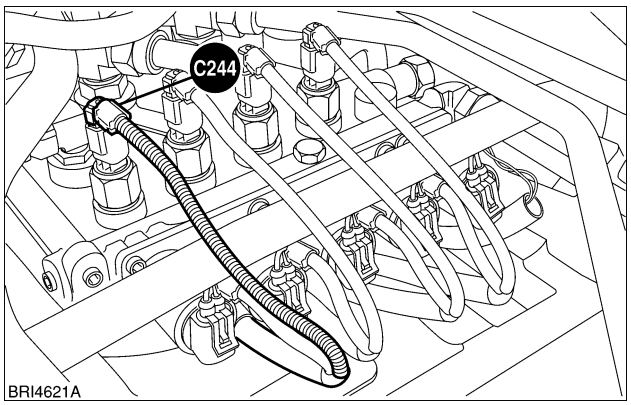
C244 PRESSURE SWITCH GEAR GROUP M

PLUG CONNECTION C244 PRESSURE SWITCH GEAR GROUP M			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7770B (U)	TRANSMISSION FORWARDS PRESSURE SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 07 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 07 (A.30.A)**
2	7000BF (U)	POWER SUPPLY TRANSMISSION CONTROLS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4405B 6



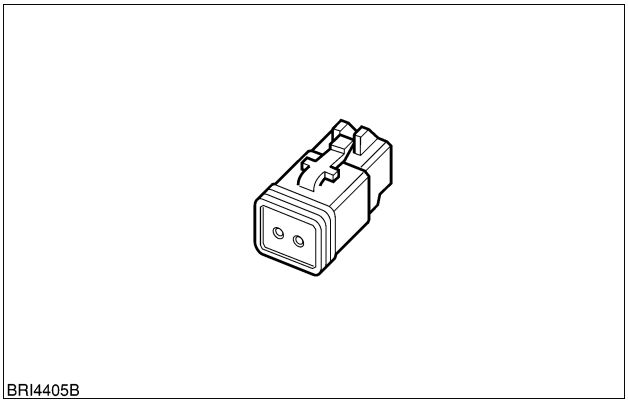
C244-BRI4621A 7

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

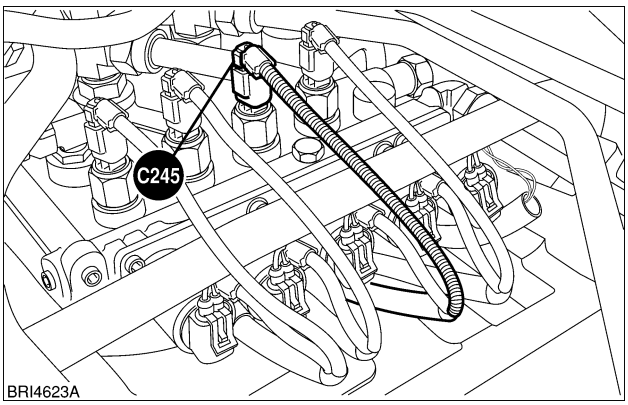
C245 PRESSURE SWITCH GEAR GROUP L

PLUG CONNECTION C245 PRESSURE SWITCH GEAR GROUP L			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7770C (U)	TRANSMISSION FORWARDS PRESSURE SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 07 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 07 (A.30.A)**
2	7000BD (U)	POWER SUPPLY TRANSMISSION CONTROLS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4405B 8



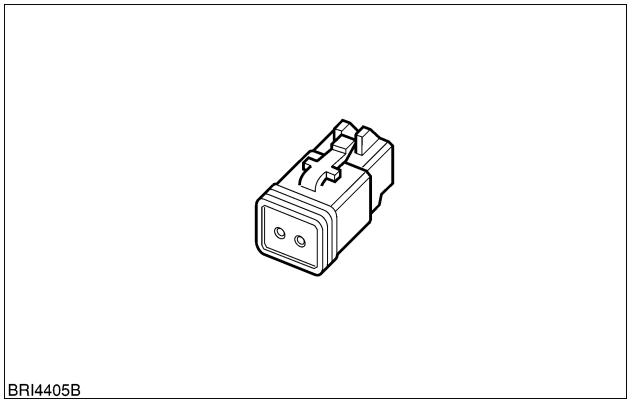
C245-BRI4623A 9

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

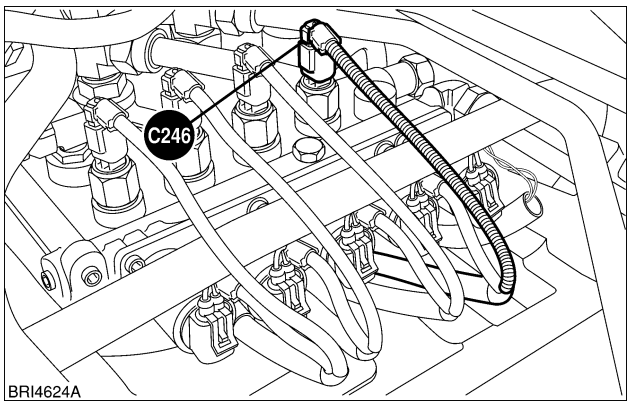
C246 PRESSURE SWITCH FOR REVERSE GEARS

PLUG CONNECTION C246 PRESSURE SWITCH FOR REVERSE GEARS			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	8050 (R)	TRANSMISSION REVERSE PRESSURE	PUMA Standard: **Wiring harness - Electrical schematic frame 07 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 07 (A.30.A)**
2	7000BC (U)	POWER SUPPLY TRANSMISSION CONTROLS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4405B 10



C246-BRI4624A 11

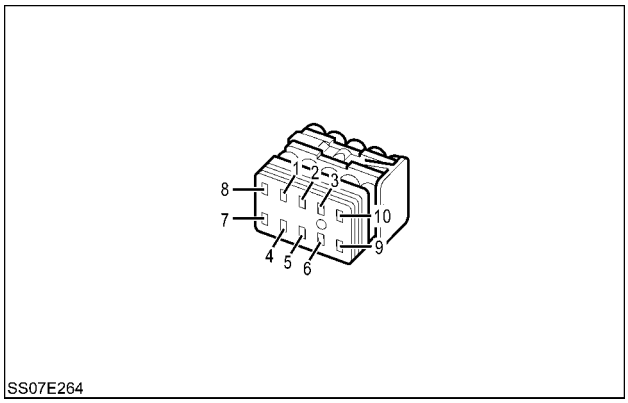
SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

C247 LOCKING SWITCH FOR THE SUSPENSION

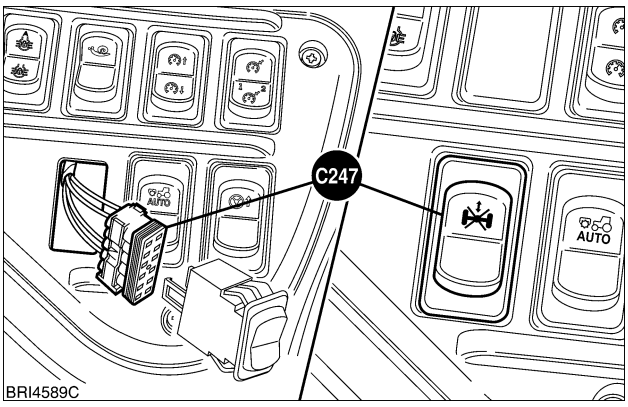
PLUG CONNECTION C247 LOCKING SWITCH FOR SUSPENSION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	7000F (U)	POWER SUPPLY TRANSMISSION CONTROLS	**Wiring harness - Electrical schematic frame 21 (A.30.A)**
3	3210 (U)	ON/OFF SWITCH FOR SUSPENSION RETURN SIGNAL	
7	3290 (O)	SUSPENSION LOCK LIGHT (OR MAGNETVENTIL RETURN SIGNAL)	
8	7000G (U)	POWER SUPPLY TRANSMISSION CONTROLS	

PLUG CONNECTION C247 - in PUMA Multicontroller LOCKING SWITCH FOR SUSPENSION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	7000AF (U)	POWER SUPPLY TRANSMISSION CONTROLS	**Wiring harness - Electrical schematic frame 21 (A.30.A)**
3	3210B (U)	ON/OFF SWITCH FOR SUSPENSION RETURN SIGNAL	
7	3290 (O)	SUSPENSION LOCK LIGHT (OR MAGNETVENTIL RETURN SIGNAL)	
8	7000AG (U)	POWER SUPPLY TRANSMISSION CONTROLS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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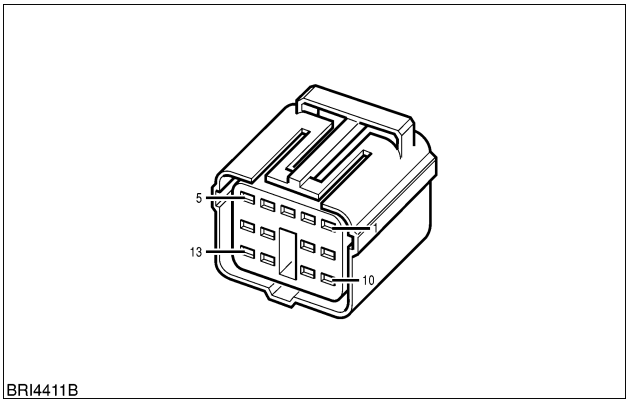
C247-BRI4589C 13

RIGHT-HAND SIDE CONSOLE - KEY PAD

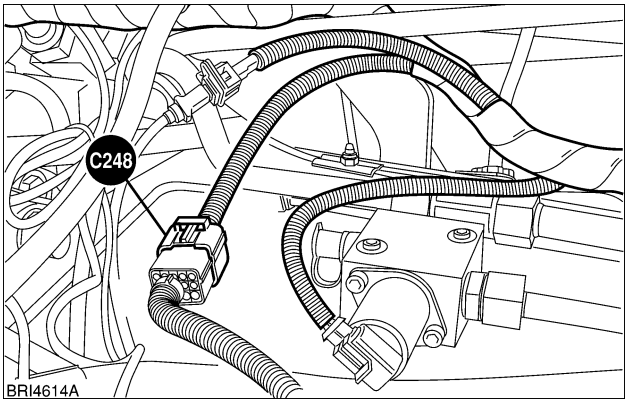
C248 PLUG CONNECTION FOR FRONT AXLE SUSPENSION

PLUG CONNECTION C248 PLUG CONNECTION FOR FRONT AXLE SUSPENSION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3240 (O) /3240 (O/B/S/)	RAISE SOLENOID VALVE POWER SUPPLY/	PUMA Standard: **Wiring harness - Electrical schematic frame 21 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 21 (A.30.A)**
2	3250 (O) /3250 (O/G/S/)	RAISE SOLENOID VALVE RETURN SIGNAL	
3	3260 (O) / 3260 (O/N/S)	LOWER SOLENOID VALVE POWER SUPPLY	
4	3270 (O) / 3270 (O/P/S)	LOWER SOLENOID VALVE RETURN SIGNAL	
5	3280 (O) / 3280 (O/U/S)	SUSPENSION LOCK SOLENOID VALVE TOP	
6	3281 (TN) /3290 (O/Y/S)	SUSPENSION LOCK SOLENOID VALVE TOP RETURN SIGNAL (-) / TELLTALE SUSPENSION LOCK (OR MV RETURN SIGNAL)	
7	3285 (TN) / 3300 (O)	SUSPENSION LOCK SOLENOID VALVE / SCANNER LINE SOLENOID VALVE	
8	3286 (TN) / / 3310 (O)	SUSPENSION LOCK SOLENOID VALVE BOTTOM RETURN SIGNAL (-) / SUSPENSION LOCK SOLENOID VALVE RAISE	
12	3295 (O)	SIGNAL PRESSURE SWITCH FOR FRONT AXLE SUSPENSION	
13	57FX (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C248-BRI4614A 15

TOP OF THE TRANSMISSION

C249 LOWER SOLENOID VALVE FOR SUSPENSION

PLUG CONNECTION C249 LOWER SOLENOID VALVE FOR SUSPENSION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3260 (O/N/S) / 3240 (O)	LOWER SOLENOID VALVE POWER SUPPLY / RAISE SOLENOID VALVE POWER SUPPLY	PUMA Standard: **Wiring harness - Electrical schematic frame 21 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 21 (A.30.A)**
2	3270 (O/P/S) / 3250 (O)	LOWER SOLENOID VALVE RETURN SIGNAL / RAISE SOLENOID VALVE RETURN SIGNAL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

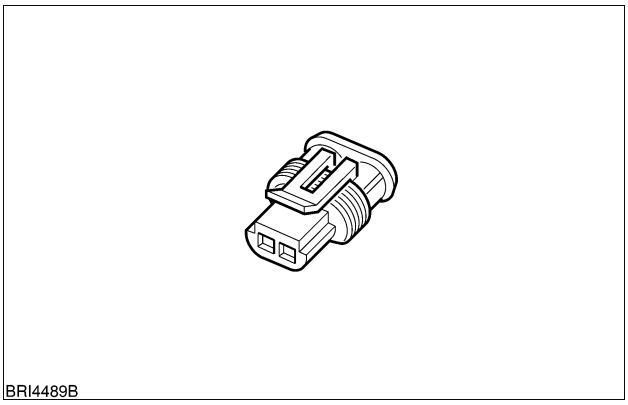
Wiring harness - Component diagram 25 Plug connections 250-259

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C250 SUSPENSION LOCK SOLENOID VALVE BOTTOM

PLUG CONNECTION C250 SUSPENSION LOCK SOLENOID VALVE BOTTOM			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3300 (O) / 3285 (TN)	SCANNER LINE SHIFT SOLENOID VALVE / SUSPENSION LOCK SOLENOID VALVE BOTTOM	PUMA Standard: **Wiring harness - Electrical schematic frame 21 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 21 (A.30.A)**
2	3310 (O) / 3286 (TN)	SOLENOID VALVE LOCK TOP / SUSPENSION LOCK SOLENOID VALVE BOTTOM RETURN SIGNAL (-)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

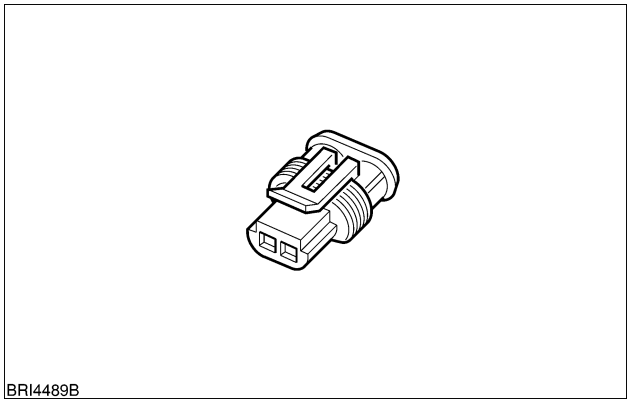


BRI4489B-1 1

C251 RAISE SOLENOID VALVE FOR SUSPENSION

PLUG CONNECTION C251 RAISE SOLENOID VALVE FOR SUSPENSION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3240 (O/B/S) / 3260 (O)	RAISE SOLENOID VALVE POWER SUPPLY / LOWER SOLENOID VALVE POWER SUPPLY	PUMA Standard: **Wiring harness - Electrical schematic frame 21 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 21 (A.30.A)**
2	3250 (O/G/S) / 3270 (O)	RAISE SOLENOID VALVE RETURN SIGNAL / LOWER SOLENOID VALVE RETURN SIGNAL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

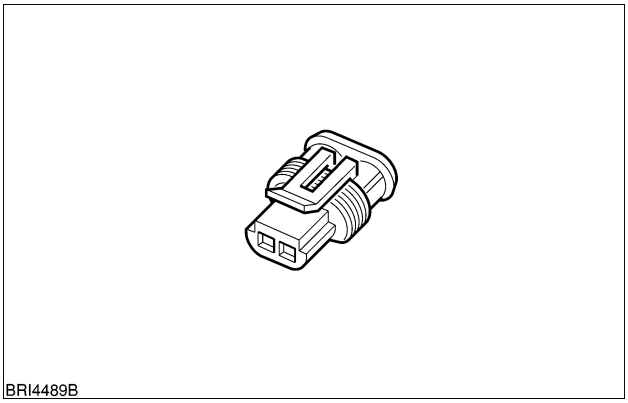


BRI4489B-1 2

C252 SOLENOID VALVE UPPER LOCK FOR THE SUSPENSION

PLUG CONNECTION C252 SOLENOID VALVE UPPER LOCK FOR THE SUSPENSION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3280 (O/U/S) / 3280 (O)	SUSPENSION LOCK SOLENOID VALVE TOP / SUSPENSION LOCK SOLENOID VALVE TOP	PUMA Standard: **Wiring harness - Electrical schematic frame 21 (A.30.A)**
2	3290 (O/Y/S) / 3281 (TN)	SUSPENSION LOCK TELLTALE (OR MV RETURN SIGNAL) / SUSPENSION LOCK SOLENOID VALVE TOP RETURN SIGNAL (-)	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 21 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

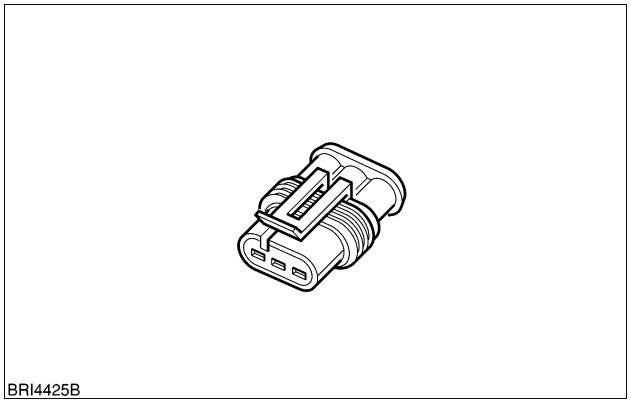


BRI4489B-1 3

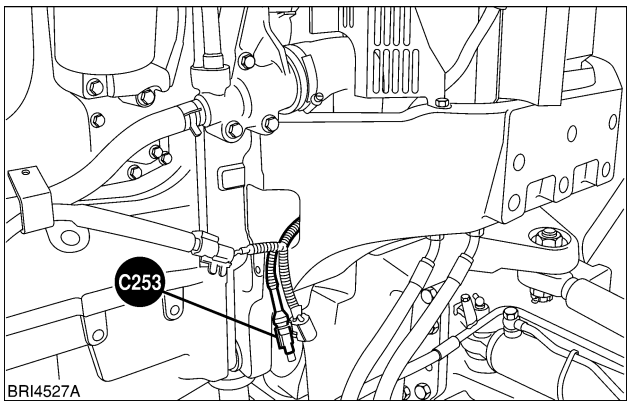
C253 AXLE HEIGHT SENSOR

PLUG CONNECTION C253 AXLE HEIGHT SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5520C (LTG)	ELECTROHYDR. REMOTE VALVE 5V Ref.	PUMA Standard: **Wiring harness - Electrical schematic frame 21 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 21 (A.30.A)**
2	3230 (U)	AXLE HEIGHT SENSOR POSITION	
3	60AF (B/W)	EARTH SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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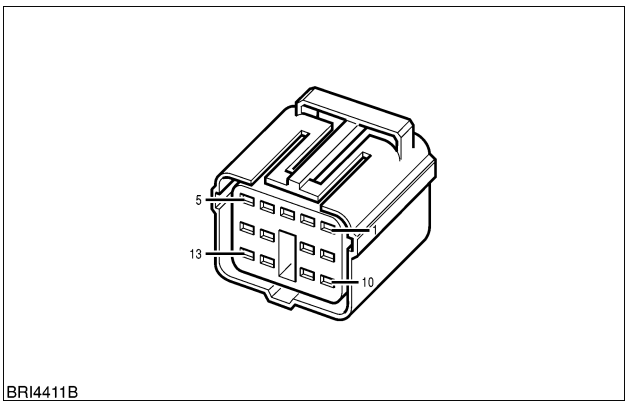
C253-BRI4527A 5

FRONT OF ENGINE - RIGHT-HAND SIDE

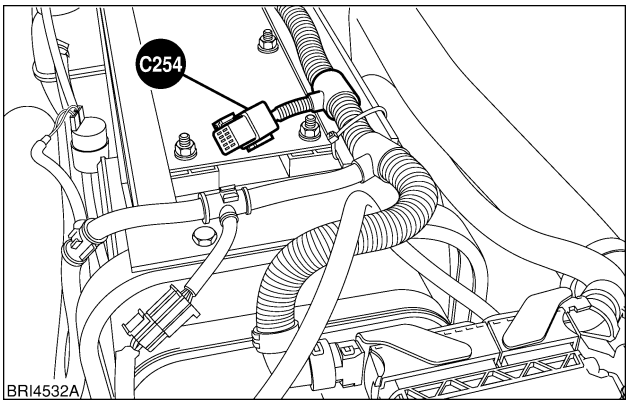
C254 PLUG CONNECTION FRONT POWER LIFT / FRONT PTO

PLUG CONNECTION C254 PLUG CONNECTION FRONT POWER LIFT / FRONT PTO			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2044 (O)	FRONT SOLENOID VALVE RETURN SIGNAL (-)	PUMA Standard: **Wiring harness - Electrical schematic frame 20 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 20 (A.30.A)**
2	2043 (O)	FRONT PTO SOLENOID VALVE	
3	2260 (O)	FRONT PTO - SPEED SIGNAL	
4	60AE (B/W)	EARTH SENSOR	
5	2570 (R)	FRONT POWER LIFT RAISE SOLENOID VALVE	
7	2510 (N)	SIGNAL ACTUAL POSITION FRONT POWER LIFT	
8	57JT (B)	VEHICLE EARTH (ALL)	
9	2250 (K)	FRONT PTO - STROMVERSORGUNG	
10	2556 (N)	FRONT POWER LIFT COMMON RAIL	
11	2590 (TN)	REAR CONTROL SWITCH FRONT POWER LIFT RAISE	
12	2591 (TN)	REAR CONTROL SWITCH FRONT POWER LIFT LOWER	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4411B-02 6



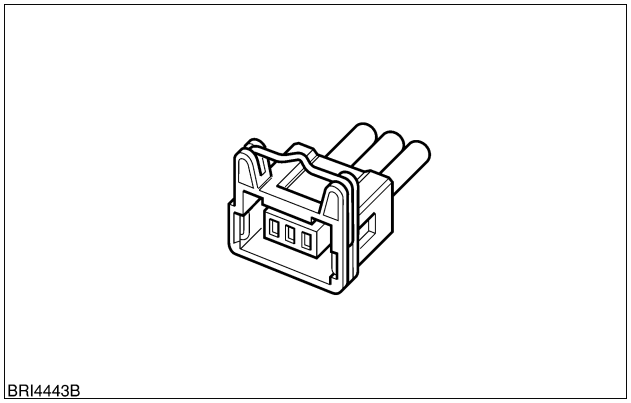
C254-BRI4532A 7

TOP ENGINE

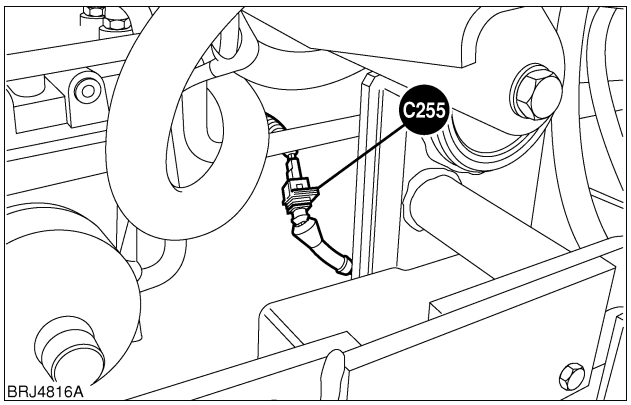
C255 ENGINE SPEED / ENGINE BLOCK TORQUE SENSOR

PLUG CONNECTION C255 ENGINE SPEED / ENGINE BLOCK - TORQUE SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2050AB (G)	POWER SUPPLY PTO / GEAR DISPLAY	PUMA Standard: **Wiring harness - Electrical schematic frame 03 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 03 (A.30.A)**
2	7760 (W)	TORQUE SENSOR	
3	60AV (B/W)	EARTH SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4443B-02 8



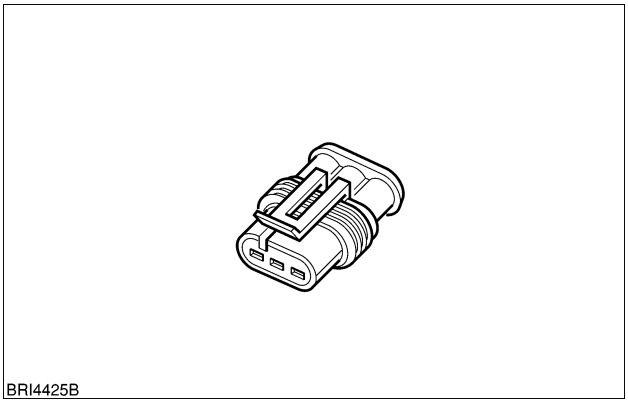
C255-BRJ4816A 9

TOP OF THE TRANSMISSION

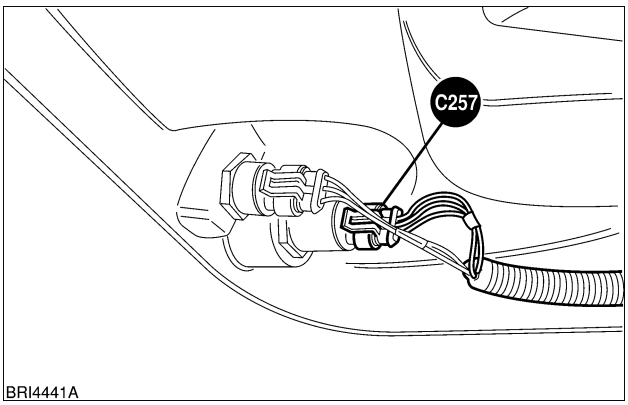
C257 PTO SWITCH LEFT-HAND SIDE

PLUG CONNECTION C257 PTO SWITCH LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2050 (G/R)	POWER SUPPLY PTO / GEAR DISPLAY	PUMA Standard: **Wiring harness - Electrical schematic frame 26 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 26 (A.30.A)**
2	2059 (W/U)	PTO SWITCH ON FENDER INPUT SIGNAL	
3	2056 (W/R/Y/)	PTO SWITCH ON FENDER ON	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4425B 10



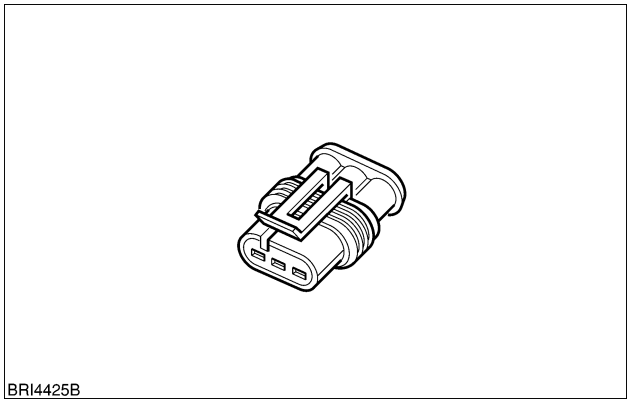
C257-BRI4441A 11

LEFT-HAND REAR FENDER

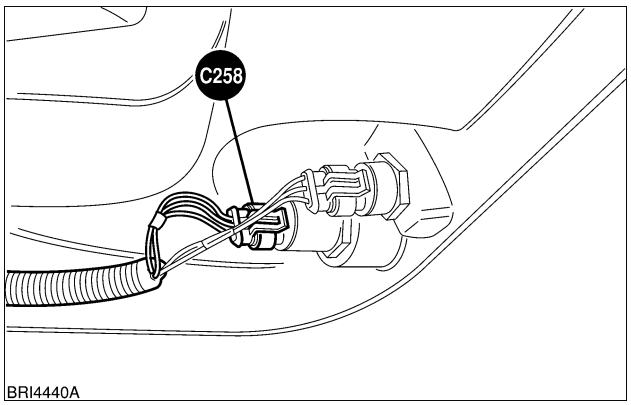
C258 PTO SWITCH RIGHT-HAND SIDE

PLUG CONNECTION C258 PTO SWITCH RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2050 (G/R)	POWER SUPPLY PTO / GEAR DISPLAY	PUMA Standard: **Wiring harness - Electrical schematic frame 26 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 26 (A.30.A)**
2	2059 (W/U)	PTO SWITCH ON FENDER INPUT SIGNAL	
3	2056 (W/R/Y/)	PTO SWITCH ON FENDER ON	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4425B 12



C258-BRI4440A 13

REAR FENDER RIGHT-HAND SIDE

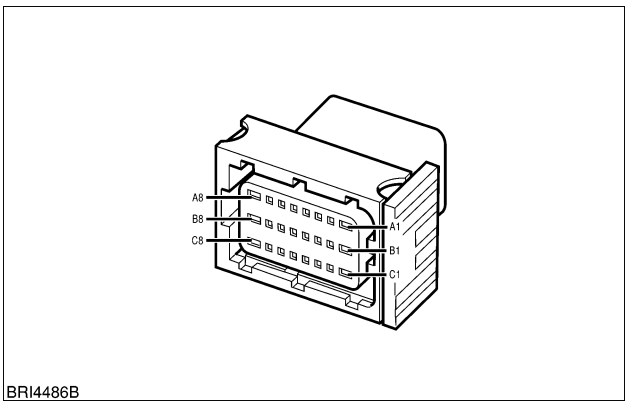
Wiring harness - Component diagram 26 Plug connections 260-269

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

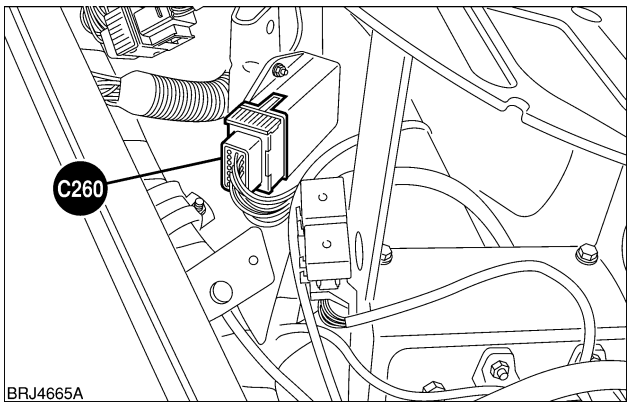
C260 FLASHER

PLUG CONNECTION C260 FLASHER			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A1	3009A (G)	FLASHER VOLTAGE B+	PUMA Standard: **Wiring harness - Electrical schematic frame 28 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 28 (A.30.A)**
A2	249 (LTG)	SMV LIGHTS RIGHT	
A3	349 (TN)	TRAILER INDICATORS RIGHT	
A4	250 (LTG)	SMV LIGHTS LEFT	
A5	350 (TN)	TRAILER INDICATORS LEFT	
A6	1020G	POWER SUPPLY HAZARD LIGHT SWITCH	
A7	1034 (LTG)	TURN SIGNAL TELLTALE (TERMINAL C3)	
A8	3000B (G)	POWER SUPPLY FLASHER (TERMINAL 49)	
B1	3009B (G)	FLASHER VOLTAGE B+	
B2	3002 (G)	CIRCUIT INDICATOR RIGHT-HAND SIDE	
B3	3001 (G)	CIRCUIT INDICATOR LEFT-HAND SIDE	
B4	1020A (G)	POWER SUPPLY HAZARD LIGHT SWITCH	
B5	1033 (LTG)	TURN SIGNAL TELLTALE (TERMINAL C2)	
B6	50 (G)	SIGNAL INDICATOR LEFT-HAND SIDE	
B7	49 (G)	SIGNAL INDICATOR RIGHT-HAND SIDE	
B8	57BG (B)	VEHICLE EARTH (ALL)	
C1	49A (G)	SIGNAL INDICATOR RIGHT-HAND SIDE	
C2	50A (G)	SIGNAL INDICATOR LEFT-HAND SIDE	
C3	1039 (LTG)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4486B 1



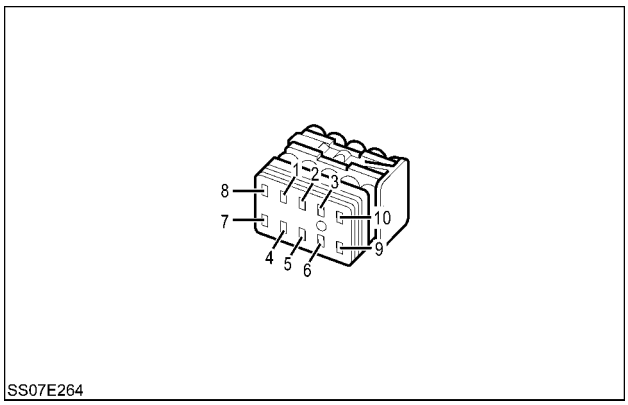
C260-BRJ4665A 2

CAB - RIGHT-HAND SIDE CONSOLE

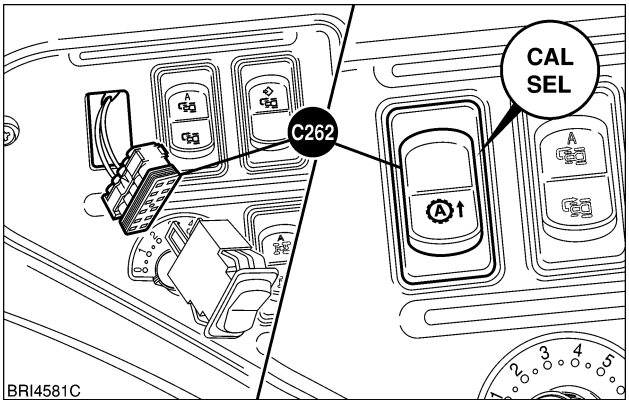
C262 SWITCH FOR THE AUTO SHIFT AND CAL SEL (not used in PUMA Multicontroller)

PLUG CONNECTION C262 SWITCH FOR THE AUTO SHIFT AND CAL SEL			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	57L (B)	VEHICLE EARTH (ALL)	**Wiring harness - Electrical schematic frame 07 (A.30.A)**
3	9027 (W)	CAL/SEL INPUT ANALOGUE-DIGITAL INSTRUMENT CLUSTER	
4	7476 (R)	TRANSMISSION AUTO ON	
5	7000K (U)	POWER SUPPLY TRANSMISSION CONTROLS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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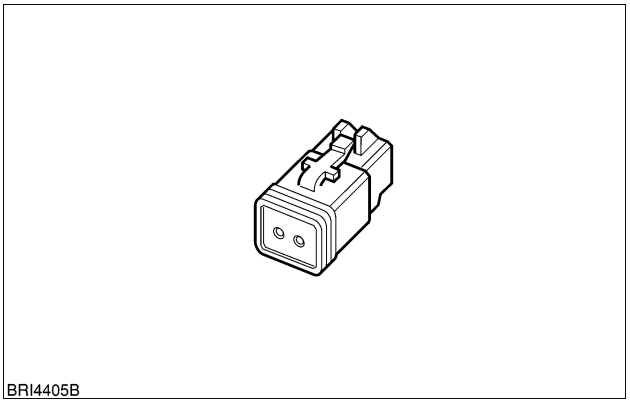
C262-BRI4581C 4

RIGHT-HAND SIDE CONSOLE - KEY PAD

C265 WARNING BUZZER

PLUG CONNECTION C265 BUZZER			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1055 (U)	50 KM/H SOLENOID VALVE+	PUMA Standard: **Wiring harness - Electrical schematic frame 25 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 25 (A.30.A)**
2	1056 (O)	50 KM/H SOLENOID VALVE-	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



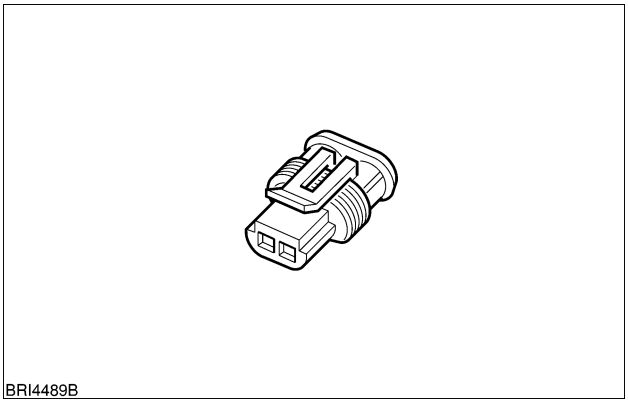
BRI4405B 5

BEHIND THE INSTRUMENT CLUSTER

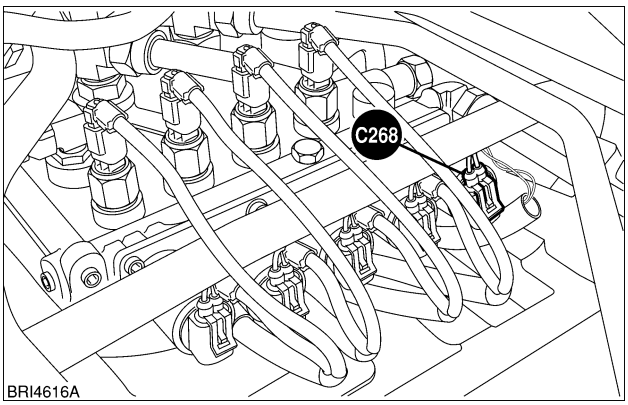
C268 FULL POWERSHIFT TRANSMISSION MV 19TH GEAR

PLUG CONNECTION C268 FULL POWERSHIFT TRANSMISSION MV 19TH GEAR			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
C1	9033 (TN)	50 KM/H SOLENOID VALVE+	PUMA Standard: **Wiring harness - Electrical schematic frame 07 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 07 (A.30.A)**
C2	9034 (TN)	50 KM/H SOLENOID VALVE-	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C268-BRI4616A 7

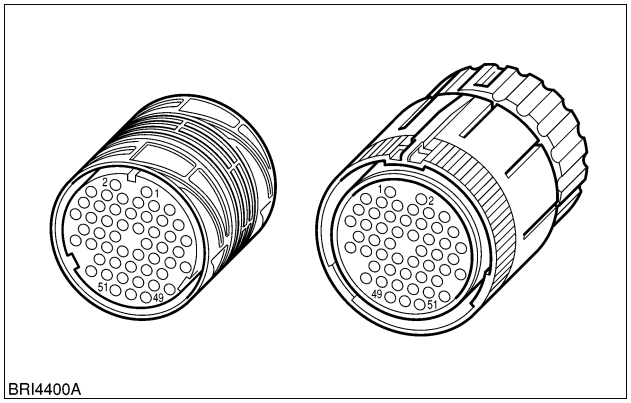
SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

C269 PLUG CONNECTION MAIN WIRING HARNESS CAB TO ENGINE E2

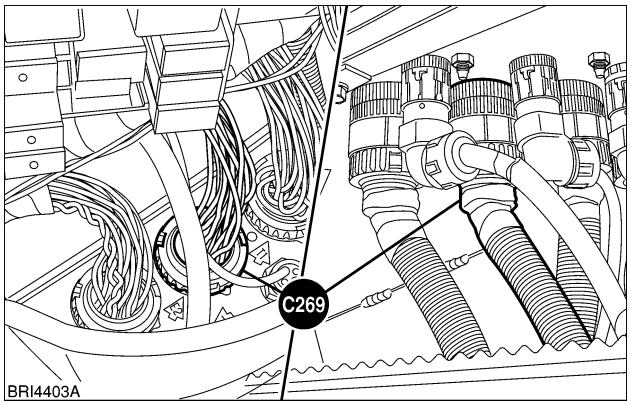
PLUG CONNECTION C269 PLUG CONNECTION MAIN WIRING HARNESS CAB TO ENGINE E2			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3272 (O)	FRONT LOADER CONTROL VALVE 1 OUTPUT	
2	3273 (O)	FRONT LOADER CONTROL VALVE 1 RETURN SIGNAL	
3	3235 (O)	SIGNAL ACCELEROMETER	
4	2590 (TN)	REAR CONTROL SWITCH FRONT POWER LIFT RAISE	
5	2591 (TN)	REAR CONTROL SWITCH FRONT POWER LIFT LOWER	
12	2027 (R)	POWER SUPPLY RADAR SENSOR	
13	3120 (K)	SIGNAL STEERING ANGLE SENSOR	
14	2044 (O)	FRONT PTO SOLENOID VALVE RETURN SIGNAL (-)	
19	2570 (R)	FRONT POWER LIFT RAISE SOLENOID VALVE	
20	60AC (B/W)	EARTH SENSOR	
21	2510 (N)	SIGNAL ACTUAL POSITION FRONT POWER LIFT	
22	2530B (N)	V REF FRONT POWER LIFT	
23	2031 (Y)	RADAR SENSOR PRESENT	
24	2028B (G)	SIGNAL RADAR SENSOR	
25	3230 (U)	AXLE HEIGHT SENSOR POSITION	
26	5520A (LTG)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
31	2043 (O)	REAR PTO SOLENOID VALVE	
32	2260 (O)	FRONT PTO - SPEED SIGNAL	
33	57JY (R)	VEHICLE EARTH (ALL)	
34	1010C (G)	IGNITION RELAY (MAGNETIC COIL)	
35	3274 (R)	FRONT LOADER CONTROL VALVE 2 OUTPUT	
36	3275 (R)	FRONT LOADER CONTROL VALVE 2 RETURN SIGNAL	
37	57JZ (B)	VEHICLE EARTH (ALL)	
38	1018 (LTG)	AIR CONDITIONING COMPRESSOR COUPLING	
39	2006B (U)	DE-ICING SWITCH - AIR CONDITIONING	
40	2006A (U)	DE-ICING SWITCH - AIR CONDITIONING	
42	5200AA (N)	POWER SUPPLY EPC CONTROL VALVE	
44	2007 (Y)	AIR CONDITIONING LOW PRESSURE	
46	2250L (K)	FRONT PTO - POWER SUPPLY	
48	9032B (Y)	STARTER SWITCH+ TO SOCKET	
47	3070D (L)	POWER SUPPLY SOCKET ON THE B-PILLAR	
49	172 (W) / 172A (W)	RELAY COIL FOR THE BATTERY ISOLATOR SWITCH (OFF)	
50	171B (W)	RELAY COIL BATTERY ISOLATOR	

PLUG CONNECTION C269 - in PUMA Multicontroller PLUG CONNECTION MAIN WIRING HARNESS CAB TO ENGINE E2			
POSITION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3272 (O)	FRONT LOADER CONTROL VALVE 1 OUTPUT	
2	57RL (B)	VEHICLE EARTH (ALL)	
3	3235 (O)	SIGNAL ACCELEROMETER	
12	2027 (R)	POWER SUPPLY RADAR SENSOR	
13	3120 (K)	SIGNAL STEERING ANGLE SENSOR	
14	2044 (O)	FRONT PTO SOLENOID VALVE RETURN SIGNAL (-)	
16	2587 (N)	EPC FRONT POWER LIFT REAR CONTROL SWITCH +	
17	2588 (L)	EPC FRONT POWER LIFT REAR CONTROL SWITCH RAISE	
18	2589 (R)	EPC FRONT POWER LIFT REAR CONTROL SWITCH LOWER	
19	2570 (R)	FRONT POWER LIFT RAISE SOLENOID VALVE	
20	60AC (B/W)	EARTH SENSOR	
21	2510 (N)	SIGNAL ACTUAL POSITION FRONT POWER LIFT	
22	2530B (N)	V REF FRONT POWER LIFT	
23	2031 (Y)	RADAR SENSOR PRESENT	
24	2028B (G)	SIGNAL RADAR SENSOR	
25	3230 (U)	AXLE HEIGHT SENSOR POSITION	
26	5520A (LTG)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
31	2043 (O)	REAR PTO SOLENOID VALVE	
32	2260 (O)	FRONT PTO - SPEED SIGNAL	
33	57JY (B)	VEHICLE EARTH (ALL)	
34	1010C (G)	IGNITION RELAY (MAGNETIC COIL)	
35	3274 (R)	FRONT LOADER CONTROL VALVE 2 OUTPUT	
36	57RM (B)	VEHICLE EARTH (ALL)	
37	57JZ (B)	VEHICLE EARTH (ALL)	
38	1018 (LTG)	AIR CONDITIONING COMPRESSOR COUPLING	
39	2006B (U)	DE-ICING SWITCH - AIR CONDITIONING	
40	2006A (U)	DE-ICING SWITCH - AIR CONDITIONING	
42	5200AA (N)	POWER SUPPLY EPC CONTROL VALVE	
44	2007 (Y)	AIR CONDITIONING LOW PRESSURE	
46	2250L (K)	FRONT PTO - POWER SUPPLY	
48	9032B (Y)	STARTER SWITCH+ TO SOCKET	
47	3070D (L)	POWER SUPPLY SOCKET ON THE B-PILLAR	
49	172 (W) / 172A (W)	RELAY COIL FOR THE BATTERY ISOLATOR SWITCH (OFF)	
50	171B (W)	RELAY COIL BATTERY ISOLATOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4400B-04 8



C269-BRI4403A 9

CAB FLOOR - RIGHT-HAND SIDE

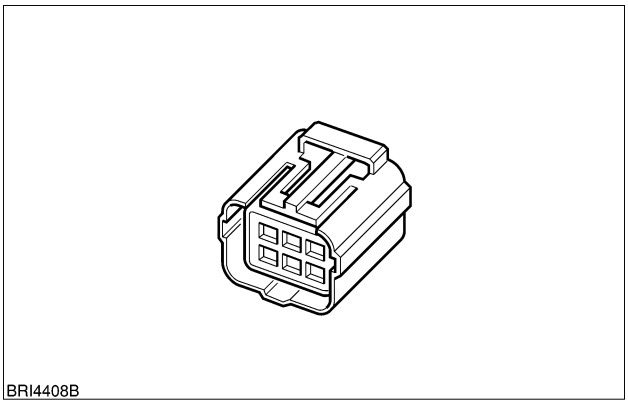
Wiring harness - Component diagram 27 Plug connections 270-279

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

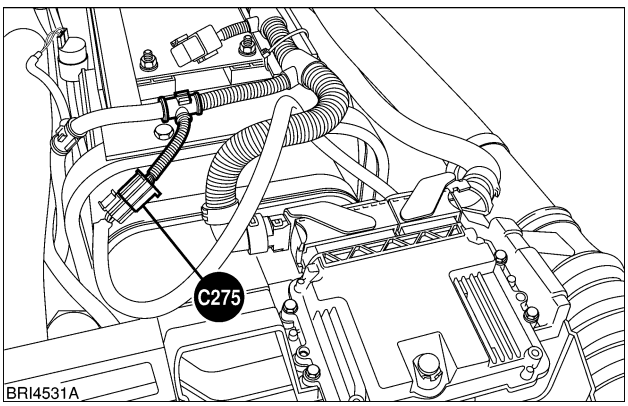
C275 VISTRONIC FAN TO THE WIRING HARNESS

PLUG CONNECTION C275 VISTRONIC FAN TO THE WIRING HARNESS			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6300 (N)	FAN SPEED	PUMA Standard: **Wiring harness - Electrical schematic frame 04 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 04 (A.30.A)**
2	57U (B)	VEHICLE EARTH (ALL)	
3	57V (B)	VEHICLE EARTH (ALL)	
4	6330 (N) / 6310 (N)	FAN SOLENOID VALVE	
5	6320 (N)	VENTILATOR 5V REF	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4408B-03 1



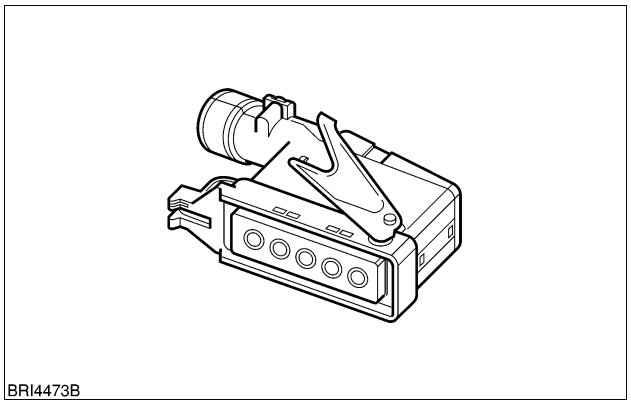
C275-BRI4531A 2

TOP ENGINE

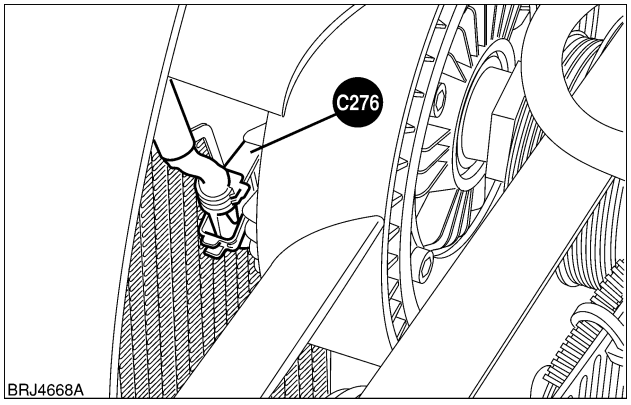
C276 VISTRONIC FAN

PLUG CONNECTION C276 VISTRONIC FAN			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6300 (N/U/S/) /6300 (N)	FAN SPEED	PUMA Standard: **Wiring harness - Electrical schematic frame 04 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 04 (A.30.A)**
2	57U (B) / 6305 (O)	VEHICLE EARTH (ALL) /	
3	57V (B) / 6408G (G)	EARTH (ALL) / PROTECTED BY FUSE B+ TO CONTROL UNIT (1)	
4	6330 (N/W/S) /6310 (N)	/ FAN SOLENOID VALVE	
5	6320 (N/Y/S) / 6320 (N)	VENTILATOR 5V REF	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4473B 3



C276-BRJ4668A 4

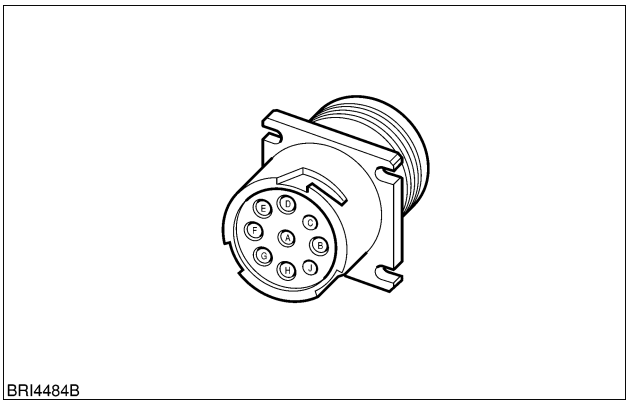
FRONT OF ENGINE

C278 DIAGNOSTICS PLUG FOR THE ENGINE CONTROLLER

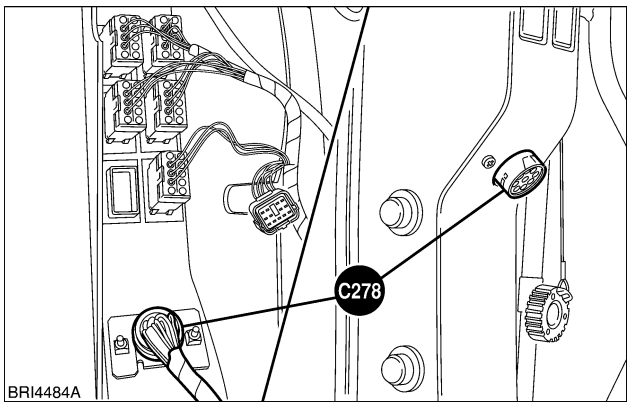
PLUG CONNECTION C278 DIAGNOSTICS PLUG FOR THE ENGINE CONTROLLER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A	57AL (B)	VEHICLE EARTH (ALL)	**Wiring harness - Electrical schematic frame 33 (A.30.A)**
B	6408 (G)	FUSE-PROTECTED VOLTAGE B+ TO CONTROL UNIT (1)	
C	5400L (Y)	CAN H	
D	5420L (G)	CAN L	
E	6418 (K)	CONTROL UNIT TO J1941(ISO) INTERFACE 2 PLUG CONNECTION ISO K	
G	2200Z (G)	SERVICE MODE INITIATION	
H	5910B (G)	ISO BUS CAN SIGNAL HIGH	
J	5900B (Y)	ISO BUS CAN SIGNAL LOW	

PLUG CONNECTION C278 - in PUMA Multicontroller DIAGNOSTICS PLUG FOR THE ENGINE CONTROLLER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A	57AL (B)	VEHICLE EARTH (ALL)	**Wiring harness - Electrical schematic frame 33 (A.30.A)**
B	6408E (G)	FUSE-PROTECTED VOLTAGE B+ TO CONTROL UNIT (1)	
C	5400E (Y)	CAN H	
D	5420E (G)	CAN L	
F	5960C (W)	RS 232 OUTPUT TRACTOR CONTROLLER	
G	2200Z (G)	SERVICE MODE INITIATION	
H	5910B (G)	ISO BUS CAN SIGNAL HIGH	
J	5900B (Y)	ISO BUS CAN SIGNAL LOW	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4484B 5



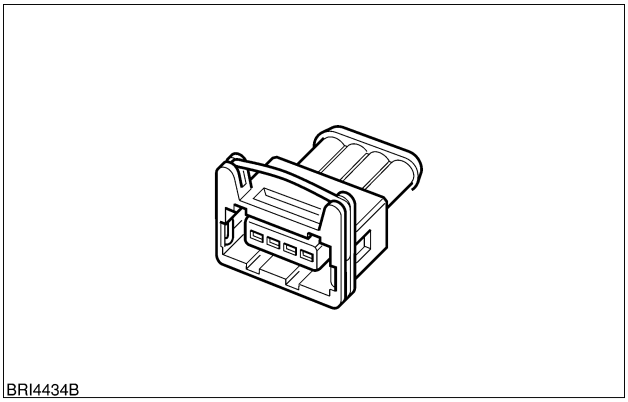
C278-BRI4484A 6

C-PILLAR RIGHT-HAND SIDE

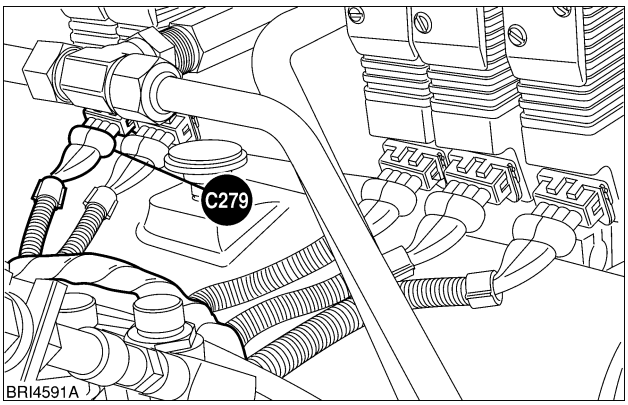
C279 ELECTROHYDR. REMOTE VALVE PLUG CONNECTION 1

PLUG CONNECTION C279 ELECTROHYDR. REMOTE VALVE PLUG CONNECTION 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5515A (S)	ELECTROHYDR. REMOTE VALVE +12V SWITCHED	PUMA Standard: **Wiring harness - Electrical schematic frame 14 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 14 (A.30.A)**
2	5510K (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5500K (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
4	57FD (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4434B 7



C279-BRI4591A 8

TRACTOR REAR

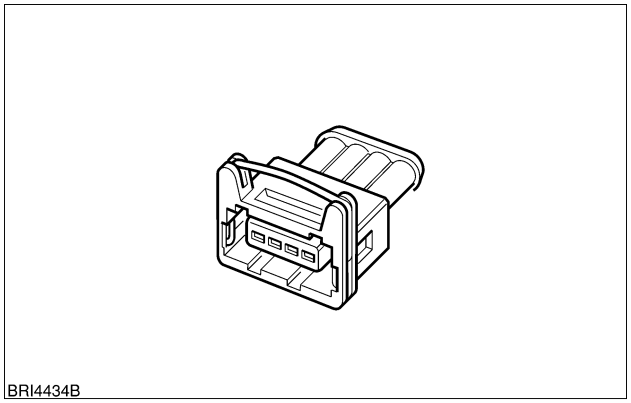
Wiring harness - Component diagram 28 Plug connections 280-289

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

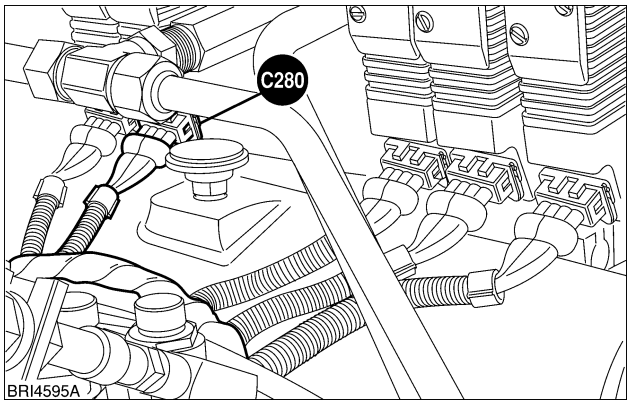
C280 ELECTROHYDR. REMOTE VALVE PLUG CONNECTION 2

PLUG CONNECTION C280 ELECTROHYDR. REMOTE VALVE PLUG CONNECTION 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5515B (S)	ELECTROHYDR. REMOTE VALVE +12V STARTER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 14 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 14 (A.30.A)**
2	5510H (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5500H (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
4	57FE (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4434B 1



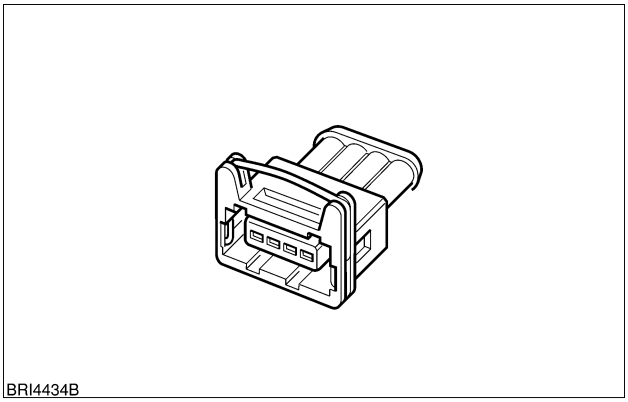
C280-BRI4595A 2

TRACTOR REAR

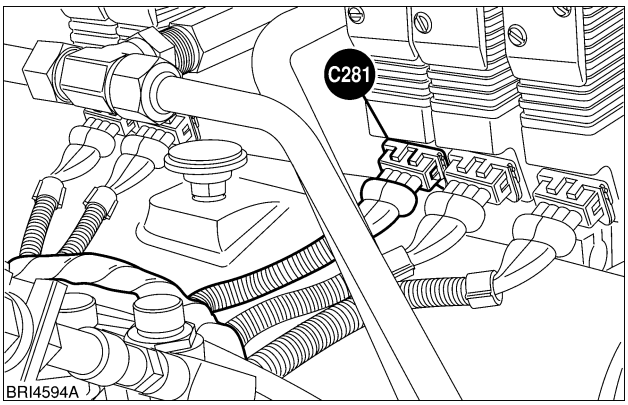
C281 ELECTROHYDR. REMOTE VALVE PLUG CONNECTION 3

PLUG CONNECTION C281 ELECTROHYDR. REMOTE VALVE PLUG CONNECTION 3			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5515C (S)	ELECTROHYDR. REMOTE VALVE +12V STARTER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 14 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 14 (A.30.A)**
2	5510F (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5500F (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
4	57FF (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4434B 3



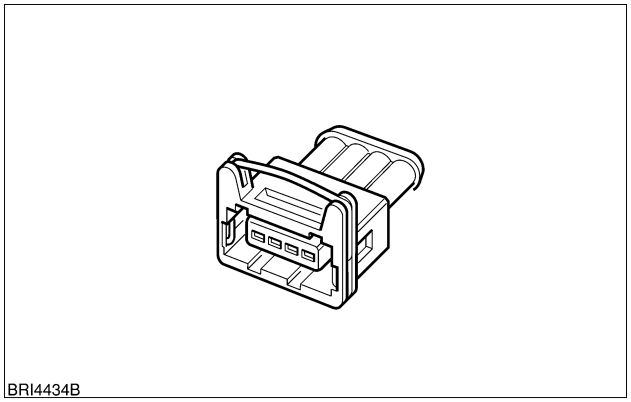
C281-BRI4594A 4

TRACTOR REAR

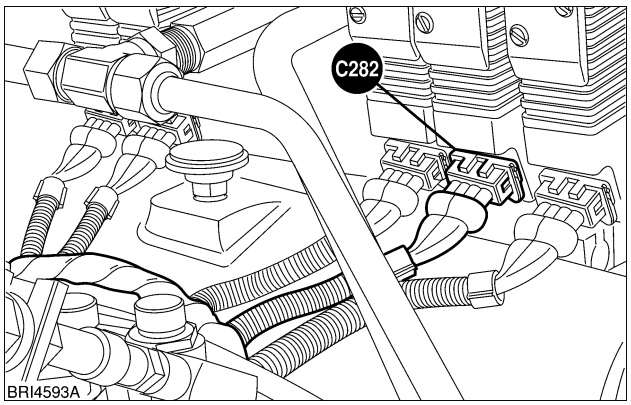
C282 ELECTROHYDR. REMOTE VALVE PLUG CONNECTION 4

PLUG CONNECTION C282 ELECTROHYDR. REMOTE VALVE PLUG CONNECTION 4			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5515D (S)	ELECTROHYDR. REMOTE VALVE +12V STARTER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 14 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 14 (A.30.A)**
2	5510D (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5500D (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
4	57FG (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4434B 5



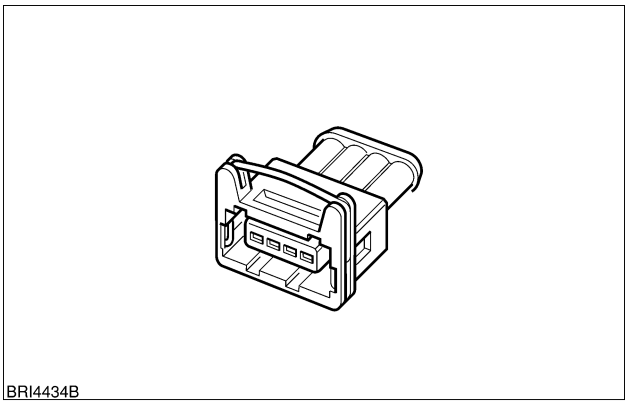
C282-BRI4593A 6

TRACTOR REAR

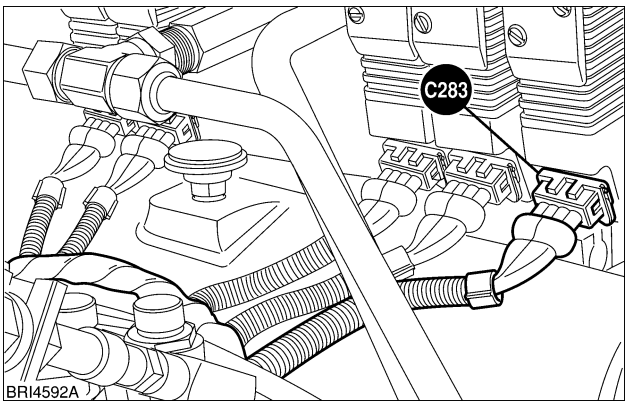
C283 ELEKTROHYDR. REMOTE VALVE PLUG CONNECTION 5 (not used in PUMA Multicontroller)

PLUG CONNECTION C283 ELECTROHYDR. REMOTE VALVE PLUG CONNECTION 5			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5515E (S)	ELECTROHYDR. REMOTE VALVE +12V STARTER SWITCH	**Wiring harness - Electrical schematic frame 14 (A.30.A)**
2	5510B (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5500B (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
4	57FK (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4434B 7



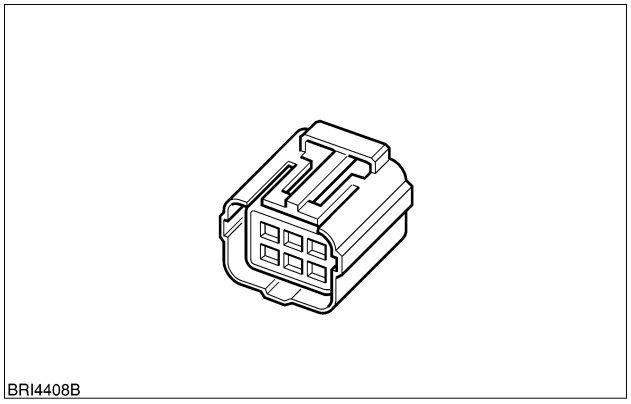
C283-BRI4592A 8

TRACTOR REAR

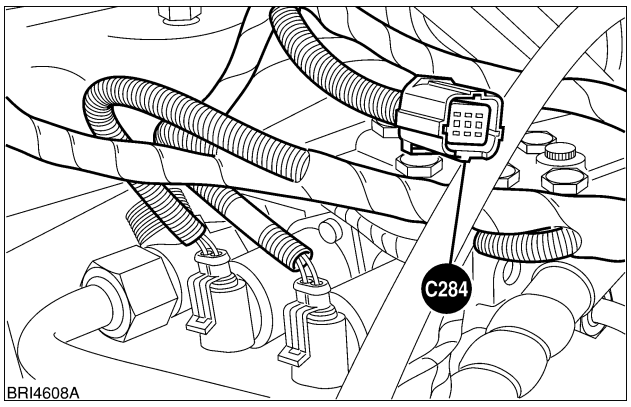
C284 HYDR. TOP LINK/LIFT LINK (EXTERNAL CONNECTION)

PLUG CONNECTION C284 HYDR. TOP LINK/LIFT LINK (EXTERNAL CONNECTION)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57EY (B)	VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 19 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 13 (A.30.A)**
2	4055 (W)	HYDR. EXTEND TOP LINK SOLENOID VALVE	
3	4056 (W)	HYDR. SHORTEN TOP LINK SOLENOID VALVE	
4	4057 (W)	HYDR. RIGHT LIFT LINK RAISE SOLENOID VALVE	
5	4058 (W)	HYDR. RIGHT LIFT LINK LOWER SOLENOID VALVE	
6	4054 (W)	HYDR. TOP LINK/LIFT LINK RELIEF SOLENOID VALVE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4408B-04 9



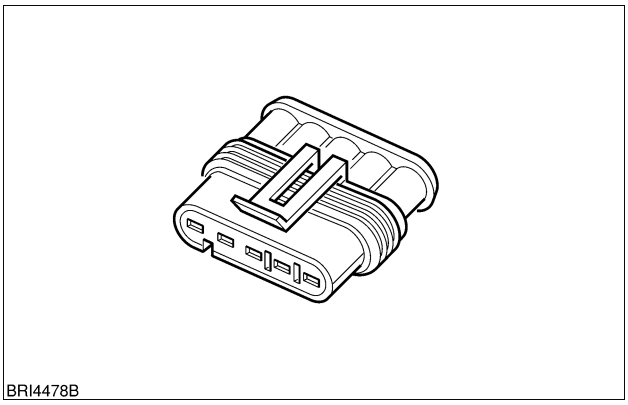
C284-BRI4608A 10

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

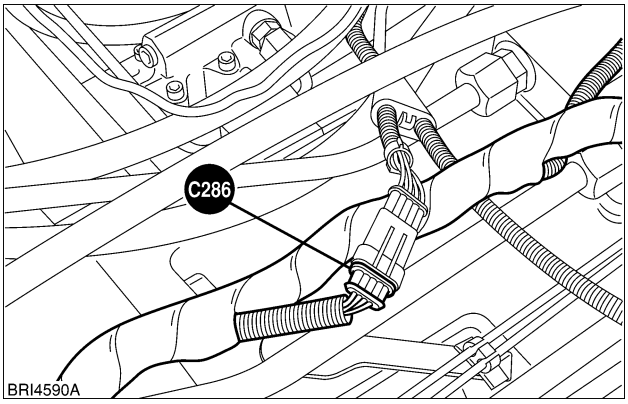
C286 CRAWLER DRIVE

PLUG CONNECTION C286 CRAWLER DRIVE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7005 (U) / 7005 (U/L/B)	MV CRAWLER GEAR TRANSMISSION	PUMA Standard: **Wiring harness - Electrical schematic frame 07 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 07 (A.30.A)**
2	7580 (U) / 7580 (U/K/B)	OVERRIDE SOLENOID VALVE CRAWLER GROUP	
3	5020J (TN) / 5020A (TN)	EPC CONTOLLER +5V REFERENCE VOLTAGE LOWERING SPEED	
4	7581 (O) / 7581 (O/L/B)	CRAWLER DRIVE POSITION ACTUAL VALUE SIGNAL	
5	60BB (B/W) / 7570G (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4478B-1 11



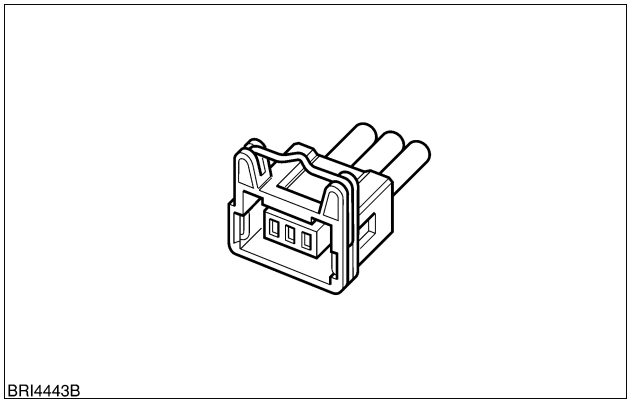
C286-BRI4590A 12

TOP OF THE TRANSMISSION

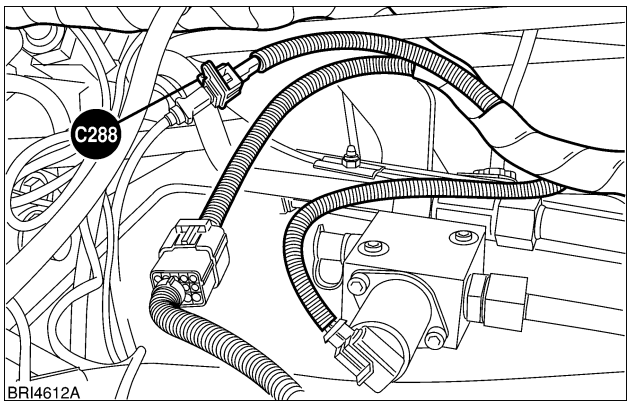
C288 PTO SPEED SENSOR

PLUG CONNECTION C288 PTO SPEED SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2050AN (G)	POWER SUPPLY PTO / SHIFTING CLAW	PUMA Standard: **Wiring harness - Electrical schematic frame 19 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 19 (A.30.A)**
2	2062 (W)	PTO SPEED SENSOR	
3	60N (B/W)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4443B-03 13



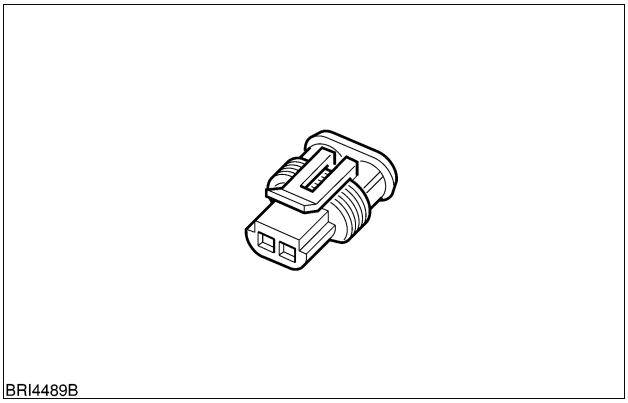
C288-BRI4612A 14

TOP OF THE TRANSMISSION

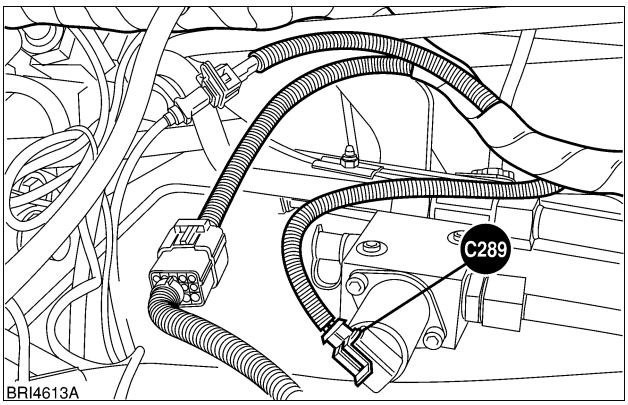
C289 RELIEF SOLENOID VALVE 19TH GEAR

PLUG CONNECTION C289 RELIEF SOLENOID VALVE 19TH GEAR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	9035 (TN)	50 KM/H RELIEF SOLENOID VALVE	PUMA Standard: **Wiring harness - Electrical schematic frame 08 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 08 (A.30.A)**
2	9036 (TN)	50 KM/H RELIEF SOLENOID VALVE RETURN SIGNAL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 15



C289-BRI4613A 16

TOP OF THE TRANSMISSION

Wiring harness - Component diagram 29 Plug connections 290-299

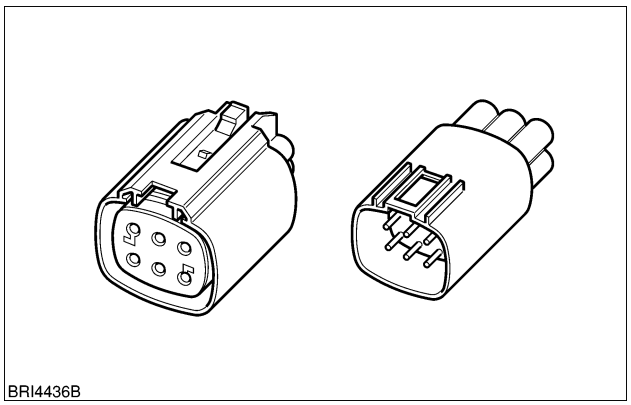
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C293 RIGHT-HAND FENDER 1

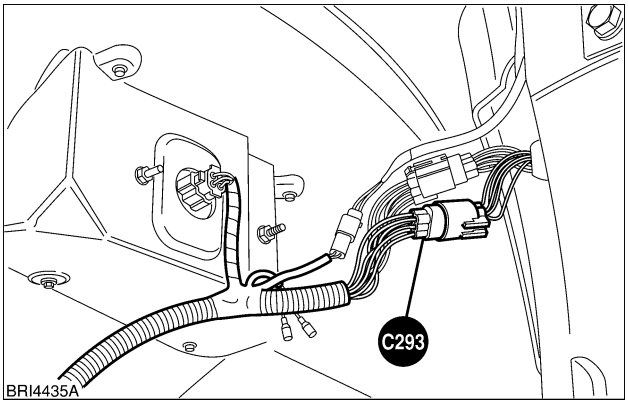
PLUG CONNECTION C293 RIGHT-HAND FENDER 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1013C (R) / 1013 (R)	LIGHTS RIGHT-HAND SIDE	**Wiring harness - Electrical schematic frame 26 (A.30.A)**
2	810C (R) / 810C (G/L)	BRAKE LIGHTS	
3	3004B (G) / 3004 (G/W)	TELLTALE INDICATOR RIGHT-HAND SIDE	
4	57AV (B)	VEHICLE EARTH (ALL)	
5	998B (G) / 998B (G/TN/B)	POWER SUPPLY WORK LAMP - REAR (INNER)	
6	57AP (B)	VEHICLE EARTH (ALL)	

PLUG CONNECTION C293 - in PUMA Multicontroller RIGHT-HAND FENDER 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1013C (R) / 1013 (R)	LIGHTS RIGHT-HAND SIDE	**Wiring harness - Electrical schematic frame 26 (A.30.A)**
2	810C (G) / 810C (G/L)	BRAKE LIGHTS	
3	3004B (G) / 3004 (G/W)	TELLTALE INDICATOR RIGHT-HAND SIDE	
4	57AV (B)	VEHICLE EARTH (ALL)	
5	998B (G) / 998B (G/TN/B)	POWER SUPPLY WORK LAMP - REAR (INNER)	
6	57AP (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4436B 1



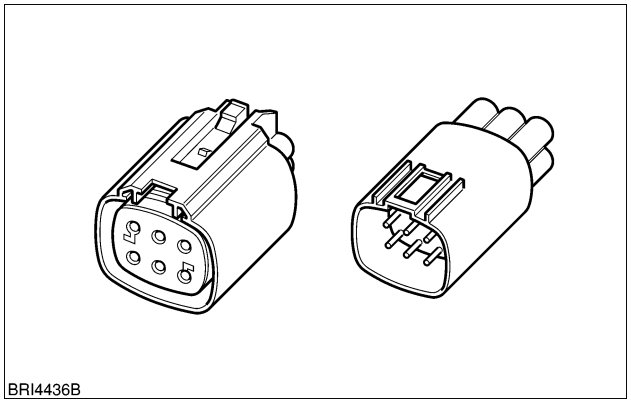
C293-BRI4435A 2

RIGHT-HAND REAR FENDER

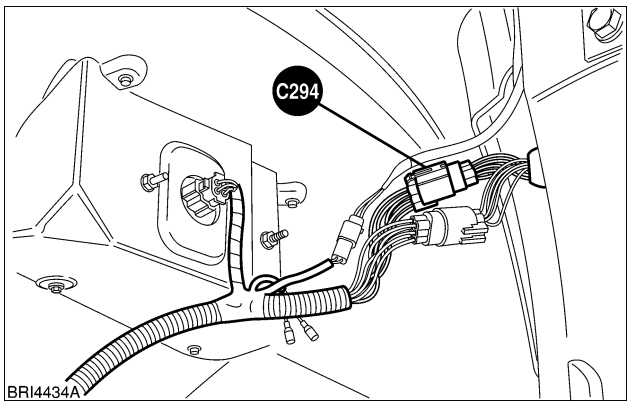
C294 RIGHT-HAND FENDER 2

PLUG CONNECTION C294 RIGHT-HAND FENDER 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5100B (K) / 5100 (K/W)	EPC REMOTE RAISE SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 12 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 12 (A.30.A)**
2	5200B (N) / 5200 (N/R/B)	POWER SUPPLY EPC CONTROL VALVE	
3	5095A (K) / 5095 (K/G)	EPC REMOTE LOWER SWITCH	
4	2057 (W) / 2050 (G/R)	PTO REAR CONTROL SWITCH CONNECTION LEFT - RIGHT / POWER SUPPLY PTO / POWER SUPPLY GEAR DISPLAY	
5	2050E (G) / 2059 (W/U)	POWER SUPPLY PTO / POWER SUPPLY GEAR DISPLAY / PTO SWITCH ON FENDER INPUT SIGNAL	
6	2056A (W) / 2056 (W/R/Y/)	PTO SWITCH ON FENDER ON	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4436B 3



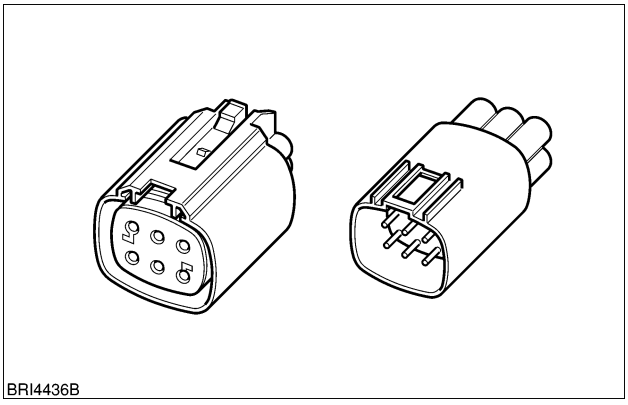
C294-BRI4434A 4

RIGHT-HAND REAR FENDER

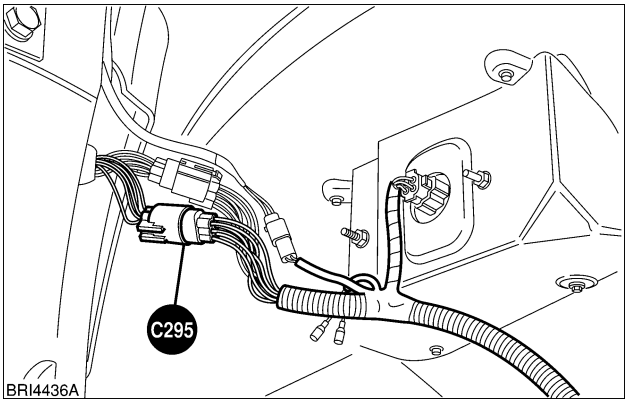
C295 LEFT-HAND FENDER 1

PLUG CONNECTION C295 LEFT-HAND FENDER 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1014C (R) / 1013 (R)	LIGHTS LEFT-HAND SIDE / LIGHTS RIGHT-HAND SIDE	PUMA Standard: **Wiring harness - Electrical schematic frame 26 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 26 (A.30.A)**
2	810B (G) / 810 (G/L)	BRAKE LIGHTS	
3	3005B (G) / 3004 (G/W)	TELLTALE INDICATOR LEFT-HAND SIDE / TELLTALE INDICATOR RIGHT-HAND SIDE	
4	57AW (B) / 57AV (B)	VEHICLE EARTH (ALL)	
5	998A (G) / 998 (G/TN/B))	POWER SUPPLY WORK LAMP - REAR (INNER)	
6	57AN (B) / 57AP (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4436B 5



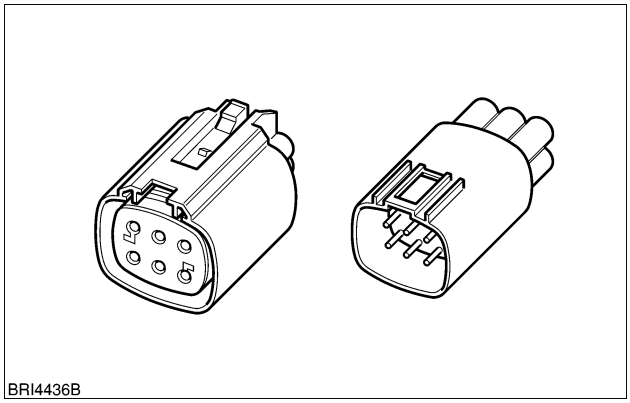
C295-BRI4436A 6

LEFT-HAND REAR FENDER

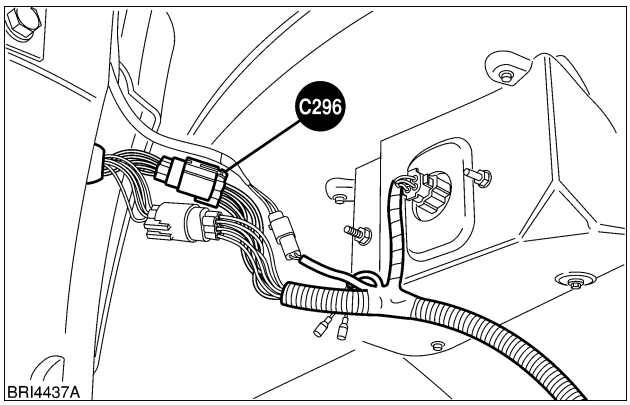
C296 LEFT-HAND FENDER 2

PLUG CONNECTION C296 LEFT-HAND FENDER 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5100A (K) / 5100 (K/w)	EPC REMOTE RAISE SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 12 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 12 (A.30.A)**
2	5200C (N) / 5200 (N/R/B)	POWER SUPPLY EPC CONTROL VALVE	
3	5095B (K) / 5095 (K/G)	EPC REMOTE LOWER SWITCH	
4	2059 (W) / 2050 (G/R)	PTO SWITCH ON FENDER INPUT SIGNAL / POWER SUPPLY PTO - MV RETURN SIGNAL (-) GEAR DISPLAY	
5	2059 (W/U) / 2057 (W)	PTO SWITCH ON FENDER INPUT SIGNAL / PTO SWITCH ON FENDER CONNECTION LEFT - RIGHT	
6	2056B (W) / 2056 (W/R/Y)	PTO SWITCH ON FENDER ON	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C296-BRI4437A 8

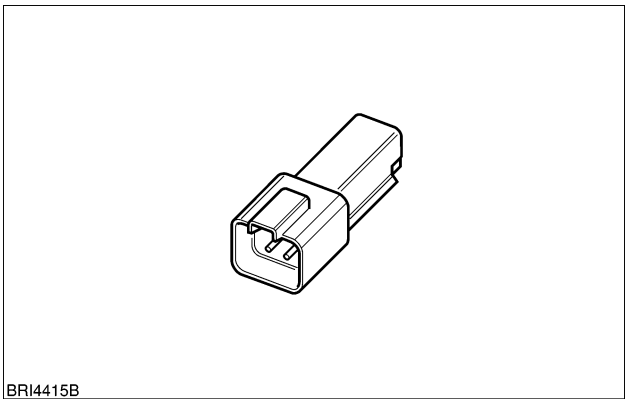
LEFT-HAND REAR FENDER

C297 MARKER LIGHT RIGHT-HAND SIDE

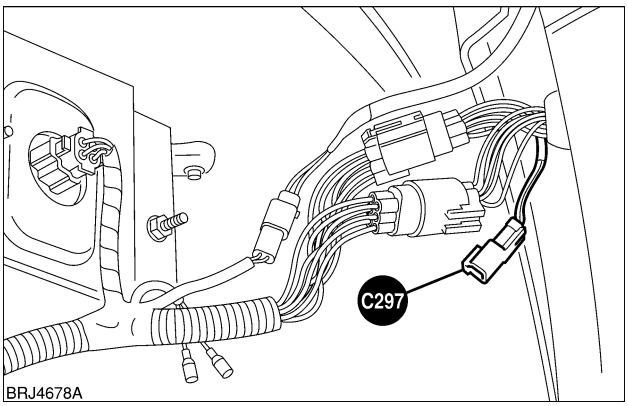
PLUG CONNECTION C297 MARKER LIGHT RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	49A (G)	SIGNAL INDICATOR RIGHT-HAND SIDE	**Wiring harness - Electrical schematic frame 28 (A.30.A)**
2	57CX (B)	VEHICLE EARTH (ALL)	

PLUG CONNECTION C297 - in PUMA Multicontroller MARKER LIGHT RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	49A (G)	SIGNAL INDICATOR RIGHT-HAND SIDE	**Wiring harness - Electrical schematic frame 28 (A.30.A)**
2	57MR (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C297-BRJ4678A 10

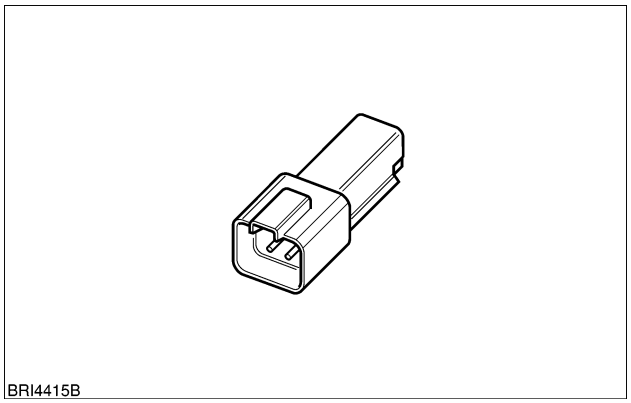
RIGHT-HAND REAR FENDER

C298 MARKER LIGHT LEFT-HAND SIDE

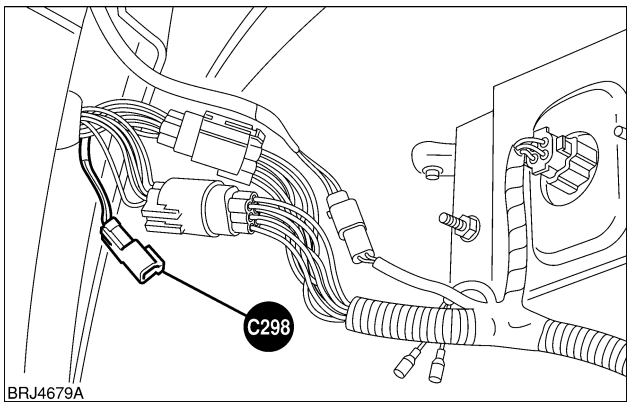
PLUG CONNECTION C298 MARKER LIGHT LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	50A (G)	SIGNAL INDICATOR LEFT-HAND SIDE	**Wiring harness - Electrical schematic frame 28 (A.30.A)**
2	57CY (B)	VEHICLE EARTH (ALL)	

PLUG CONNECTION C298 - in PUMA Multicontroller MARKER LIGHT LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	50A (G)	SIGNAL INDICATOR LEFT-HAND SIDE	**Wiring harness - Electrical schematic frame 28 (A.30.A)**
2	57MS (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4415B 11



C298-BRJ4679A 12

LEFT-HAND REAR FENDER

Wiring harness - Component diagram 30 Plug connections 300-309

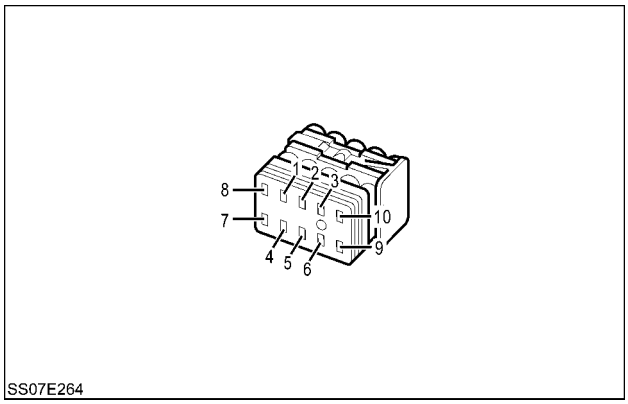
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C301 INCREASE/REDUCE ENGINE SPEED SWITCH

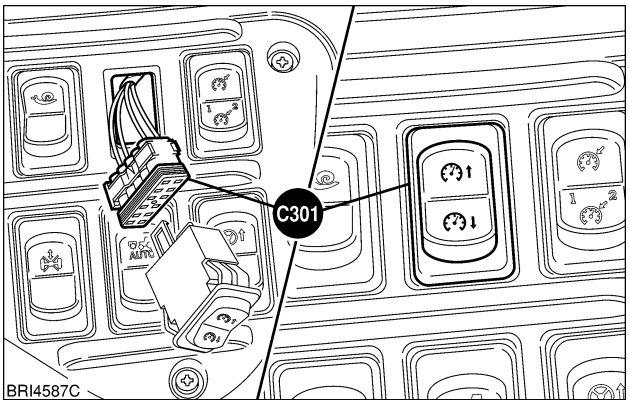
PLUG CONNECTION C301 INCREASE/DECREASE ENGINE SPEED SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6540 (N)	REDUCE CONSTANT SPEED	**Wiring harness - Electrical schematic frame 02 (A.30.A)**
2	7000D (U)	POWER SUPPLY TRANSMISSION CONTROLS	
3	6530 (N)	INCREASE CONSTANT SPEED	

PLUG CONNECTION C301 - in PUMA Multicontroller INCREASE/DECREASE ENGINE SPEED SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6540 (N)	REDUCE CONSTANT SPEED	**Wiring harness - Electrical schematic frame 04 (A.30.A)**
2	7000AD (U)	POWER SUPPLY TRANSMISSION CONTROLS	
3	6530 (N)	INCREASE CONSTANT SPEED	
7	57RY (B)	VEHICLE EARTH (ALL)	
8	1012AB (R)	LIGHTING	
9	57RZ (B)	VEHICLE EARTH (ALL)	
10	1012AC (R)	LIGHTING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C301-BRI4587C 2

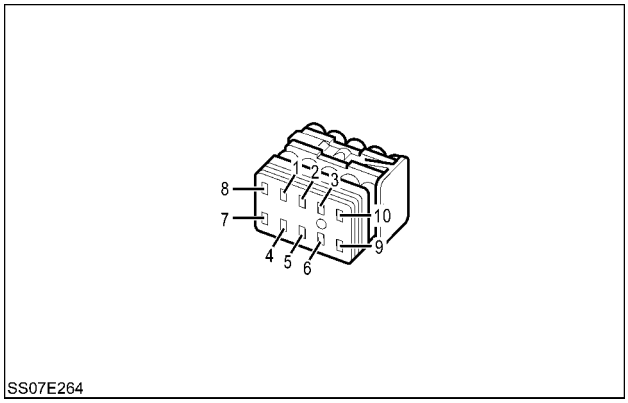
KEY PAD RIGHT-HAND SIDE CONSOLE

C302 SWITCH FOR HEADLAND MANAGEMENT

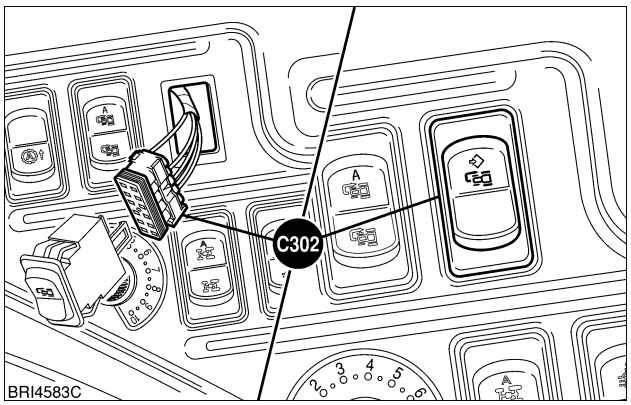
PLUG CONNECTION C302 SWITCH FOR HEADLAND MANAGEMENT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5610 (R)	PROGRAMMING SWITCH FOR HEADLAND MANAGEMENT	**Wiring harness - Electrical schematic frame 10 (A.30.A)**
2	7000H (U)	POWER SUPPLY TRANSMISSION CONTROLS	**Wiring harness - Electrical schematic frame 11 (A.30.A)**

PLUG CONNECTION C302 - in PUMA Multicontroller SWITCH FOR HEADLAND MANAGEMENT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	7000BB (U)	POWER SUPPLY TRANSMISSION CONTROLS	**Wiring harness - Electrical schematic frame 11 (A.30.A)**
7	57RW (B)	VEHICLE EARTH (ALL)	
8	1012X (R)	LIGHTING	
9	57RX (B)	VEHICLE EARTH (ALL)	
10	1012Y(R)	LIGHTING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C302-BRI4583C 4

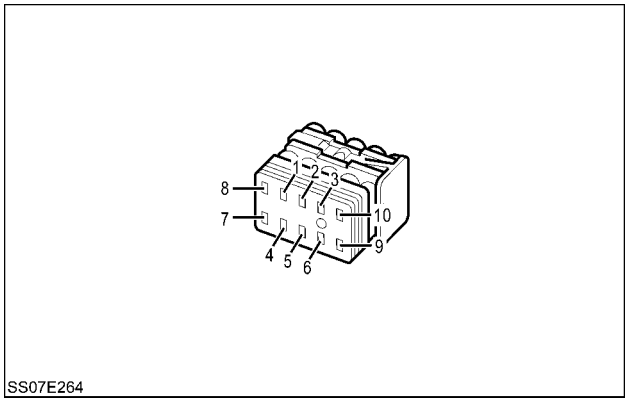
KEY PAD RIGHT-HAND SIDE CONSOLE

C309 CONSTANT SPEED CRUISE-AUTO-SWITCH

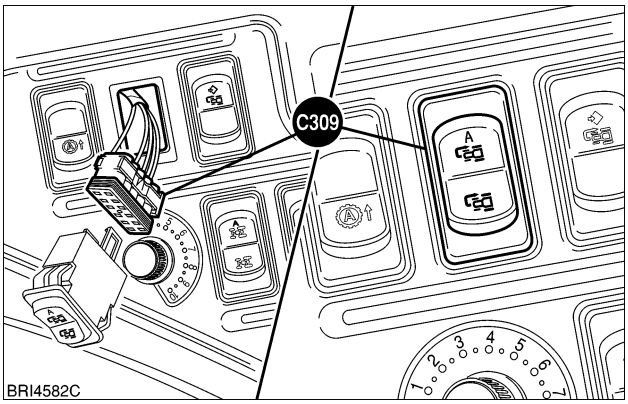
PLUG CONNECTION C309 CONSTANT SPEED CRUISE-AUTO-SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5640 (R)	AUTO SWITCH FOR HEADLAND MANAGEMENT	**Wiring harness - Electrical schematic frame 02 (A.30.A)**
2	7000AJ (U)	POWER SUPPLY TRANSMISSION CONTROLS	
3	5630 (R)	MANUAL MODE SWITCH FOR HEADLAND MANAGEMENT	

PLUG CONNECTION C309 - in PUMA Multicontroller CONSTANT SPEED CRUISE-AUTO-SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5630 (R)	MANUAL MODE SWITCH FOR HEADLAND MANAGEMENT	**Wiring harness - Electrical schematic frame 02 (A.30.A)**
2	7000AJ (U)	POWER SUPPLY TRANSMISSION CONTROLS	
3	5640 (R)	AUTO SWITCH FOR HEADLAND MANAGEMENT	
7	57RT (B)	VEHICLE EARTH (ALL)	
8	1012AA (R)	LIGHTING	
9	57RV (B)	VEHICLE EARTH (ALL)	
10	1012Z (R)	LIGHTING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C309-BRI4582C 6

KEY PAD RIGHT-HAND SIDE CONSOLE

Wiring harness - Component diagram 31 Plug connections 310-319

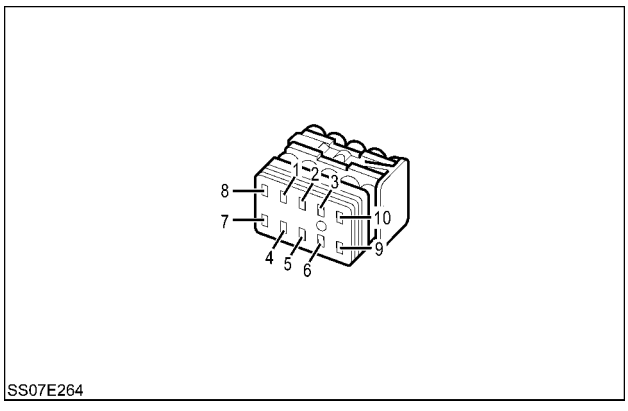
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C313 EMERGENCY SHUTDOWN FOR HYDRAULICS (ELECTROHYDR. REMOTE VALVE OFF SWITCH)

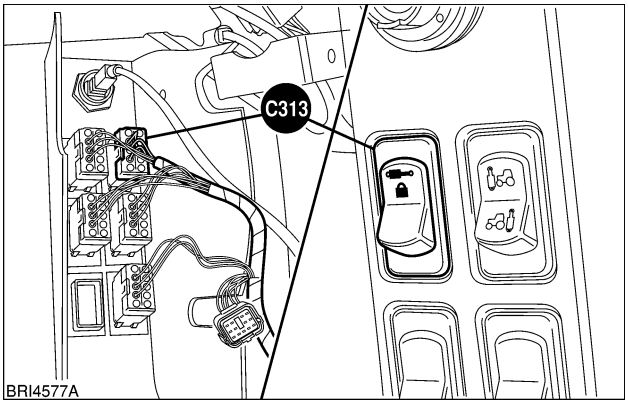
PLUG CONNECTION C313 SHUTDOWN FOR HYDRAULICS (MAIN SWITCH FOR ELECTROHYDR. REMOTE VALVE)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5597 (S)	ELECTROHYDR. REMOTE VALVE MAIN SWITCH RELEASE	**Wiring harness - Electrical schematic frame 16 (A.30.A)**
2	7000M (U)	POWER SUPPLY TRANSMISSION CONTROLS	
5	5200J (N)	POWER SUPPLY EPC CONTROL VALVE	
6	5595 (S)	ELECTROHYDR. REMOTE VALVE MAIN SWITCH	
9	5835 (S)	CONNECTION HYDRAULICS MAIN SWITCH HIGH-FLOW HYDROPUMP	

PLUG CONNECTION C313 - in PUMA Multicontroller SHUTDOWN FOR HYDRAULICS (MAIN SWITCH FOR ELECTROHYDR. REMOTE VALVE)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5210A (O)	EPC - CONTROL VALVE ENGAGEMENT	**Wiring harness - Electrical schematic frame 16 (A.30.A)**
2	7000M (U)	POWER SUPPLY TRANSMISSION CONTROLS	
3	5597A (S)	ELECTROHYDR. REMOTE VALVE MAIN SWITCH RELEASE	
5	5835 (S)	CONNECTION HYDRAULICS MAIN SWITCH HIGH-FLOW HYDROPUMP	
7	57PV (B)	VEHICLE EARTH (ALL)	
8	1012L (R)	LIGHTING	
9	57RP (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E264 1



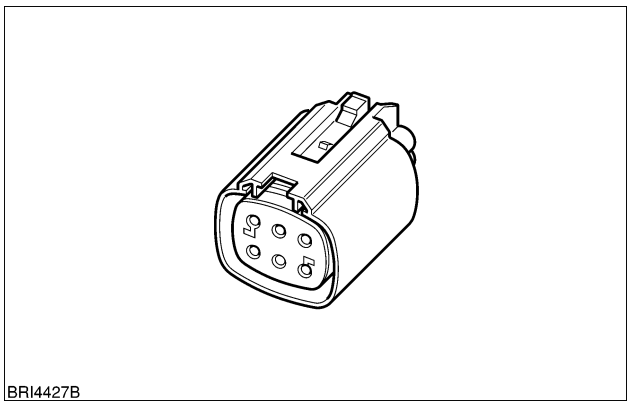
C313-BRI4577A 2

C-PILLAR RIGHT-HAND SIDE

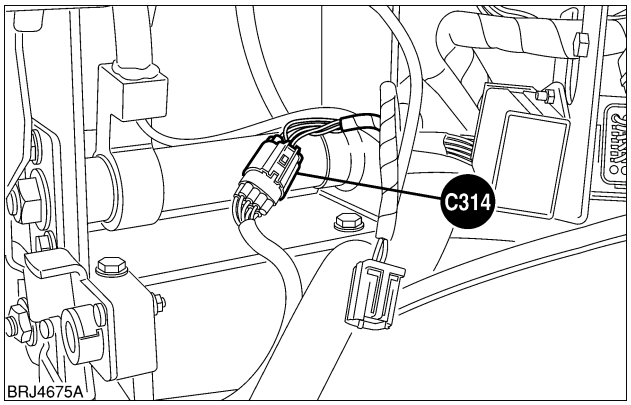
C314 HAND THROTTLE (not used in PUMA Multicontroller)

PLUG CONNECTION C314 HAND THROTTLE LEVER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5200F (N)	POWER SUPPLY EPC CONTROL VALVE	**Wiring harness - Electrical schematic frame 03 (A.30.A)**
2	6440A (S)	HAND THROTTLE LEVER SETTING 1	
4	6460A (S)	HAND THROTTLE LEVER SWITCH (NO IDLE)	
5	5020D (TN)	EPC CONTOLLER +5V REFERENCE VOLTAGE LOWERING SPEED	
6	60J (B/W)	EARTH SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4427B 3



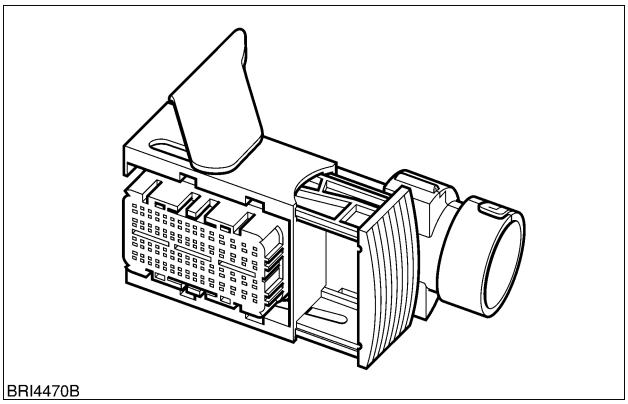
C314-BRJ4675A 4

CAB - RIGHT-HAND SIDE CONSOLE

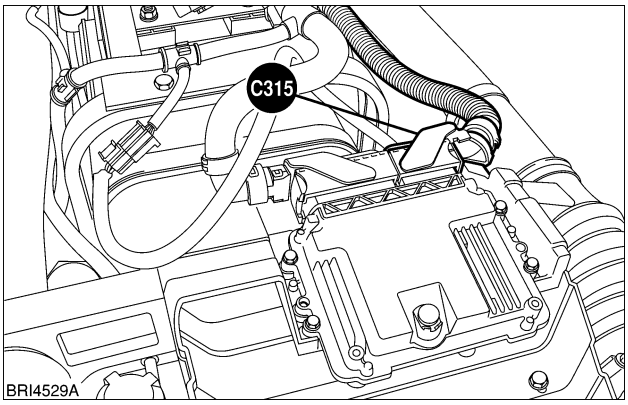
C315 ECU-A

PLUG CONNECTION C315 ECU-A			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1			

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4470B 5



C315-BRI4529A 6

TOP ENGINE

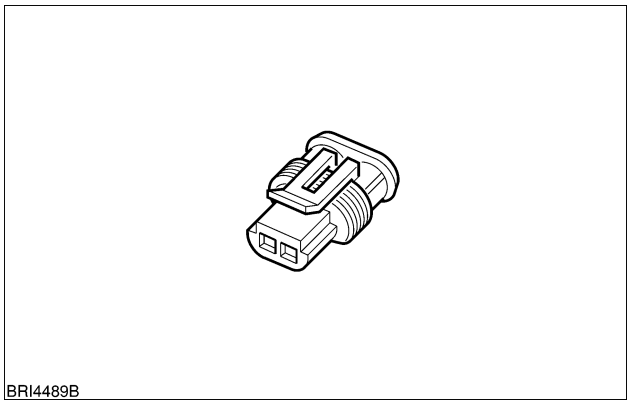
Wiring harness - Component diagram 32 Plug connections 320-329

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C321 HEADLIGHT INSTALLED BY DEALER

PLUG CONNECTION C321 HEADLIGHT INSTALLED BY DEALER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57H (B)	VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 25 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 25 (A.30.A)**
2	1010 (G)	IGNITION RELAY (MAGNETIC COIL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



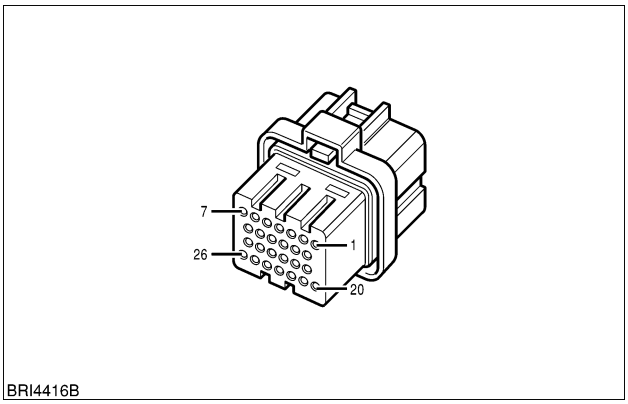
BRI4489B 1

TOP ENGINE

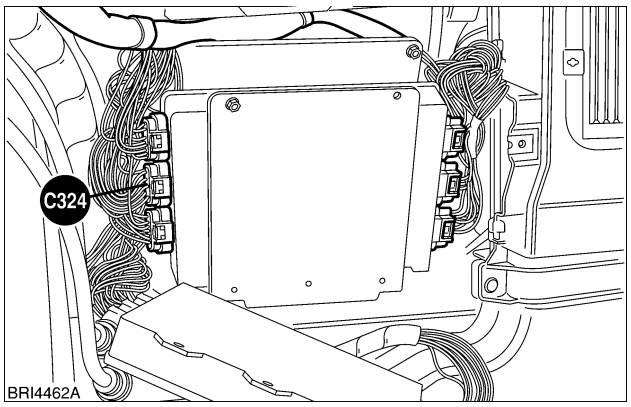
C324 XCM CN1A (MAIN CONTROL UNIT)

PLUG CONNECTION C324 XCM CN1A (MAIN CONTROL UNIT)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2540S (N)	FRONT POWER LIFT +12 V STARTER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 37 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 37 (A.30.A)**
2	2540T (N)	FRONT POWER LIFT +12 V STARTER SWITCH	
3	2540W (N)	FRONT POWER LIFT +12 V STARTER SWITCH	
6	3280 (O)	SUSPENSION LOCK SOLENOID VALVE TOP	
7	3285 (TN)	SUSPENSION LOCK SOLENOID VALVE BOTTOM	
8	2250K (K)	FRONT PTO - POWER SUPPLY	
10	3260 (O)	LOWER SOLENOID VALVE POWER SUPPLY	
11	3240 (O)	RAISE SOLENOID VALVE POWER SUPPLY	
12	2570 (R)	FRONT POWER LIFT SOLENOID VALVE	
13	2043 (O)	FRONT PTO SOLENOID VALVE	
14	5000B (L)	POWER SUPPLY EPC MEMORY	
15	5400S (Y)	CAN H	
16	5420S (G)	CAN L	
19	61G (B)	EARTH HOUSING	
20	5200M (N)	POWER SUPPLY EPC CONTROL VALVE	
21	5500G (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
22	5510G (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
23	60AA (B/W)	EARTH SENSOR	
25	57BR (B)	VEHICLE EARTH (ALL)	
26	57BS (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4416B-05 2



C324-BRI4462A 3

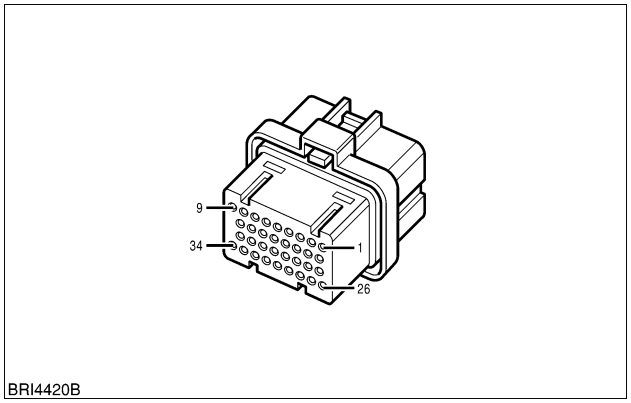
BACK OF CAB - BEHIND THE DRIVER'S SEAT

C325 XCM CN1B (MAIN CONTROL UNIT)

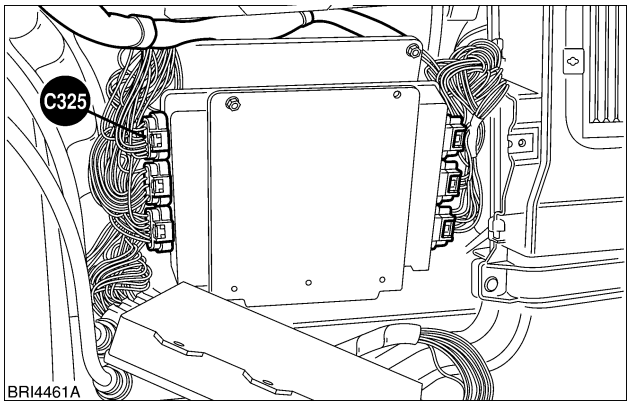
PLUG CONNECTION C325 XCM CN1B (MAIN CONTROL UNIT)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	2510 (N)	SIGNAL ACTUAL POSITION FRONT POWER LIFT	
3	2520 (N)	SIGNAL SETPOINT POSITION FRONT POWER LIFT	
5	3235 (O)	SIGNAL ACCELEROMETER	
6	3230 (U)	AXLE HEIGHT SENSOR POSITION	
11	2248 (K)	FRONT PTO - SWITCH (VCCS)	
12	2245 (K)	FRONT PTO - SWITCH TO MODULE (MOM)	
16	2530 (N)	V REF FRONT POWER LIFT	
17	5520 (LTG)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
18	2550 (N)	OVERRIDE SWITCH FRONT POWER LIFT	
19	2591 (TN)	REAR CONTROL SWITCH FRONT POWER LIFT LOWER	
21	1001Z (W)	POWER SUPPLY ENGAGING MAGNET	
22	2556 (N)	FRONT POWER LIFT COMMON RAIL	
23	3295 (O)	SIGNAL PRESSURE SWITCH FOR FRONT AXLE SUSPENSION	
26	2590 (TN)	REAR CONTROL SWITCH FRONT POWER LIFT RAISE	
29	3210 (U)	ON/OFF SWITCH FOR SUSPENSION RETURN SIGNAL	
30	5561 (O)	SWITCH TIME-CONTROLLED OIL FLOW ELECTROHYDR. REMOTE VALVE 1	

PLUG CONNECTION C325 - in PUMA Multicontroller XCM CN1B (MAIN CONTROL UNIT)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	2510 (N)	SIGNAL ACTUAL POSITION FRONT POWER LIFT	
3	2520 (N)	SIGNAL SETPOINT POSITION FRONT POWER LIFT	
5	3235 (O)	SIGNAL ACCELEROMETER	
6	3230 (U)	AXLE HEIGHT SENSOR POSITION	
11	2248 (K)	FRONT PTO - SWITCH (VCCS)	
12	2245 (K)	FRONT PTO - SWITCH TO MODULE (MOM)	
16	2530 (N)	V REF FRONT POWER LIFT	
17	5520 (LTG)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
18	2550 (N)	OVERRIDE SWITCH FRONT POWER LIFT	
19	2582 (G)	FRONT CONTROL SWITCH	
21	1001Z (W)	POWER SUPPLY ENGAGING MAGNET	
22	2556 (N)	FRONT POWER LIFT COMMON RAIL	
23	3295 (O)	SIGNAL PRESSURE SWITCH FOR FRONT AXLE SUSPENSION	
26	2583 (N)	FRONT CONTROL SWITCH	
29	3210 (U)	ON/OFF SWITCH FOR SUSPENSION RETURN SIGNAL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C325-BRI4461A 5

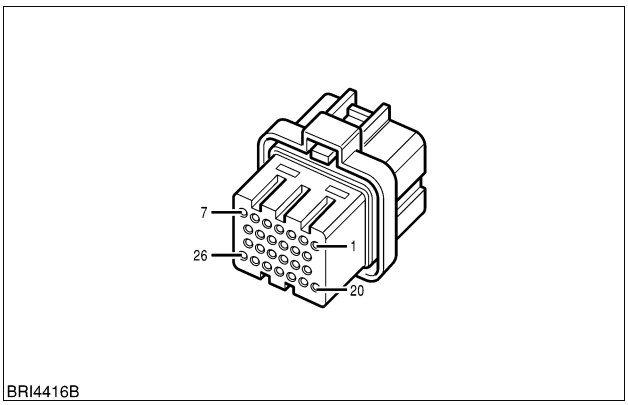
BACK OF CAB - BEHIND THE DRIVER'S SEAT

C326 XCM CN2 (MAIN CONTROL UNIT)

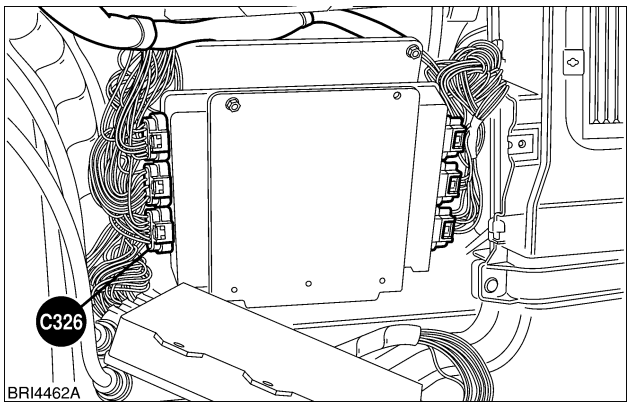
PLUG CONNECTION C326 XCM CN2 (MAIN CONTROL UNIT)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3270 (O)	LOWER SOLENOID VALVE RETURN SIGNAL	
3	3250 (O)	RAISE SOLENOID VALVE RETURN SIGNAL	
6	3281 (TN)	SUSPENSION LOCK SOLENOID VALVE TOP RETURN SIGNAL (-)	
7	2044 (O)	FRONT PTO SOLENOID VALVE RETURN SIGNAL (-)	
13	3286 (TN)	SUSPENSION LOCK SOLENOID VALVE BOTTOM RETURN SIGNAL (-)	
18	3290 (O)	SUSPENSION LOCK LIGHT (OR SOLENOID VALVE RETURN SIGNAL)	
19	2270 (O)	FRONT PTO - WARNING LIGHT	
21	57BN (B)	VEHICLE EARTH (ALL)	
26	57BP (B)	VEHICLE EARTH (ALL)	

PLUG CONNECTION C326 - in PUMA Multicontroller XCM CN2 (MAIN CONTROL UNIT)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3250 (O)	RAISE SOLENOID VALVE RETURN SIGNAL	
3	3286 (TN)	SUSPENSION LOCK SOLENOID VALVE BOTTOM RETURN SIGNAL (-)	
6	3281 (TN)	SUSPENSION LOCK SOLENOID VALVE TOP RETURN SIGNAL (-)	
7	2044 (O)	FRONT PTO SOLENOID VALVE RETURN SIGNAL (-)	
13	3270 (O)	LOWER SOLENOID VALVE RETURN SIGNAL	
18	3290 (O)	SUSPENSION LOCK LIGHT (OR SOLENOID VALVE RETURN SIGNAL)	
19	2270 (O)	FRONT PTO - WARNING LIGHT	
21	57BN (B)	VEHICLE EARTH (ALL)	
26	57BP (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4416B-07 6



C326-BRI4463A 7

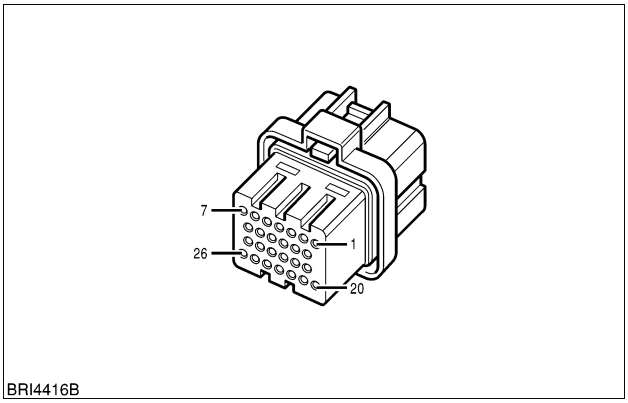
BACK OF CAB - BEHIND THE DRIVER'S SEAT

C327 XCM CN3A (MAIN CONTROL UNIT)

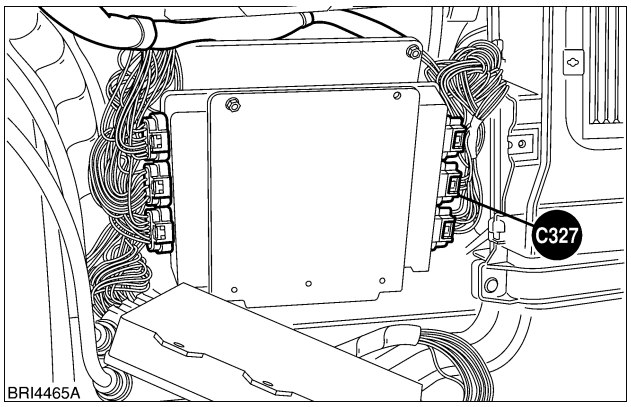
PLUG CONNECTION C327 XCM CN3A (MAIN CONTROL UNIT)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5551 (O)	CONTROL KNOB SIGNAL ELECTRO-HYDR. REMOTE VALVE 1	
3	5552 (U)	CONTROL KNOB SIGNAL ELECTRO-HYDR. REMOTE VALVE 2	
5	5553 (W)	CONTROL KNOB SIGNAL ELECTRO-HYDR. REMOTE VALVE 3	
7	5554 (U)	CONTROL KNOB SIGNAL ELECTRO-HYDR. REMOTE VALVE 4	
8	2067 (R)		
14	5572 (L)		
15	5564 (L)	SWITCH TIME-CONTROLLED OIL FLOW ELECTROHYDR. REMOTE VALVE 4	
16	5521 (LTG)	ELECTROHYDR. REMOTE VALVE ENGINE 1	
17	5522 (LTG)	ELECTROHYDR. REMOTE VALVE ENGINE 2	
18	5523 (LTG)	ELECTROHYDR. REMOTE VALVE ENGINE 3	
19	5524 (LTG)	ELECTROHYDR. REMOTE VALVE ENGINE 4	
20	5570 (L)		
22	4051 (W)	SWITCH HYDR. TOP LINK/LIFT LINK - LOWER	
24	4052 (W)	SWITCH HYDR. LENGTHEN LIFT LINK	
25	4053 (W)	SWITCH HYDR. SHORTEN LIFT LINK	

PLUG CONNECTION C327 - in PUMA Multicontroller XCM CN3A (MAIN CONTROL UNIT)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
18	5523 (G)	ELECTROHYDR. REMOTE VALVE: ENGINE 3	
22	4051 (W)	SWITCH HYDR. TOP LINK/LIFT LINK - LOWER	
24	4052 (W)	SWITCH HYDR. LENGTHEN LIFT LINK	
25	4053 (W)	SWITCH HYDR. SHORTEN LIFT LINK	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4416B-08 8



C327-BRI4465A 9

BACK OF CAB - BEHIND THE DRIVER'S SEAT

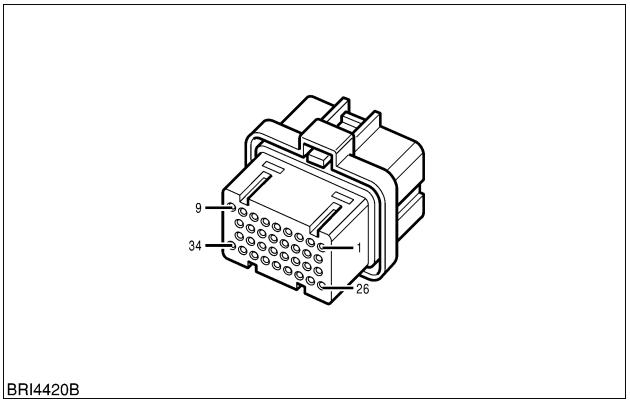
C328 XCM CN3B (MAIN CONTROL UNIT)

PLUG CONNECTION C328 XCM CN3B (MAIN CONTROL UNIT)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
5	4054 (W)	HYDR. TOP LINK/LIFT LINK RELIEF SOLENOID VALVE	
6	4056 (W)	HYDR. SHORTEN TOP LINK SOLENOID VALVE	
7	4058 (W)	HYDR. RIGHT LIFT LINK LOWER SOLENOID VALVE	
11	4060 (W)	SELECT HYDRAULICS FRONT	
14	4055 (W)	HYDR. EXTEND TOP LINK SOLENOID VALVE	
15	4057 (W)	HYDR. RIGHT LIFT LINK RAISE SOLENOID VALVE	
22	2260 (O)	FRONT PTO - SPEED SIGNAL	
25	2250C (K)	FRONT PTO - POWER SUPPLY	
26	5591 (L)	WARNING LIGHT ELECTROHYDR. REMOTE VALVE 1	
27	5594 (L)	WARNING LIGHT ELECTROHYDR. REMOTE VALVE 2	
28	5592 (L)	WARNING LIGHT ELECTROHYDR. REMOTE VALVE 2	
29	5593 (L)	WARNING LIGHT ELECTROHYDR. REMOTE VALVE 3	
30	5562 (O)	SWITCH TIME-CONTROLLED OIL FLOW ELECTROHYDR. REMOTE VALVE 2	
31	4061 (W)	SELECT HYDRAULICS REAR	
32	5563 (O)	SWITCH TIME-CONTROLLED OIL FLOW ELECTROHYDR. REMOTE VALVE 3	
33	4050 (W)	SWITCH HYDR. TOP LINK/LIFT LINK - RAISE	
34	2250B (K)	FRONT PTO - POWER SUPPLY	

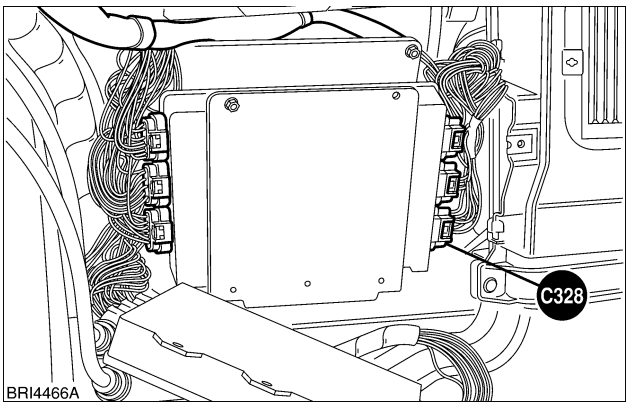
PLUG CONNECTION C328 - in PUMA Multicontroller XCM CN3B (MAIN CONTROL UNIT)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
5	4054 (W)	HYDR. TOP LINK/LIFT LINK RELIEF SOLENOID VALVE	
6	4056 (W)	HYDR. SHORTEN TOP LINK SOLENOID VALVE	
7	4058 (W)	HYDR. RIGHT LIFT LINK LOWER SOLENOID VALVE	
14	4055 (W)	HYDR. EXTEND TOP LINK SOLENOID VALVE	
15	4057 (W)	HYDR. RIGHT LIFT LINK RAISE SOLENOID VALVE	
22	2260 (O)	FRONT PTO - SPEED SIGNAL	
25	2250C (K)	FRONT PTO - POWER SUPPLY	
26	5591 (L)	WARNING LIGHT ELECTROHYDR. REMOTE VALVE 1	
27	5594 (L)	WARNING LIGHT ELECTROHYDR. REMOTE VALVE 2	
28	5592 (L)	WARNING LIGHT ELECTROHYDR. REMOTE VALVE 2	

29	5593 (L)	WARNING LIGHT ELECTROHYDR. REMOTE VALVE 3
33	4050 (W)	SWITCH HYDR. TOP LINK/LIFT LINK - RAISE
34	2250B (K)	FRONT PTO - POWER SUPPLY

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C328-BRI4466A 11

BACK OF CAB - BEHIND THE DRIVER'S SEAT

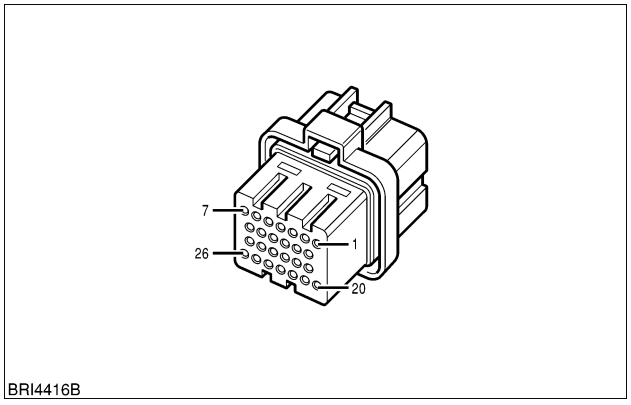
C329 XCM CN4 (MAIN CONTROL UNIT)

PLUG CONNECTION C329 XCM CN4 (MAIN CONTROL UNIT)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	4101 (TQ)	GEAR RANGE ACTIVATED	
2	5580 (U)	SIGNAL LED JOYSTICK REAR	
3	5585 (Y)	SIGNAL LED JOYSTICK FRONT	
5	5640 (R)	AUTO SWITCH FOR HEADLAND MANAGEMENT	
6	3169 (O)	AUTOM. VERSION RELIEF SOLENOID VALVE RETURN SIGNAL	
8	7970 (L)	TRANSMISSION GEAR GROUP M/REVERSE GEARS	
9	2069 (O)	PTO MANAGEMENT ON	
10	3014C (R)	SIGNAL WARNING LIGHT HAND BRAKE	
11	7770 (U)	TRANSMISSION FORWARDS PRESSURE SWITCH	
12	6620 (N)	CONTROL UNIT COOLANT TEMP. SIGNAL	
14	7960 (W)	TRANSMISSION GEAR GROUP L / H	
16	7730 (TN)	SIGNAL SHUTTLE SWITCH NEUTRAL	
17	8050 (R)	TRANSMISSION REVERSE PRESSURE	
20	7430 (Y)	SIGNAL COUPLING SETTING	
21	5830 (R)	CONNECTION HIGH-FLOW HYDROPUMP	
23	7476 (R)	TRANSMISSION AUTO ON	
24	5835 (S)	CONNECTION HYDRAULICS MAIN SWITCH HIGH-FLOW HYDROPUMP	
25	5840 (W)	FRONT POWER LIFT SWITCH PRESENT MECH.	

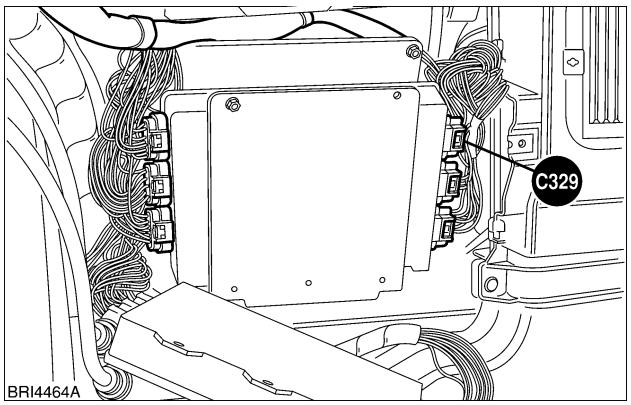
PLUG CONNECTION C329 - in PUMA Multicontroller XCM CN4 (MAIN CONTROL UNIT)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	5580 (U)	SIGNAL LED JOYSTICK REAR	
3	5585 (Y)	SIGNAL LED JOYSTICK FRONT	
5	5640 (R)	AUTO SWITCH FOR HEADLAND MANAGEMENT	
6	3169 (O)	AUTOM. VERSION RELIEF SOLENOID VALVE RETURN SIGNAL	
8	7970 (L)	TRANSMISSION GEAR GROUP M/REVERSE GEARS	
9	2069 (O)	PTO MANAGEMENT ON	
10	3014C (R)	SIGNAL WARNING LIGHT HAND BRAKE	
11	7770 (U)	TRANSMISSION FORWARDS PRESSURE SWITCH	
12	6620 (N)	CONTROL UNIT COOLANT TEMP. SIGNAL	
14	7960 (W)	TRANSMISSION GEAR GROUP L / H	
16	7730 (TN)	SIGNAL SHUTTLE SWITCH NEUTRAL	
17	8050 (R)	TRANSMISSION REVERSE PRESSURE	
20	7430 (Y)	SIGNAL COUPLING SETTING	
21	5830 (R)	CONNECTION HIGH-FLOW HYDROPUMP	
24	5835 (S)	CONNECTION HYDRAULICS MAIN SWITCH HIGH-FLOW HYDROPUMP	

25	5840 (W)	FRONT POWER LIFT SWITCH PRESENT MECH.	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4416B-10 12



C329-BRI4464A 13

BACK OF CAB - BEHIND THE DRIVER'S SEAT

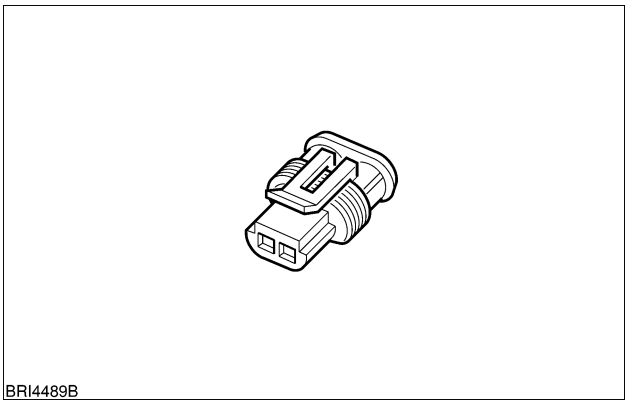
Wiring harness - Component diagram 33 Plug connections 330-339

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

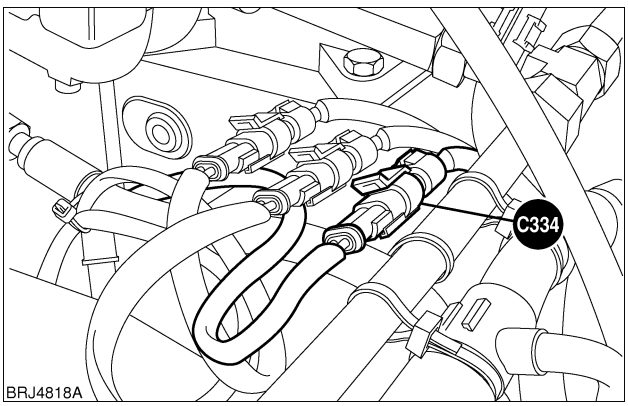
C334 POWER LIFT ADJUSTMENT VALVE 1

PLUG CONNECTION C334 POWER LIFT ADJUSTMENT VALVE 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	4054 (W)	HYDR. TOP LINK/LIFT LINK RELIEF SOLENOID VALVE	PUMA Standard: **Wiring harness - Electrical schematic frame 13 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 13 (A.30.A)**
2	57MJ (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 1



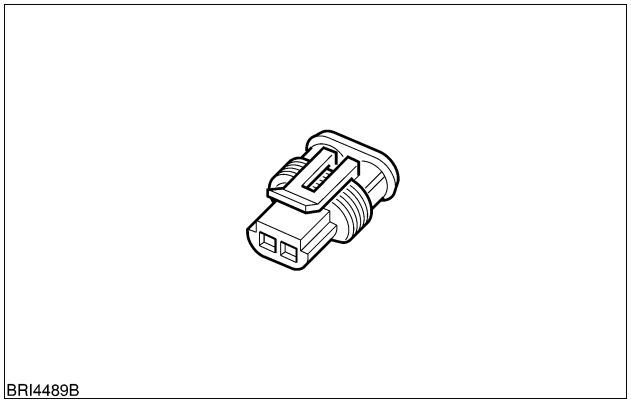
C334-BRJ4818A 2

REAR AXLE

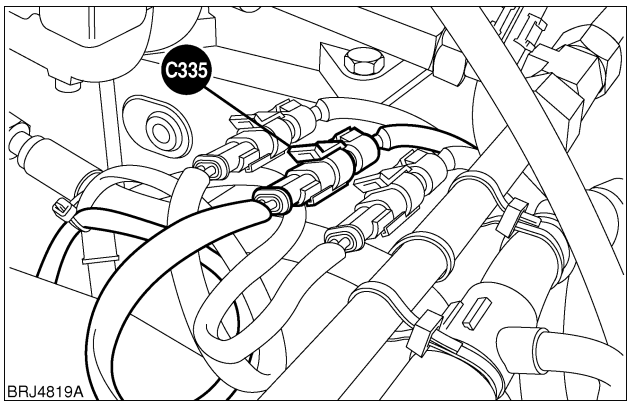
C335 POWER LIFT ADJUSTMENT VALVE 2

PLUG CONNECTION C335 POWER LIFT ADJUSTMENT VALVE 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	4055 (W)	HYDR. EXTEND TOP LINK SOLENOID VALVE	PUMA Standard: **Wiring harness - Electrical schematic frame 13 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 13 (A.30.A)**
2	57MK (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 3



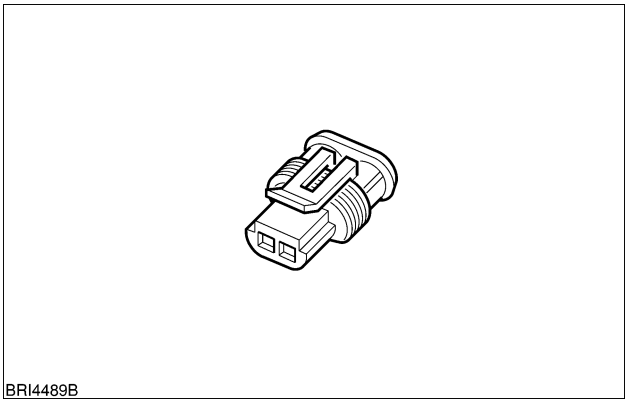
C335-BRJ4819A 4

REAR AXLE

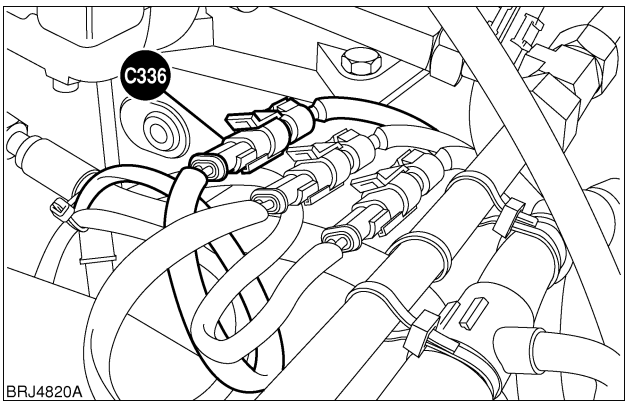
C336 POWER LIFT ADJUSTMENT VALVE 3

PLUG CONNECTION C336 POWER LIFT ADJUSTMENT VALVE 3			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	4056 (W)	HYDR. SHORTEN TOP LINK SOLENOID VALVE	PUMA Standard: **Wiring harness - Electrical schematic frame 13 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 13 (A.30.A)**
2	57ML (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 5



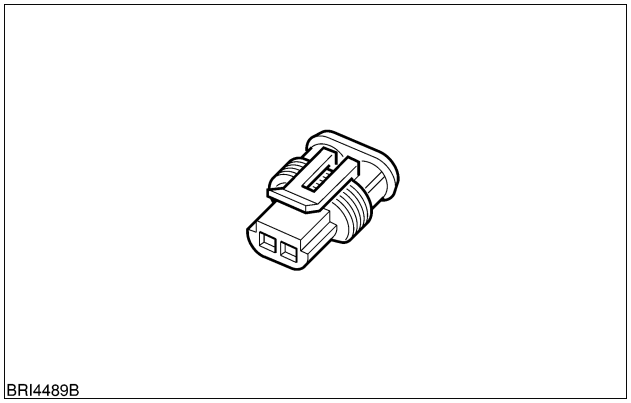
C336-BRJ4820A 6

REAR AXLE

C337 POWER LIFT ADJUSTMENT VALVE 4

PLUG CONNECTION C337 POWER LIFT ADJUSTMENT VALVE 4			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	4057 (W)	HYDR. RIGHT LIFT LINK RAISE SOLENOID VALVE	PUMA Standard: **Wiring harness - Electrical schematic frame 13 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 13 (A.30.A)**
2	57MM (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



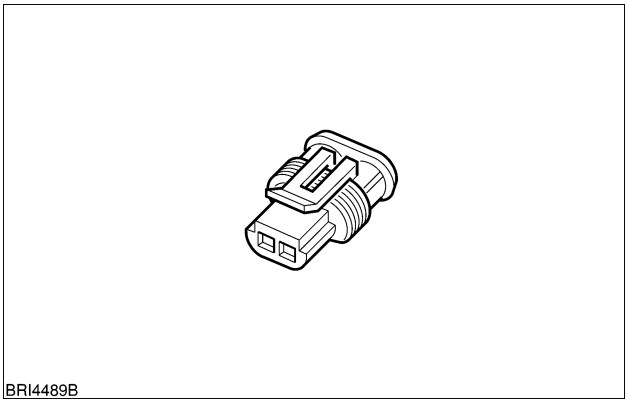
BRI4489B 7

REAR AXLE

C338 POWER LIFT ADJUSTMENT VALVE 5

PLUG CONNECTION C338 POWER LIFT ADJUSTMENT VALVE 5			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	4058 (W)	HYDR. RIGHT LIFT LINK LOWER SOLENOID VALVE	PUMA Standard: **Wiring harness - Electrical schematic frame 13 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 13 (A.30.A)**
2	57MN (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 8

REAR AXLE

Wiring harness - Component diagram 34 Plug connections 340-349

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C344 TERMINAL RESISTOR 1A FULL POWERSHIFT SWITCH B

PLUG CONNECTION C344 Terminal resistor 1A FULL POWERSHIFT SWITCH B			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
			PUMA Standard: **Wiring harness - Electrical schematic frame 15 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 15 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C346 CONNECTOR GROUND DRIVE PTO (not used in PUMA Multicontroller)

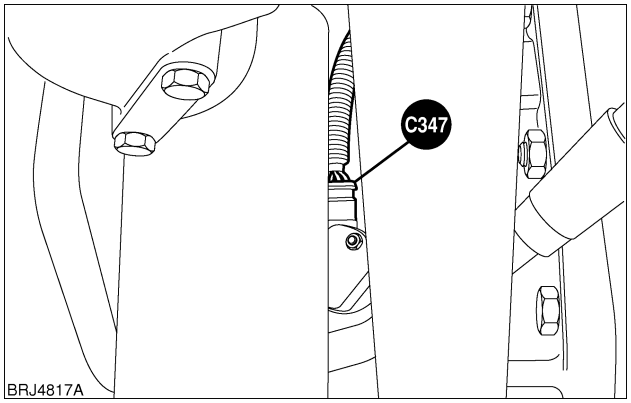
PLUG CONNECTION C346 CONNECTOR GROUND DRIVE PTO			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	45 (W)		
2	45 (W)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C347 CRAWLER DRIVE POTENTIOMETER

PLUG CONNECTION C347 CRAWLER DRIVE POTENTIOMETER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5020A (TN)	EPC CONTOLLER +5V REFERENCE VOLTAGE LOWERING SPEED	PUMA Standard: **Wiring harness - Electrical schematic frame 07 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 07 (A.30.A)**
2	7581 (O/L/B)	CRAWLER DRIVE SETTING SIGNAL	
3	7570G (B)	SIGNAL EARTH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



C347-BRJ4817A 1

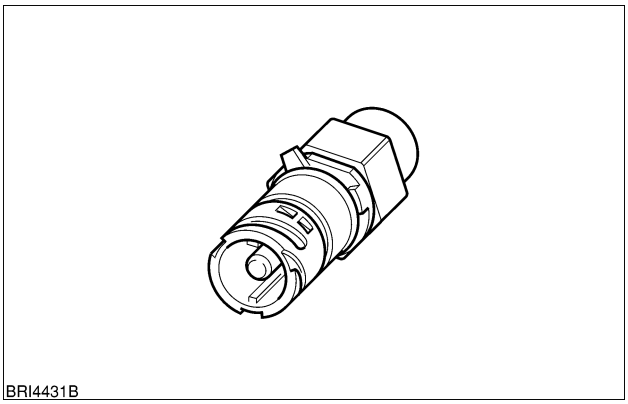
Wiring harness - Component diagram 35 Plug connections 350-359

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

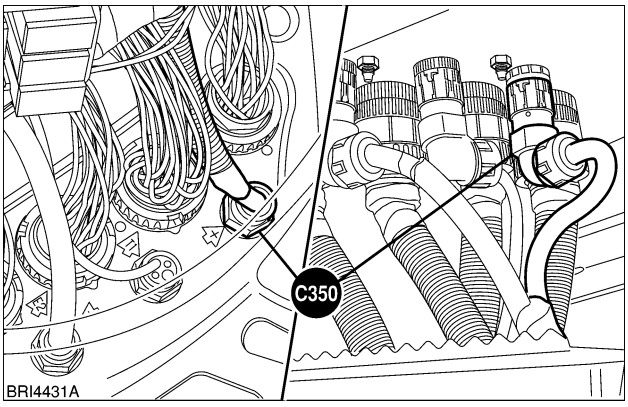
C350 MAIN CURRENT (FUSE) 1 MAIN CURRENT B+

PLUG CONNECTION C350 MAIN CURRENT (FUSE) 1 MAIN CURRENT B +			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1 (R)	BATTERY POWER SUPPLY	PUMA Standard: **Wiring harness - Electrical schematic frame 01 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4431B 1



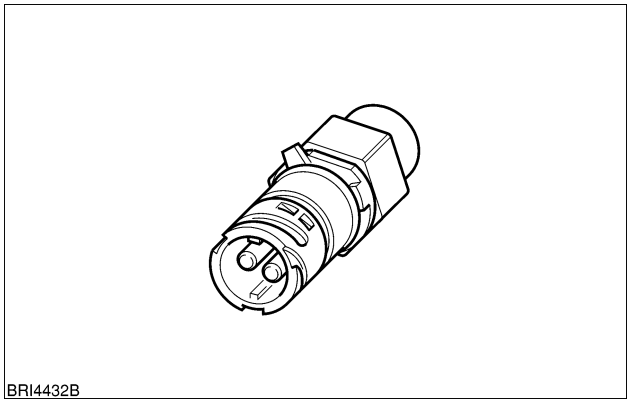
C350-BRI4431A 2

CAB FLOOR - RIGHT-HAND SIDE

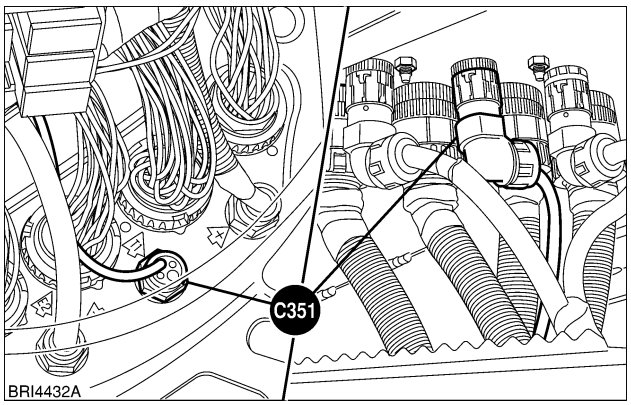
C351 MAIN CURRENT (FUSE) 2 MAIN CURRENT E

PLUG CONNECTION C351 MAIN CURRENT (FUSE) 2 MAIN CURRENT E			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	160 (U)	BATTERY POWER SUPPLY FOR ELECTRONICS	PUMA Standard: **Wiring harness - Electrical schematic frame 01 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**
2	1C(R)	BATTERY POWER SUPPLY	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4432B 3



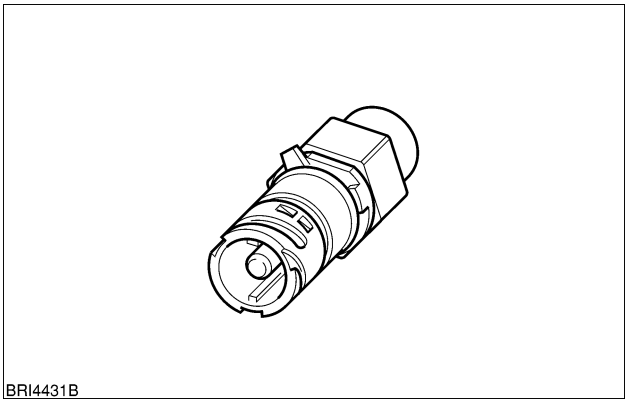
C351-BRI4432A 4

CAB FLOOR - RIGHT-HAND SIDE

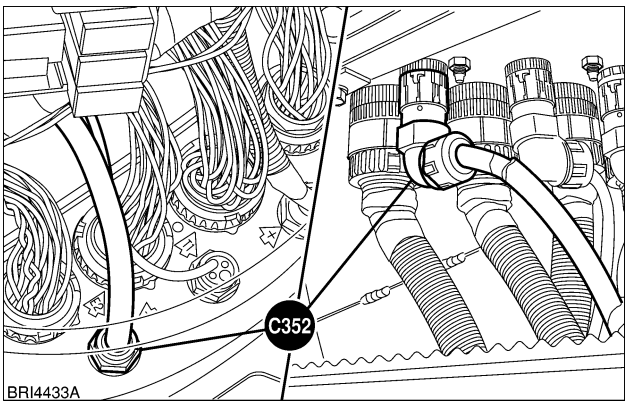
C352 MAIN CURRENT (FUSE) 3 MAIN CURRENT B -

PLUG CONNECTION C352 MAIN CURRENT (FUSE) 3 MAIN CURRENT B -			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57 (B)	VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 01 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4431B 5



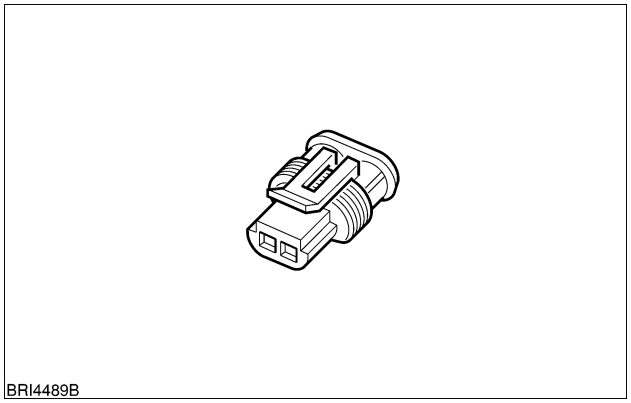
C352-BRI4433A 6

CAB FLOOR - RIGHT-HAND SIDE

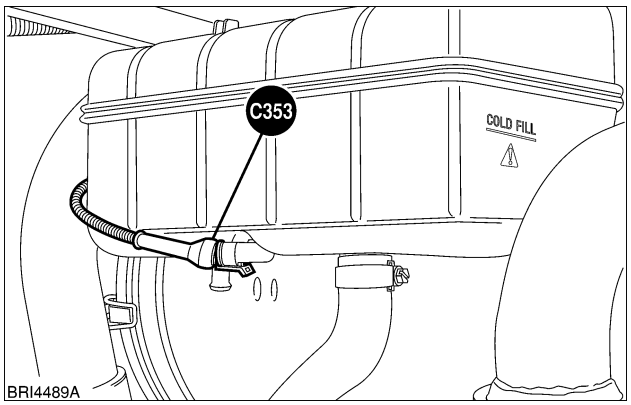
C353 EQUALIZING RESERVOIR

PLUG CONNECTION C353 EQUALIZING RESERVOIR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	650 (TQ)	COOLANT GAUGE SENSOR	PUMA Standard: **Wiring harness - Electrical schematic frame 02 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 03 (A.30.A)**
2	57JA (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 7



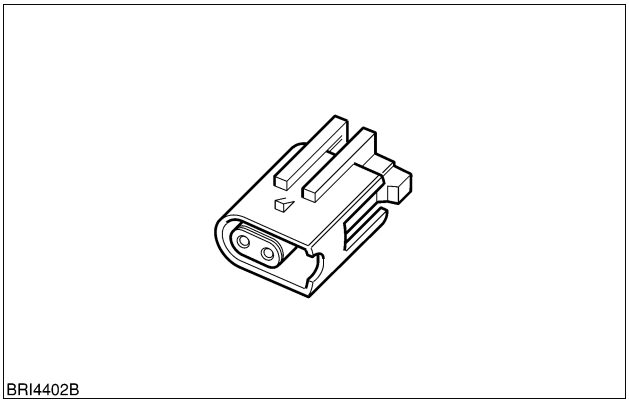
C353-BRI4489A 8

TOP ENGINE

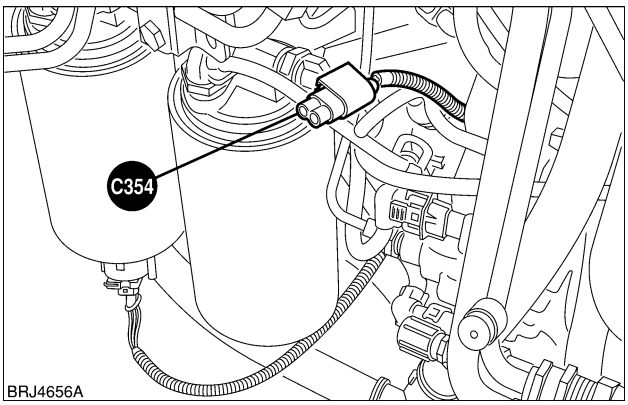
C354 FUEL PRE-HEATER

PLUG CONNECTION C354 FUEL PRE-HEATER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6570 (G)	CONTROL UNIT TO FUEL FILTER HEATING RETURN SIGNAL	PUMA Standard: **Wiring harness - Electrical schematic frame 04 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 04 (A.30.A)**
2	6408J (G)	FUSE-PROTECTED VOLTAGE B+ TO CONTROL UNIT (1)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4402B 9



C354-BRJ4656A 10

BACK OF ENGINE - LEFT-HAND SIDE

Wiring harness - Component diagram 36 Plug connections 360-369

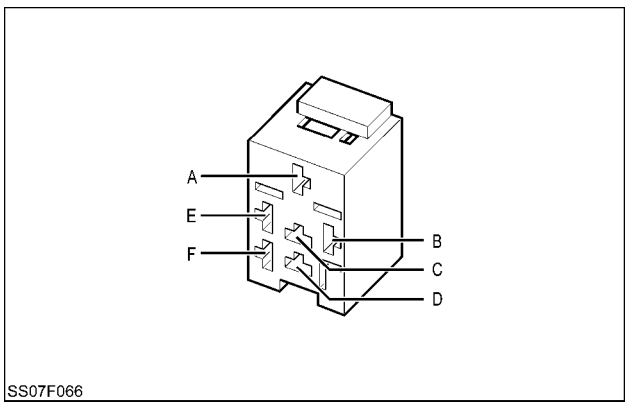
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C362 HEATER BLOWER SWITCH

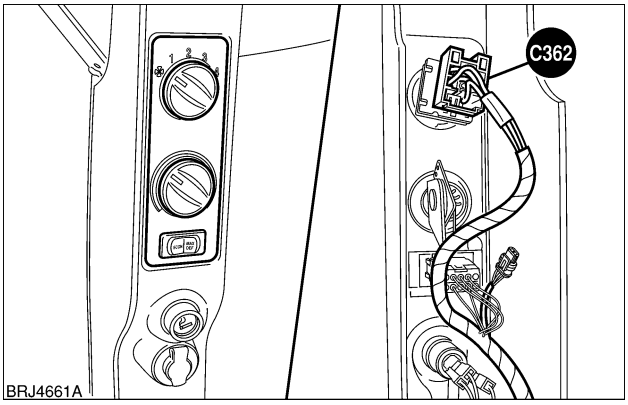
PLUG CONNECTION C362 (WITH MANUAL TEMPERATURE CONTROL) HEATER BLOWER SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A	(G/Y)	BLOWER LEVEL 1	PUMA Standard: **Wiring harness - Electrical schematic frame 41 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 41 (A.30.A)**
B	(K)	BLOWER LEVEL 2	
C	(K/O)	BLOWER LEVEL 3	
D	(G/S)	BLOWER LEVEL 4	
E	(R)	POWER SUPPLY POTENTIAL 15	
F	(G)	FROM AIR CON SWITCH	

PLUG CONNECTION C362 (WITH AUTOMATIC TEMPERATURE CONTROL) HEATER BLOWER SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A	(G/S)	SIGNAL BLOWER SPEED AUTO	PUMA Standard: **Wiring harness - Electrical schematic frame 40 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 40 (A.30.A)**
B	(G/Y)	SIGNAL BLOWER SPEED 1	
C	(K/G)	SIGNAL BLOWER SPEED 2	
D	(K/O)	SIGNAL BLOWER SPEED 3	
E	(B/W)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07F066 1



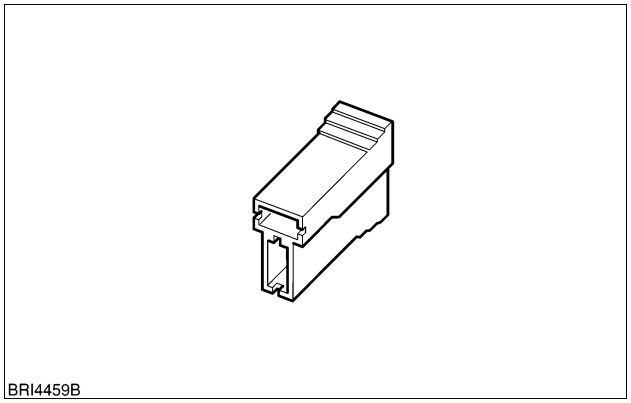
C362-BRJ4661A 2

CAB - C-PILLAR LEFT-HAND SIDE

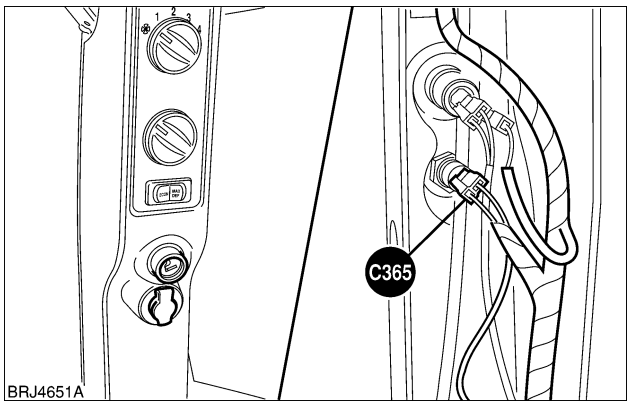
C365 8A SOCKET

PLUG CONNECTION C365 8A SOCKET			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	9032C (Y)	STARTER SWITCH+ TO SOCKET	PUMA Standard: **Wiring harness - Electrical schematic frame 24 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 24 (A.30.A)**
2	57CT (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4459B 3



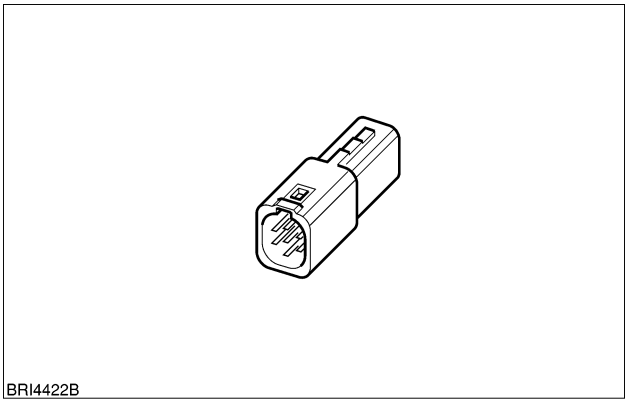
C365-BRJ4651A 4

CAB - C-PILLAR LEFT-HAND SIDE

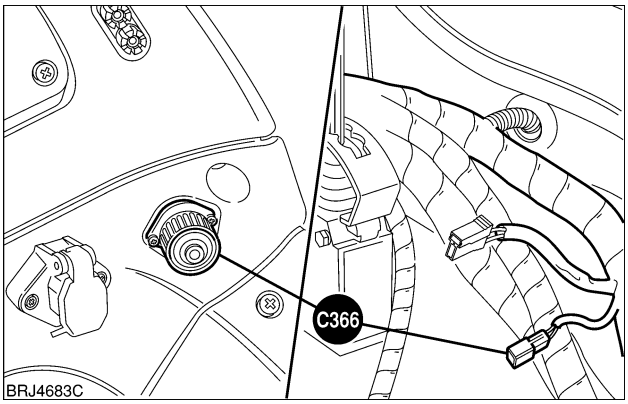
C366 CONNECTOR RADAR SENSOR SOCKET

PLUG CONNECTION C366 CONNECTOR RADAR SENSOR SOCKET			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2320 (P/K/Y) / 2320 (L)	ACTUAL VALUE ROAD SPEED ISO 11786 SOCKET PIN 1	PUMA Standard: **Wiring harness - Electrical schematic frame 31 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 31 (A.30.A)**
2	2300 (P/B/Y) / 2300 (L)	THEOR. ROAD SPEED ISO 11786 SOCKET PIN 2	
3	2330 (P/LG/Y) / 2330 (L)	PTO SPEED ISO 11876 SOCKET PIN 3	
4	2310 (P/G/Y) / 2310 (L)	LOWER/RAISE - POWER LIFT MODE ISO 11786 SOCKET PIN 4	
5	3062 (L) / 1050 (G/W)	SWITCH IMPLEMENT SOCKET / POWER SUPPLY ACCESSORY DEVICES	
6	1050A (G) / 61 (B)	POWER SUPPLY ACCESSORY DEVICES / HOUSING EARTH	
7	61B (B/O) / 5190B (R/W/B)	HOUSING EARTH / POWER LIFT LOCK / LIFT-O-MATIC	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4422B 5



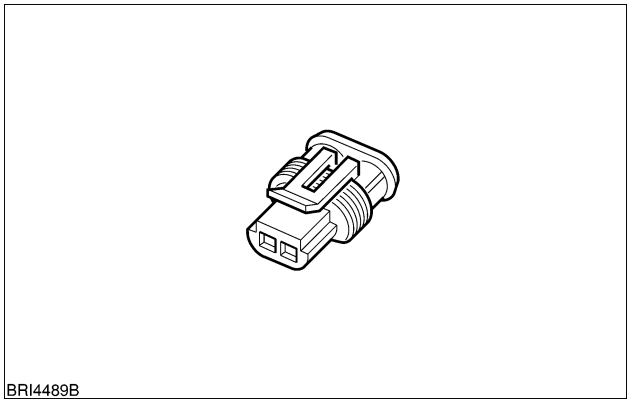
C366-BRJ4683C 6

RIGHT-HAND SIDE CONSOLE

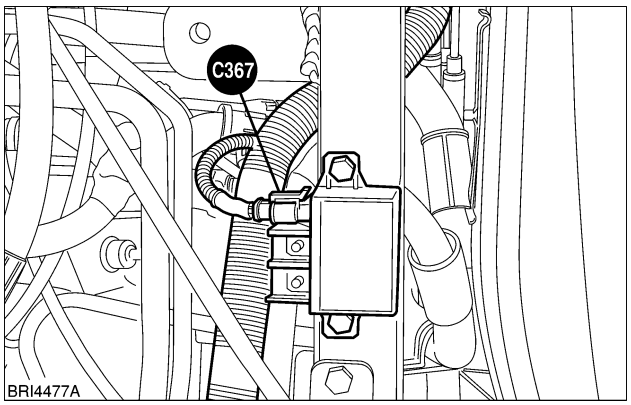
C367 HEATER GRID

PLUG CONNECTION C367 HEATER GRID			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6586 (L)	CONTROL UNIT TO HEATER GRID RELAY RETURN SIGNAL	PUMA Standard: **Wiring harness - Electrical schematic frame 04 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 04 (A.30.A)**
2	6408H (G)	FUSE-PROTECTED VOLTAGE B+ TO CONTROL UNIT (1)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 7



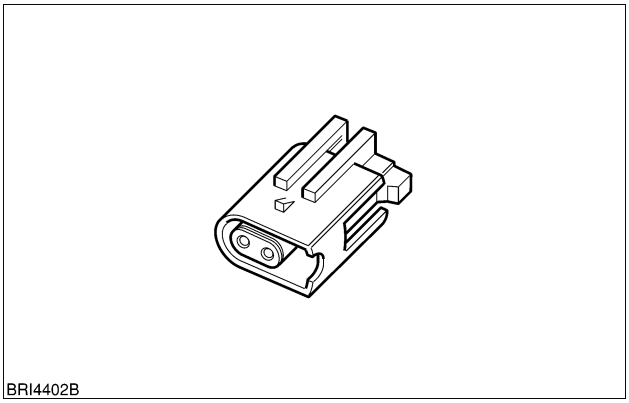
C367-BRI4477A 8

ENGINE - LEFT-HAND SIDE

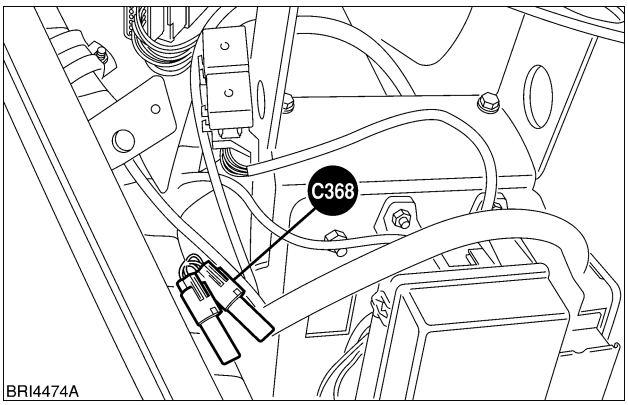
C368 DIODE PLUG CONNECTION

PLUG CONNECTION C368 DIODE PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	830A (R) / 820A (R)	BRAKE LIGHT SWITCH RIGHT / BRAKE LIGHT SWITCH LEFT	PUMA Standard: **Wiring harness - Electrical schematic frame 25 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 25 (A.30.A)**
2	825B (Y) / 825A (Y)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4402B-1 9



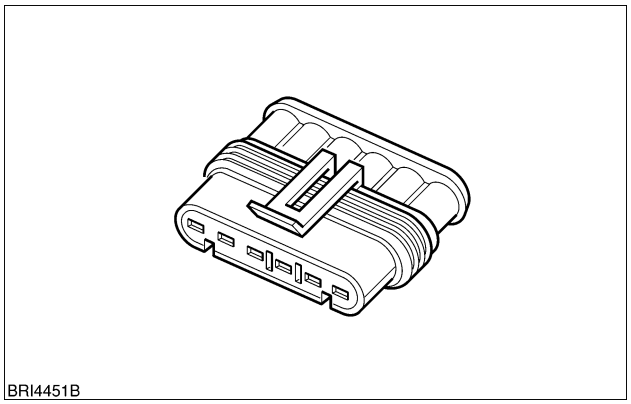
C368-BRI4474A 10

RIGHT-HAND SIDE CONSOLE

C369 CROSSGATE LEVER (not used in PUMA Multicontroller)

PLUG CONNECTION C369 CROSSGATE LEVER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5200H (N)	POWER SUPPLY EPC CONTROL VALVE	
2	5500C (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
3	5510C (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
4	57 (B)	VEHICLE EARTH (ALL)	
5	5580 (U)		
6	5585 (Y)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4451B 11

RIGHT-HAND SIDE CONSOLE

Wiring harness - Component diagram 37 Plug connections 370-379

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

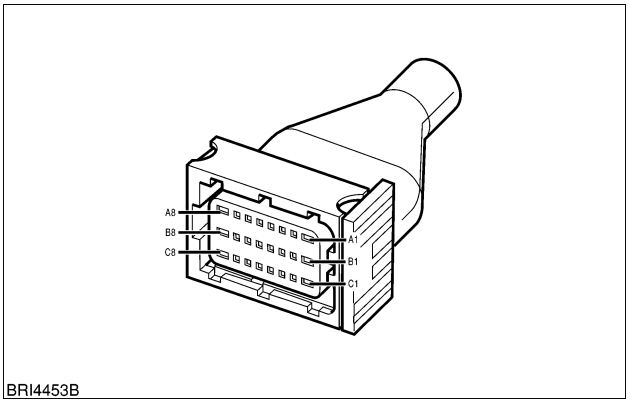
C370 OPERATOR CONTROL ARMREST

PLUG CONNECTION C370 OPERATOR CONTROL ARMREST			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A1	6440B (S)	HAND THROTTLE LEVER SETTING 1	**Wiring harness - Electrical schematic frame 10 (A.30.A)**
A2	5125 (TQ)	EPC RAISE SIGNAL - RAPID CONTROL SWITCH	
A3	5130 (TQ)	EPC LOWER SIGNAL - RAPID CONTROL SWITCH	
A4	5200E (N)	POWER SUPPLY EPC CONTROL VALVE	
A5	5020C (TN)	EPC CONTOLLER +5V REFERENCE VOLTAGE LOWERING SPEED	
A6	5050 (TN)	EPC CONTROL	
A7	5155 (U)	EPC POTENTIOMETER WORKING DEPTH CONTROL	
A8	7200B (S)	TRANSMISSION SHIFT DOWN	
B1	7210B (S)	TRANSMISSION SHIFT UP	
B2	5120 (K)	EPC SIGNAL LIFT HEIGHT LIMIT	
B3	5145 (TQ)	EPC POTENTIOMETER SETPOINT SLIP CONTROL	
B4	5045 (TN)	EPC LOWERING SPEED	
B5	5040 (TN)	EPC TRACTION / POSITION CONTROL	
B6	60D (B/W)	EARTH SENSOR	
B7	4101B (TQ)	GEAR RANGE ACTIVATED	
B8	7525F (G)	POWER SUPPLY TRANSMISSION SENSOR 5 V	
C1	5240 (O)	EPC RAISE SIGNAL - RAPID CONTROL SWITCH 2	
C2	5220 (Y)	EPC RAISE TELLTALE	
C3	5230 (Y)	EPC LOWER TELLTALE	
C4	5110 (K)	EPC SIGNAL TELLTALE	
C5	5180 (TQ)	EPC WHEEL SLIP WARNING LIGHT	
C6	5620 (R)	HEADLAND MANAGEMENT ON/OFF SWITCH	
C7	5133 (TQ)	EPC STOP	
C8	5250 (O)	EPC LOWER SIGNAL - RAPID CONTROL SWITCH 2	

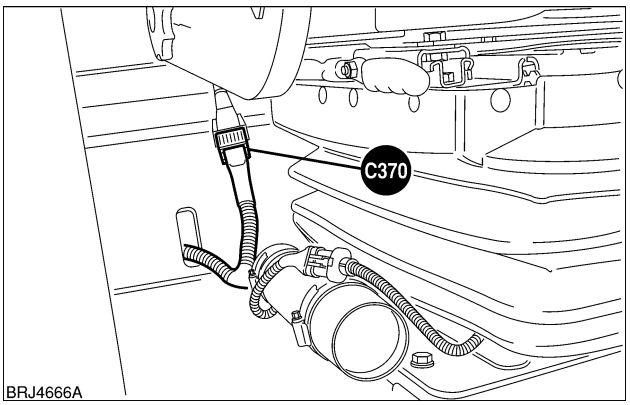
PLUG CONNECTION C370 - in PUMA Multicontroller OPERATOR CONTROL ARMREST			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A1	5200AM (N)	POWER SUPPLY POTENTIAL 15	
A2	5580 (U)	SIGNAL LED JOYSTICK REAR	
A3	5585 (Y)	SIGNAL LED JOYSTICK FRONT	
A4	5591 (L)	SIGNAL TIMER PROG. EPC 1 LED	
A5	5592 (L)	SIGNAL TIMER PROG. EPC 2 LED	
A6	5593 (L)	SIGNAL TIMER PROG. EPC 3 LED	
A7	5594 (L)	SIGNAL TIMER PROG. EPC 4 LED	
B1	7000BC (U)	POWER SUPPLY TRANSMISSION CONTROLS	**Wiring harness - Electrical schematic frame 42 (A.30.A)**

B6	5400N (Y)	CAN H
B7	5420N (G)	CAN L
B8	2050N (G)	POWER SUPPLY POTENTIAL +15
C1	57PS (B)	VEHICLE EARTH (ALL)
C4	3277 (O)	SIGNAL REVERSING VALVE FRONT LOADER 1
C5	3278 (O)	SIGNAL REVERSING VALVE FRONT LOADER 2
C6	5400BG (Y)	CAN H
C7	5420BG (G)	CAN L
C8	1012K (R)	LIGHTING

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4453B 1



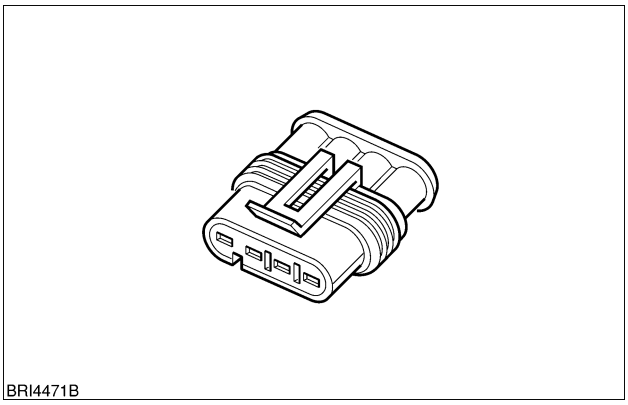
C370-BRJ4666A 2

CAB FLOOR ON RIGHT NEAR THE DRIVER'S SEAT

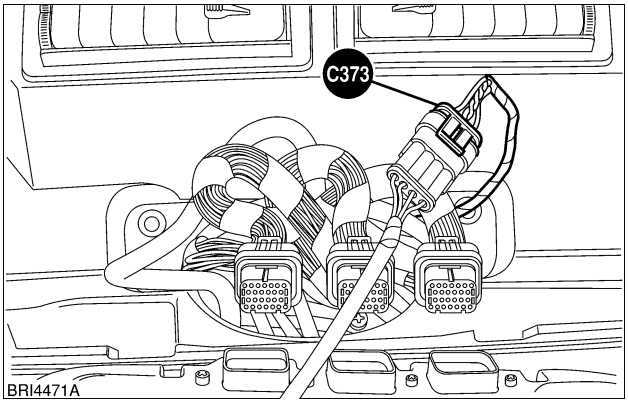
C373 INSTRUMENT PANEL KEY PAD (not used in PUMA Multicontroller)

PLUG CONNECTION C373 INSTRUMENT PANEL KEY PAD			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1050F (G)	POWER SUPPLY ACCESSORY DEVICES	**Wiring harness - Electrical schematic frame 25 (A.30.A)**
2	5420H (G)	CAN L	
3	5400H (Y)	CAN H	
4	61H (B/O)	EARTH HOUSING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4471B 3



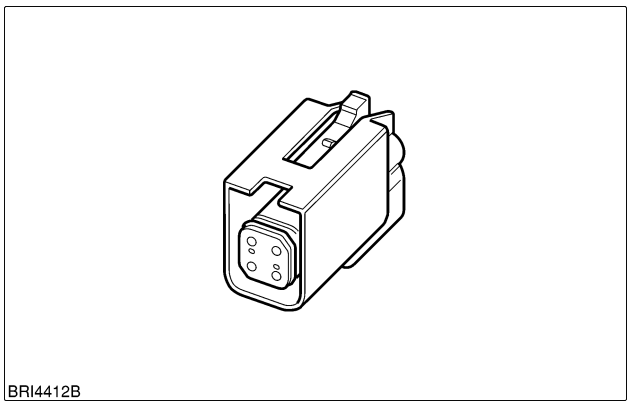
C373-BRI4471A 4

STEERING COLUMN CONSOLE

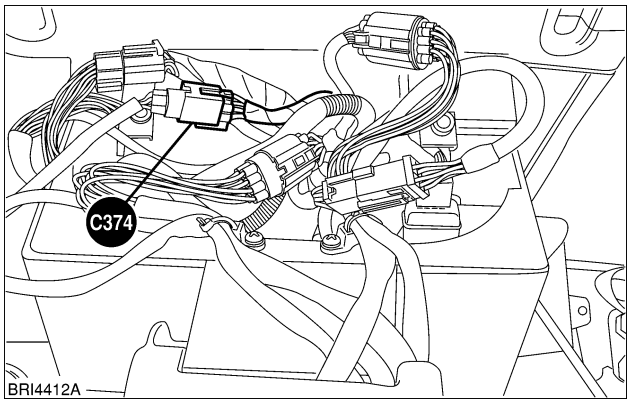
C374 WIRING HARNESS PLUG CONNECTION HAZARD LIGHT SWITCH

PLUG CONNECTION C374 WIRING HARNESS PLUG CONNECTION HAZARD LIGHT SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1021 (P) / 1021 (L)	POWER SUPPLY HAZARD LIGHT SWITCH (STARTER BATTERY)	PUMA Standard: **Wiring harness - Electrical schematic frame 28 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 28 (A.30.A)**
2	1020A (G/W) / 1020A (G)	POWER SUPPLY HAZARD LIGHT SWITCH	
3	57BF (B)	VEHICLE EARTH (ALL)	
4	1020 (G/S) / 1020 (G)	POWER SUPPLY HAZARD LIGHT SWITCH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4412B-01 5



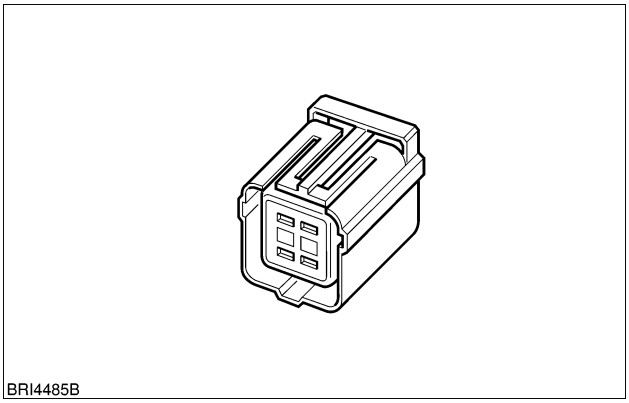
C374-BRI4412A 6

STEERING COLUMN CONSOLE

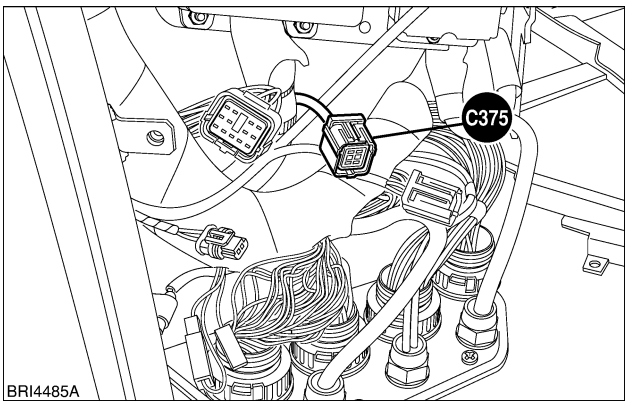
C375 DIAGNOSTICS LINK ANALOGUE-DIGITAL INSTRUMENT CLUSTER

PLUG CONNECTION C375 DIAGNOSTICS LINK ANALOGUE-DIGITAL INSTRUMENT CLUSTER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7650Z (W)	DIAGNOSTICS PLUG RS232 OUT	PUMA Standard: **Wiring harness - Electrical schematic frame 33 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 33 (A.30.A)**
2	7640Z (TN)	DIAGNOSTICS PLUG RS232 IN	
3	57BT (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4485B 7



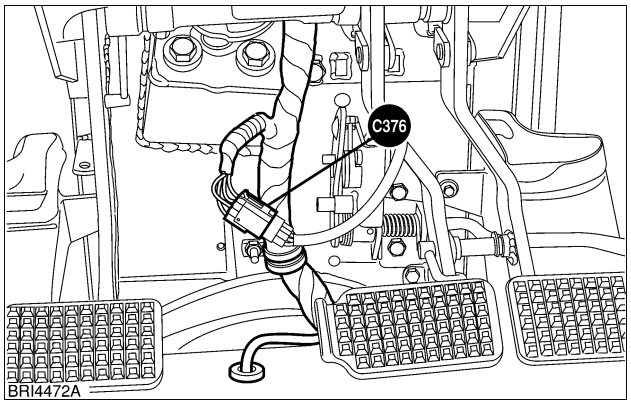
C375-BRI4485A 8

RIGHT-HAND SIDE CONSOLE

C376 ELECTRONIC ACCELERATOR PEDAL

PLUG CONNECTION C376 ELECTRONIC ACCELERATOR PEDAL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	6402 (G)	CONTROL UNIT TO ACCELERATOR PEDAL POTENTIOMETER POTENTIOMETER	PUMA Standard: **Wiring harness - Electrical schematic frame 02 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 02 (A.30.A)**
3	7000L (U)	POWER SUPPLY TRANSMISSION CONTROLS	
4	6355B (R)	+5V LOW-SIGNAL REFERENCE VOLTAGE	
6	6404 (G)	ACCELERATOR POT. TO SWITCH REDUCED IDLING SPEED	
7	60BL (B/W)	EARTH SENSOR	
8	60BM (B/W)	EARTH SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



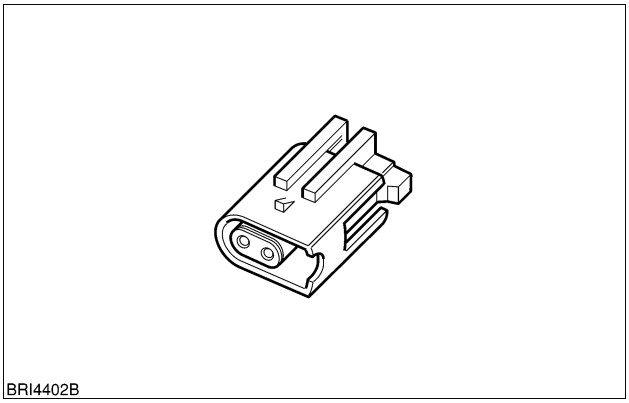
C376-BRI4472A 9

STEERING COLUMN CONSOLE

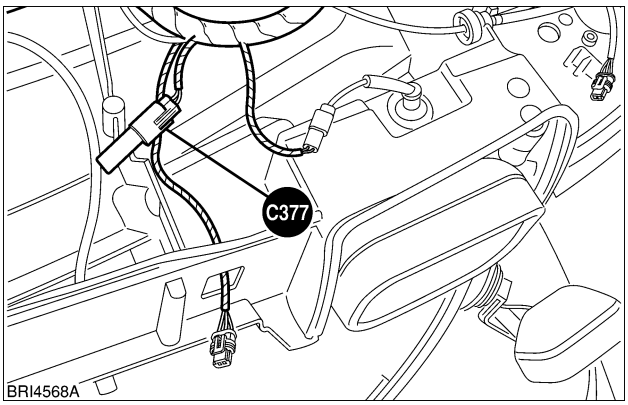
C377 DIODE

PLUG CONNECTION C377 DIODE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	978 (W) / 10P (G)	LICENCE PLATE LIGHT / VOLTAGE SUPPLY VIA STARTER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 26 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 26 (A.30.A)**
2	170A (K/N/B) / 997C (G)	ACTUATING SWITCH FOR BATTERY ISOLATOR SWITCH / WORK LAMP - POWER SUPPLY REAR (OUTER)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4402B 10



C377-BRI4568A 11

CAB ROOF REAR - RIGHT-HAND SIDE

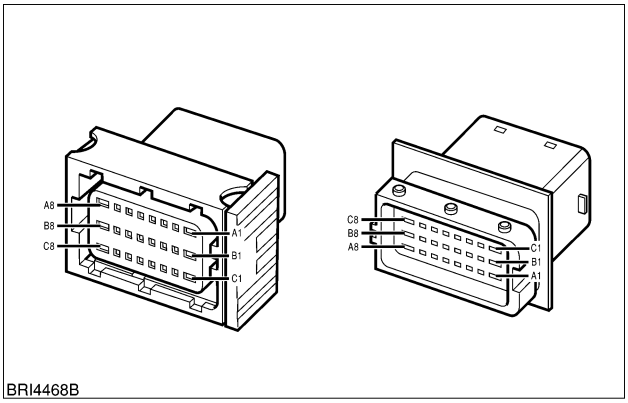
C378 PLUG CONNECTION SWITCH MODULE RIGHT SIDE CONSOLE

PLUG CONNECTION C378 PLUG CONNECTION SWITCH MODULE RIGHT SIDE CONSOLE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A1	7000 (U) / 7000A (U)	POWER SUPPLY TRANSMISSION CONTROLS	
A2	5640 (R)	AUTO SWITCH FOR HEADLAND MANAGEMENT	
A3	7476 (R)	TRANSMISSION AUTO ON	
A4	3025 (Y)	ALL WHEEL DRIVE SOLENOID VALVE (MANUAL)	
A5	3027 (Y)	ALL WHEEL DRIVE SOLENOID VALVE (AUTO)	
A6	7120 (Y)	DIFF. LOCK WARNING LIGHT (MANUAL)	
A7	7125 (LTG) / 7125 (G)	DIFF. LOCK WARNING LIGHT (AUTO)	
A8	7170 (W)	DIFFERENTIAL LOCK SWITCH (AUTO ON)	
B1	7175 (Y)	DIFFERENTIAL LOCK SWITCH (MANUAL ON)	
B2	5630 (R)	MANUAL MODE SWITCH FOR HEADLAND MANAGEMENT	
B3	6620 (N)	CONTROL UNIT COOLANT TEMP. SIGNAL	
B4	6530 (N)	INCREASE CONSTANT SPEED	
B5	6540 (N)	REDUCE CONSTANT SPEED	
B6	7040 (N)	CRAWLER GROUP SWITCH	
B7	2067 (R) / 2069 (U)	/ PTO MANAGEMENT ON	
B8	57AD (B) / 57 (B)	VEHICLE EARTH (ALL)	
C1	2050A (G) / 2050 (G)	POWER SUPPLY PTO / SHIFTING CLAW	
C2	3210 (U)	ON/OFF SWITCH FOR SUSPENSION RETURN SIGNAL	
C3	3290 (O)	SUSPENSION LOCK LIGHT (OR SOLENOID VALVE RETURN SIGNAL)	
C5	5610 (R)	PROGRAMMING SWITCH FOR HEADLAND MANAGEMENT	
C7	6510 (N)	CONSTANT SPEED SETPOINT 1	
C8	9027 (W)	CAL/SEL INPUT ANALOGUE-DIGITAL INSTRUMENT CLUSTER	

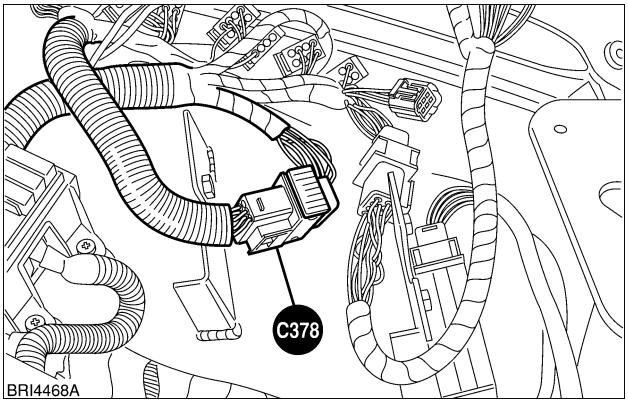
PLUG CONNECTION C378 - in PUMA Multicontroller PLUG CONNECTION SWITCH MODULE RIGHT SIDE CONSOLE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A1	7000 (U) / 7000A (U)	POWER SUPPLY TRANSMISSION CONTROLS	
A2	5640 (R)	AUTO SWITCH FOR HEADLAND MANAGEMENT	
A4	3025 (Y)	ALL WHEEL DRIVE SOLENOID VALVE (MANUAL)	
A5	3027 (Y)	ALL WHEEL DRIVE SOLENOID VALVE (AUTO)	

A6	7120 (Y)	DIFF. LOCK WARNING LIGHT (MANUAL)
A7	7125 (LTG) / 7125 (G)	DIFF. LOCK WARNING LIGHT (AUTO)
A8	7170 (W)	DIFFERENTIAL LOCK SWITCH (MANUAL ON)
B1	7175 (W)	DIFFERENTIAL LOCK SWITCH (AUTO ON)
B2	5630 (R)	MANUAL MODE SWITCH FOR HEADLAND MANAGEMENT
B3	6620 (N)	CONTROL UNIT COOLANT TEMP. SIGNAL
B4	6530 (N)	INCREASE CONSTANT SPEED
B5	6540 (N)	REDUCE CONSTANT SPEED
B6	7040 (N)	CRAWLER GROUP SWITCH
B7	1012W (R)	LIGHTING
B8	57AD (B) / 57 (B)	VEHICLE EARTH (ALL)
C1	5520C (G) / 5520C (LTG)	ELECTROHYDR. REMOTE VALVE 5V REF.
C2	3210 (U)	ON/OFF SWITCH FOR SUSPENSION RETURN SIGNAL
C3	3290 (O)	SUSPENSION LOCK LIGHT (OR SOLENOID VALVE RETURN SIGNAL)
C5	5610 (R)	PROGRAMMING SWITCH FOR HEADLAND MANAGEMENT
C6	5523 (G)	ELECTROHYDR. REMOTE VALVE ENGINE 3
C7	6510 (N)	CONSTANT SPEED SETPOINT 1

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4468B 12



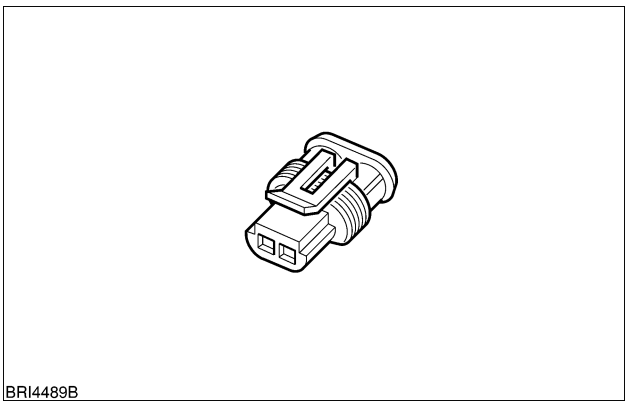
C378-BRI4468A 13

RIGHT-HAND SIDE CONSOLE

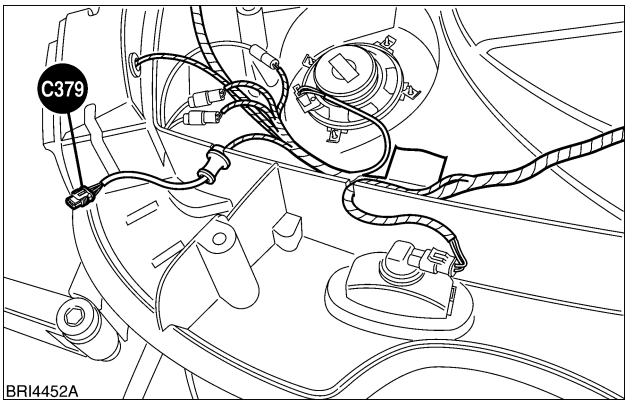
C379 SMV LIGHT FRONT LEFT (not used in PUMA Multicontroller)

PLUG CONNECTION C379 SMV LIGHT FRONT LEFT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	250A (LTG)	SMV LIGHTS LEFT	
2	57T (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 14



C379-BRI4452A 15

CAB ROOF FRONT - LEFT-HAND SIDE

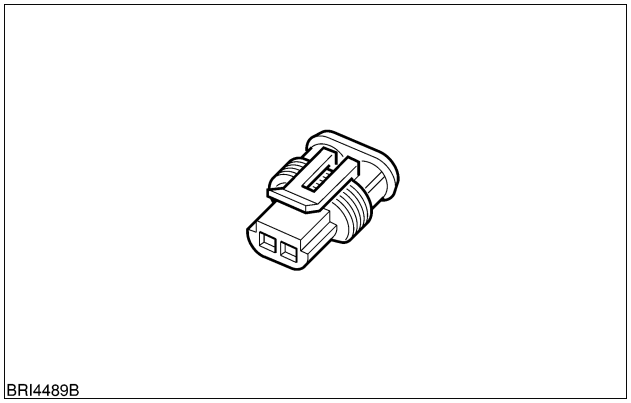
Wiring harness - Component diagram 38 Plug connections 380-389

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

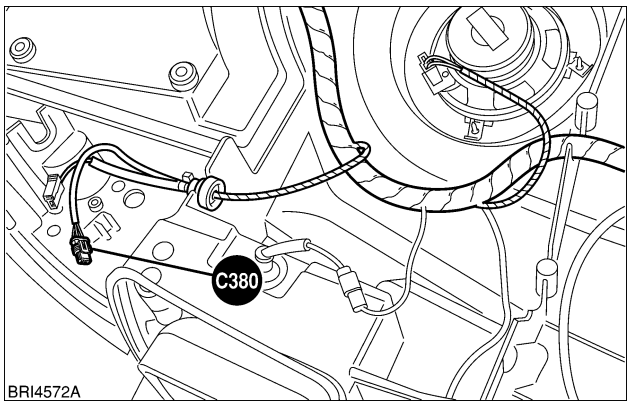
C380 SMV LIGHT LEFT REAR (not used in PUMA Multicontroller)

PLUG CONNECTION C380 SMV LIGHT LEFT REAR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	250B (LTG)	SMV LIGHTS LEFT	
2	57Q (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B-01 1



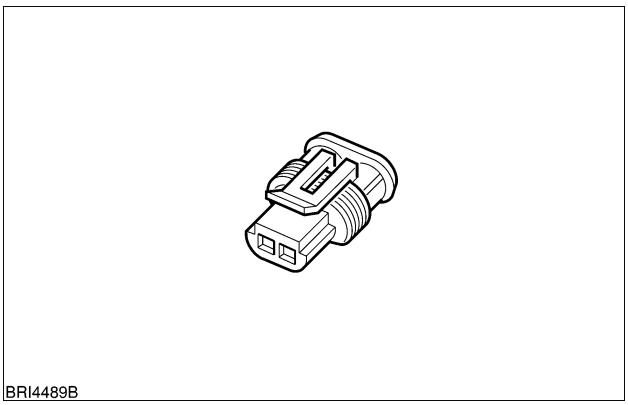
C380-BRI4572A 2

CAB ROOF REAR - LEFT-HAND SIDE

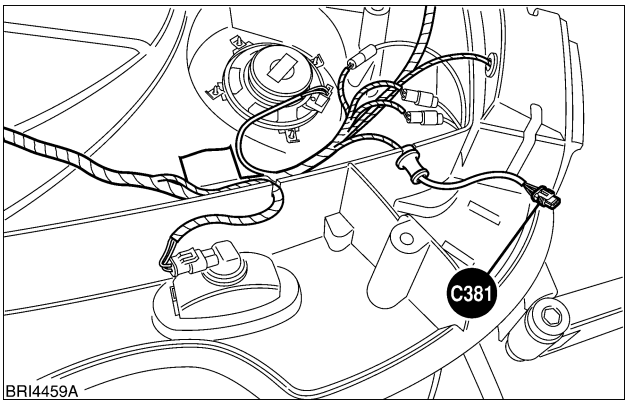
C381 SMV LIGHT RIGHT FRONT (not used in PUMA Multicontroller)

PLUG CONNECTION C381 SMV LIGHT RIGHT FRONT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	249A (LTG)	SMV LIGHTS RIGHT	
2	57K (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B-01 3



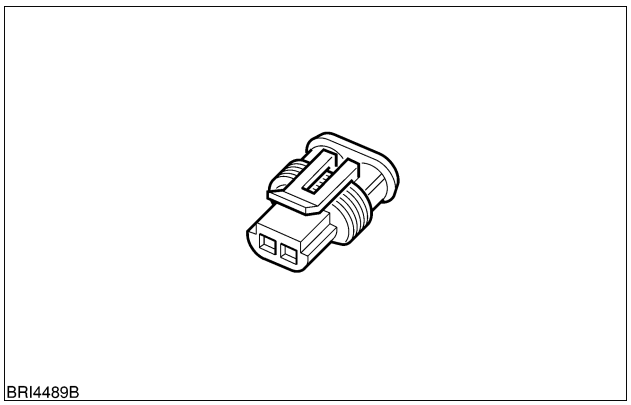
C381-BRI4459A 4

CAB ROOF FRONT - RIGHT-HAND SIDE

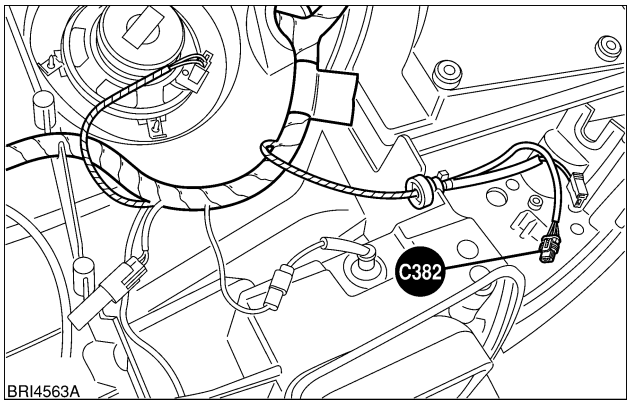
C382 SMV LIGHT RIGHT REAR (not used in PUMA Multicontroller)

PLUG CONNECTION C382 SMV LIGHT RIGHT REAR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	249B (LTG)	SMV LIGHTS RIGHT	
2	57G (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B-01 5



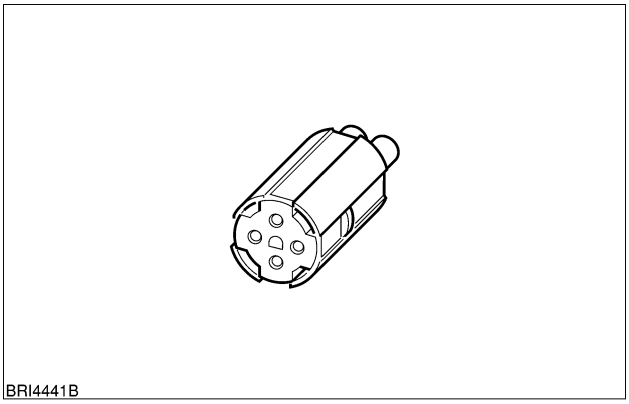
C382-BRI4563A 6

CAB ROOF REAR - RIGHT-HAND SIDE

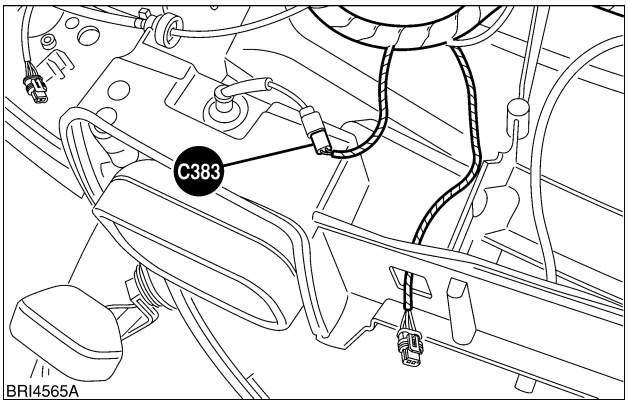
C383 WORK LAMP LEFT REAR

PLUG CONNECTION C383 WORK LAMP LEFT REAR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	997A (G)	POWER SUPPLY WORK LAMP - REAR (OUTER)	PUMA Standard: **Wiring harness - Electrical schematic frame 29 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 29 (A.30.A)**
4	57P (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4441B 7



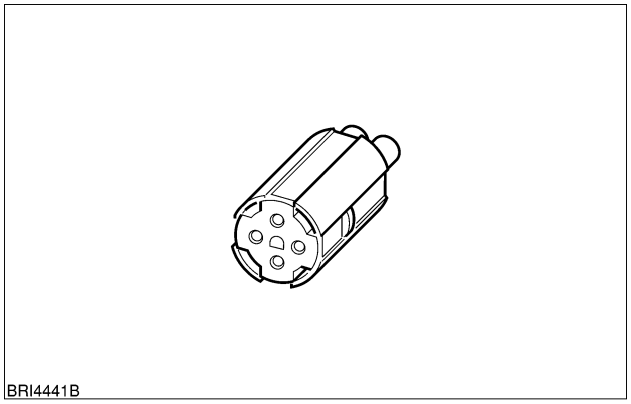
C383-BRI4565A 8

CAB ROOF REAR - LEFT-HAND SIDE

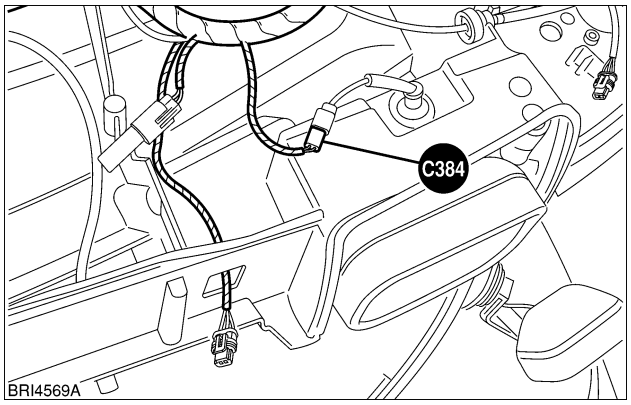
C384 WORK LAMP RIGHT REAR

PLUG CONNECTION C384 WORK LAMP RIGHT REAR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	997B (G)	POWER SUPPLY WORK LAMP - REAR (OUTER)	PUMA Standard: **Wiring harness - Electrical schematic frame 29 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 29 (A.30.A)**
4	57F (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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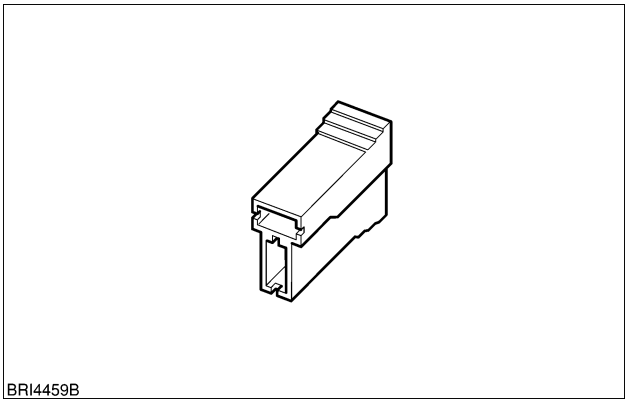
C384-BRI4569A 10

CAB ROOF REAR - RIGHT-HAND SIDE

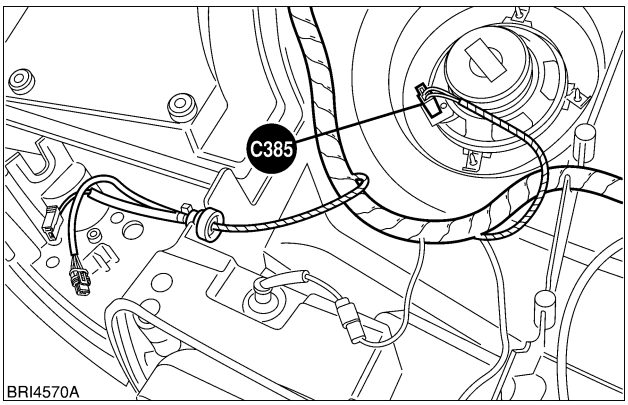
C385 SPEAKER - REAR LEFT

PLUG CONNECTION C385 SPEAKER - REAR LEFT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3091 (L)	SPEAKER REAR - RIGHT +	PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	3092 (L)	SPEAKER REAR - RIGHT -	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4459B 11



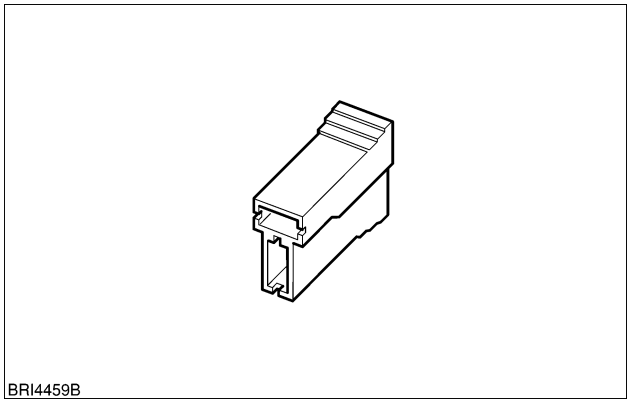
C385-BRI4570A 12

CAB ROOF REAR - LEFT-HAND SIDE

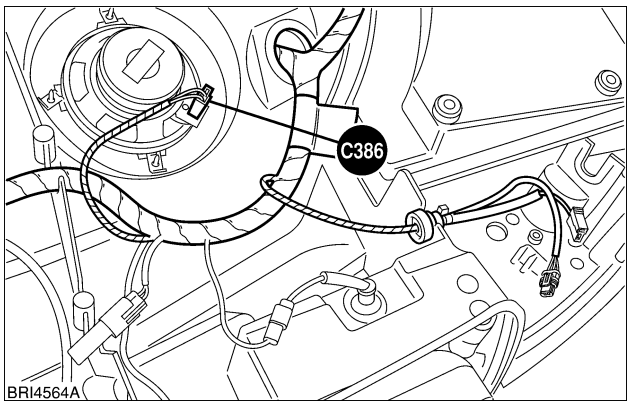
C386 SPEAKER - REAR RIGHT

PLUG CONNECTION C386 SPEAKER - REAR RIGHT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3097 (G)	SPEAKER REAR - LEFT +	PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	3098 (G)	SPEAKER REAR - LEFT -	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4459B 13



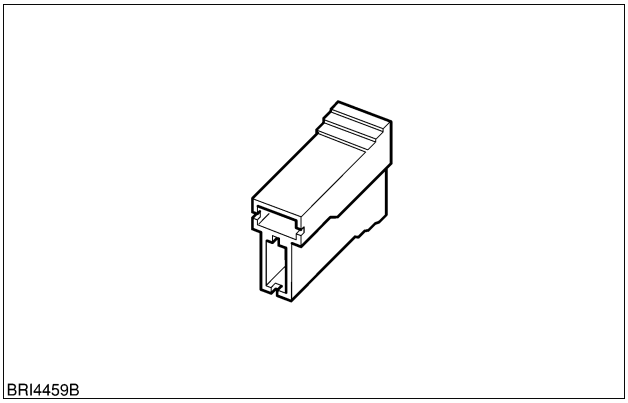
C386-BRI4564A 14

CAB ROOF REAR - RIGHT-HAND SIDE

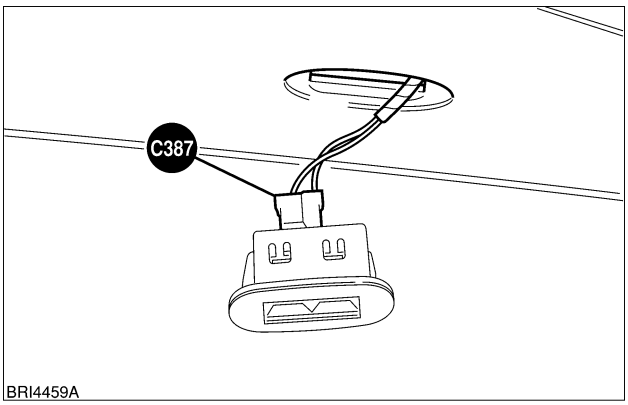
C387 CONSOLE LIGHTING RIGHT-HAND SIDE

PLUG CONNECTION C387 CONSOLE LIGHTING RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57H (B)	VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	1013B (R)	LIGHTS RIGHT-HAND SIDE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4459B 15



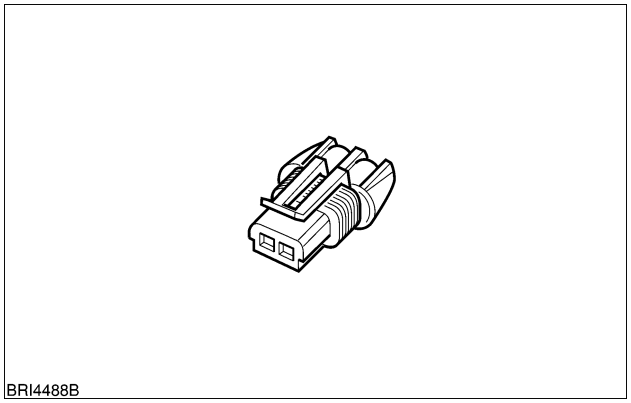
C387-BRI4459A 16

INSIDE OF THE CAB ROOF - RIGHT-HAND SIDE

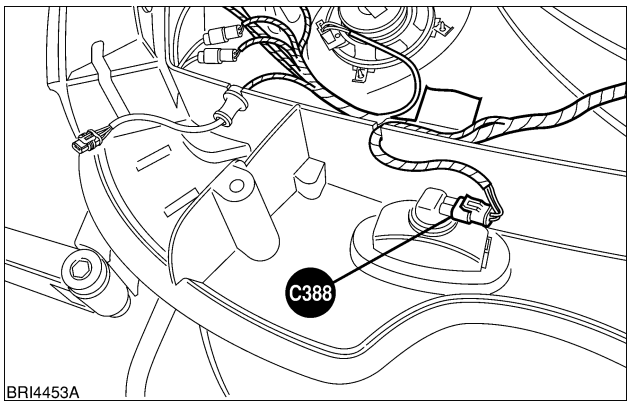
C388 STEPS LIGHTING LEFT-HAND SIDE

PLUG CONNECTION C388 STEPS LIGHTING LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3057A (L)		PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	666C (L)	POWER SUPPLY SWITCH INTERIOR LIGHT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4488B 17



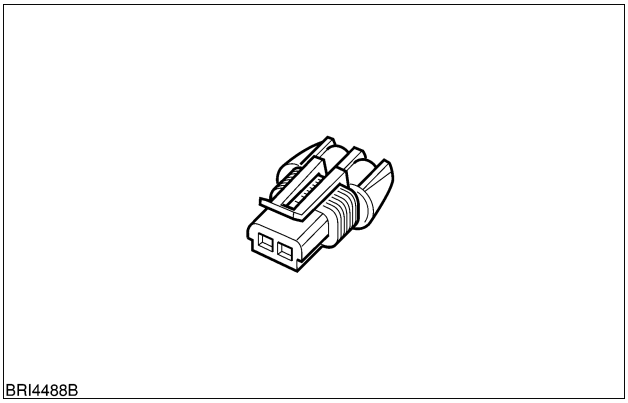
C388-BRI4453A 18

CAB ROOF FRONT - LEFT-HAND SIDE

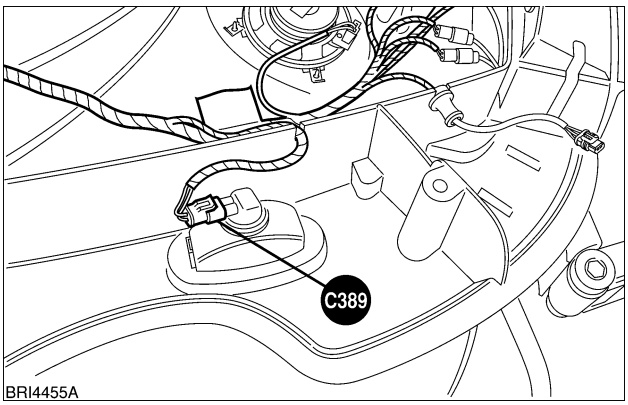
C389 STEPS LIGHTING RIGHT-HAND SIDE

PLUG CONNECTION C389 STEPS LIGHTING RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3057 (L)		PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	666B (L)	POWER SUPPLY SWITCH INTERIOR LIGHT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4488B 19



C389-BRI4455A 20

CAB ROOF FRONT - RIGHT-HAND SIDE

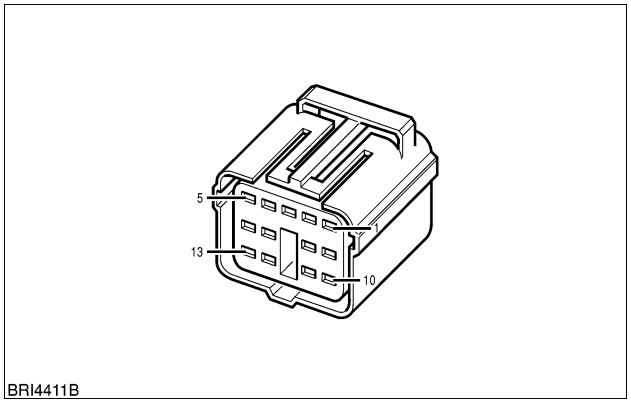
Wiring harness - Component diagram 39 Plug connections 390-399

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

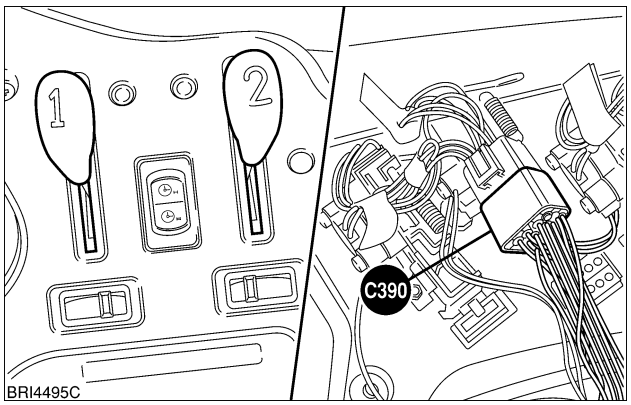
C390 ELECTROHYDR. REMOTE VALVE - LEVER 1-2 (not used in PUMA Multicontroller)

PLUG CONNECTION C390 ELECTROHYDR. REMOTE VALVE - LEVER 1-2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5521 (LTG)	ELECTROHYDR. REMOTE VALVE ENGINE 1	**Wiring harness - Electrical schematic frame 17 (A.30.A)**
2	5520A (G)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
3	5520B (G)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
4	5551 (O)	CONTROL KNOB SIGNAL ELECTRO-HYDR. REMOTE VALVE 1	
5	60A (B/W)	EARTH SENSOR	
6	5522 (G)	ELECTROHYDR. REMOTE VALVE ENGINE 2	
8	5520G (G)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
9	5520H (G)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
10	5552 (U)	CONTROL KNOB SIGNAL ELECTRO-HYDR. REMOTE VALVE 2	
11	60C (B/W)	EARTH SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4411B-01 1



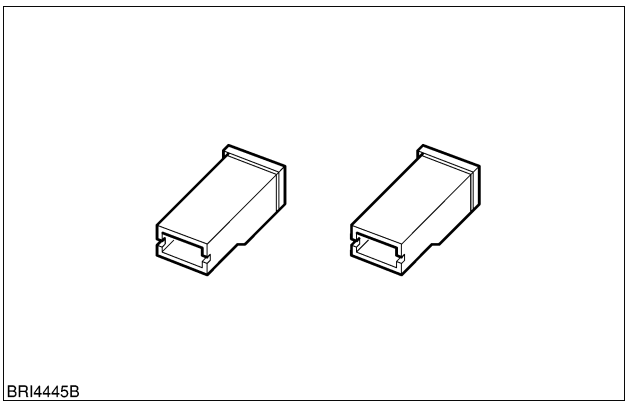
C390-BRI4495C 2

RIGHT-HAND SIDE CONSOLE - CONTROL PANEL ELECTROHYDR. REMOTE VALVE

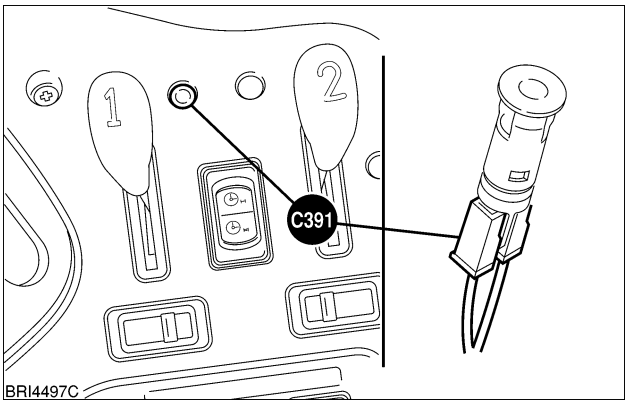
C391 LIGHT 1 (not used in PUMA Multicontroller)

PLUG CONNECTION C391 LIGHT 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5591 (LTG) / 5200A (N)	WARNING LIGHT ELECTROHYDR. REMOTE VALVE 1 / POWER SUPPLY EPC CONTROL VALVE	**Wiring harness - Electrical schematic frame 16 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4445B-02 3



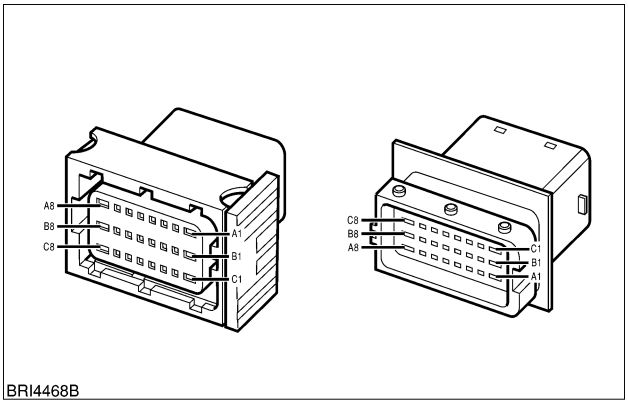
C391-BRI4497C 4

RIGHT-HAND SIDE CONSOLE - CONTROL PANEL ELECTROHYDR. REMOTE VALVE

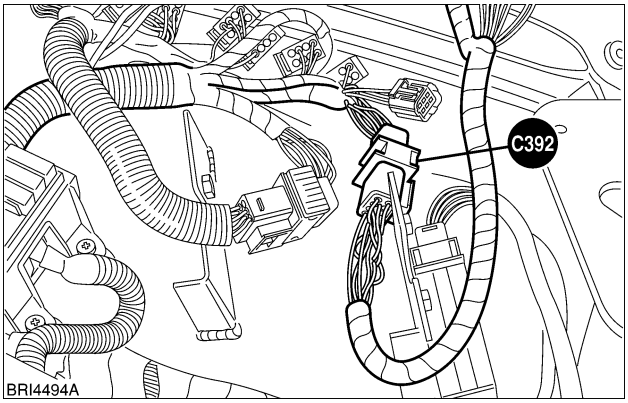
C392 ELECTROHYDR. REMOTE VALVE TO MAIN WIRING HARNESS REAR PLUG CONNECTION 1 (not used in PUMA Multicontroller)

PLUG CONNECTION C392 ELECTROHYDR. REMOTE VALVE TO MAIN WIRING HARNESS REAR PLUG CONNECTION 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A1	5520 (G)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
A2	5521 (LTG)	ELECTROHYDR. REMOTE VALVE ENGINE 1	
A3	5522 (G) / 5522 (LTG)	ELECTROHYDR. REMOTE VALVE ENGINE 2	
A4	5523 (LTG)	ELECTROHYDR. REMOTE VALVE ENGINE 3	
A5	5524 (LTG)	ELECTROHYDR. REMOTE VALVE ENGINE 4	
A6	5591 (LTG) / 5591 (L)	WARNING LIGHT ELECTROHYDR. REMOTE VALVE 1	
A7	5551 (O)	CONTROL KNOB SIGNAL ELECTRO-HYDR. REMOTE VALVE 1	
A8	5552 (U)	CONTROL KNOB SIGNAL ELECTRO-HYDR. REMOTE VALVE 2	
B1	5553 (O) / 5553 (W)	CONTROL KNOB SIGNAL ELECTRO-HYDR. REMOTE VALVE 3	
B2	5554 (O) / 5554 (U)	CONTROL KNOB SIGNAL ELECTRO-HYDR. REMOTE VALVE 4	
B3	5570 (L)		
B4	5572 (L)		
B5	5592 (L)	WARNING LIGHT ELECTROHYDR. REMOTE VALVE 2	
B6	5593 (L)	WARNING LIGHT ELECTROHYDR. REMOTE VALVE 3	
B7	5594 (L)	WARNING LIGHT ELECTROHYDR. REMOTE VALVE 4	
B8	5200 (N)	POWER SUPPLY EPC CONTROL VALVE	
C1	5561 (O)	SWITCH TIME-CONTROLLED OIL FLOW ELECTROHYDR. REMOTE VALVE 1	
C2	5562 (O)	SWITCH TIME-CONTROLLED OIL FLOW ELECTROHYDR. REMOTE VALVE 2	
C3	5563 (O)	SWITCH TIME-CONTROLLED OIL FLOW ELECTROHYDR. REMOTE VALVE 3	
C4	5564 (L)	SWITCH TIME-CONTROLLED OIL FLOW ELECTROHYDR. REMOTE VALVE 4	
C5	5596 (L) / 5596 (S)	ELECTROHYDR. REMOTE VALVE MAIN SWITCH TELLTALE	
C6	60 (B/W)	EARTH SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4468B 5



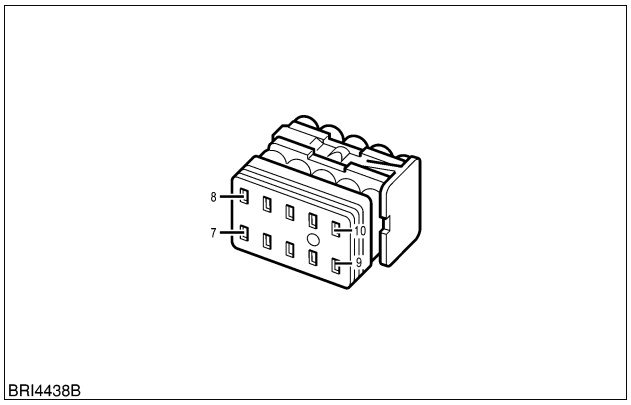
C392-BRI4494A 6

RIGHT-HAND SIDE CONSOLE - CONTROL PANEL ELECTROHYDR. REMOTE VALVE

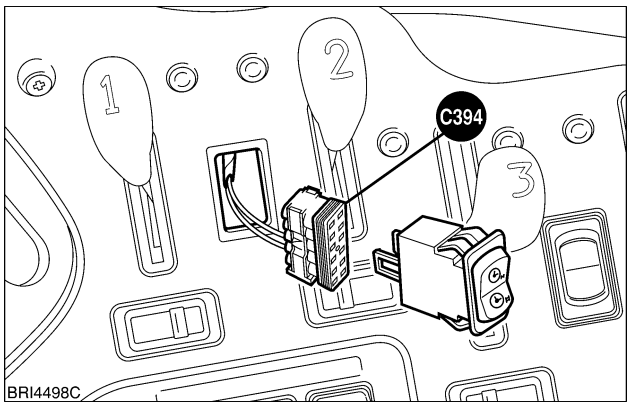
C394 ELECTROHYDR. REMOTE VALVE - SWITCH 1/2 TIME/OIL FLOW (not used in PUMA Multicontroller)

PLUG CONNECTION C394 ELECTROHYDR. REMOTE VALVE - SWITCH 1/2 TIME/OIL FLOW			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5561 (O)	SWITCH TIME-CONTROLLED OIL FLOW ELECTROHYDR. REMOTE VALVE 1	**Wiring harness - Electrical schematic frame 17 (A.30.A)**
5	5520C (G)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
6	5562 (O)	SWITCH TIME-CONTROLLED OIL FLOW ELECTROHYDR. REMOTE VALVE 2	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4438A 7



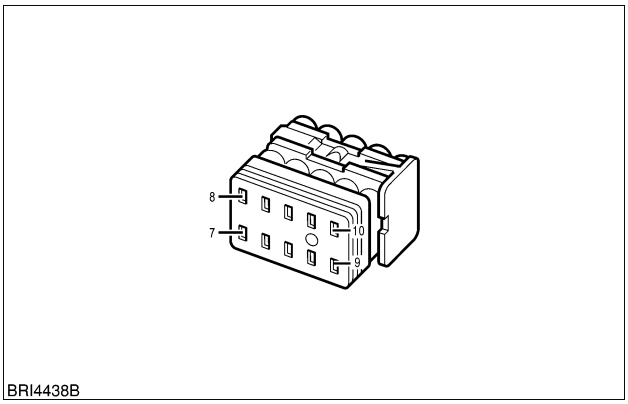
C394-BRI4498C 8

RIGHT-HAND SIDE CONSOLE - CONTROL PANEL ELECTROHYDR. REMOTE VALVE

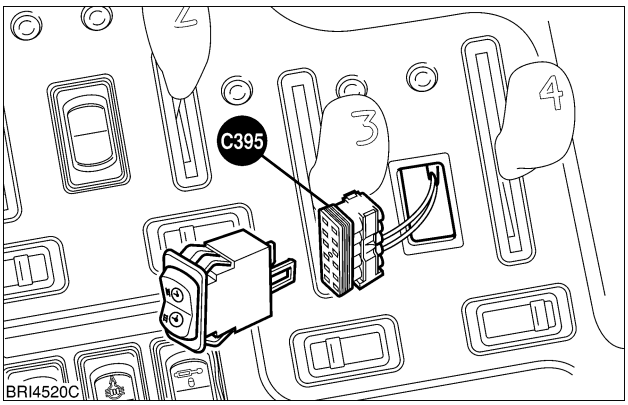
C395 ELECTROHYDR. REMOTE VALVE - SWITCH 3/4 TIME/OIL FLOW (not used in PUMA Multicontroller)

PLUG CONNECTION C395 ELECTROHYDR. REMOTE VALVE - SWITCH 3/4 TIME/OIL FLOW			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5563 (O)	SWITCH TIME-CONTROLLED OIL FLOW ELECTROHYDR. REMOTE VALVE 3	**Wiring harness - Electrical schematic frame 17 (A.30.A)**
5	5520D (G)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
6	5564 (L)	SWITCH TIME-CONTROLLED OIL FLOW ELECTROHYDR. REMOTE VALVE 4	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4438A 9



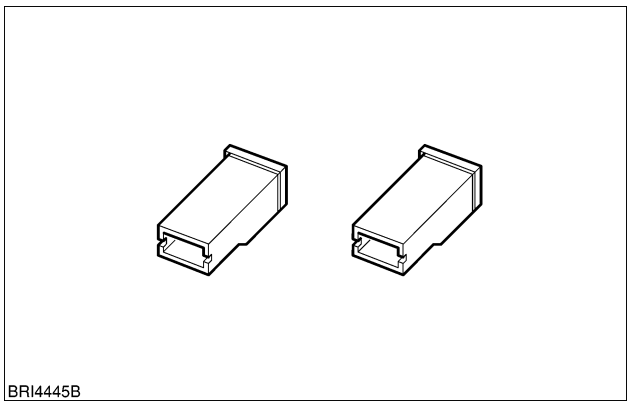
C395-BRI4520C 10

RIGHT-HAND SIDE CONSOLE - CONTROL PANEL ELECTROHYDR. REMOTE VALVE

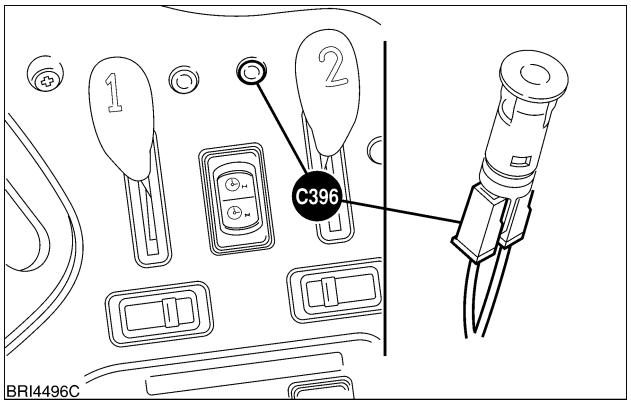
C396 LAMP 2 (not used in PUMA Multicontroller)

PLUG CONNECTION C396 LIGHT 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5200B (N) / 5592 (L)	POWER SUPPLY EPC CONTROL VALVE / WARNING LIGHT ELECTROHYDR. REMOTE VALVE 2	**Wiring harness - Electrical schematic frame 16 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4445B-02 11



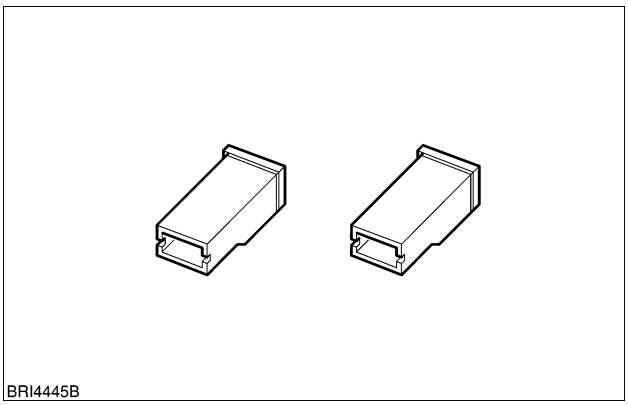
C396-BRI4496C 12

RIGHT-HAND SIDE CONSOLE - CONTROL PANEL ELECTROHYDR. REMOTE VALVE

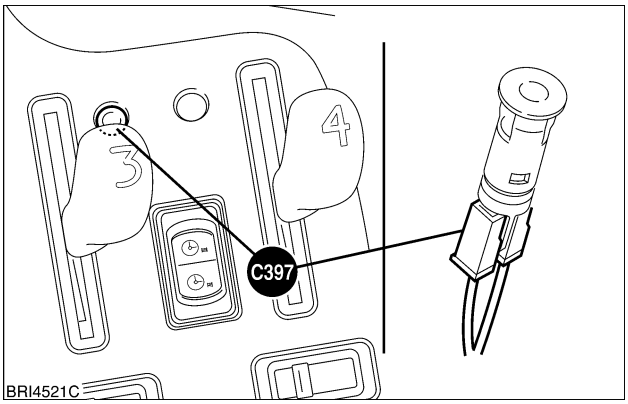
C397 LAMP 3 (not used in PUMA Multicontroller)

PLUG CONNECTION C397 LIGHT 3			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5200C (N) / 5593 (L)	POWER SUPPLY EPC CONTROL VALVE / WARNING LIGHT ELECTROHYDR. REMOTE VALVE 3	**Wiring harness - Electrical schematic frame 16 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4445B-02 13



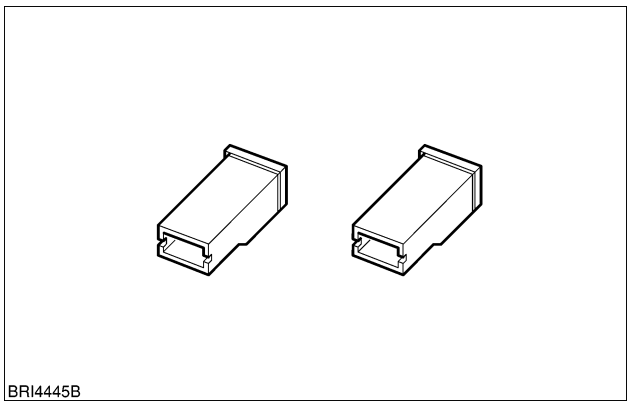
C397-BRI4521C 14

RIGHT-HAND SIDE CONSOLE - CONTROL PANEL ELECTROHYDR. REMOTE VALVE

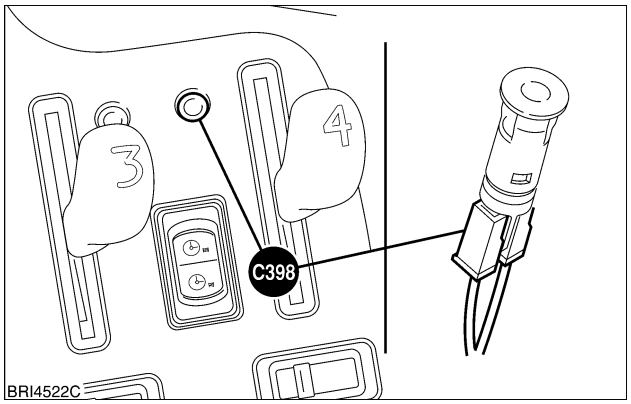
C398 LAMP 4 (not used in PUMA Multicontroller)

PLUG CONNECTION C398 LIGHT 4			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5200D (N) / 5594 (L)	POWER SUPPLY EPC CONTROL VALVE / WARNING LIGHT ELECTROHYDR. REMOTE VALVE 4	**Wiring harness - Electrical schematic frame 16 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4445B-02 15



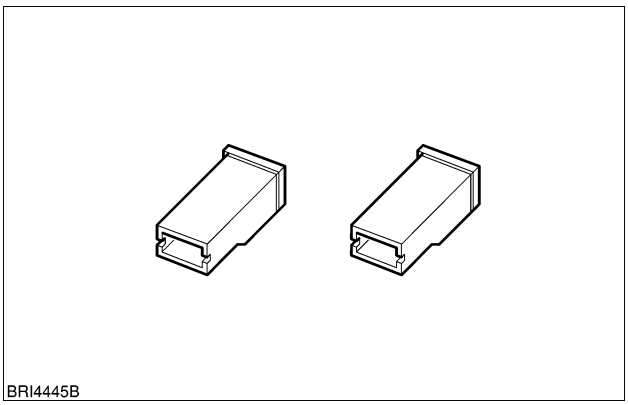
C398-BRI4522C 16

RIGHT-HAND SIDE CONSOLE - CONTROL PANEL ELECTROHYDR. REMOTE VALVE

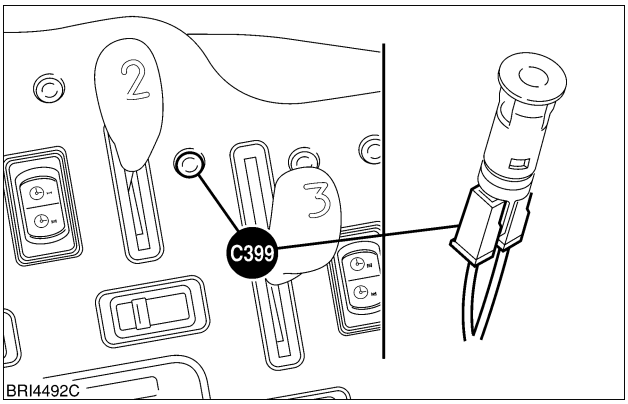
C399 MAIN TELLTALE (not used in PUMA Multicontroller)

PLUG CONNECTION C399 MAIN TELLTALE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5200E (N) / 5596 (L)	POWER SUPPLY EPC CONTROL VALVE / ELECTROHYDR. REMOTE VALVE MAIN SWITCH TELLTALE	**Wiring harness - Electrical schematic frame 16 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4445B-02 17



C399-BRI4492C 18

RIGHT-HAND SIDE CONSOLE - CONTROL PANEL ELECTROHYDR. REMOTE VALVE

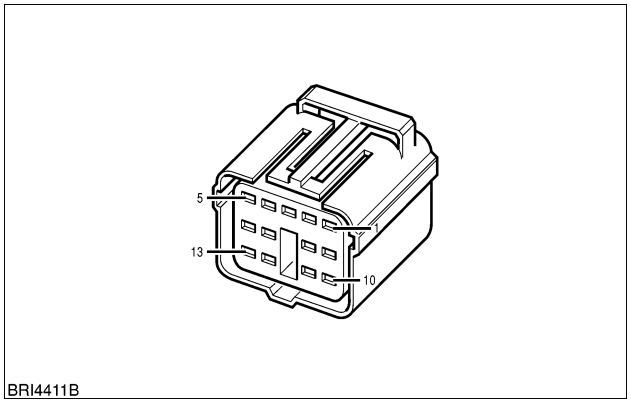
Wiring harness - Component diagram 40 Plug connections 400-409

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

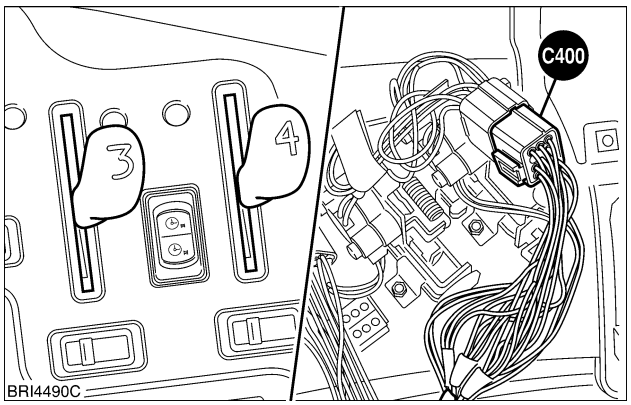
C400 ELECTROHYDR. REMOTE VALVE - LEVER 3-4 (not used in PUMA Multicontroller)

PLUG CONNECTION C400 CONTROL SWITCH 3-4			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5523 (LTG)	ELECTROHYDR. REMOTE VALVE ENGINE 3	**Wiring harness - Electrical schematic frame 17 (A.30.A)**
2	5520E (G)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
3	5520F (G)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
4	5553 (O)	CONTROL KNOB SIGNAL ELECTRO-HYDR. REMOTE VALVE 3	
5	60B (B/W)	EARTH SENSOR	
6	5524 (LTG)	ELECTROHYDR. REMOTE VALVE ENGINE 4	
8	5520J (G)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
9	5520K (G)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
10	5554 (O)	CONTROL KNOB SIGNAL ELECTRO-HYDR. REMOTE VALVE 4	
11	60D (B/W)	EARTH SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4411B-01 1



C400-BRI4490C 2

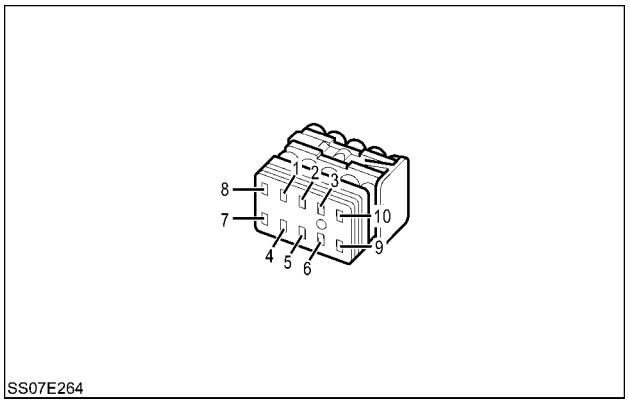
RIGHT-HAND SIDE CONSOLE - CONTROL UNIT LEVER

C401 PROGRAMMING SWITCH FOR CONSTANT SPEED (ENGINE SPEED SETTING)

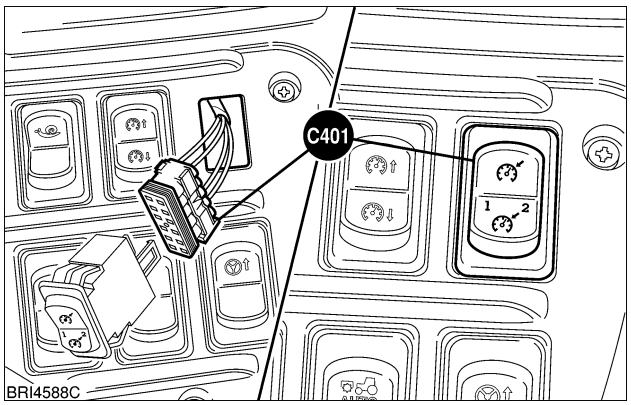
PLUG CONNECTION C401 PROGRAMMING SWITCH FOR CONSTANT SPEED (ENGINE SPEED SETTING).			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6620 (N)	CONTROL UNIT COOLANT TEMP. SIGNAL	**Wiring harness - Electrical schematic frame 02 (A.30.A)**
2	7000E (U)	POWER SUPPLY TRANSMISSION CONTROLS	
5	7000AE (U)	POWER SUPPLY TRANSMISSION CONTROLS	
6	6510 (N)	CONSTANT SPEED SETPOINT 1	
7	57F (B)	VEHICLE EARTH (ALL)	
9	57G (B)	VEHICLE EARTH (ALL)	

PLUG CONNECTION C401 - in PUMA Multicontroller PROGRAMMING SWITCH FOR CONSTANT SPEED (ENGINE SPEED SETTING).			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6620 (N)	CONTROL UNIT COOLANT TEMP. SIGNAL	**Wiring harness - Electrical schematic frame 02 (A.30.A)**
2	7000AE (U)	POWER SUPPLY TRANSMISSION CONTROLS	
5	7000AE (U)	POWER SUPPLY TRANSMISSION CONTROLS	
6	6510 (N)	CONSTANT SPEED SETPOINT 1	
7	57KC (B)	VEHICLE EARTH (ALL)	
8	1012AD (R)	LIGHTING	
9	57KD (B)	VEHICLE EARTH (ALL)	
10	1012AE (R)	LIGHTING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C401-BRI4588C 4

RIGHT-HAND SIDE CONSOLE - KEY PAD

C406 SOLENOID VALVE TRAILER BRAKE

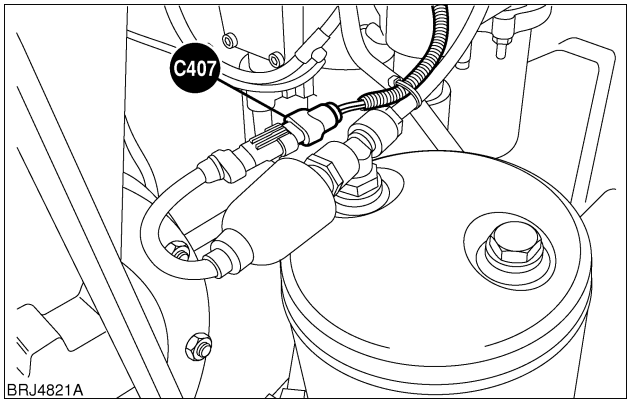
PLUG CONNECTION C406 SOLENOID VALVE TRAILER BRAKE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	8000X (N)	SOLENOID VALVE TRAILER BRAKE	PUMA Standard: **Wiring harness - Electrical schematic frame 30 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 30 (A.30.A)**
2	57EK (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C407 PRESSURE SWITCH FOR AIR BRAKE SYSTEM

PLUG CONNECTION C407 PRESSURE SWITCH FOR AIR BRAKE SYSTEM			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	8010 (TN)	PRESSURE TRAILER BRAKE	PUMA Standard: **Wiring harness - Electrical schematic frame 30 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 30 (A.30.A)**
2	8020B (TN)	PRESSURE TRAILER BRAKE	
3	2095D (G)	EARTH SIGNAL INSTRUMENTS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



C407-BRJ4821A 5

C408 SOLENOID VALVE TRAILER BRAKE 1

PLUG CONNECTION C408 SOLENOID VALVE TRAILER BRAKE 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	8000B (N) / 8000C (N)	SOLENOID VALVE TRAILER BRAKE	PUMA Standard: **Wiring harness - Electrical schematic frame 30 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 30 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C409 PUMP PRESSURE SWITCH TRAILER BRAKE ITALY VERSION

PLUG CONNECTION C409 PUMP PRESSURE SWITCH TRAILER BRAKE ITALY VERSION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	8010A (TN) / 8060E (U)	TRAILER BRAKE PRESSURE / POWER SUPPLY FOR TRAILER BRAKE	PUMA Standard: **Wiring harness - Electrical schematic frame 30 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 30 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

Wiring harness - Component diagram 41 Plug connections 410-419

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C410 PRESSURE SWITCH TRAILER BRAKEPIPE ITALY VERSION

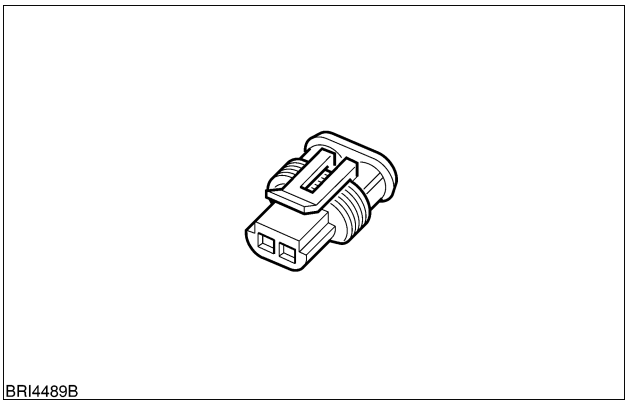
PLUG CONNECTION C410 PRESSURE SWITCH TRAILER BRAKEPIPE ITALY VERSION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	8020A (TN) / 57FA (B)	TRAILER BRAKE PRESSURE / VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 30 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 30 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

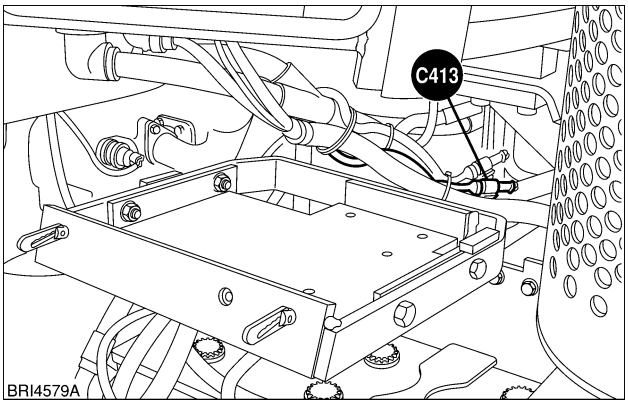
C413 FRONT LOADER CONTROL VALVE 1

PLUG CONNECTION C413 FRONT LOADER SOLENOID VALVE 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3272 (O)	FRONT LOADER CONTROL VALVE 1 OUTPUT	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 17 (A.30.A)**
2	3273 (O)	FRONT LOADER CONTROL VALVE 1 RETURN SIGNAL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 1



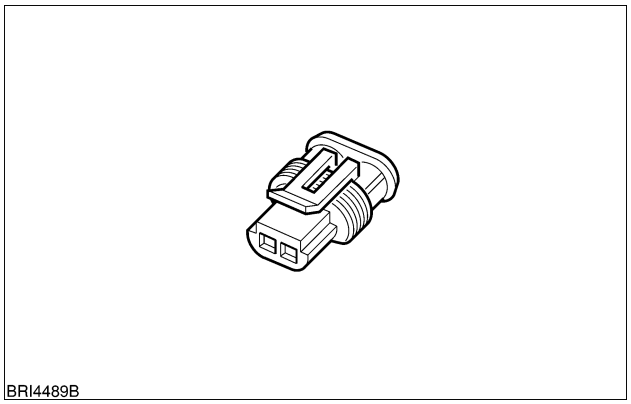
C413-BRI4579A 2

BEHIND STEPS - RIGHT-HAND SIDE

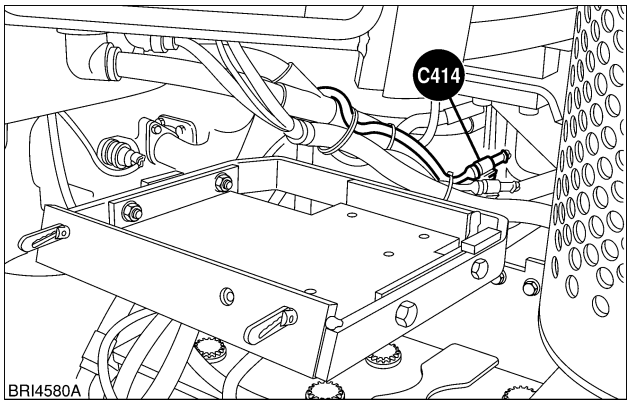
C414 FRONT LOADER CONTROL VALVE 2

PLUG CONNECTION C414 FRONT LOADER CONTROL VALVE 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3274 (R)	FRONT LOADER CONTROL VALVE 2 OUTPUT	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 17 (A.30.A)**
2	3275 (R)	FRONT LOADER CONTROL VALVE 2 RETURN SIGNAL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 3



C414-BRI4580A 4

BEHIND STEPS - RIGHT-HAND SIDE

C415 8A TERMINAL STUD / 439 8A TERMINAL STUD

PLUG CONNECTION C415 8A TERMINAL STUD / 439 8A TERMINAL STUD			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57D (B) / 3070 (P/W)	EARTH (ALL) / POWER SUPPLY SOCKET ON B-PILLAR	**Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	57 (B) / 3070 (P/W)	EARTH (ALL) / POWER SUPPLY SOCKET ON B-PILLAR	

PLUG CONNECTION C415 - in PUMA Multicontroller 8A TERMINAL STUD / 439 8A TERMINAL STUD			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3070A (L) / 3070 (P/W)	POWER SUPPLY SOCKET ON THE B-PILLAR	**Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	57 (B) / 57PT (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C416 20 AMP MULTI B+ (not used in PUMA Multicontroller)

PLUG CONNECTION C416 20 AMP MULTI B+			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57E (B)	VEHICLE EARTH (ALL)	**Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	3070C (P)	POWER SUPPLY SOCKET ON THE B-PILLAR	
3	9032 (Y/G)	STARTER SWITCH+ TO SOCKET	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C417 8A RING TERMINALS (2 OFF)

PLUG CONNECTION C417 8A RING TERMINALS (2 OFF)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57 (B)	VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 23 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 23 (A.30.A)**
2	3070 (P/W)	POWER SUPPLY SOCKET ON THE B-PILLAR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

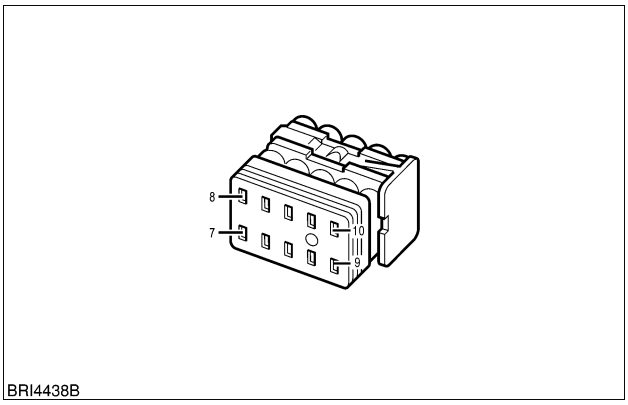
Wiring harness - Component diagram 42 Plug connections 420-429

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C422 PTO MANAGEMENT (not used in PUMA Multicontroller)

PLUG CONNECTION C422 PTO MANAGEMENT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	2050C (G)	POWER SUPPLY PTO / SHIFTING CLAW	**Wiring harness - Electrical schematic frame 20 (A.30.A)**
3	2069 (U)	PTO MANAGEMENT ON	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



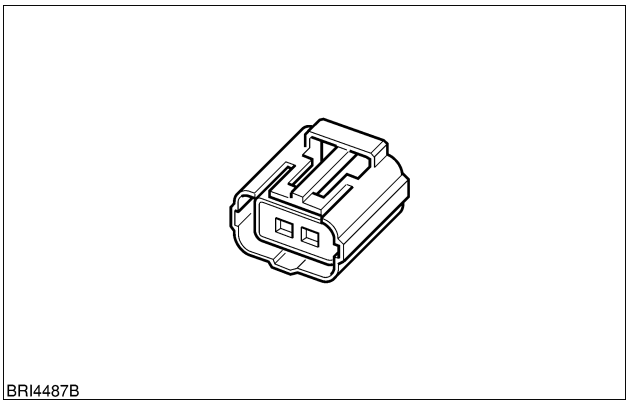
BRI4438A 1

C424 POWER SUPPLY FRONT LOADER

PLUG CONNECTION C424 POWER SUPPLY FRONT LOADER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3271A (O)	FRONT LOADER RELAY POWER SUPPLY	**Wiring harness - Electrical schematic frame 04 (A.30.A)**
2	57FP (B)	VEHICLE EARTH (ALL)	

PLUG CONNECTION C424 - in PUMA Multicontroller POWER SUPPLY FRONT LOADER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3271A (O) / 3271 (R)	FRONT LOADER RELAY POWER SUPPLY	**Wiring harness - Electrical schematic frame 17 (A.30.A)**
2	1006C (N) / 1006 (U)	WARNING LIGHT 3-PHASE ALTERNATOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



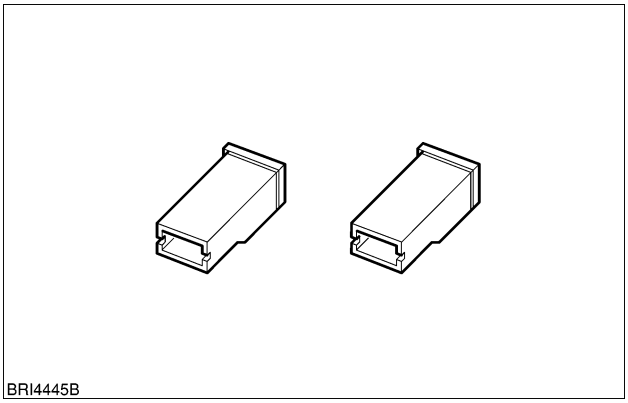
BRI4487B 2

RIGHT-HAND SIDE CONSOLE

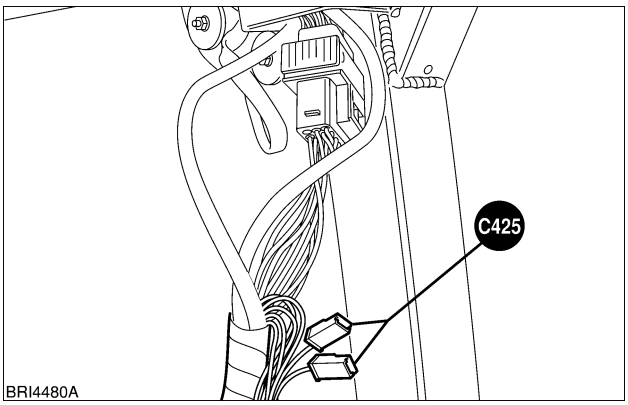
C425 AUXILIARY HEADLIGHT SWITCH

PLUG CONNECTION C425 AUXILIARY HEADLIGHT SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1030A (U) / 1027A (U)	HEADLAMP DIP BEAM / MAIN BEAM HEADLIGHT	PUMA Standard: **Wiring harness - Electrical schematic frame 27 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 27 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4445B 3



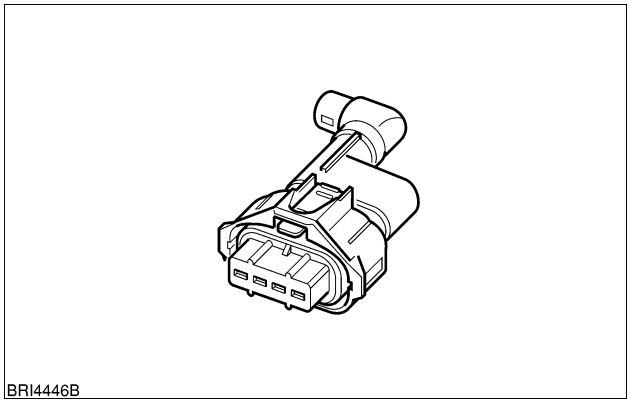
C425-BRI4480A 4

C-PILLAR RIGHT-HAND SIDE

C427 CHARGING PRESSURE/TEMPERATURE SENSOR (EDC 16)

PLUG CONNECTION C427 CHARGING PRESSURE/TEMPERATURE SENSOR (EDC 16)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1			PUMA Standard: **Wiring harness - Electrical schematic frame 04 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 04 (A.30.A)**
2			
3			
4			

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



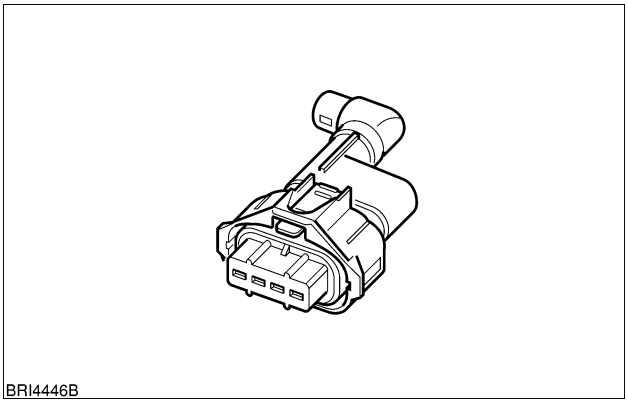
BRI4446B 5

ENGINE - LEFT-HAND SIDE

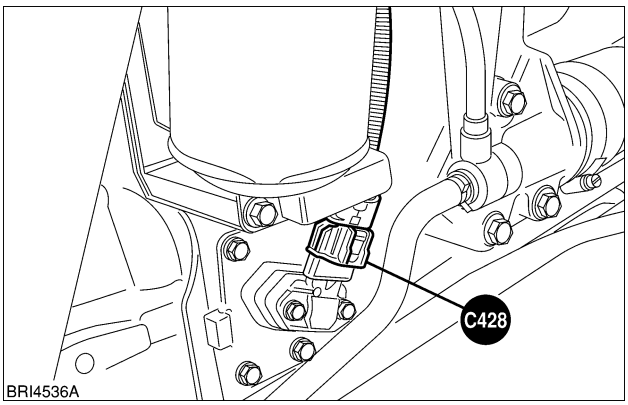
C428 OIL PRESSURE/TEMPERATURE SENSOR (EDC 16)

PLUG CONNECTION C428 OIL PRESSURE/TEMPERATURE SENSOR (EDC 16)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1			PUMA Standard: **Wiring harness - Electrical schematic frame 05 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 05 (A.30.A)**
2			
3			
4			

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4446B 6



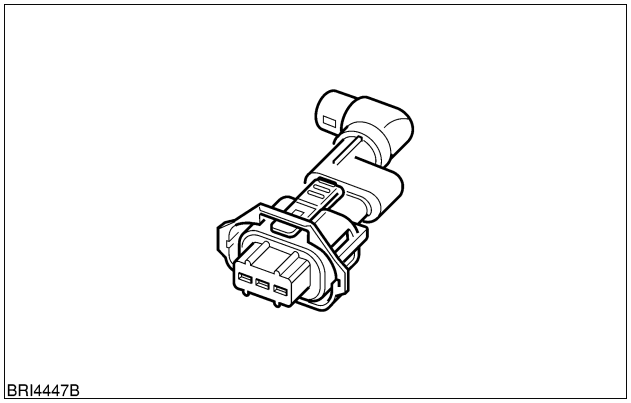
C428-BRI4536A 7

ENGINE - RIGHT-HAND SIDE

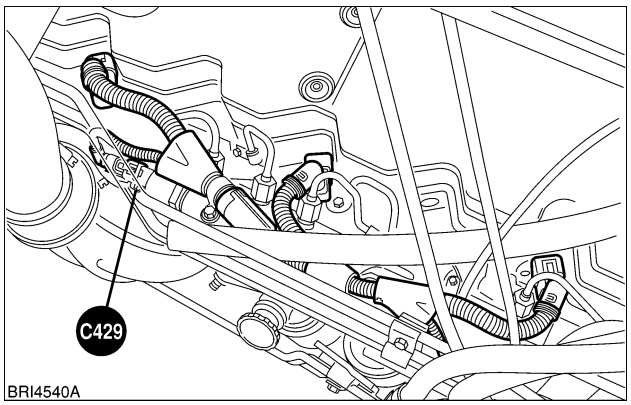
C429 RAIL PRESSURE SENSOR (EDC 16)

PLUG CONNECTION C429 RAIL PRESSURE SENSOR (EDC 16)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1			PUMA Standard: **Wiring harness - Electrical schematic frame 05 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 05 (A.30.A)**
2			
3			

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4447B 8



C429-BRI4540A 9

BONNET - LEFT-HAND SIDE

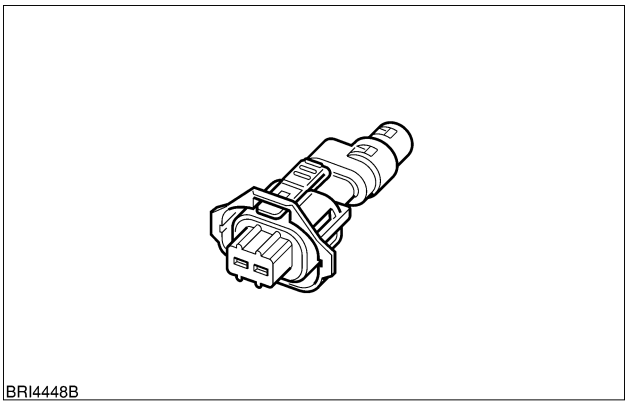
Wiring harness - Component diagram 43 Plug connections 430-439

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C430 COOLANT TEMPERATURE SENSOR

PLUG CONNECTION C430 COOLANT TEMPERATURE SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	P/B	SIGNAL	PUMA Standard: **Wiring harness - Electrical schematic frame 05 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 05 (A.30.A)**
2	W/Y	EARTH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



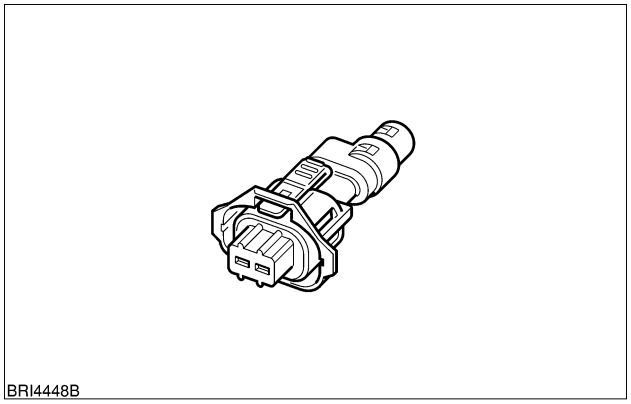
BRI4448B 1

ENGINE - FRONT

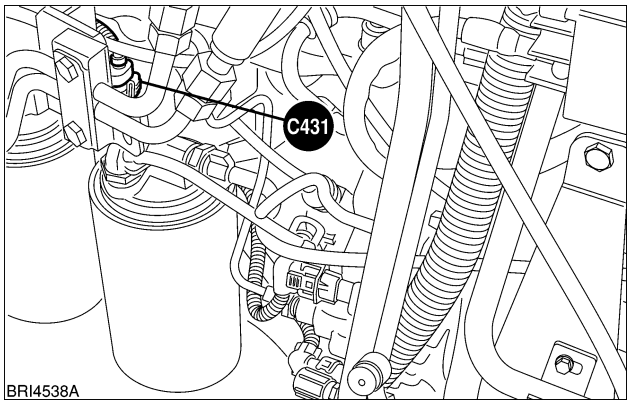
C431 FUEL TEMPERATURE SENSOR

PLUG CONNECTION C431 FUEL TEMPERATURE SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	W/U	SIGNAL	PUMA Standard: **Wiring harness - Electrical schematic frame 05 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 05 (A.30.A)**
2	O/B	EARTH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4448B 2



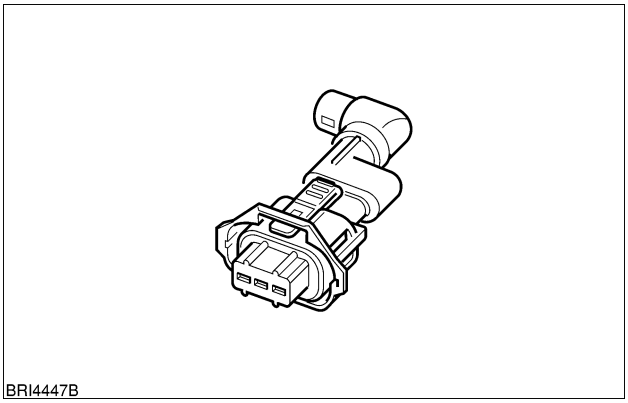
C431-BRI4538A 3

ENGINE - LEFT-HAND SIDE

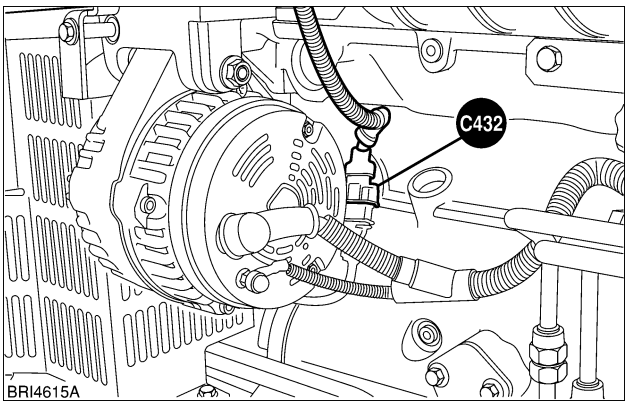
C432 CRANKSHAFT SPEED SENSOR

PLUG CONNECTION C432 CRANKSHAFT SPEED SENSOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	W	NEGATIVE	PUMA Standard: **Wiring harness - Electrical schematic frame 05 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 05 (A.30.A)**
2	R	POSITIVE	
3	R	LUBRICATION FOR SENSOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4447B 4



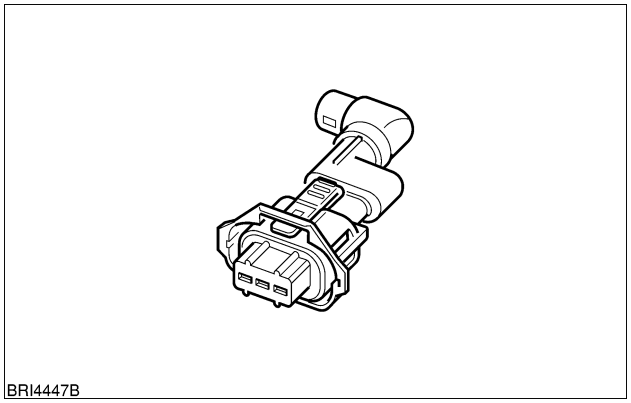
C432-BRI4615A 5

ENGINE - LEFT-HAND SIDE

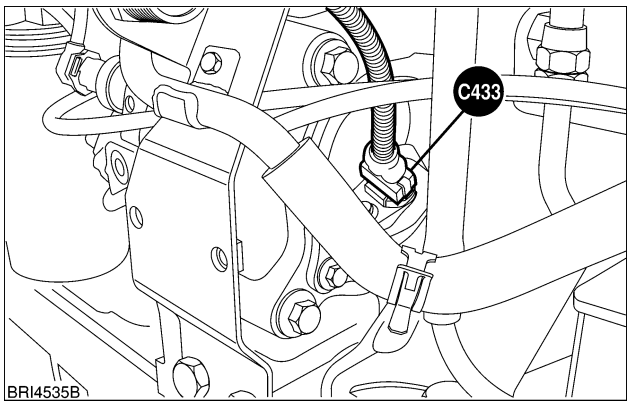
C433 CAMSHAFT SPEED SENSOR (EDC 16)

PLUG CONNECTION C433 CAMSHAFT SPEED SENSOR (EDC 16)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	W	SENSOR EARTH	PUMA Standard: **Wiring harness - Electrical schematic frame 05 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 05 (A.30.A)**
2	R	SENSOR SIGNAL	
3	G	SENSOR SUPPLY	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4447B 6



C433-BRI4535B 7

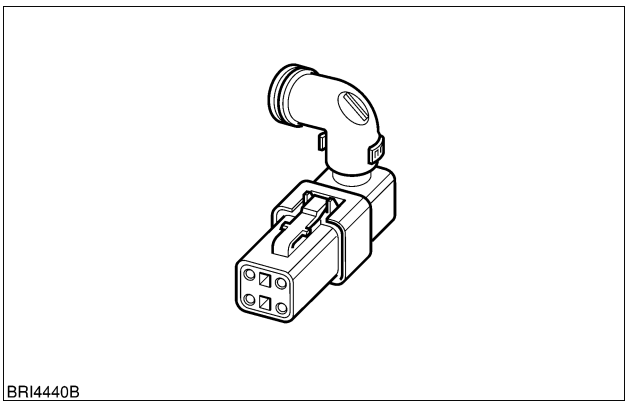
ENGINE - LEFT-HAND SIDE

C434 INJECTOR CYLINDER 1 (EDC 16)

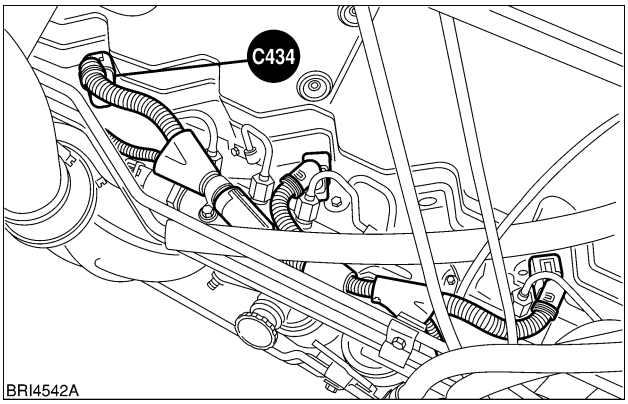
PLUG CONNECTION C434 INJECTOR CYLINDER 1 (EDC 16)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
3	1100 (N/W)		**Wiring harness - Electrical schematic frame 05 (A.30.A)**
4	1100 (S/Y)		

PLUG CONNECTION C434 - in PUMA Multicontroller INJECTOR CYLINDER 1 / 2 (EDC 16)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(N/B)	POSITIVE	**Wiring harness - Electrical schematic frame 05 (A.30.A)**
2	(S/R)	NEGATIVE	
3	(S/Y)	POSITIVE	
4	(N/W)	NEGATIVE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4440B 8



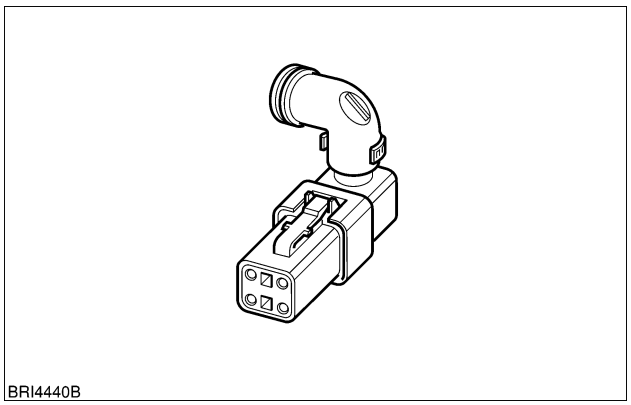
C434-BRI4542A 9

BONNET - LEFT-HAND SIDE

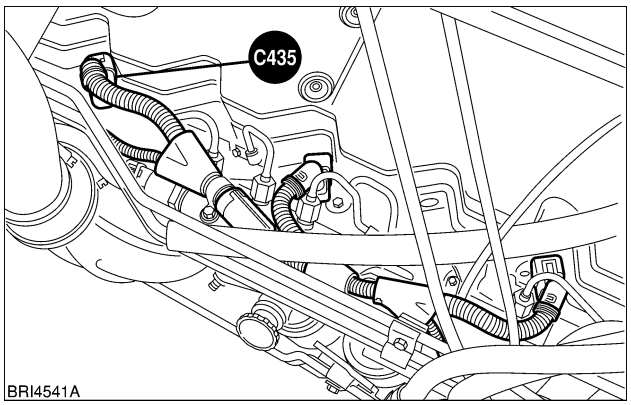
C435 INJECTOR CYLINDER 2 (EDC 16) (not used in PUMA Multicontroller)

PLUG CONNECTION C435 INJECTOR CYLINDER 2 (EDC 16)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1100 (N/B)		**Wiring harness - Electrical schematic frame 05 (A.30.A)**
2	1100 (S/R)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4440B 10



C435-BRI4541A 11

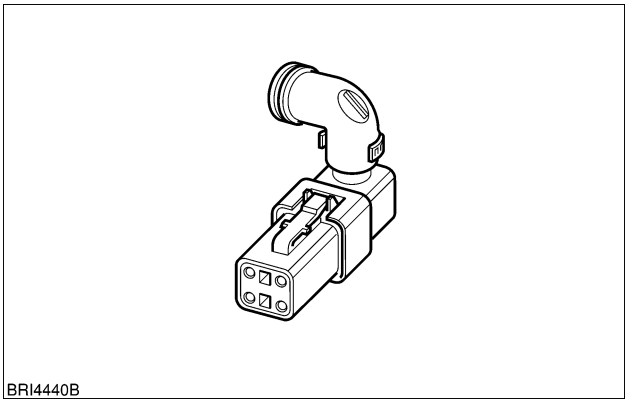
BONNET - LEFT-HAND SIDE

C436 INJECTOR CYLINDER 3 (EDC 16)

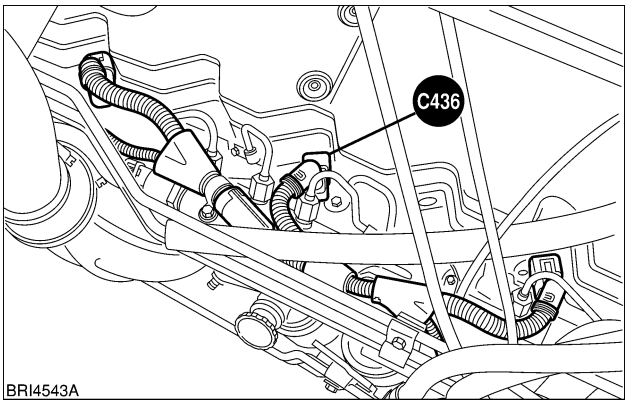
PLUG CONNECTION C436 INJECTOR CYLINDER 3 (EDC 16)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
3	910 (S/B)		**Wiring harness - Electrical schematic frame 05 (A.30.A)**
4	910 (N/G)		

PLUG CONNECTION C436 - in PUMA Multicontroller INJECTOR CYLINDER 3 / 4 (EDC 16)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(G/W)	POSITIVE	**Wiring harness - Electrical schematic frame 05 (A.30.A)**
2	(O/B)	NEGATIVE	
3	(S/B)	POSITIVE	
4	(N/G)	NEGATIVE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4440B 12



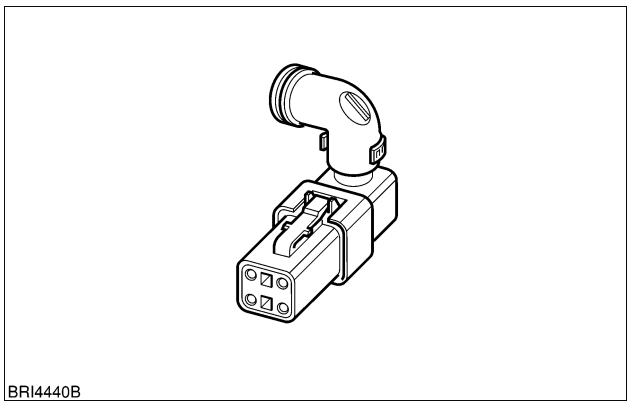
C436-BRI4543A 13

BONNET - LEFT-HAND SIDE

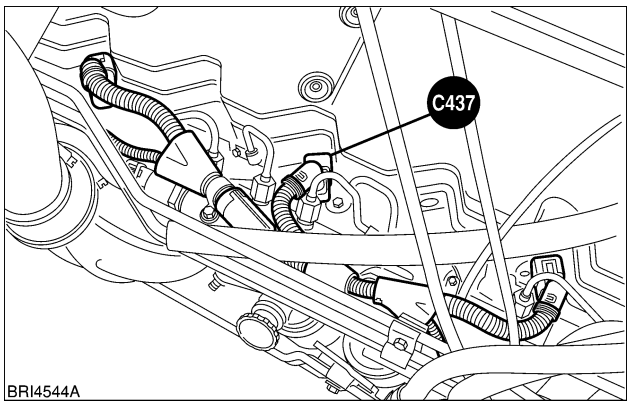
C437 INJECTOR CYLINDER 4 (EDC 16) (not used in PUMA Multicontroller)

PLUG CONNECTION C437 INJECTOR CYLINDER 4 (EDC 16)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	910 (G/W)		**Wiring harness - Electrical schematic frame 05 (A.30.A)**
2	910 (O/B)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4440B 14



C437-BRI4544A 15

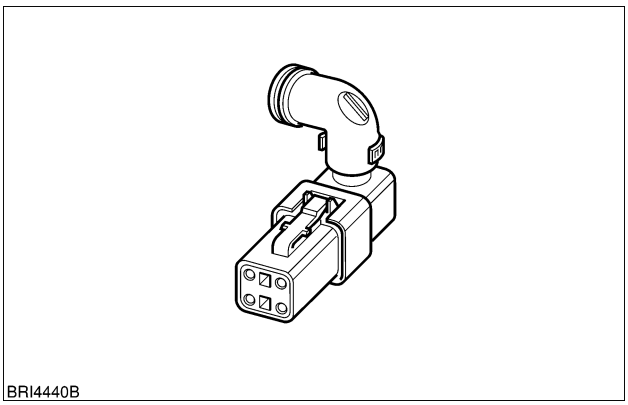
BONNET - LEFT-HAND SIDE

C438 INJECTOR CYLINDER 5 (EDC 16)

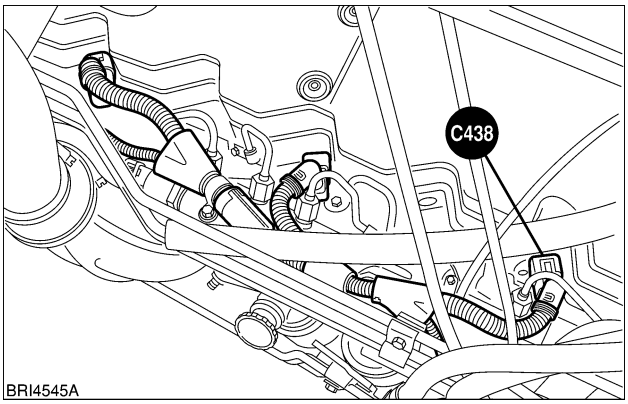
PLUG CONNECTION C438 INJECTOR CYLINDER 5 (EDC 16)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
3	880 (O/U)		**Wiring harness - Electrical schematic frame 05 (A.30.A)**
4	880 (G/Y)		

PLUG CONNECTION C438 - in PUMA Multicontroller INJECTOR CYLINDER 5 / 6 (EDC 16)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(G/B)	POSITIVE	**Wiring harness - Electrical schematic frame 05 (A.30.A)**
2	(O/W)	NEGATIVE	
3	(O/U)	NEGATIVE	
4	(G/Y)	POSITIVE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4440B 16



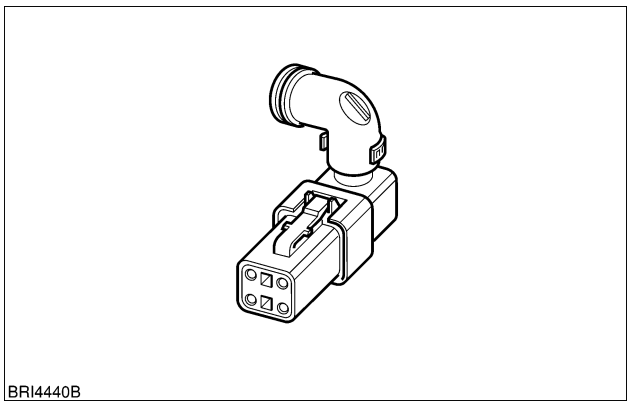
C438-BRI4545A 17

BONNET - LEFT-HAND SIDE

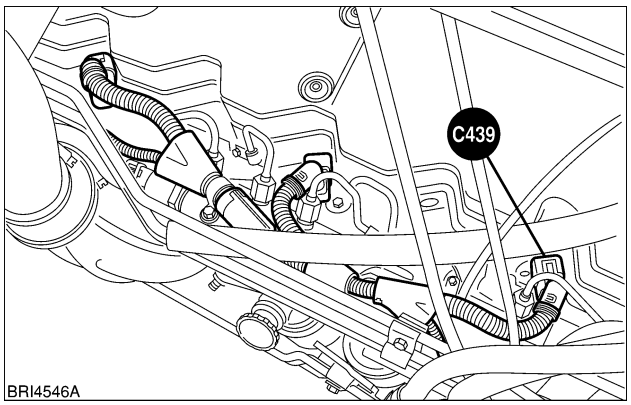
C439 INJECTOR CYLINDER 6 (EDC 16) (not used in PUMA Multicontroller)

PLUG CONNECTION C439 INJECTOR CYLINDER 6 (EDC 16)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	880 (G/B)		**Wiring harness - Electrical schematic frame 05 (A.30.A)**
2	880 (O/W)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4440B 18



C439-BRI4546A 19

BONNET - LEFT-HAND SIDE

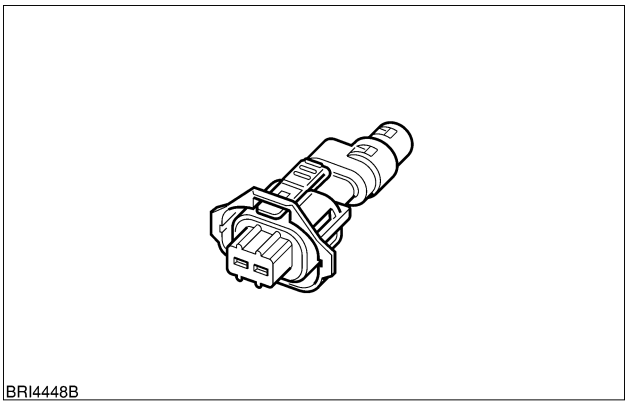
Wiring harness - Component diagram 44 Plug connections 440-449

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

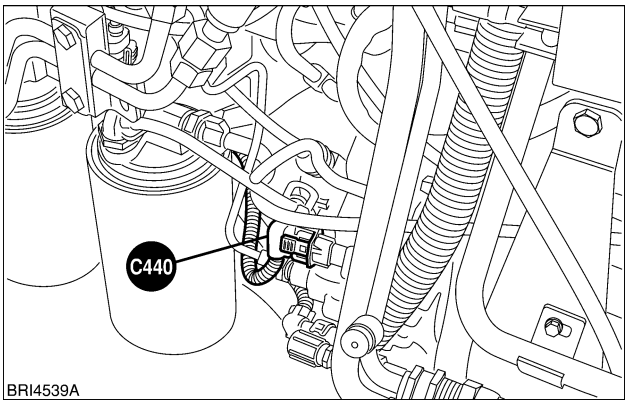
C440 FUEL FLOW METER (EDC 16)

PLUG CONNECTION C440 FUEL FLOW METER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	G	PWM HIGH-PRESSURE PUMP FUEL POSITIVE	PUMA Standard: **Wiring harness - Electrical schematic frame 04 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 04 (A.30.A)**
2	O	PWM HIGH-PRESSURE PUMP FUEL NEGATIVE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4448B 1



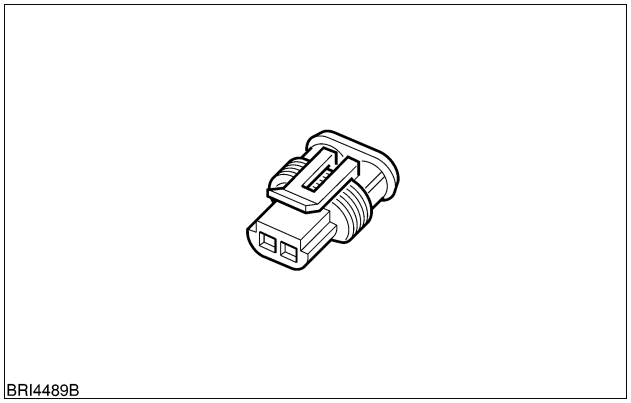
C440-BRI4539A 2

ENGINE - LEFT-HAND SIDE

C441 FRONT LOADER CONTROL VALVE 1 (not used in PUMA Multicontroller)

PLUG CONNECTION C441 FRONT LOADER SOLENOID VALVE 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3272 (O)	FRONT LOADER CONTROL VALVE 1 OUTPUT	**Wiring harness - Electrical schematic frame 04 (A.30.A)**
2	3273 (O)	FRONT LOADER CONTROL VALVE 1 RETURN SIGNAL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

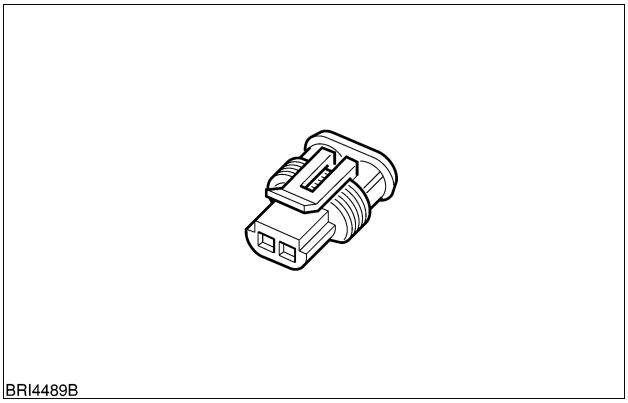


BRI4489B 3

C442 FRONT LOADER CONTROL VALVE 2 (not used in PUMA Multicontroller)

PLUG CONNECTION C442 FRONT LOADER CONTROL VALVE 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3274 (R)	FRONT LOADER CONTROL VALVE 2 OUTPUT	**Wiring harness - Electrical schematic frame 04 (A.30.A)**
2	3275 (R)	FRONT LOADER CONTROL VALVE 2 RETURN SIGNAL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

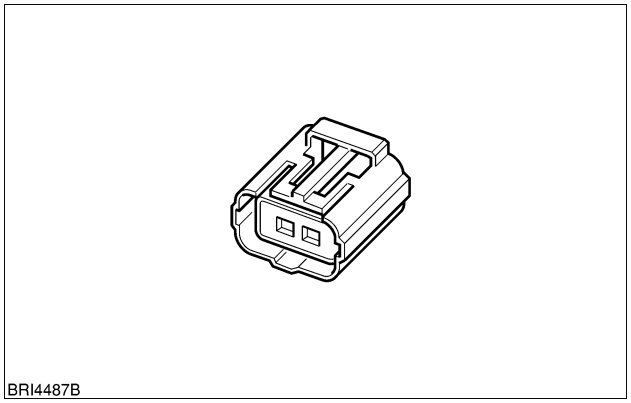


BRI4489B 4

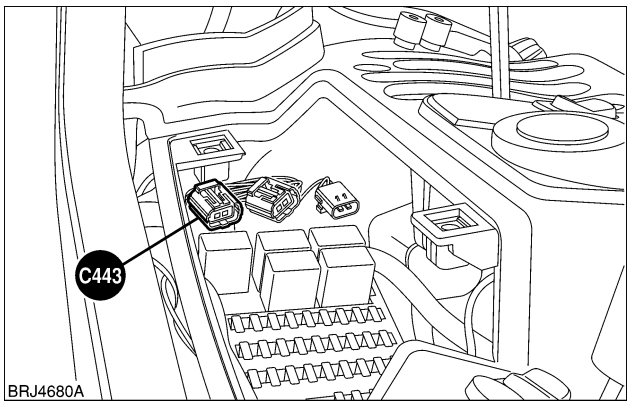
C443 ELECTROHYDR. REMOTE VALVE SELECT CAN-BUS

PLUG CONNECTION C443 ELECTROHYDR. REMOTE VALVE SELECT CAN-BUS			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5500E (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	PUMA Standard: **Wiring harness - Electrical schematic frame 34 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 34 (A.30.A)**
2	5510E (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4487B 5



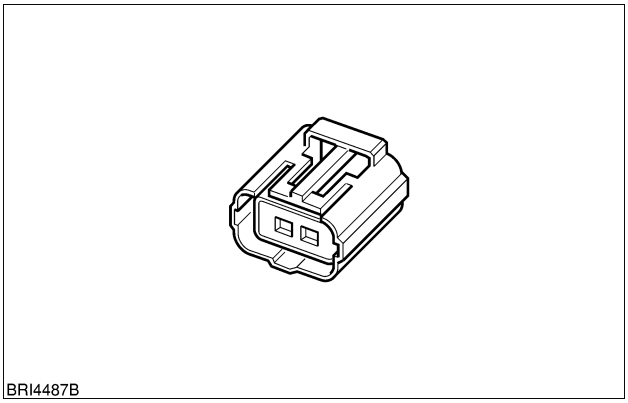
C443-BRJ4680A 6

RIGHT-HAND SIDE CONSOLE

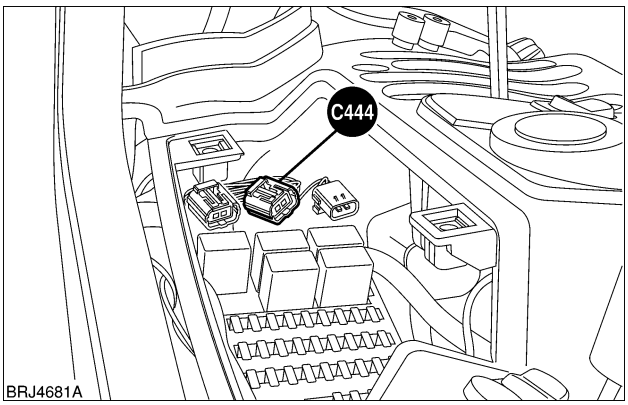
C444 CAN-BUS TRANSMISSION

PLUG CONNECTION C444 CAN-BUS TRANSMISSION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5400E (Y)	CAN H	PUMA Standard: **Wiring harness - Electrical schematic frame 34 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 34 (A.30.A)**
2	5420E (G)	CAN L	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4487B 7



C444-BRJ4681A 8

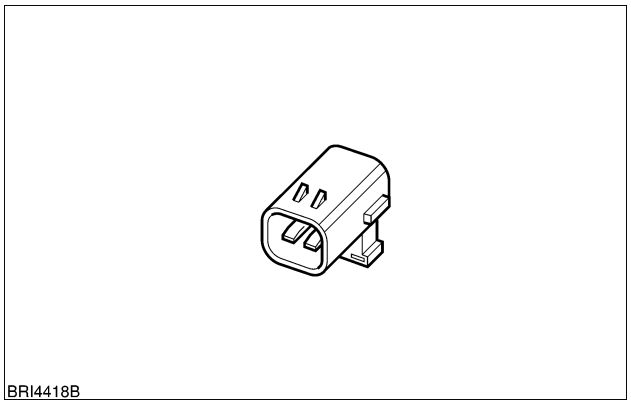
RIGHT-HAND SIDE CONSOLE

C445 SELECT CAN-BUS DIAGNOSTICS

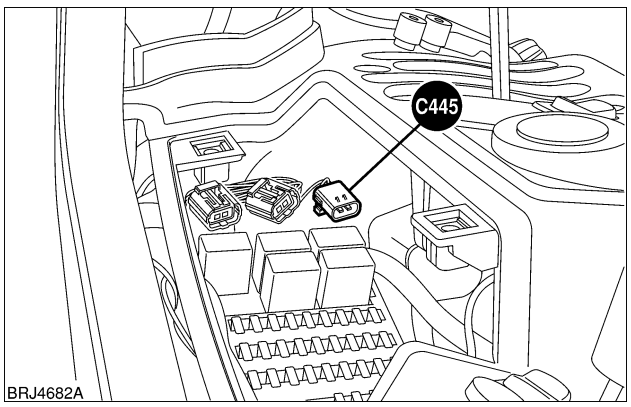
PLUG CONNECTION C445 SELECT CAN-BUS DIAGNOSTICS			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5400L (Y)	CAN H	**Wiring harness - Electrical schematic frame 33 (A.30.A)**
2	5420L (G)	CAN L	

PLUG CONNECTION C445 - in PUMA Multicontroller SELECT CAN-BUS DIAGNOSTICS			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5400K (Y)	CAN H	**Wiring harness - Electrical schematic frame 34 (A.30.A)**
2	5420K (G)	CAN L	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4418B 9



C445-BRJ4682A 10

RIGHT-HAND SIDE CONSOLE

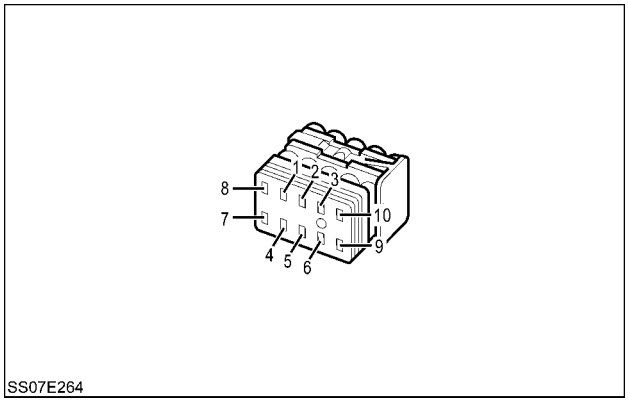
Wiring harness - Component diagram 45 Plug connections 450-459

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C455 OIL MOTOR OPERATION SWITCH

PLUG CONNECTION C455 OIL MOTOR OPERATION SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	5520C (G)	ELECTROHYDR. REMOTE VALVE 5V REF	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 16 (A.30.A)**
3	5523 (G)	ELECTROHYDR. REMOTE VALVE ENGINE 3	
7	57SA (B)	VEHICLE EARTH (ALL)	
8	1012AF (R)	LIGHTING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E264 1

CAB - RIGHT-HAND SIDE CONSOLE

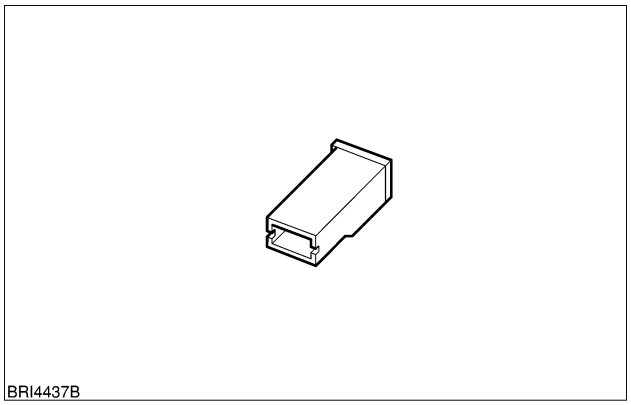
Wiring harness - Component diagram 46 Plug connections 460-469

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

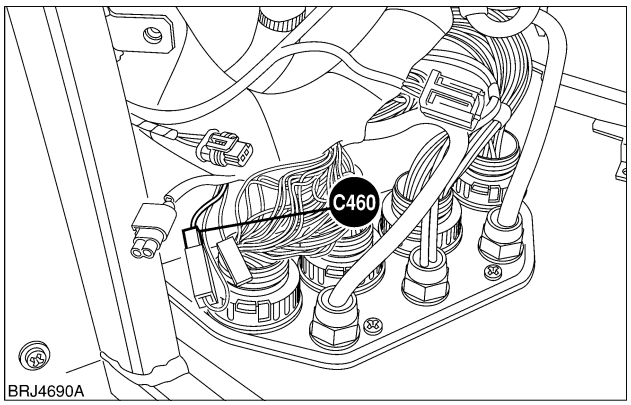
C460 BATTERY POSITIVE POLE A

PLUG CONNECTION C460 BATTERY POSITIVE POLE A			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	150AM (N)	BATTERY POWER SUPPLY (NO FUSE) (ALL)	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4437B 1



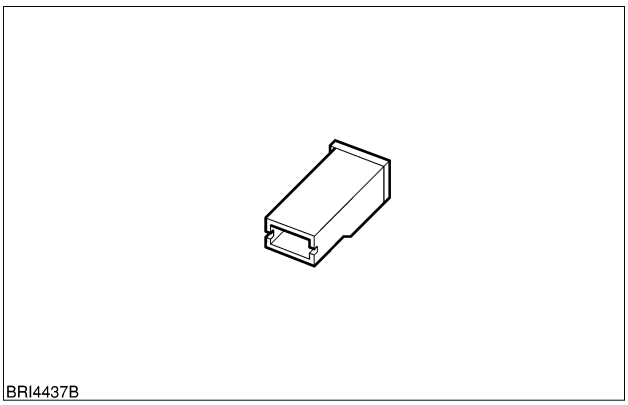
C460-BRJ4690A 2

CAB FLOOR - RIGHT-HAND SIDE

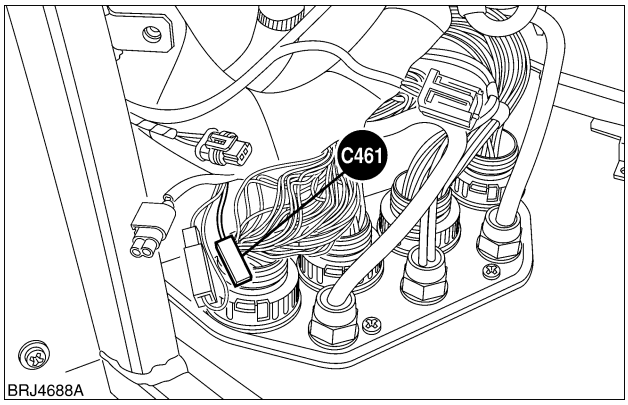
C461 BATTERY POSITIVE POLE B

PLUG CONNECTION C461 BATTERY POSITIVE POLE B			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1 (R)	BATTERY POWER SUPPLY	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4437B 3



C461-BRI4688A 4

CAB FLOOR - RIGHT-HAND SIDE

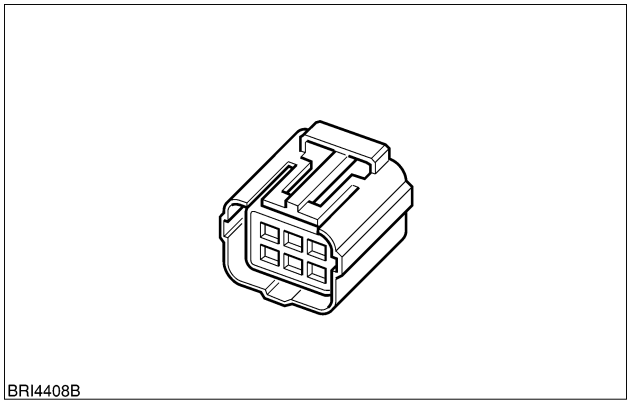
Wiring harness - Component diagram 50 Plug connections 500-509

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

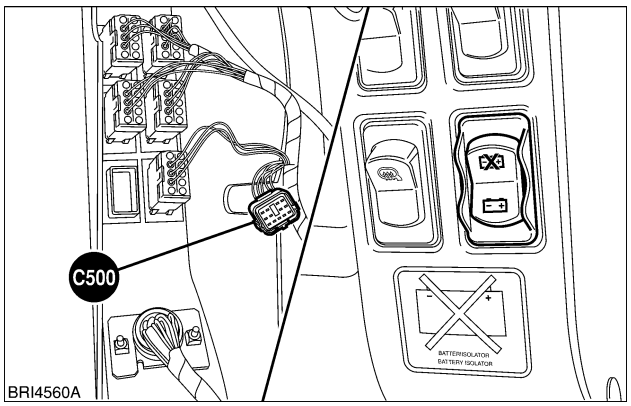
C500 BATTERY ISOLATOR SWITCH 1

PLUG CONNECTION C500 BATTERY ISOLATOR SWITCH 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1H (R)	BATTERY POWER SUPPLY	PUMA Standard: **Wiring harness - Electrical schematic frame 01 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**
2	10P (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	
3	171 (W)	RELAY COIL BATTERY ISOLATOR	
4	10W (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	
5	172 (W)	RELAY COIL FOR THE BATTERY ISOLATOR SWITCH (OFF)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4408B-02 1



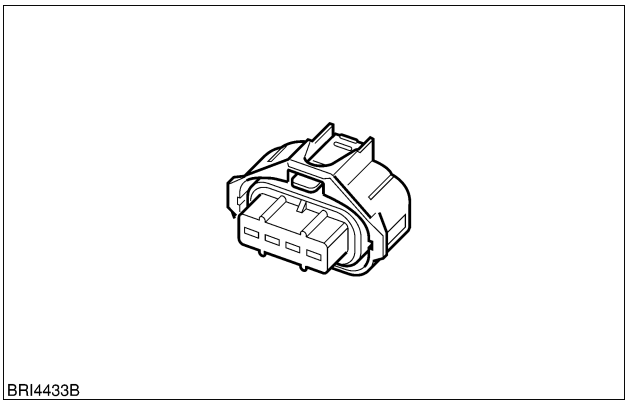
C500-BRI4560A-1 2

RIGHT-HAND SIDE C-PILLAR

C501 BATTERY ISOLATOR SWITCH 2 (not used in PUMA Multicontroller)

PLUG CONNECTION C501 BATTERY ISOLATOR SWITCH 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1H (R) / 172A (W)	BATTERY POWER SUPPLY / RELAY COIL FOR BATTERY ISOLATOR SWITCH (OFF)	
2	10P (G) / 57HA (B)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH / VEHICLE EARTH (ALL)	
3	171A (W/TQ/B) / 57HA (B)	RELAY COIL FOR THE BATTERY ISOLATOR SWITCH / VEHICLE EARTH (ALL)	
4	170B (K/N/B) / 171B (W)	ACTUATING SWITCH FOR BATTERY ISOLATOR SWITCH / RELAY COIL FOR BATTERY ISOLATOR SWITCH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

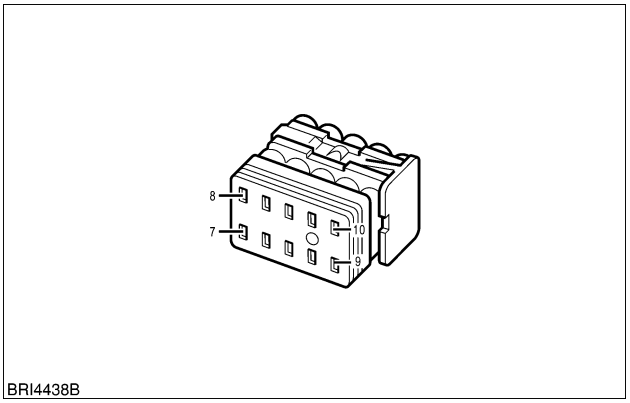


BRI4433B 3

C503 ROCKER SWITCH (RELAY SWITCH)

PLUG CONNECTION C503 ROCKER SWITCH (RELAY SWITCH)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	1H (R)	BATTERY POWER SUPPLY	PUMA Standard: **Wiring harness - Electrical schematic frame 01 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**
3	170 (K/N/B)	ACTUATING SWITCH BATTERY ISOLATOR	
4	171A (W/TQ/B)	RELAY COIL BATTERY ISOLATOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

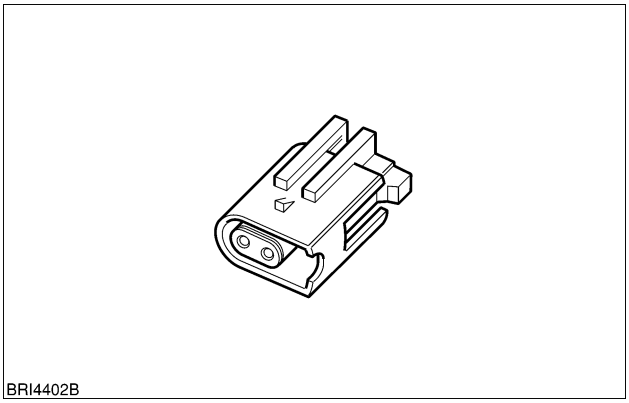


BRI4438A-1 4

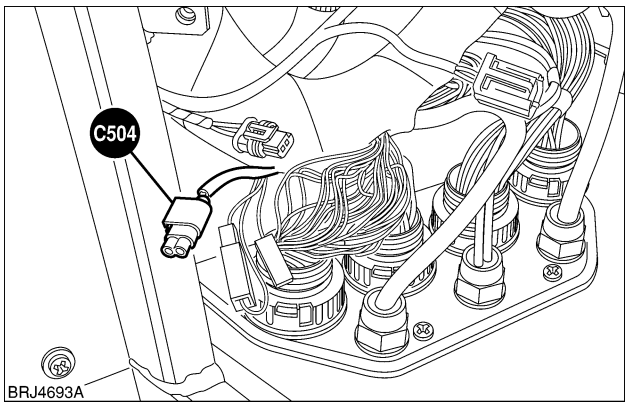
C504 DIODE FOR BATTERY ISOLATOR SWITCH

PLUG CONNECTION C504 DIODE FOR THE BATTERY ISOLATOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1001AD (W)	POWER SUPPLY ENGAGING MAGNET	PUMA Standard: **Wiring harness - Electrical schematic frame 01 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**
2	171A (W)	RELAY COIL BATTERY ISOLATOR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4402B 5



C504-BRI4693A 6

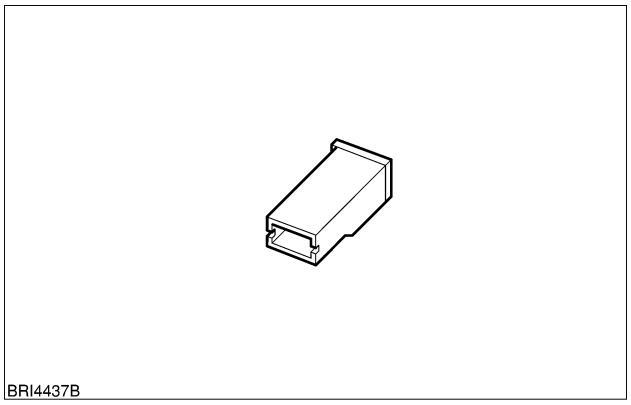
Wiring harness - Component diagram 51 Plug connections 510-519

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C510 HIGH-FLOW HYDROPUMP

PLUG CONNECTION C510 HIGH-FLOW HYDROPUMP			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5830 (U)	CONNECTION HIGH-FLOW HYDROPUMP	PUMA Standard: **Wiring harness - Electrical schematic frame 11 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 11 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

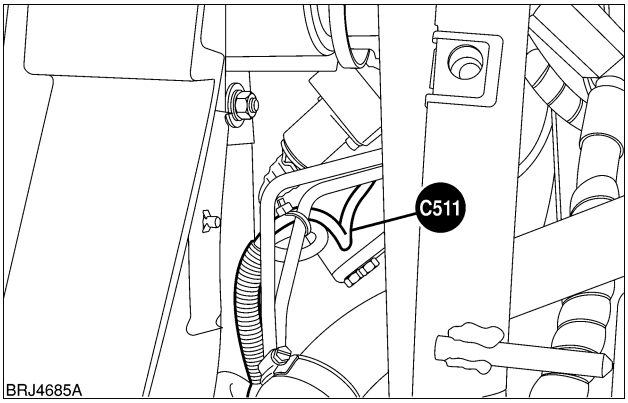


BRI4437B 1

C511 FAST-STEER STEERING SYSTEM - LVDT MAGNETIC COILS

PLUG CONNECTION C511 FAST STEER STEERING SYSTEM - LVDT MAGNETIC COILS			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3179 (N)	FAST STEER - POSITION SENSOR SECONDARY NEGATIVE	PUMA Standard: **Wiring harness - Electrical schematic frame 22 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 22 (A.30.A)**
2	3175 (W)	FAST STEER - POSITION SENSOR PRIMARY POSITIVE	
3	3177 (U)	FAST STEER - POSITION SENSOR SECONDARY COMMON	
4	3176 (B)	FAST STEER - POSITION SENSOR PRIMARY NEGATIVE	
5	3178 (G/Y)	FAST STEER - POSITION SENSOR SECONDARY POSITIVE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



C511-BRJ4685A 2

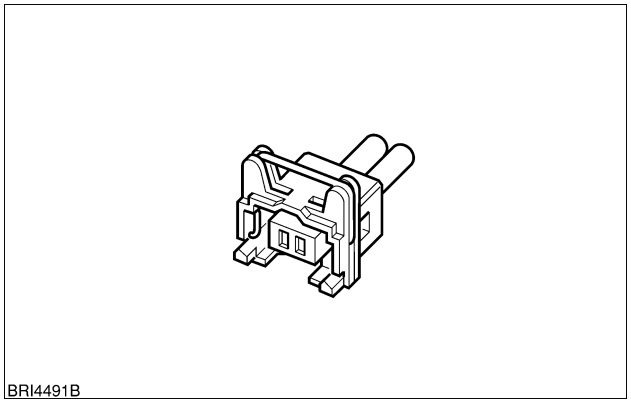
BACK OF ENGINE

C512 SOLENOID VALVE

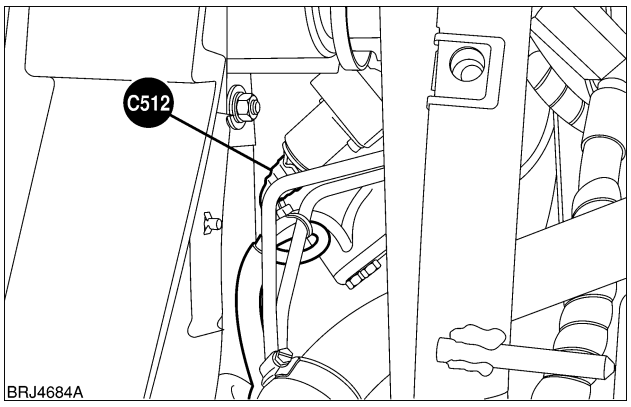
PLUG CONNECTION C512 SOLENOID VALVE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3173 (R/G)	FAST STEER - HYDRAULIC VALVE DELIVERY SIDE DRIVING STAGE	**Wiring harness - Electrical schematic frame 22 (A.30.A)**
2	3174 (G/B)	FAST STEER - HYDRAULIC VALVE INLET SIDE DRIVING STAGE	

PLUG CONNECTION C512 - in PUMA Multicontroller SOLENOID VALVE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3173 (R)	FAST STEER - HYDRAULIC VALVE DELIVERY SIDE DRIVING STAGE	**Wiring harness - Electrical schematic frame 22 (A.30.A)**
2	3174 (G)	FAST STEER - HYDRAULIC VALVE INLET SIDE DRIVING STAGE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4491B 3



C512-BRJ4684A 4

BACK OF ENGINE

C513 PROXIMITY SWITCH

PLUG CONNECTION C513 PROXIMITY SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	3172 (L)	FAST STEER - STEERING PROXIMITY SWITCH SETTING	PUMA Standard: **Wiring harness - Electrical schematic frame 22 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 22 (A.30.A)**
3	10C (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	

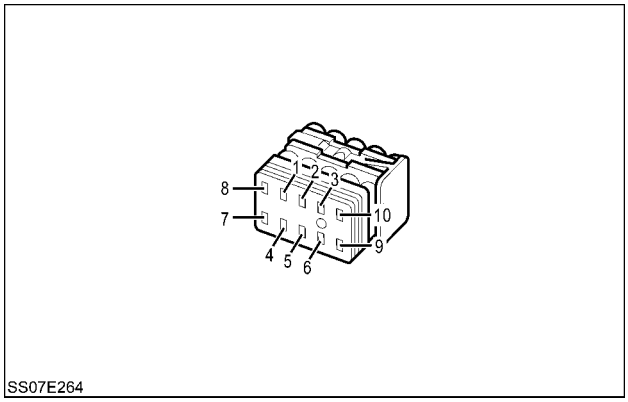
NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C514 CONTROL

PLUG CONNECTION C514 CONTROL SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	10B (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	**Wiring harness - Electrical schematic frame 22 (A.30.A)**
3	3170 (O)	FAST STEER - ON/OFF	
4	3180 (B)	FAST STEER - SAFETY SWITCH	
5	57 (B)	VEHICLE EARTH (ALL)	
7	3171 (O/R)	FAST STEER - LAMP	
8	10E (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	

PLUG CONNECTION C514 - in PUMA Multicontroller CONTROL SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	10B (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	**Wiring harness - Electrical schematic frame 22 (A.30.A)**
3	3170 (O)	FAST STEER - ON/OFF	
4	3180 (B)	FAST STEER - SAFETY SWITCH	
5	57 (B)	VEHICLE EARTH (ALL)	
7	3171 (O)	FAST STEER - LAMP	
8	10E (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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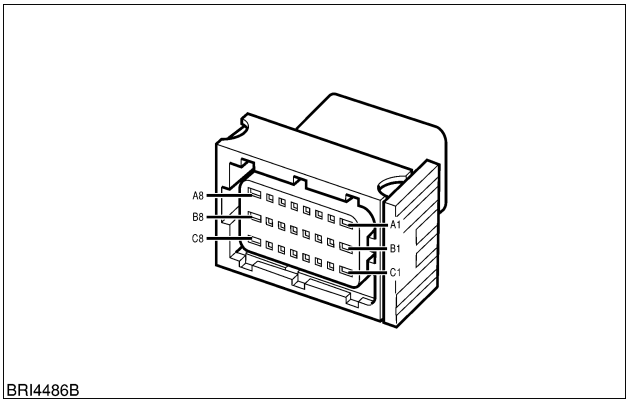
C515 CONTROL MODULE

PLUG CONNECTION C515 CONTROL MODULE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A1	3170 (O)	FAST STEER - ON/OFF	**Wiring harness - Electrical schematic frame 22 (A.30.A)**
A2	3173 (R/G)	FAST STEER - HYDRAULIC VALVE DELIVERY SIDE DRIVING STAGE	
A4	5400 (Y)	CAN H	
A5	5420 (G)	CAN L	
A6	3174 (G/B)	FAST STEER - HYDRAULIC VALVE INLET SIDE DRIVING STAGE	
A7	57C (B)	VEHICLE EARTH (ALL)	
A8	57B (B)	VEHICLE EARTH (ALL)	
B1	3171 (O/R)	FAST STEER - LAMP	
B4	3172 (L)	FAST STEER - STEERING PROXIMITY SWITCH SETTING	
B5	3178 (G/Y)	FAST STEER - POSITION SENSOR SECONDARY POSITIVE	
B6	3179 (N)	FAST STEER - POSITION SENSOR SECONDARY NEGATIVE	
B8	160 (U)	BATTERY POWER SUPPLY FOR ELECTRONICS	
C1	3175 (W)	FAST STEER - POSITION SENSOR PRIMARY POSITIVE	
C2	3176 (B)	FAST STEER - POSITION SENSOR PRIMARY NEGATIVE	
C3	3177 (U)	FAST STEER - POSITION SENSOR SECONDARY COMMON	
C4	3180 (B)	FAST STEER - SAFETY SWITCH	
C8	10D (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH	

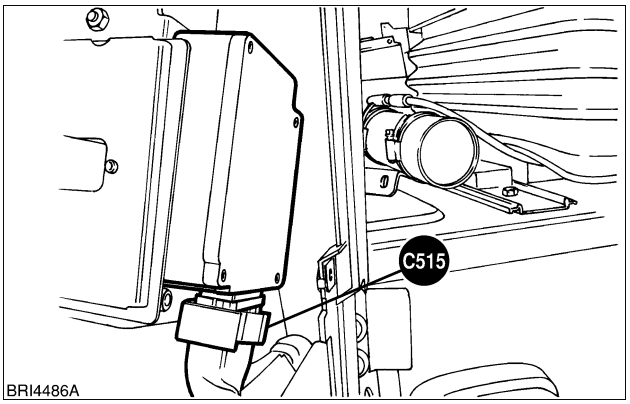
PLUG CONNECTION C515 - in PUMA Multicontroller CONTROL MODULE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A1	3170 (O)	FAST STEER - ON/OFF	**Wiring harness - Electrical schematic frame 22 (A.30.A)**
A2	3173 (R)	FAST STEER - HYDRAULIC VALVE DELIVERY SIDE DRIVING STAGE	
A4	5400 (Y)	CAN H	
A5	5420 (G)	CAN L	
A6	3174 (G)	FAST STEER - HYDRAULIC VALVE INLET SIDE DRIVING STAGE	
A7	57C (B)	VEHICLE EARTH (ALL)	
A8	57B (B)	VEHICLE EARTH (ALL)	
B1	3171 (O)	FAST STEER - LAMP	
B4	3172 (L)	FAST STEER - STEERING PROXIMITY SWITCH SETTING	
B5	3178 (G/Y)	FAST STEER - POSITION SENSOR SECONDARY POSITIVE	
B6	3179 (N)	FAST STEER - POSITION SENSOR SECONDARY NEGATIVE	
B8	160 (U)	BATTERY POWER SUPPLY FOR ELECTRONICS	

C1	3175 (W)	FAST STEER - POSITION SENSOR PRIMARY POSITIVE
C2	3176 (B)	FAST STEER - POSITION SENSOR PRIMARY NEGATIVE
C3	3177 (U)	FAST STEER - POSITION SENSOR SECONDARY COMMON
C4	3180 (B)	FAST STEER - SAFETY SWITCH
C8	10D (G)	VOLTAGE SUPPLY SWITCHED VIA STARTER SWITCH

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4486B 6



C515-BRI4486A 7

CAB FLOOR FRONT - RIGHT SIDE CONSOLE

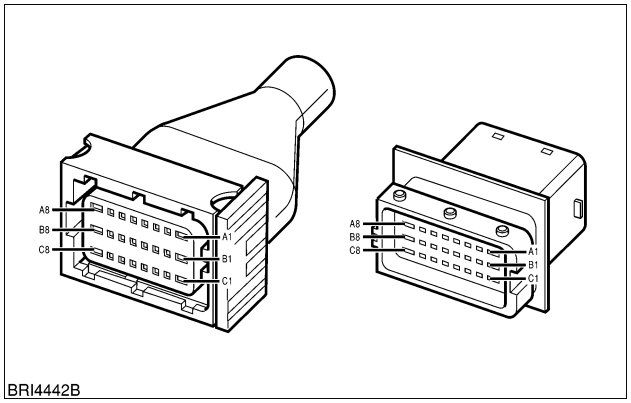
Wiring harness - Component diagram 53 Plug connections 530-539

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

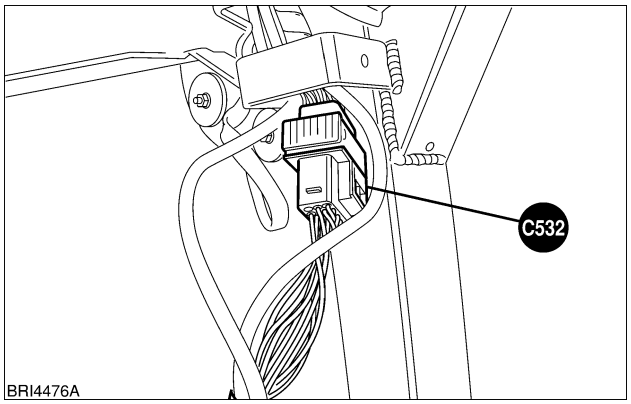
C532 CAB ROOF TO THE CAB WIRING HARNESS - CAB ROOF

PLUG CONNECTION C532 CAB ROOF TO THE CAB WIRING HARNESS - CAB ROOF			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A1	998 (G) / 998D (G)	POWER SUPPLY WORK LAMP - REAR (INNER)	
A2	28 (Y)	WIPER MOTOR (RETURN TO INITIAL POSITION)	
A3	56 (W)	WIPER MOTOR - HIGH	
A4	58 (R)	WIPER MOTOR - LOW	
A5	1019 (G) / 1019A (G)	POWER SUPPLY FRONT WINDSCREEN WIPER	
A6	1038B (TN) / 1038 (TN)	POWER SUPPLY FRONT WINDSCREEN WIPER - REAR	
A7	1120 (G)	REAR WINDSCREEN WIPER RETURN TO INITIAL POSITION	
A8	4011 (L)	POWER SUPPLY SWITCH ROTATING BEACON	
B1	1013 (R) / 1013B (R)	LIGHTS RIGHT-HAND SIDE	
B2	249 (LTG)	SMV LIGHTS RIGHT	
B3	666 (L) / 666A (L)	POWER SUPPLY SWITCH INTERIOR LIGHT	
B4	1090 (R)	SIGNAL RELAY REAR WORK LAMP	
B5	1092 (R)	SIGNAL RELAY FRONT WORK LAMP	
B6	1925C (R) / 1925 (R)	POWER SUPPLY POTENTIAL +15	
B7	1071B (L)	POWER SUPPLY FRONT WORK LAMP	
B8	1071A (L)	POWER SUPPLY FRONT WORK LAMP	
C1	1014 (R) / 1014D (R)	LIGHTS LEFT-HAND SIDE	
C2	250 (LTG)	SMV LIGHTS LEFT	
C3	138 (L) / 138A (L)	STATION MEMORY RADIO	
C4	3079 (R)	RADIO +12V IGNITION	
C5	1927 (R) / 1927A (R)	SIGNAL MIRROR HEATING	
C6	3052 (L)	INTERIOR LIGHT TO DOOR CONTACT SWITCH	
C7	1013AH (R)	LIGHTS RIGHT-HAND SIDE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4442B 1



C532-BRI4476A 2

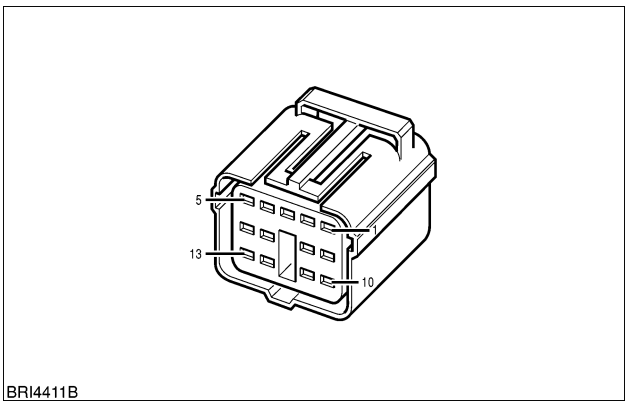
C-PILLAR RIGHT-HAND SIDE

C539 FAST STEER - PLUG OF THE CONNECTING CABLE

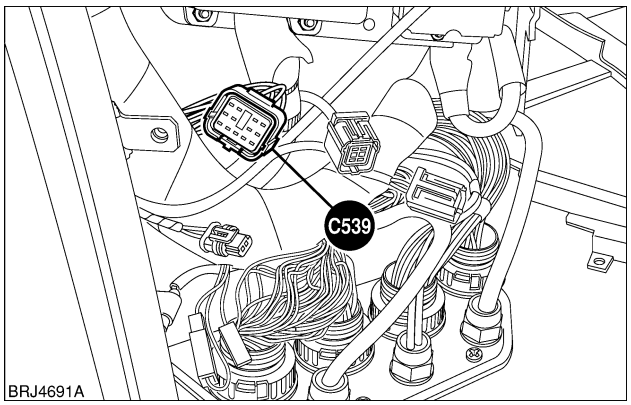
PLUG CONNECTION C539 FAST STEER - PLUG OF THE CONNECTING CABLE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5000D (L)	POWER SUPPLY EPC MEMORY	**Wiring harness - Electrical schematic frame 22 (A.30.A)**
2	5200AB (N)	POWER SUPPLY EPC CONTROL VALVE	
3	57CZ (B)	VEHICLE EARTH (ALL)	
4	5400V (Y)	CAN H	
5	5420V (G)	CAN L	
6	1001AC (W)	POWER SUPPLY ENGAGING MAGNET	
12	3169 (O)	AUTOM. VERSION RELIEF SOLENOID VALVE RETURN SIGNAL	
13	3168 (O)	POWER SUPPLY RELIEF SOLENOID VALVE AUTOMAT. VERSION (HSD)	

PLUG CONNECTION C539 - in PUMA Multicontroller FAST STEER - PLUG OF THE CONNECTING CABLE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5000D (L) / 160 (U)	POWER SUPPLY EPC MEMORY	**Wiring harness - Electrical schematic frame 22 (A.30.A)**
2	5200AB (N) / 10A (G)	POWER SUPPLY EPC CONTROL VALVE	
3	57CZ (B) / 57A (B)	VEHICLE EARTH (ALL)	
4	5400X (Y) / 5400 (Y)	CAN H	
5	5420X (Y) / 5420 (G)	CAN L	
6	1001AC (W)	POWER SUPPLY ENGAGING MAGNET	
12	3169 (O)	AUTOM. VERSION RELIEF SOLENOID VALVE RETURN SIGNAL	
13	3168 (O)	POWER SUPPLY RELIEF SOLENOID VALVE AUTOMAT. VERSION (HSD)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4411B 3



C539-BRI4691A 4

RIGHT-HAND SIDE CONSOLE

Wiring harness - Component diagram 54 Plug connections 540-549

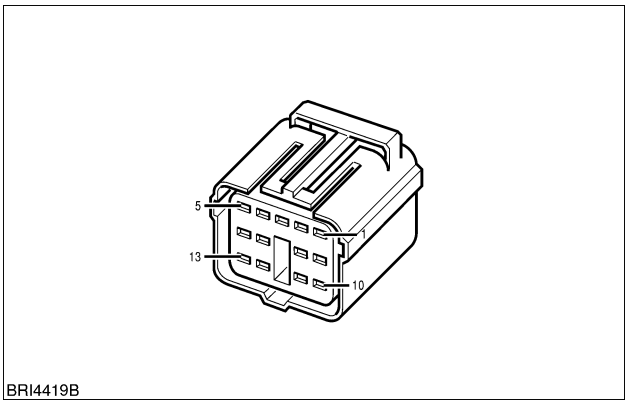
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C544 VIRTUAL TERMINAL PLUG CONNECTION 1

PLUG CONNECTION C544 VIRTUAL TERMINAL PLUG CONNECTION 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5910 (G)	ISO BUS CAN SIGNAL HIGH	**Wiring harness - Electrical schematic frame 35 (A.30.A)**
2	5900 (Y)	ISO BUS CAN SIGNAL LOW	
3	5915 (B)	ISO BUS CAN POWER SUPPLY EARTH	
4	5920 (R)	ISO BUS CAN POWER SUPPLY POSITIVE	
6	5500A (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
7	5510A (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
8	5000D (L)	POWER SUPPLY EPC MEMORY	
11	7000R (U)	POWER SUPPLY TRANSMISSION CONTROLS	
13	57SW (B)	VEHICLE EARTH (ALL)	

PLUG CONNECTION C544 - in PUMA Multicontroller VIRTUAL TERMINAL PLUG CONNECTION 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5900 (Y)	ISO BUS CAN SIGNAL LOW	**Wiring harness - Electrical schematic frame 35 (A.30.A)**
2	5910 (G)	ISO BUS CAN SIGNAL HIGH	
3	5915 (B)	ISO BUS CAN POWER SUPPLY EARTH	
4	5920 (R)	ISO BUS CAN POWER SUPPLY POSITIVE	
5	5960C (W)	RS 232 OUTPUT TRACTOR - CONTROLLER	
6	5500A (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
7	5510A (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
8	5000D (L)	POWER SUPPLY EPC MEMORY	
11	7000R (U)	POWER SUPPLY TRANSMISSION CONTROLS	
12	1012J (R)	LIGHTING	
13	57SW (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



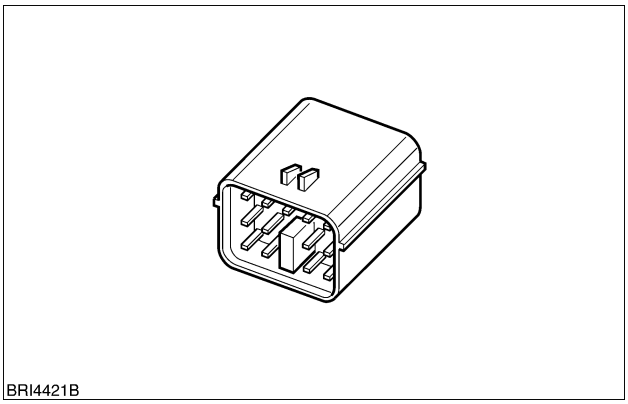
BRI4419B 1

RIGHT-HAND SIDE CONSOLE

C545 VIRTUAL TERMINAL PLUG CONNECTION 2

PLUG CONNECTION C545 VIRTUAL TERMINAL PLUG CONNECTION 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5900A (Y)	ISO BUS CAN SIGNAL LOW	PUMA Standard: **Wiring harness - Electrical schematic frame 35 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 35 (A.30.A)**
2	5910A (G)	ISO BUS CAN SIGNAL HIGH	
3	5915A (B)	ISO BUS CAN POWER SUPPLY EARTH	
4	5920A (R)	ISO BUS CAN POWER SUPPLY POSITIVE	
6	5500B (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
7	5510B (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4421B 2

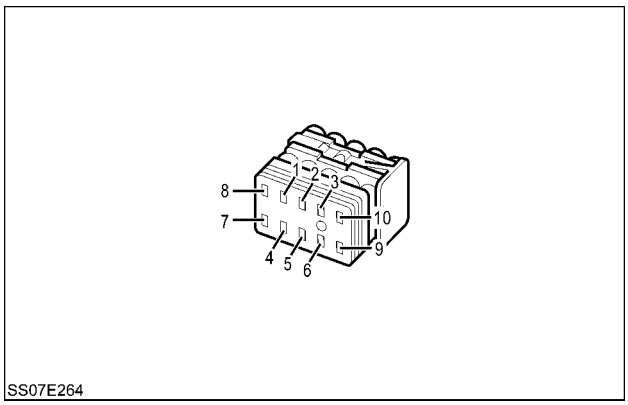
RIGHT-HAND SIDE CONSOLE

C546 LIFT LINK SWITCH

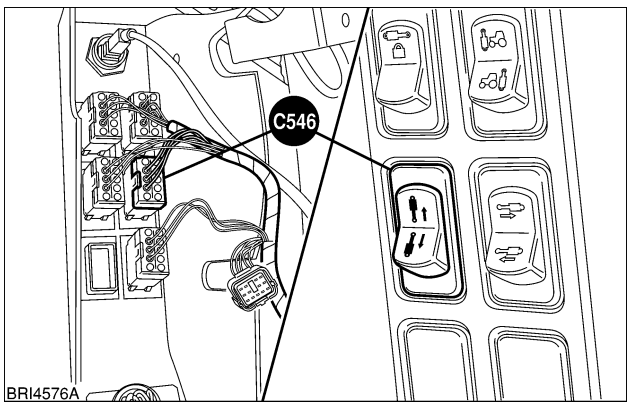
PLUG CONNECTION C546 LIFT LINK SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	4053 (W)	SWITCH HYDR. SHORTEN LIFT LINK	**Wiring harness - Electrical schematic frame 15 (A.30.A)**
2	2050B (G)	POWER SUPPLY PTO / SHIFTING CLAW	
6	4052 (W)	SWITCH HYDR. LENGTHEN LIFT LINK	

PLUG CONNECTION C546 - in PUMA Multicontroller LIFT LINK SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	4053 (W)	SWITCH HYDR. SHORTEN LIFT LINK	**Wiring harness - Electrical schematic frame 15 (A.30.A)**
2	2050B (G)	POWER SUPPLY PTO / SHIFTING CLAW	
6	4052 (W)	SWITCH HYDR. LENGTHEN LIFT LINK	
7	57RB (B)	VEHICLE EARTH (ALL)	
8	1012T (R)	LIGHTING	
9	57RC (B)	VEHICLE EARTH (ALL)	
10	1012V (R)	LIGHTING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E264 3



C546-BRI4576A 4

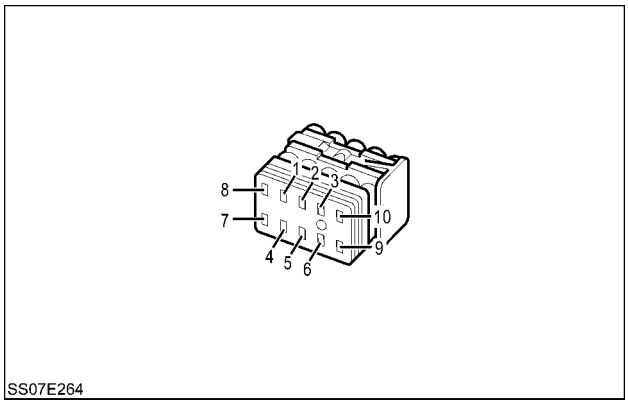
C-PILLAR RIGHT-HAND SIDE

C547 UPPER LINK SWITCH

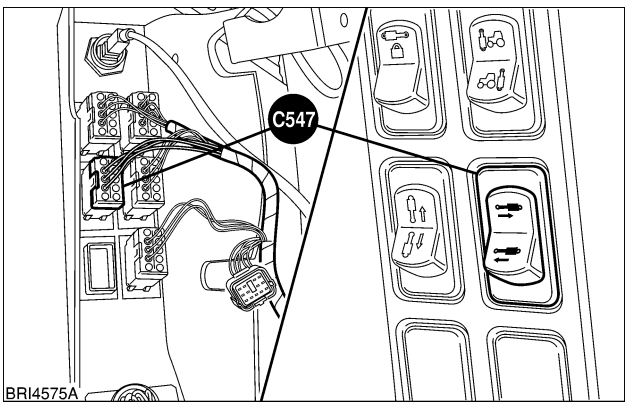
PLUG CONNECTION C547 TOP LINK SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	4050 (W)	SWITCH HYDR. TOP LINK/LIFT LINK - RAISE	**Wiring harness - Electrical schematic frame 15 (A.30.A)**
2	2050C (G)	POWER SUPPLY PTO / SHIFTING CLAW	
6	4051 (W)	SWITCH HYDR. TOP LINK/LIFT LINK - LOWER	

PLUG CONNECTION C547 - in PUMA Multicontroller TOP LINK SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	4050 (W)	SWITCH HYDR. TOP LINK/LIFT LINK - RAISE	**Wiring harness - Electrical schematic frame 15 (A.30.A)**
2	2050C (G)	POWER SUPPLY PTO / SHIFTING CLAW	
6	4051 (W)	SWITCH HYDR. TOP LINK/LIFT LINK - LOWER	
7	57PZ (B)	VEHICLE EARTH (ALL)	
8	1012R (R)	LIGHTING	
9	57RA (B)	VEHICLE EARTH (ALL)	
10	1012S (R)	LIGHTING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E264 5



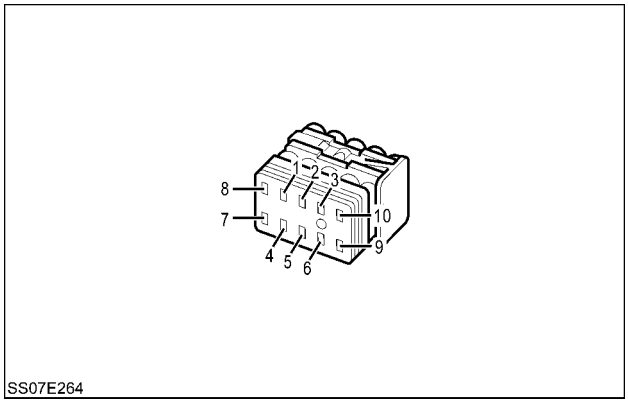
C547-BRI4575A 6

C-PILLAR RIGHT-HAND SIDE

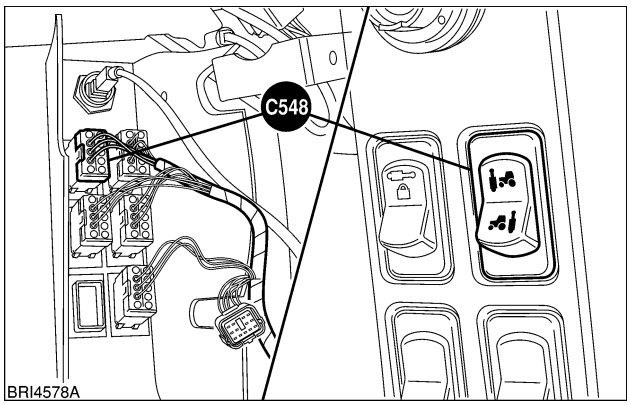
C548 ELECTROHYDR. REMOTE VALVE SELECTION SWITCH

PLUG CONNECTION C548 ELECTROHYDR. REMOTE VALVE SELECTION SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	4060 (W)	SELECT HYDRAULICS FRONT	PUMA Standard: **Wiring harness - Electrical schematic frame 16 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 44 (A.30.A)**
2	5200N (N)	POWER SUPPLY EPC CONTROL VALVE	
3	4061 (W)	SELECT HYDRAULICS REAR	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

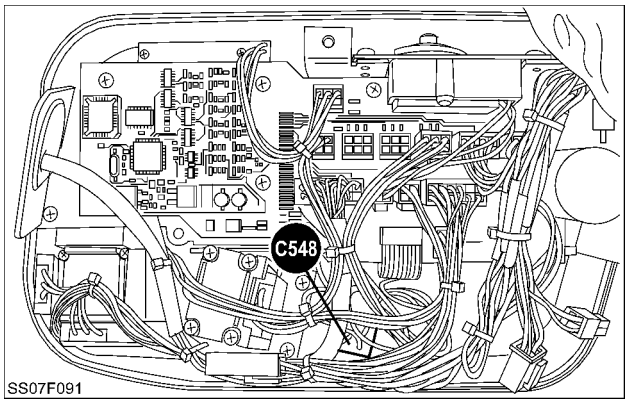


SS07E264 7



C548-BRI4578A 8

C-PILLAR RIGHT-HAND SIDE - in PUMA Standard



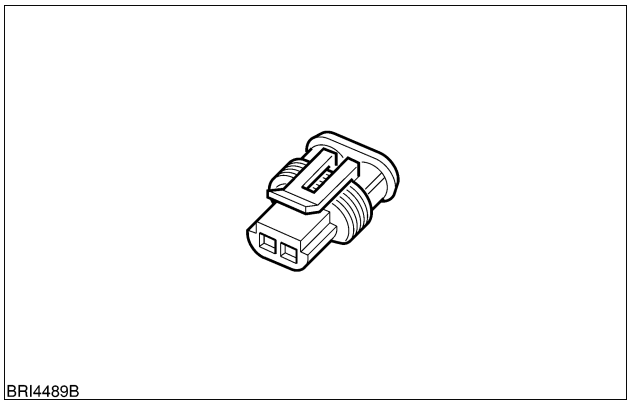
SS07F091 9

ARMREST- in PUMA Multicontroller

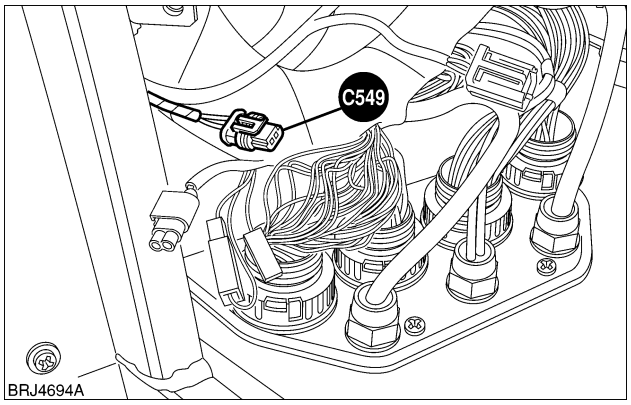
C549 FRONT POWER LIFT RECORDED

PLUG CONNECTION C549 FRONT POWER LIFT RECORDED			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5200L (N)	POWER SUPPLY EPC CONTROL VALVE	PUMA Standard: **Wiring harness - Electrical schematic frame 12 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 12 (A.30.A)**
2	5840 (W)	FRONT POWER LIFT SWITCH PRESENT MECH.	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 10



C549-BRI4694A 11

CAB FLOOR - RIGHT SIDE CONSOLE

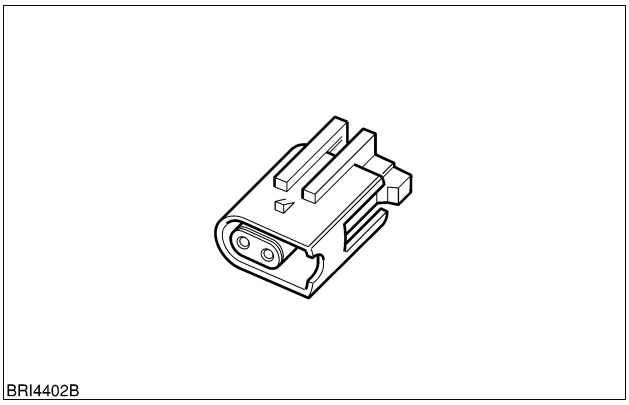
Wiring harness - Component diagram 55 Plug connections 550-559

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C550 OIL FLOW DIVIDER SWITCH

PLUG CONNECTION C550 OIL FLOW DIVIDER SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5200K (N)	POWER SUPPLY EPC CONTROL VALVE	PUMA Standard: **Wiring harness - Electrical schematic frame 01 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 12 (A.30.A)**
2	9000 (TN)	OIL FLOW DIVIDER	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



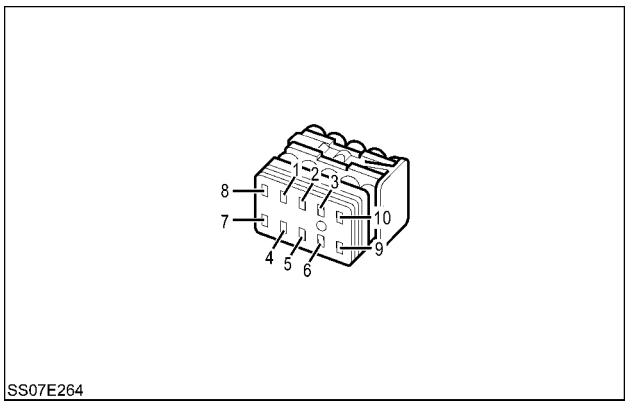
BRI4402B-01 1

C551 MIRROR HEATING SWITCH

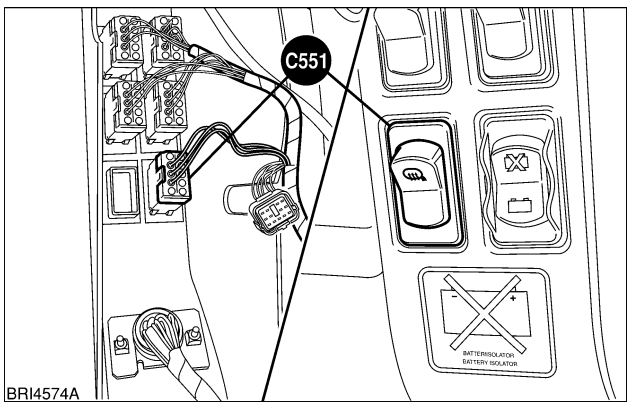
PLUG CONNECTION C551 MIRROR HEATING SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	1925A (R)	POWER SUPPLY POTENTIAL 15	**Wiring harness - Electrical schematic frame 24 (A.30.A)**
3	1928 (R)	CONTROL CURRENT TO TIME RELAY	
7	57MS (B)	VEHICLE EARTH (ALL)	
8	1927B (R)	POWER SUPPLY SWITCH ON (LED)	

PLUG CONNECTION C551 - in PUMA Multicontroller MIRROR HEATING SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	1925A (R)	POWER SUPPLY POTENTIAL 15	**Wiring harness - Electrical schematic frame 24 (A.30.A)**
3	1928 (R)	CONTROL CURRENT TO TIME RELAY	
7	57MS (B)	VEHICLE EARTH (ALL)	
8	1927B (R)	POWER SUPPLY SWITCH ON (LED)	
9	57PW (B)	VEHICLE EARTH (ALL)	
10	1012M (R)	LIGHTING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E264 2



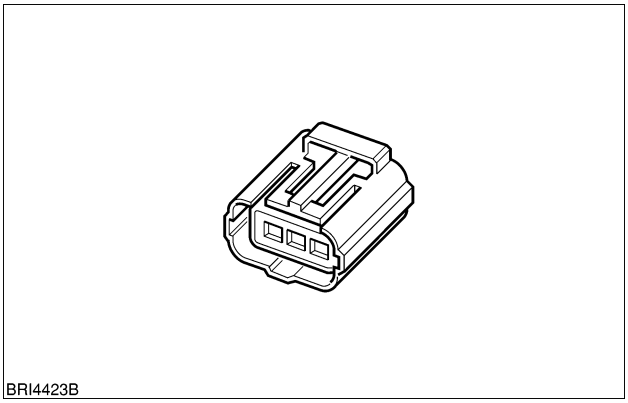
C551-BRI4574A 3

C-PILLAR RIGHT-HAND SIDE

C552 NON TRACTOR CONTROL UNIT POWER SUPPLY 2

PLUG CONNECTION C552 NON TRACTOR CONTROL UNIT POWER SUPPLY 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5980 (U)	ISO BUS IMPLEMENT SIGNAL	PUMA Standard: **Wiring harness - Electrical schematic frame 36 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 36 (A.30.A)**
2	5970 (O)	ISO BUS ECU SIGNAL	
3	7000AR (U)	POWER SUPPLY TRANSMISSION CONTROLS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



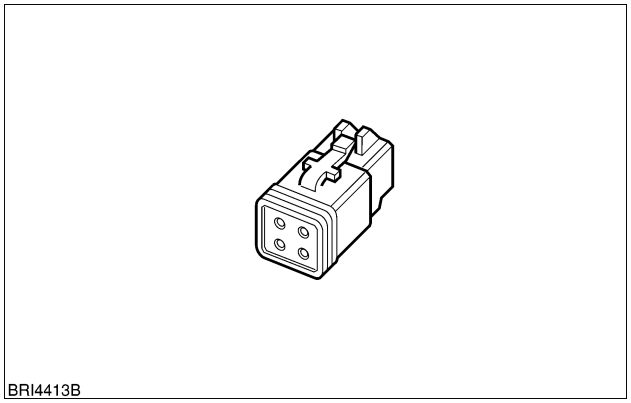
BRI4423B 4

BACK OF CAB - BEHIND THE DRIVER'S SEAT

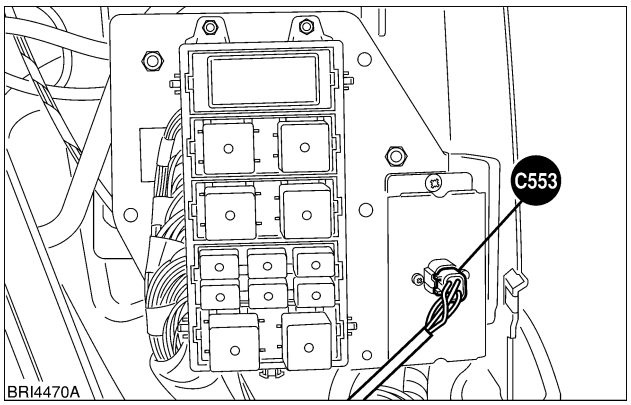
C553 ISO BUS CAN EXPANSION

PLUG CONNECTION C553 ISO BUS CAN EXPANSION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5920E (R)	ISO BUS CAN POWER SUPPLY POSITIVE	PUMA Standard: **Wiring harness - Electrical schematic frame 33 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 33 (A.30.A)**
2	5900E (Y)	ISO BUS CAN SIGNAL LOW	
3	5915E (B)	ISO BUS CAN POWER SUPPLY EARTH	
4	5910E (G)	ISO BUS CAN SIGNAL HIGH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4413B 5



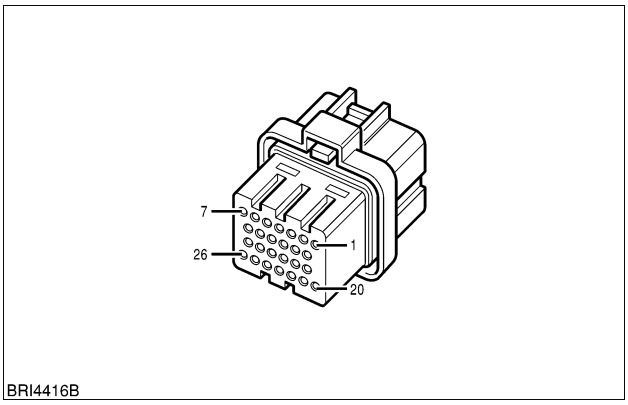
C553-BRI4470A 6

RIGHT-HAND SIDE CONSOLE

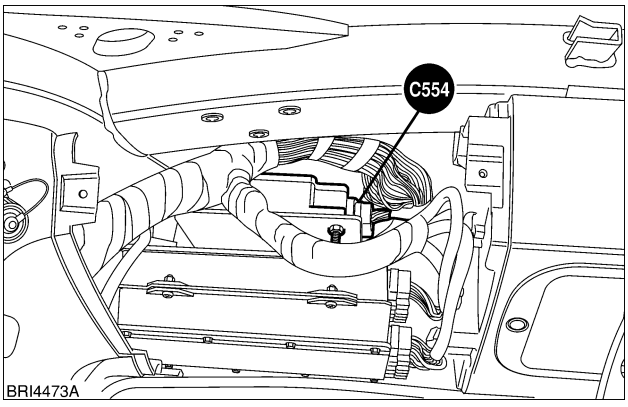
C554 TRACTORCONTROL UNIT (TECU)

PLUG CONNECTION C554 TRACTOR CONTROL UNIT (TECU)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5910D (G)	ISO BUS CAN SIGNAL HIGH	PUMA Standard: **Wiring harness - Electrical schematic frame 38 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 38 (A.30.A)**
2	5900D (Y)	ISO BUS CAN SIGNAL LOW	
4	5400P (Y)	CAN H	
5	5420P (G)	CAN L	
10	5000C (L)	POWER SUPPLY EPC MEMORY	
11	57TA (B)	VEHICLE EARTH (ALL)	
14	5980 (U)	ISO BUS IMPLEMENT SIGNAL	
15	5970 (O)	ISO BUS ECU SIGNAL	
16	7000AR (U)	POWER SUPPLY TRANSMISSION CONTROLS	
21	61T (B/O)	EARTH HOUSING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4416B-10 7



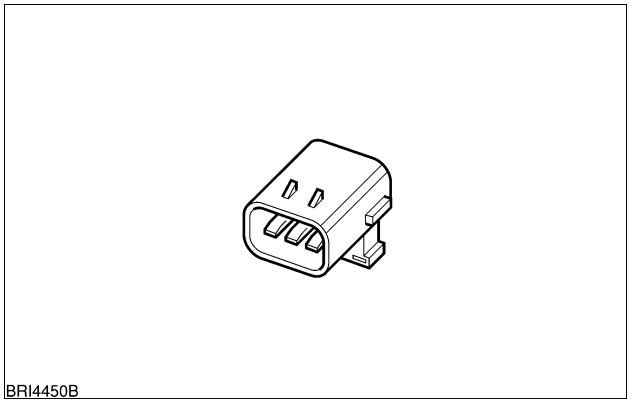
C554-BRI4473A 8

BACK OF CAB - BEHIND THE DRIVER'S SEAT

C555 NON TRACTOR CONTROL UNIT POWER SUPPLY 1

PLUG CONNECTION C555 TRACTOR CONTROL UNIT POWER SUPPLY 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5980 (U)	ISO BUS IMPLEMENT SIGNAL	PUMA Standard: **Wiring harness - Electrical schematic frame 36 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 36 (A.30.A)**
2	5970 (O)	ISO BUS ECU SIGNAL	
3	7000AR (U)	POWER SUPPLY TRANSMISSION CONTROLS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4450B 9

RIGHT-HAND SIDE CONSOLE

C556 TRACTOR CONTROL UNIT CAN-BUS REPLACEMENT

PLUG CONNECTION C556 TRACTOR CONTROL UNIT CAN-BUS REPLACEMENT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5920D (R) / 5915D (B)	ISO CAN-BUS POWER SUPPLY POSITIVE / ISO CAN-BUS POWER SUPPLY EARTH	PUMA Standard: **Wiring harness - Electrical schematic frame 33 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 33 (A.30.A)**

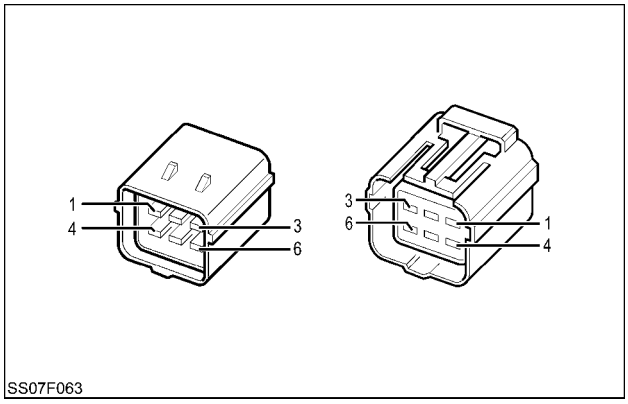
NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C557 CLIMATE CONTROLLER

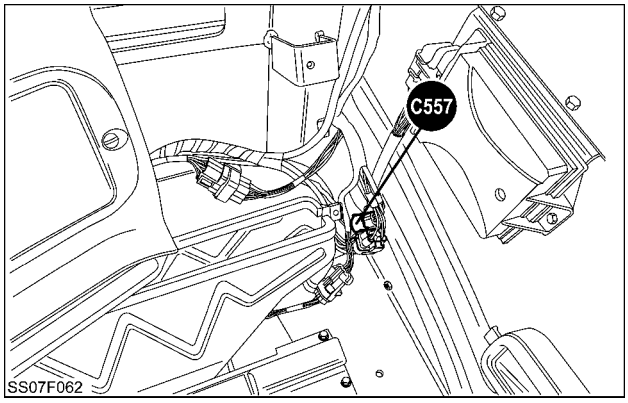
PLUG CONNECTION C557 (WITH MANUAL TEMPERATURE CONTROL) CLIMATE CONTROLLER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5420M (G)	CAN L	PUMA Standard: **Wiring harness - Electrical schematic frame 41 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 41 (A.30.A)**
2	5400M (Y)	CAN H	
4	2006A (U) / (W)	DE-ICING SWITCH - AIR CONDITIONING	
5	2006B (U) / (W/U)	DE-ICING SWITCH - AIR CONDITIONING	
6	2005 (O) / (P/R)	CLUTCH RELAY AIR CONDITIONING SYSTEM	

PLUG CONNECTION C557 (WITH AUTOMATIC TEMPERATURE CONTROL) CLIMATE CONTROLLER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5420M (G)	CAN L	PUMA Standard: **Wiring harness - Electrical schematic frame 40 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 40 (A.30.A)**
2	5400M (Y)	CAN H	
4	2006A (U) / (P)	DE-ICING SWITCH - AIR CONDITIONING	
5	2006B (U) / (W)	DE-ICING SWITCH - AIR CONDITIONING	
6	2005 (O) / (W)	CLUTCH RELAY AIR CONDITIONING SYSTEM	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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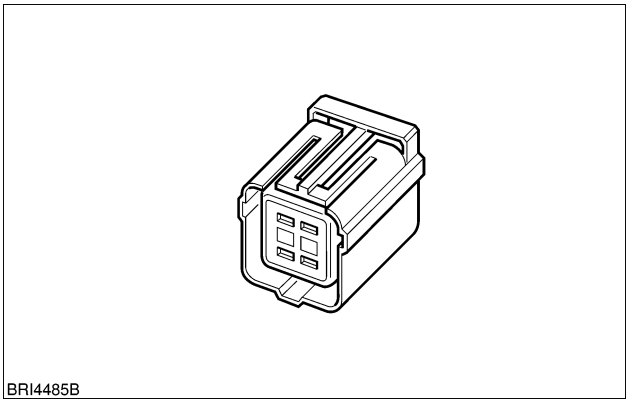
SS07F062 11

BACK OF TRACTOR - LEFT-HAND SIDE BEHIND THE DRIVER'S SEAT

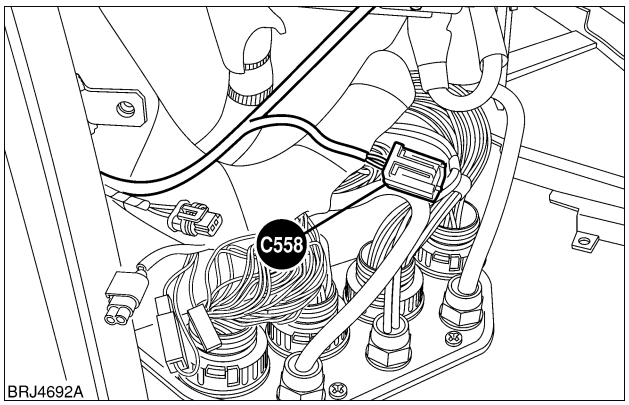
C558 FRONT SOCKET (OPTION)

PLUG CONNECTION C558 FRONT SOCKET (OPTION)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5980B (U)	ISO BUS IMPLEMENT SIGNAL	PUMA Standard: **Wiring harness - Electrical schematic frame 19 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 19 (A.30.A)**
2	5970C (O)	ISO BUS ECU SIGNAL	
3	2250P (K)	FRONT PTO - POWER SUPPLY	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4485B 12



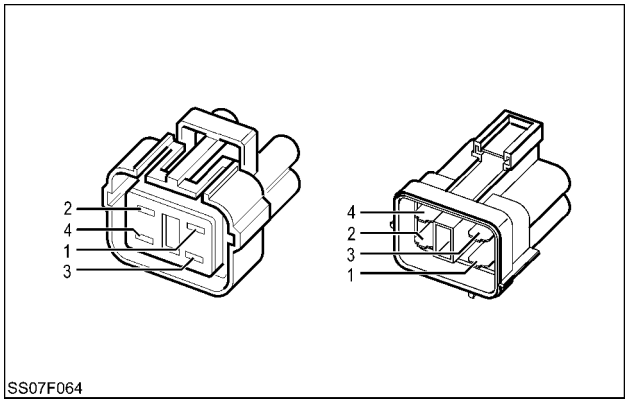
C558-BRI4692A 13

RIGHT-HAND SIDE CONSOLE

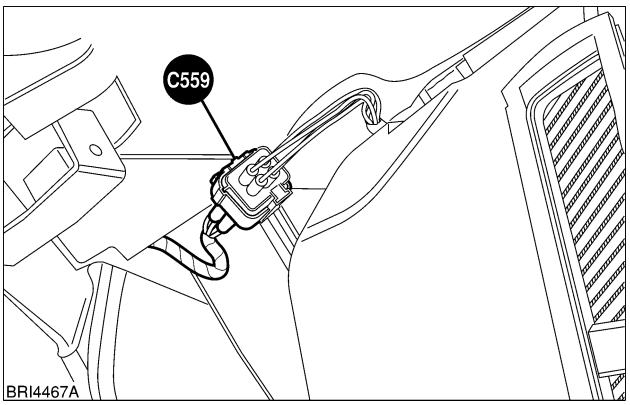
C559 AIR CONDITIONING SYSTEM POWER SUPPLY

PLUG CONNECTION C559 AIR CONDITIONING SYSTEM POWER SUPPLY			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	982B (G)	POWER SUPPLY BLOWER MOTOR	PUMA Standard: **Wiring harness - Electrical schematic frame 40 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 40 (A.30.A)**
2	982C (G)	POWER SUPPLY BLOWER MOTOR	
3	57NZ (B)	VEHICLE EARTH (ALL)	
4	57PA (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C559-BRI4467A 15

BACK OF TRACTOR - LEFT-HAND SIDE BEHIND THE DRIVER'S SEAT

Wiring harness - Component diagram 56 Plug connections 560-569

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C560 EARTH AIR CONDITIONING SYSTEM (not used in PUMA Multicontroller)

PLUG CONNECTION C560 EARTH AIR CONDITIONING SYSTEM			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
4	57CF (B)	VEHICLE EARTH (ALL)	**Wiring harness - Electrical schematic frame 38 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C563 RELAY 8130 - BLOWER MOTOR (not used in PUMA Multicontroller)

PLUG CONNECTION C563 RELAY 8130 - BLOWER MOTOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
B1	2005 (O)	CLUTCH RELAY AIR CONDITIONING SYSTEM	
B2	57CK (B)	VEHICLE EARTH (ALL)	
B3	981 (G)	POWER SUPPLY RELAY AIR CONDITIONING COMPRESSOR COUPLING	
B5	1018 (LTG)	AIR CONDITIONING COMPRESSOR COUPLING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C564 PLUG CONNECTION 2 (not used in PUMA Multicontroller)

PLUG CONNECTION C564 PLUG CONNECTION 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57 (B) / 57A (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C565 PLUG CONNECTION 1 (not used in PUMA Multicontroller)

PLUG CONNECTION C565 PLUG CONNECTION 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
31	57 (B)	VEHICLE EARTH (ALL)	
34	57A (B)	VEHICLE EARTH (ALL)	
58L	3060A (L)	RELAY IMPLEMENT SOCKET	
58R	3060B (L)	RELAY IMPLEMENT SOCKET	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C566 PLUG CONNECTION 3 (not used in PUMA Multicontroller)

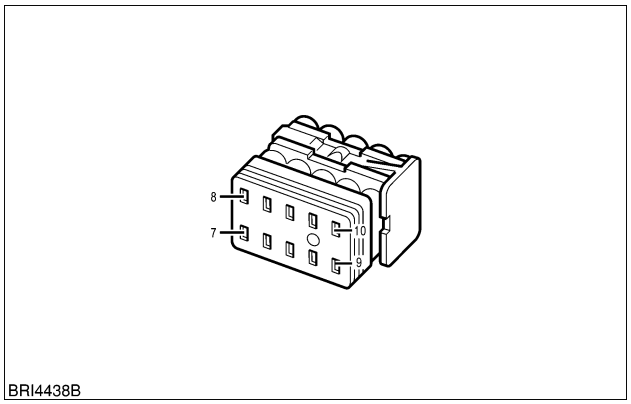
PLUG CONNECTION C566 PLUG CONNECTION 3			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3060 (L)	RELAY IMPLEMENT SOCKET	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

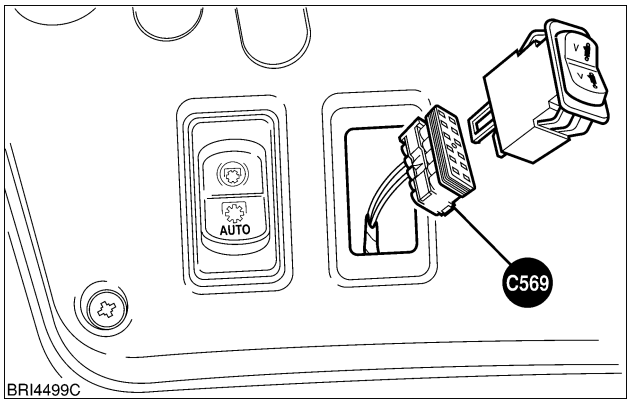
C569 SWITCH FOR THE 5TH REMOTE VALVE (not used in PUMA Multicontroller)

PLUG CONNECTION C569 SWITCH 5TH REMOTE VALVE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
3	5570 (L)		**Wiring harness - Electrical schematic frame 17 (A.30.A)**
4	5572 (L)		
5	5200F (N)	POWER SUPPLY EPC CONTROL VALVE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4438A 1



C569-BRI4499C1 2

Wiring harness - Component diagram 57 Plug connections 570-579

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C570 MAIN EXTENSION (not used in PUMA Multicontroller)

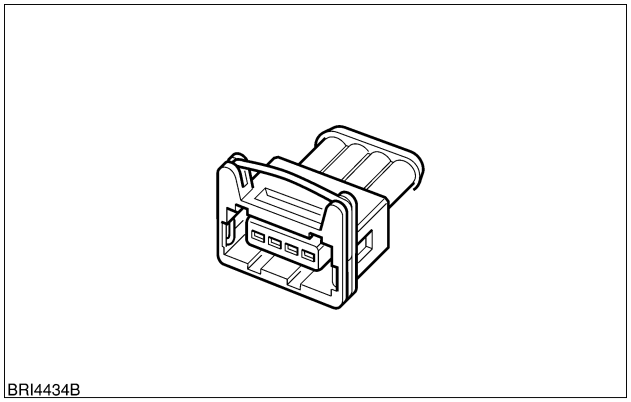
PLUG CONNECTION C570 MAIN EXTENSION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5515G (S)	ELECTROHYDR. REMOTE VALVE +12V STARTER SWITCH	
2	5510M (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5500M (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
5	57MA (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

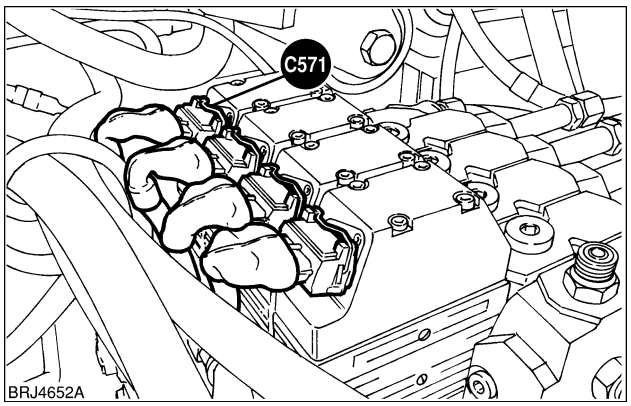
C571 ELECTROHYDR. REMOTE VALVE 7

PLUG CONNECTION C571 ELECTROHYDR. REMOTE VALVE 7			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5515J (S)	ELECTROHYDR. REMOTE VALVE +12V STARTER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 15 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 15 (A.30.A)**
2	5510N (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5500N (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
5	57MC (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4434B 1



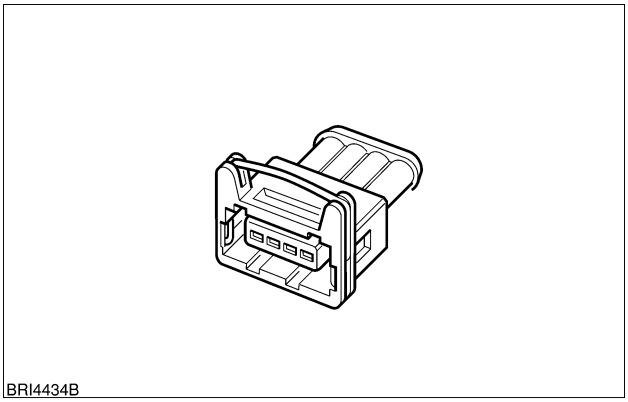
C571-BRJ4652A 2

CAB STEPS - RIGHT-HAND SIDE

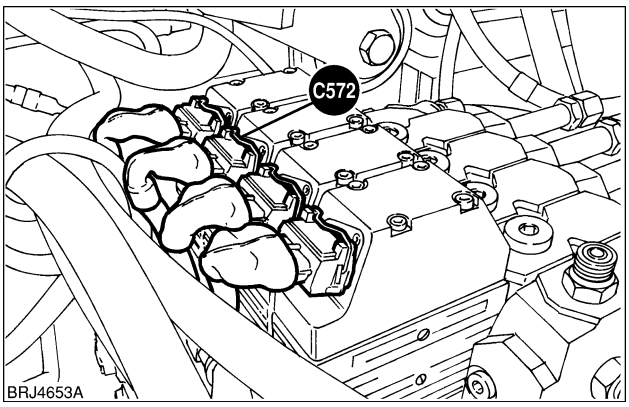
C572 ELECTROHYDR. REMOTE VALVE 8

PLUG CONNECTION C572 ELECTROHYDR. REMOTE VALVE 8			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5515K (S)	ELECTROHYDR. REMOTE VALVE +12V STARTER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 15 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 15 (A.30.A)**
2	5510Q (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5500Q (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
5	57MD (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4434B 3



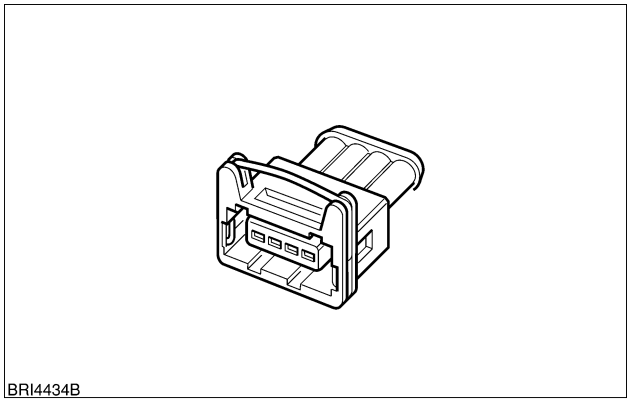
C572-BRJ4653A 4

CAB STEPS - RIGHT-HAND SIDE

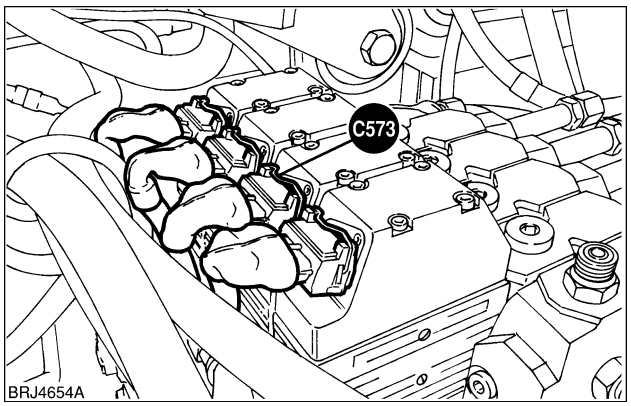
C573 ELECTROHYDR. REMOTE VALVE 9

PLUG CONNECTION C573 ELECTROHYDR. REMOTE VALVE 9			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5515L (S)	ELECTROHYDR. REMOTE VALVE +12V STARTER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 15 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 15 (A.30.A)**
2	5510S (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5500S (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
5	57ME (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4434B 5



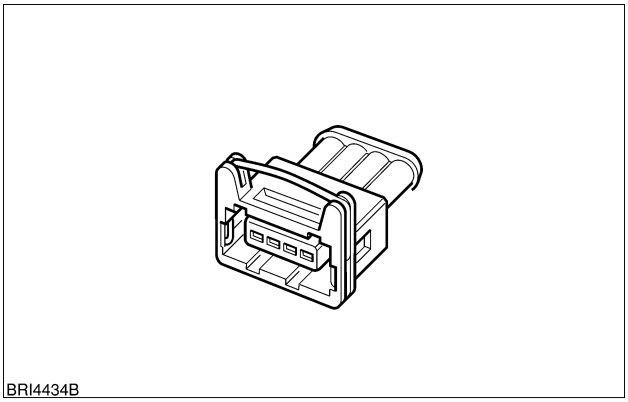
C573-BRJ4654A 6

CAB STEPS - RIGHT-HAND SIDE

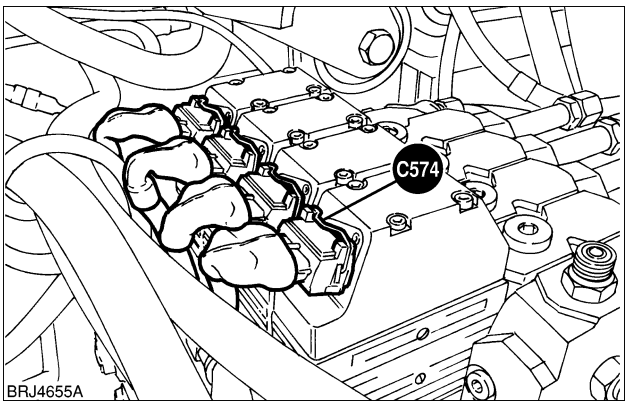
C574 ELECTROHYDR. REMOTE VALVE 10

PLUG CONNECTION C574 ELECTROHYDR. REMOTE VALVE 10			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5515M (S)	ELECTROHYDR. REMOTE VALVE +12V STARTER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 15 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 15 (A.30.A)**
2	5510U (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5500U (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
5	57MF (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C574-BRJ4655A 8

CAB STEPS - RIGHT-HAND SIDE

C575 TERMINAL RESISTOR (not used in PUMA Multicontroller)

PLUG CONNECTION C575 TERMINAL RESISTOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	5510V (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5500V (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C576 ANTI-FREEZE PROTECTION FOR BRAKE SYSTEM

PLUG CONNECTION C576 ANTI-FREEZE PROTECTION FOR BRAKE SYSTEM			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	8060F (U)	POWER SUPPLY FOR THE TRAILER BRAKE	PUMA Standard: **Wiring harness - Electrical schematic frame 30 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 30 (A.30.A)**
2	57FN (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C577 SOLENOID VALVE PARKING BRAKE

PLUG CONNECTION C577 SOLENOID VALVE PARKING BRAKE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	8070 (L)	TRAILER MV PARKING BRAKE	PUMA Standard: **Wiring harness - Electrical schematic frame 30 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 30 (A.30.A)**
2	57EL (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C578 30 SOLENOID VALVE (not used in PUMA Multicontroller)

PLUG CONNECTION C578 30 SOLENOID VALVE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1AA (R)	BATTERY POWER SUPPLY	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C579 466 MV BATTERY SWITCH

PLUG CONNECTION C579 466 MV BATTERY SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	171B (W/TQ/B)	RELAY COIL BATTERY ISOLATOR	PUMA Standard: **Wiring harness - Electrical schematic frame 01 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**
2	57NN (B)	VEHICLE EARTH (ALL)	
3	57NP (B)	VEHICLE EARTH (ALL)	
4	172A (W/TQ/Y)	RELAY COIL FOR THE BATTERY ISOLATOR SWITCH (OFF)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

Wiring harness - Component diagram 58 Plug connections 580-589

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C580 238 TO THE ENGINE WIRING HARNESS

PLUG CONNECTION C580 238 TO THE ENGINE WIRING HARNESS			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	171B (W/TQ/B)	RELAY COIL BATTERY ISOLATOR	PUMA Standard: **Wiring harness - Electrical schematic frame 01 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**
2	57HA (B)	VEHICLE EARTH (ALL)	
3	172A (W/TQ/Y)	RELAY COIL FOR THE BATTERY ISOLATOR SWITCH (OFF)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C581 BATTERY +VE (Ring) (not used in PUMA Multicontroller)

PLUG CONNECTION C581 BATTERY +VE (Ring)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1B (R)	BATTERY POWER SUPPLY	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C582 BLUE PLUG CONNECTION (not used in PUMA Multicontroller)

PLUG CONNECTION C582 BLUE PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1C (R) / 160 (U)	BATTERY POWER SUPPLY / BATTERY POWER SUPPLY FOR ELECTRONICS	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C583 BLACK PLUG CONNECTION (not used in PUMA Multicontroller)

PLUG CONNECTION C583 BLACK CONNECTOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57 (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C584 M3 BATTERY -VE -(PREVIOUSLY +VE) (not used in PUMA Multicontroller)

PLUG CONNECTION C584 M3 BATTERY -VE -(PREVIOUSLY +VE)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57 (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C585 INPUT SIGNAL PLUG CONNECTION (not used in PUMA Multicontroller)

PLUG CONNECTION C585 INPUT SIGNAL PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(R)		
2	(B)		
3	(R)		
4	(Y)		
5	(G)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C586 606 FUSE 30A (not used in PUMA Multicontroller)

PLUG CONNECTION C586 606 FUSE 30A			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	150AW (N) / 150AT (N)	BATTERY POWER SUPPLY (NO FUSE) (ALL)	
	150AX (N) / 150AV (N)	BATTERY POWER SUPPLY (NO FUSE) (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C587 RELAY - ISO RELAY 1

PLUG CONNECTION C587 RELAY - ISO RELAY 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
30	150AW (N)	BATTERY POWER SUPPLY (NO FUSE) (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 24 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 24 (A.30.A)**
85	5080 (U)	EPC LIFTING SHAFT	
86	57MX (B)	VEHICLE EARTH (ALL)	
87	5985 (U)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C588 RELAY - ISO RELAY 2

PLUG CONNECTION C588 RELAY - ISO RELAY 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
30	150AX (N)	BATTERY POWER SUPPLY (NO FUSE) (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 24 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 24 (A.30.A)**
85	5070A (O)	EPC LEFT FORCE MEASURING PIN	
86	57MY (B)	VEHICLE EARTH (ALL)	
87	5975 (O)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C589 658 PLUG CONNECTION (not used in PUMA Multicontroller)

PLUG CONNECTION C589 658 PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5070A (O)	EPC LEFT FORCE MEASURING PIN	
2	5080 (U)	EPC LIFTING SHAFT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

Wiring harness - Component diagram 59 Plug connections 590-599

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C590 SOCKET 3 (not used in PUMA Multicontroller)

PLUG CONNECTION C590 SOCKET 3			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5985 (U)		
2	57NN (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C591 SOCKET

PLUG CONNECTION C591 SOCKET			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57MT (B)	VEHICLE EARTH (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 24 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 24 (A.30.A)**
2	57MV (B)	VEHICLE EARTH (ALL)	
3	5975 (O)		
4	5985 (U)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C592 6MM RING TERMINAL (not used in PUMA Multicontroller)

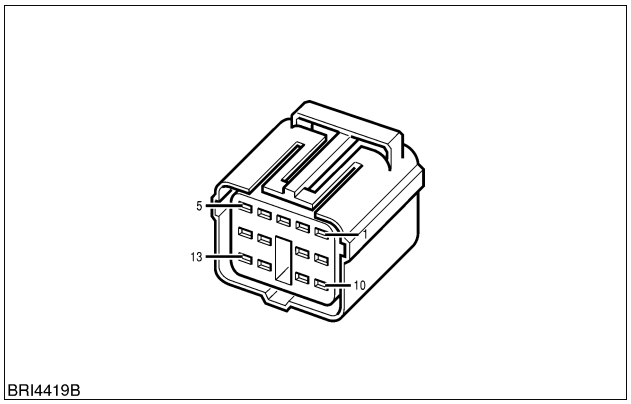
PLUG CONNECTION C592 6-MM RING TERMINAL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
	57MZ (B)	VEHICLE EARTH (ALL)	
	150AS (N)	BATTERY POWER SUPPLY (NO FUSE) (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

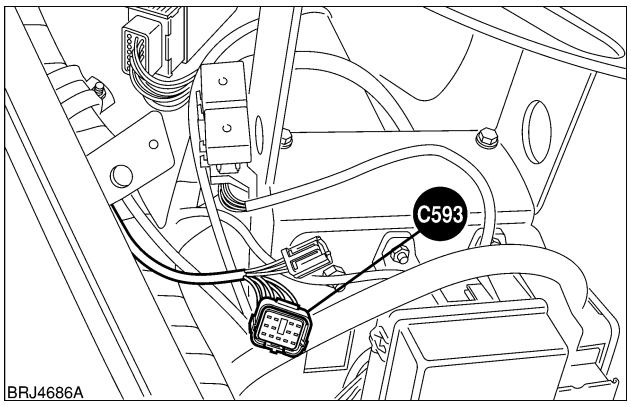
C593 ROTARY ENCODER AND SWITCH (not used in PUMA Multicontroller)

PLUG CONNECTION C593 ROTARY ENCODER AND SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5520A (LTG)	ELECTROHYDR. REMOTE VALVE 5V Ref.	**Wiring harness - Electrical schematic frame 38 (A.30.A)**
2	5935 (Y)		
3	5940 (Y)		
4	5945 (Y)		
5	5950 (Y)		
6	5990 (Y)		
7	57C (B)	VEHICLE EARTH (ALL)	
8	57D (B)	VEHICLE EARTH (ALL)	
9	57E (B)	VEHICLE EARTH (ALL)	
10	57F (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4419B 1



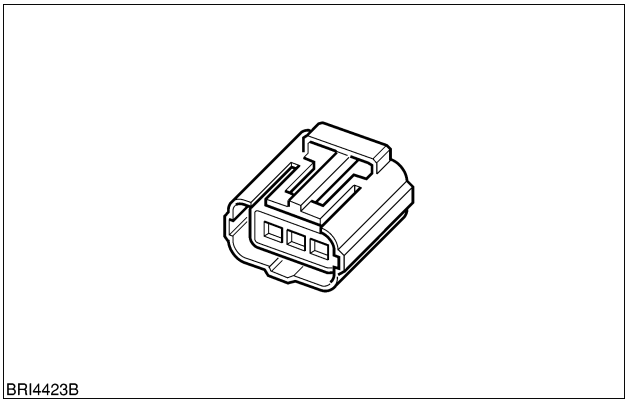
C593-BRJ4686A 2

RIGHT-HAND SIDE CONSOLE

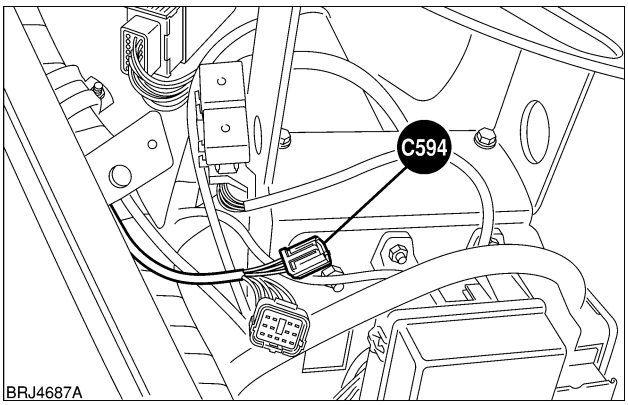
C594 REVERSE VIEW CAMERA

PLUG CONNECTION C594 REVERSE VIEW CAMERA			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5520B (LTG)	ELECTROHYDR. REMOTE VALVE 5V Ref.	PUMA Standard: **Wiring harness - Electrical schematic frame 35 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 35 (A.30.A)**
2	57B (B)	VEHICLE EARTH (ALL)	
3	5960A (Y)	RS232 OUTPUT TRACTOR - CONTROLLER	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4423B 3



C594-BRJ4687A 4

RIGHT-HAND SIDE CONSOLE

C595 SMALL COLOUR DISPLAY / VIRTUAL TERMINAL

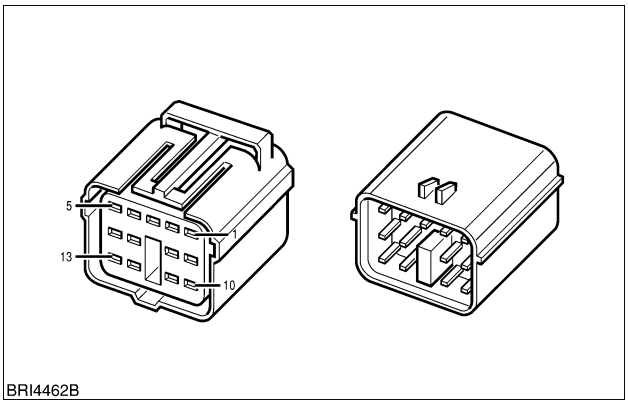
PLUG CONNECTION C595 SMALL COLOUR DISPLAY / VIRTUAL TERMINAL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5500J (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	PUMA Standard: **Wiring harness - Electrical schematic frame 35 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 35 (A.30.A)**
2	5510J (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5945 (Y)		
4	5950 (Y)		
5	5910F (Y)	ISO BUS CAN SIGNAL HIGH	
6	5900F (G)	ISO BUS CAN SIGNAL LOW	
9	5960 (Y)	RS232 OUTPUT TRACTOR - CONTROLLER	
10	5955 (Y)	RS232 INPUT TRACTOR - CONTROLLER	
13	5000 (L)	POWER SUPPLY EPC MEMORY	
14	57 (B)	VEHICLE EARTH (ALL)	
15	7000 (U)	POWER SUPPLY TRANSMISSION CONTROLS	
17	5935 (Y)		
18	5940 (Y)		
19	5990 (Y)		
20	5520 (LTG)	ELECTROHYDR. REMOTE VALVE 5V Ref.	
21	5964 (R)		
22	5962 (G)		
23	5966 (Y)		
24	5968 (B)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C596 SMALL COLOUR DISPLAY INPUT SIGNAL (not used in PUMA Multicontroller)

PLUG CONNECTION C596 SMALL COLOUR DISPLAY INPUT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5900C (G)	ISO BUS CAN SIGNAL LOW	
2	5910C (Y)	ISO BUS CAN SIGNAL HIGH	
3	5915C (B)	ISO BUS CAN POWER SUPPLY EARTH	
4	5920C (R)	ISO BUS CAN POWER SUPPLY POSITIVE	
6	5500A (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
7	5510A (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
8	5000 (L)	POWER SUPPLY EPC MEMORY	
9	5955 (Y)	RS232 INPUT TRACTOR - CONTROLLER	
10	5960B (Y)	RS232 OUTPUT TRACTOR - CONTROLLER	
11	7000 (U)	POWER SUPPLY TRANSMISSION CONTROLS	
13	57A (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



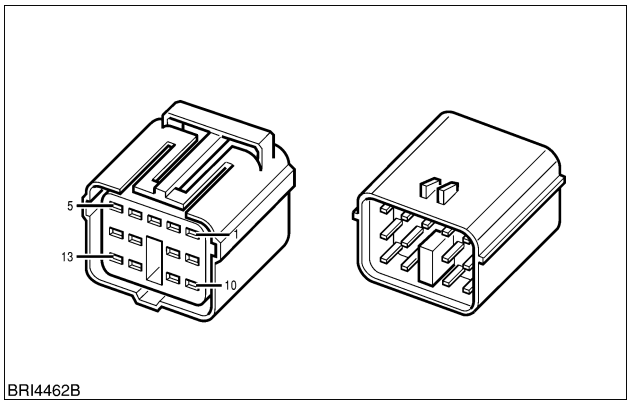
BRI4462B 5

RIGHT-HAND SIDE CONSOLE

C597 SMALL COLOUR DISPLAY OUTPUT (not used in PUMA Multicontroller)

PLUG CONNECTION C597 SMALL COLOUR DISPLAY OUTPUT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5900G (G)	ISO BUS CAN SIGNAL LOW	
2	5910G (Y)	ISO BUS CAN SIGNAL HIGH	
3	5915G (B)	ISO BUS CAN POWER SUPPLY EARTH	
4	5920G (R)	ISO BUS CAN POWER SUPPLY POSITIVE	
6	5500K (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
7	5510K (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4462B 6

RIGHT-HAND SIDE CONSOLE

C598 TRACTOR CONTROL UNIT REPLACEMENT SQUARE (not used in PUMA Multicontroller)

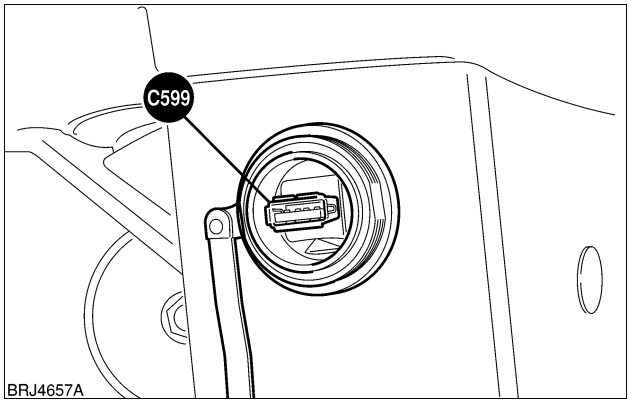
PLUG CONNECTION C598 TRACTOR CONTROL UNIT REPLACEMENT SQUARE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5915F (B) / 5920F (R)	ISO CAN-BUS POWER SUPPLY EARTH / ISO CAN-BUS POWER SUPPLY EARTH POSITIVE	**Wiring harness - Electrical schematic frame 35 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C599 USB PLUG CONNECTION

PLUG CONNECTION C599 USB PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5962 (G)		PUMA Standard: **Wiring harness - Electrical schematic frame 35 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 35 (A.30.A)**
2	5966 (Y)		
3	5964 (R)		
4	5968 (B)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



C599-BRJ4657A 7

C-PILLAR TOP RIGHT-HAND SIDE

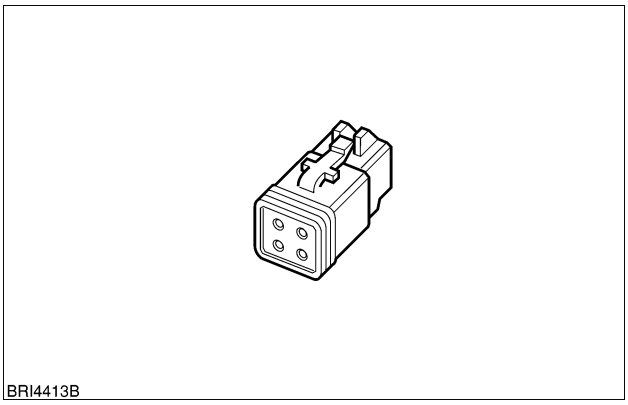
Wiring harness - Component diagram 60 Plug connections 600-609

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C600 SOCKET 2

PLUG CONNECTION C600 SOCKET 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5920B (R)	ISO BUS CAN POWER SUPPLY POSITIVE	PUMA Standard: **Wiring harness - Electrical schematic frame 35 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 35 (A.30.A)**
2	5910B (G)	ISO BUS CAN SIGNAL HIGH	
3	5915B (B)	ISO BUS CAN POWER SUPPLY EARTH	
4	5900B (Y)	ISO BUS CAN SIGNAL LOW	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

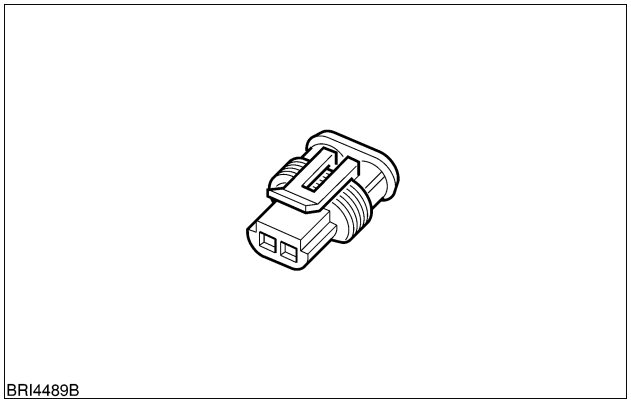


BRI4413B-01 1

C601 ISO IMPLEMENT SOCKET

PLUG CONNECTION C601 ISO IMPLEMENT SOCKET			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5970A (O)	ISO BUS ECU SIGNAL	PUMA Standard: **Wiring harness - Electrical schematic frame 24 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 24 (A.30.A)**
2	5980 (U)	ISO BUS IMPLEMENT SIGNAL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

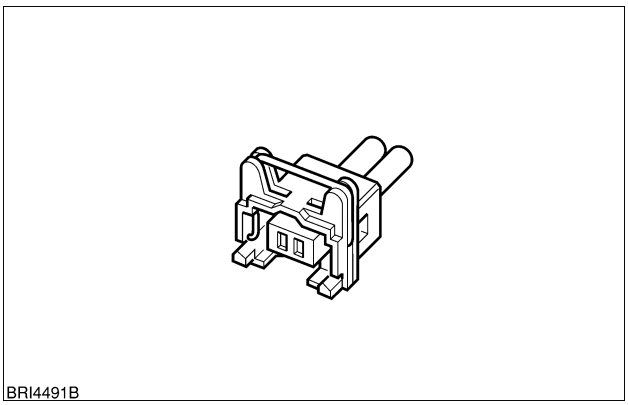


BRI4489B 2

C602 PARK LOCK SOLENOID VALVE (not used in PUMA Multicontroller)

PLUG CONNECTION C602 PARK LOCK SOLENOID VALVE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7586 (U)	PARK LOCK SOLENOID VALVE	
2	57EE (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C603 BUS TERMINAL RESISTOR

PLUG CONNECTION C603 BUS TERMINAL RESISTOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5515F (S)	ELECTROHYDR. REMOTE VALVE +12V STARTER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 15 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 15 (A.30.A)**
2	5510A (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5500A (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	
4	57FM (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C604 BUS TERMINAL RESISTOR

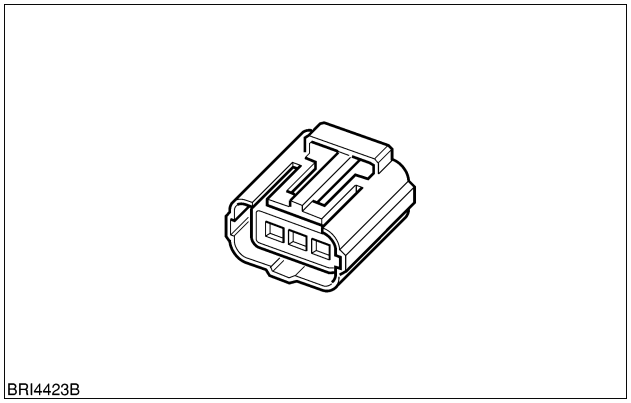
PLUG CONNECTION C604 BUS TERMINAL RESISTOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	5510 (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	PUMA Standard: **Wiring harness - Electrical schematic frame 15 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 15 (A.30.A)**
3	5500 (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

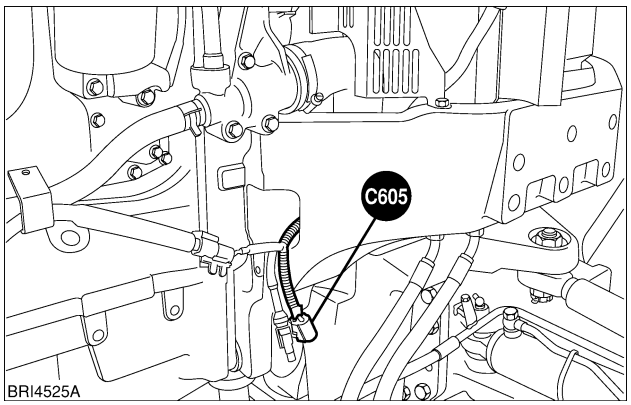
C605 ACCELEROMETER FOR SUSPENSION

PLUG CONNECTION C605 ACCELEROMETER FOR SUSPENSION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3235 (TN)	SIGNAL ACCELEROMETER	PUMA Standard: **Wiring harness - Electrical schematic frame 21 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 21 (A.30.A)**
2	60AG (B/W)	EARTH SENSOR	
3	5520D (LTG)	ELECTROHYDR. REMOTE VALVE 5V Ref.	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C605-BRI4525A 5

FRONT OF ENGINE - RIGHT-HAND SIDE

C606 BUS TERMINAL RESISTOR (not used in PUMA Multicontroller)

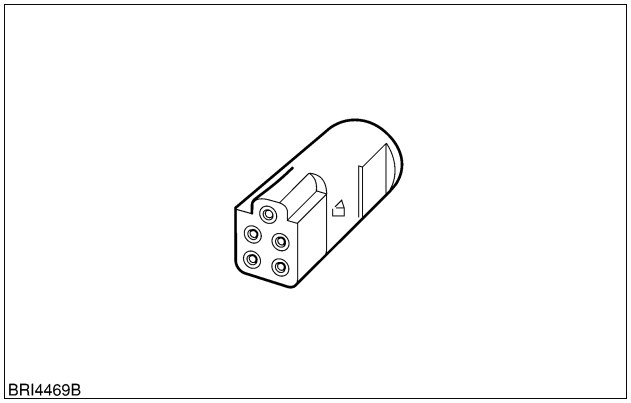
PLUG CONNECTION C606 BUS TERMINAL RESISTOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	5510 (U)	ELECTROHYDR. REMOTE VALVE CAN LOW	
3	5500 (R)	ELECTROHYDR. REMOTE VALVE CAN HIGH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

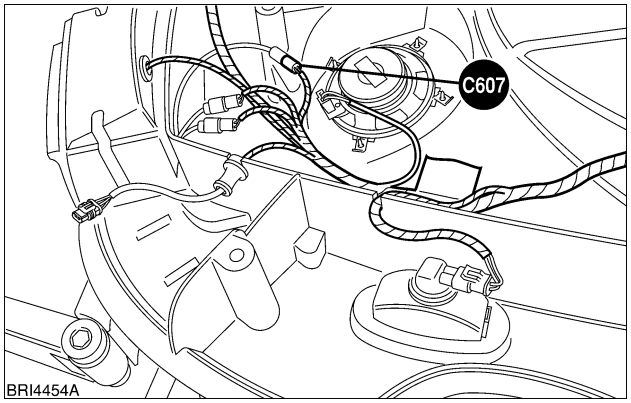
C607 ELECTRICAL MIRROR LEFT-HAND SIDE

PLUG CONNECTION C607 ELECTRICAL MIRROR LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1922A (G)		PUMA Standard: **Wiring harness - Electrical schematic frame 24 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 24 (A.30.A)**
2	1920 (O)		
3	1921 (Y)		
4	1927A (R)		
5	57AC (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4469B 6



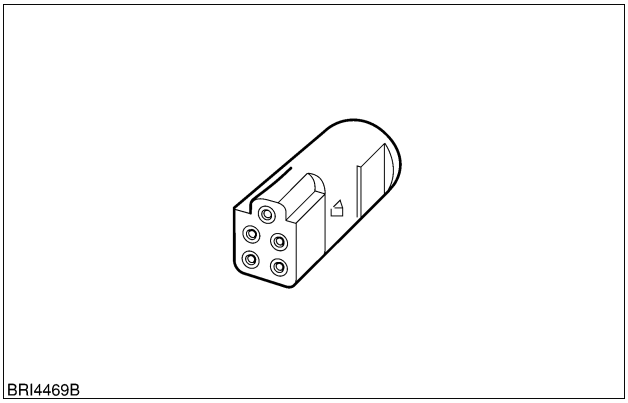
C607-BRI4454A 7

CAB ROOF FRONT - LEFT-HAND SIDE

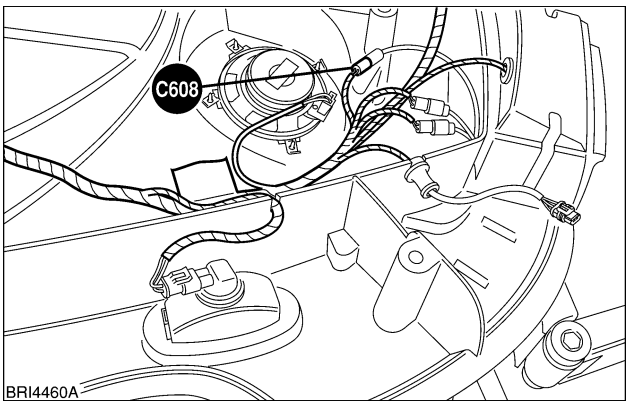
C608 ELECTRICAL MIRROR RIGHT-HAND SIDE

PLUG CONNECTION C608 ELECTRICAL MIRROR RIGHT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1922B (G)		PUMA Standard: **Wiring harness - Electrical schematic frame 24 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 24 (A.30.A)**
2	1923 (O)		
4	1927B (R)		
5	57AD (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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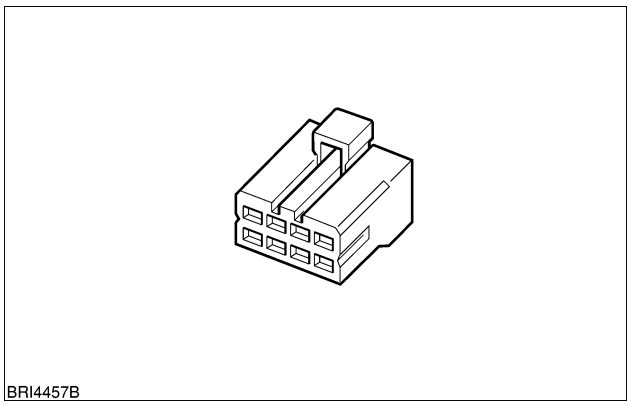
C608-BRI4460A 9

CAB ROOF FRONT - RIGHT-HAND SIDE

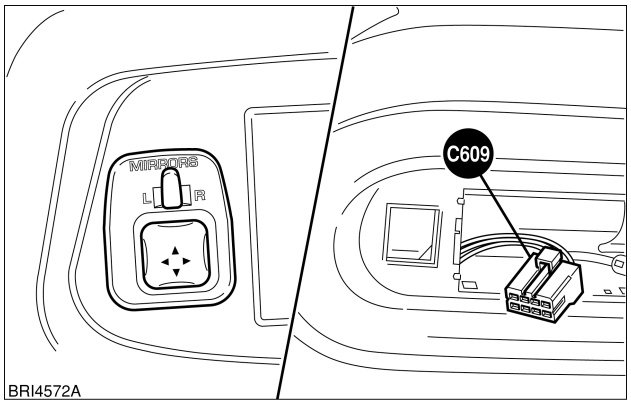
C609 MIRROR CONTROL SWITCH

PLUG CONNECTION C609 MIRROR CONTROL SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1920 (O)		PUMA Standard: **Wiring harness - Electrical schematic frame 24 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 24 (A.30.A)**
2	1923 (O)		
4	57AE B)	VEHICLE EARTH (ALL)	
5	1924 (Y)		
6	1921 (Y)		
7	1922 (G)		
8	1925 (R)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C609-BRI4572A 11

CAB ROOF

Wiring harness - Component diagram 61 Plug connections 610-619

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C610 MAIN WIRING HARNESS FRONT (not used in PUMA Multicontroller)

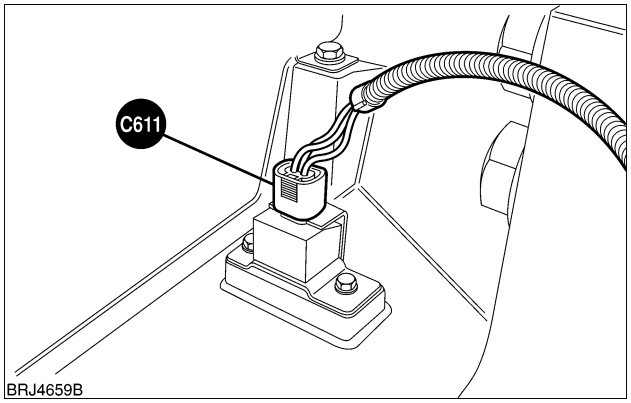
PLUG CONNECTION C610 MAIN WIRING HARNESS FRONT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3235 (TN)	SIGNAL ACCELEROMETER	
2	60AG (B/W)	EARTH SENSOR	
3	5520D (G)	ELECTROHYDR. REMOTE VALVE 5V Ref.	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C611 ACCELEROMETER

PLUG CONNECTION C611 ACCELEROMETER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3235 (TN)	SIGNAL ACCELEROMETER	PUMA Standard: **Wiring harness - Electrical schematic frame 21 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 21 (A.30.A)**
2	60AG (B/W)	EARTH SENSOR	
3	5520D (G)	ELECTROHYDR. REMOTE VALVE 5V Ref.	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



C611-BRJ4659B 1

ENGINE - FRONT, BEHIND THE RADIATOR

C612 SUSPENSION DEPRESSURISED (not used in PUMA Multicontroller)

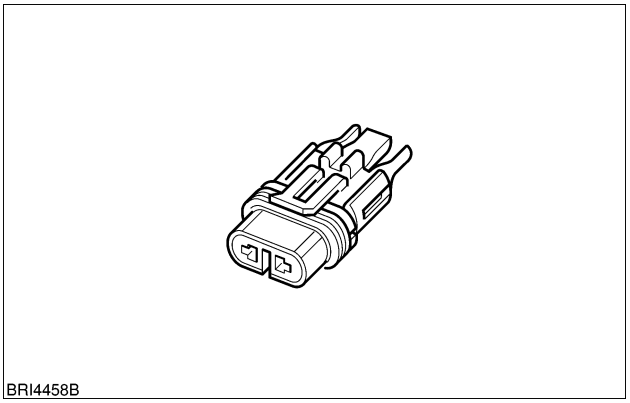
PLUG CONNECTION C612 SUSPENSION DEPRESSURISED			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3295 (O) / 57FX (B)	SIGNAL PRESSURE SWITCH FOR FRONT AXLE SUSPENSION / EARTH (ALL)\	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

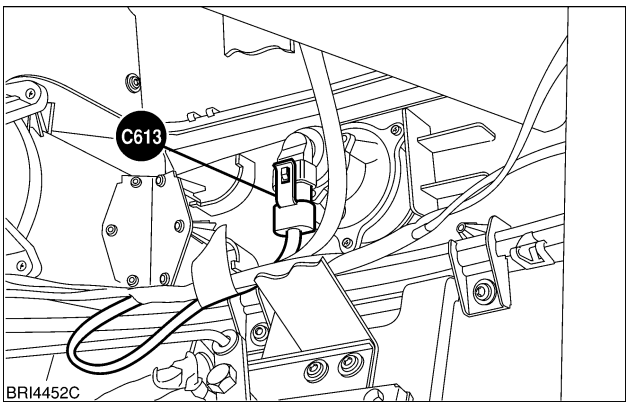
C613 WORK LAMP INSTALLED BY DEALER ON LEFT-HAND SIDE

PLUG CONNECTION C613 WORK LAMP INSTALLED BY DEALER ON LEFT-HAND SIDE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1073A (L)	POWER SUPPLY FRONT WORK LAMP	PUMA Standard: **Wiring harness - Electrical schematic frame 29 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 29 (A.30.A)**
2	57F (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4458B-01 2



C613-BRI4452C 3

BONNET

C616 RED PLUG CONNECTION (not used in PUMA Multicontroller)

PLUG CONNECTION C616 RED PLUG CONNECTION			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1 (R)	BATTERY POWER SUPPLY	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C617 M8 - RING TERMINAL (not used in PUMA Multicontroller)

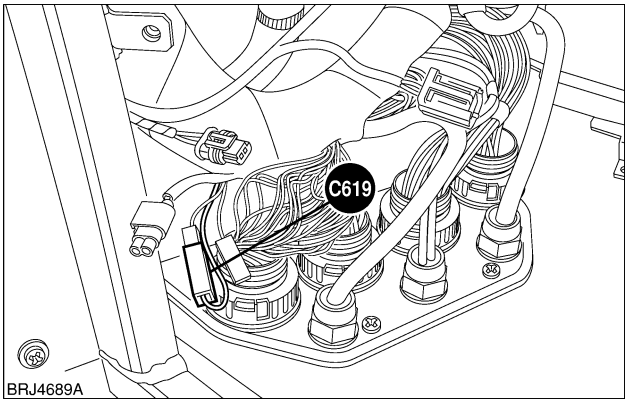
PLUG CONNECTION C617 M8 - RING TERMINAL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	57 (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C619 MEMORY +

PLUG CONNECTION C619 MEMORY +			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	150AG (N)	BATTERY POWER SUPPLY (NO FUSE) (ALL)	PUMA Standard: **Wiring harness - Electrical schematic frame 37 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



C619-BRJ4689A 4

CAB FLOOR - RIGHT SIDE CONSOLE

Wiring harness - Component diagram 62 Plug connections 620-629

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C620 REPLACEMENT 1

PLUG CONNECTION C620 REPLACEMENT 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5920B (R)	ISO BUS CAN POWER SUPPLY POSITIVE	PUMA Standard: **Wiring harness - Electrical schematic frame 33 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 33 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C621 REPLACEMENT 2

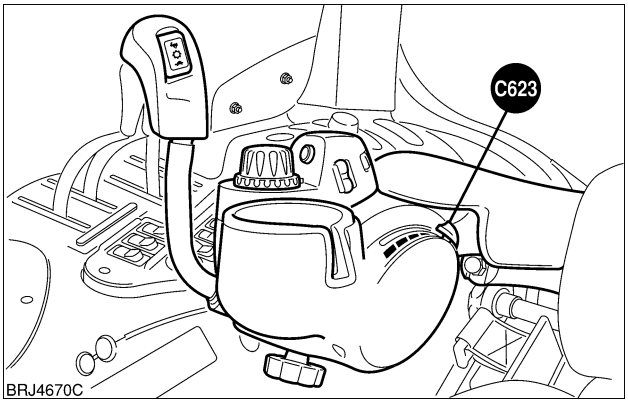
PLUG CONNECTION C621 REPLACEMENT 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5915B (B)	ISO BUS CAN POWER SUPPLY EARTH	PUMA Standard: **Wiring harness - Electrical schematic frame 33 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 33 (A.30.A)**

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C623 THROTTLE - OPERATOR CONTROL ARMREST (not used in PUMA Multicontroller)

PLUG CONNECTION C623 HAND THROTTLE - CONTROL ARMREST			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
			Wiring harness - Electrical schematic frame 10 (A.30.A)

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



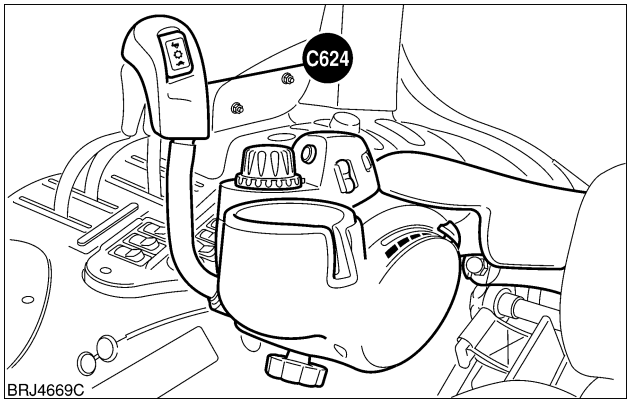
C623-BRJ4670C 1

OPERATOR CONTROL ARMREST

C624 TRANSMISSION SWITCH - OPERATOR CONTROL ARMREST (not used in PUMA Multicontroller)

PLUG CONNECTION C624 OPERATOR CONTROL ARMREST			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
			Wiring harness - Electrical schematic frame 10 (A.30.A)

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



C624-BRJ4669C 2

OPERATOR CONTROL ARMREST

C625 RELAY - FUEL PRE-HEATER

PLUG CONNECTION C625 RELAY - FUEL PRE-HEATER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	6570 (G)	EARTH SWITCHED FROM ENGINE ELECTRONICS (ECU)	PUMA Standard: **Wiring harness - Electrical schematic frame 04 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 04 (A.30.A)**
2	6408 (G)	POWER SUPPLY POTENTIAL 15	
3		TO THE FUEL PRE-HEATER	
5		POWER SUPPLY POTENTIAL 30	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C626 FUEL PRE-HEATER

PLUG CONNECTION C626 FUEL PRE-HEATER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
			PUMA Standard: **Wiring harness - Electrical schematic frame 04 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 04 (A.30.A)**

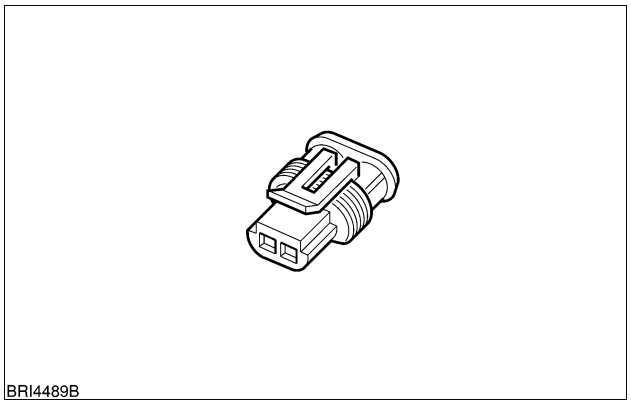
NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

C627 TEMPERATURE CONTROL

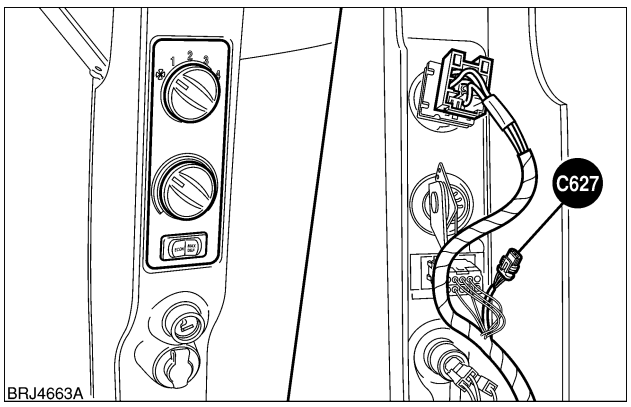
PLUG CONNECTION C627 (WITH MANUAL TEMPERATURE CONTROL) TEMPERATURE CONTROL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(U)	LOW PRESSURE SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 41 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 41 (A.30.A)**
2	(P)	THERMOSTAT SWITCH	

PLUG CONNECTION C627 (WITH AUTOMATIC TEMPERATURE CONTROL) TEMPERATURE CONTROL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(LG/R)	SETTING VALUE INPUT	PUMA Standard: **Wiring harness - Electrical schematic frame 40 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 40 (A.30.A)**
2	(B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4489B 3



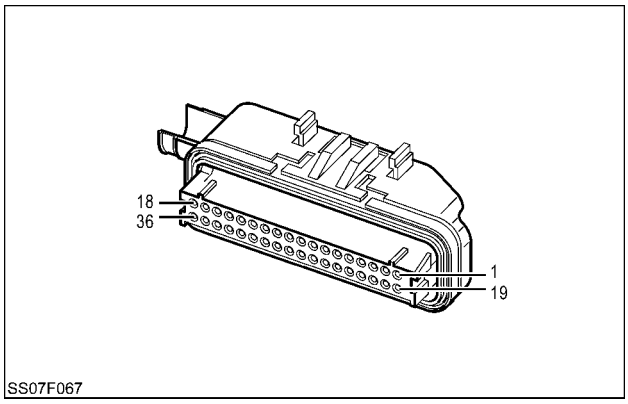
C627-BRJ4663A 4

CAB - C-PILLAR LEFT-HAND SIDE

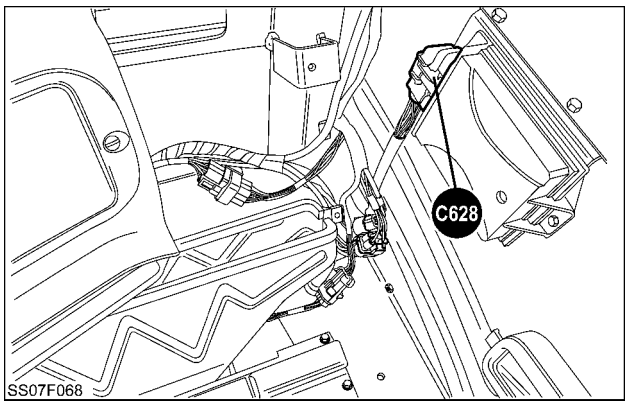
C628 AUTOMATIC TEMPERATURE CONTROL

PLUG CONNECTION C628 AUTOMATIC TEMPERATURE CONTROL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(G)	CAN L	
2	(Y)	CAN H	PUMA Standard: **Wiring harness - Electrical schematic frame 40 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 40 (A.30.A)**
3	(Y/R)	TEMPERATURE SIGNAL OUTPUT	
4	(W/R)	POWER SUPPLY HEATING CONTROL	
5	(R)	BLOWER SPEED OUTPUT	
6	(U/R)	BLOWER SPEED +	
15	(P/R)	COMPRESSOR COUPLING RELAY	
16	(O/R)	DEHUMIDIFIED OUTPUT	
17	(R)	POWER SUPPLY POTENTIAL 15	
18	(B)	VEHICLE EARTH (ALL)	
21	(R/B)	CAB TEMPERATURE SENSOR	
22	(Y/B)	OUTPUT TEMPERATURE SENSOR	
23	(P/B)	EVAP TEMPERATURE SENSOR	
24	(O/B)	OUTSIDE TEMPERATURE SENSOR	
25	(N/R)	MAXIMUM BLOWER SPEED MODE	
26	(S/R)	HEATING MODE	
27	(G/S)	BLOWER SPEED AUTO	
28	(G/Y)	BLOWER SPEED 1	
29	(LG/R)	SETTING VALUE INPUT	
30	(K/G)	BLOWER SPEED 2	
31	(K/O)	BLOWER SPEED 3	
33	(W)	HIGH PRESSURE SWITCH INPUT +	
34	(W/U)	HIGH PRESSURE SWITCH INPUT -	
35	(U)	LOW PRESSURE SWITCH INPUT +	
36	(U/W)	LOW PRESSURE SWITCH INPUT -	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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SS07F068 6

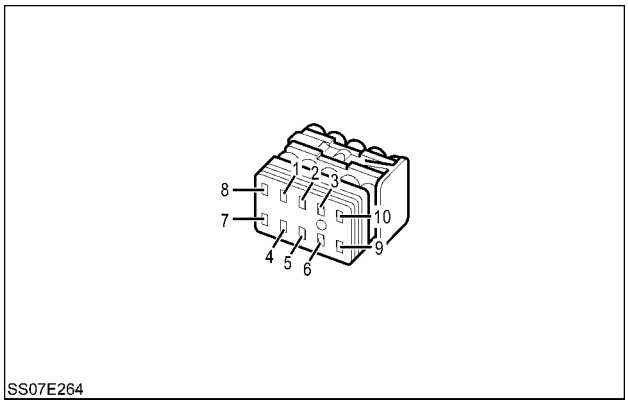
BACK OF TRACTOR - LEFT-HAND SIDE BEHIND THE DRIVER'S SEAT

C629 AIR CONDITIONING SYSTEM SWITCH

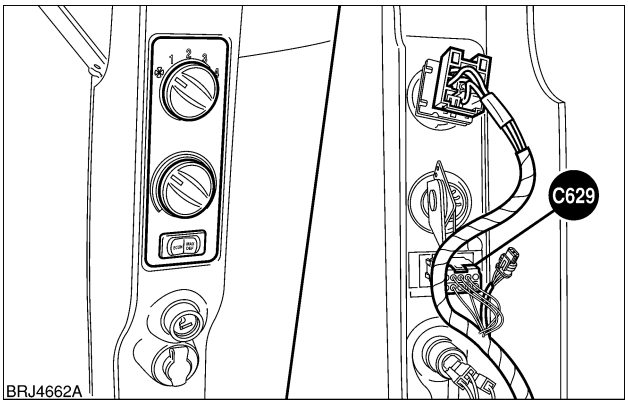
PLUG CONNECTION C629 (WITH MANUAL TEMPERATURE CONTROL) AIR CONDITIONING SYSTEM SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	(G)	BLOWER SWITCH	PUMA Standard: **Wiring harness - Electrical schematic frame 41 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 41 (A.30.A)**
3	(U)	AIR CONDITIONING	
7	(B)	VEHICLE EARTH (ALL)	

PLUG CONNECTION C629 (WITH AUTOMATIC TEMPERATURE CONTROL) AIR CONDITIONING SYSTEM SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(N/R)	MAXIMUM SPEED MODE	PUMA Standard: **Wiring harness - Electrical schematic frame 40 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 40 (A.30.A)**
2	(R)	POWER SUPPLY POTENTIAL 15	
3	(S/R)	HEATING MODE	
7	(B)	VEHICLE EARTH (ALL)	
9	(B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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C629-BRJ4662A 8

CAB - C-PILLAR LEFT-HAND SIDE

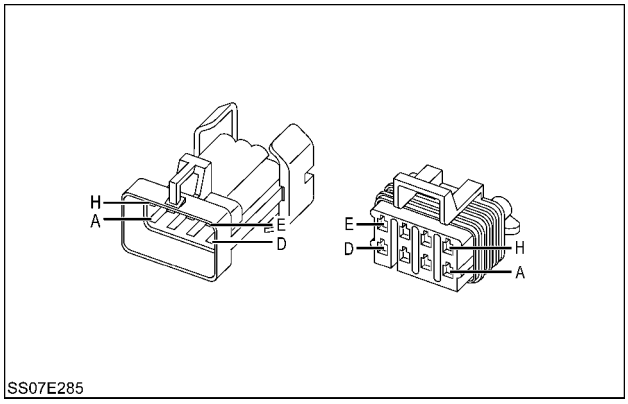
Wiring harness - Component diagram 63 Plug connections 630-639

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

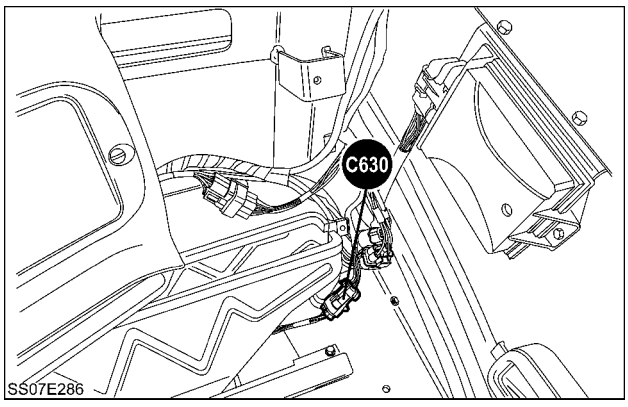
C630 AIR CONDITIONING AND HEATING UNIT

PLUG CONNECTION C630 AIR CONDITIONING SYSTEM			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
A	YB	SIGNAL OUTPUT TEMPERATURE SENSOR	PUMA Standard: **Wiring harness - Electrical schematic frame 40 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 40 (A.30.A)**
B	B/P	SIGNAL EVAPORATOR TEMPERATURE SENSOR	
C	U	SIGNAL LOW PRESSURE SWITCH	
D	B	VEHICLE EARTH (ALL)	
E	R	POWER SUPPLY POTENTIAL 15	
F	Y/R	HEATING VALVE SLIDE VALVE	
G	U/W	HEATING VALVE SLIDE VALVE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E285 1



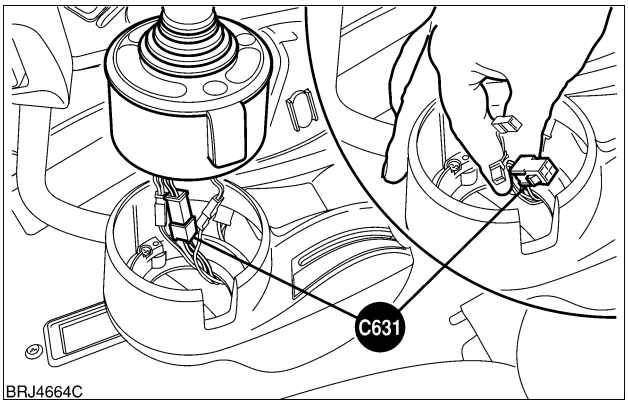
SS07E286 2

CAB LEFT-HAND SIDE

C631 JOYSTICK CAN-BUS (not used in PUMA Multicontroller)

PLUG CONNECTION C631 JOYSTICK CAN-BUS			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
			Wiring harness - Electrical schematic frame 12 (A.30.A)

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



C631-BRJ4664C 3

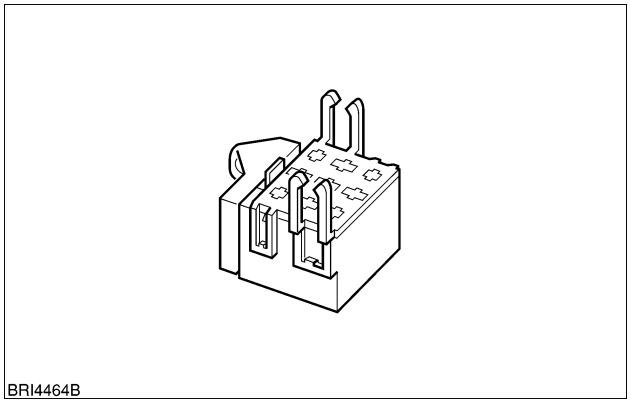
OPERATOR CONTROL ARMREST

C632 RELAY - ORIENTATION LIGHTING

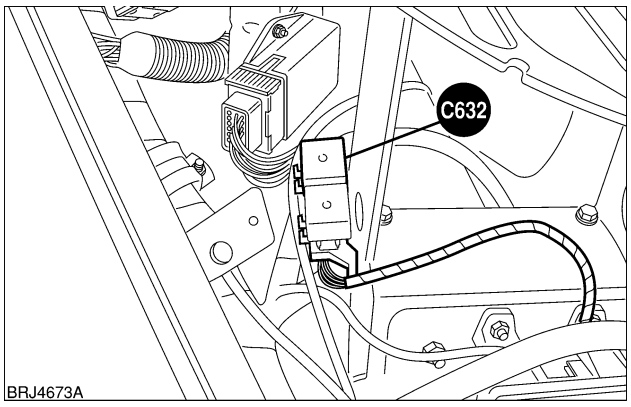
PLUG CONNECTION C632 RELAY - ORIENTATION LIGHTING			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	1024 (R)	POWER SUPPLY RIGHT-HAND AND LEFT-HAND SIDE MARKER LIGHT	**Wiring harness - Electrical schematic frame 27 (A.30.A)**
4	1052 (Y)	OUTSIDE LIGHTING RELAY	
6	1030AC (N)	HEADLAMP DIPPED BEAM	
8	1030AB (N)	HEADLAMP DIPPED BEAM	

PLUG CONNECTION C632 - in PUMA Multicontroller RELAY - ORIENTATION LIGHTING			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	1024 (R)	POWER SUPPLY RIGHT-HAND AND LEFT-HAND SIDE MARKER LIGHT	**Wiring harness - Electrical schematic frame 27 (A.30.A)**
4	1052 (Y)	OUTSIDE LIGHTING RELAY	
6	1030AC (U)	HEADLAMP DIPPED BEAM	
8	1030AB (U)	HEADLAMP DIPPED BEAM	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



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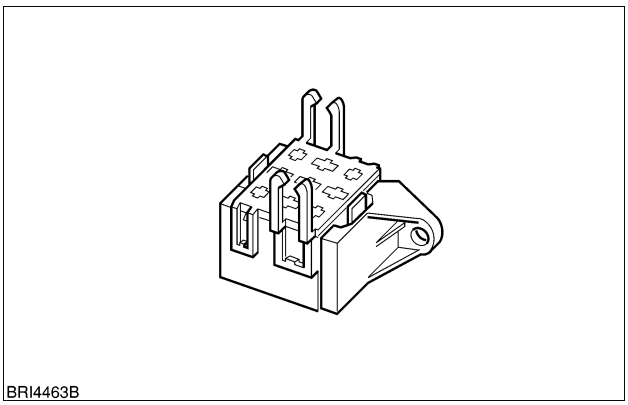
C632-BRJ4673A 5

RIGHT-HAND SIDE CONSOLE

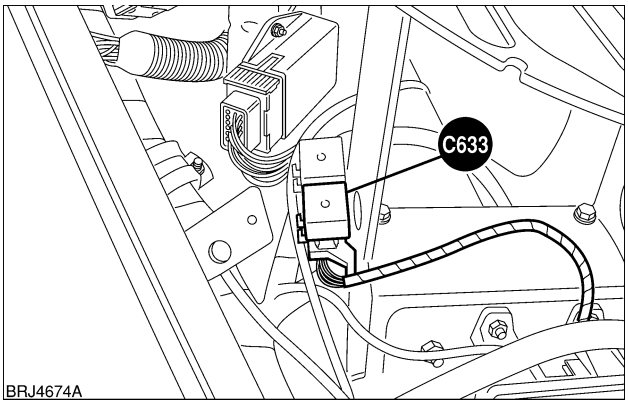
C633 RELAY - HEATED MIRROR

PLUG CONNECTION C633 RELAY - HEATED MIRROR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	1927 (R)	POWER SUPPLY POTENTIAL 15	PUMA Standard: **Wiring harness - Electrical schematic frame 27 (A.30.A)** PUMA Multicontroller: **Wiring harness - Electrical schematic frame 24 (A.30.A)**
4	57HM (B)	VEHICLE EARTH (ALL)	
5	1925B (R)	POWER SUPPLY POTENTIAL 15	
6	1928 (R)	VON SCHALTER BEHEIZTE SPIEGEL	
8	666C (L)	POWER SUPPLY SWITCH INTERIOR LIGHT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



BRI4463B 6



C633-BRJ4674A 7

RIGHT-HAND SIDE CONSOLE

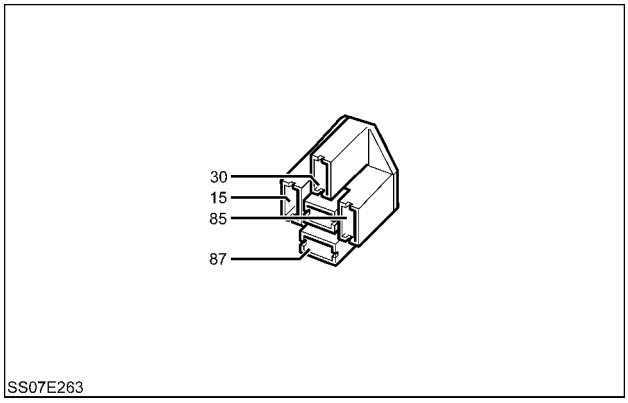
Wiring harness - Component diagram 66 Plug connections 660-669

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C666 TIME RELAY ELECTRICAL BATTERY ISOLATOR

PLUG CONNECTION C666 TIME RELAY ELECTRICAL BATTERY ISOLATOR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
15	172 (Y)	RELAY COIL FOR THE BATTERY ISOLATOR SWITCH (OFF)	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**
30	1K (R)	BATTERY POWER SUPPLY	
85	57 (B)	VEHICLE EARTH (ALL)	
87	172A (Y)	RELAY COIL FOR THE BATTERY ISOLATOR SWITCH (OFF)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



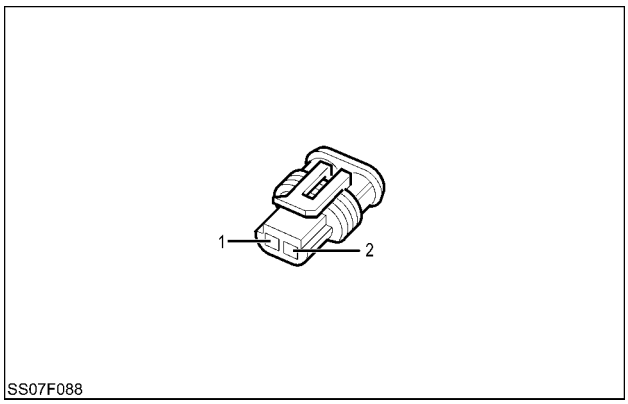
SS07E263 1

C-PILLAR RIGHT-HAND SIDE

C667 SUPPLY LIGHT ISOBUS

PLUG CONNECTION C667 SUPPLY LIGHT ISOBUS			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1012L (R)	LIGHTING	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 35 (A.30.A)**
2	57PW (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*

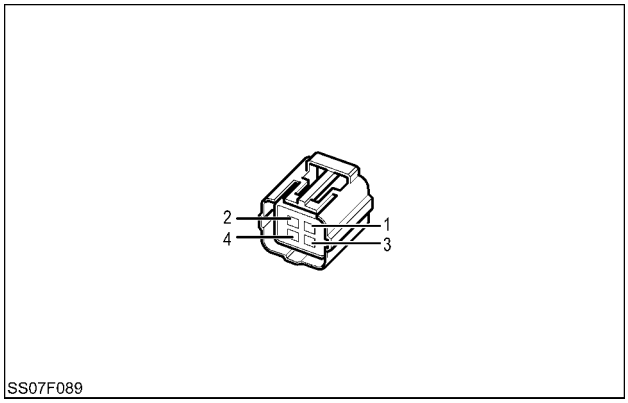


SS07F088 2

C668 INTERFACE FOR ADDITIONAL CAN BUS CONTROL

PLUG CONNECTION C668 INTERFACE FOR ADDITIONAL CAN BUS CONTROL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5400K (Y) / 5400K (Y)	CAN H	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 34 (A.30.A)**
2	5420K (G) / 5420K (G)	CAN L	
3	5400W (Y) / 5400W (Y)	CAN H	
4	5420W (G) / 5420W (G)	CAN L	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07F089 3

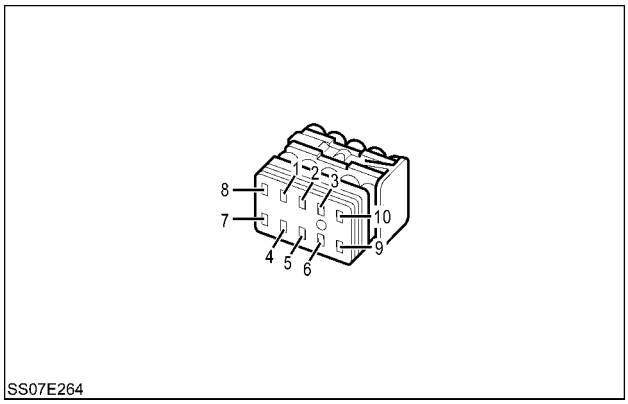
Wiring harness - Component diagram 80 Plug connections 800-809

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

C800 CREEP SPEED/ GEF. FRONT AXLE

PLUG CONNECTION C800 CRAWLER GEAR / GEF. FRONT AXLE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	7040B (N)	CRAWLER GROUP SWITCH	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 01 (A.30.A)**
2	7000BY (U)	POWER SUPPLY TRANSMISSION CONTROLS	
3	3210A (U)	ON/OFF SWITCH FOR SUSPENSION RETURN SIGNAL	
7	57SB (B)	VEHICLE EARTH (ALL)	
8	1012AK (R)	LIGHTING	
9	57SC (B)	VEHICLE EARTH (ALL)	
10	1012AL (R)	LIGHTING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



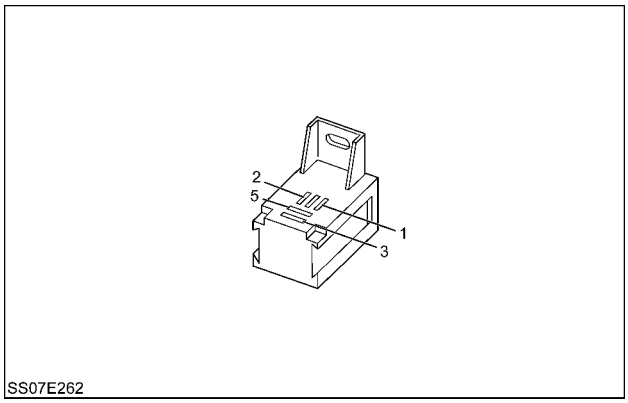
SS07E264 1

RIGHT-HAND SIDE CONSOLE

C801 RELAY FRONT LOADER SOLENOID VALVE 1

PLUG CONNECTION C801 RELAY FRONT LOADER SOLENOID VALVE 1			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3278 (O)	FRONT LOADER - CONTROL VALVE 3 RELAY	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 17 (A.30.A)**
2	57FS (B)	VEHICLE EARTH (ALL)	
3	3271C (R)	FRONT LOADER RELAY POWER SUPPLY	
5	3274 (O)	FRONT LOADER - CONTROL VALVE 2 OUTPUT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



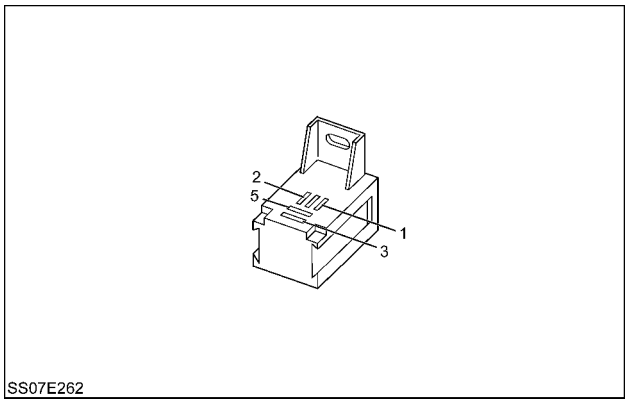
SS07E262 2

RIGHT-HAND SIDE CONSOLE

C802 RELAY FRONT LOADER D+

PLUG CONNECTION C802 RELAY, FRONT LOADER D+			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	1006 (R)	WARNING LIGHT 3-PHASE ALTERNATOR	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 17 (A.30.A)**
2	57FT (B)	VEHICLE EARTH (ALL)	
3	3271 (U)	FRONT LOADER RELAY POWER SUPPLY	
5	3271A (R)	FRONT LOADER RELAY POWER SUPPLY	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



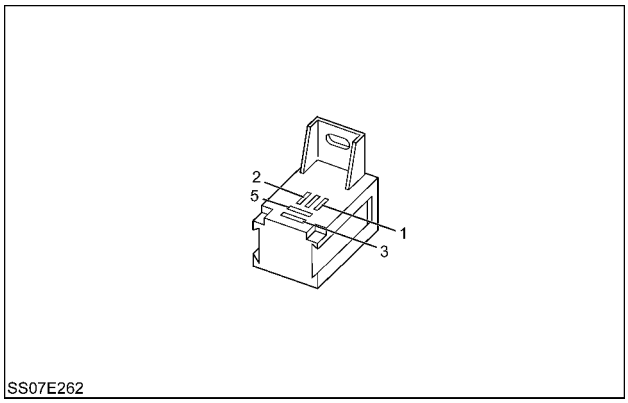
SS07E262 3

RIGHT-HAND SIDE CONSOLE

C803 RELAY FRONT LOADER SOLENOID VALVE 2

PLUG CONNECTION C803 RELAY, FRONT LOADER SOLENOID VALVE 2			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3277 (O)	FRONT LOADER CONTROL VALVE 3 COIL	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 17 (A.30.A)**
2	57FR (B)	VEHICLE EARTH (ALL)	
3	3271B (R)	FRONT LOADER RELAY POWER SUPPLY	
5	3272 (O)	FRONT LOADER - CONTROL VALVE 1 OUTPUT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E262 4

RIGHT-HAND SIDE CONSOLE

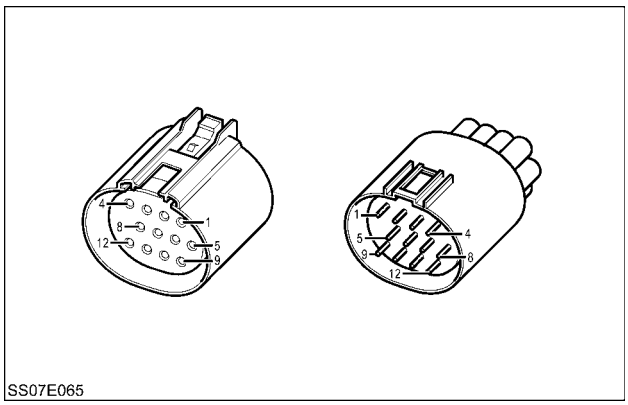
Wiring harness - Component diagram 91 Plug connections 910-919

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

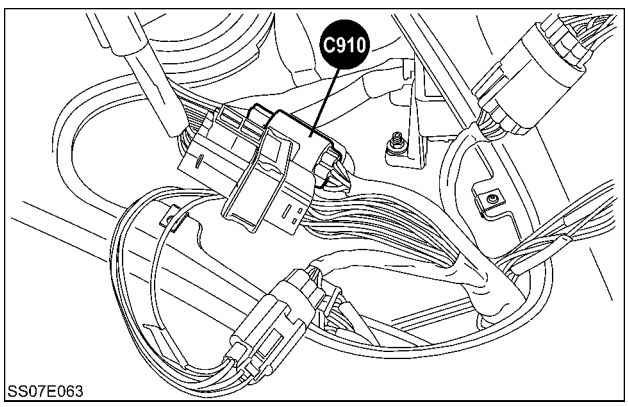
C910 EDC - LED CONTROLS AND SWITCHES

PLUG CONNECTION C910 EDC - LED CONTROLS AND SWITCHES			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5200H (N) / 5200 (O)	EPC POWER SUPPLY POTENTIAL +15	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 10 (A.30.A)**
3	5205 (W) / 5100 (W)	EPC SIGNAL RAISE	
4	5215 (Y) / 5095 (W)	EPC SIGNAL LOWER	
5	5110 (K) / Status (W)	EPC STATUS TELLTALE	
6	5180 (TQ) / Slip (W)	EPC WHEEL SLIP TELLTALE	
7	5220 (Y) / Raise (W)	EPC RAISE TELLTALE	
8	5230 (Y) / Lower (W)	EPC LOWER TELLTALE	
11	1012H (R) / 1012 (S)	LIGHTING	
12	57BY (B) / 57AY (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E065 1



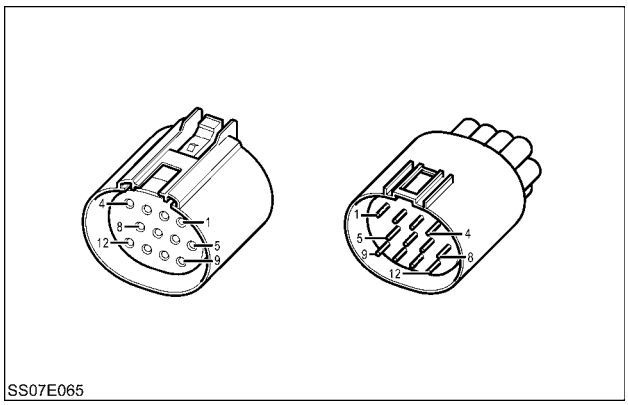
SS07E063 2

RIGHT-HAND SIDE CONSOLE

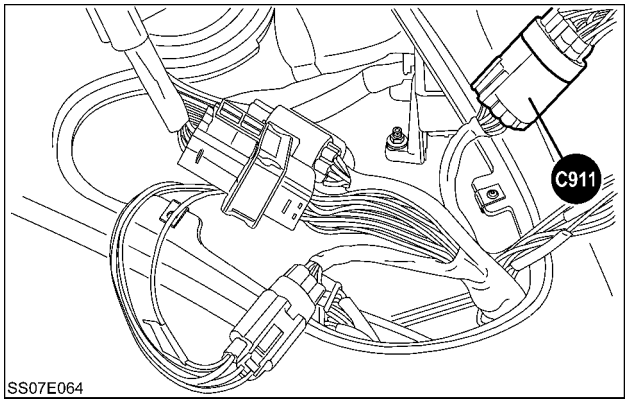
C911 EDC - POTENTIOMETER PANEL

PLUG CONNECTION C911 EDC - POTENTIOMETER PANEL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5020C (TN) / 60K (N)	EPC CONTOLLER +5V REFERENCE VOLTAGE	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 10 (A.30.A)**
2	60BL (B/W) / 5020F (O)	EARTH SENSOR	
3	5155 (U) / 5155 (G)	EPC POTENTIOMETER WORKING DEPTH CONTROL	
4	5120 (K) / 5120 (G)	EPC HEIGHT LIMIT CONTROL	
5	5045 (G) / 5045 (TN)	EPC LOWERING SPEED	
6	5040 (G) / 5040 (TN)	EPC TRACTION / POSITION CONTROL	
7	5145 (TQ) / 5145 (G)	EPC POTENTIOMETER SETPOINT SLIP CONTROL	
11	1012C (R) / 1012C (S)	LIGHTING	
12	57AE (B) / 57AE (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E065 3



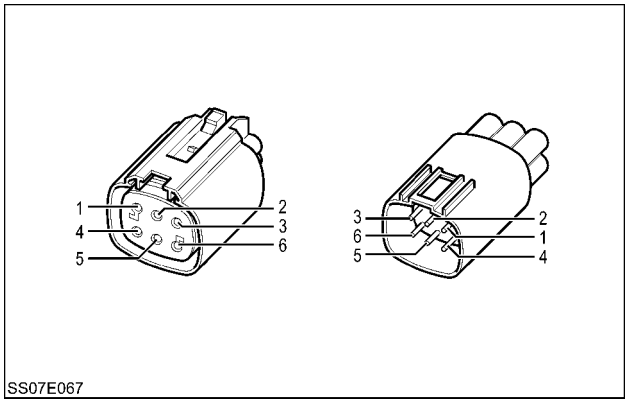
SS07E064 4

RIGHT-HAND SIDE CONSOLE

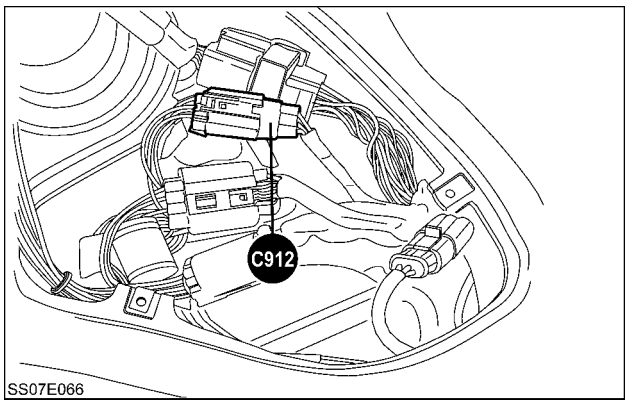
C912 EDC - POTENTIOMETER SETPOINT

PLUG CONNECTION C912 EDC - POTENTIOMETER SETPOINT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5020C (TN) / 699 (O)	EPC CONTOLLER +5V REFERENCE VOLTAGE	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 10 (A.30.A)**
2	60BM (B/W) / 697 (N)	EARTH SENSOR	
3	5050 (TN) / 698 (G)	EPC CONTROL	
5	1012D (R) / 700 (S)	LIGHTING	
6	57GC (B) / 701 (B)	VEHICLE EARTH (ALL)	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E067 5



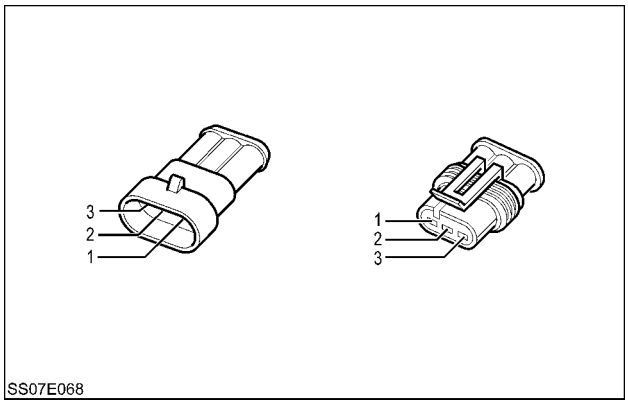
SS07E066 6

RIGHT-HAND SIDE CONSOLE

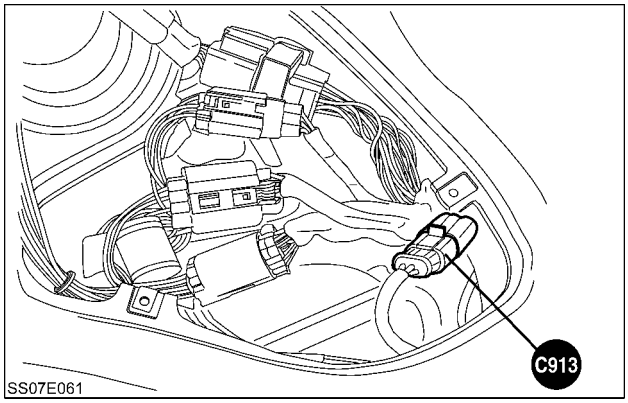
C913 EFH - EXTERNAL BUTTON - FRONT POWER LIFT

PLUG CONNECTION C913 EFH - EXTERNAL PUSH BUTTON - FRONT POWER LIFT			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	2587 (N) / 57RN (B)	VEHICLE EARTH (ALL)	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 20 (A.30.A)**
2	2588 (L) / 2582 (G)	EPC FRONT POWER LIFT REAR CONTROL SWITCH RAISE	
3	2589 (R) / 2583 (N)	EPC FRONT POWER LIFT REAR CONTROL SWITCH LOWER	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E068 7



SS07E061 8

RIGHT-HAND SIDE CONSOLE

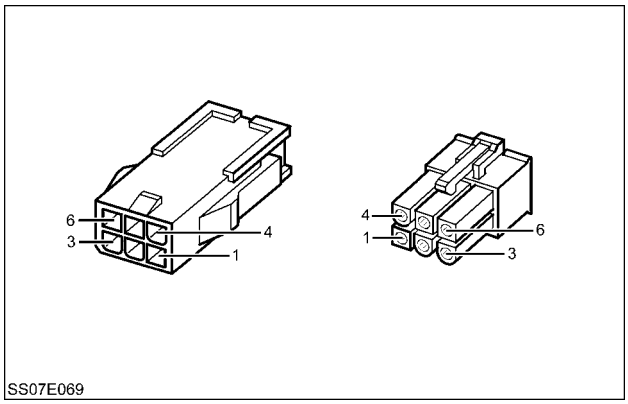
Wiring harness - Component diagram 92 Plug connections 920-929

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

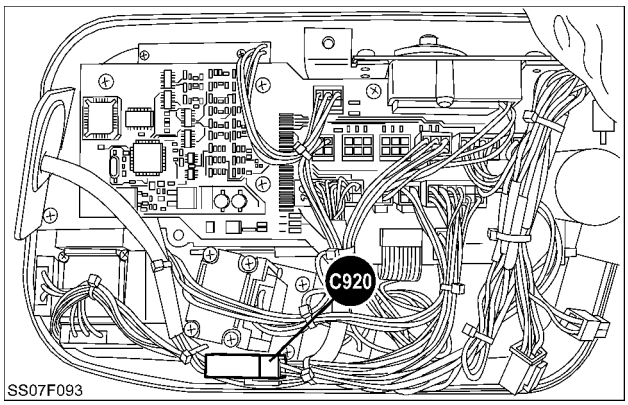
C920 ARU - CAN DOG

PLUG CONNECTION C920 ARU - CAN DOG			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(K)	POWER SUPPLY POTENTIAL +15	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 42 (A.30.A)**
2	(S)	LIGHTING	
3	(N)	EARTH	
4	(Y)	CAN H	
5	(G)	CAN L	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E069 1



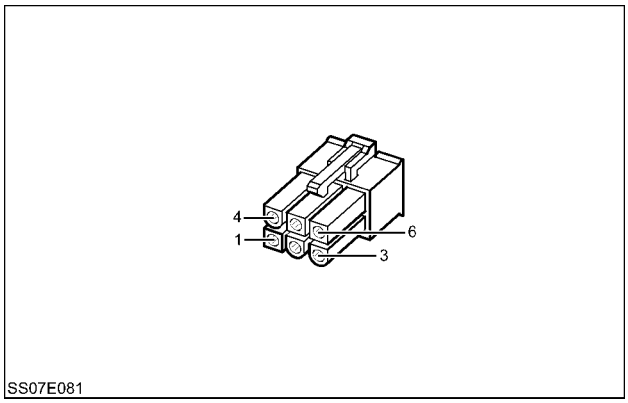
SS07F093 2

ARMREST

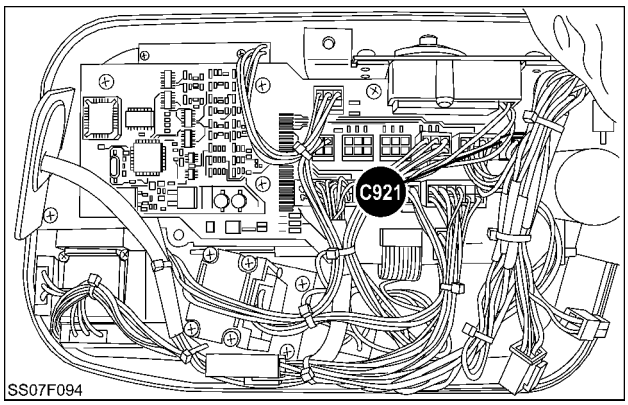
C921 ARU - POWER SUPPLY WIRIONG HARNESS

PLUG CONNECTION C921 ARU - POWER SUPPLE WIRING HARNESS			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(S)	LIGHTING	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 42 (A.30.A)**
4	(B)	EARTH	
5	(P)	POWER SUPPLY POTENTIAL +15	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E081 3



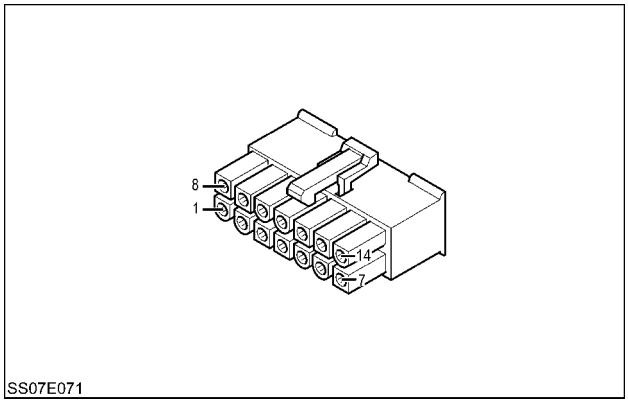
SS07F094 4

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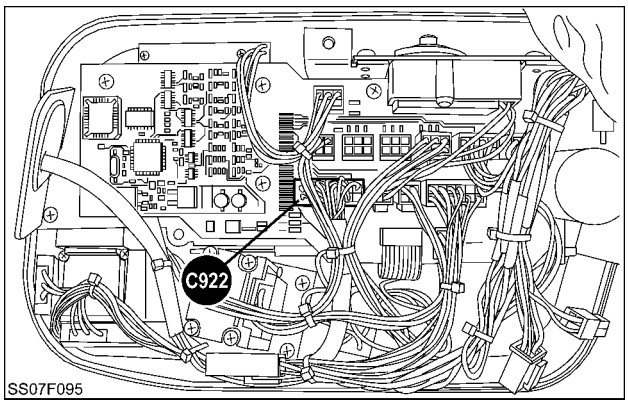
C922 ARU - WIRING HARNESS MULTICONTROLLER

PLUG CONNECTION C922 ARU - WIRING HARNESS MULTICONTROLLER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(R)	POWER SUPPLY 5V STAB.	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 43 (A.30.A)**
2	(N)	EARTH	
3	(R/U)	SIGNAL FORWARDS / REVERSE	
4	(Y)	SIGNAL SPEED NEGATIVE	
5	(S)	SIGNAL HEADLAND MANAGEMENT CONTROLLER	
6	(S/K)	SIGNAL LOWER EPC	
7	(U)	SIGNAL EDC CONTROL - TRANSPORT	
8	(P)	LIGHTING	
9	(B)	SIGNAL SHIFT	
10	(W/G)	SIGNAL AUTO TRANS ON/OFF	
11	(G)	SIGNAL SPEED POSITIVE	
12	(K)	SIGNAL RAISE EPC	
13	(W)	SIGNAL FINGER WHEEL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E071 5



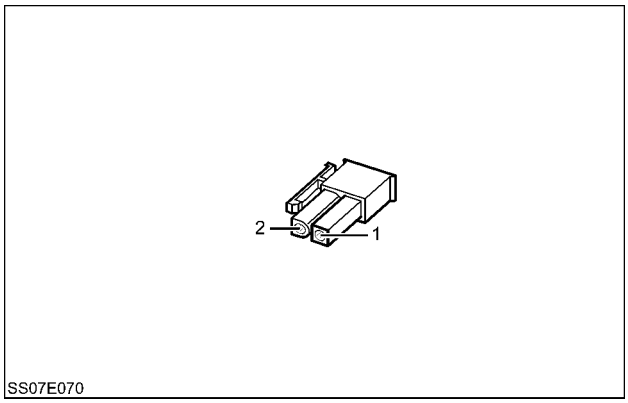
SS07F095 6

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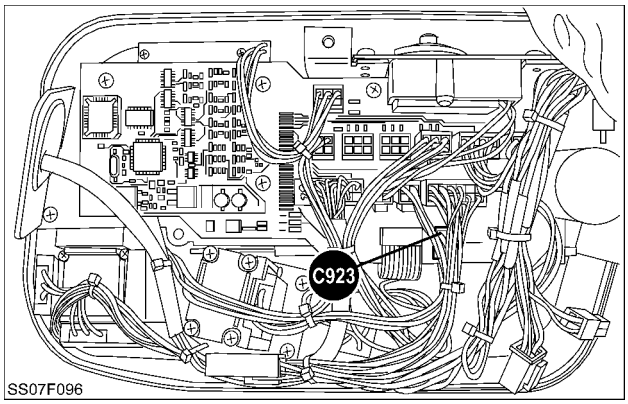
C923 ARU - TRANSPARENT KEYBOARD LIGHTING

PLUG CONNECTION C923 ARU - TRANSPARENT KEYBOARD LIGHTING			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(R)	LIGHTING	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 44 (A.30.A)**
2	(N)	EARTH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E070 7



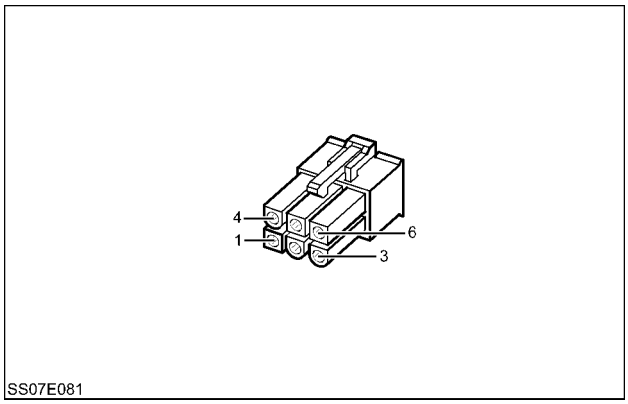
SS07F096 8

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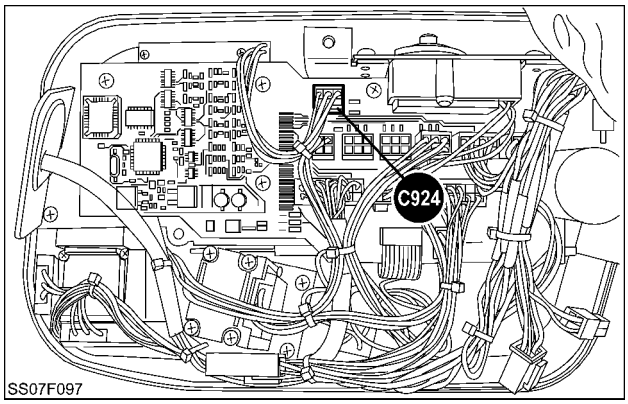
C924 ARU - LED DISPLAYS REMOTE VALVES (OUTPUT)

PLUG CONNECTION C924 ARU - LED DISPLAYS REMOTE VALVES (OUTPUT)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(Y)	POWER SUPPLY POTENTIAL 15	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 42 (A.30.A)**
2	(K)	SIGNAL TIMER PROG. EPC 1 LED	
3	(K)	SIGNAL TIMER PROG. EPC 2 LED	
4	(K)	SIGNAL TIMER PROG. EPC 3 LED	
5	(K)	SIGNAL TIMER PROG. EPC 4 LED	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E081 9



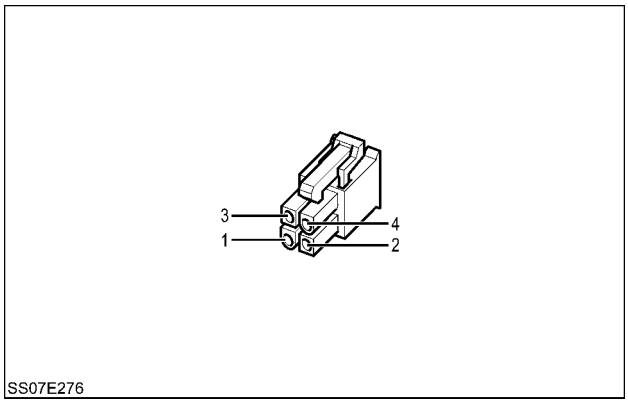
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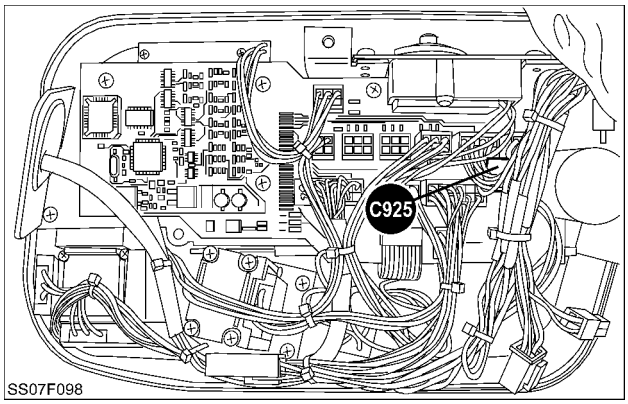
C925 ARU - CAN BUS

PLUG CONNECTION C925 ARU - CAN BUS			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
3	(Y)	CAN H	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 42 (A.30.A)**
4	(G)	CAN L	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E276 11



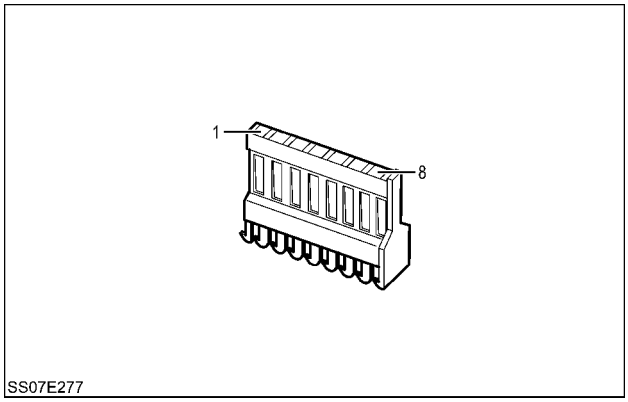
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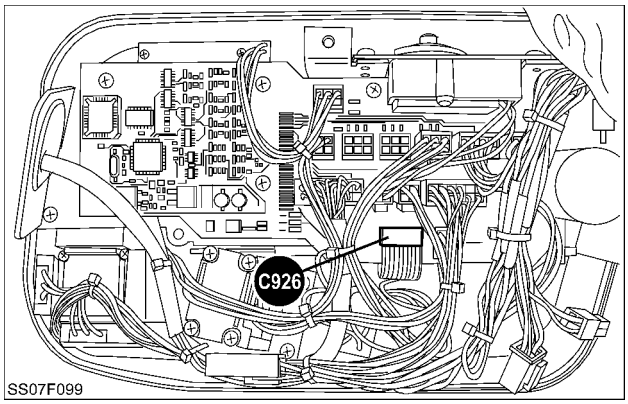
C926 ARU - TRANSPARENT KEYBOARD

PLUG CONNECTION C926 ARU - TRANSPARENT KEYBOARD			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(W)		PUMA Multicontroller: **Wiring harness - Electrical schematic frame 44 (A.30.A)**
2	(W)		
3	(W)		
4	(W)		
5	(W)		
6	(W)		
7	(W)		
8	(W)		

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E277 13



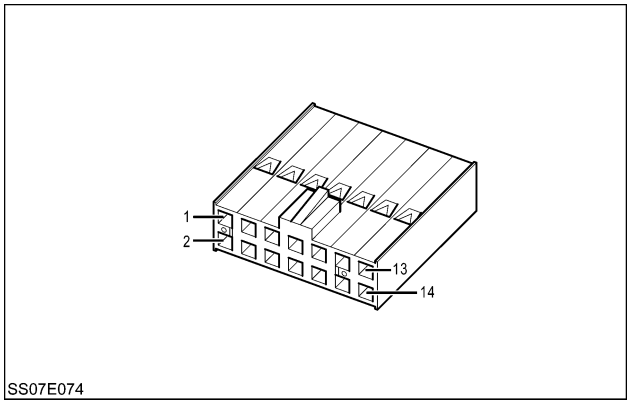
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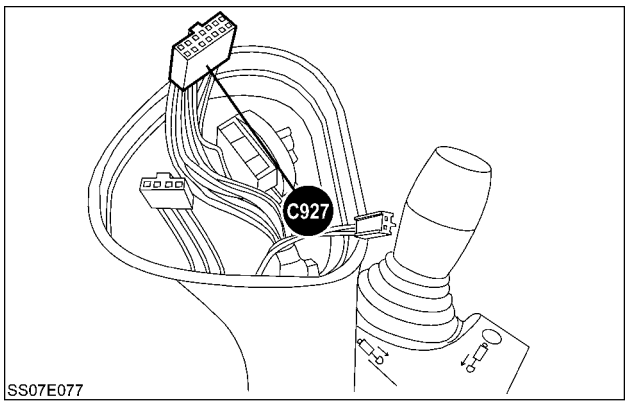
C927 ARU - MULTICONTROLLER

PLUG CONNECTION C927 ARU - MULTICONTROLLER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(R)	POWER SUPPLY 5V STAB.	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 43 (A.30.A)**
2	(N)	EARTH	
3	(R/U)	SIGNAL FORWARDS / REVERSE	
4	(Y)	SIGNAL SPEED NEGATIVE	
5	(S)	SIGNAL HEADLAND MANAGEMENT CONTROLLER	
6	(S/K)	SIGNAL LOWER EPC	
7	(U)	SIGNAL EDC CONTROL - TRANSPORT	
8	(P)	LIGHTING	
9	(B)	SIGNAL SHIFT	
10	(W/G)	SIGNAL AUTO TRANS ON/OFF	
11	(G)	SIGNAL SPEED POSITIVE	
12	(K)	SIGNAL RAISE EPC	
13	(W)	SIGNAL FINGER WHEEL	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E074 15



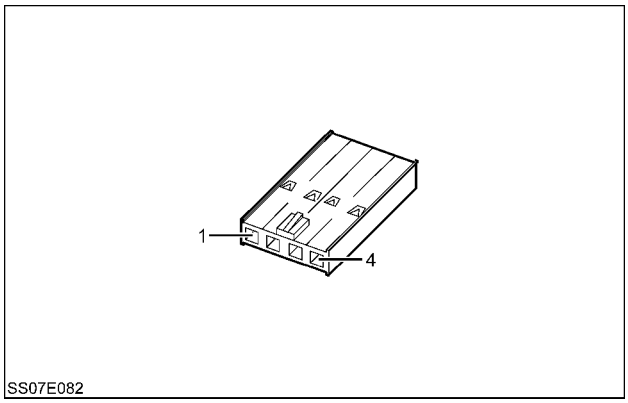
SS07E077 16

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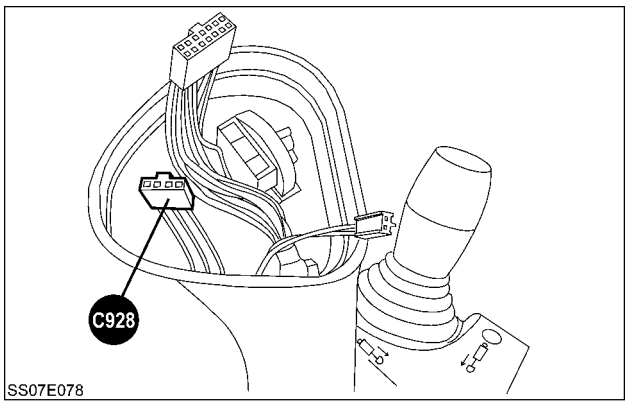
C928 ARU - MULTICONTROLLER - FINGER WHEEL

PLUG CONNECTION C928 ARU - MULTICONTROLLER - FINGER WHEEL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(N)	EARTH	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 43 (A.30.A)**
3	(W)	SIGNAL FINGER WHEEL	
4	(R)	POWER SUPPLY 5V STAB.	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E082 17



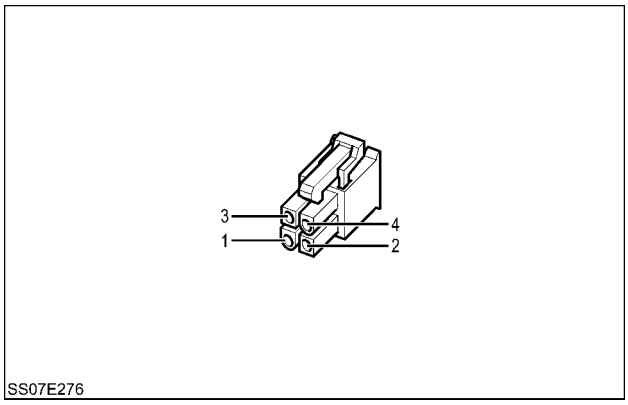
SS07E078 18

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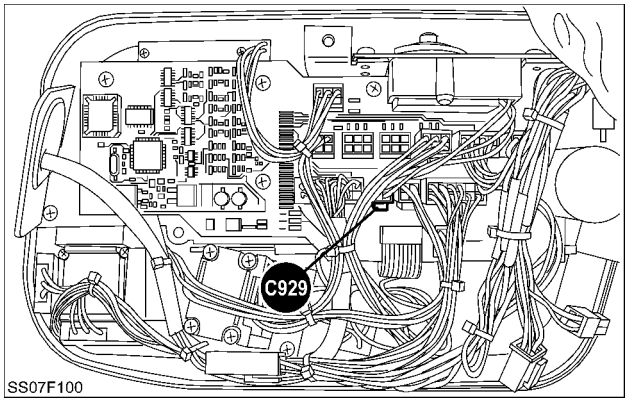
C929 ARU - HAND THROTTLE

PLUG CONNECTION C929 ARU - HAND THROTTLE			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(R)	POWER SUPPLY 5V STAB.	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 43 (A.30.A)**
2	(W)	SIGNAL	
4	(N)	EARTH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E276 19



SS07F100 20

ARMREST

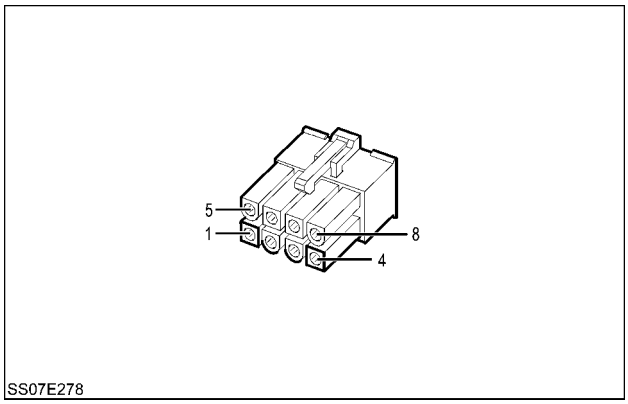
Wiring harness - Component diagram 93 Plug connections 930-939

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

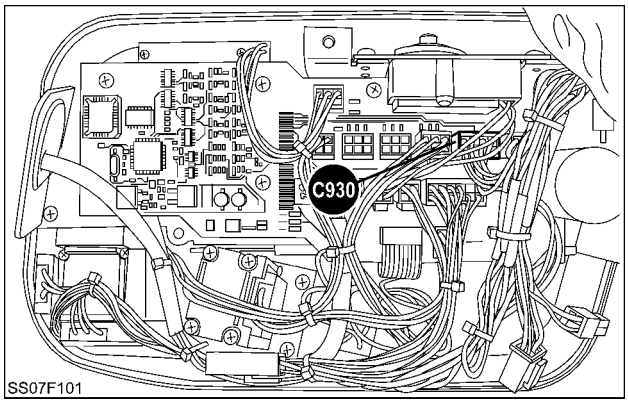
C930 ARU - LED DISPLAYS REMOTE VALVES (INPUT)

PLUG CONNECTION C930 ARU - LED DISPLAYS REMOTE VALVES (INPUT)			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(Y)	POWER SUPPLY POTENTIAL 15	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 42 (A.30.A)**
2	(K)	SIGNAL LED JOYSTICK REAR	
3	(K)	SIGNAL LED JOYSTICK FRONT	
4	(K)	SIGNAL TIMER PROG. EPC 1 LED	
5	(K)	SIGNAL TIMER PROG. EPC 2 LED	
6	(K)	SIGNAL TIMER PROG. EPC 3 LED	
7	(K)	SIGNAL TIMER PROG. EPC 4 LED	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E278 1



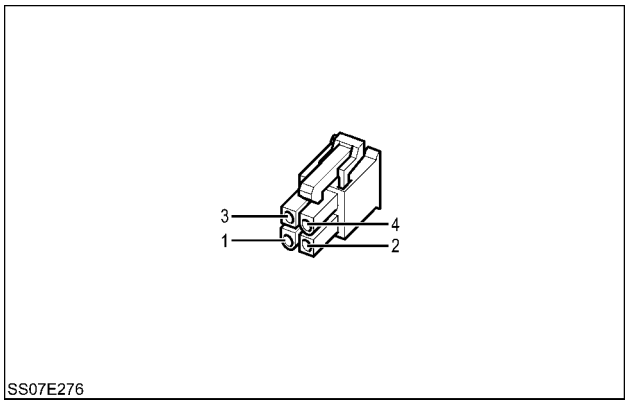
SS07F101 2

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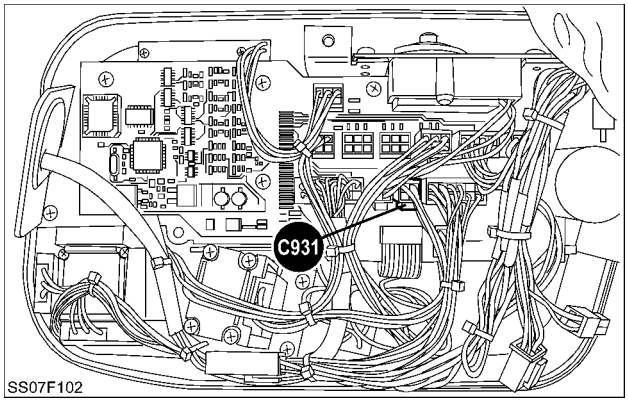
C931 ARU - CONTROL LEVER EPC3

PLUG CONNECTION C931 ARU - CONTROL LEVER EPC3			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(R)	POWER SUPPLY 5V STAB.	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 44 (A.30.A)**
2	(W)	SIGNAL	
4	(N)	EARTH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E276 3



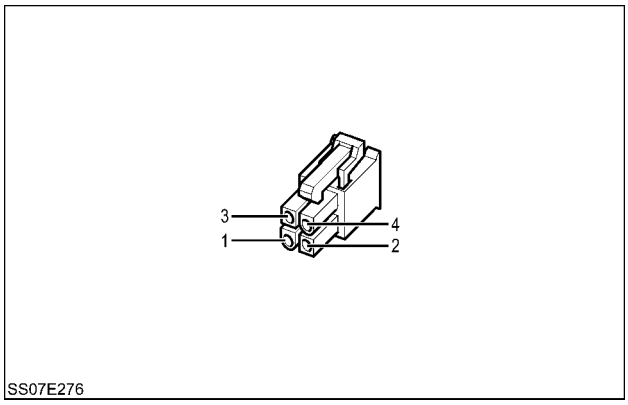
SS07F102 4

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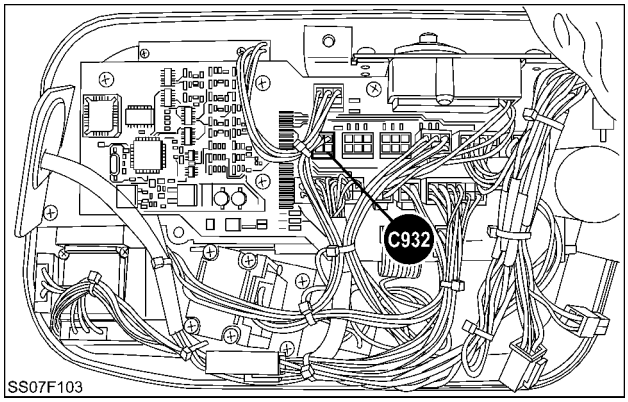
C932 ARU - LED DISPLAYS REMOTE VALVES FRONT / REAR

PLUG CONNECTION C932 ARU - LED DISPLAYS REMOTE VALVES FRONT / REAR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(Y)	POWER SUPPLY POTENTIAL +15	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 42 (A.30.A)**
2	(K)	SIGNAL LED JOYSTICK REAR	
3	(K)	SIGNAL LED JOYSTICK FRONT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E276 5



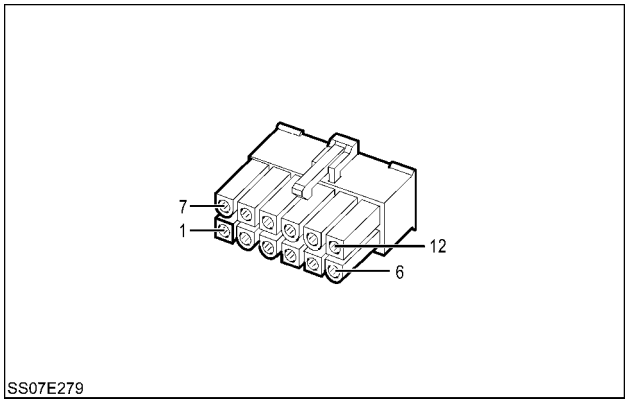
SS07F103 6

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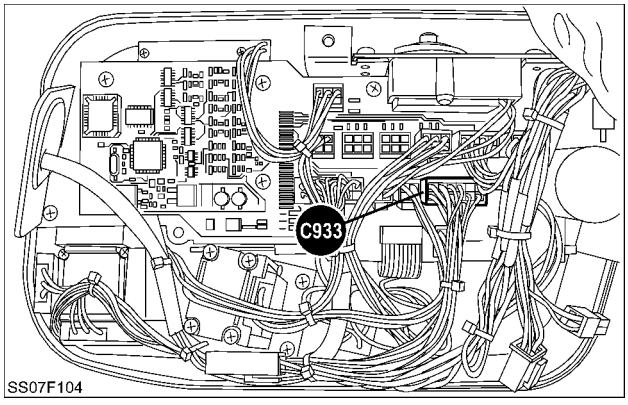
C933 ARU - JOYSTICK, PUSH BUTTON

PLUG CONNECTION C933 ARU - JOYSTICK, PUSH BUTTON			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(R)	POWER SUPPLY 5V STAB.	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 44 (A.30.A)**
2	(W)	SIGNAL	
3	(N)	EARTH	
4	(S)	POWER SUPPLY 5V STAB.	
7	(R)	POWER SUPPLY 5V STAB.	
8	(W)	SIGNAL	
9	(N)	EARTH	
10	(Y)	SIGNAL REVERSING VALVES FRONT LOADER 1	
11	(G)	SIGNAL REVERSING VALVES FRONT LOADER 2	
12	(B)	SIGNAL JOYSTICK PUSH BUTTON	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E279 7



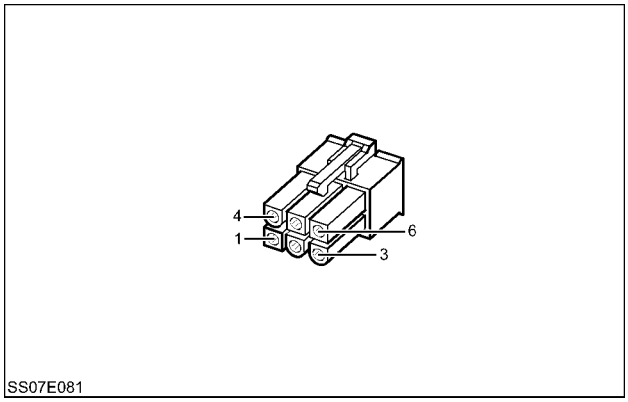
SS07F104 8

ARMREST

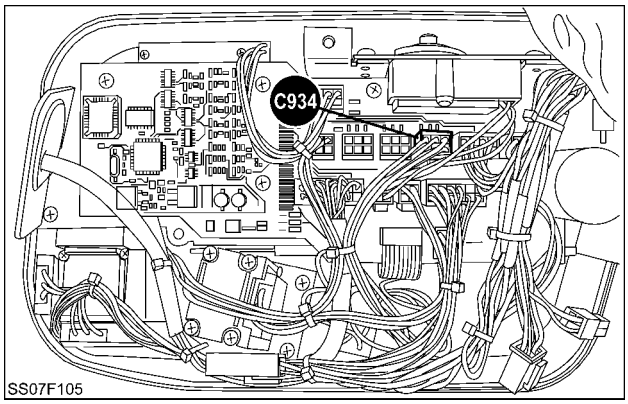
C934 ARU - TOGGLE SWITCH REMOTE VALVES FRONT / REAR

PLUG CONNECTION C934 ARU - TOGGLE SWITCH REMOTE VALVES FRONT / REAR			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(R)	POWER SUPPLY 5V STAB.	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 44 (A.30.A)**
2	(G)	ELECTROHYDR. REMOTE VALVE SELECTION SWITCH	
3	(W)	ELECTROHYDR. REMOTE VALVE SELECTION SWITCH	
5	(S)	LIGHTING	
6	(B)	EARTH	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E081 9



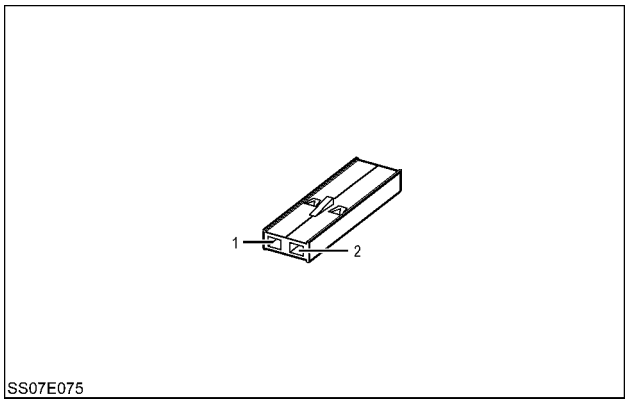
SS07F105 10

ARMREST

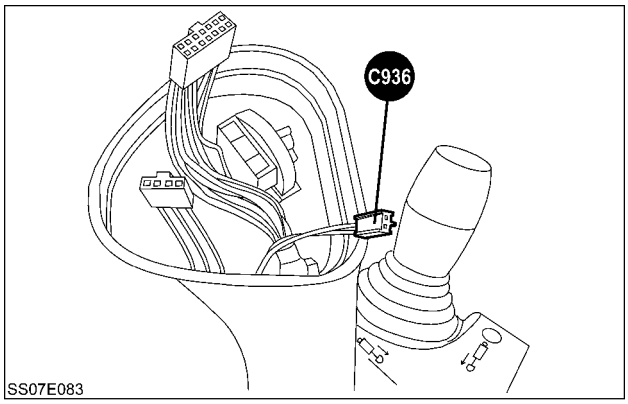
C936 ARU - SHIFT BUTTON

PLUG CONNECTION C936 ARU - SHIFT BUTTON			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	(B)	SIGNAL	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 43 (A.30.A)**
2	(B)	POWER SUPPLY 5V STAB.	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E075 11



SS07E083 12

ARMREST

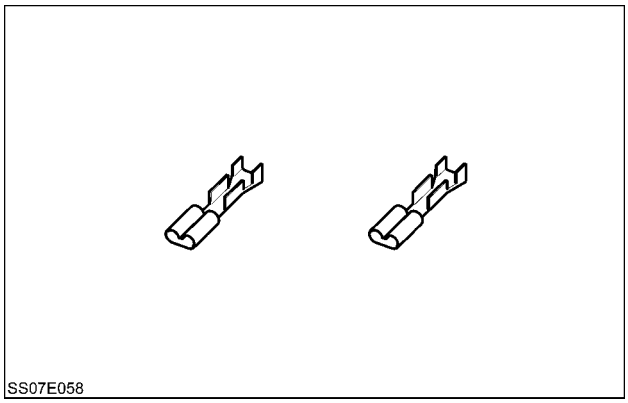
Wiring harness - Component diagram 95 Plug connections 950-959

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

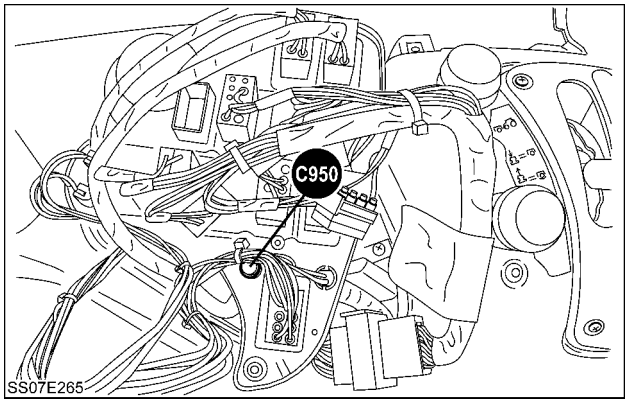
C950 EDC - SLIP CONTROL

PLUG CONNECTION C950 EDC - SLIP CONTROL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	SLIP (W)	EPC SIGNAL EARTH	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 10 (A.30.A)**
1	SLIP+ (O)	EPC SUPPLY POTENTIAL +15	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E058 1



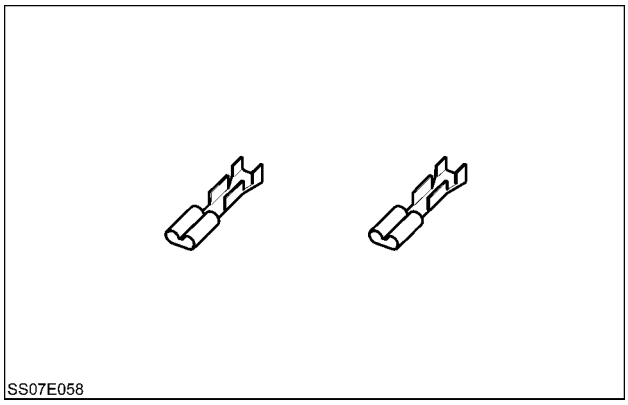
SS07E265 2

RIGHT-HAND SIDE CONSOLE

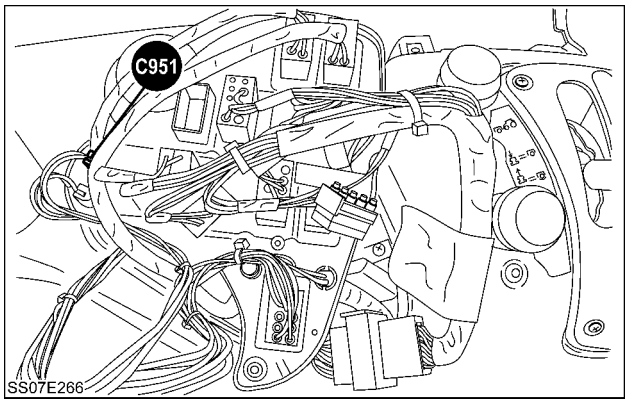
C951 EDC - LOWER CONTROL

PLUG CONNECTION C951 EDC - LOWER CONTROL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	LOWER (W)	EPC SIGNAL EARTH	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 10 (A.30.A)**
1	LOWER+ (O)	EPC SUPPLY POTENTIAL +15	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E058 3



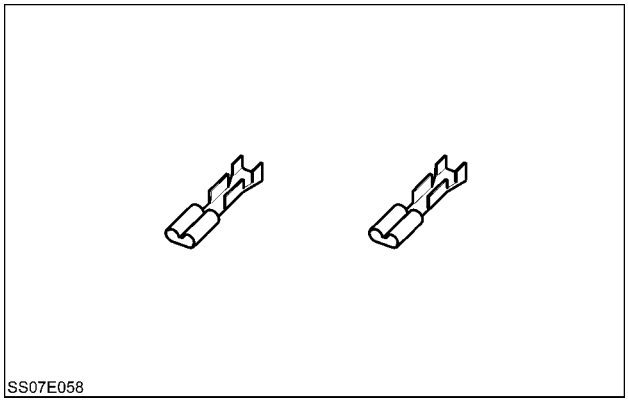
SS07E266 4

RIGHT-HAND SIDE CONSOLE

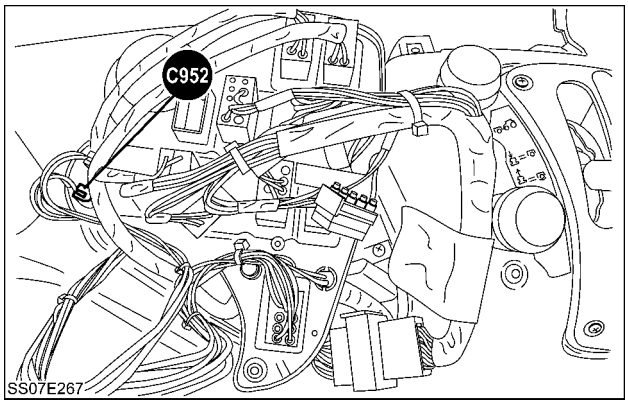
C952 EDC - RAISE CONTROL

PLUG CONNECTION C952 EDC - RAISE CONTROL			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	RAISE (W)	EPC SIGNAL EARTH	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 10 (A.30.A)**
1	RAISE+ (O)	EPC SUPPLY POTENTIAL +15	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E058 5



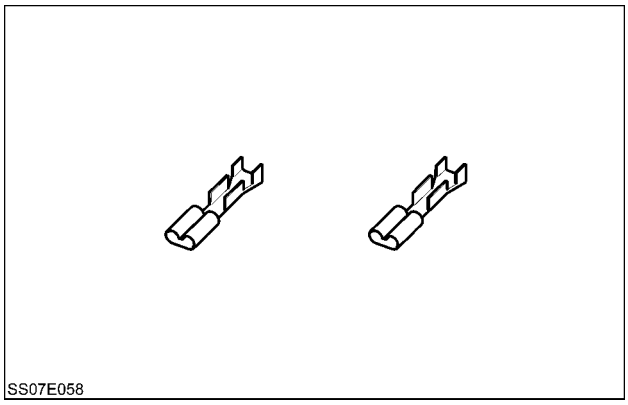
SS07E267 6

RIGHT-HAND SIDE CONSOLE

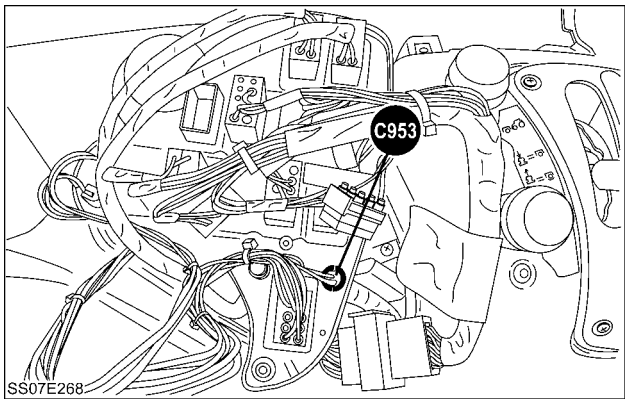
C953 EDC - DIAGNOSTICS

PLUG CONNECTION C953 EDC - DIAGNOSTICS			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	STATUS (W)	EPC SIGNAL EARTH	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 10 (A.30.A)**
1	STATUS+ (O)	EPC SUPPLY POTENTIAL +15	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E058 7



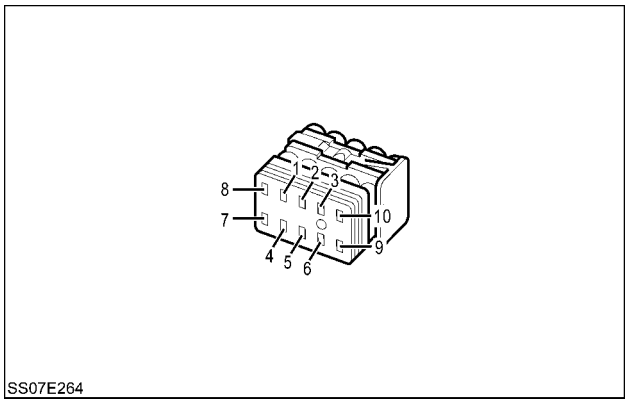
SS07E268 8

RIGHT-HAND SIDE CONSOLE

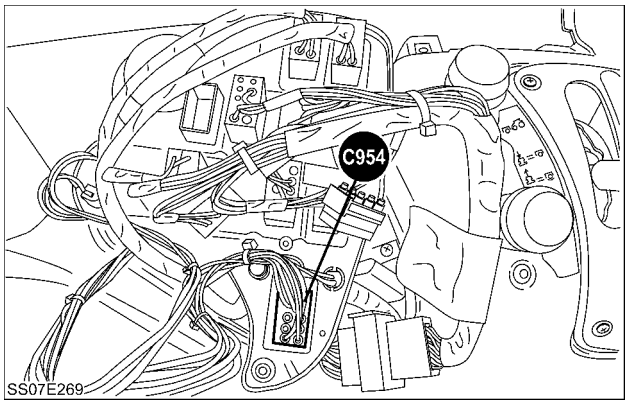
C954 EDC - PUSH BUTTON RAISE / LOWER

PLUG CONNECTION C954 EDC - PUSH BUTTON RAISE / LOWER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	5100 (W)	EPC SWITCH RAISE	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 10 (A.30.A)**
2	EXTER-NAL+ (O)	EPC SUPPLY POTENTIAL +15	
3	5095 (W)	EPC SWITCH LOWER	
7	57BY (B)	VEHICLE EARTH (ALL)	
8	1012HA (S)	LIGHTING	
9	57CY (B)	VEHICLE EARTH (ALL)	
10	1012HB (S)	LIGHTING	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E264 9



SS07E269 10

RIGHT-HAND SIDE CONSOLE

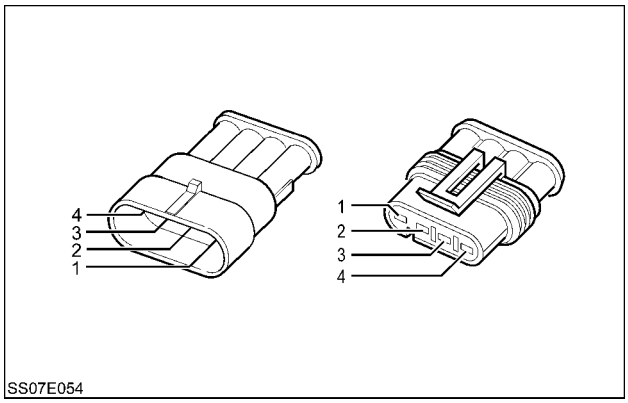
Wiring harness - Component diagram 98 Plug connections 980-989

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

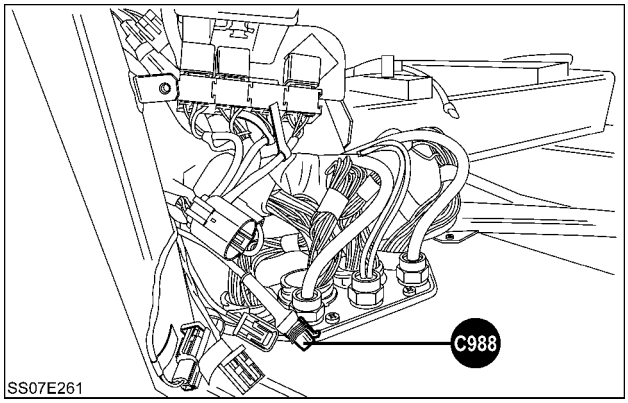
C988 PREPARATION REVERSING VALVE FRONT LOADER

PLUG CONNECTION C988 PREPARATION REVERSING VALVE FRONT LOADER			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
1	3277 (O) / 3277 (O)	FRONT LOADER - SIGNAL RELAY SOLENOID VALVE 1	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 17 (A.30.A)**
2	3278 (O) / 3278 (O)	FRONT LOADER - SIGNAL RELAY SOLENOID VALVE 2	
3	3274 (R) / 3274 (O)	FRONT LOADER - CONTROL VALVE 2 OUTPUT	
4	3272 (O) / 3272 (O)	FRONT LOADER - CONTROL VALVE 1 OUTPUT	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07E054 1



SS07E261 2

RIGHT-HAND SIDE CONSOLE

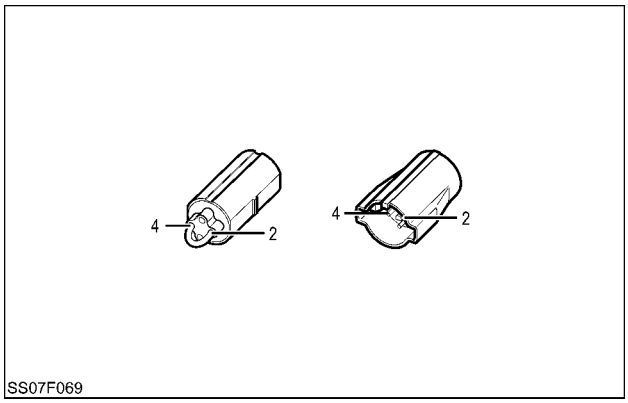
Wiring harness - Component diagram 99 Plug connections 990-999

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

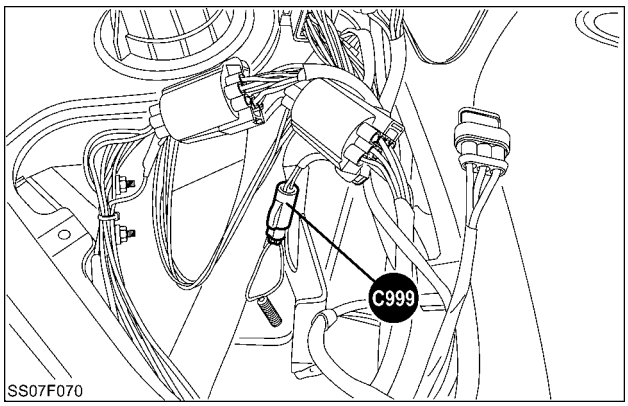
C999 PREPARATION PTO BRAKE SWITCH

PLUG CONNECTION C999 PREPARATION PTO BRAKE SWITCH			
LOCATION	CABLE NUMBER	CIRCUIT	WIRING DIAGRAM
2	2120B (TN) / 2120 (TN)	SIGNAL PTO BRAKE	PUMA Multicontroller: **Wiring harness - Electrical schematic frame 19 (A.30.A)**
4	2120B (TN) / 2120A (TN)	SIGNAL PTO BRAKE	

NOTE: *The colour coding of the cables is described in* ***Wiring harness - Overview (A.30.A)****.*



SS07F069 1



SS07F070 2

RIGHT-HAND SIDE CONSOLE

Alternator - Remove

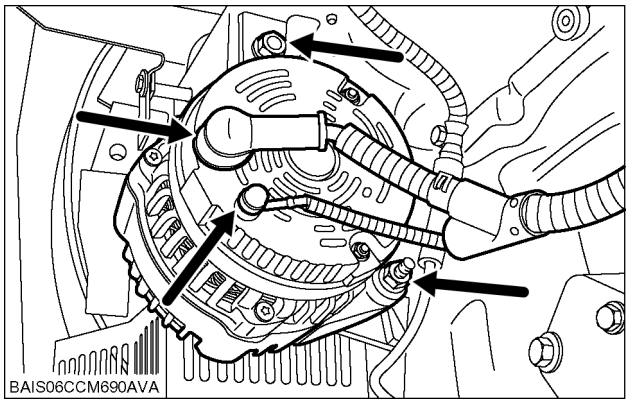
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Prior operation:
Ensure the battery is disconnected prior to removing the alternator, refer to, **Battery - Disconnect (A.30.A)**.

1. With reference to Figure **1**

   Disconnect the two cables from the rear of the alternator.

   Remove the alternator drive belt in the following manner. Place a bar with a 15mm socket attachment, onto the tensioner arm pulley retaining bolt and gently rotate the tensioner, refer to **Alternator - Static description (A.30.A)**. Remove the fan belt from the pulley, and allow the tensioner to return to its untensioned position once the belt has been removed.



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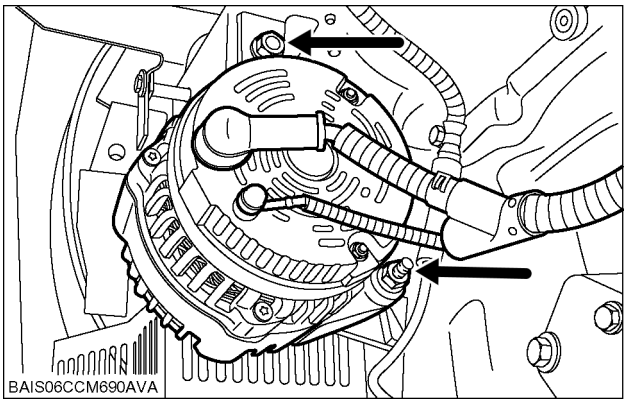
2. Remove the alternator upper and lower mounting bolts, and remove the alternator from the engine bracket .

Alternator - Install

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

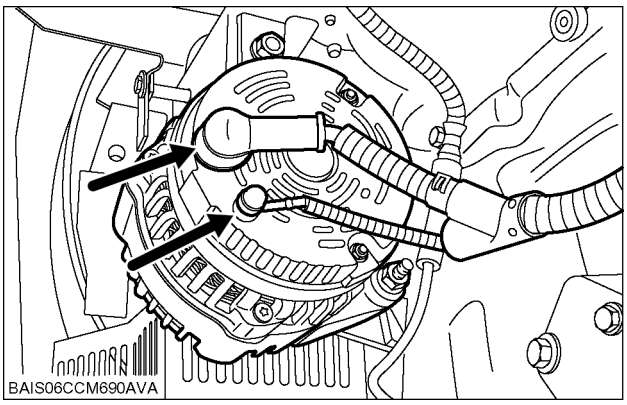
NOTE: *Ensure the battery ground (negative) cable is disconnected from the battery when installing the alternator.*

1. Install the alternator to the engine mounting bracket and tighten the bolts to the specified torque of, **25 Nm** (**18.4 lbft**).



BAIS06CCM690AVA 1

2. Rotate the tensioner arm and install the drive belt over the pulley, release the tensioner arm to allow the correct tension to be applied to the belt, refer to, **Alternator - Preliminary test (A.30.A)**.
3. Reconnect the two electrical cables to the alternator.



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Next operation:
Reconnect the battery, refer to, **Battery - Connect (A.30.A)**.

Alternator - Preliminary test

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

CAUTION - Service Precautions

1. To avoid damage to the components of the alternator charging system, service precautions must be observed as follows:
   - NEVER make or break any of the charging circuit connections, including the battery, when the engine is running.
   - NEVER short any of the charging components to ground.
   - ALWAYS disconnect the battery ground cable (negative) when charging the battery on the tractor using a battery charger.
   - ALWAYS observe correct polarity when installing the battery or using a slave battery to start the engine.

CONNECT POSITIVE TO POSITIVE AND NEGATIVE TO NEGATIVE

Preliminary Checks

2. Prior to electrical testing thoroughly inspect the charging and electrical system.
   Check all leads and connections for continuity and tightness.

   1. Check the battery
   Using a hydrometer check the individual battery cells. The battery should be at least **70 %**charged and in good condition.

   2. Check the drive belt
   Inspect the alternator drive belt and pulley, ensuring that both are clean, free from oil and grease and in good condition.
   The alternator drive belt is automatically tensioned by a spring tensioner mounted at the front of the engine, refer to **Alternator - Static description (A.30.A)**. If the belt tension is suspect, check the tensioner assembly as follows:

   Fan Belt Tensioner Removal
   The fan belt should be removed in the following manner. Place a bar with a **15 mm** socket attachment onto the bolt of the tensioner arm and rotate the lever clockwise. Remove the fan belt from the pulley and allow the tensioner to return to its untensioned position once the belt has been removed.
   Remove the tensioner from the pump by loosening and removing the centre attaching bolt.
   .

Inspection and Repair

3. Checking of the tensioner assembly operation should be carried out, with the tensioner assembly still attached to the front of the engine. To check the spring load, place a “breakback" torque bar preset to, **52 - 63 lbf.ft** (**70 - 85 Nm**) (**7.1 - 8.7 kgf.m**), onto the pulley arm **15 mm** socket. Raise the lever up through an arc of **20 °** maximum. If the torque bar does not “break" within the range a new tensioner assembly is required.
   Ensure the tensioner pulley rotates freely by hand. If not replace with new parts.

4. Re-Assembly
   Fit a new pulley to the assembly, if required, and torque the attaching bolt, refer to, **Fan and drive Belt tensioner - Torque (B.50.A)**.
   To reassemble the arm assembly, position the tensioner on to the front of the engine, fit the mounting bolt through the assembly, and torque the bolt, refer to, **Fan and drive Belt tensioner - Torque (B.50.A)**.
   Refitment of the fan belt is the reverse of the removal procedure, but ensure the “Poly V” belt, is positioned correctly onto all of the pulleys.

Check the Warning Lamp

5. Turn on the key start switch and check that the warning lamp is fully illuminated.
   If the warning lamp is not fully illuminated check the bulb. If the bulb is not the cause of the fault carry out the Alternator wiring connections test as detailed under ‘initial tests’ in this section.
   If the warning lamp is illuminated start the engine and run above idling speed. The lamp should go out.
   If the lamp does not go out, stop the engine and remove the wire from the D+ terminal. If the lamp now goes out a faulty alternator component is indicated.
   If the warning lamp remains illuminated, check for a short circuit to earth (ground) between the ‘D+’ cable end and the warning lamp.

INITIAL TESTS

6. The initial tests may be performed without removing any of the charging circuit components from the tractor and enable the following items to be checked:
   - Alternator wire connections
   - Alternator charging current and controlled voltage
   - Alternator charging circuit volt drops
   - Alternator maximum output performance

Test equipment required:

7. - Voltmeter (**0 - 30 volts** moving coil type
   - Millivoltmeter (**0 - 1 volt**)
   - Ammeter (**0 - 200 Amperes** moving coil type)
   - **1.5 Ohm 200 Amperes** variable load resistor

NOTE: *Most commercial test equipment incorporates several testing devices within a single unit . Use such equipment in accordance with the manufacturers instructions.*

8. Refer to **Alternator - Electrical test (A.30.A)** for testing procedures.

Alternator - Electrical test

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Alternator Wiring Connections Test

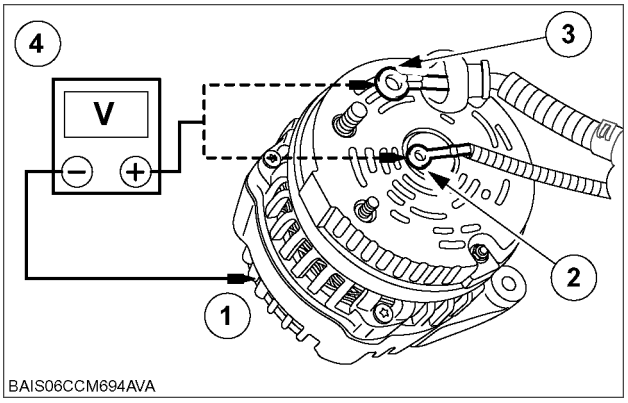
1. With reference to **1**

   1. Disconnect the battery
   2. Disconnect the D+ **(2)** and B+ **(3)** terminals from the alternator.
   3. Reconnect the battery and turn the key start on but do not start the engine. Connect a voltmeter **(4)** between each terminal and earth (ground), **(1)**. Battery voltage should be registered.

   If battery voltage is not registered a continuity fault in the external cable circuitry must be traced and remedied, refer to the circuit diagram (refer to **Wiring harness - Electrical schematic frame 01 (A.30.A)**).

   4. Connect the D+ terminal, warning lamp (thin brown) wire, to earth (ground). The warning lamp should illuminate.
   5. Disconnect the battery and reconnect the removed alternator cable connections to the alternator.

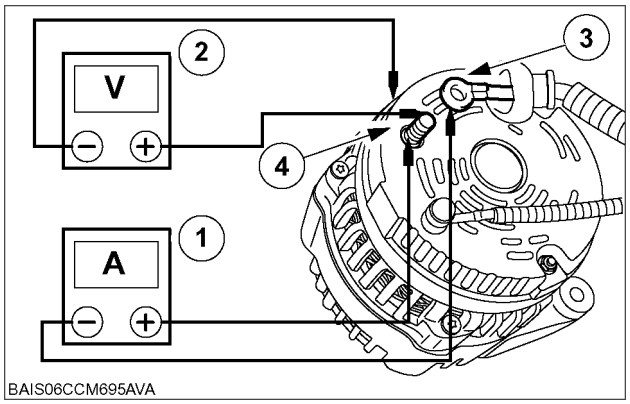
NOTE: *If the warning lamp fails to illuminate when the cable is reconnected to the alternator, a fault is indicated in the alternator regulator or rotor circuits. Ensure that the D+ terminal is clean.*



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Charging Current And Controlled Voltage Tests

2. With reference to Figure **2**
The following test should be performed at **20 °C**, a lower temperature will create a higher voltage and a higher temperature will create a lower voltage.
1. Ensure all tractor electrical components are switched off and the key start switch is in the 'off' position.
2. Disconnect the battery negative terminal and disconnect the B+ terminal **(4)** of the alternator.
3. Connect an ammeter **(1)**, between the removed (thick brown) cable **(3)** and the B+ alternator terminal.
4. Connect a voltmeter **(2)** between the alternator B+ terminal and earth (ground)
5. Reconnect the battery. Start and run the engine at **2000 rev/min**. and observe the ammeter and voltmeter readings.



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The voltmeter should register in excess of battery voltage and when the ammeter reading falls to **5 Amperes** the voltmeter reading should stabilise at **14.1 V +/- 0.15.**

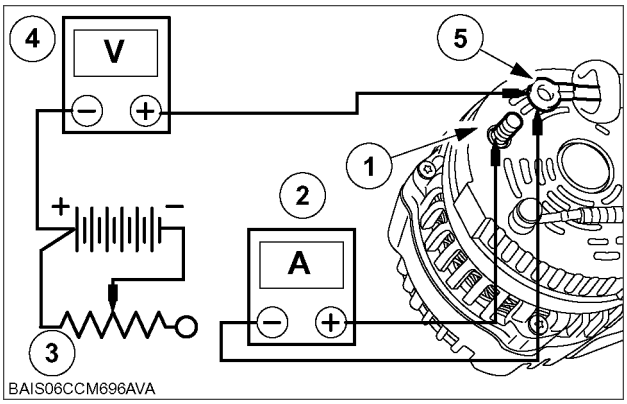
If the voltmeter reading exceeds the above value the alternator regulator is faulty.
If the voltmeter reading is below the specified value a faulty alternator component or a high resistance fault in the external connections of the charging system is indicated.

If the ammeter registers zero amperes a faulty alternator component is indicated.

Charging Circuit Volt Drop Tests

(a) Insulated-Side Volt Drop Tests

3. With reference to Figure **3**



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Ensure the key start switch is in the 'off' position.
1. Disconnect the battery negative cable and disconnect the B+ cable **(1)** from the alternator
2. Connect a millivoltmeter **(4)** between the battery positive terminal and the B+ cable **(5)**. (Positive side to cable).
3. Securely connect an ammeter **(2)** between the B+ terminal of the alternator and the B+ cable (negative side to cable)
4. Reconnect the battery negative cable and connect a variable load resistor **(3)**, with the slider in the minimum current draw position (maximum resistance), across the battery terminals.
5. Start the engine and increase the speed to **2000 rev/min**.
6. Slowly increase the current loading of the resistor (decrease resistance) until the ammeter registers **150 Amperes**.
7. Observe the millivoltmeter reading which should not exceed **400 millivolts**.

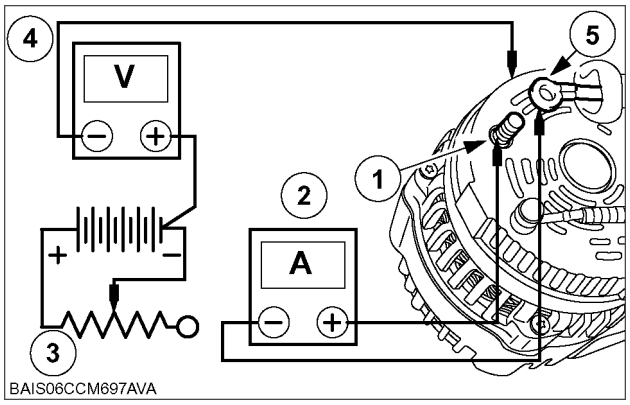
If the reading is in excess of **400 millivolts**, a high resistance fault is indicated in the external circuitry.

If the required alternator output cannot be achieved and the millivoltmeter reading is less than 400 millivolts, then a faulty alternator component is indicated.
.

8. Stop the engine.

(b) Ground-Side Volt Drop Test

4. With reference to **4**



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1. Ensure the key start switch is in the 'off' position.
2. The circuit is the same as that used in the previous test except for the millivoltmeter **(4)** which is now connected between the battery negative terminal and the alternator frame (negative side to frame).
3. Start the engine and increase the speed to **2000 rev/min**.
4. Slowly increase the current loading of the resistor (decrease resistance) until the ammeter **(2)** registers **150 Amperes**
5. Observe the voltmeter reading which should not exceed 200 millivolts.

If the reading is in excess of **200 millivolts** a high resistance fault is indicated in the external circuitry.

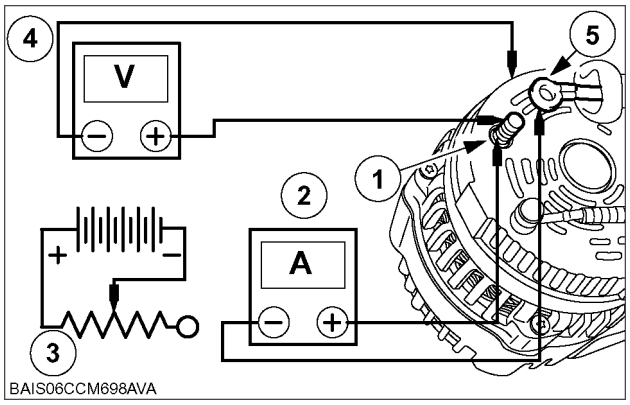
If the required alternator output cannot be achieved and the millivoltmeter reading is less than **200 millivolts** then a faulty alternator component is indicated.
.

6. Stop the engine.

NOTE: *Ensure the variable load resistor **(3)** is in the minimum current draw position (maximum resistance).*

Alternator Maximum Output Performance Test

5. With reference to **5**.



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1. Ensure the key start switch is in the 'off' position.
2. Disconnect the battery negative cable and disconnect the B+ cable **(5)** from the alternator.
3. Securely connect an ammeter **(2)** between the B+ terminal **(1)** of the alternator and the B+ cable (negative side to cable).
4. Connect a voltmeter **(4)** between the alternator B+ terminal and earth (ground).
5. Reconnect the battery, start and increase the engine speed to **2000 rev/min**.
6. Slowly increase the current loading of the resistor **(3)** (decrease resistance) until the ammeter registers **150 Amperes**.
7. Observe the voltmeter reading which should not fall below **13 volts**.

If the reading falls below **13 volts** a faulty alternator component is indicated..

Regulator and rotor field circuit test

6. Test equipment required:
   - **12 volt** battery
   - Multimeter
   - **2.2 Watt** Test Lamp

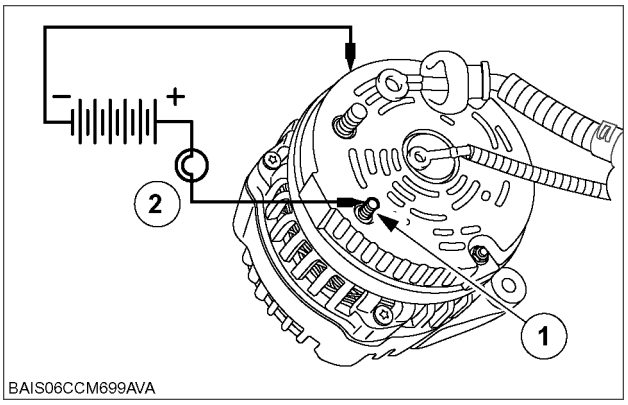
IMPORTANT: *Prior to removal of the alternator cables from the alternator ensure that the key start switch is in the 'off' position and the battery negative cable is disconnected.*

7. With reference to **6**

   1. Disconnect all of the alternator cables.
   2. Connect a **12 volt** battery and a 2.2 Watt test lamp **(2)** in series between the D+ **(1)** and the alternator frame (negative side to frame).
   3. The test lamp should illuminate.

   If the test lamp is not illuminated a fault is indicated in the rotor circuit. Check brushes, slip rings and continuity of rotor field windings.

   If examination indicates these parts to be satisfactory the regulator may be suspect.



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Battery - Remove

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Prior operation:
Battery - Disconnect (A.30.A)

1. Disconnect the Negative lead from the battery terminal (Refer to **Battery - Disconnect (A.30.A)**) and secure out of the way.

   Disconnect the positive lead from the battery terminal and secure out of the way.

   Loosen the top bolts securing both battery clamps and remove clamps .

2. Using the flexible handles at each end of the battery, lift the battery from the tractor.

Next operation:
Battery - Connect (A.30.A)

Battery - Install

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

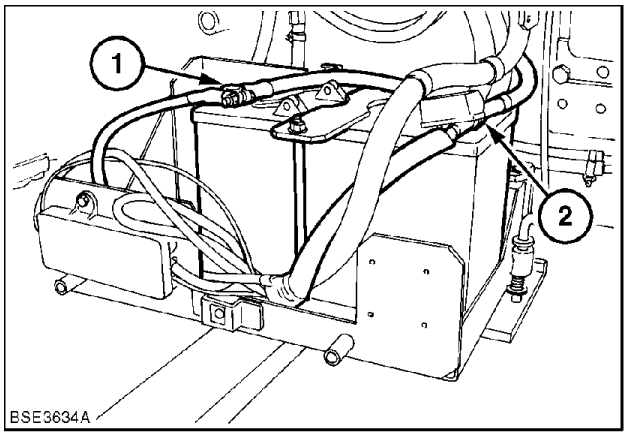
1. Installation of the battery is the removal procedure in reverse, (**Battery - Remove (A.30.A)**)observing the following points:

   Ensure that the battery is clean and dry and that the vent caps are fully installed. Smear the terminals with petroleum jelly, do not use conventional lubricating greases as these can promote electrolytic corrosion.

   Ensure the battery tray and clamps are clean and free from stones or small objects which may puncture the battery casing.

   Ensure that the battery terminal polarity is correct and that the terminal connections are sufficiently tight, but not overtightened.

2. The radio, if fitted, will lose its stored information and will require reprogramming. It should be noted that on models with electronic instrument panel and microprocessors, that these components will not lose their memories, i.e, electronic draft control and transmission calibrations will not be affected.



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Battery - Electrical test

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Specific Gravity

1. The specific gravity of the battery electrolyte indicates the state of charge. Fully charged the specific gravity of the electrolyte is 1.280 minimum at **25 °C**.

   Alternatively the approximate state of charge can be measured by using an accurate digital volt meter (+/- 0.01V) as follows:-
   Less than **10.5 V** Battery un-serviceable*
   Less than **11.8 V** Battery discharged
   Less than **12.3 V** Battery 1/2 charged
   Better than **12.6 V** Battery fully charged
   * See note under tests for possible recovery of a mildly sulphated battery.

   Battery voltage to be taken with the battery unloaded and:-
   A. After the battery has rested unloaded for at least **4 hours**.
   B. If the vehicle has recently run or battery has recently been charged, switch on headlamps for **2 minutes**.

   When a battery discharges, sulphuric acid in the electrolyte combines chemically with the plates and this action lowers the specific gravity of the solution.

   A battery hydrometer will determine the specific gravity of the electrolyte in a cell and the amount of unused sulphuric acid in the solution is a measure of the degree of charge of that cell.

   The lower the temperature at which a battery is required to operate, the more necessary it is that the battery is maintained in a fully charged condition. For example a battery with a low specific gravity of 1.225 at **27 °C** (**80 °F**) will operate the starting motor at warm ambient temperatures but may not, due to lower battery efficiency at a low temperature.

   Table 1 shows the effect of temperature on the efficiency of a typical battery.
   Maximum battery life will be obtained if the correct care and periodic inspection is given. It is important that output capacity should not be exceeded by constant and excessive overloading and that charging requirements are maintained.

   Table 1: refer to **Battery - General specification (A.30.A)**.

Servicing The Battery

2. When servicing a battery the following steps should be observed:
   1. Maintain the electrolyte to the recommended level of **17 mm** (**0.67 in.**) above the plates. If this is not observed the acid will reach a high concentration that will damage the separators and impair the performance of the plates.
   2. Use only distilled or de-mineralised water, do not overfill and never use tap water or water from a rain barrel or other source
   3. Always keep the battery at least **75 %** charged otherwise the plates will become sulphated and loss of efficiency will result with possible damage from freezing at low temperatures.
   4. Avoid overcharging the battery as excessive charging will create high internal heat that will cause plate grid deterioration and produce water loss.
   5. When fast charging ensure the battery temperature does not exceed **50 °C**.
   6. Do not add sulphuric acid to a cell unless the electrolyte has been lost through spilling. Before replenishing ensure the solution is at the correct specific gravity. A slow charge is the only method to be employed to fully charge a battery. A high rate charger can be used to quickly boost the battery capacity but this must be followed by a slow charge rate to bring the battery to full capacity.

⚠ WARNING ⚠

Batteries contain sulphuric acid and during charging generate a highly explosive mixture of hydrogen and oxygen gases.- Never use equipment that generates flames or sparks in order to control electrolyte level- Do not remove the battery cover plugs without protection for eyes and hands.

B039

Dry Charged Batteries

3. Dry charged batteries must be prepared for service as follows:
   1. Remove the battery cell vent plugs.
   2. Fill each cell to the recommended level with electrolyte of 1.260 specific gravity.
   3. After filling, allow the battery to stand for **15 minutes** then re-check the electrolyte level and top up if necessary.
   4. Charge the battery for **4 hours** at a rate of **5 - 8 amperes** and check that all cells are gassing freely.
   5. Install the battery cell vent plugs.

NOTE: *The electrolyte must be diluted sulphuric acid preferably at a temperature of* ***21 °- 32 °C*** *(* ***70 °- 90 °F****).*

Charging The Battery

4. Before charging a battery:
   1. Thoroughly clean the battery casing and cell covers with dilute ammonia or hot water and clean the terminals.
   2. Check the level of the electrolyte in each cell and, if below plates, add distilled water to bring above plate level.

Normal (Top-up) Charging

5. 1. With a slow charger use a rate of **3 - 6 amperes** for the time necessary to bring the battery to full charge. This may take **36 hours** or more if the battery is heavily discharged. A severely sulphated battery might not accept a charge. When the battery is fully charged the cells will gas freely and the specific gravity will remain constant. Remove the charger after three consecutive hydrometer readings taken at hourly intervals indicate that the specific gravity has stopped rising.
   2. When using a fast or high rate of charge carefully follow the manufacturers instructions. High rate charging raises the temperature of the electrolyte and unless the charger is equipped with an automatic time or temperature device, the electrolyte temperature could exceed **50 °C** , which may cause violent battery gassing and damage to internal components.
   3. Re-check the level of electrolyte in each cell and add distilled water as necessary.

⚠ WARNING ⚠

When a battery is being charged an explosive gas is produced. Do not smoke or use an exposed flame when checking the electrolyte level and ensure the charger is switched off before connecting or disconnecting to avoid sparks which could ignite the gas.

B038

Recharging Deeply Discharged Batteries

6. The recommended method to recharge a low maintenance battery is to use a constant voltage charger. For deeply discharged batteries a 48 hours charging period at **16 volts** is recommended, with current limitation, (**88 A** for **176 Ah** batteries).

   This system is self regulating: high current is delivered at the beginning (when battery voltage is low), lower and lower current is then absorbed when battery reaches full charge (and its voltage is high).

   If only constant current chargers are available it is recommended to use the current levels and times shown Table 2 below. The figures are intended for deeply discharged batteries. If the battery is only 50% discharged use one half of the time listed (slow charge programs). For other states of discharge reduce proportionally the time of charge. Whenever possible use the slowest charge program to increase the battery's life.

   If when charging the battery, violent gassing or spewing of electrolyte occurs, or the battery case feels hot (**50 °C** or greater), reduce or temporarily halt charging to avoid damaging the battery.

   Table 2: refer to **Battery - General specification (A.30.A)**.

Tests

7. Before commencing battery tests check the battery for clogged vents, corrosion, raised vent plugs or a cracked case.

   Test equipment required:
   - Hydrometer
   - Battery starter tester (High rate discharge tester)
   - Thermometer
   - Battery Charger

Specific Gravity:

8. This test will determine the state of battery charge.
   1. With the float in the vertical position take the reading.
   2. Adjust the hydrometer reading for electrolyte temperature variations by subtracting 4 points (0.004 specific gravity) for every **5.5 °C** (**10 °F**) below the temperature at which the hydrometer is calibrated and by adding 4 points (0.004 specific gravity) for every **5.5 °C** (**10 °F**) above this temperature.

   The following examples are calculated using a hydrometer calibrated at **30 °C** (**86 °F**).

   Example 1:
   Temperature below **30 °C** (**86 °F**)
   Electrolyte temperature **19 °C** (**66 °F**)
   Hydrometer reading 1.270
   Subtract 11.0/5.5 x 0.004 0.008
   Corrected specific gravity = 1.262

   Example 2:
   Temperature above **30 °C** (**86 °F**)
   Electrolyte temperature **40 °C** (**104 °F**)
   Hydrometer reading 1.220
   Subtract 10.0/5.5 x 0.004 0.007
   Corrected specific gravity = 1.227

   3. If the specific gravity is 1.280 or more the battery is fully charged and in good operating condition.
   4. Should the corrected specific gravity be below 1.280, charge the battery and inspect the charging system to determine the cause of the low battery charge.

   If the battery has been charged under static conditions, denser electrolyte will accumulate at the bottom of the cells. The battery should be shaken periodically to mix the electrolyte, this will improve the charge rate and provide a more accurate hydrometer reading when tested.
   Refer to **Battery - General specification (A.30.A)**.

NOTE: *Specific gravity should not vary more than 0.025 points between cells.*

NOTE: *If distilled water has recently been added the battery should be recharged for a short period otherwise accurate hydrometer readings will not be obtained.*

Performance Test:

9. The performance test is to determine if the battery has adequate capacity to turn the engine. The voltage reading obtained is used to determine the battery condition. Prior to testing, ensure the electrolyte level is correct and the open circuit voltage is **12.5 V** or more. The battery may be tested on or off the tractor.

   1. Set the current control switch of the battery starter tester (high rate discharge tester) to the 'off' position and the voltage selector switch equal to, or slightly higher than, the rated battery voltage. Connect the tester positive leads to the battery positive terminal and the negative leads to the negative battery terminal.

   2. Turn the current control knob until the ammeter reading is half the CCA rating of the battery and take the voltage reading.

   - If the reading is **9.6 volts** or more after **15 seconds**, the battery has an acceptable output capacity and will readily accept a normal charge.

   - If however the reading is below **9.6 volts**, the battery is considered unsatisfactory for service and should be test charged as described below.

⚠ CAUTION ⚠

Do not leave the high discharge load on the battery for periods longer than 15 seconds.

B003

Test Charging:

10. This test is designed only for batteries that have failed the previous capacity test.
    1. Attach the battery starter (high rate discharge tester) positive leads to the battery positive terminal and the negative leads to the battery negative terminal.
    2. Connect the battery charger positive lead to the battery positive terminal and the negative lead to the battery negative terminal.
    3. Turn the charger timer past a ' **3 minutes**' charge indication and then back to the ' **3 minutes**' mark.
    4. Set the charging rate as close as possible to **40 amperes**
    5. After **3 minutes** at this fast charge take the voltmeter reading.
    - If the total voltage is over **15.5 volts** the battery is unsatisfactory and is probably sulphated or worn out and should be replaced.
    - If the total voltage is under **15.5 volts**, test the specific gravity of each cell and re-charge the battery to the following scale:
    Refer to **Battery - General specification (A.30.A)**.

NOTE: *A mildly sulphated battery can be recovered by using a multiple battery type charger, with an open circuit upper voltage limit of* ***50 volts****. Owing to the high resistance of a sulphated battery, it will primarily require a high voltage setting to overcome the resistance of the sulphation. initially there may be no visible acceptance of the charge. After a few minutes of inactivity a small charge will be apparent, followed by a rapid increase in the charge rate. The charge rate must not exceed* ***14.0 amperes*** *or the electrolyte temperature* ***50 °C****. When the ampere rate has stabilised, reset the volts until the charge rate is a steady 5 amperes. Continue at this rate until the electrolyte specific gravity stops rising at approximately 1.275-1.280 at* ***20 °C*** *(* ***68 °F****), this can take up to* ***48 hours*** *of charging. Stand the battery for* ***24 hours*** *and then conduct the capacity test detailed previously.*

NOTE: *When battery problems are experienced the alternator drive belt tension and the complete charging system should be checked.*

Common Causes of Battery Failures

11. 1. Internal open circuit.
2. Internal short circuit.
3. Loss of electrolyte.
4. Separation of active materials from grids.
5. Accumulation of sulphate crystals too large to disperse.

These failures are normally caused by the following:
1. Failure of inter cell components.
2. Excessive crystal growth may puncture the separators and cause short circuits.
3. Excessive over charging (charging system malfunction, boost/recovery techniques with high voltage, operation in very high temperatures.
4. Freezing of electrolyte.
A fully charged battery does not freeze until **-65 °C**. A **50 %** charged battery freezes between **-17 - -27 °C**. Fully discharged electrolyte freezes at - **3 - -11 °C**.
Excessively high boost charging and gassing will also cause separation of active materials from the grids. Separation destroys the chemical function of the battery.
5. Crystal growth occurs whenever batteries are left discharged. High temperatures and extended discharged periods increase this condition. At room temperature after one week the battery is unlikely to recover on the vehicle. Recharge will require a higher constant voltage. After 3 weeks the battery will have suffered permanent degradation and the procedure detailed previously for charging a 'Deeply Discharged' battery should be followed.

When fully charged, batteries have a long shelf life. The lead calcium type battery self discharges at **3 %** per month. This means that it will take 16 months to drop to **50 %** charged. On the tractor the quiescent load is about **50 mA**. To predict run-down on a static vehicle this should be added as approximately **8 Ah** per week.

It is worth stressing that when cranking, if a battery starts to fade, it is beneficial to stop and allow two minutes for the battery to recover. The recovery time should be increased as the temperature decreases.

With a dual battery set up, an old battery should not be used with a new one. One battery will always fail first. If the battery has given the service life expected, change both batteries. If one has failed early, i.e, through manufacturing defect, then it is acceptable to replace just one battery.

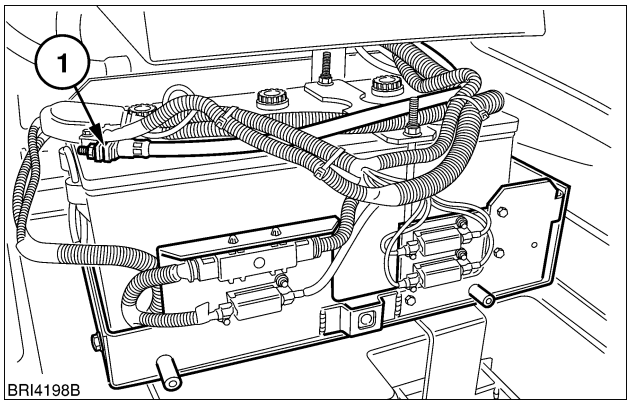
Battery - Connect

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Prior operation:
Battery - Disconnect (A.30.A) Battery - Remove (A.30.A)

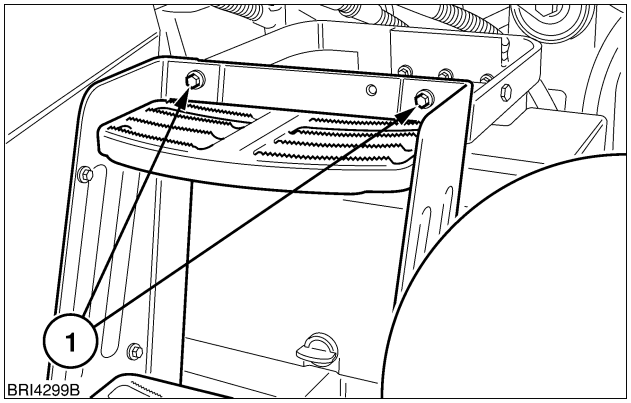
1. Connect the battery negative cable **(1)** and install the battery cover.

NOTE: *If the battery has been fully removed from the tractor (or a new battery is being installed) ensure the positive cable is also connected correctly.*



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2. Swing the step into the upright position and secure with the retaining bolts, nuts and washers **(1)**.

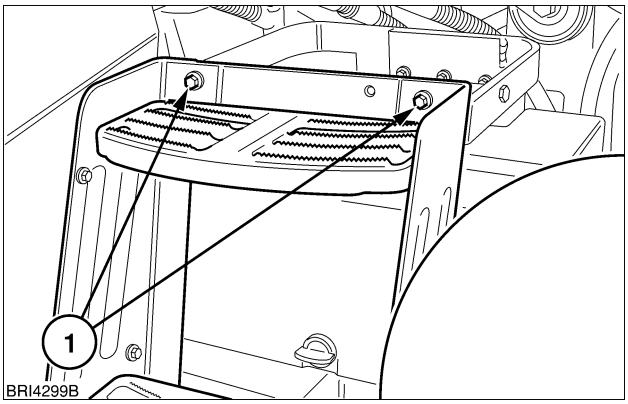


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Battery - Disconnect

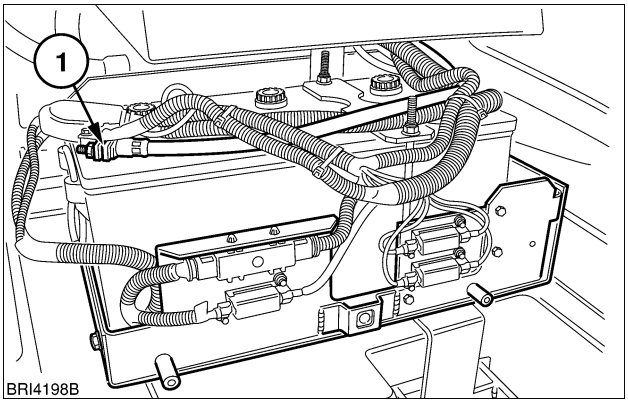
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

1. Undo the step retaining bolts **(1)** and swing the step away from the battery cover. Undo the battery cover knob and remove the battery cover



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2. Disconnect the battery negative cable **(1)**.



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DISTRIBUTION SYSTEMS - A

ELECTRICAL POWER SYSTEM - 30.A

Alternator - Electrical test 673
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Alternator - General specification 22
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Alternator - Install 669
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Alternator - Preliminary test 670
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Alternator - Remove 668
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Alternator - Static description 28
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Alternator - Torque 22
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Battery - Connect 688
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Battery - Disconnect 689
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Battery - Electrical test 680
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Battery - General specification 23
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Battery - Install 679
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Battery - Remove 678
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Battery - Static description 29
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
ELECTRICAL POWER SYSTEM - General specification 14
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
ELECTRICAL POWER SYSTEM - Static description PROTECTING THE ELECTRONIC AND ELECTRICAL SYSTEMS DURING BATTERY CHARGING OR WELDING 24
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Fuse and relay box - General specification 15
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Fuse and relay box - Static description 25
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component Diagram 00 Plug connections 00-09 252
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 01 Plug connections 10-19 257
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 02 Plug connections 20-29 264
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 03 Plug connections 30-39 275
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 04 Plug connections 40-49 283
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 05 Plug connections 50-59 290
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 06 Plug connections 60-69 298
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 07 Plug connections 70-79 307
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 08 Plug connections 80-89 315
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Wiring harness - Component diagram 09 Plug connections 90-99 322
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 10 Plug connections 100-109 332
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 11 Plug connections 110-119 344
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 12 Plug connections 120-129 353
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 13 Plug connections 130-139 361
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 14 Plug connections 140-149 368
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 17 Plug connections 170-179 372
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 18 Plug connections 180-189 376
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 19 Plug connections 190-199 381
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 21 Plug connections 210-219 385
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 22 Plug connections 220-229 388
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 23 Plug connections 230-239 389
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 24 Plug connections 240-249 392
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 25 Plug connections 250-259 403
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 26 Plug connections 260-269 411
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Wiring harness - Component diagram 27 Plug connections 270-279 419
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 28 Plug connections 280-289 424
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 29 Plug connections 290-299 432
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 30 Plug connections 300-309 439
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 31 Plug connections 310-319 442
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 32 Plug connections 320-329 446
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 33 Plug connections 330-339 459
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 34 Plug connections 340-349 464
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 35 Plug connections 350-359 467
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 36 Plug connections 360-369 472
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 37 Plug connections 370-379 479
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Wiring harness - Component diagram 38 Plug connections 380-389 490
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 13 94
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 15 96
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 16 98
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 17 103
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 18 107
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 19 111
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 20 115
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 21 116
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 22 122
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 23 126
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 24 132
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 25 133
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 26 137
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 27 141
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 28 143
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 29 145
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 30 146
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 32 151
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 33 152
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 39 156
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 40 158
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 42 168
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 43 172
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 44 175
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 45 176
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 46 177
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 47 180
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 48 181
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 49 183
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 50 185
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 55 188
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 57 191
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 60 192
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 61 196
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 62 202
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 63 208
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 64 212
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 65 217
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 66 219
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 67 222
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 68 225
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 69 228
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 70 232
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 71 236
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 72 242
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 73 245
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 74 247
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 75 251
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 76 257
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 77 260
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 78 263
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 80 267
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 81 269
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 82 275
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 83 280
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 84 283
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 85 288
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component diagram 86 293
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Wiring harness

Static description 296
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical symbol 298
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Overview 299
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 01 Power Distribution (Power - Maxi Fuses) 316
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 02 Power Distribution (Fuses 1 - 14) 318
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 03 Power Distribution (Fuses 15 - 21) 320
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 04 Power Distribution (Fuses 22 - 30) 322
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 05 Power Distribution (Fuses 31 - 45) 324
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 06 Power Distribution (Fuses 46 - 54) 326
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 07 Power Distribution (Fuses 55 - 60) 328
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 08 Start/Charging (Start & Charging W/Isolator) 330
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 09 Start / Charging (without Isolator) 332
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 10 Engine Controller (Supply, Sensors) 334
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 11 Engine Controller (Supply, Injectors) 336
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 12 Power Distribution (Power Earthing) 338
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 13 Main Controller (Transmission Control) 340
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 14 Main Controller (Transmission Control) 342
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 15 Main - Controller (Electronic Draft Control) 344
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 16 Main - Controller (5V Supply, Sensor Ground, Seat) 346
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 17 Transmission (Power Take Off) 348
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 18 Auxiliary Controller (SFA, EHR'S, Link Levelling) 350
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 19 Auxiliary Controller (Front Hitch, PTO) 352
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 20 Fast Steer (Steering Control) 354
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 21 Instrument Cluster (Switches, Sensors, Keypad & Radar Socket) 356
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 22 Instrument Cluster (Switches) 358
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 23 Armrest Controller (MFH, Joystick, SWCD, EDC) 360
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 24 Armrest Controller (Switch, Led's, Potentiometer) 362
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 25 Auto - Guidance (Steering Control, Switch, Supply, Solenoid) 364
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 26 Can Power (Can System) 366
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 27 Climate Control Auto (Heating Controller, Supply, Switch, Relay) 368
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 28 Climate Control Manual (Heating, Supply, Switch, Relay) 370
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 29 Heated Mirrors (Switch & Relay) 372
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 30 Heated Screen (Supply, Switch & Relay) 374
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 31 Implement Sockets (Cigar Lighter, Power Sockets) 376
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 32 Lighting (Switch & Flasher Unit) 378
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 33 Lighting Auxiliary (Worklamps & Beacons) 380
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 34 Lighting (Side, Console & Licence Plate Lamps) 382
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 37 Lighting (Headlamps / Worklamps Hood / Headlamps Grabrail) 384
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 38 Lighting (Trailer) 386
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 39 Lighting (Interior Lights) 388
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 40 Lighting (Stop / Tail Lamps & Worklamps) 390
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 41 I.C.E (Radio) 392
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 42 Washers & Wipers (Switch & Relay) 394
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 43 Colour Display (Instruments) 396
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 44 Trailer Brakes (Hydraulic / Pneumatic Brake) 398
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 45 Electronic Park Lock (Supply, Switch & Relay) 400
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 46 Front Loader 402
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 47 Isobus (Isobus Power & Relay) 404
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 48 Diagnostics 406
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 49 Can System (Can Bus 1) 408
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 50 Can System (Auto - Guidance) 410
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 51 CAN System (EHR CAN) 412
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 52 CAN System (EHR CAN) 414
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical schematic frame 53 CAN System (Isobus CAN) 416
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

SERVICE

Alternator

Remove 419
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Install 420
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Preliminary test 421
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical test 424
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Battery

Disconnect 429
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Connect 430
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electrical test 432
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Remove 440
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Install 442
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

ELECTRICAL POWER SYSTEM - General specification

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Description	All Models
Alternator	ISKRA, **12 V**, **150 A** (optional with heated screen **200 A**)
Battery	Minimum maintenance **12 V** 176 Ah (1300 cca)
Starting motor	Positive engagement, solenoid operated **4.2 kW** - geared reduction
Cold starting aid	Optional inlet manifold grid heater (**80 A**) and fuel heater
Bulb rating and type	
- headlights	**60/55 W** - H4
- parking lights (front)	**5 W** - R**5 W**
- parking lights (rear)	**5 W** - P **21/5 W**
- work lights (hi-mount rear, on C-pillar and grabrail)	**12 V 55 W** - H3
- turn indicators (front)	**21 W** - PY**21 W**
- turn indicators (rear)	**21 W** - R**21 W** or PY**21 W**
- stop lights	**21 W** - P **21/5 W**
- licence plate lights	**5 W** - R**5 W**
- rotating beacon	**55 W** - H1
- interior / step light	**12 V** R **10 W**
- HID Xenon work lights rear roof	HID DIS **12 V 35 W**
- work lights hood	**12 V 50 W** - GE886
- SMV (slow moving vehicle) lights (N. America only) and extremity lights	**21 W**-P**21 W**
- intermediate front hood Xenon	HID DIS **12 V 35 W**
- roof front work lights	**12.8 V 50 W** - GE885

Fuse and relay box - General specification

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Description of the relays

Relay	Function
K001 / K002	Wiper Module Front & Rear
K003	Ignition Relay
K004	Lights Relay
K005	Starter Motor On
K006	Blower Motor
K007	Dipped Beam Headlamps
K008	Stop Lamps Relay
K009	Main Beam Headlamps
K010	Hydraulic Trailer Brake
K011	Electronic Park Brake
K012	Pneumatic Trailer Brake
K013	Engine Shutdown
K014	Get U Home
K015	Front Worklamps Hood
K016	Rear Worklamps C Pillar Relay
K017	Power Supply ECU
K018	EL.Battery Isolator
K019	Air Condition Clutch Relay
K020	El.Hydraulic Remote Lock Relay
K021	Timer Relay Battery Isolator
K022	Heated Mirror Timer Relay
K044	Front Screen Heater Relay
K045	Rear Screen Heater Relay
NOTE: The following relays are located outside the safety box!	
K023	Grid Heater Relay
K024	Fuel Heater Relay
K040	ISO Relay 1 Rear
K041	ISO Relay 2 Rear
K042	ISO Relay 1 Front
K043	ISO Relay 2 Front
K046	Reversible Fan Relay
K047	Relay Less EPL
K050	Relay Autoguidance Crank Isolate
K051	Relay Autoguidance Solenoid B
K052	Relay Autoguidance Solenoid A
K053	EL.Shiftable PTO Drive Upper Speed Relay
K054	EL.Shiftable PTO Drive Lower Speed Relay
K491	Relais Loader Valve 1
K492	Relais Loader Valve 2

Fuses

No.	Amps	Circuit
F001	10	Interior and step lighting and relay mirror heating
F002	25	Cigar lighter and power socket, cab (potential 30)
F003	10	Coupling of the A/C compressor
F004	10	Screw terminal red (potential 30)
F005	30	Blower motor
F006	10	Station memory and work lamp control unit

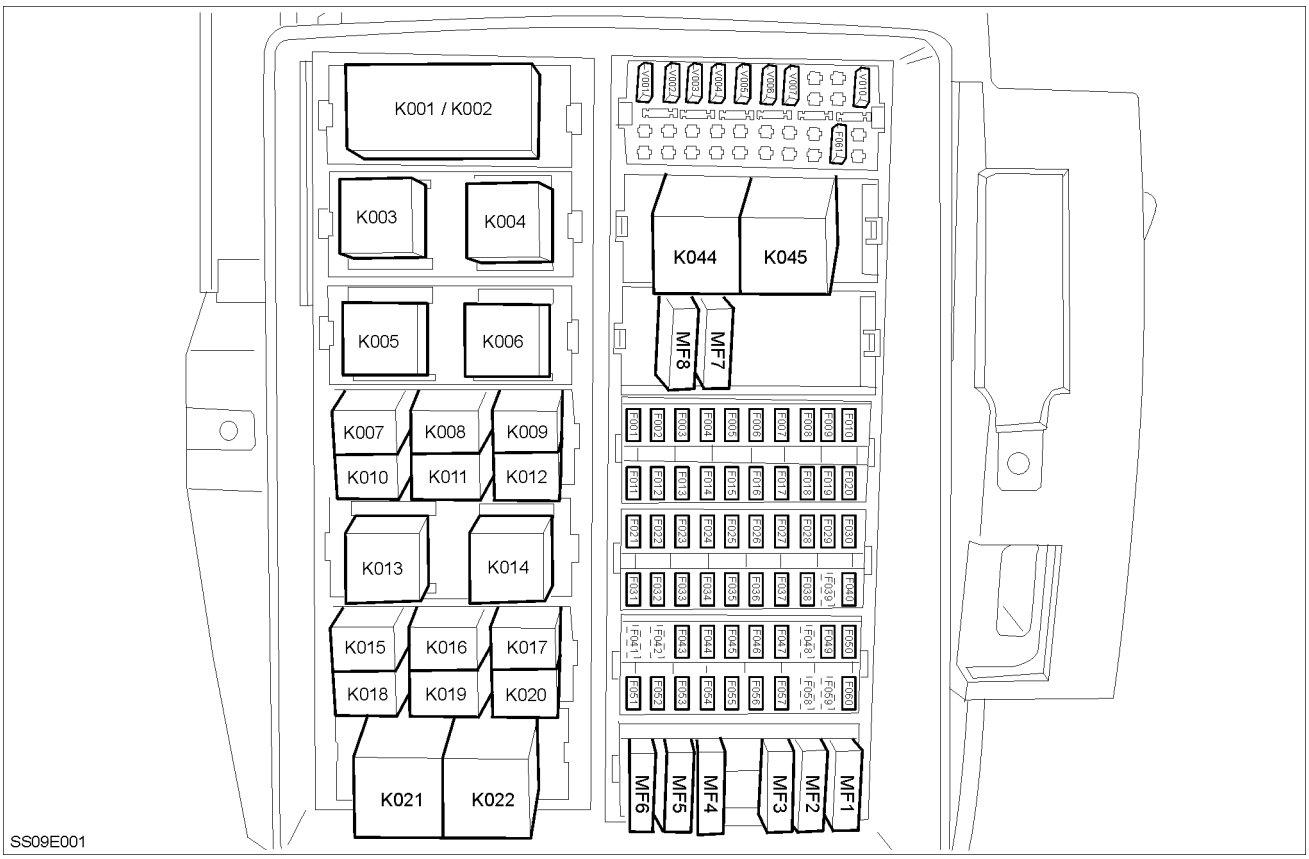
No.	Amps	Circuit
F007	20	Switch - Main headlights and hazard light switch
F008	20	Starter switch
F009	25	Front loader power
F010	30	Rear power socket (potential 15)
F011	15	Front windscreen wiper
F012	10	Rear windscreen wiper / switch, windscreen washing system, front/rear
F013	15	Relay, brake lights
F014	15	Headlight switch and flasher
F015	20	Brake light switch and pedal lock
F016	15	Trailer brake
F017	25	Power socket, cab (potential 15)
F018	15	Air blower motor relay and driver's seat / Armrest adjust
F019	15	Heated mirrors
F020	10	Radar sensor, normal signal socket / keypad
F021	15	Water sensor for the fuel filter, brake fluid level switch
F022	15	Side marker lights, right
F023	15	Side marker lights, left / licence plate lights
F024	10	Illumination - Lighting / cigar lighter - ICU - VT - heated mirror switch - EHR-lock switch
F025	15	Dipped beam headlights relay, get you home
F026	15	Main beam headlights
F027	30	Front work lamp (bonnet)
F028	15	Work lamp control unit / Roof rear worklamps
F029	30	Work lamp control unit / Roof front worklamps + grabrail
F030	15	Work lamp (C-pillar)
F031	15	Rotating beacon (via work lamp control unit)
F032	15	Flasher unit
F033	25	Diagnostics plug 1/2
F034	10	ICU 3 and hand brake switch
F035	10	Potential 30 for electronics
F039		Not used
F040	10	Radio memory
F041		Not used
F042		Not used
F043	10	Engine electronics (potential 15)
F044	25	Front-mounted equipment socket (B+)
F045	25	Power supply - **8 A** socket (potential 15) C-pillar left
F046	15	Engine controller B+ supply
F047	10	Engine controller B+ supply
F048		Not Used
F049	15	Viscotronic fan, relay heater grid, relay fuel filter heater, exhaust brake
F050	15	Reversible fan
F051	25	Electronic park brake
F052	10	ICU 3 supply
F053	15	Transmission control supply (potential 15)
F054	10	PTO rear
F055	10	Supply Ignition Fast Steer / GARU / A/C pressure switch / ACU / CCU
F056	15	PTO front
F057	15	Supply Ignition / ACU - Front hitch
F058		Not Used
F059		Not Used
F060	10	Timer relay battery isolator - battery isolator control switch
F061	10	Battery Isolator

Maxi Fuses

No.	Amps	Fused components
MF1	80	Supply to F009, F013, F018, F021, F045, F050
MF2	30	Supply to F006, F007, F008, F036, F037, F038
MF3	80	Supply to V019, F030, K005, K013
MF4	80	Supply to F027, K015
MF5	80	Supply to F026, F031, F051
MF6	80	Supply to F001, F002, F003, F004, F005, F044
MF7	30	Supply heated windscreen front
MF8	20	Supply heated screen rear

Diode

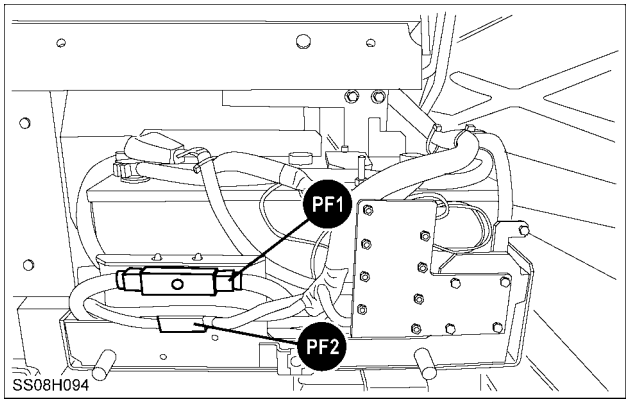
Diode	Function
V001	Get you home
V002	Get you home
V003	Get you home
V004	Dipped Beam Headlamps Diode
V005	Brake Light Diode
V006	Brake Light Diode
V007	El. Battery Isolator Diode



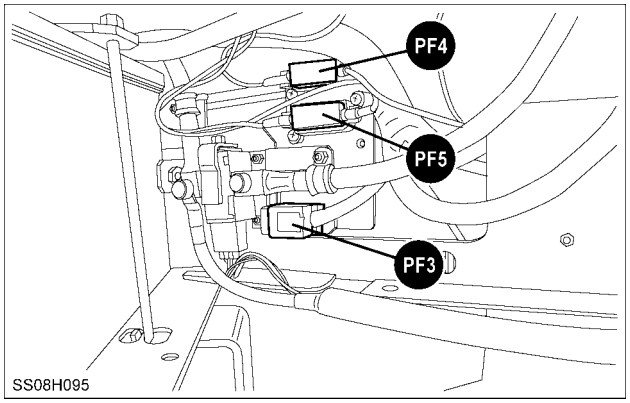
SS09E001 1

Fuses for the electrical supply

Fuse No.	Amps	Fuse-protected power supply
PF1	250	Power Fuse, Main power supply B+ (250A)
PF2	30	Power Fuse, Power Supply CCU
PF3	30	Power Fuse, Power Supply Memory



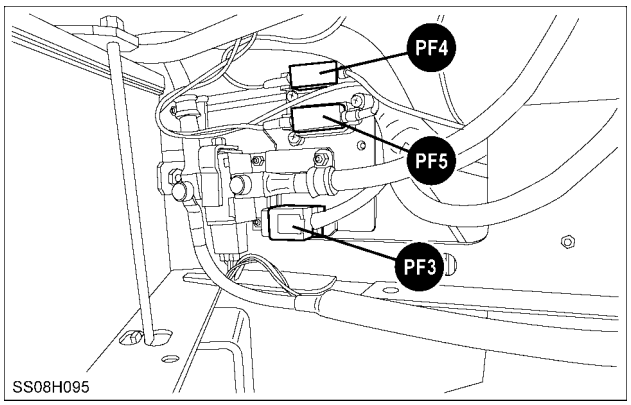
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SS08H095 3

Main current fuses for the ISO BUS power supply (if installed)

Fuse No.	Amps	Fuse-protected power supply
PF4	30	Power Fuse, ISO Bus Rear
PF5	30	Power Fuse, ISO Bus Rear
PF6	30	Power Fuse, ISO Bus Front
PF7	30	Power Fuse, ISO Bus Front



SS08H095 4

Alternator - Torque

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

	Value
Pulley Retaining Nut	**80 Nm** (**59.0 lb ft**)
Terminal Nut - B+	**12 Nm** (**8.9 lb ft**)
Terminal Nut - D+	**3.5 Nm** (**2.6 lb ft**)
Mounting Bolts	**25 Nm** (**18.4 lb ft**)

Alternator - General specification

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Polarity	Negative Ground
Nominal Voltage	**14.0 V**
Maximum Rev/Min. - Permanent/Intermittent	15,000/18,000
Nominal Output	**150 A** / **200 A**
Regulator Controlled Voltage	**14.1 V +/- 0.15**
Rotor Field Winding Resistance	**2.7 Ω +/- 0.27 @ 23 °C** (**73.4 °F**) ± **5 °C** (**41.0 °F**) (at **150 A**) **2.9 Ω +/- 0.10 @ 23 °C** (**73.4 °F**) ± **5 °C** (**41.0 °F**) (at **200 A**)

Battery - General specification

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Temperature	Efficiency of a Fully Charged Battery
25.0 °C (**77.0 °F**)	**100 %**
-4.5 °C (**23.9 °F**)	**82 %**
-24.0 °C (**-11.2 °F**)	**64 %**
-27.5 °C (**-17.5 °F**)	**58 %**
-31.0 °C (**-23.8 °F**)	**50 %**
-34.5 °C (**-30.1 °F**)	**40 %**
-37.5 °C (**-35.5 °F**)	**33 %**

	176 Ah (**1300 cca**)
Slow Charge Programs	46 hours at **5 A**
	23 hours at **10 A**
Fast charge Program (emergencies only)	13 hours at **18 A**

Use the following table to determine the state of charge

State of Charge	Corrected Specific Gravity @ **15 °C** (**59.0 °F**)	Corrected Specific Gravity @ **25 °C** (**77.0 °F**)	Average Battery Voltage
100 %	1.295	1.287	12.76
75 %	1.253	1.246	12.52
50 %	1.217	1.210	12.30
25 %	1.177	1.170	12.06
Discharged	1.137	1.130	11.84

Specific Gravity	Fast charge up to :
1.150 SG or less	**60 minutes**
1.151 - 1.175 SG	**45 minutes**
1.176 - 1.200 SG	**30 minutes**
1.201 - 1.225 SG	**15 minutes**
	(Slow charge only)

Description	Battery Specification
Capacity (Ampere hour at 20 hour rate)	176
Cold Cranking Ampere Rating	1300
Voltage	12
Cells	6
Ground Terminal	Negative

ELECTRICAL POWER SYSTEM - Static description PROTECTING THE ELECTRONIC AND ELECTRICAL SYSTEMS DURING BATTERY CHARGING OR WELDING

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Precautions

To avoid damage to the electronic/electrical systems, always observe the following:

1. Never make or break any of the charging circuit connections, including the battery connections, when the engine is running.
2. Never short any of the charging components to earth.
3. Do not use a slave battery of higher than **12 V** nominal voltage.
4. Always observe correct polarity when installing the batteries or using a slave battery to jump start the engine. Follow the instructions in the operator's manual when jump starting the tractor. Connect positive to positive and negative to negative.
5. Always disconnect the earth cable from the batteries before carrying out arc welding on the tractor or on any implement attached to the tractor.
6. Position the welder earth cable clamp as close to the welding area as possible.
7. If welding is to be carried out in close proximity to a computer module, then the module should be removed from the tractor. It is recommended that this procedure be carried out by an authorised dealer.
8. Never allow welding cables to lay on, near or across any electrical wiring or electronic component while welding is in progress.
9. Always disconnect the negative cable from the batteries when charging the batteries in the tractor with a battery charger.

⚠ WARNING ⚠

Batteries contain sulphuric acid. In case of contact with skin, flush the affected area with water for five minutes. Seek medical attention immediately. Avoid contact with the skin, eyes or clothing. Wear eye protection when working near batteries.

B040

IMPORTANT: *Failure to disconnect the two earth cable connections at the battery prior to charging the batteries or welding on the tractor or attached implement will result in damage to the electronic and electrical systems.*

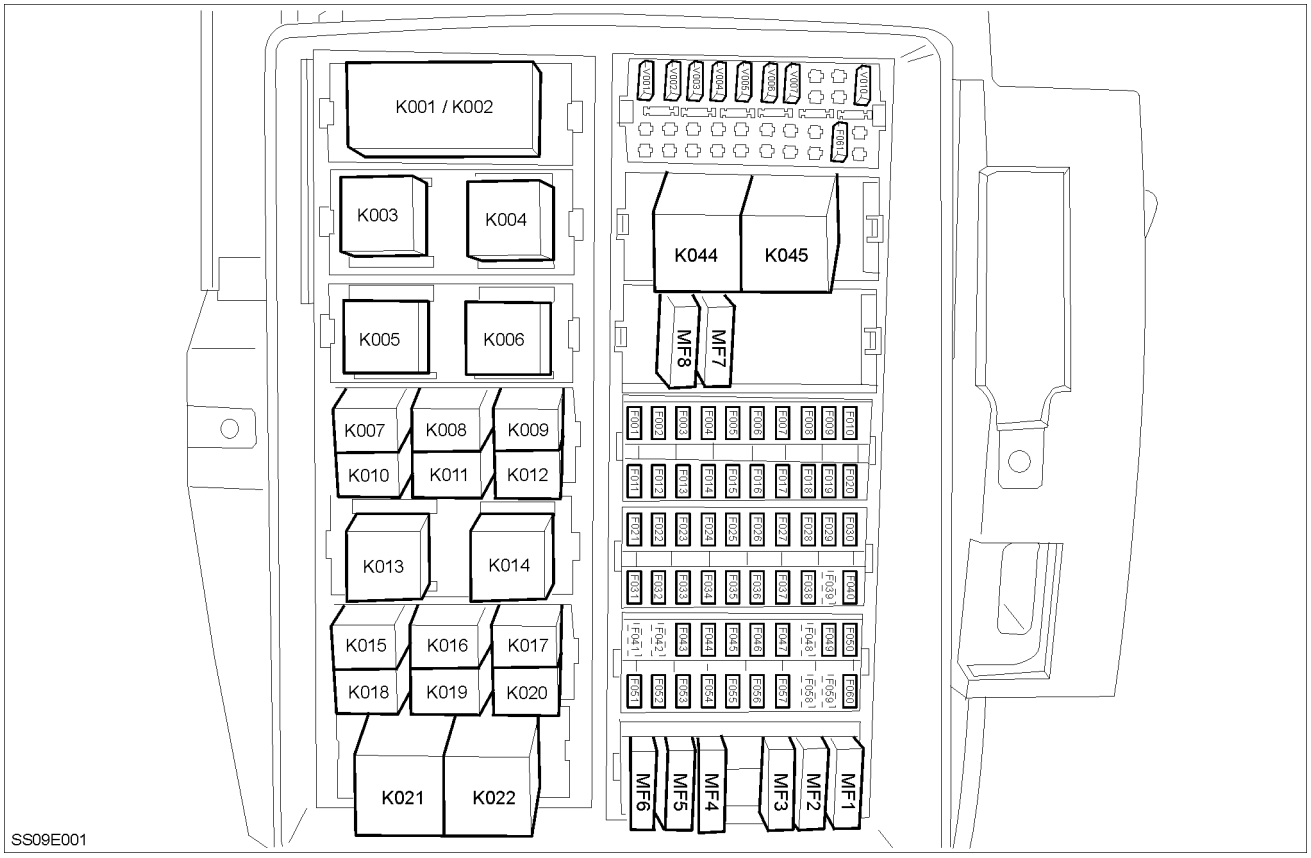
Fuse and relay box - Static description

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Fuses and Relays

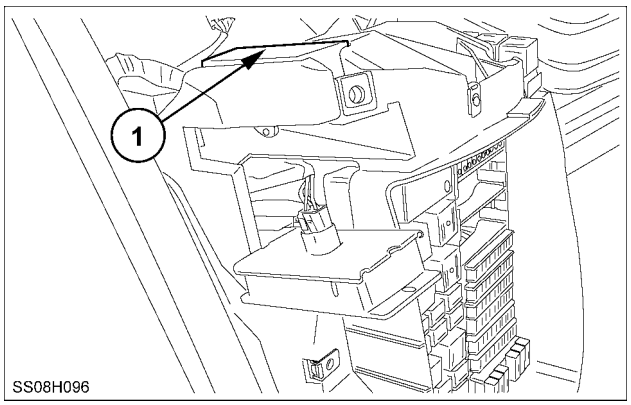
IMPORTANT: *Do not replace a blown fuse with another of a different rating.*

The fuse box and relay box is located behind a panel at the right-hand side.
To check or change fuses or relays, remove the two screws securing the panel to the console.
In addition to the main fuses there are additional 'Maxi' fuses which are provided to protect the main fuses and electrical circuit.
There is provision for 60 fuses although they may not all be fitted, depending on the specification of the tractor. The fuses are numbered and colour coded.
Refer to **Fuse and relay box - General specification (A.30.A)** for fuse positions and descriptions and for relay functions.



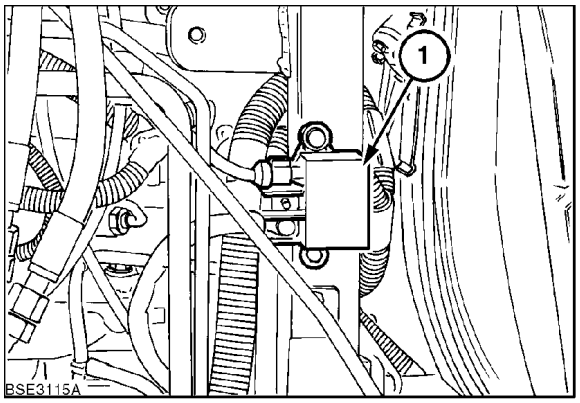
SS09E001 1

The flasher relay unit **(1)**, is located behind the right hand trim on the top of the fuse and relay box.



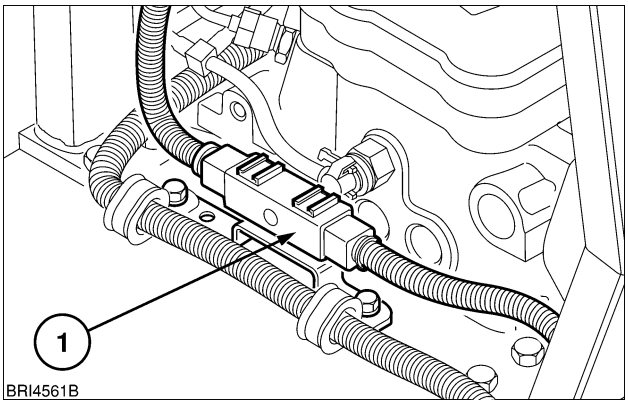
SS08H096 2

Grid Heater relay **(1)**, located to the rear of the left hand side of the engine.



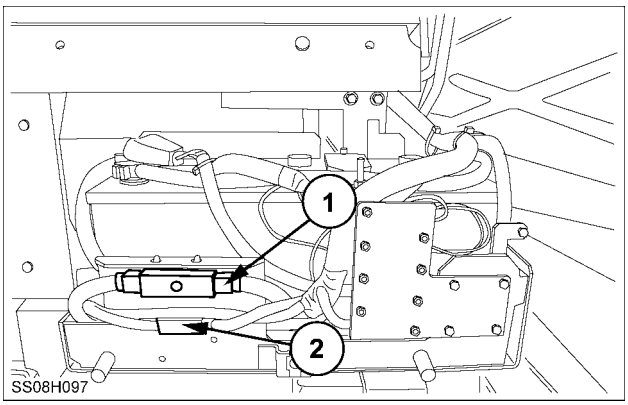
BSE3115A 3

Grid Heater Fuse (**125 A**) **(1)**, located on the right hand side of the engine near the starter motor.



BRI4561B 4

In addition to the fuses in the internal fuse box, there are also extra fuses located on the battery tray. A **250 A** 'MEGA' fuse **(1)** which protects the main electrical system and one **30 A** fuse **(2)** which protect the front lift electrical system, supply to the electronics system and implement ISO BUS circuit and battery isolator circuit (where fitted).

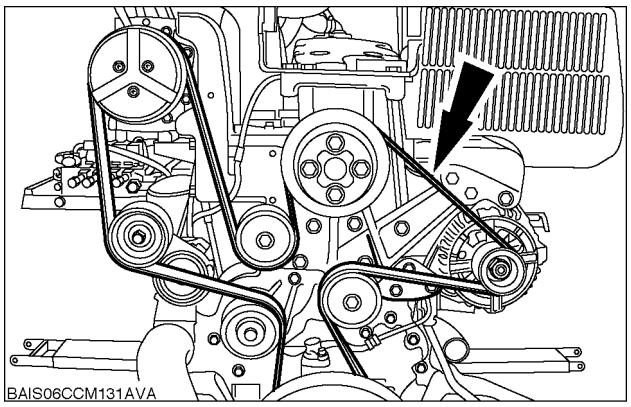


SS08H097 5

Alternator - Static description

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

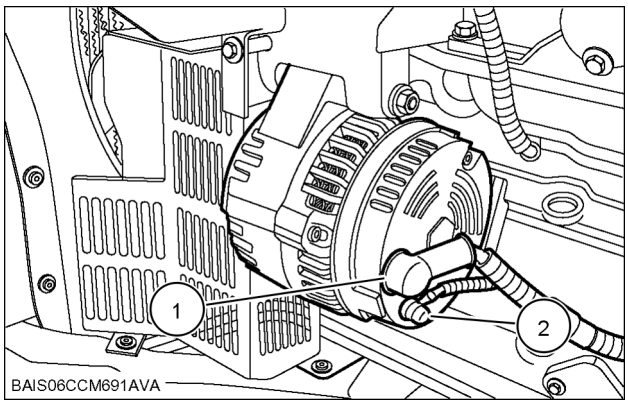
ISKRA **150 A** (optional with heated screen **200 A**) alternators are fitted to all models. They incorporate internal cooling fans and integral regulators. The alternator is mounted at the front on the left hand side of the engine and is driven from a crankshaft pulley via a 'poly vee' drive belt.



BAIS06CCM131AVA 1

Alternator Operation

Refer to **Wiring harness - Electrical schematic frame 08 Start/Charging (Start & Charging W/Isolator) (A.30.A)** for charging circuit schematic.
When the key start switch is turned on a small current flows from the battery through the rotor field wiring. The circuit is made via the charge indicator warning lamp, alternator terminal 'D+' the rotor field winding, the alternator regulator and ground.
At this stage the warning light is illuminated and the rotor partially magnetised.
When the engine is started and the partially magnetised rotor revolves within the stator windings a 3-phase alternating current is generated. A constant portion of the generated current is converted to direct current by the three field diodes incorporated in the rectifier pack.
This direct current is fed back to supplement the current flowing through the rotor field winding.
This action results in an ever increasing magnetic influence of the rotor along with an associated rapid rise in generated output current and voltage.
During the rise in generated output voltage (reflected at the 'D+' terminal) the brilliance of the warning lamp is reduced and when the voltage at the 'D+' terminal equates to that at the battery side of the warning light the lamp is extinguished.
The voltage continues to rise until the predetermined regulated voltage level is reached.
In the event of drive belt breakage the voltage will not build up within the alternator and so the charge indicator light will remain on to indicate failure.



BAIS06CCM691AVA 2

Alternator

1 Output Connection (B+ Terminal)
2 Warning Lamp (D+ terminal)

Battery - Static description

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

All models use a single “low maintenance - hybrid" battery with negative ground of six cell construction and is located on the right hand side of the tractor behind the cab steps.

NOTE: *"Low maintenance" means that under normal charging conditions the battery may lose a small amount of water from the electrolyte. Conditions that may cause water loss include prolonged charging above* ***14.4 V*** *where gassing occurs as it approaches full charge. This can be caused by a faulty charging system or boost/recovery charging equipment.*

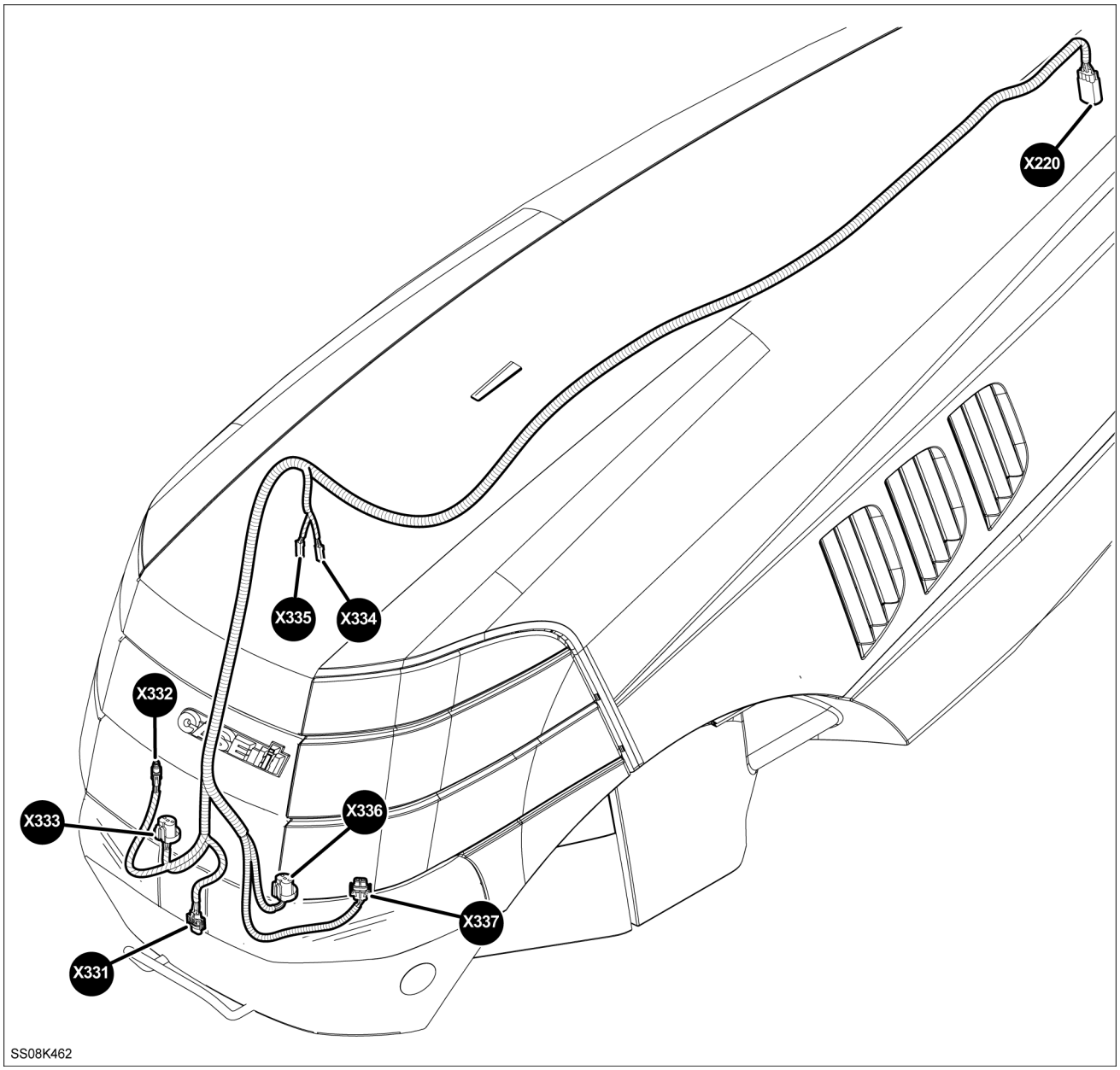
The battery has four major functions:

- To provide a source of current for starting, lighting and instrumentation.
- To help control the voltage in the electrical system.
- To furnish current when the electrical demands exceed the alternator output.
- To support quiescent loads from radio and micro processor memory.

The battery is constructed in such a manner that each cell contains positive and negative plates placed alternatively next to each other. Each positive plate is separated from a negative plate by a non-conducting porous envelope separator. If any of the positive plates should make contact with negative plates within a cell, the cell will short circuit and suffer irreparable damage. All of the positive plates are welded to a bus-bar, forming a positive terminal and all of the negative plates are welded to a similar bus-bar forming a negative terminal.
Each positive plate is composed of a lead grid with lead peroxide pasted into the grid openings. The negative plates are composed of a lead grid with spongy lead pasted into the grid openings.
The plates are submerged in a liquid electrolyte solution of diluted sulphuric acid.

Connector - Overview Wiring Harness Hood

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]



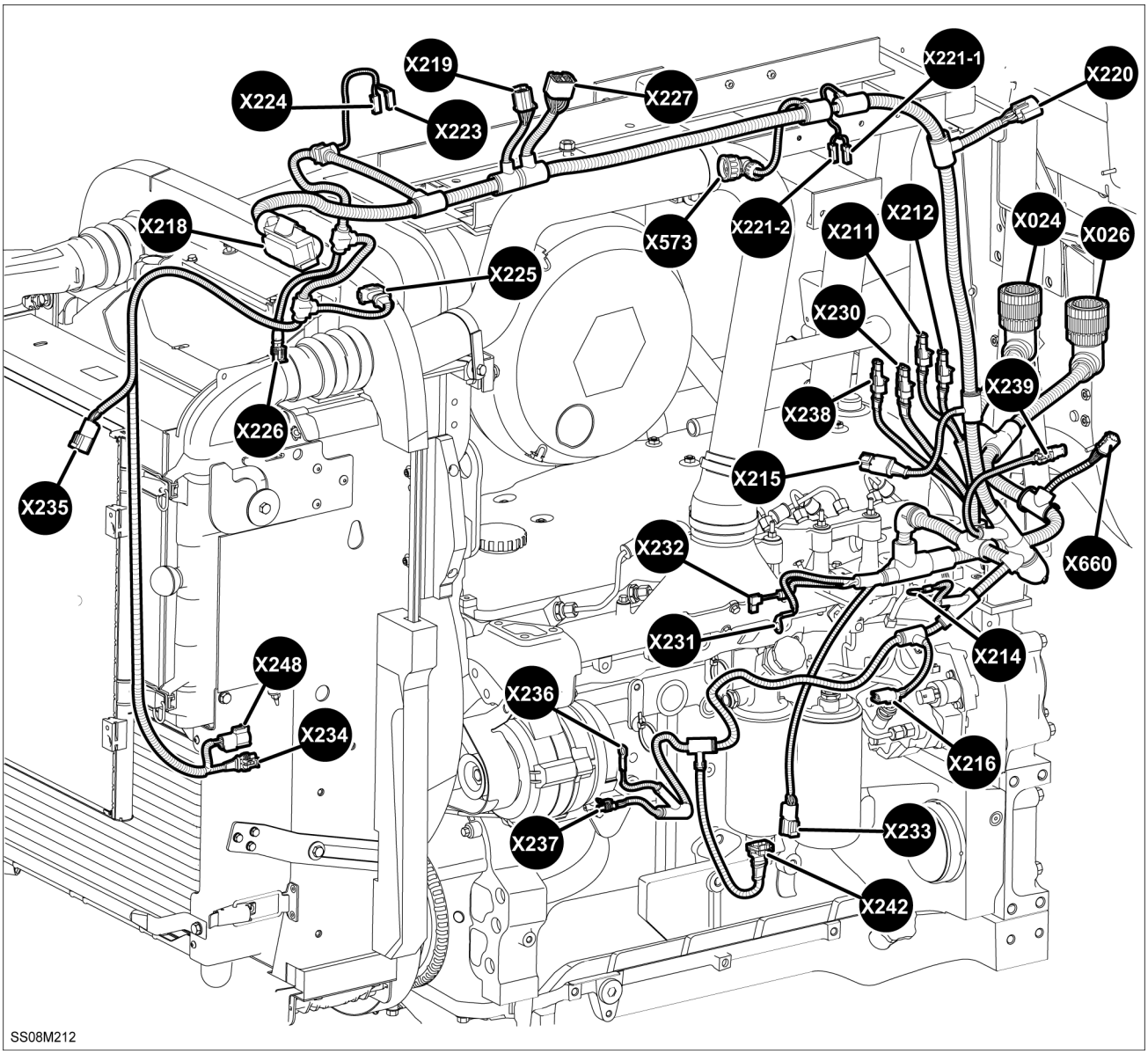
SS08K462 1

Con.	Description	Con.	Description
X220	Front Lamps	**X331**	Worklamp Right Hand
X332	Corner Lamp Right Hand	**X333**	Headlamp Right Hand
X334	Horn	**X335**	Horn
X336	Headlamp Left Hand	**X337**	Corner Lamp Left Hand
X338	not used		

Connector - Overview Wiring Harness Engine

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Engine and front attachments

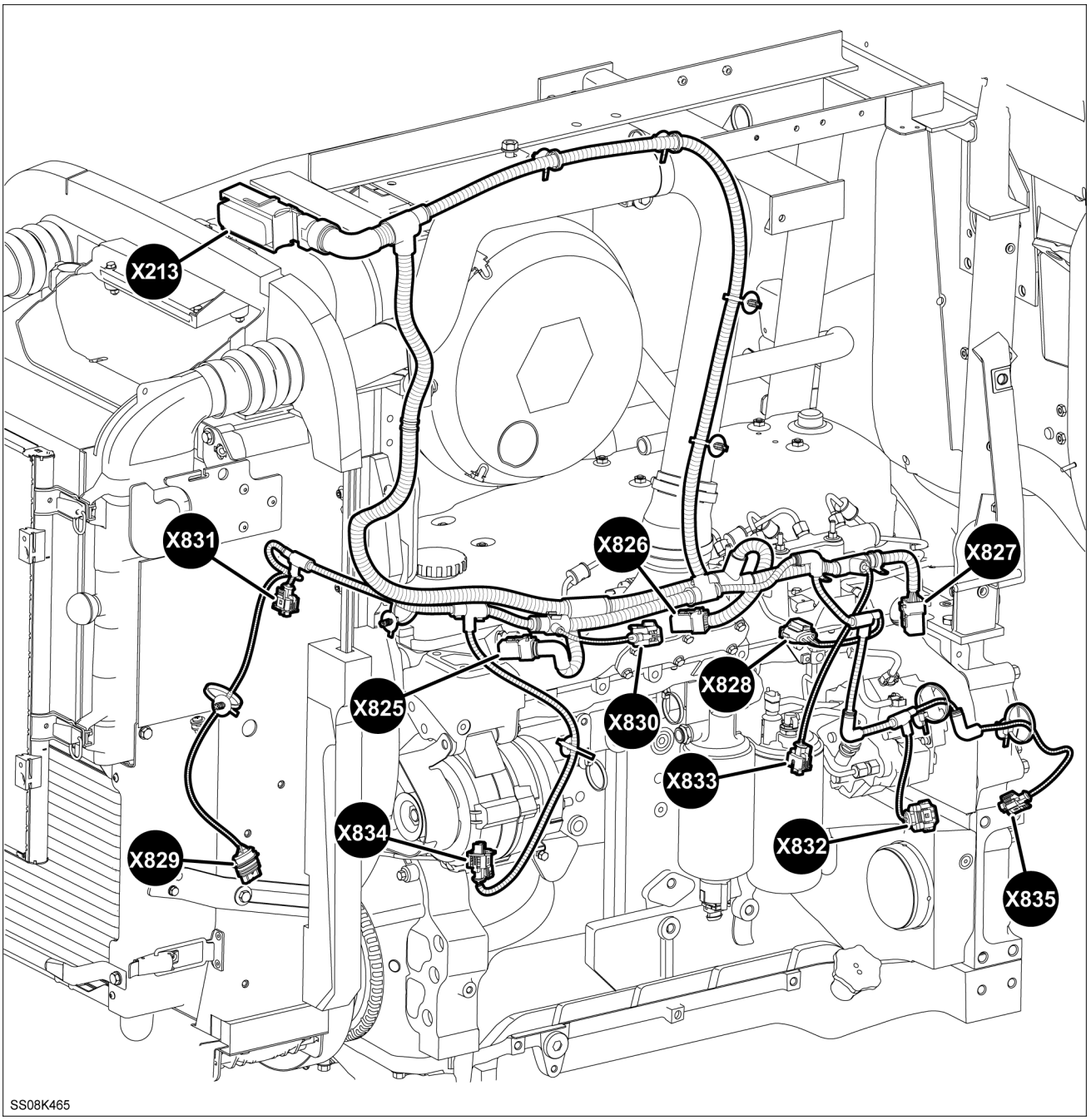


SS08M212 1

Con.	Description	Con.	Description
X024	Cab to Engine Main Connector E2	**X026**	Main Harness Connector - E1 - Engine to Cab
X211	Loader Valve Option A	**X212**	Loader Valve Option B
X214	Earth Point - Electronic Module	**X215**	Grid Heater Relay
X216	Fuel Heater Relay	**X218**	Engine Module Bosch EDC 16
X219	Visctronic Fan	**X220**	Front Lamps
X221	Brake Fluid Level (1/2)	**X223**	Air Cleaner Switch
X224	Air Cleaner Switch	**X225**	A/C Pressure Switch
X226	A/C Clutch	**X227**	Front Hitch and Front PTO
X230	D.I.A Engine Inline	**X231**	Starter Solenoid B+
X232	Starter Solenoid 1	**X233**	Radar Gun
X234	Front Axle (Self Level)	**X235**	Steering Angle Sensor
X236	Alternator B+	**X237**	Alternator D+

Con.	Description	Con.	Description
X238	Battery Isolator	**X239**	Reversible Fan
X242	Water in Fuel Sensor	**X248**	Suspension Accelerometer
X573	Exhaust Brake Solenoid	**X660**	ISO Implement Connector

Engine components (Injectors, Sensors...)

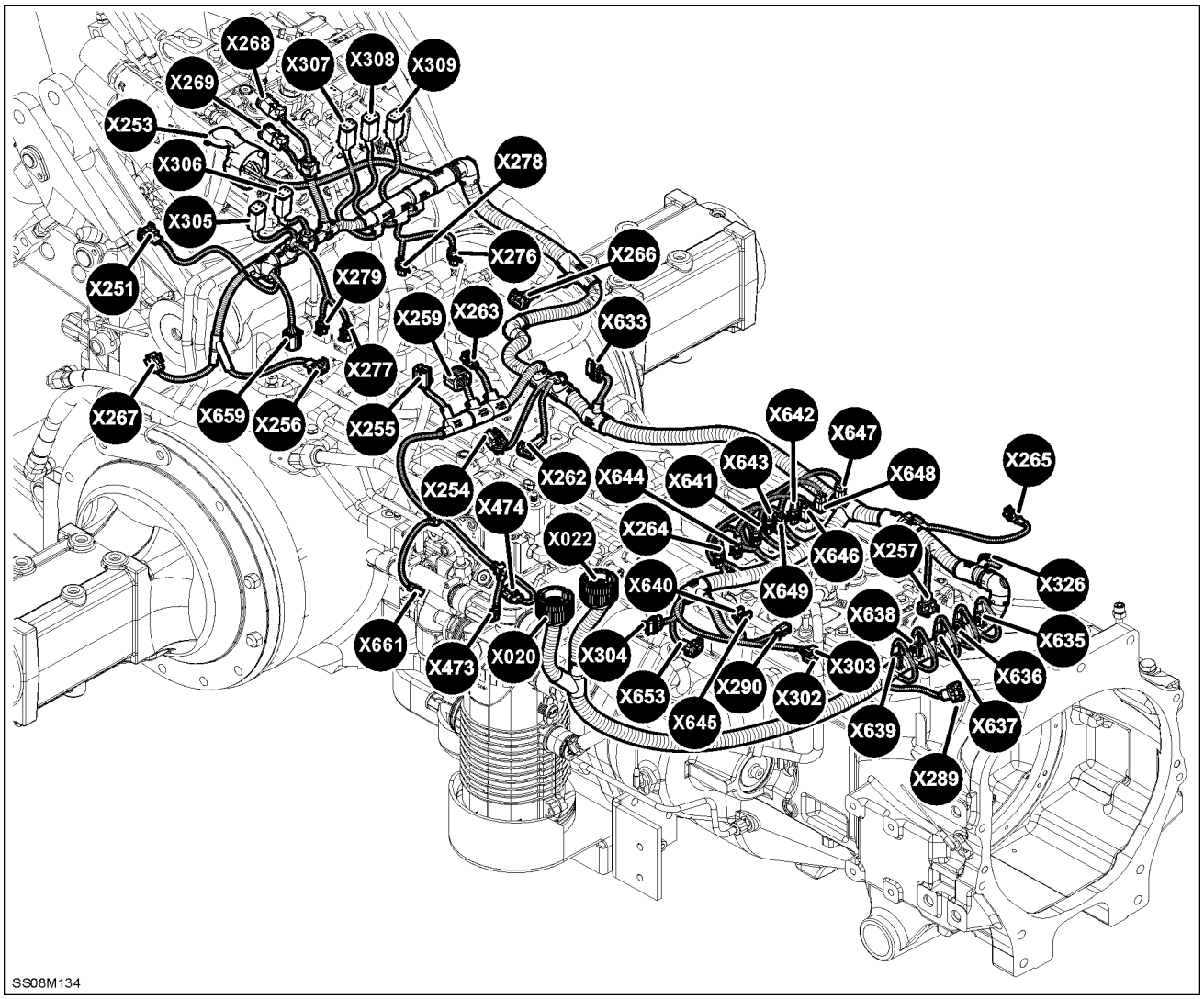


SS08K465 2

Con.	Description	Con.	Description
X213	Engine Control Unit A	**X825**	Injector Cylinder 1 & 2 (EDC16)
X826	Injector Cylinder 3 & 4 (EDC16)	**X827**	Injector Cylinder 5 & 6 (EDC16)
X828	Boost Pressure / Temperature Sensor (EDC16)	**X829**	Oil Pressure / Temperature Sensor (EDC16)
X830	Rail Pressure Sensor (EDC16)	**X831**	Coolant Temperature Sensor
X832	Fuel Temperature Sensor	**X833**	High Pressure Pump
X834	Increment Speed Sensor	**X835**	Camshaft Speed Sensor

Connector - Overview Wiring Harness Drive Line

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]



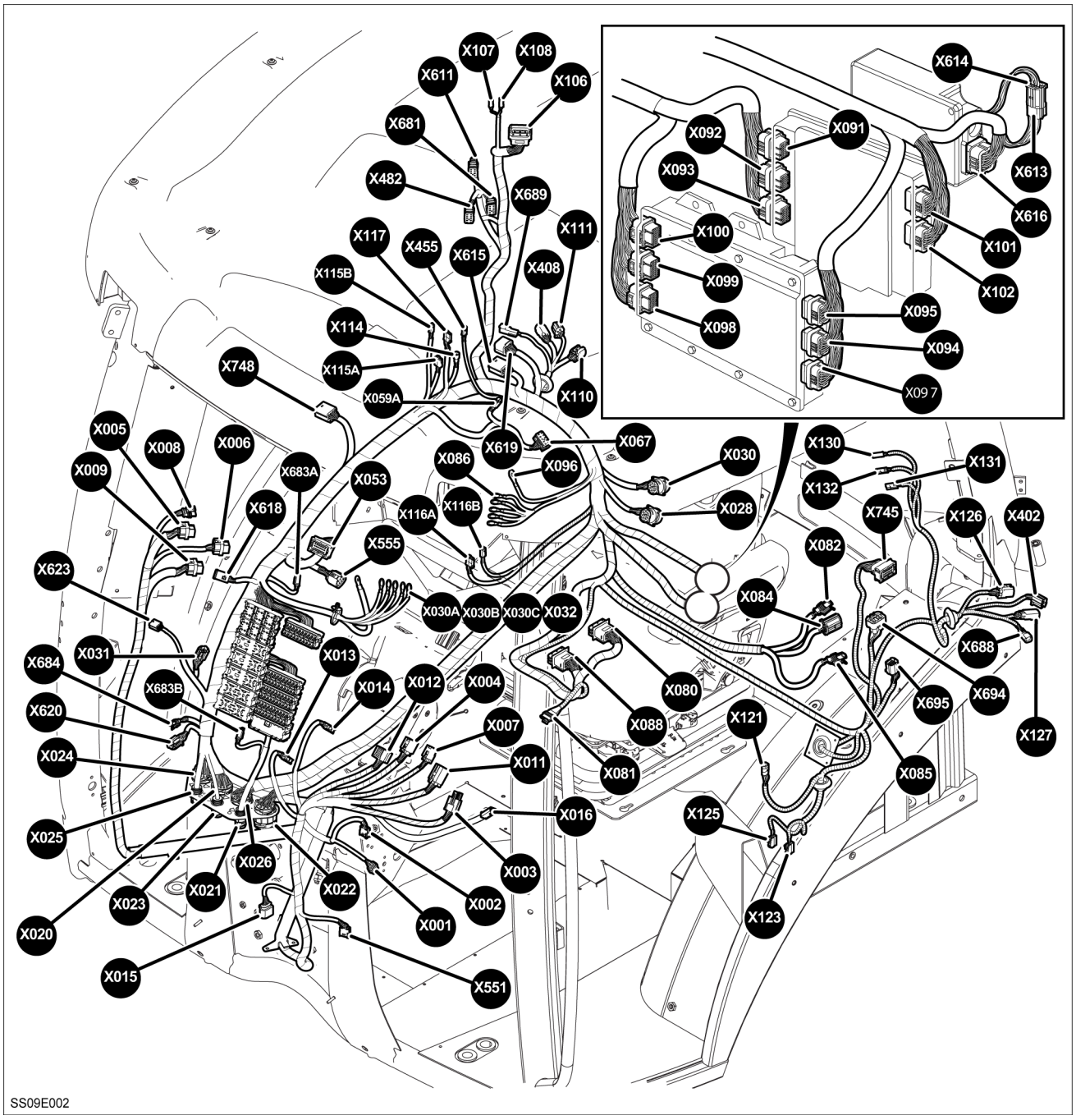
SS08M134 1

Con.	Description	Con.	Description
X020	Extension Harness Connector 2 (Cab)	**X022**	Extension Harness Connector 1 (Electronic)
X251	PTO Speed Sensor	**X253**	Trailer Socket
X254	Trailer Brakes - Air	**X255**	Trailer Brakes Hydraulic
X256	Draft Pin Right Hand	**X257**	Axel speed Sensor
X259	Front Suspension Connector	**X262**	PTO Twist Sensor
X263	19th Dump Solenoid	**X264**	19th Gear Solenoid
X265	Fuel Tank Sensor	**X266**	Draft Pin Left Hand
X267	Rock Shaft Potentiometer	**X268**	EDC Valve Raise
X269	EDC Valve Lower	**X276**	Diff. Lock Solenoid
X277	Rear PTO Brake Solenoid	**X278**	Rear PTO Solenoid
X279	4WD Solenoid	**X289**	Fly Wheel Speed Sensor
X290	Trans Oil Temperatur Sensor	**X302**	PAS Pressure Switch
X303	PAS Pressure Switch	**X304**	CAN Terminator Resistor
X305	EHR Valve Connector 1	**X306**	EHR Valve Connector 2
X307	EHR Valve Connector 3	**X308**	EHR Valve Connector 4
X309	EHR Valve Connector 5	**X326**	Earth Transmission
X473	Low Hydro Charge Switch	**X474**	Hydraulic Filter Blocked (Vacuum Switch)
X633	Creeper Connector	**X635**	Clutch Solenoid A

Con.	Description	Con.	Description
X636	Clutch Solenoid B	**X637**	Clutch Solenoid C
X638	Clutch Solenoid D	**X639**	Clutch Solenoid E
X640	Trans Oil Pressure Switch Pin 1	**X641**	Low Range Solenoid
X642	Med Range Solenoid	**X643**	High Range Solenoid
X644	Rev Range Solenoid	**X645**	Trans Oil Pressure Switch PIN 2
X646	Low Range Press Switch	**X647**	Med Range Press Switch
X648	High Range Press Switch	**X649**	Rev Range Press Switch
X653	Mid Speed Sensor Output speed P.U.	**X659**	Link Level (External Connection)
X661	High Flow Pump (detection)		

Connector - Overview Wiring Harness Main Cab

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]



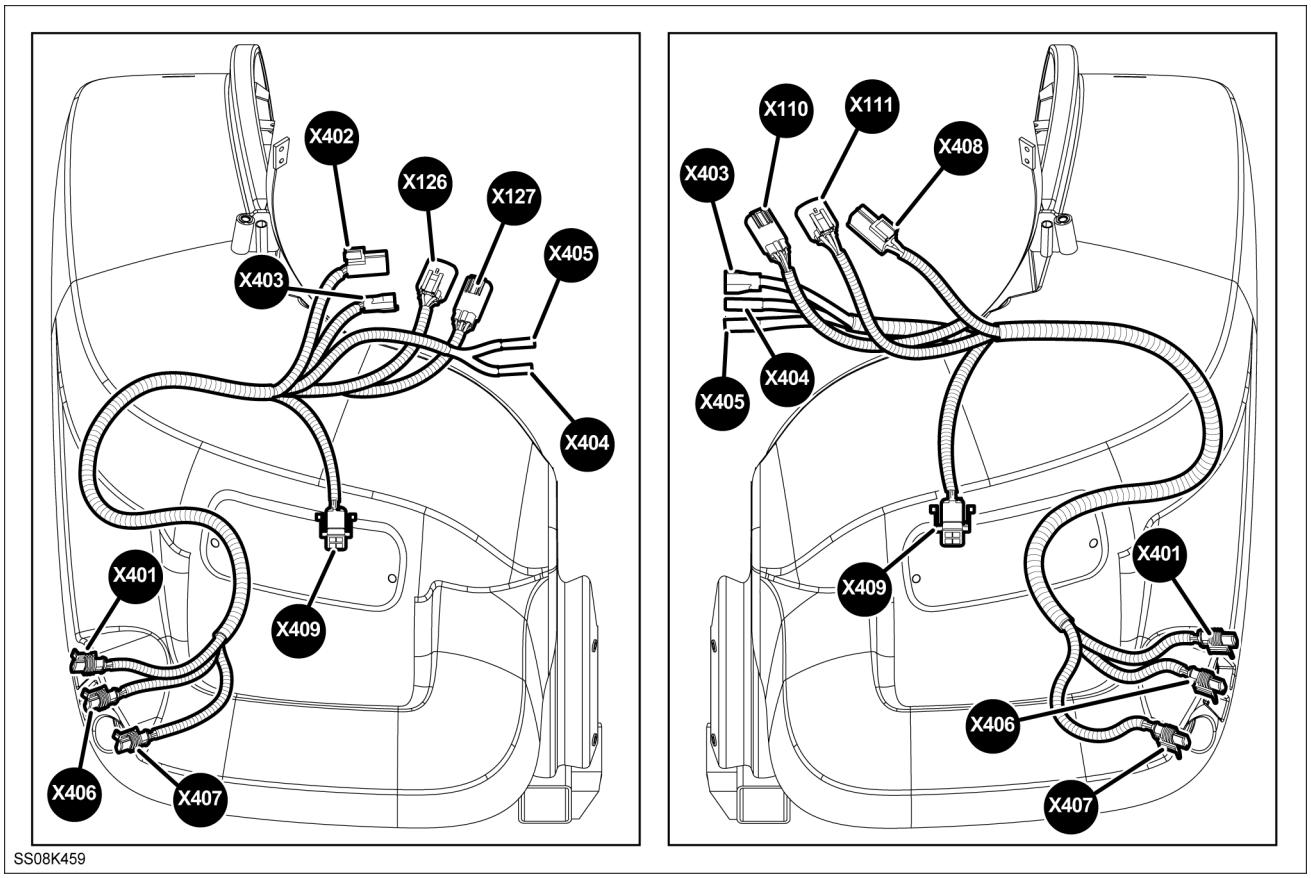
SS09E002 1

Con.	Description	Con.	Description
X001	Clutch Switch	**X002**	Clutch Potentiometer
X003	Starter Switch	**X004**	Main Light Switch
X005	Instrument Cluster Unit CN1	**X006**	Instrument Cluster Unit CN2
X007	Hazard Switch Harness	**X008**	Key Pad
X009	Instrument Cluster Unit CN3	**X011**	Front and Rear Wiper Switch
X012	Shuttle Lever	**X013**	Stop Lamp Switch Left
X014	Stop Lamp Switch Right	**X015**	Foot Throttle
X016	Brake Pedals Latched Switch	**X020**	Extension Harness Connector 2 (Cab)
X021	Main Power (Fuse) 1 Power B+	**X022**	Extension Harness Connector 1 (Electronic)
X023	Main Power (Fuse) 2 Power E	**X024**	Cab to Engine Main Connector E2

Con.	Description	Con.	Description
X025	Main Power (Fuse) 3 Power B-	**X026**	Main Harness Connector - E1 - Engine to Cab
X028	Diagnostic Connector 2	**X030**	Diagnostic Connector
X030A	Earth Header 2	**X030B**	Earth Header 2
X030C	Earth Header 2	**X031**	ADIC Diagnostic Connector
X032A	Earth Header 2	**X032B**	Earth Header 2
X053	Flasher ECU	**X059A**	Lever Mounted PTO Brake Switch
X067	Rear PTO Brake Switch	**X080**	Armrest 1
X081	Seat Connector	**X082**	Loader Power
X084	Loader Valve 2	**X085**	Loader Valve 1
X086A	Earth Header 1	**X086B**	Earth Header 1
X086C	Earth Header 1	**X086D**	Earth Header 1
X088	Armrest 2	**X091**	CCM Central Control Unit (CN2)
X092	CCM Central Control Unit (CN1a)	**X093**	CCM Central Control Unit (CN1b)
X094	CCM Central Control Unit (CN3a)	**X095**	CCM Central Control Unit (CN3b)
X096	Case Earth CCM & ACU	**X097**	CCM Central Control Unit (CN4)
X098	ACU Auxiliary Control Unit (CN2)	**X099**	ACU Auxiliary Control Unit (CN1a)
X100	ACU Auxiliary Control Unit (CN1b)	**X101**	ACU Auxiliary Control Unit (CN3b)
X102	ACU Auxiliary Control Unit (CN3a)	**X106**	Roof to Cab Harness - Roof
X107	Aux Headlamp Switch	**X108**	Aux Headlamp Switch
X110	Right Hand Fender Connector 2 HPL Raise/Lower Switch	**X111**	Right Hand Fender Connector 1 Tail Lamp
X114	ISO 11786 Signal Interface	**X115A**	30A Power Socket Positiv
X115B	30A Power Socket Negativ	**X116A**	Rear Power Socket Implement Positive
X116B	Rear Power Socket Implement Negative	**X117**	Power Studs
X121	Hand Brake	**X123**	Washer Motor Rear
X125	Washer Motor Front	**X126**	Left Hand Fender Connector 1 Tail Lamp
X127	Left Hand Fender Connector 2 HPL Raise/Lower Switch	**X130**	Cigar Lighter (Illumination)
X131	Cigar Lighter (Power)	**X132**	8 Amp Socket
X402	Rear Fender 3rd Remote Left	**X408**	Rear Fender 3rd Remote Right
X455	Rev. Alarm H58	**X482**	Battery Isolator Control Switch
X551	Exhaust Brake Switch	**X555**	Additional Roof Headlamps
X611	Heated Mirror Switch	**X613**	TECU Power In/Out
X614	TECU By-Pass	**X615**	TECU VT / SWCD Input
X616	TECU Unit - CN1	**X618**	ISO BUS CAN Extension
X619	TECU VT / SWCD Output	**X620**	Front Break Away (Option)
X623	Fast Steer Connector	**X681**	Hydraulics Master Switch
X683A	Heated Screen B+	**X683B**	Heated Screen D+
X684	Front Hitch Detect	**X688**	Extremity Lamp Left Hand
X689	Extremity Lamp Right Hand	**X694**	Air Con Power
X695	Air Con Control	**X745**	Electronic Park Brake Interface Connector
X748	Electric Shift PTO		

Connector - Overview Wiring Harness Fender

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

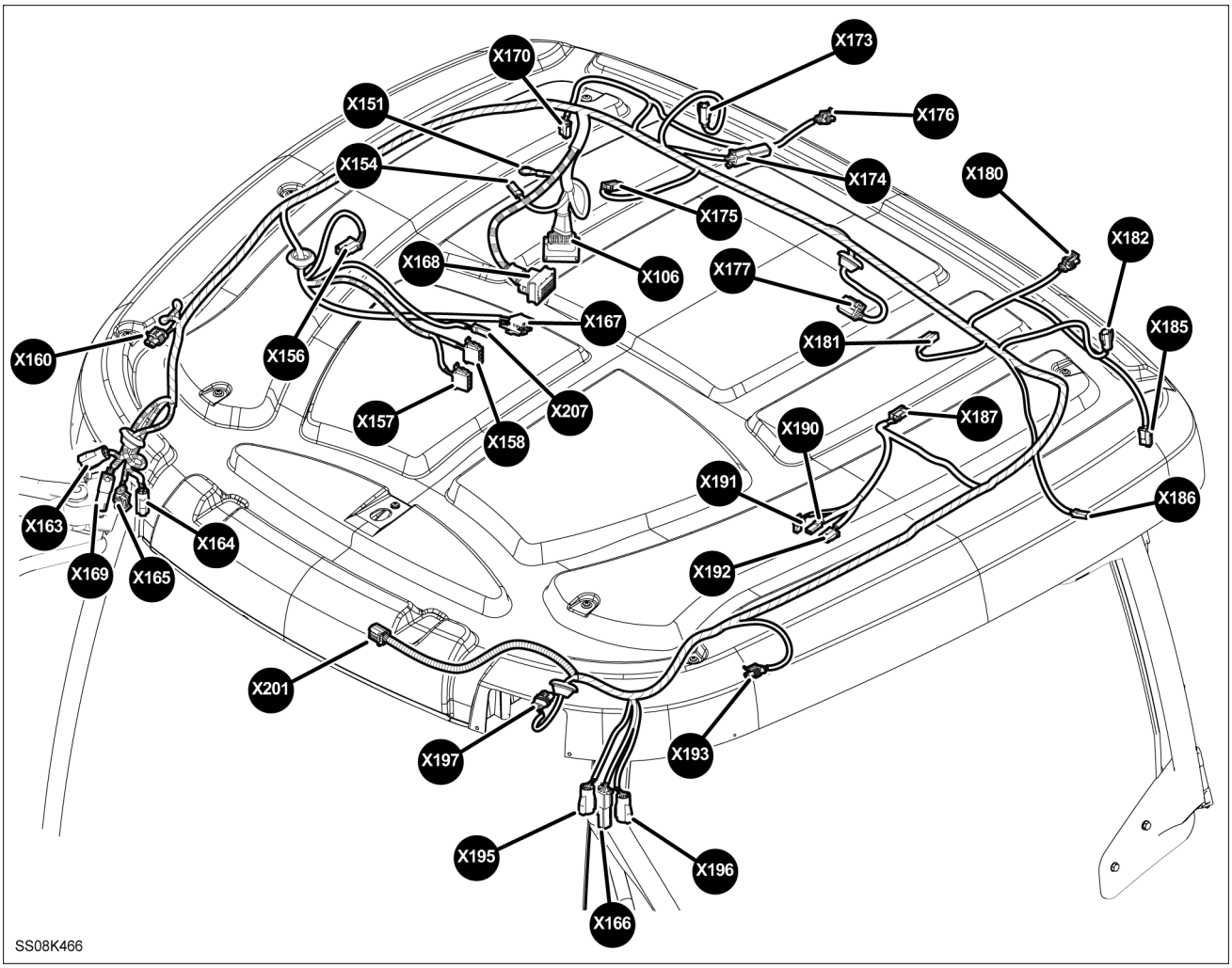


SS08K459 1

Con.	Description	Con.	Description
X110	Right Hand Fender Connector 2 HPL Raise/Lower Switch	**X111**	Right Hand Fender Connector 1 Tail Lamp
X126	Left Hand Fender Connector 1 Tail Lamp	**X127**	Left Hand Fender Connector 2 HPL Raise/Lower Switch
X401	EHR 3 Switch Fender Right and Left	**X402**	Rear Fender 3rd Remote Left
X403	Worklamp C - Pillar Right and Left	**X404**	License Lamp Right and Left
X405	License Lamp Right and Left	**X406**	Rear PTO Switch Right and Left
X407	HPL Switch Right and Left	**X408**	Rear Fender 3rd Remote Right
X409	Stop Tail Light Right and Left (LMP-018)		

Connector - Overview Wiring Harness Roof

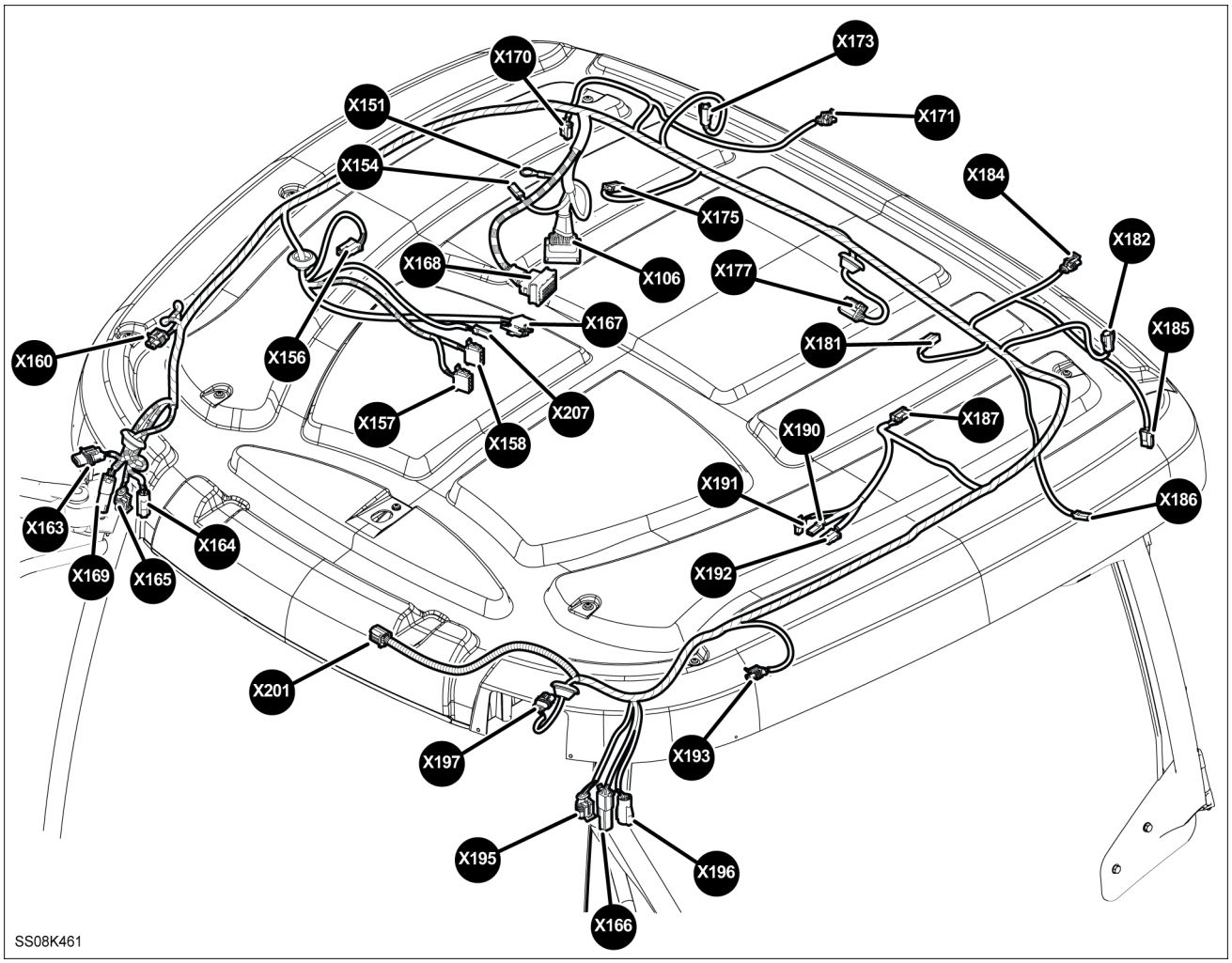
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]



SS08K466 1

Con.	Description	Con.	Description
X106	Roof to Cab Harness - Roof	**X151**	Roof Earth
X154	not used	**X156**	Console Lamp Right Hand
X157	Radio 2	**X158**	Radio 1
X160	not used	**X163**	Grabrail Side lamp Right Hand
X164	Worklamp Grabrail Right Hand Front	**X165**	Worklamp Roof Front Left Hand 2
X166	Electric Mirror Left Hand	**X167**	Mirror Control
X168	Worklamps ECU	**X169**	Electric Mirror Right Hand
X170	Rotating Beacon Right Hand	**X173**	Worklamp Rear Right
X174	Licence Plate Diode	**X175**	Radio Speaker Right Hand Rear
X176	License Plate Right Hand	**X177**	Wiper Motor Rear
X180	Licence Plate Left Hand	**X181**	Radio Speaker Left Hand Rear
X182	Worklamp Left Hand Rear	**X185**	Rotating Beacon Left Hand
X186	Door Switch Left Hand	**X187**	not used
X190	Interior Lamp A	**X191**	Interior Lamp B1
X192	Interior Lamp B2	**X193**	Puddle Lamp Left Hand
X195	Side Lamp Grabrail Left Hand	**X196**	Worklamp Grabrail Left Hand
X197	Worklamp Left Hand Front Upper	**X201**	Wiper Motor Front (Cab)
X207	Antenne Plus		

Wiring Harness Roof - North America only



SS08K461 2

Con.	Description	Con.	Description
X106	Roof to Cab Harness - Roof	**X151**	Roof Earth
X154	not used	**X156**	Console Lamp Right Hand
X157	Radio 2	**X158**	Radio 1
X160	not used	**X163**	SMV Lamp Right Hand Front
X164	Worklamp Grabrail Right Hand Front	**X165**	Worklamp Roof Front Left Hand 2
X166	Electric Mirror Left Hand	**X167**	Mirror Control
X168	Worklamps ECU	**X169**	Electric Mirror Right Hand
X170	Rotating Beacon Right Hand	**X171**	SMV Lamp Rear Right Hand
X173	Worklamp Rear Right	**X175**	Radio Speaker Right Hand Rear
X177	Wiper Motor Rear	**X181**	Radio Speaker Left Hand Rear
X182	Worklamp Left Hand Rear	**X184**	SMV Lamp Rear Left Hand
X185	Rotating Beacon Left Hand	**X186**	Door Switch Left Hand
X187	Console Lamp Left Hand	**X190**	Interior Lamp A
X191	Interior Lamp B1	**X192**	Interior Lamp B2
X193	Puddle Lamp Left Hand	**X195**	SMV Lamp Left Hand Front
X196	Worklamp Grabrail Left Hand	**X197**	Worklamp Left Hand Front Upper
X201	Wiper Motor Front (Cab)	**X207**	Antenne Plus

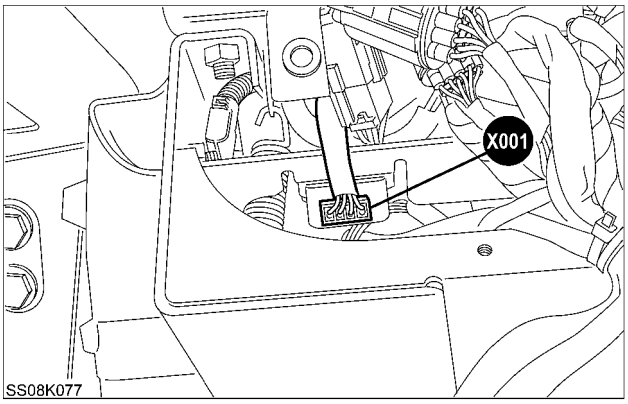
Connector - Component Diagram 00

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

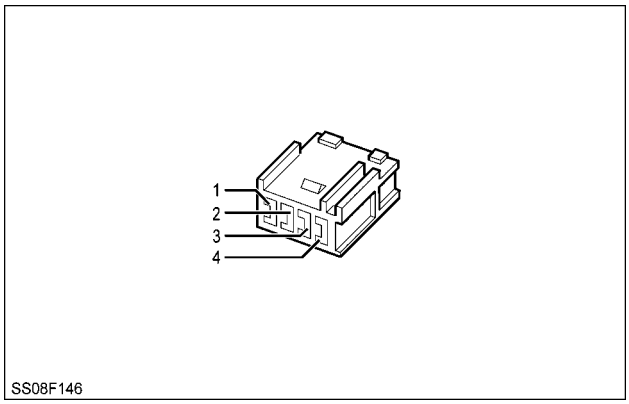
X001 CLUTCH SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1001AH (W)	STARTER SOLENOID FEED
2	7425 (Y)	DRIVE SIGNAL
3	7660 (R)	TRANS CLUTCH DISCONNECT
4	1000B (W)	SAFETY START SWITCH SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K077 1



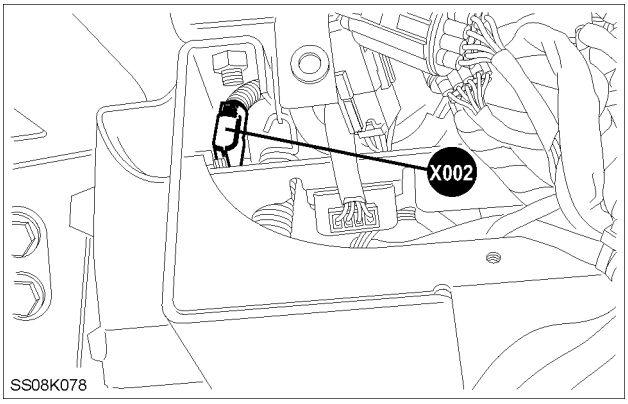
SS08F146 2

STEERING CONSOLE

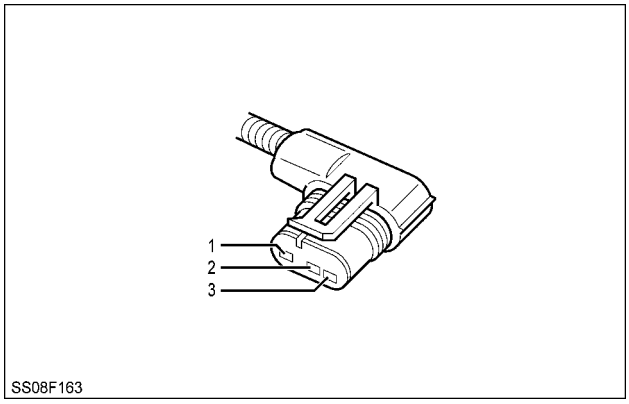
X002 CLUTCH POTENTIOMETER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7525A (G)	TRANS SENSOR SUPPLY 5v
2	7430 (Y)	CLUTCH POSITION SIGNAL
3	60B (B/W)	SENSOR GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K078 3



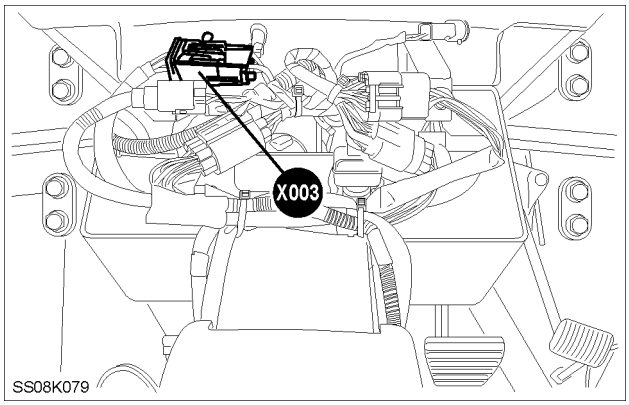
SS08F163 4

STEERING CONSOLE

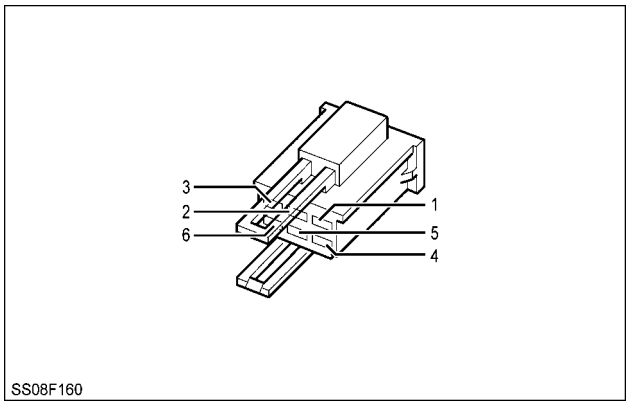
X003 STARTER SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	150AE (N)	BATTERY FEED (UNFUSED)(ALL)
2	137 (W)	RADIO FEED
3	71 (W)	IGNITION SWITCHED FEEDS (UNFUSED)
4	1010 (G)	IGNITION RELAY (COIL)
6	1000 (W)	SAFETY START SWITCH SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K079 5



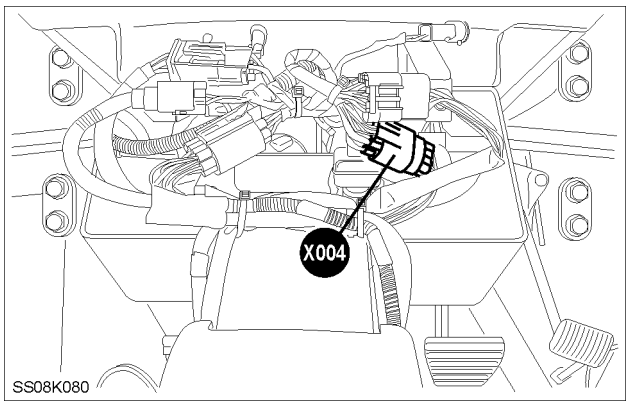
SS08F160 6

STEERING CONSOLE

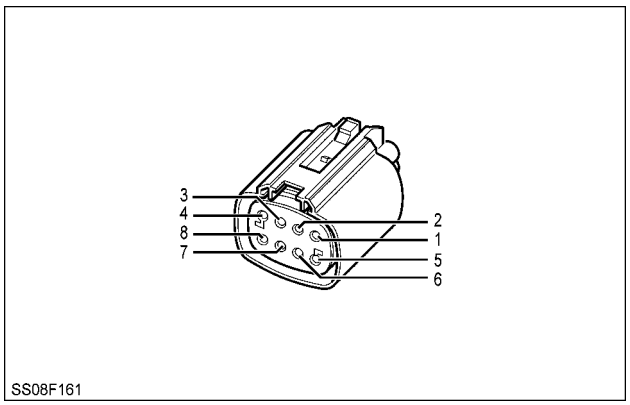
X004 MAIN LIGHT SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	150AA (N)	BATTERY FEED (UNFUSED)(ALL)
2	1024 (R)	RIGHT & LEFT HAND SIDELAMP FEED
3	1027D (U)	HEADLAMP MAIN BEAM
4	1030C (U)	HEADLAMP DIP BEAM
5	3000 (G)	FLASHER UNIT SUPPLY (TERMINAL 49)
6	376 (P)	HORN FEED
7	3001 (G)	LEFT HAND FLASHER CIRCUIT
8	3002 (G)	RIGHT HAND FLASHER CIRCUIT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K080 7



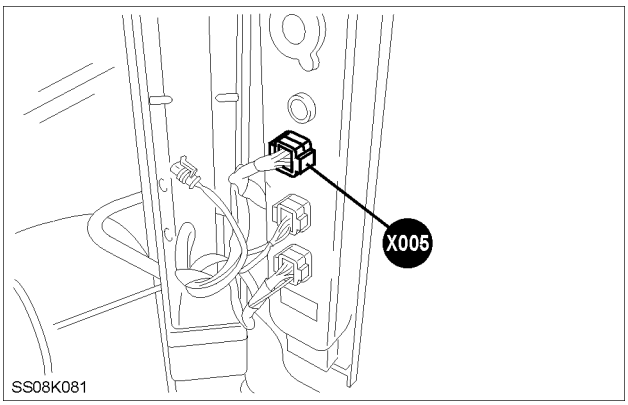
SS08F161 8

BEHIND STEERING CONSOLE

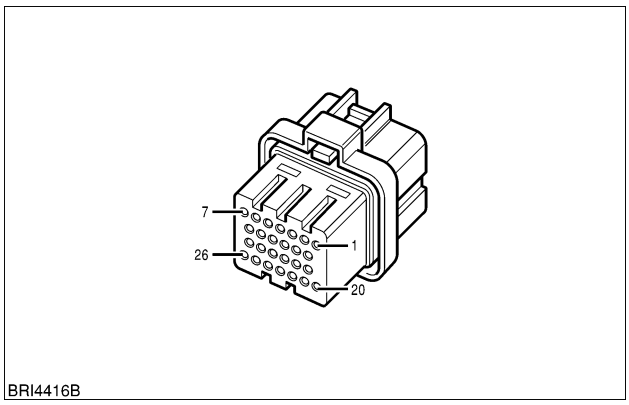
X005 INSTRUMENT CLUSTER UNIT CN1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3017 (G)	EPB SYSTEM FAILURE WARNING LIGHT
4	3016 (S)	BRAKE FLUID LEVEL SIGNAL
5	3005 (G)	LEFT HAND TURN SIGNAL WARNING LAMP
6	3004 (G)	RIGHT HAND TURN SIGNAL WARNING LAMP
8	7640Z (TN)	DIAGNOSTIC PLUG RS232 IN
9	7650Z (W)	DIAGNOSTIC PLUG RS232 OUT
11	1005 (S)	AIR CLEANER WARNING LAMP
12	7130 (N)	HYD FILTER WNG LP
14	1052 (Y)	GET U HOME LIGHTS RELAY
15	1012E (R)	ILLUMINATION
16	1001P (W)	STARTER SOLENOID FEED
19	2014A (G)	ENGINE OIL PRESSURE SENDER (+5 VOLT)
22	2095 (G)	INSTRUMENT SIGNAL GROUND
23	57BE (B)	EARTH (ALL)
24	160R (Y)	BATTERY SUPPLY ELECTRONICS
25	1006 (N)	ALTERNATOR WARNING LAMP
26	9031A (L)	ADIC MEMORY B+

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K081 9



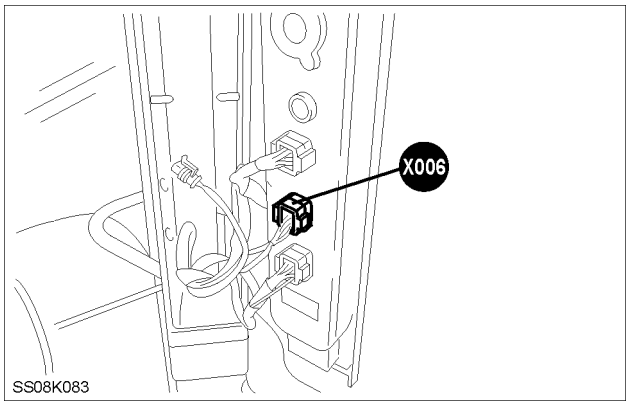
BRI4416B-02 10

BEHIND INSTRUMENT CLUSTER

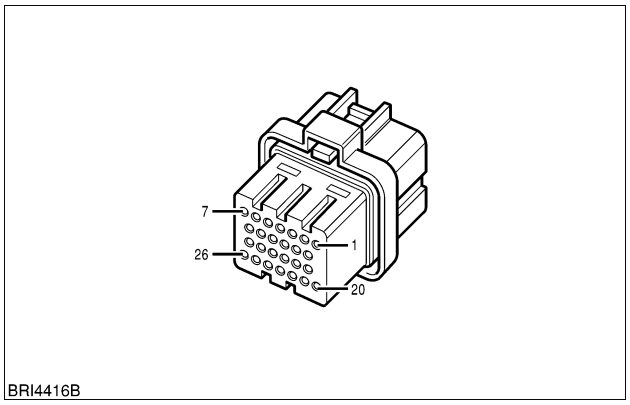
X006 INSTRUMENT CLUSTER UNIT CN2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
11	3062 (P)	IMPLEMENT SOCKET SWITCH
14	2330 (P)	PTO SPEED ISO11876 SKT.PIN#3
15	2320 (P)	TRUE GROUND SPEED ISO 11786 SKT.PIN#1
16	2300 (P)	THEORETICAL GROUND SPEED ISO 11786 SKT.PIN#2
17	2310 (P)	IN/OUT OF WORK-HPL MODE ISO11786 SKT.PIN#4

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K083 11



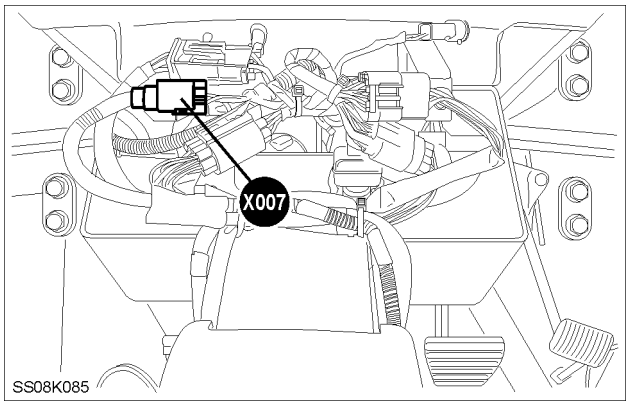
BRI4416B-03 12

BEHIND INSTRUMENT CLUSTER

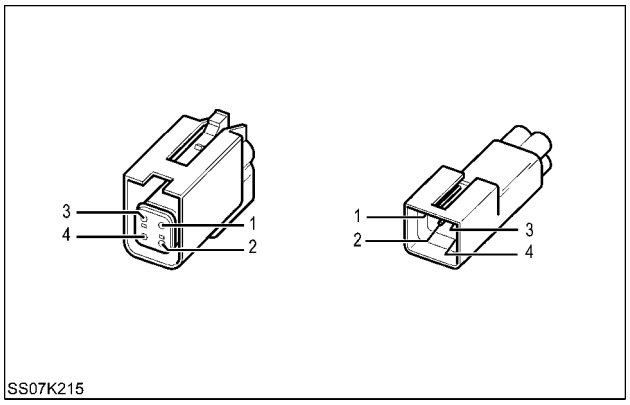
X007 HAZARD SWITCH HARNESS

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1021 (P)	HAZARD SWITCH SUPPLY (BATTERY)
2	1020A (G) / 1020A (G/W)	HAZARD SWITCH SUPPLY
3	57BF (B)	EARTH (ALL)
4	1020 (G) / 1020 (G/S)	HAZARD SWITCH SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K085 13



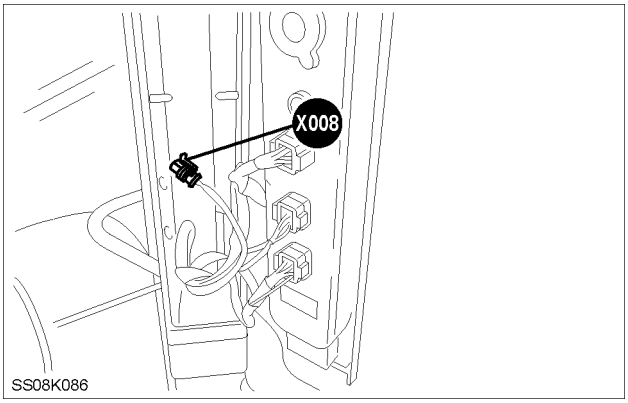
SS07K215 14

STEERING CONSOLE

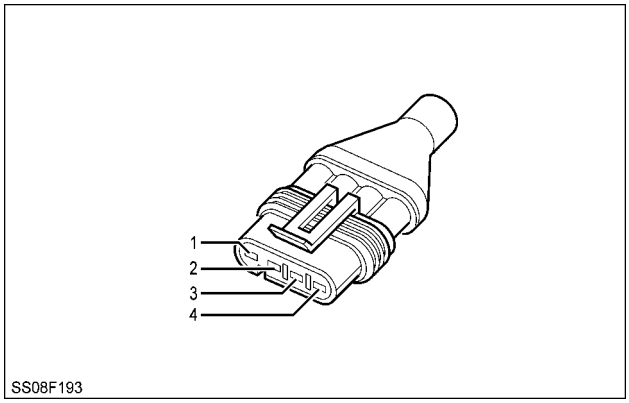
X008 KEY PAD

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1050F (G)	ACCESSORY FEED
2	5420H (G)	CAN L
3	5400H (Y)	CAN H
4	61H (B/O)	CASE GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K086 15



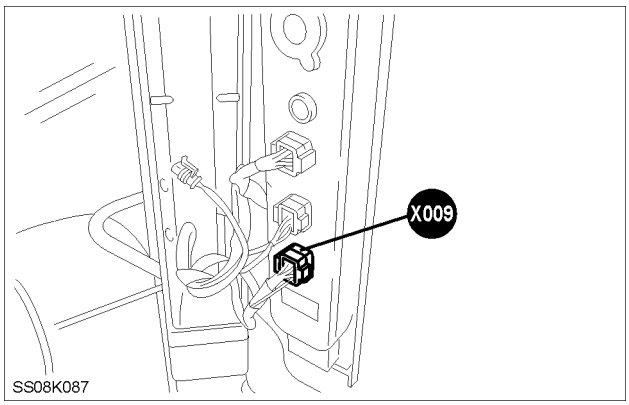
SS08F193 16

BEHIND INSTRUMENT CLUSTER

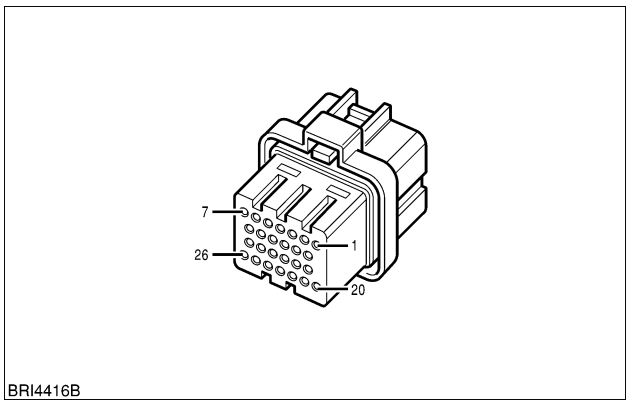
X009 INSTRUMENT CLUSTER UNIT CN3

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	7160 (R)	HYD LOW CHARGE WARNING
6	8020 (TN)	TRAILER BRAKE PRESSURE
7	3014A (R)	HANDBRAKE WARNING LAMP SIGNAL
9	2087 (O)	EXHAUST BRAKE SOLENOID
11	3052 (P)	DOME LAMP TO DOOR SWITCH
12	3500 (W)	POWER STEERING PRESSURE SIGNAL
13	1034 (LG)	TURN SIGNAL WARNING LAMP (TERM C3)
14	29 (G)	MAIN FUEL SENDER SIGNAL
15	8010 (TN)	TRAILER BRAKE PRESSURE
16	1033 (LG)	TURN SIGNAL WARNING LAMP (TERM C2)
17	7996 (R)	BRAKE PEDALS UNLATCHED SIGNAL
18	1026 (U)	HIGH BEAM INDICATOR LAMP
19	2200Z (G)	SERVICE MODE INITIATE
21	7155 (U)	VANE PUMP PRESSURE SENSOR SIGNAL
22	3120 (K)	STEERING SENSOR SIGNAL
25	5420G (G)	CAN L
26	5400G (Y)	CAN H

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K087 17



BRI4416B-02 18

BEHIND INSTRUMENT CLUSTER

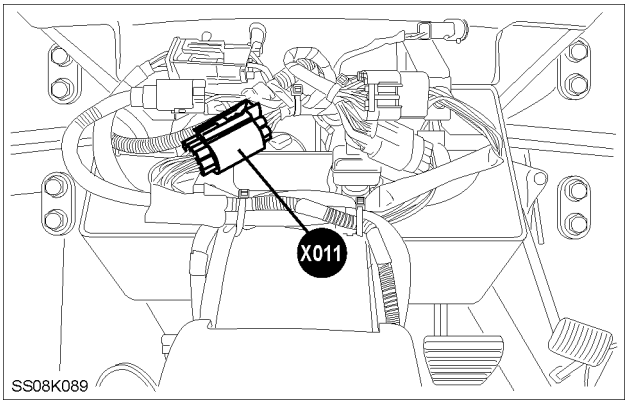
Connector - Component diagram 01

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

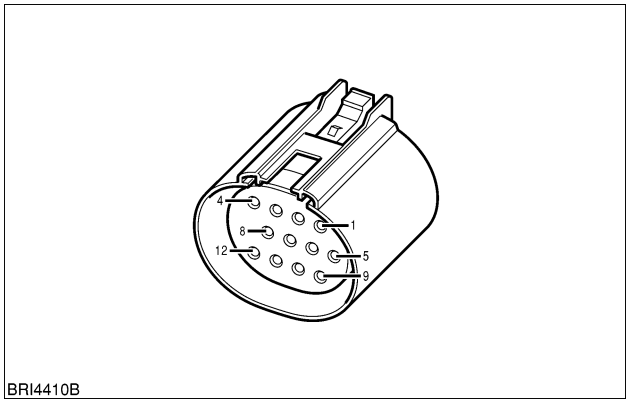
X011 FRONT AND REAR WIPER SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1038A (TN)	WINDSHIELD WIPER FEED-REAR
2	57E (B)	EARTH (ALL)
3	587 (LG)	WINDSHIELD WIPER INTERMITTENT DELAY
5	58 (R)	WIPER MOTOR-LOW
6	56 (W)	WIPER MOTOR-HIGH
7	1121 (G)	RR WINDSHIELD WASH
8	1119 (G)	RR WINDSHIELD WIPER
9	97 (LG)	WINDSHIELD WASHER FEED
10	63 (U)	WIPER MOTOR-PARK FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K089 1



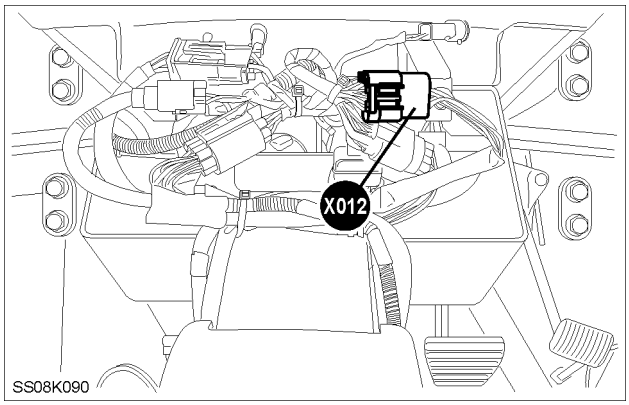
BRI4410B 2

STEERING CONSOLE

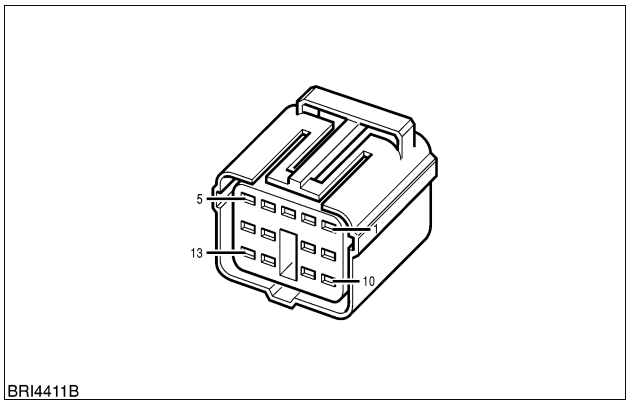
X012 SHUTTLE LEVER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7525C (G)	TRANS SENSOR SUPPLY 5v
2	7250 (S)	TRANSMISSION FORWARD SIGNAL
3	7260 (S)	TRANSMISSION REVERSE SIGNAL
4	7295 (W)	DRIVE DISABLE SIGNAL
5	7000B (U)	TRANS CONTROL SUPPLY
6	7420A (Y)	TCM TO CLUTCH POSITION SWITCH
7	7425 (Y)	DRIVE SIGNAL
8	57SS (B)	EARTH (ALL)
9	3036 (O)	EPB SHUTTLE PARK SWITCH INPUT
10	3039 (U)	EPB SHUTTLE PARK SWITCH OUTPUT
11	7730 (TN)	NOT IN PARKLOCK
12	1001X (W)	STARTER SOLENOID FEED
13	1001AH (W)	STARTER SOLENOID FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K090 3



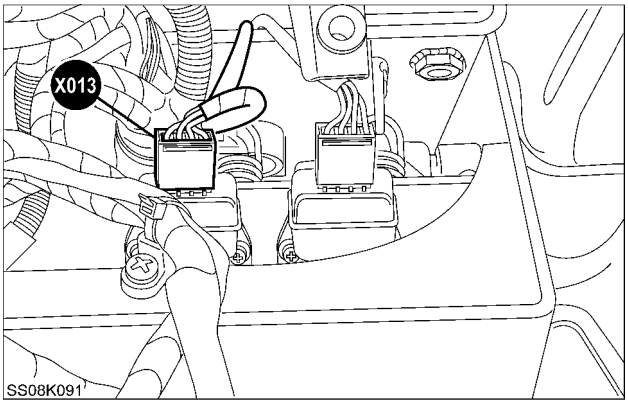
BRI4411B 4

STEERING CONSOLE

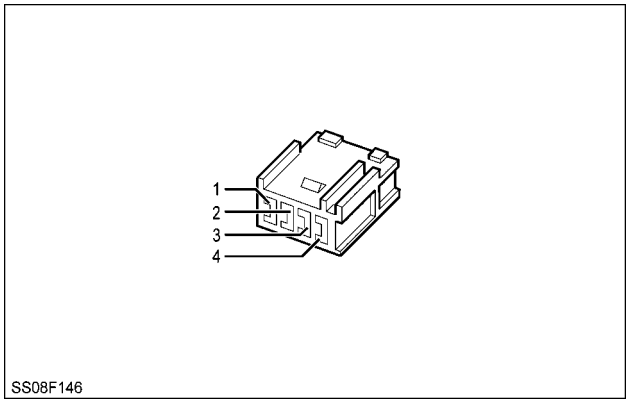
X013 STOP LAMP SWITCH LEFT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	10B (G)	IGNITION SUPPLY
2	10A (G)	IGNITION SUPPLY
3	840A (G)	R & L STOPLAMP SIGNAL
4	820 (R)	STOPLAMP SWITCH LH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K091 5



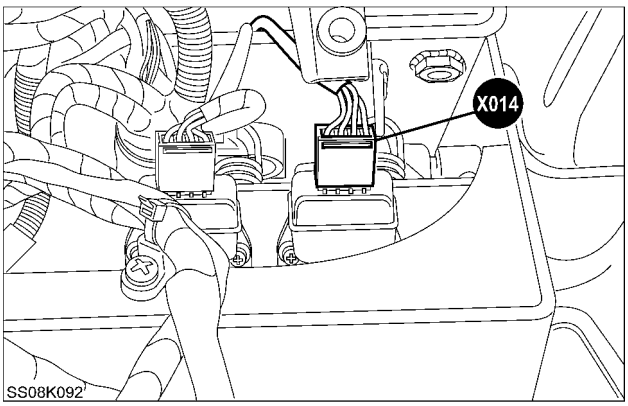
SS08F146 6

BEHIND STEERING CONSOLE

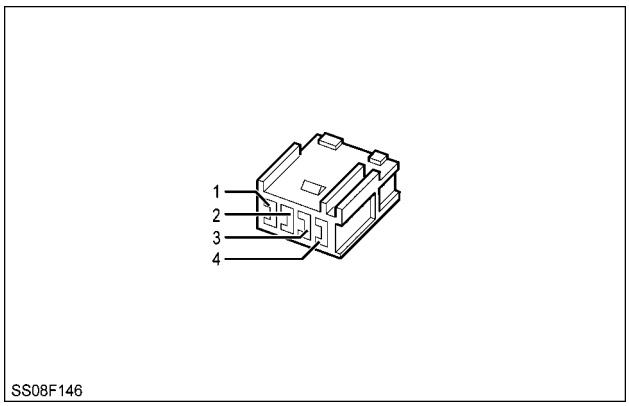
X014 STOP LAMP SWITCH RIGHT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	10C (G)	IGNITION SUPPLY
2	10DG)	IGNITION SUPPLY
3	840 (G)	R & L STOPLAMP SIGNAL
4	830 (R)	STOPLAMP SWITCH RH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K092 7



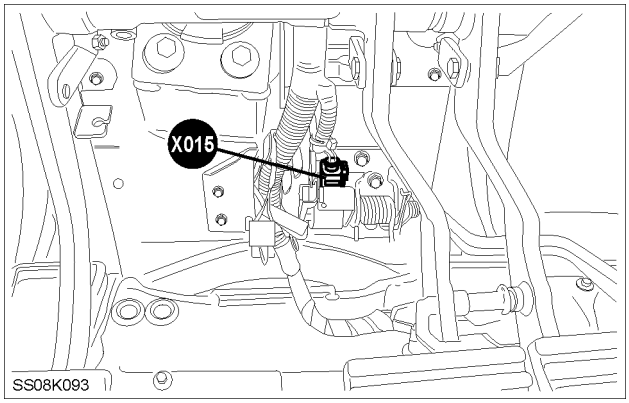
SS08F146 8

BEHIND STEERING CONSOLE

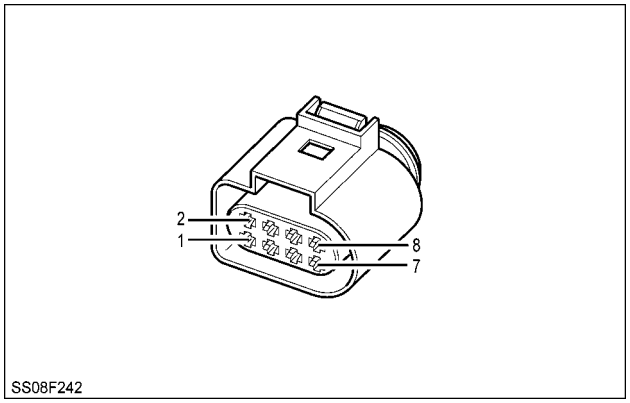
X015 FOOT THROTTLE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	6402 (G)	ECU TO THROTTLE POT. VAR
3	7000L (U)	TRANS CONTROL SUPPLY
4	6355B (R)	+5V LOW POWER REFERENCE
6	6404 (G)	THROTTLE POT. TO LOW IDLE SWITCH
7	60BL (B/W)	SENSOR GROUND
8	60BM (B/W)	SENSOR GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K093 9



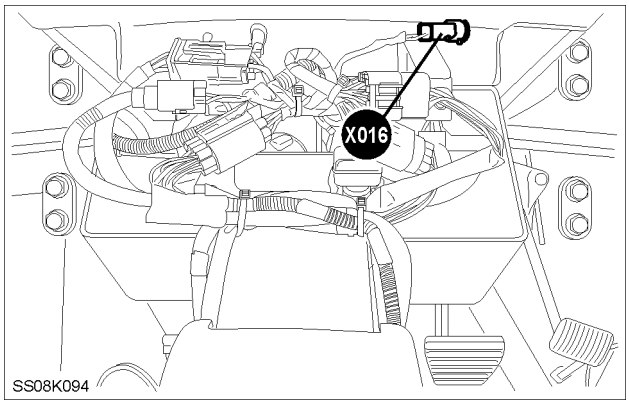
SS08F242 10

BASE STEERING CONSOLE

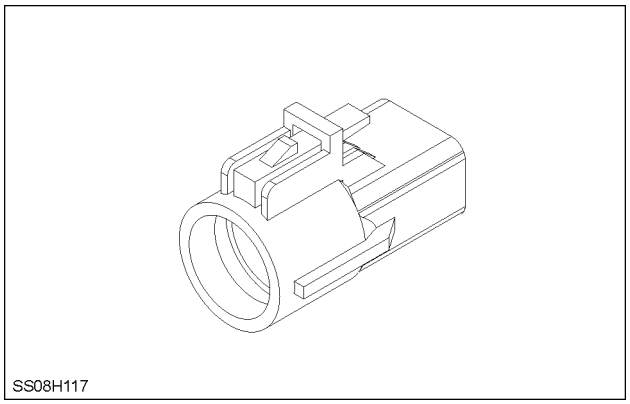
X016 BRAKE PEDALS LATCHED SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	10L (G)	IGNITION SUPPLY
2	7996 (R)	BRAKE PEDALS UNLATCHED SIGNAL

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K094 11



SS08H117 12

STEERING CONSOLE

Connector - Component diagram 02

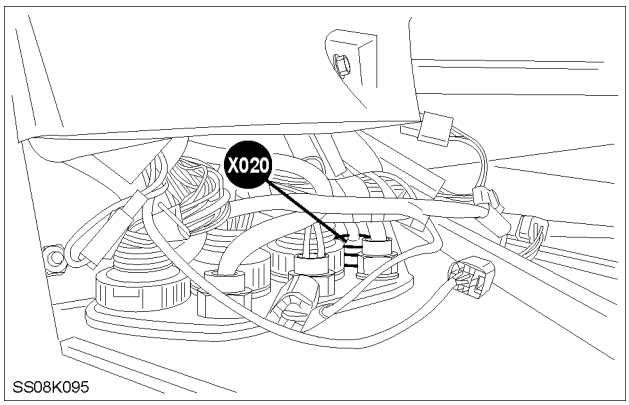
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

X020 EXTENSION HARNESS CONNECTOR 2 (CAB)

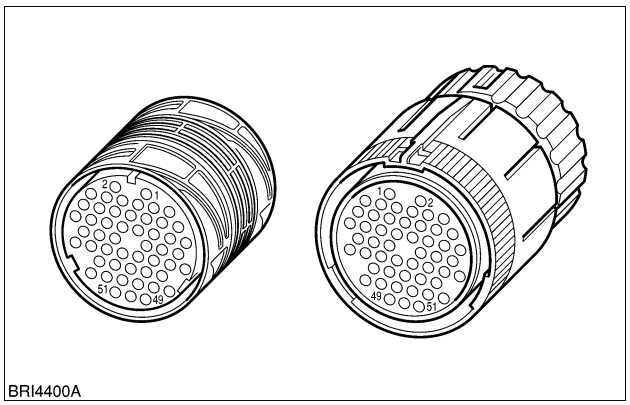
POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	29 (G)	MAIN FUEL SENDER SIGNAL
2	1013D (R) / 1013D (N)	RIGHT HAND LAMPS
3	1014E (R) / 1014E (B)	LEFT HAND LAMPS
4	810A (G) / 810A (R)	STOPLAMPS
5	349 (TN) / 349 (G)	TRAILER TURN LAMPS RH
6	350 (TN) / 350 (Y)	TRAILER TURN LAMPS LH
7	7925 (P)	TCM CLUTCH C RETURN
8	3286 (TN)	SUSPENSION LOCKOUT SOLENOID LOWER RETURN (-)
9	7160 (R)	HYD LOW CHARGE WARNING
10	3281 (TN)	SUSPENSION LOCKOUT SOLENOID UPPER RETURN (-)
11	2055A (W) / -	PTO SYNCHRO GROUND SPEED ENGAGED
12	2095B (G)	INSTRUMENT SIGNAL GROUND
13	3270 (O)	LOWER SOLENOID RET
14	3250 (O)	RAISE SOLENOID RET
15	7407 (K) / 7980 (K)	TRANS MED RANGE
16	3240 (O)	RAISE SOLENOID PWR
17	9051 (P) / 9033 (TN)	50KPH SOLENOID+
18	3260 (O)	LOWER SOLENOID PWR
19	7408 (W) / 7982 (W)	TRANS MED RANGE RET
20	8010A (TN)	TRAILER BRAKE PRESSURE
21	8000A (N)	TRAILER BRAKE SOLENOID
22	8000X (N)	TRAILER BRAKE SOLENOID
23	3280 (O)	SUSPENSION LOCKOUT SOLENOID UPPER
24	8010 (TN)	TRAILER BRAKE PRESSURE
25	60A (B/W)	SENSOR GROUND
26	8020 (TN)	TRAILER BRAKE PRESSURE
27	8060D (U)	TRAILER BRAKE SUPPLY
28	3500 (W) / 3500 (Y)	POWER STEERING PRESSURE SIGNAL
29	3285 (TN)	SUSPENSION LOCKOUT SOLENOID LOWER
30	5515 (S)	EHR +12V IGN.
31	5500V (R) / 5500L (R)	EHR CAN HIGH
32	5510V (U) / 5510L (U)	EHR CAN LOW
33	4055 (W)	LINK LEVEL TOP LINK EXTEND SOLENOID
34	4056 (W)	LINK LEVEL TOP LINK RETRACT SOLENOID
35	4057 (W)	LINK LEVEL RIGHT LINK RAISE SOLENOID
36	4058 (W)	LINK LEVEL RIGHT LINK LOWER SOLENOID
37	9050 (P) / 9034 (TN)	50KPH SOLENOID-
38	4054 (W)	LINK LEVEL DUMP SOLENOID
39	5830 (R) / 5830 (U)	HIGH FLOW PUMP LINK
40	8050 (R)	TRANS REV PRESSURE
41	7770 (U)	TRANS FORWARD PRESSURE SWITCH
42	7022 (S) / -	REVERSE ALARM GROUND SIGNAL
44	8000B (N) / -	TRAILER BRAKE SOLENOID
45	7582 (U) / -	CREEPER RAIL SWITCH NOT
46	7411 (Y) / -	TRANS HYDROSTAT INPUT SPEED SENSOR (CVT)
47	7970 (P) / -	TRANS MED/REV
48	7130 (N) / 7130A (N)	HYD FILTER WNG LP
49	8070 (L)	TRAILER PARK BRAKE SOLENOID
50	2250N (K) / 2012 (Y)	TRANS OIL PRESSURE WARNING LAMP

POS.	WIRE NUMBER	CIRCUIT REFERENCE
51	2012 (Y) / 2012A (Y)	TRANS OIL PRESSURE WARNING LAMP

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K095 1



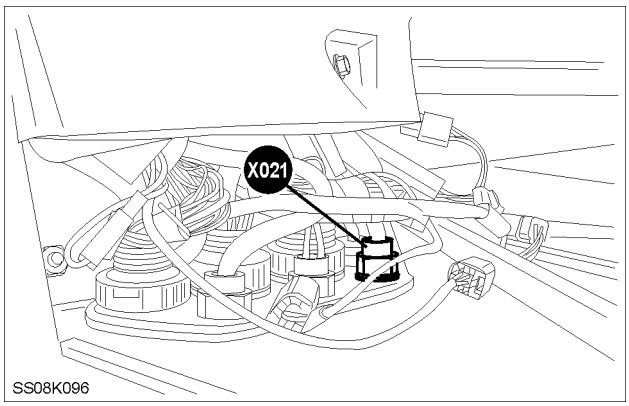
BRI4400B-03 2

FRONT RIGHT HAND CAB FLOOR

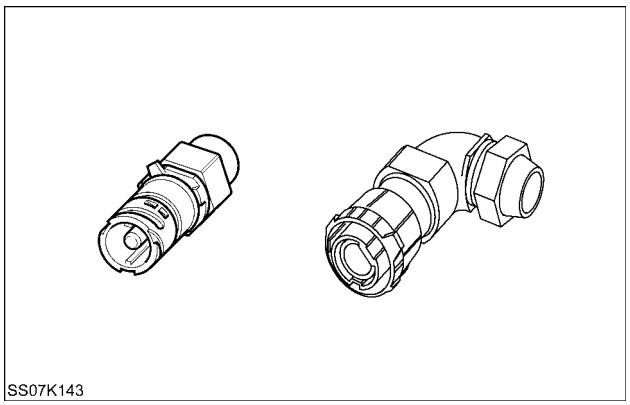
X021 MAIN POWER (FUSE) 1 POWER B+

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1 (R)	BATTERY SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K096 3



SS07K143 4

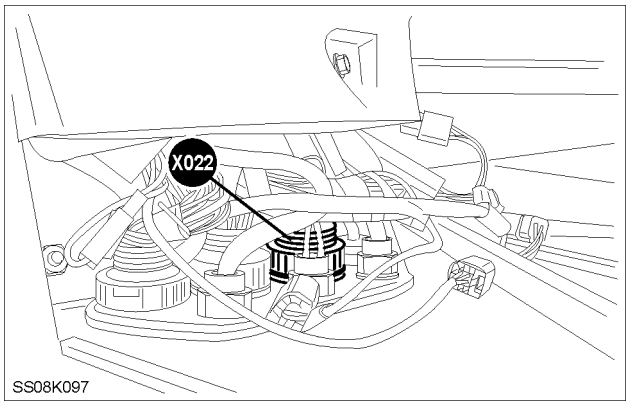
FRONT RIGHT HAND CAB FLOOR

X022 EXTENSION HARNESS CONNECTOR 1 (ELECTRONIC)

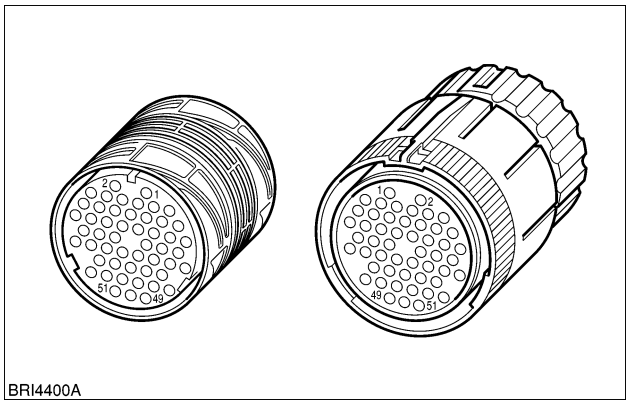
POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3024 (Y)	2WD SOLENOID
2	7584 (U) / -	PARKLOCK SENSOR SWITCH SIGNAL
3	7080 (LG)	DIFF-LOCK SOLENOID FEED
4	2130 (N)	PTO BRAKE SOLENOID
5	2051 (O)	PTO SOLENOID RETURN (-)
6	2042 (O)	PTO SOLENOID-REAR
7	2140 (O)	PTO SPEED SENSOR
8	2062 (W)	PTO TWIST SENSOR
9	7910 (TQ)	CLUTCH 'B' SIGNAL
10	7935 (P)	TCM CLUTCH D RETURN
11	7401 (P)	TRANS RPM SPEED SENSOR
12	7400 (Y)	TRANS RPM SPEED SENSOR TO TCM INPUT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
13	7155 (U) / -	VANE PUMP PRESSURE SENSOR SIGNAL
14	7930 (TQ)	CLUTCH 'D' SIGNAL
15	7940 (TQ)	CLUTCH 'E' SIGNAL
16	7960 (W) / -	TRANS SLOW/FAST
17	7431 (TQ)	SUPPLY
18	7915 (P)	TCM CLUTCH B RETURN
19	7000P (U)	TRANS CONTROL SUPPLY
20	7945 (P)	TCM CLUTCH E RETURN
21	9036 (TN) / 7580 (U)	CREEPER SOLENOID MONITOR
22	7225 (W)	TRANS HI RANGE SOL - RET
23	8045 (P)	TRANS REV SOL RET
24	7985 (G)	TRANS REVERSE RANGE
25	3295 (O)	FRONT SUSPENSION PRESSURE SWITCH SIGNAL
26	7235 (Y)	TRANS LOW RANGE SOL - RET
27	7785 (O) / 7581 (O)	CREEPER POSITION SIGNAL
28	7760 (W)	TORQUE SENSOR
29	9035 (TN) / 7005 (U)	TRANS CREEPER GR SOL
30	7586 (U) / -	BRAKE LUBRICATION SOLENOID
31	7500 (G)	TRANS OIL TEMP. SENSOR
32	5097 (K)	EDC VALVE DOWN RETURN
33	5090 (K)	EDC VALVE DOWN
34	5087 (K)	EDC VALVE UP RETURN
35	5085 (K)	EDC VALVE UP
36	5070 (TN)	EDC LEFT PIN
37	5075 (K)	EDC VOLTAGE TO PINS
38	5065 (TN)	EDC RIGHT PIN
39	9033 (TN) / 9035 TN)	50KPH DUMP SOLENOID
40	9034 (TN) / 9036 (TN)	50KPH DUMP SOLENOID RETURN
41	2014B (G) / -	ENGINE OIL PRESSURE SENDER (+5 VOLT)
42	7220 (S)	TRANSMISSION HIGH RANGE
43	7230 (S)	TRANSMISSION LOW RANGE
44	7900 (TQ)	CLUTCH 'A' SIGNAL
45	7775 (K) / -	B CLUTCH PRESSURE SIGNAL
46	5080 (K)	EDC ROCKSHAFT
47	5020A (TN)	EDC PROC +5V REF VOLTAGE DROP POSN/RATE
48	7920 (TQ)	CLUTCH 'C' SIGNAL
49	2050L (G) / 2050AV (G)	PTO SUPPLY / DOG SUPPLY
50	9000 (N) / -	DIVERTER VALVE
51	7589 (U) / -	BRAKE PRESSURE SIGNAL

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K097 5



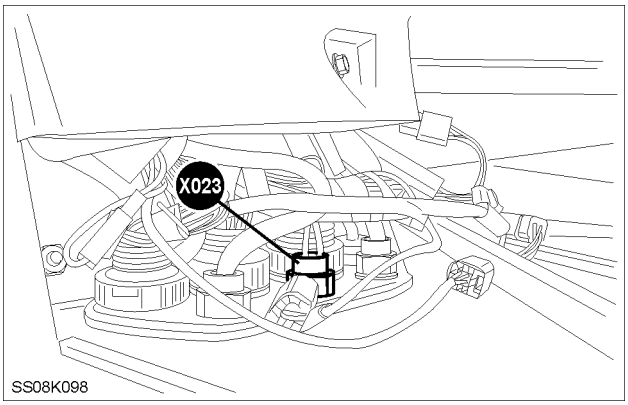
BRI4400B-03 6

FRONT RIGHT HAND CAB FLOOR

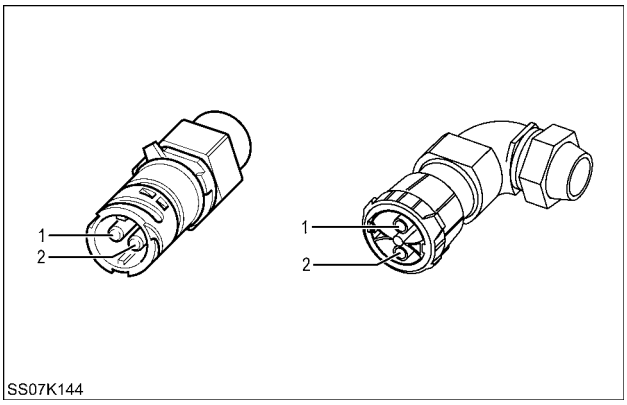
X023 MAIN POWER (FUSE) 2 POWER E

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	160 (U)	BATTERY SUPPLY ELECTRONICS
2	1C (R)	BATTERY SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K098 7



SS07K144 8

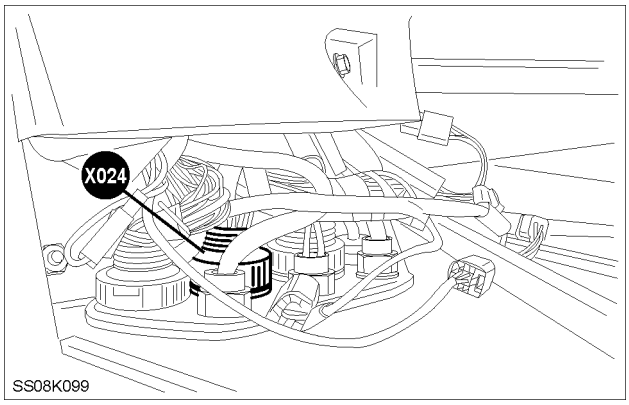
FRONT RIGHT HAND CAB FLOOR

X024 CAB TO ENGINE MAIN CONNECTOR E2

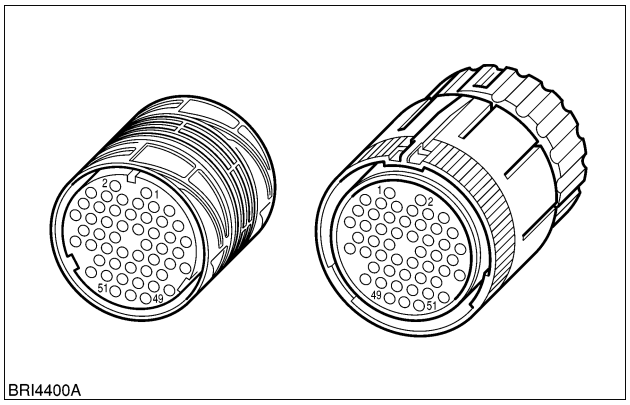
POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3272 (O)	LOADER VALVE #1 OUT
2	3273 (O)	LOADER VALVE #1 RETURN
3	3235 (O) / 3235 (TN)	ACCELEROMETER SIGNAL
4	2590 (TN)	EXTERNAL SWITCH FHPL UP
5	2591 (TN)	EXTERNAL SWITCH FHPL DOWN
6	5920F (R) / 5920B (R)	ISO BUS CAN SUPPLY POSITIVE
7	5910F (G) / 5910B (Y)	ISO BUS CAN SIGNAL HIGH
8	5915F (B) / 5915B (B)	ISO BUS CAN SUPPLY GROUND
9	5900F (Y) / 5900B (G)	ISO BUS CAN SIGNAL LOW
10	5970A (O)	ISO BUS ECU SIGNAL
11	5980 (U)	ISO BUS IMPLEMENT SIGNAL
12	2027 (R)	RADAR ASSEMBLY (GUN) POWER
13	3120 (K)	STEERING SENSOR SIGNAL
14	2044 (O)	PTO SOLENOID-FRONT RETURN(-)
19	2570 (R)	FRONT HITCH RAISE SOLENOID
20	60AA (B/W) / 60AC (B/W)	SENSOR GROUND
21	2510 (N)	FRONT HITCH POSITION SIGNAL
22	2530 (N) / 2530B (N)	FRONT HITCH V REF
23	2031 (Y)	RADAR PRESENT
24	2028B (G)	RADAR ASSEMBLY (GUN) SIGNAL
25	3230 (U)	AXLE HEIGHT SENSOR POSITION
26	3220 (LG) / 3220A (LG)	AXLE HEIGHT SENSOR 5V REF
31	2043 (O)	PTO SOLENOID-FRONT
32	- / 2260 (O)	PTO FRONT - SPEED SIGNAL
34	1010C (G) / 1010 (G)	IGNITION RELAY (COIL)
35	3274 (R)	LOADER VALVE #2 OUT
36	3275 (R)	LOADER VALVE #2 RETURN
38	1018 (LG)	AIR CONDITIONER CLUTCH
39	2006B (U)	DE-ICING SWITCH - AIR CONDITIONER
40	2006A (U)	DE-ICING SWITCH - AIR CONDITIONER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
42	5200AA (N)	EDC VALVE SUPPLY
44	2007 (Y)	AIR CONDITIONER LOW PRESSURE
46	2250L (K) / 2250 (K)	PTO FRONT - SUPPLY
47	3070D (P) / -	'B' PILLAR SKT SUPPLY
48	9032B (Y) / -	IGN+ TO POWER SKT
49	172B (W) / 172A (W)	BATTERY ISOLATOR RELAY COIL (OFF)
50	171B (W)	BATTERY ISOLATOR RELAY COIL

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K099 9



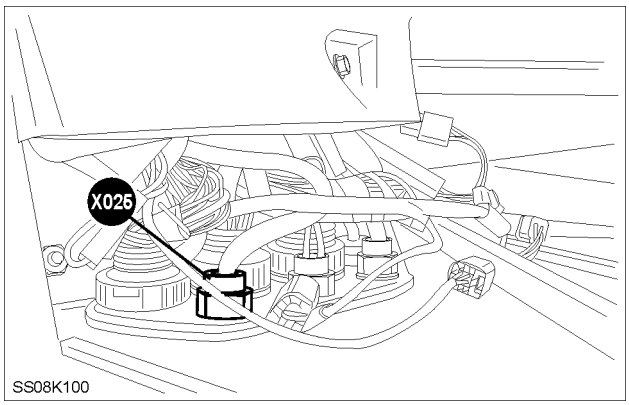
BRI4400B-03 10

FRONT RIGHT HAND CAB FLOOR

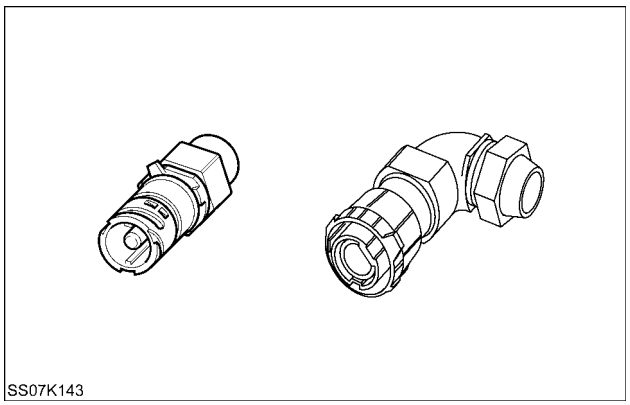
X025 MAIN POWER (FUSE) 3 POWER B-

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57 (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K100 11



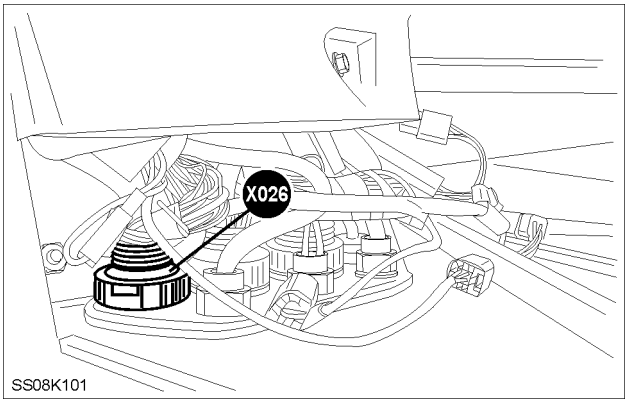
SS07K143 12

FRONT RIGHT HAND CAB FLOOR

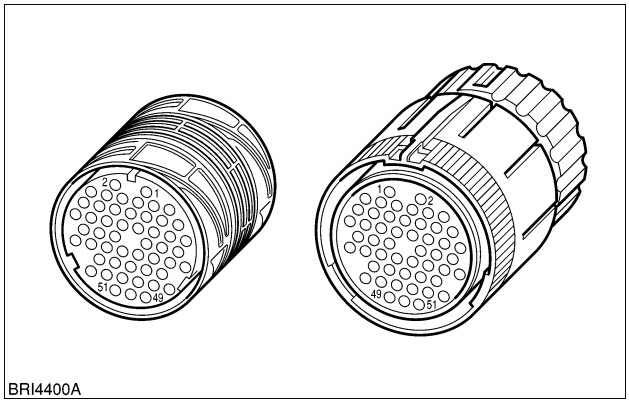
X026 MAIN HARNESS CONNECTOR - E1 - ENIGNE TO CAB

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5400BJ (Y) / 5400D (Y)	CAN H
2	5420BJ (G) / 5420D (G)	CAN L
10	2556 (N)	FRONT HITCH SWITCH COMMON RAIL
12	6315 (N)	REVERSIBLE FAN OPTION - RELAY CONTROL
13	6407 (O)	ENGINE SHUTDOWN SIGNAL (EDC16)
14	6408D (O) / 6408D (G)	FUSED B+ TO ECU (1)
15	6408N (G) / 6408A (G)	FUSED B+ TO ECU (1)
16	6408B (G)	FUSED B+ TO ECU (1)
17	6408C (G)	FUSED B+ TO ECU (1)
20	6418 (K)	ECU TO J1941(ISO) INTERFACE #2 CONNECTOR ISO K
24	3016 (S)	BRAKE FLUID LEVEL SIGNAL
25	10J (G) / 10H (G)	IGNITION SUPPLY
26	1030BB (U) / 1030B (U)	HEADLAMP DIP BEAM
27	1030A (U)	HEADLAMP DIP BEAM
28	6325 (N)	REVERSIBLE FAN OPTION - RELAY FEED
29	1073A (P)	WORKLAMP FRONT FEED
30	376 (P)	HORN FEED
36	1027BB (U) / 1027B (U)	HEADLAMP MAIN BEAM
37	1027E (U) / 1027A (U)	HEADLAMP MAIN BEAM
38	2095A (G) / 2095 (G)	INSTRUMENT SIGNAL GROUND
40	2014 (G)	ENGINE OIL PRESSURE SENDER (+5 VOLT)
41	1006A (N) / 1006 (N)	ALTERNATOR WARNING LAMP
43	71D (W) / 71C (W)	IGNITION SWITCHED FEEDS (UNFUSED)
44	1005 (S)	AIR CLEANER WARNING LAMP
45	1001S (W)	STARTER SOLENOID FEED
46	1001T (W)	STARTER SOLENOID FEED
47	2050AF (G) / -	PTO SUPPLY / DOG SUPPLY
48	6300 (N) / -	FAN SPEED
49	5020H (TN) / -	EDC PROC +5V REF VOLTAGE DROP POSN/RATE
51	6408F (G) / 6408N (G)	FUSED B+ TO ECU (1)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K101 13



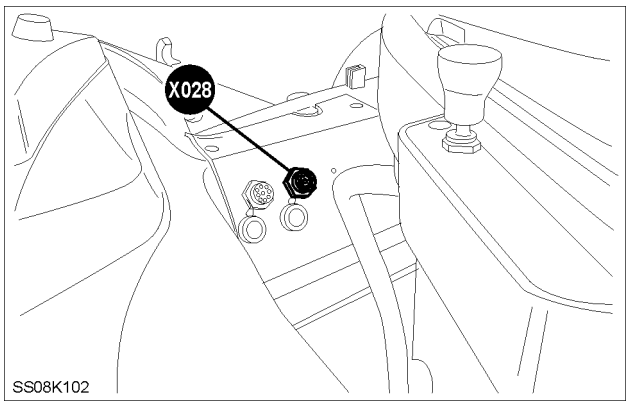
BRI4400B-03 14

FRONT RIGHT HAND CAB FLOOR

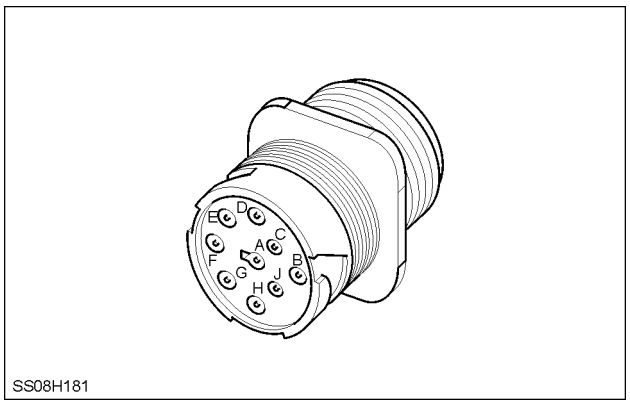
X028 DIAGNOSTIC CONNECTOR 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	57RG (B)	EARTH (ALL)
B	6408N (G)	FUSED B+ TO ECU (1)
C	5500E (R)	EHR CAN HIGH
D	5510E (U)	EHR CAN LOW
F	5960C (W)	RS232 OUTPUT TECU
G	5955D (G)	RS232 INPUT TECU

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K102 15



SS08H181 16

CAB RIGHT HAND BEHIND OPERATOR'S SEAT

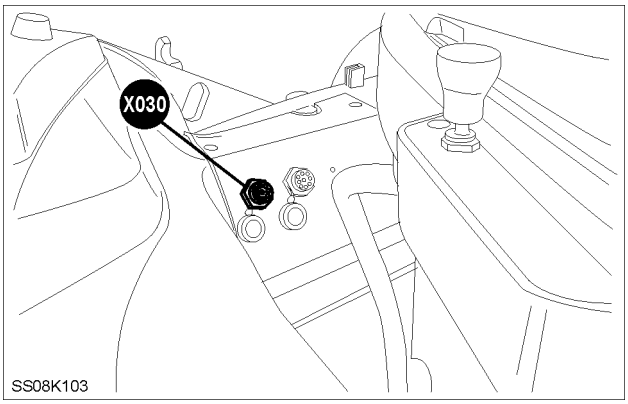
Connector - Component diagram 03

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

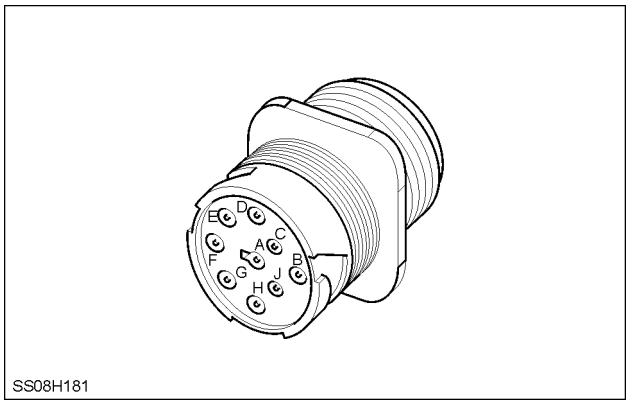
X030 DIAGNOSTIC CONNECTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	57AL (B)	EARTH (ALL)
B	6408E (G)	FUSED B+ TO ECU (1)
C	5400E (Y)	CAN H
D	5420E (G)	CAN L
E	6418 (K)	ECU TO J1941(ISO) INTERFACE #2 CONNECTOR ISO K
G	2200Z (G)	SERVICE MODE INITIATE
H	5910B (Y)	ISO BUS CAN SIGNAL HIGH
J	5900B (G)	ISO BUS CAN SIGNAL LOW

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K103 1



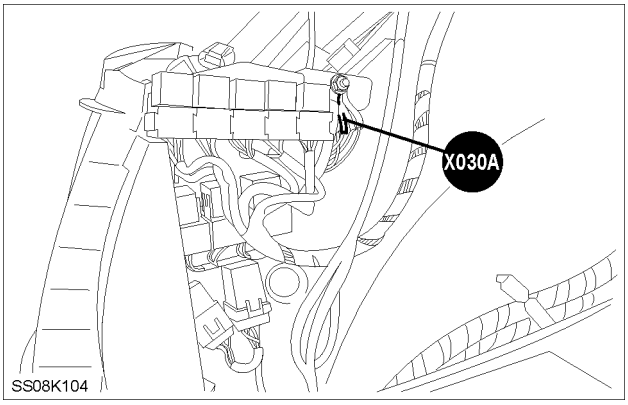
SS08H181 2

CAB RIGHT HAND BEHIND OPERATOR'S SEAT

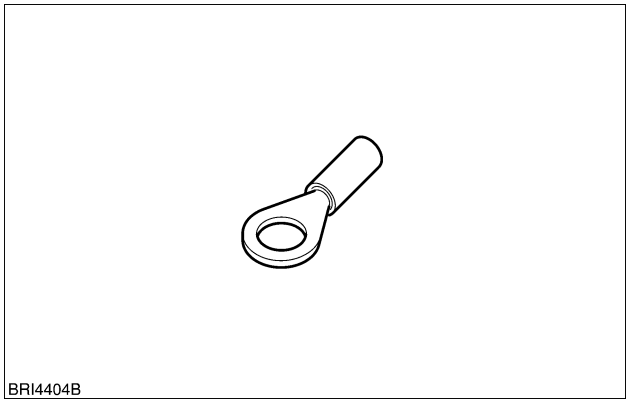
X030A EARTH HEADER 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
X	57BU (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K104 3



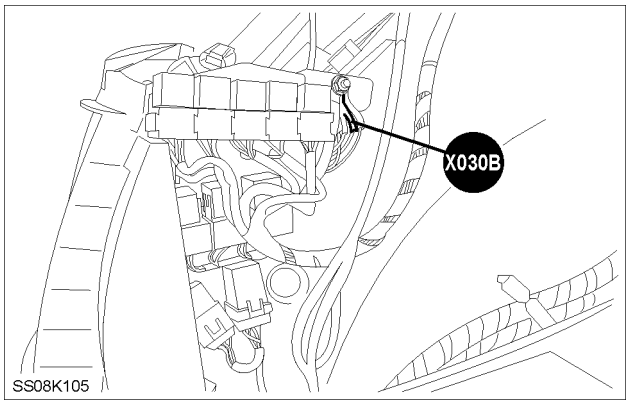
BRI4404B 4

BEHIND RIGHT HAND TRIM

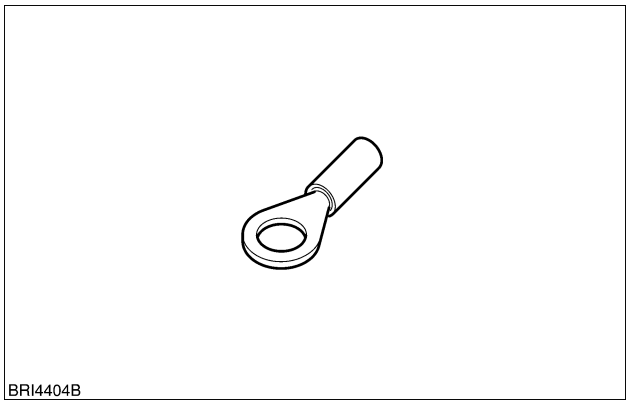
X030B EARTH HEADER 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
X	57XX (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K105 5



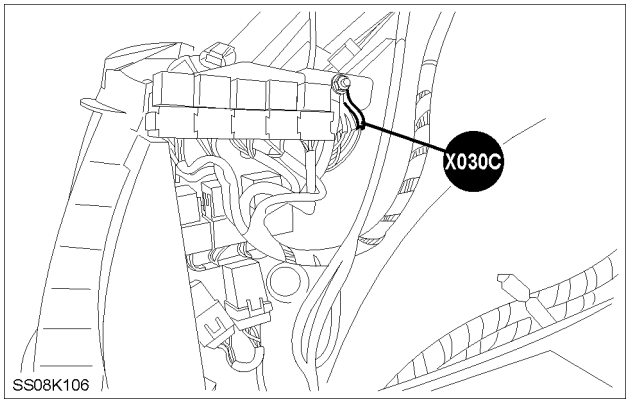
BRI4404B 6

BEHIND RIGHT HAND TRIM

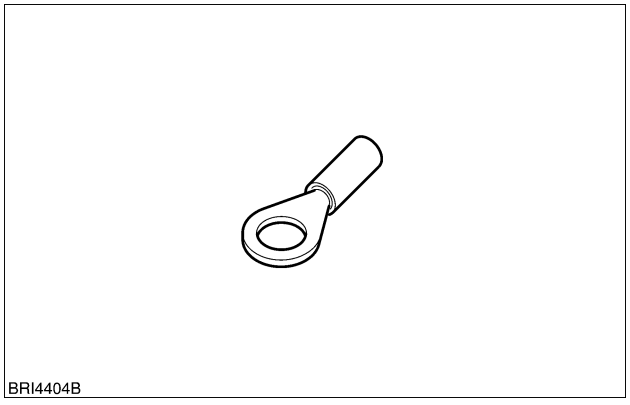
X030C EARTH HEADER 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
X	57BB (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K106 7



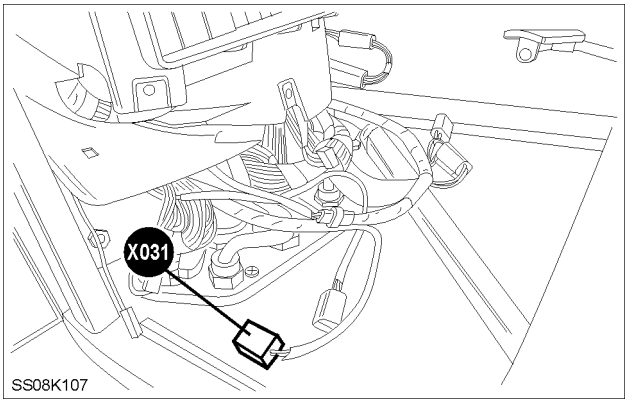
BRI4404B 8

BEHIND RIGHT HAND TRIM

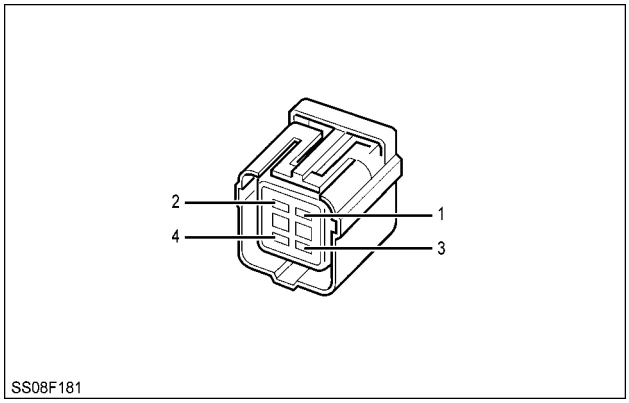
X031 ADIC DIAGNOSTIC CONNECTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7650Z (W)	DIAGNOSTIC PLUG RS232 OUT
2	7640Z (TN)	DIAGNOSTIC PLUG RS232 IN
3	57BT (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K107 9



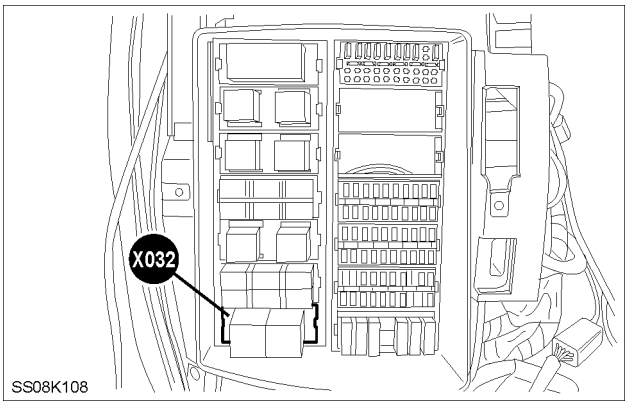
SS08F181 10

FRONT RIGHT HAND CAB FLOOR

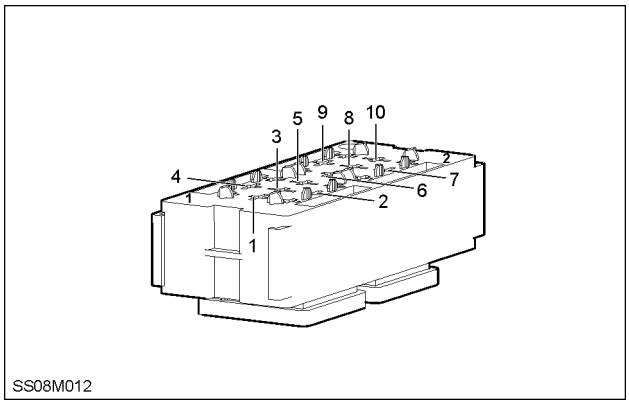
X032 TIMER RELAY FOR BATTERY ISOLATOR AND HEATED MIRROR (K021 / K022)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	666C (P)	DOMELAMP SWITCH FEED
2	1928 (R)	HEATED MIRROR RELAY COIL +12V FROM SW
3	1925 (R)	MIRROR CONTROL +12V
4	57HM (B)	EARTH (ALL)
5	1927 (R)	MIRROR ILLUMINATION
6	1L (R)	BATTERY SUPPLY
7	172 (W)	BATTERY ISOLATOR RELAY COIL (OFF)
9	57SL (B)	EARTH (ALL)
10	172A (W)	BATTERY ISOLATOR RELAY COIL (OFF)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K108 11



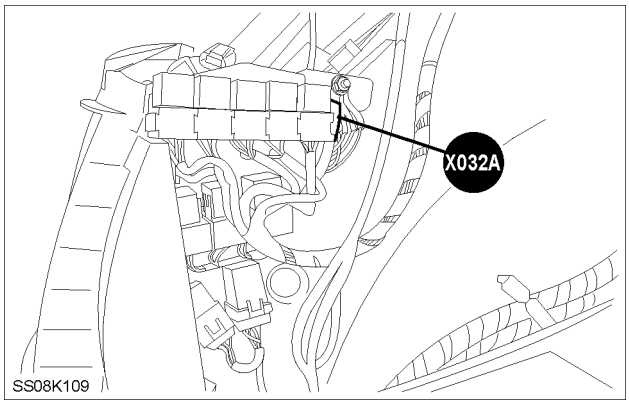
SS08M012 12

FRONT RIGHT HAND CAB

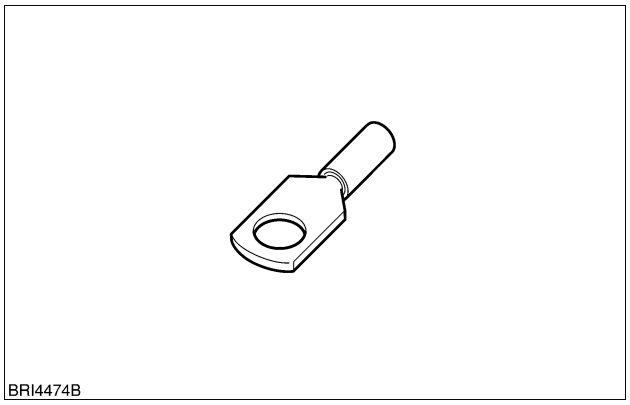
X032A EARTH HEADER 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
X	57 (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K109 13



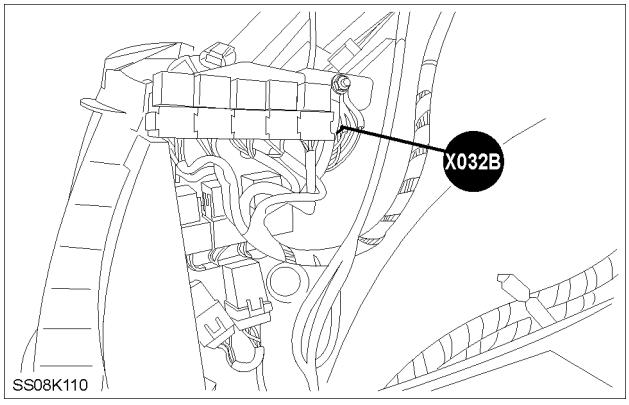
BRI4474B 14

BEHIND RIGHT HAND TRIM

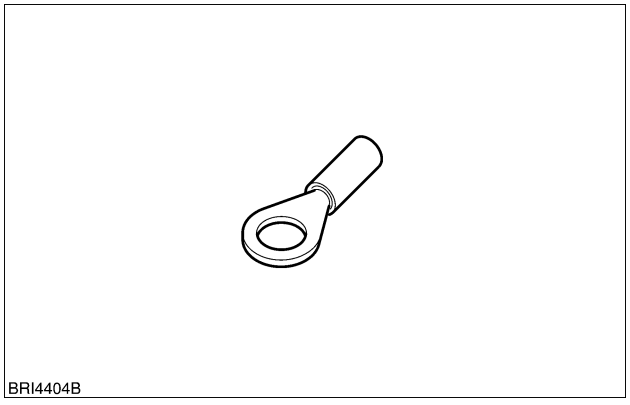
X032B EARTH HEADER 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
X	57CR (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K110 15



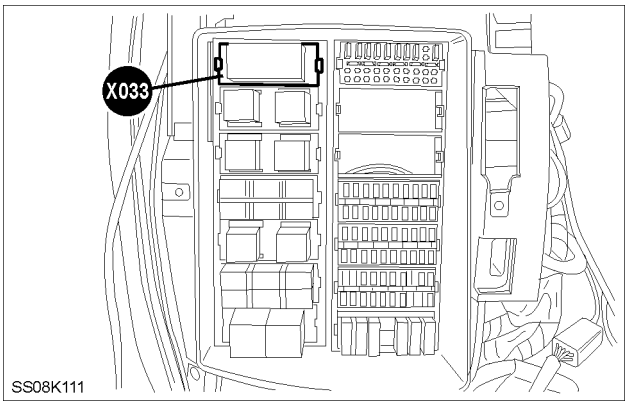
BRI4404B 16

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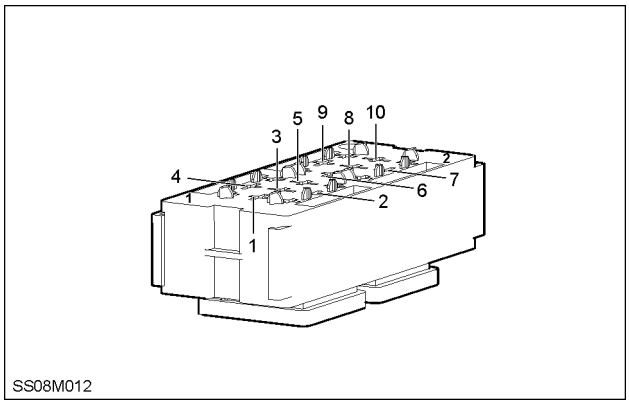
X033 WINDSCREEN WIPERS FRONT & REAR (K001 / K002)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1120 (G)	RR WINDSHIELD WIPER PARK RETURN
2	1121B (G)	RR WINDSHIELD WASH
4	57K (B)	EARTH (ALL)
5	1119 (G)	RR WINDSHIELD WIPER
6	28 (Y)	WIPER MOTOR (PARK RETURN)
7	587 (LG)	WINDSHIELD WIPER INTERMITTENT DELAY
8	1019B (G)	WINDSHIELD WIPER FEED
9	57J (B)	EARTH (ALL)
10	63 (U)	WIPER MOTOR-PARK FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K111 17



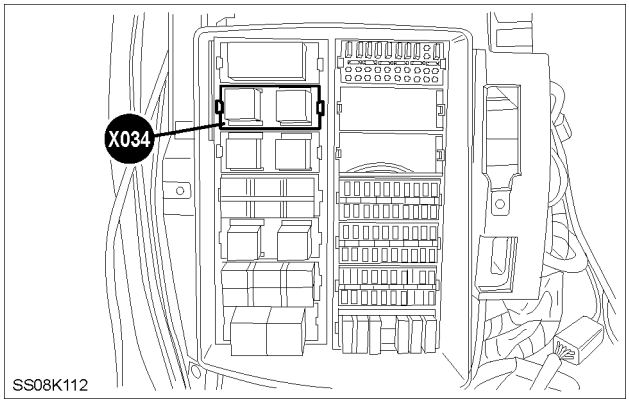
SS08M012 18

FRONT RIGHT HAND CAB

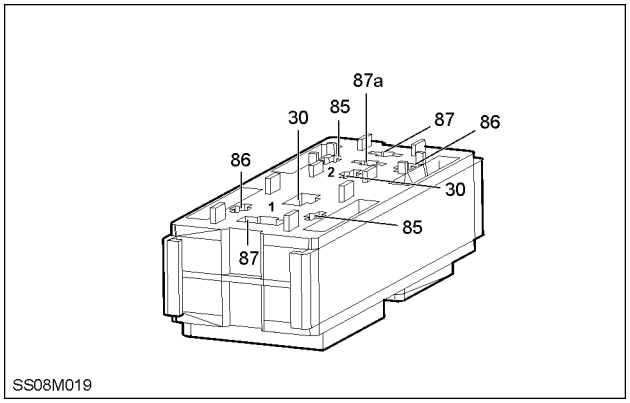
X034 IGNITION / LIGHTS RELAY (K003 / K004)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A30	150E (N)	BATTERY FEED (UNFUSED)(ALL)
A85	57AG (B)	EARTH (ALL)
A86	1010A (G)	IGNITION RELAY (COIL)
A87	1011 (Y)	SUPPLY TO FUSES
B30	1023 (N)	LIGHT SWITCH FEED
B85	57BC (B)	EARTH (ALL)
B86	1024 (R)	RIGHT & LEFT HAND SIDELAMP FEED
B87	1023A (N)	LIGHT SWITCH FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K112 19



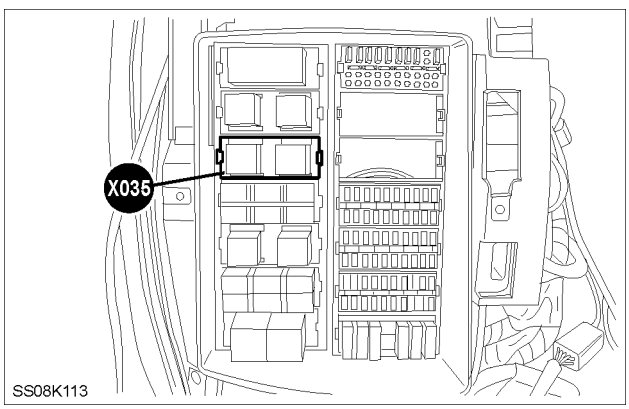
SS08M019 20

FRONT RIGHT HAND CAB

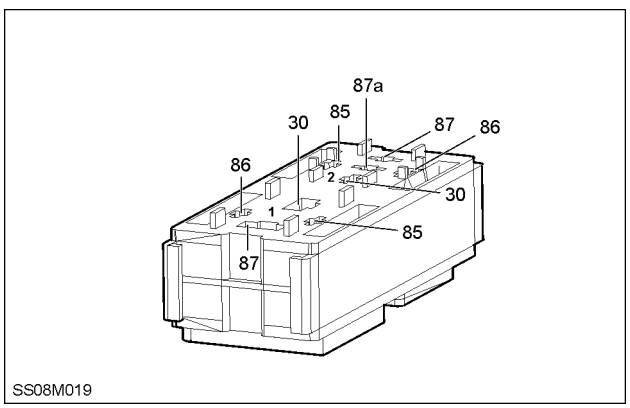
X035 STARTER MOTOR ON / BLOWER MOTOR RELAY (K005 / K006)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A30	150W (N)	BATTERY FEED (UNFUSED)(ALL)
A85	57AC (B)	EARTH (ALL)
A86	1001L (W)	STARTER SOLENOID FEED
A87	1001Y (W)	STARTER SOLENOID FEED
B30	982 (G)	BLOWER MOTOR FEED
B85	57CJ (B)	EARTH (ALL)
B86	181J (G)	BLOWER MOTOR FEED
B87	982A (G)	BLOWER MOTOR FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K113 21



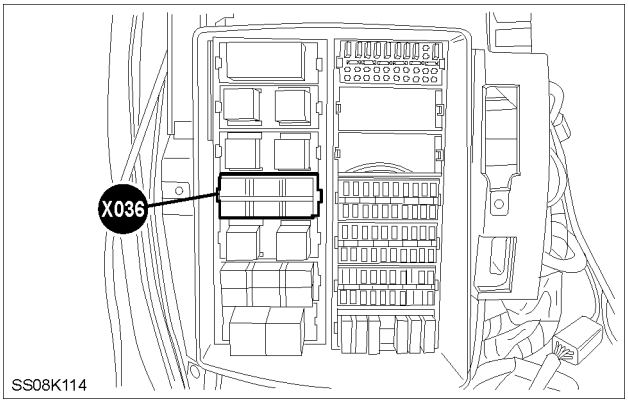
SS08M019 22

FRONT RIGHT HAND CAB

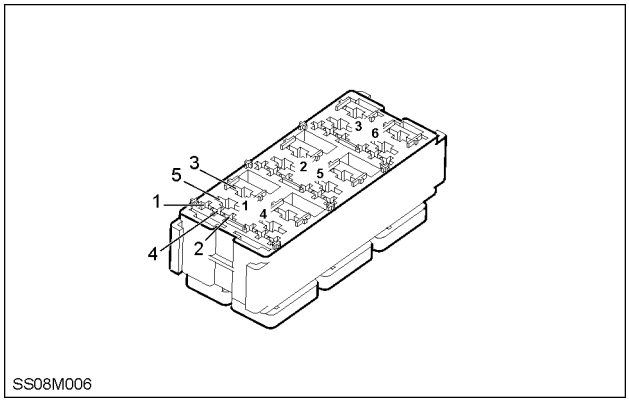
X036 CONTROL RELAYS (K007 - K012)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A1	825 (Y)	PNEUMATIC TRAILER SOLENOID +12V
A2	57CZ (B)	EARTH (ALL)
A3	10E (G)	IGNITION SUPPLY
A5	8000X (N)	TRAILER BRAKE SOLENOID
B1	57SZ (B)	EARTH (ALL)
B2	3150A (W)	HANDBRAKE SWITCH (N.C CONTACT) OFF SIG
B3	8060B (U)	TRAILER BRAKE SUPPLY
B4	8000B (N)	TRAILER BRAKE SOLENOID
B5	8070 (P)	TRAILER PARK BRAKE SOLENOID
C1	8010A (TN)	TRAILER BRAKE PRESSURE
C2	57BM (B)	EARTH (ALL)
C3	8060A (U)	TRAILER BRAKE SUPPLY
C5	8000C (N)	TRAILER BRAKE SOLENOID
D1	1027C (U)	HEADLAMP MAIN BEAM
D2	57BA (B)	EARTH (ALL)
D3	1027 (U)	HEADLAMP MAIN BEAM
D5	1027B (U)	HEADLAMP MAIN BEAM
E1	840B (G)	R & L STOPLAMP SIGNAL
E2	57BJ (B)	EARTH (ALL)
E3	810 (G)	STOPLAMPS
E5	810D (G)	STOPLAMPS
F1	1030AE (U)	HEADLAMP DIP BEAM
F2	57AZ (B)	EARTH (ALL)
F3	1030AA (U)	HEADLAMP DIP BEAM
F5	1030B (U)	HEADLAMP DIP BEAM

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K114 23



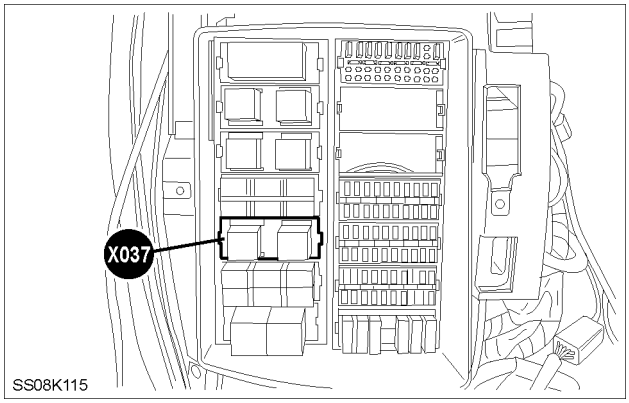
SS08M006 24

FRONT RIGHT HAND CAB

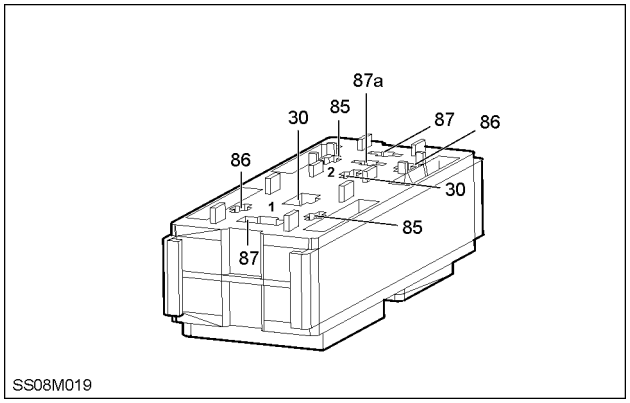
X037 ENGINE SHUTDOWN / GET U HOME RELAY (K013 / K014)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A30	6413B (O)	ENGINE SHUTDOWN RELAY SUPPLY
A85	6407 (O)	ENGINE SHUTDOWN SIGNAL (EDC16)
A86	150AP (N)	BATTERY FEED (UNFUSED)(ALL)
A87	150AN (N)	BATTERY FEED (UNFUSED)(ALL)
B30	1024 (R)	RIGHT & LEFT HAND SIDELAMP FEED
B85	1052 (Y)	GET U HOME LIGHTS RELAY
B86	1030AC (U)	HEADLAMP DIP BEAM
B87	1030AB (U)	HEADLAMP DIP BEAM

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K115 25



SS08M019 26

FRONT RIGHT HAND CAB

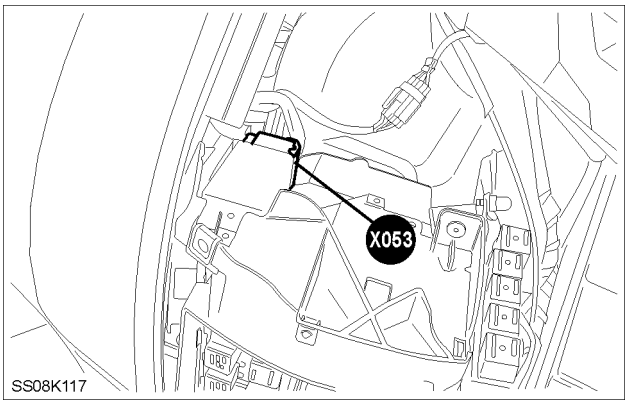
Connector - Component diagram 05

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

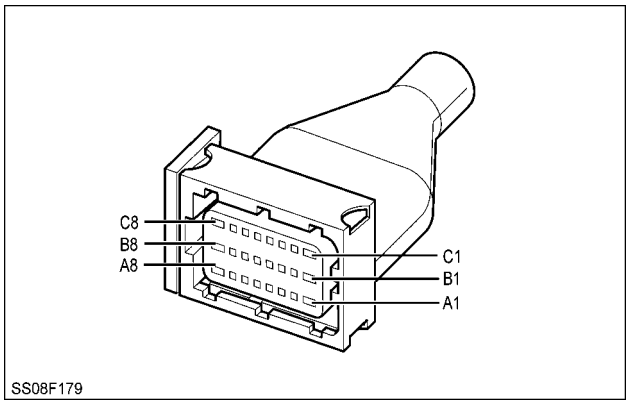
X053 FLASHER ECU

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A1	3009A (G)	FLASHER UNIT SUPPLY B+
A2	249 (LG)	SMV LAMPS RH
A3	349 (TN)	TRAILER TURN LAMPS RH
A4	250 (LG)	SMV LAMPS LH
A5	350 (TN)	TRAILER TURN LAMPS LH
A6	1020 (G)	HAZARD SWITCH SUPPLY
A7	1034 (LG)	TURN SIGNAL WARNING LAMP (TERM C3
A8	3000B (G)	FLASHER UNIT SUPPLY (TERMINAL 49)
B1	3009B (G)	FLASHER UNIT SUPPLY B+
B2	3002 (G)	RIGHT HAND FLASHER CIRCUIT
B3	3001 (G)	LEFT HAND FLASHER CIRCUIT
B4	1020A (G)	HAZARD SWITCH SUPPLY
B5	1033 (LG)	TURN SIGNAL WARNING LAMP (TERM C2)
B6	50 (G)	LEFT HAND TURN SIGNAL
B7	49 (G)	RIGHT HAND TURN SIGNAL
B8	57BG (B)	EARTH (ALL)
C1	49A (G)	RIGHT HAND TURN SIGNAL
C2	50A (G)	LEFT HAND TURN SIGNAL
C3	1039 (LG)	NASO LIGHTS INPUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K117 1



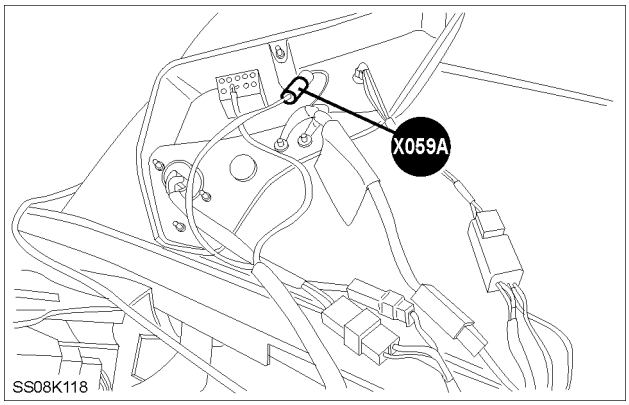
SS08F179 2

BEHIND RIGHT HAND TRIM TOP THE FUSEBOX

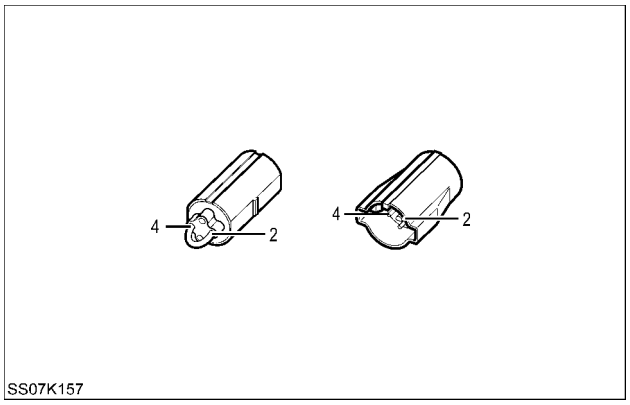
X059A LEVER MOUNTED PTO BRAKE SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	2120 (TN)	PTO BRAKE SIGNAL
4	2120A (TN)	PTO BRAKE SIGNAL

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K118 3



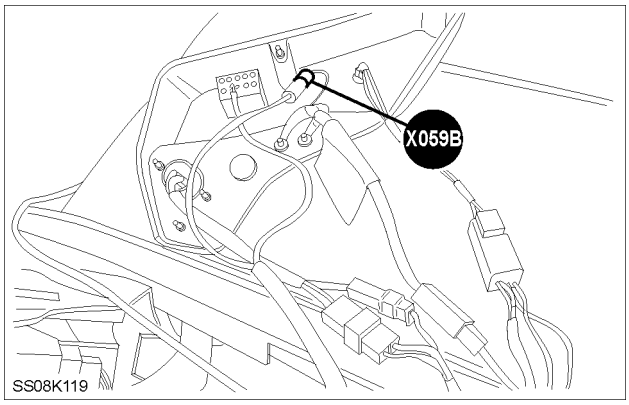
SS07K157 4

BEHIND RIGHT HAND SWITCH PANEL

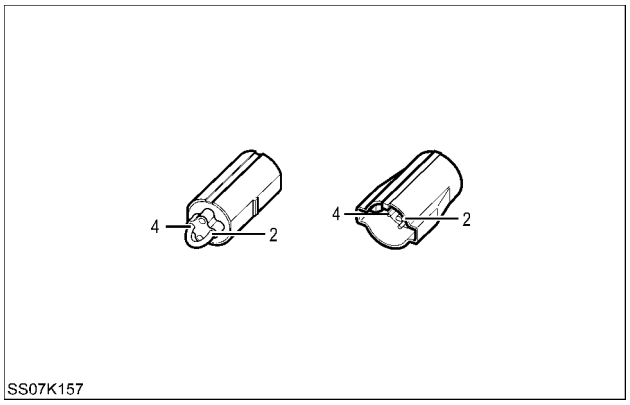
X059B LEVER MOUNTED PTO MATING HALF

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	2120B (TN)	PTO BRAKE SIGNAL
4	2120B (TN)	PTO BRAKE SIGNAL

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K119 5



SS07K157 6

BEHIND RIGHT HAND SWITCH PANEL

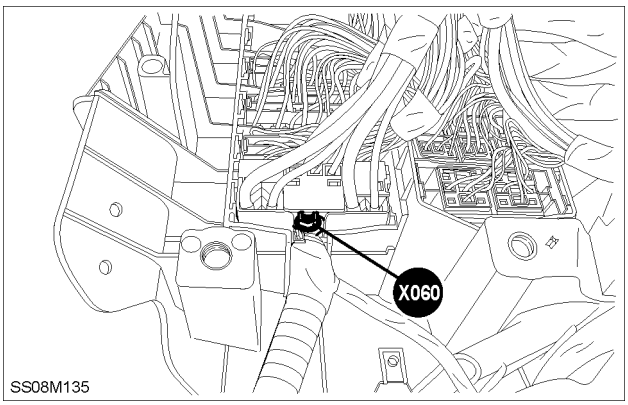
Connector - Component diagram 06

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

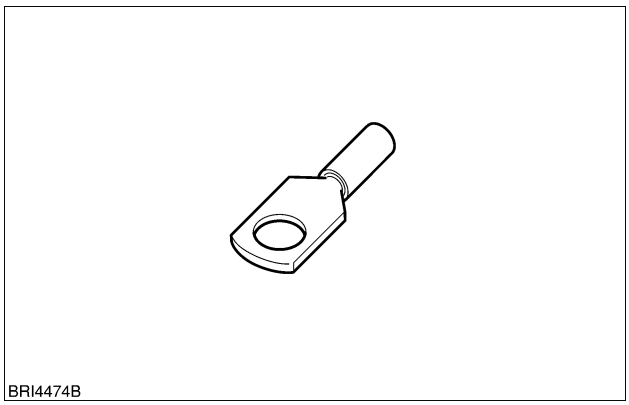
X060 FUSE BOX MAIN B+ FEED

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1 (R)	BATTERY SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M135 1



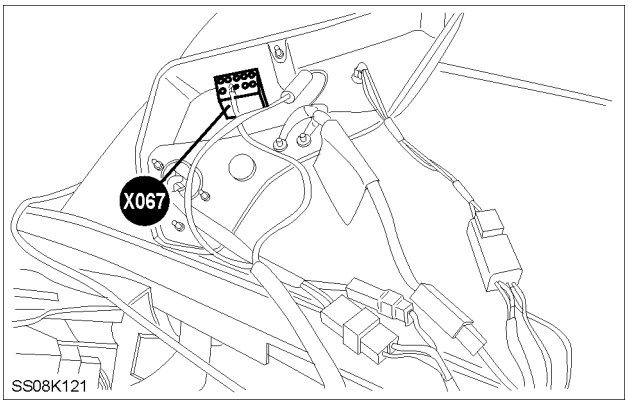
BRI4474B 2

BEHIND RIGHT HAND FUSEBOX

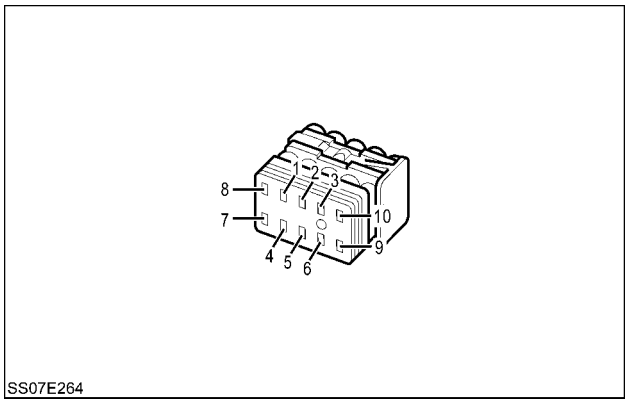
X067 REAR PTO BRAKE SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2120A (TN)	PTO BRAKE SIGNAL
2	2050J (G)	PTO SUPPLY / DOG SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K121 3



SS07E264 4

BEHIND RIGHT HAND SWITCH PANEL

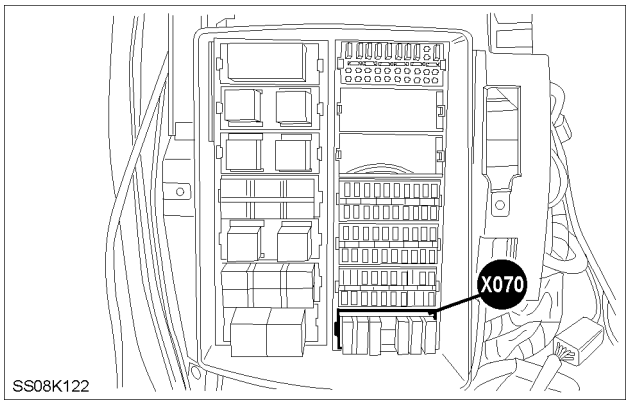
Connector - Component diagram 07

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

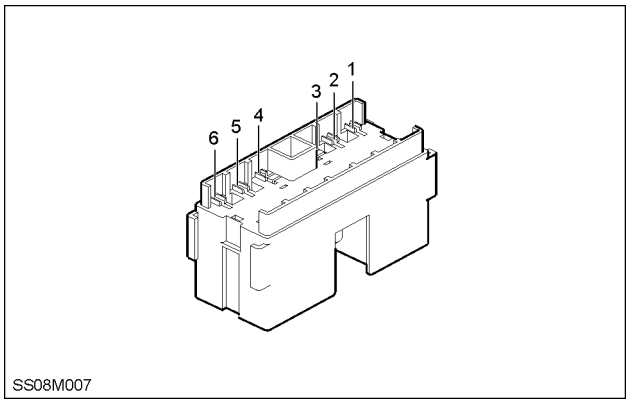
X070 MAXI - FUSE MODULE MF1 TO MF6

POS.	WIRE NUMBER	CIRCUIT REFERENCE
M1	150E (N)	BATTERY FEED (UNFUSED)(ALL)
M2	150V (N)	BATTERY FEED (UNFUSED)(ALL)
M3	150AF (N)	BATTERY FEED (UNFUSED)(ALL)
M4	150Y (N)	BATTERY FEED (UNFUSED)(ALL)
M5	150G (N)	BATTERY FEED (UNFUSED)(ALL)
M6	150F (N)	BATTERY FEED (UNFUSED)(ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K122 1



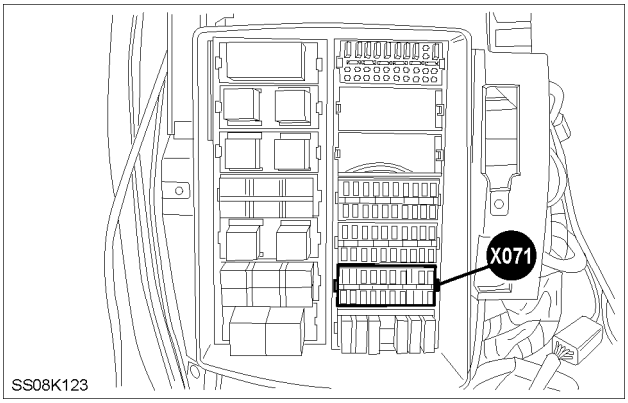
SS08M007 2

FRONT RIGHT HAND CAB

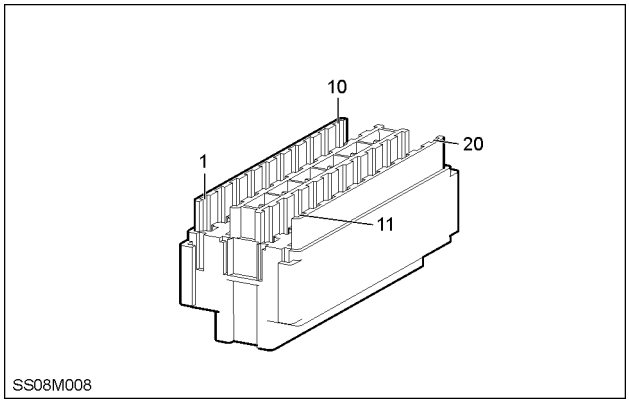
X071 MINI FUSE MODULE F041 TO F060

POS.	WIRE NUMBER	CIRCUIT REFERENCE
3A	71 (W)	IGNITION SWITCHED FEEDS (UNFUSED)
3B	71D (W)	IGNITION SWITCHED FEEDS (UNFUSED)
4A	3070D (P)	'B' PILLAR SKT SUPPLY
4B	150AJ (N)	BATTERY FEED (UNFUSED)(ALL)
5A	9032C (Y)	IGN+ TO POWER SKT.
5B	1011E (Y)	SUPPLY TO FUSES
6A	6408K (G)	FUSED B+ TO ECU (1)
7A	6408 (G)	FUSED B+ TO ECU (1)
9A	6408D (O)	FUSED B+ TO ECU (1)
10A	6325 (N)	REVERSIBLE FAN OPTION - RELAY FEED
10B	1011K (Y)	SUPPLY TO FUSES
11A	3031 (N)	EPB +12 HOT
11B	150BC (N)	BATTERY FEED (UNFUSED)(ALL)
12A	160R (Y)	BATTERY SUPPLY ELECTRONICS
13A	7000 (U)	TRANS CONTROL SUPPLY
14A	2050 (G)	PTO SUPPLY / DOG SUPPLY
14B	160C (U)	BATTERY SUPPLY ELECTRONICS
15A	5200 (N)	EDC VALVE SUPPLY
16A	2250 (K)	PTO FRONT - SUPPLY
17A	2540 (N)	FRONT HITCH +12v IGN
20A	1H (R)	BATTERY SUPPLY
20B	1E (R)	BATTERY SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K123 3



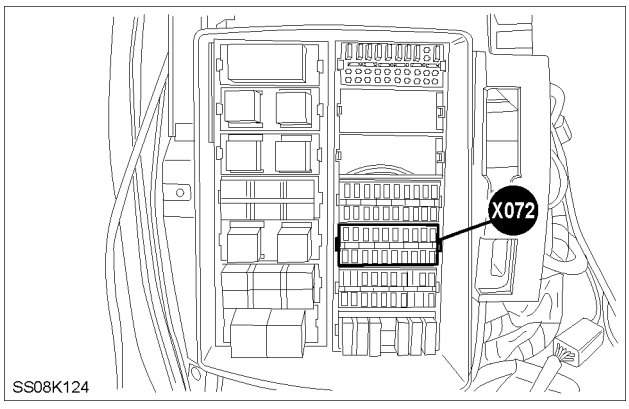
SS08M008 4

FRONT RIGHT HAND CAB

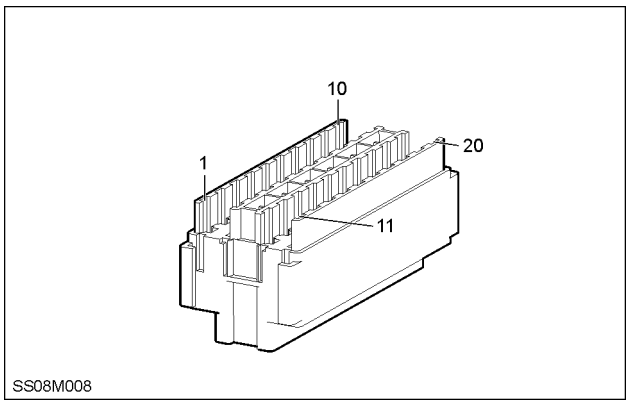
X072 MINI FUSE MODULE F021 TO F040

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1A	10J (G)	IGNITION SUPPLY
1B	1011D (Y)	SUPPLY TO FUSES
2A	1013 (R)	RIGHT HAND LAMPS
3A	1014 (R)	LEFT HAND LAMPS
3B	1023A (N)	LIGHT SWITCH FEED
4A	1012 (R)	ILLUMINATION
5A	1030 (U)	HEADLAMP DIP BEAM
5B	1023 (N)	LIGHT SWITCH FEED
6A	1027 (U)	HEADLAMP MAIN BEAM
6B	150T (N)	BATTERY FEED (UNFUSED)(ALL)
7A	1073 (P)	WORKLAMP FRONT FEED
7B	150P (N)	BATTERY FEED (UNFUSED)(ALL)
8A	998D (G)	WORK LAMP-REAR FEED (INNER)
9A	1071 (P)	WORKLAMP FRONT FEED
10A	998C (G)	WORK LAMP-REAR FEED (INNER)
10B	150AB (N)	BATTERY FEED (UNFUSED)(ALL)
11A	4011 (P)	ROTATING BEACON SWITCH SUPPLY
11B	150BA (N)	BATTERY FEED (UNFUSED)(ALL)
12A	3009 (G)	FLASHER UNIT SUPPLY B+
13A	6408 (G)	FUSED B+ TO ECU (1)
14A	9031 (P)	ADIC MEMORY B+
14B	150AG (N)	BATTERY FEED (UNFUSED)(ALL)
15A	5000 (P)	EDC MEMORY POWER
16A	1072A (P)	WORKLAMP FRONT RELAY SUPPLY
17A	1072B (P)	WORKLAMP FRONT RELAY SUPPLY
17B	150JA (N)	BATTERY FEED (UNFUSED)(ALL)
18A	1099 (R)	FEED FRONT WORKLAMP INNER
20A	3079 (R)	RADIO +12V IGNITION
20B	137 (W)	RADIO FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K124 5



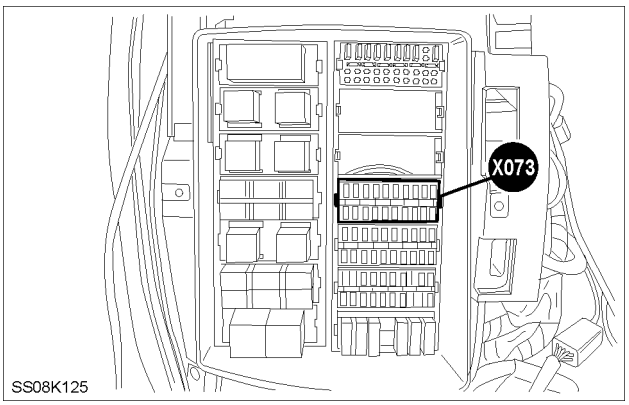
SS08M008 6

FRONT RIGHT HAND CAB

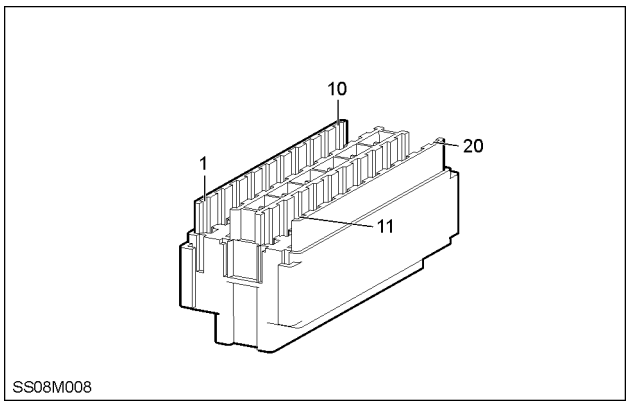
X073 MINI FUSE MODULE F001 TO F020

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1A	666 (P)	DOMELAMP SWITCH FEED
1B	150AC (N)	BATTERY FEED (UNFUSED)(ALL)
2A	150 (N)	BATTERY FEED (ALL)
3A	981 (G)	A/C CLUTCH RELAY FEED
4A	3070A (P)	'B' PILLAR SKT SUPPLY
5A	982 (G)	BLOWER MOTOR FEED
5B	150AD (N)	BATTERY FEED (UNFUSED)(ALL)
6A	138A (P)	RADIO KAM
7A	150B (N)	BATTERY FEED (UNFUSED)(ALL)
7B	150J (N)	BATTERY FEED (UNFUSED)(ALL)
8A	150AE (N)	BATTERY FEED (UNFUSED)(ALL)
9A	3271A (O)	LOADER RELAY FEED
9B	1011A (Y)	SUPPLY TO FUSES
10A	9032D (Y)	IGN.+ TO POWER SKT.
11A	1019 (G)	WINDSHIELD WIPER FEED
12A	1038 (TN)	WINDSHIELD WIPER FEED-REAR
13A	810 (G)	STOPLAMPS
13B	1011B (Y)	SUPPLY TO FUSES
14A	3000A (G)	FLASHER UNIT SUPPLY (TERMINAL 49)
15A	10 (G)	IGNITION SUPPLY
16A	8060 (U)	TRAILER BRAKE SUPPLY
17A	9032 (Y)	IGN+ TO POWER SKT.
18A	181A (G)	BLOWER MOTOR FEED
18B	1011C (Y)	SUPPLY TO FUSES
19A	1925 (R)	MIRROR CONTROL +12V
20A	1050 (G)	BLOWER MOTOR FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K125 7



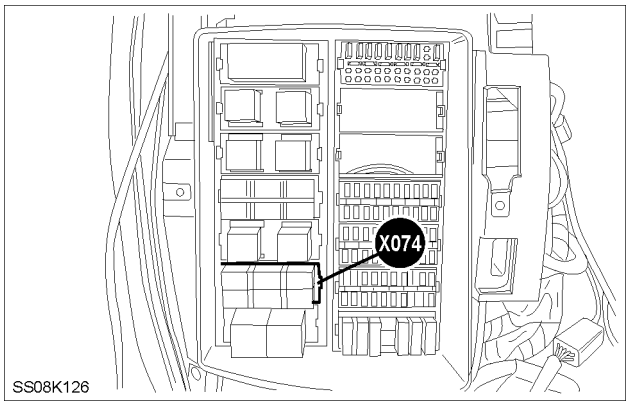
SS08M008 8

FRONT RIGHT HAND CAB

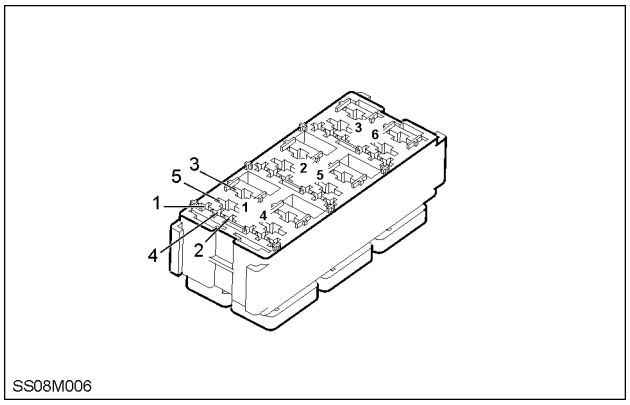
X074 RELAY MODULE (K015 - K020)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A1	5597A (S)	EHR MASTER ENABLE
A2	57GH (B)	EARTH (ALL)
A3	2250F (K)	PTO FRONT - SUPPLY
A5	5515 (S)	EHR +12V IGN.
B1	2005 (O)	AIR CON CLUTCH RELAY
B2	57CK (B)	EARTH (ALL)
B3	981 (G)	A/C CLUTCH RELAY FEED
B5	1018 (LG)	AIR CONDITIONER CLUTCH
C1	173A (W)	BATTERY ISOLATOR RELAY COIL +12V
C2	57CC (B)	EARTH (ALL)
C3	172A (W)	BATTERY ISOLATOR RELAY COIL (OFF)
C4	172B (W)	BATTERY ISOLATOR RELAY COIL (OFF)
D1	1010B (G)	IGNITION RELAY (COIL)
D2	57AF (B)	EARTH (ALL)
D3	160 (U)	BATTERY SUPPLY ELECTRONICS
D5	160C (U)	BATTERY SUPPLY ELECTRONICS
E1	1090 (R)	REAR WORKLAMP RELAY SIGNAL
E2	57AS (B)	EARTH (ALL)
E3	998C (G)	WORK LAMP-REAR FEED (INNER)
E5	998 (G)	WORK LAMP-REAR FEED (INNER)
F1	1092 (R)	FRONT WORKLAMP RELAY SIGNAL
F2	57AR (B)	EARTH (ALL)
F3	1073 (P)	WORKLAMP FRONT FEED
F5	1073A (P)	WORKLAMP FRONT FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K126 9



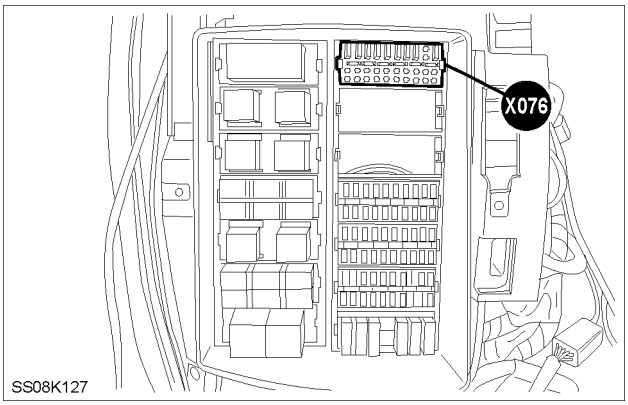
SS08M006 10

FRONT RIGHT HAND CAB

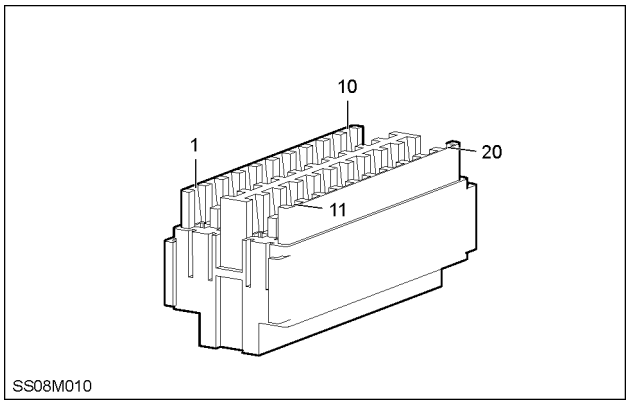
X076 DIODE BLOCK

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1A	1013AG (R)	RIGHT HAND LAMPS
1B	1024A (R)	RIGHT & LEFT HAND SIDELAMP FEED
2A	1013AF (R)	RIGHT HAND LAMPS
2B	1013AE (R)	RIGHT HAND LAMPS
3A	1030AD (U)	HEADLAMP DIP BEAM
3B	1024B (R)	RIGHT & LEFT HAND SIDELAMP FEED
4A	1030AF (U)	HEADLAMP DIP BEAM
4B	1030C (U)	HEADLAMP DIP BEAM
5A	825B (Y)	PNEUMATIC TRAILER SOLENOID +12V
5B	830A (R)	STOPLAMP SWITCH RH
6A	825A (Y)	PNEUMATIC TRAILER SOLENOID +12V
6B	820A (R)	STOPLAMP SWITCH LH
7A	171A (W)	BATTERY ISOLATOR RELAY COIL
7B	1000A (W)	SAFETY START SWITCH SUPPLY
10A	1030AJ (U)	HEADLAMP DIP BEAM
10B	1027AA (U)	HEADLAMP MAIN BEAM
19A	150AH (N)	BATTERY FEED (UNFUSED)(ALL)
19B	150AM (N)	BATTERY FEED (UNFUSED)(ALL)
20A	150AI (N)	BATTERY FEED (UNFUSED)(ALL)
20B	1D (R)	BATTERY SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K127 11



SS08M010 12

FRONT RIGHT HAND CAB

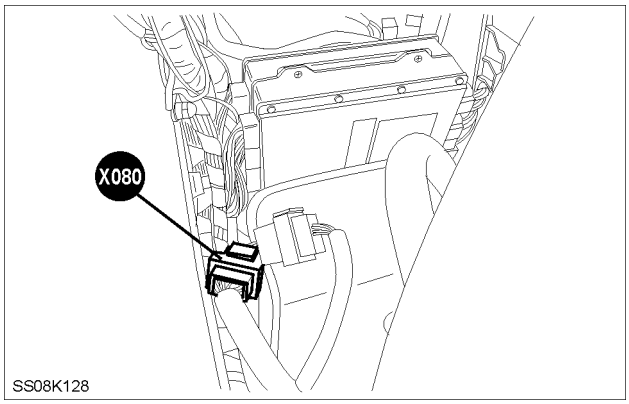
Connector - Component diagram 08

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

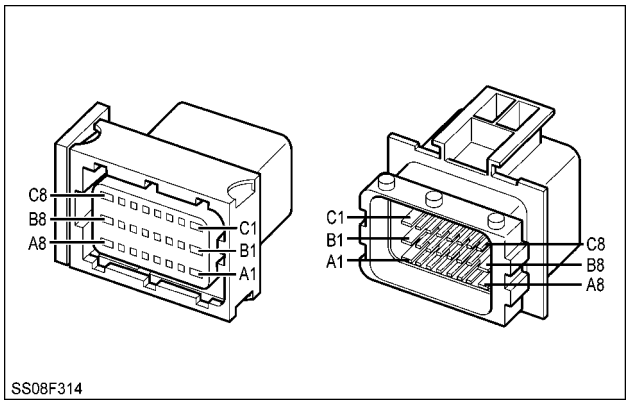
X080 ARMREST 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A1	5200AT (N)	EDC VALVE SUPPLY
A2	5400D (Y)	CAN H
A3	5420D (G)	CAN L
A4	5500W (R) / 5500B (R)	EHR CAN HIGH
A5	5510W (U) / 5510B (U)	EHR CAN LOW
A6	5955C (G)	RS232 INPUT TECU
A7	5960E (W) / 5960C (W)	RS232 OUTPUT TECU
A8	2250S (K)	PTO FRONT - SUPPLY
B1	7000BM (U)	TRANS CONTROL SUPPLY
B2	2045 (O)	PTO SWITCH TO MODULE
B3	2046 (O)	PTO SWITCH (VCC)
B4	2248 (K)	PTO FRONT - SWITCH (VCCS)
B5	2245 (K)	PTO FRONT - SWITCH TO MODULE
B6	2065 (N)	PTO ENGAGED
B7	2270 (O)	PTO FRONT - WARNING LAMP
B8	57RE (B)	EARTH (ALL)
C2	5915 (B)	EDC VALVE SUPPLY
C3	5900 (G)	ISO BUS CAN SIGNAL LOW
C4	5910 (Y)	ISO BUS CAN SIGNAL HIGH
C5	5920 (R)	ISO BUS CAN SUPPLY POSITIVE
C8	57RF (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K128 1



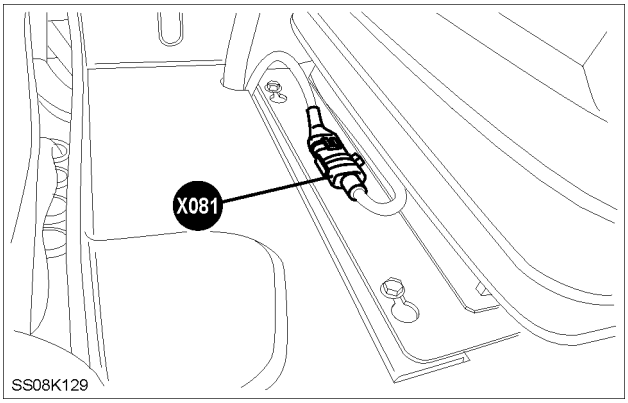
SS08F314 2

BEHIND RIGHT HAND TRIM

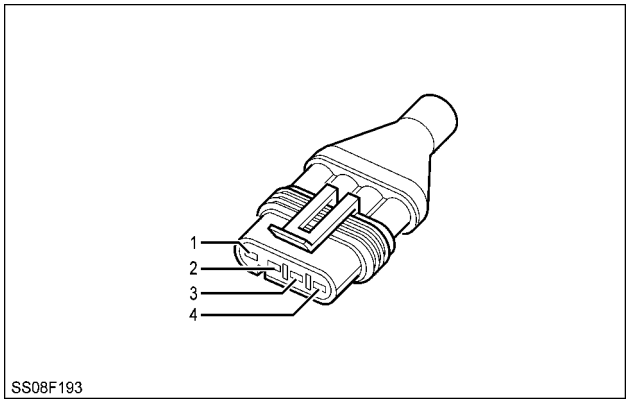
X081 SEAT CONNECTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	6355A (R)	+5V LOW POWER REFERENCE
2	7245 (P)	DEADMAN
3	181K (G)	BLOWER MOTOR FEED
4	57CN (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K129 3



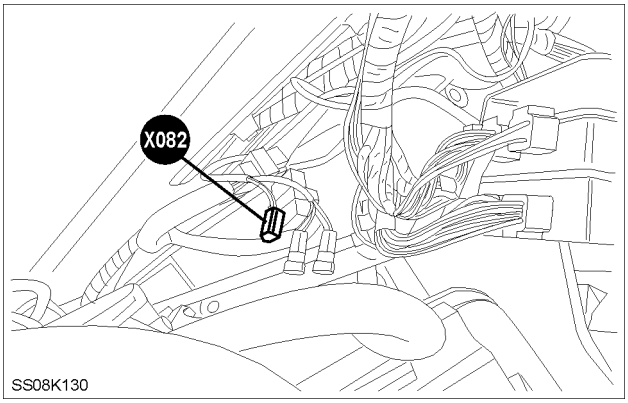
SS08F193 4

IN CAB RIGHT OF OPERATOR'S SEAT

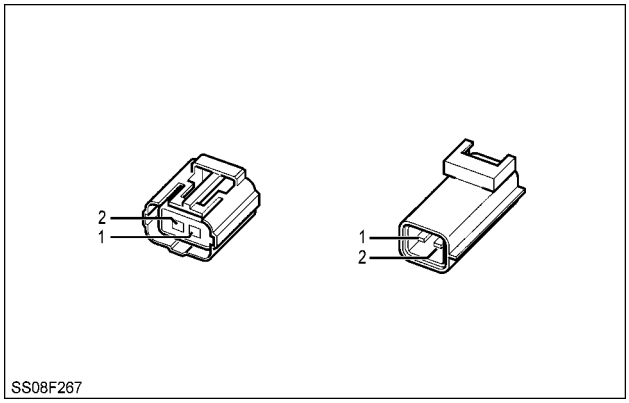
X082 LOADER POWER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3271A (O) / 3271 (U)	LOADER RELAY FEED
2	57FP (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K130 5



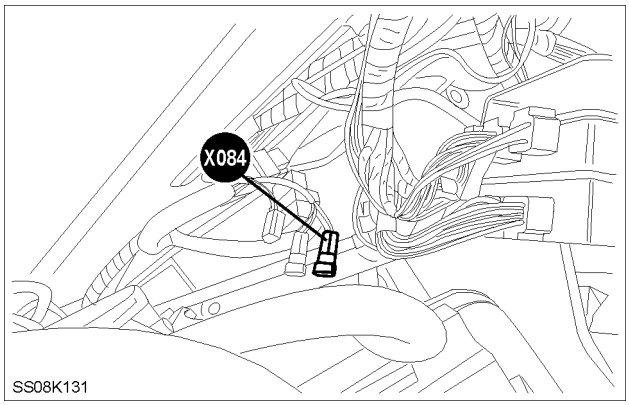
SS08F267 6

BEHIND RIGHT HAND TRIM

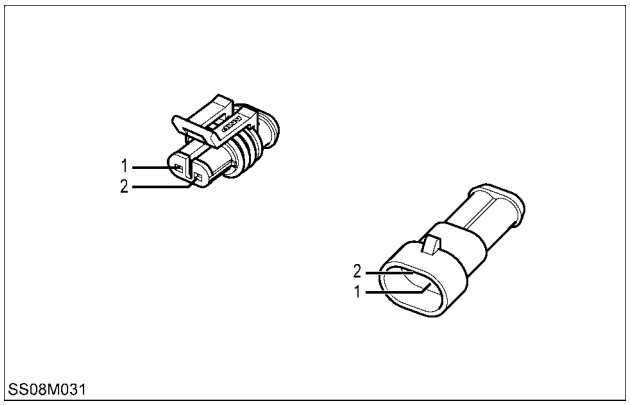
X084 LOADER VALVE 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3274 (R) / 3279 (Y)	LOADER VALVE #2 OUT
2	3275 (R) / -	LOADER VALVE #2 RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K131 7



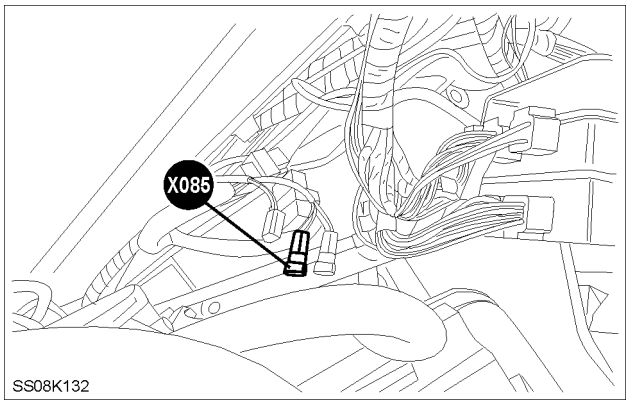
SS08M031 8

BEHIND RIGHT HAND TRIM

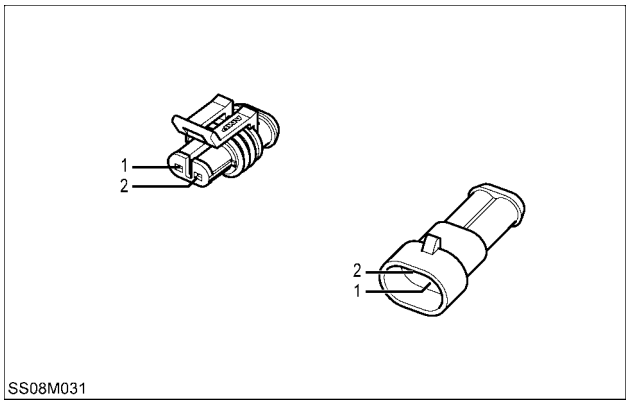
X085 LOADER VALVE 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3272 (O) / 3272C (O)	LOADER VALVE #1 OUT
2	3273 (O) / 3273C (O)	LOADER VALVE #1 RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K132 9



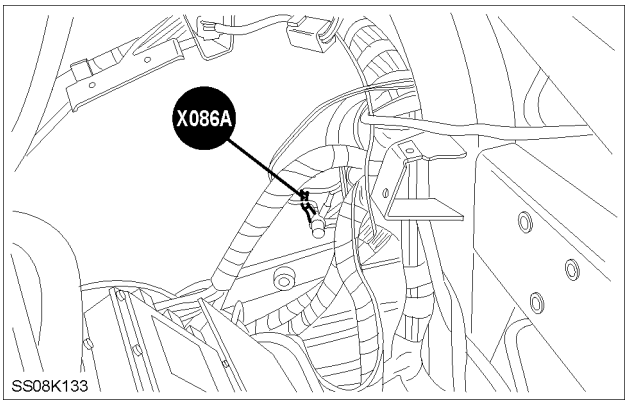
SS08M031 10

BEHIND RIGHT HAND TRIM

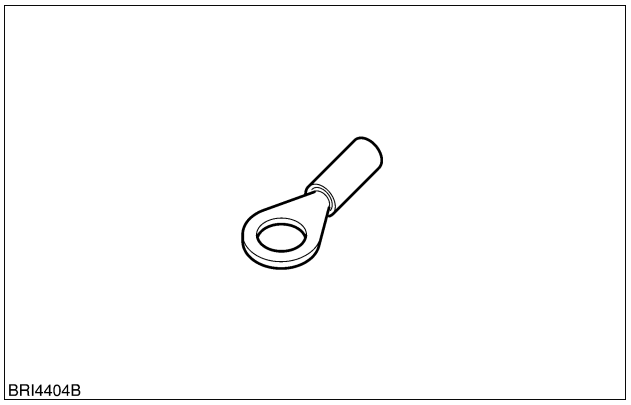
X086A EARTH HEADER 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57CG (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K133 11



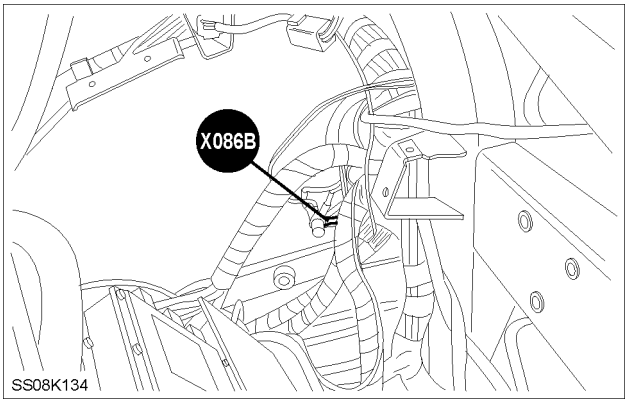
BRI4404B 12

BEHIND RIGHT HAND TRIM

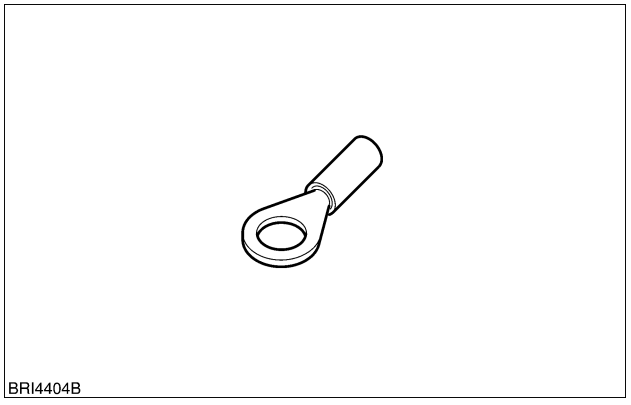
X086B EARTH HEADER 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57CH (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K134 13



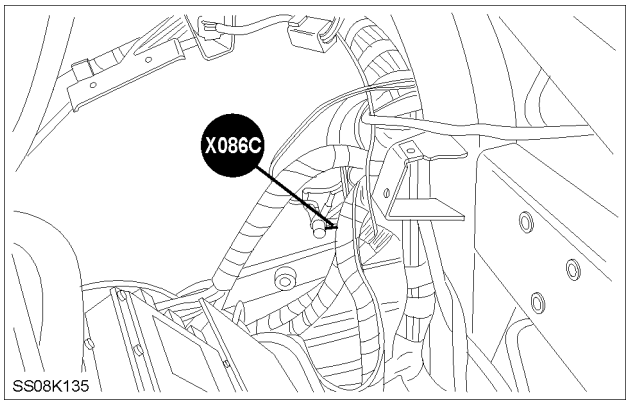
BRI4404B 14

BEHIND RIGHT HAND TRIM

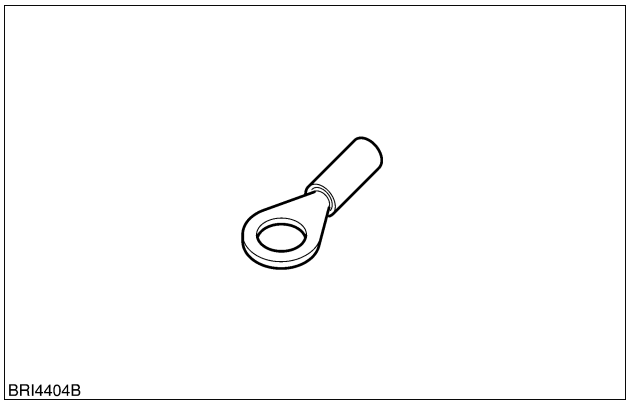
X086C EARTH HEADER 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57BH (B), 57RD (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K135 15



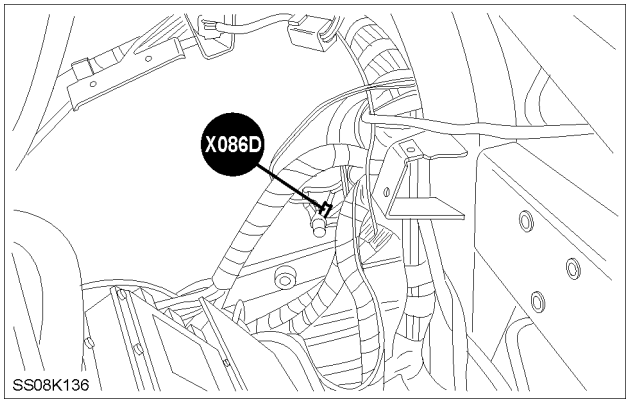
BRI4404B 16

BEHIND RIGHT HAND TRIM

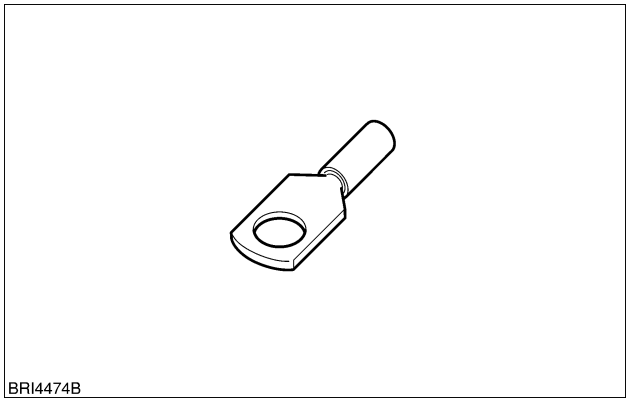
X086D EARTH HEADER 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57CF (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K136 17



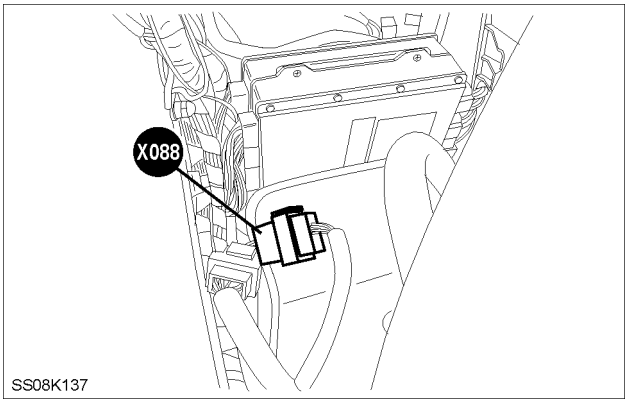
BRI4474B 18

BEHIND RIGHT HAND TRIM

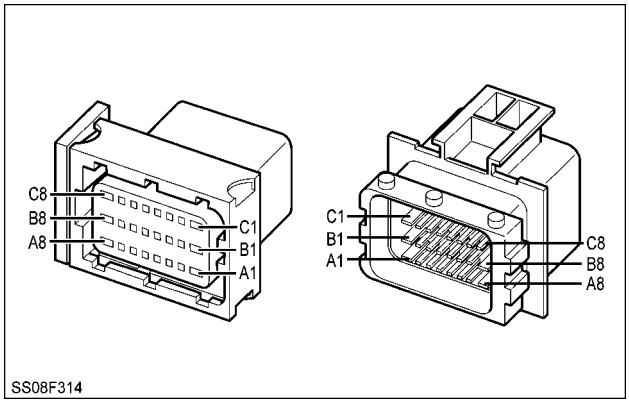
X088 ARMREST 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A1	181L (G) / 181P (G)	BLOWER MOTOR FEED
A2	5400BJ (Y) / 5400H (Y)	CAN H
A3	5420BJ (G) / 5420H (G)	CAN L
A4	5500V (R) / 5500D (R)	EHR CAN HIGH
A5	5510V (U) / 5510D (U)	EHR CAN LOW
B1	57AD (B) / 57 (B)	EARTH (ALL)
B2	9000 (N) / 9000A (N)	DIVERTER VALVE
C2	5915F (B)	EDC VALVE SUPPLY
C3	5900F (G)	ISO BUS CAN SIGNAL LOW
C4	5910F (Y)	ISO BUS CAN SIGNAL HIGH
C5	5920F (R)	ISO BUS CAN SUPPLY POSITIVE

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K137 19



SS08F314 20

BEHIND RIGHT HAND TRIM

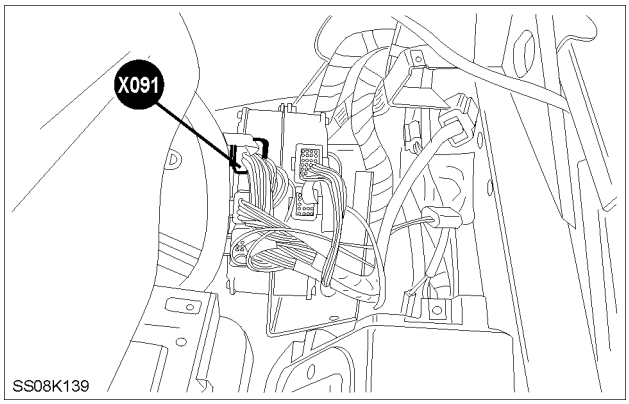
Connector - Component diagram 09

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

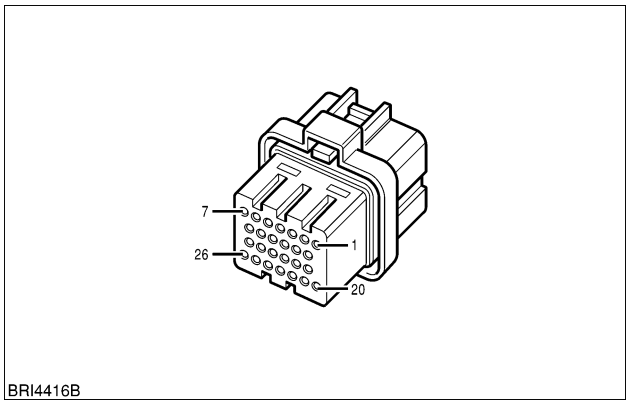
X091 CCM CENTRAL CONTROL UNIT (CN2)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7915 (P)	TCM CLUTCH B RETURN
2	7225 (W)	TRANS HI RANGE SOL - RET
3	7935 (P)	TCM CLUTCH D RETURN
4	5087 (K)	EDC VALVE UP RETURN
5	5097 (K)	EDC VALVE DOWN RETURN
6	7925 (P)	TCM CLUTCH C RETURN
7	7408 (W)	HYDROSTAT 1 SOLENOID GND
8	7900 (TQ)	CLUTCH 'A' SIGNAL
13	9050 (P)	CN1a 92 -10
14	2062 (W)	PTO TWIST SENSOR
15	2151 (K)	EPTO DRIVE RELAY UPPER SPEED
16	3168 (O)	AUTO GUIDANCE DUMP SOLENOID FEED (HSD)
17	2152 (K)	ESPTO DRIVE RELAY LOWER SPEED
18	7022 (S)	REVERSE ALARM GROUND SIGNAL
20	2140 (O)	PTO SPEED SENSOR
21	57W (B)	EARTH (ALL)
23	6355 (R)	+5V LOW POWER REFERENCE
24	6315 (N)	REVERSIBLE FAN OPTION - RELAY CONTROL
26	57X (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K139 1



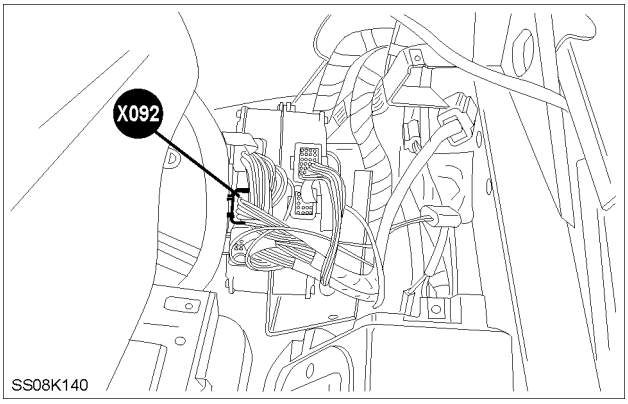
BRI4416B-02 2

BEHIND OPERATOR'S SEAT

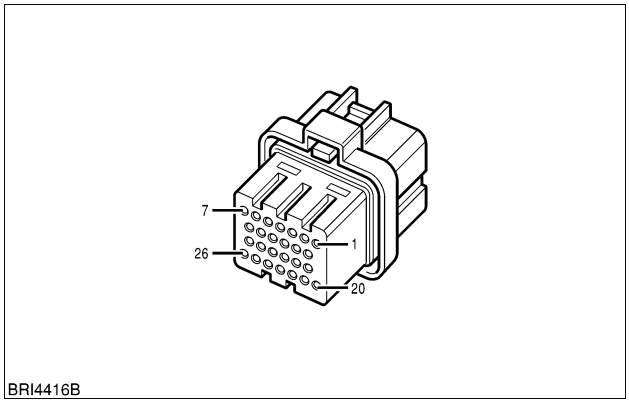
X092 CCM CENTRAL CONTROL UNIT (CN1a)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7000C (U)	TRANS CONTROL SUPPLY
2	7000D (U)	TRANS CONTROL SUPPLY
3	7000E (U)	TRANS CONTROL SUPPLY
4	7431 (TQ)	SUPPLY
5	5085 (K)	EDC VALVE UP
6	7920 (TQ)	CLUTCH 'C' SIGNAL
7	7930 (TQ)	CLUTCH 'D' SIGNAL
8	7660 (R)	TRANS CLUTCH DISCONNECT
9	7220 (S)	TRANSMISSION HIGH RANGE
10	9051 (P)	CN2 98 -13
11	7910 (TQ)	CLUTCH 'B' SIGNAL
12	5090 (K)	EDC VALVE DOWN
13	7407 (K)	HYDROSTAT 1 SOLENOID +
14	5000A (P)	EDC MEMORY POWER
15	5400T (Y)	CAN H
16	5420T (G)	CAN L
19	61 (B)	CASE GROUND
20	5200A (N)	EDC VALVE SUPPLY
21	5500H (R)	EHR CAN HIGH
22	5510H (U)	EHR CAN LOW
23	60 (B/W)	SENSOR GROUND
25	57Y (B)	EARTH (ALL)
26	57Z (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K140 3



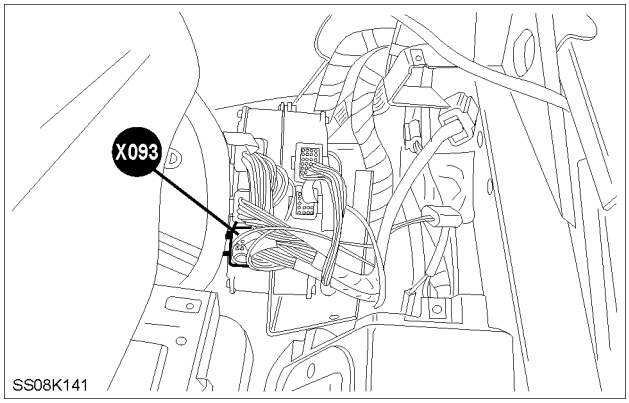
BRI4416B-02 4

BEHIND OPERATOR'S SEAT

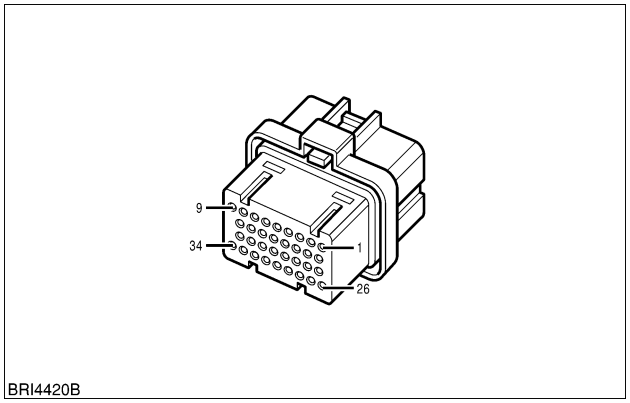
X093 CCM CENTRAL CONTROL UNIT (CN1b)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	6402 (G)	ECU TO THROTTLE POT. VAR
2	5080 (K)	EDC ROCKSHAFT
7	2012 (Y)	TRANS OIL PRESSURE WARNING LAMP
9	5065 (TN)	EDC RIGHT PIN
10	5070 (TN)	EDC LEFT PIN
11	2050K (G)	PTO SUPPLY / DOG SUPPLY
12	7250 (S)	TRANSMISSION FORWARD SIGNAL
13	7260 (S)	TRANSMISSION REVERSE SIGNAL
14	7500 (G)	TRANS OIL TEMP. SENSOR
16	5020 (TN)	EDC PROC +5V REF VOLTAGE DROP POSN/RATE
17	7525 (G)	TRANS SENSOR SUPPLY 5v
19	2031 (Y)	RADAR PRESENT
21	1001 (W)	STARTER SOLENOID FEED
22	820B (R)	STOPLAMP SWITCH LH
23	830B (R)	STOPLAMP SWITCH RH
24	2250N (K)	PTO FRONT - SUPPLY
25	5075 (K)	EDC VOLTAGE TO PINS
27	7420A (Y)	TCM TO CLUTCH POSITION SWITCH
29	5100 (K)	EDC EXTERNAL SWITCH UP
30	5095 (K)	EDC EXTERNAL SWITCH DOWN
33	2028B (G)	RADAR ASSEMBLY (GUN) SIGNAL
34	7401 (P)	TRANS RPM SPEED SENSOR

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K141 5



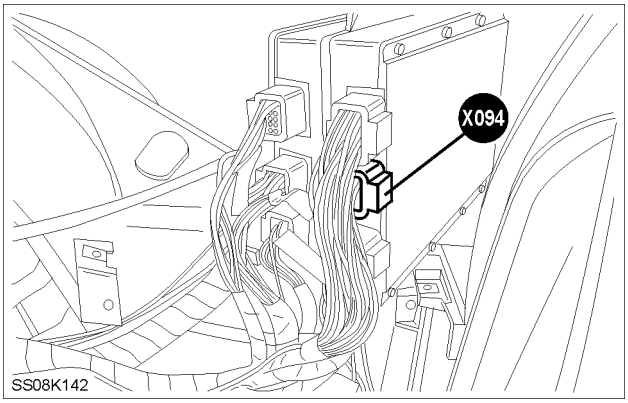
BRI4420B 6

BEHIND OPERATOR'S SEAT

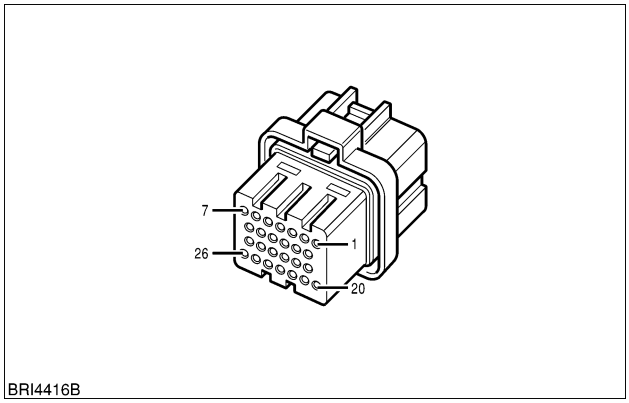
X094 CCM CENTRAL CONTROL UNIT (CN3a)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7589 (U)	BRAKE PRESSURE SIGNAL
2	7970 (P)	TRANS MED/REV
3	2059 (W)	FENDER PTO SWITCH INPUT
8	7775 (K)	B CLUTCH PRESSURE SIGNAL
9	7785 (O)	A CLUTCH PRESSURE SIGNAL
10	7584 (U)	PARKLOCK SENSOR SWITCH SIGNAL
12	2045 (O)	PTO SWITCH TO MODULE
13	2046 (O)	PTO SWITCH (VCC)
14	2007 (Y)	AIR CONDITIONER LOW PRESSURE
15	1039 (LG)	NASO LIGHTS INPUT
16	5595 (S)	EHR MASTER STOP SWITCH
17	5210 (O)	EDC VALVE ENABLE
18	2056 (W)	PTO FENDER PTO SWITCH ON
20	2159 (U)	PTO UPPER SPEED
26	7582 (U)	CREEPER RAIL SWITCH NOT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K142 7



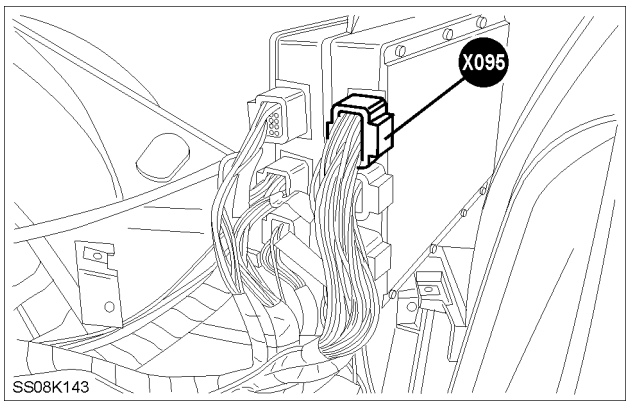
BRI4416B-02 8

BEHIND OPERATOR'S SEAT

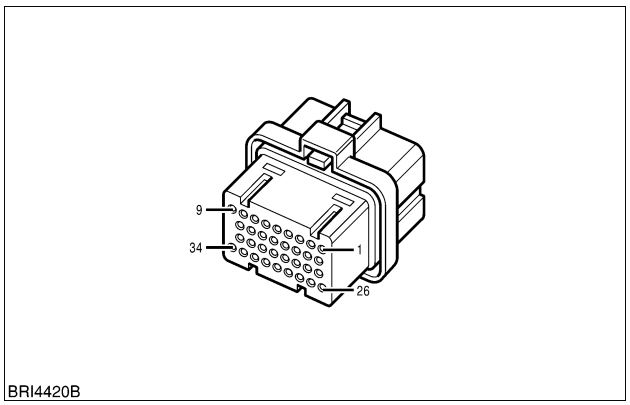
X095 CCM CENTRAL CONTROL UNIT (CN3b)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7945 (P)	TCM CLUTCH E RETURN
2	9036 (TN)	50KPH DUMP SOLENOID RETURN
3	7235 (Y)	TRANS LOW RANGE SOL - RET
4	8045 (P)	TRANS REV SOL RET
5	9035 (TN)	50KPH DUMP SOLENOID
6	9033 (TN)	50KPH SOLENOID+
7	7985 (G)	TRANS REVERSE RANGE
8	2130 (N)	PTO BRAKE SOLENOID
9	7080 (LG)	DIFF-LOCK SOLENOID FEED
10	9034 (TN)	50KPH SOLENOID-
12	7586 (U)	PARKLOCK SOLENOID
13	7940 (TQ)	CLUTCH 'E' SIGNAL
14	2042 (O)	PTO SOLENOID-REAR
15	7230 (S)	TRANSMISSION LOW RANGE
16	8000B (N)	TRAILER BRAKE SOLENOID
17	3024 (Y)	2WD SOLENOID
18	2051 (O)	PTO SOLENOID RETURN (-)
19	7411 (Y)	TRANS HYDROSTAT INPUT SPEED SENSOR (CVT)
20	7400 (Y)	TRANS RPM SPEED SENSOR TO TCM INPUT
21	6300 (N)	FAN SPEED
22	7760 (W)	TORQUE SENSOR
24	2120 (TN)	PTO BRAKE SIGNAL
25	7000J (U)	TRANS CONTROL SUPPLY
26	7295 (W)	DRIVE DISABLE SIGNAL
27	2065 (N)	PTO ENGAGED
32	6404 (G)	THROTTLE POT. TO LOW IDLE SWITCH
33	2055A (W)	PTO SYNCHRO GROUND SPEED ENGAGED
34	7000K (U)	TRANS CONTROL SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K143 9



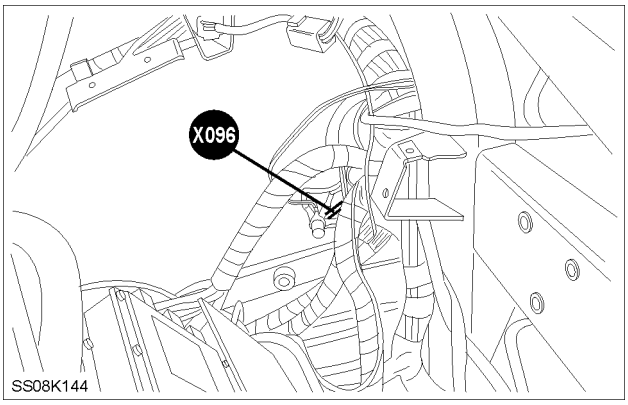
BRI4420B 10

BEHIND OPERATOR'S SEAT

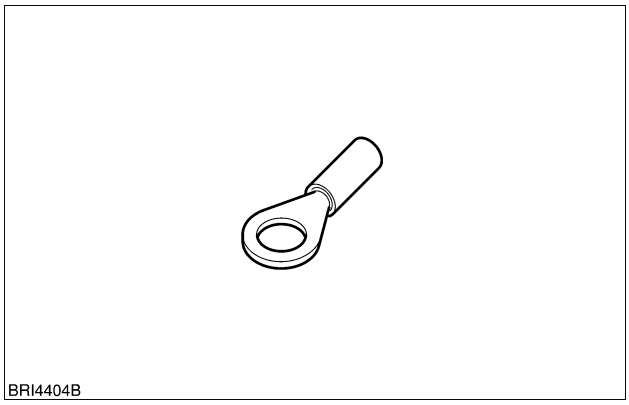
X096 CASE EARTH CCM & ACU

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	61,61A,61G (B,B/O,B)	CASE GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K144 11



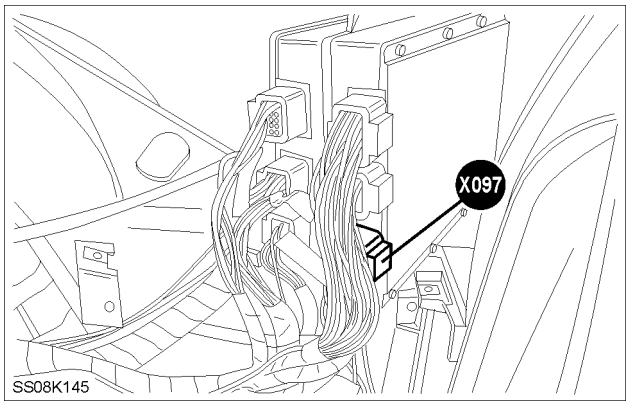
BRI4404B 12

BEHIND RIGHT HAND TRIM

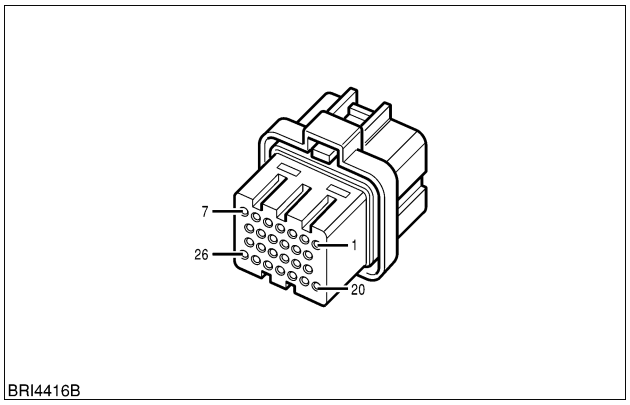
X097 CCM CENTRAL CONTROL UNIT (CN4)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	3274A (R)	LOADER VALVE #2 OUT
3	7275A (R)	TCM SERIAL DATA OUT-DISPLY DATA IN
4	2157 (U)	ESPTO NEUTRAL
6	3169 (O)	AUTO GUIDANCE DUMP SOLENOID RETURN (CURSEN)
7	2155 (N)	ESPTO ACTUATOR POWER +12V
8	2156 (N)	ESPTO ACTUATOR POS SIGNAL
9	7245 (P)	DEADMAN
10	3014C (R)	HANDBRAKE WARNING LAMP SIGNAL
11	7770 (U)	TRANS FORWARD PRESSURE SWITCH
12	2153 (R)	ESPTO ACTUATOR UPPER SPEED
14	7960 (W)	TRANS SLOW/FAST
16	7730 (TN)	NOT IN PARKLOCK
17	8050 (R)	TRANS REV PRESSURE
18	2158 (U)	ESPTO LOWER SPEED
20	7430 (Y)	CLUTCH POSITION SIGNAL
21	5830 (R)	HIGH FLOW PUMP LINK
23	2154 (N)	ESPTO ACTUATOR LOWER SPEED
24	5835 (S)	HYDRAULIC MASTER SWITCH HIGH FLOW PUMP LINK
25	5840 (W)	FRONT HITCH DETECT INPUT
26	3155A (N)	HANDBRAKE TRANS INTERLOCK

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K145 13



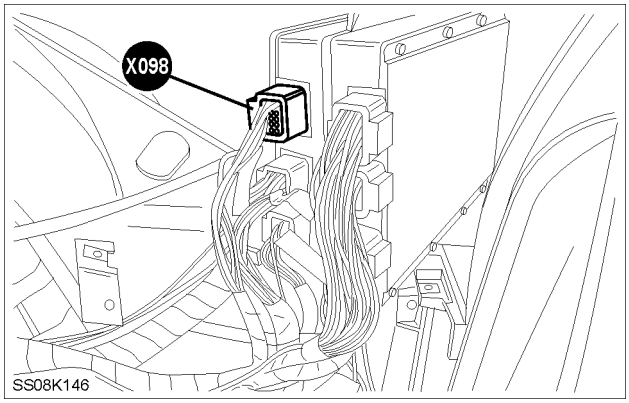
BRI4416B-02 14

BEHIND OPERATOR'S SEAT

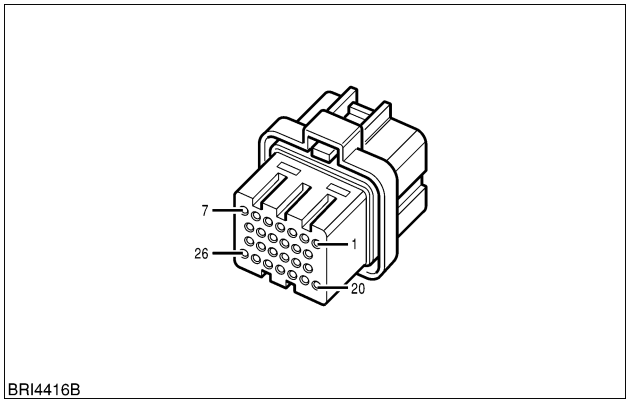
X098 ACU AUXILIARY CONTROL UNIT (CN2)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3250 (O)	RAISE SOLENOID RET
3	3286 (TN)	SUSPENSION LOCKOUT SOLENOID LOWER RETURN (-)
6	3281 (TN)	SUSPENSION LOCKOUT SOLENOID UPPER RETURN (-)
7	2044 (O)	PTO SOLENOID-FRONT RETURN(-)
13	3270 (O)	LOWER SOLENOID RET
19	2270 (O)	PTO FRONT - WARNING LAMP
21	57BN (B)	EARTH (ALL)
26	57BP (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K146 15



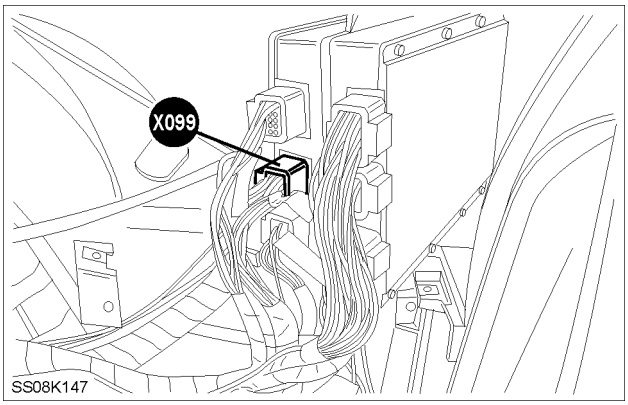
BRI4416B-02 16

BEHIND OPERATOR'S SEAT

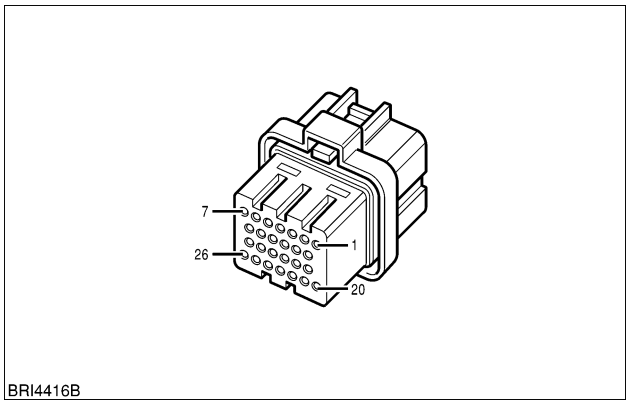
X099 ACU AUXILIARY CONTROL UNIT (CN1a)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2540S (N)	FRONT HITCH +12v IGN
2	2540T (N)	FRONT HITCH +12v IGN
3	2540W (N)	FRONT HITCH +12v IGN
6	3280 (O)	SUSPENSION LOCKOUT SOLENOID UPPER
7	3285 (TN)	SUSPENSION LOCKOUT SOLENOID LOWER
8	2250K (K)	PTO FRONT - SUPPLY
10	3260 (O)	LOWER SOLENOID PWR
11	3240 (O)	RAISE SOLENOID PWR
12	2570 (R)	FRONT HITCH RAISE SOLENOID
13	2043 (O)	PTO SOLENOID-FRONT
14	5000B (P)	EDC MEMORY POWER
15	5400S (Y)	CAN H
16	5420S (G)	CAN L
19	61G (B)	CASE GROUND
20	5200N (N)	EDC VALVE SUPPLY
21	5500G (R)	EHR CAN HIGH
22	5510G (U)	EHR CAN LOW
23	60AA (B/W)	SENSOR GROUND
25	57BR (B)	EARTH (ALL)
26	57BS (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K147 17



BRI4416B-02 18

BEHIND OPERATOR'S SEAT

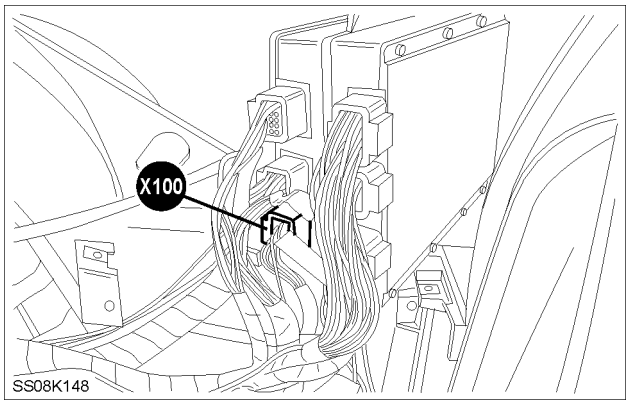
Connector - Component diagram 10

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

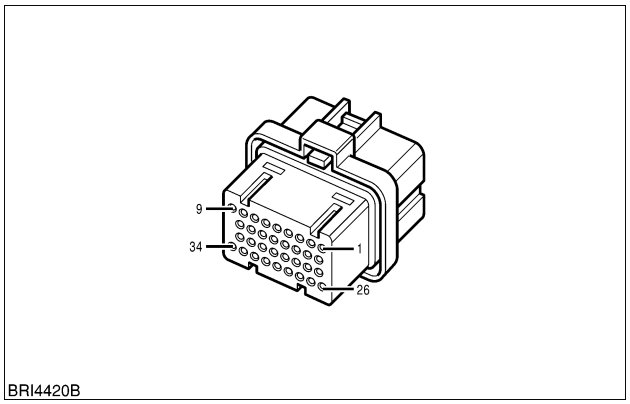
X100 ACU AUXILIARY CONTROL UNIT (CN1b)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	2510 (N)	FRONT HITCH POSITION SIGNAL
5	3235 (O)	ACCELEROMETER SIGNAL
6	3230 (U)	AXLE HEIGHT SENSOR POSITION
11	2248 (K)	PTO FRONT - SWITCH (VCCS)
12	2245 (K)	PTO FRONT - SWITCH TO MODULE (MOM)
16	2530 (N)	FRONT HITCH V REF
17	3220 (LG)	AXLE HEIGHT SENSOR 5V REF
19	2591 (TN)	EXTERNAL SWITCH FHPL DOWN
21	1001Z (W)	STARTER SOLENOID FEED
22	2556 (N)	FRONT HITCH SWITCH COMMON RAIL
23	3295 (O)	FRONT SUSPENSION PRESSURE SWITCH SIGNAL
26	2590 (TN)	EXTERNAL SWITCH FHPL UP

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K148 1



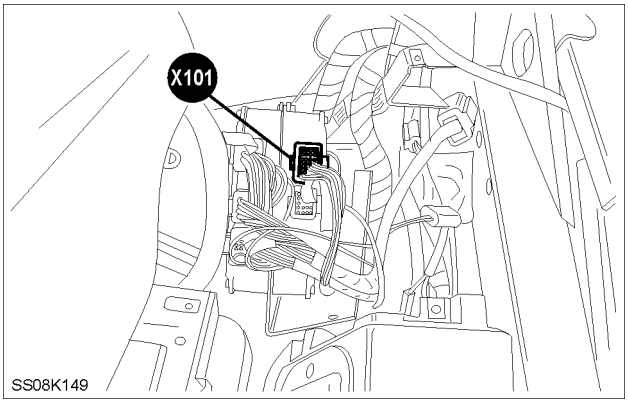
BRI4420B 2

IN CAB RIGHT HAND BEHIND OPERATOR'S SEAT

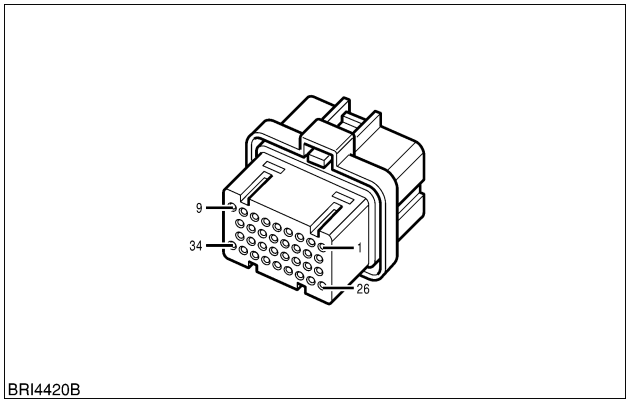
X101 ACU AUXILIARY CONTROL UNIT (CN3b)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
5	4054 (W)	LINK LEVEL DUMP SOLENOID
6	4056 (W)	LINK LEVEL TOP LINK RETRACT SOLENOID
7	4058 (W)	LINK LEVEL RIGHT LINK LOWER SOLENOID
14	4055 (W)	LINK LEVEL TOP LINK EXTEND SOLENOID
15	4057 (W)	LINK LEVEL RIGHT LINK RAISE SOLENOID
25	2250C (K)	PTO FRONT - SUPPLY
34	2250B (K)	PTO FRONT - SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K149 3



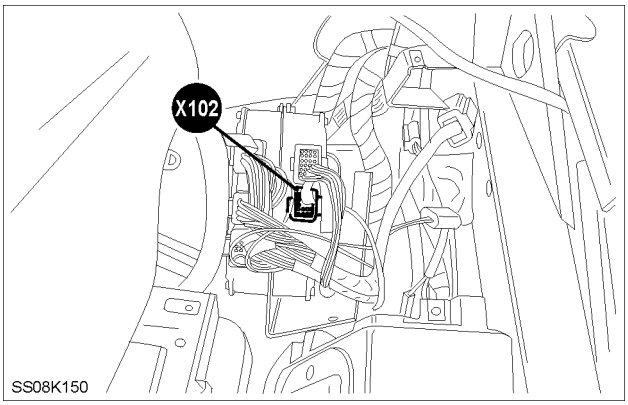
BRI4420B 4

IN CAB RIGHT HAND BEHIND OPERATOR'S SEAT

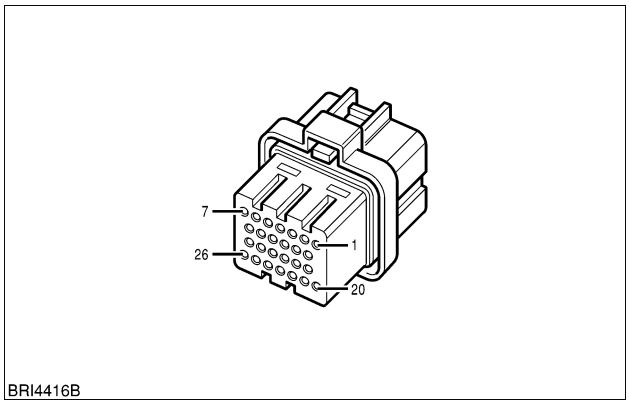
X102 ACU AUXILIARY CONTROL UNIT (CN3a)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
16	5574 (P)	FENDER 3RD EHR SWITCH – UP
17	5576 (P)	FENDER 3RD EHR SWITCH – DOWN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K150 5



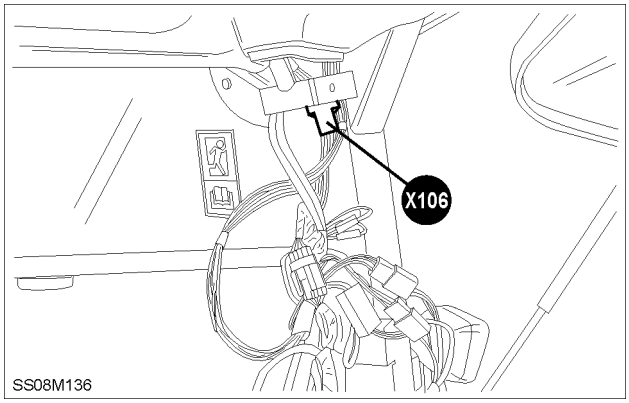
BRI4416B-01 6

IN CAB RIGHT HAND BEHIND OPERATOR'S SEAT

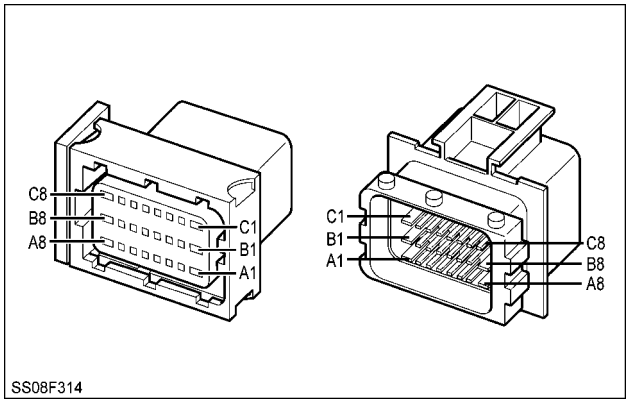
X106 ROOF TO CAB HARNESS - ROOF

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A1	998D (G) / 998 (G)	WORK LAMP-REAR FEED (INNER)
A2	28 (Y)	WIPER MOTOR (PARK RETURN)
A3	56 (W)	WIPER MOTOR-HIGH
A4	58 (R)	WIPER MOTOR-LOW
A5	1019A (G) / 1019 (G)	WINDSHIELD WIPER FEED
A6	1038B (TN) / 1038 (TN)	WINDSHIELD WIPER FEED-REAR
A7	1120 (G)	RR WINDSHIELD WIPER PARK RETURN
A8	4011 (P)	ROTATING BEACON SWITCH SUPPLY
B1	1013B (R) / 1013 (R)	RIGHT HAND LAMPS
B2	249 (LG)	SMV LAMPS RH
B3	666A (P) / 666 (L)	DOMELAMP SWITCH FEED
B4	1090 (R)	REAR WORKLAMP RELAY SIGNAL
B5	1092 (R)	FRONT WORKLAMP RELAY SIGNAL
B6	1925C (R) / 1925 (R)	MIRROR CONTROL +12V
B7	1071B (P)	WORKLAMP FRONT FEED
B8	1071A (P)	WORKLAMP FRONT FEED
C1	1014D (R) / 1014 (R)	LEFT HAND LAMPS
C2	250 (LTG)	SMV LAMPS LH
C3	138A (P) / 138 (L)	RADIO KAM
C4	3079 (R)	RADIO +12V IGNITION
C5	1927A (R) / 1927 (R)	MIRROR ILLUMINATION
C6	3052 (P) / -	DOME LAMP TO DOOR SWITCH
C7	1013AH (R)	RIGHT HAND LAMPS

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M136 7



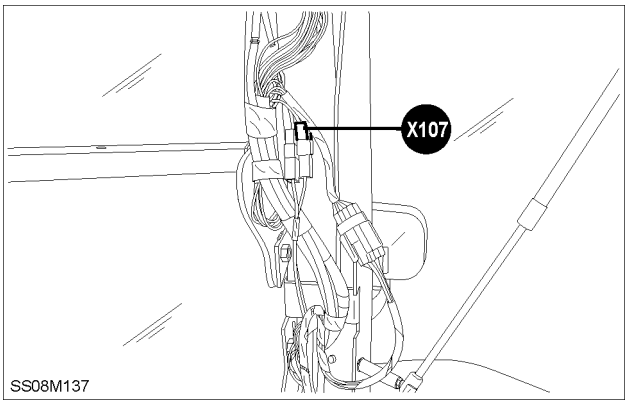
SS08F314 8

REAR RIGHT HAND C-PILLAR

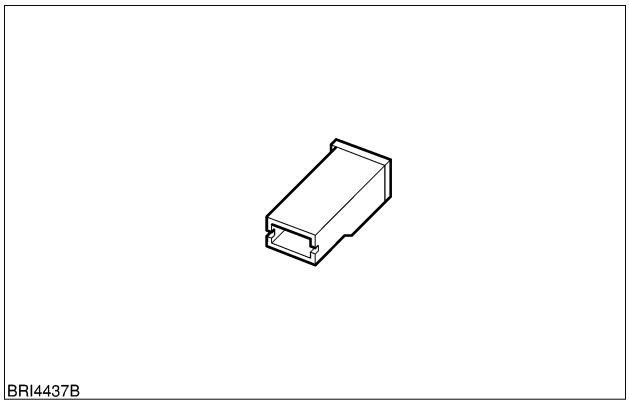
X107 AUX HEADLAMP SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1030A (U)	HEADLAMP DIP BEAM

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M137 9



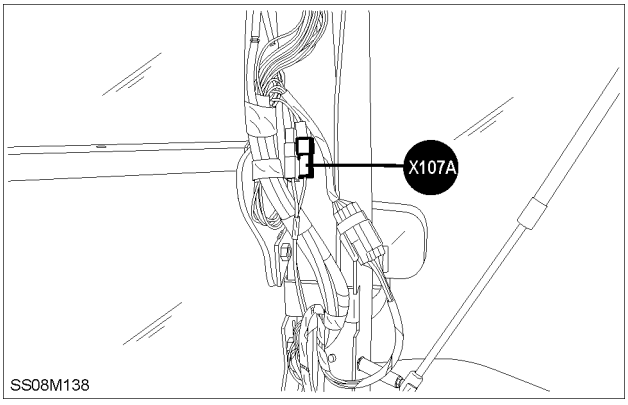
BRI4437B 10

REAR RIGHT HAND C-PILLAR

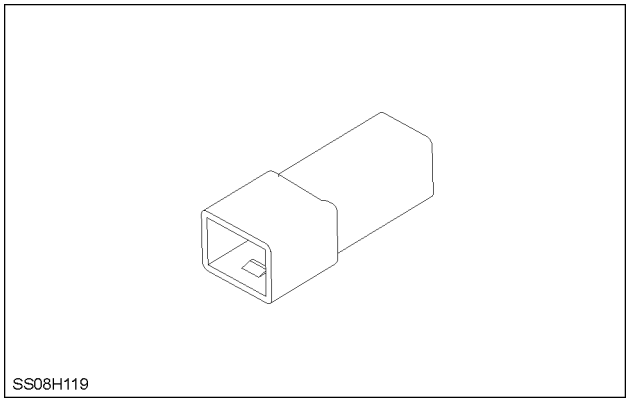
X107A AUX HEADLAMP SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1030A (U)	HEADLAMP DIP BEAM

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M138 11



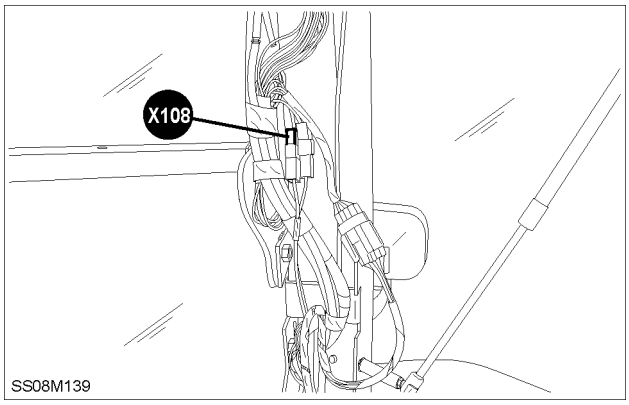
SS08H119 12

REAR RIGHT HAND C-PILLAR

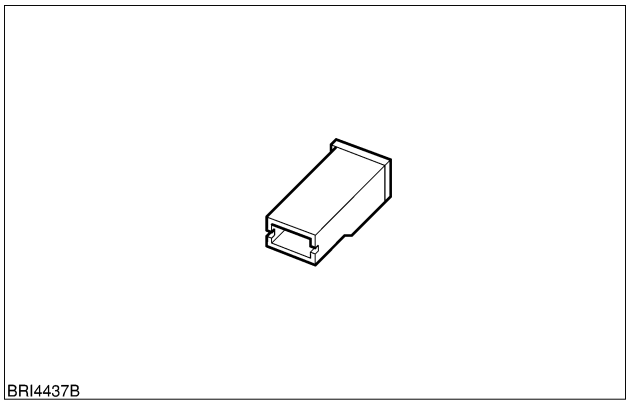
X108 AUX HEADLAMP SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1027E (U)	HEADLAMP MAIN BEAM

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M139 13



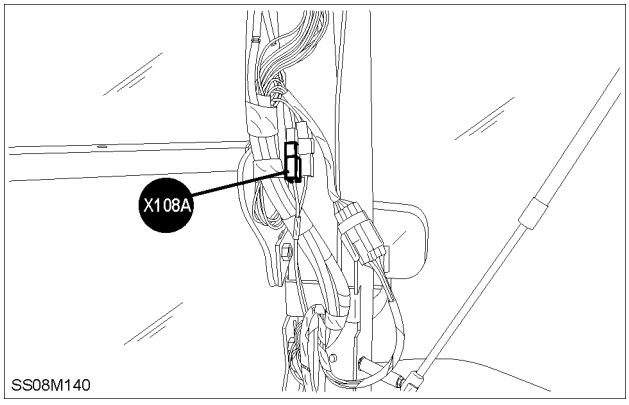
BRI4437B 14

REAR RIGHT HAND C-PILLAR

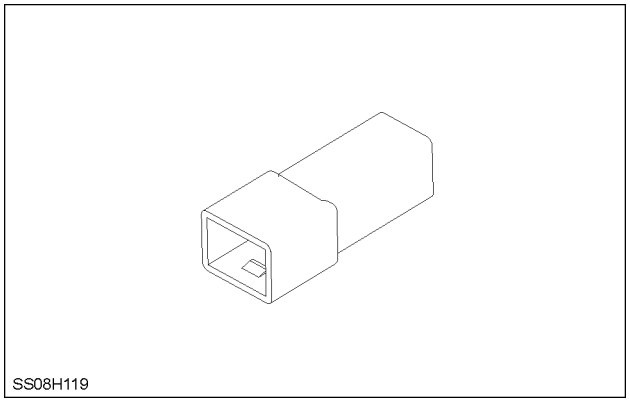
X108A AUX HEADLAMP SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1027A (U)	HEADLAMP MAIN BEAM

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M140 15



SS08H119 16

REAR RIGHT HAND C-PILLAR

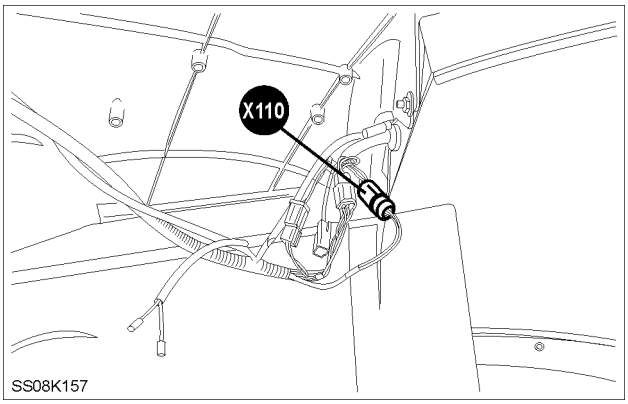
Connector - Component diagram 11

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

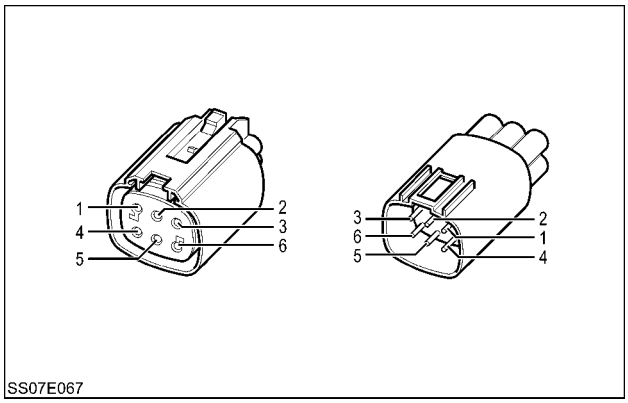
X110 RIGHT HAND FENDER CONNECTOR 2 HPL RAISE/LOWER SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5100B (K) / 5100 (K)	EDC EXTERNAL SWITCH UP
2	5200B (N) / 5200 (N)	EDC VALVE SUPPLY
3	5095A (K) / 5095 (K)	EDC VALVE DOWN EDC EXTERNAL SWITCH DOWN
4	2057 (W)	PTO FENDER SWITCH LH - RH LINK
5	2050E (G) / 2050 (G)	PTO SUPPLY / DOG SUPPLY
6	2056A (W) / 2056 (W)	PTO FENDER PTO SWITCH ON

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K157 1



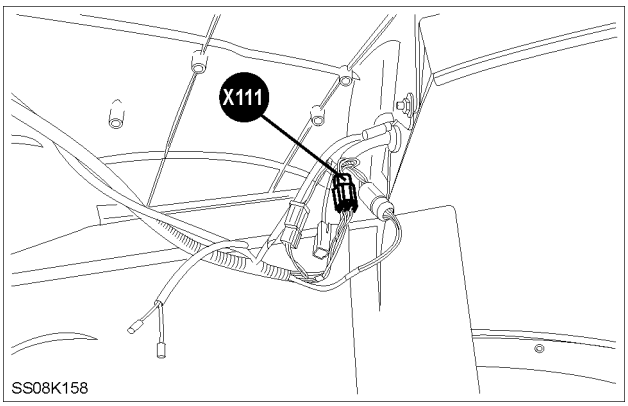
SS07E067 2

RIGHT HAND REAR FENDER

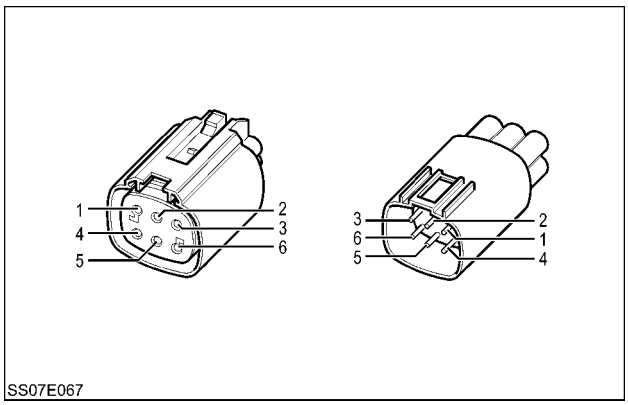
X111 RIGHT HAND FENDER CONNECTOR 1 TAIL LAMP

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1013C (R) / 1013 (R)	RIGHT HAND LAMPS
2	810C (G) / 810 (G)	STOPLAMPS
3	3004B (G) / 3004 (G)	RIGHT HAND TURN SIGNAL WARNING LAMP
4	57AV (B)	EARTH (ALL)
5	998B (G) / 998 (G)	WORK LAMP-REAR FEED (INNER)
6	57AP (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K158 3



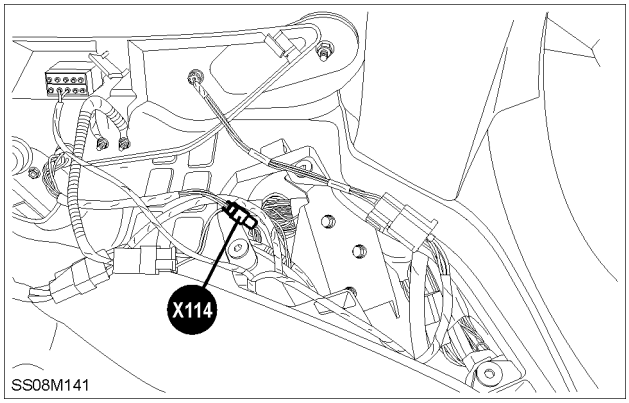
SS07E067 4

RIGHT HAND REAR FENDER

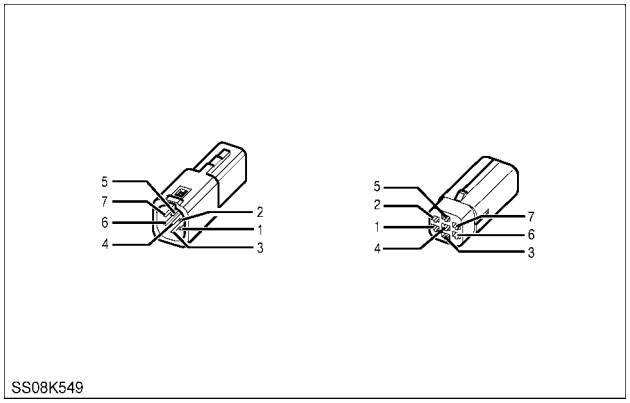
X114 ISO 11786 SIGNAL INTERFACE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2320 (P) / 2320 (P/K/Y)	TRUE GROUND SPEED ISO 11786 SKT.PIN#1
2	2300 (P) / 2300 (P/B/Y)	THEORETICAL GROUND SPEED ISO 11786 SKT.PIN#2
3	2330 (P) / 2330 (P/LG/Y)	PTO SPEED ISO11876 SKT.PIN#3
4	2310 (P) / 2310 (P/G/Y)	IN/OUT OF WORK-HPL MODE ISO11786 SKT.PIN#4
5	3062 (P)	IMPLEMENT SOCKET SWITCH
6	1050A (G) / 1050 (G/W)	ACCESSORY FEED
7	61B (B/O) / 61 (B)	CASE GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M141 5



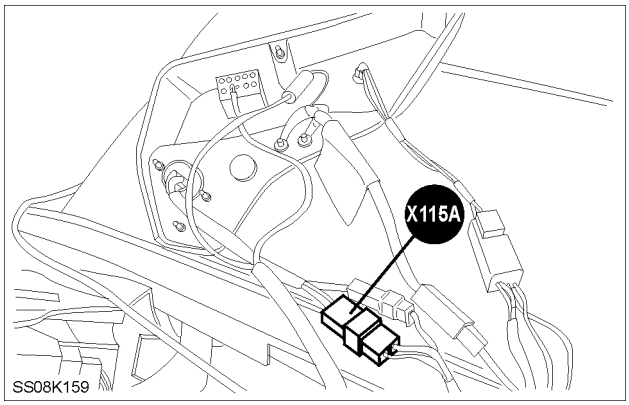
SS08K549 6

BEHIND RIGHT HAND SWITCH PANEL

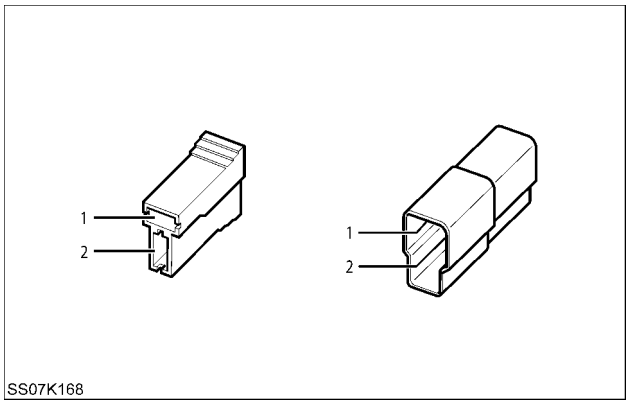
X115A 30 AMPERE POWER SOCKET POSITIV

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	150C (N)	BATTERY FEED (ALL)
2	9032A (Y) / 9032B (Y)	IGN+ TO POWER SKT.

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K159 7



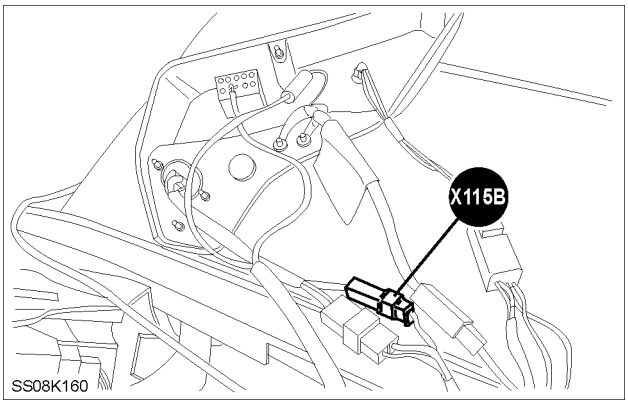
SS07K168 8

BEHIND RIGHT HAND SWITCH PANEL

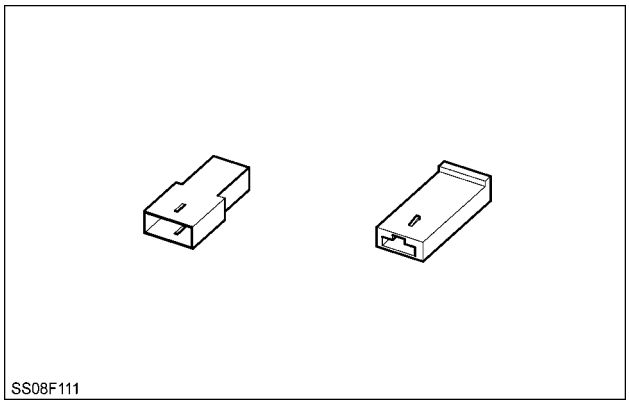
X115B 30 AMPERE POWER SOCKET NEGATIV

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57CW (B) / 57CR (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K160 9



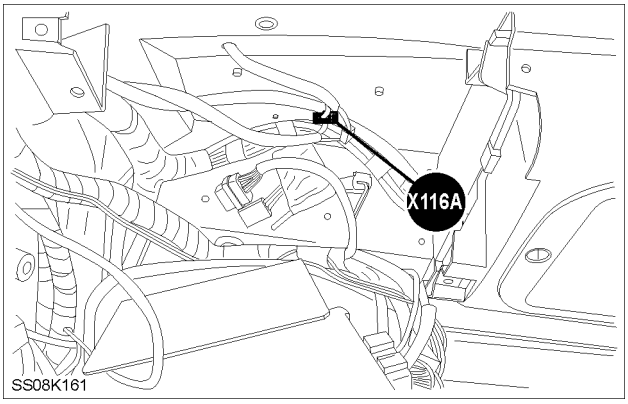
SS08F111 10

BEHIND RIGHT HAND SWITCH PANEL

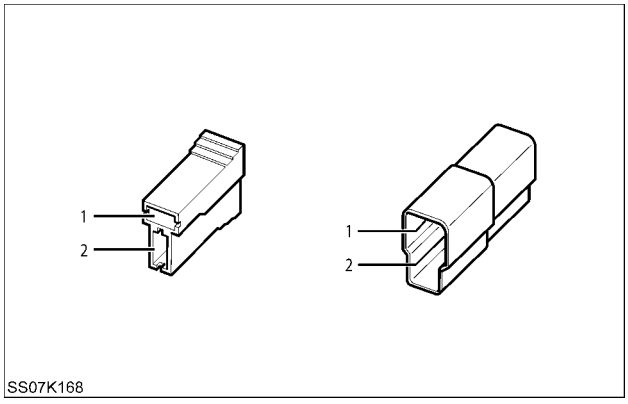
X116A REAR POWER SOCKET IMPLEMENT POSITIVE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	150BF (N)	BATTERY FEED (ALL)
2	9032D (Y)	IGN.+ TO POWER SKT.

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K161 11



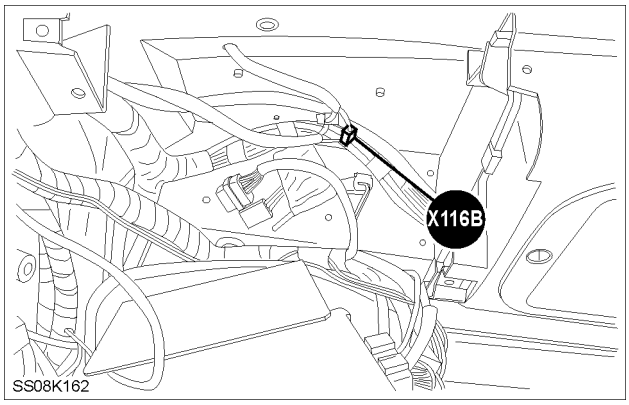
SS07K168 12

CAB RIGHT HAND BEHIND OPERATOR'S SEAT

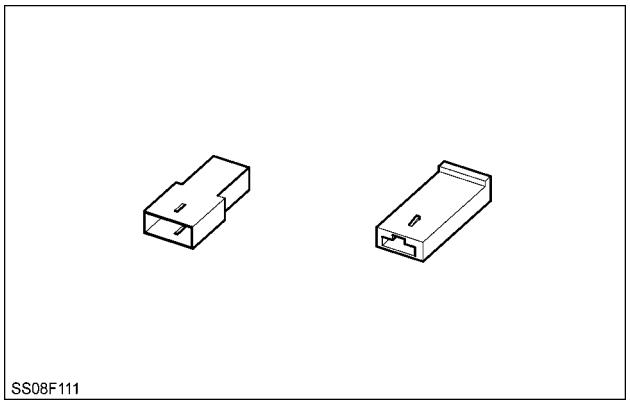
X116B REAR POWER SOCKET IMPLEMENT NEGATIVE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57CR (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K162 13



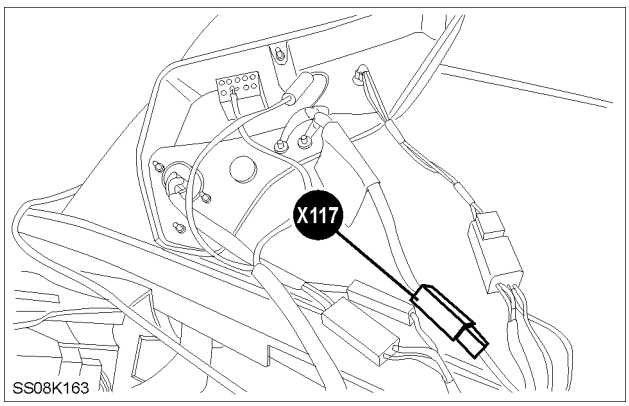
SS08F111 14

CAB RIGHT HAND BEHIND OPERATOR'S SEAT

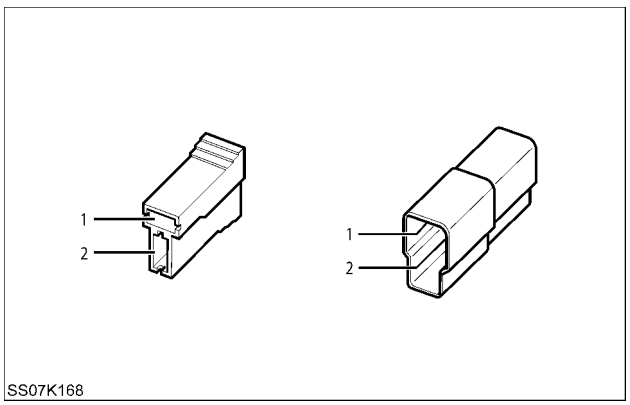
X117 POWER STUDS

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57PT (B) / 57 (B)	EARTH (ALL)
2	3070A (P) / 3070 (P/W)	'B' PILLAR SKT SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K163 15



SS07K168 16

BEHIND RIGHT HAND SWITCH PANEL

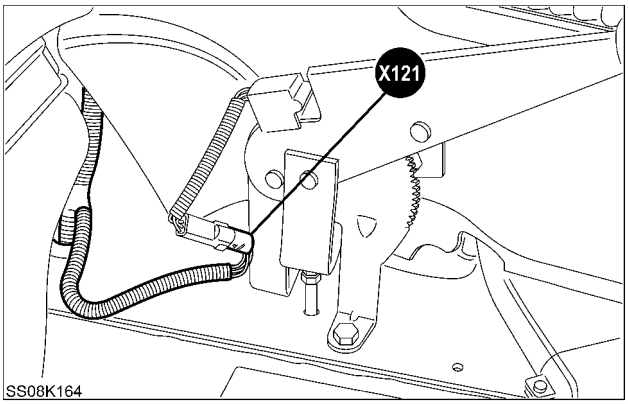
Connector - Component diagram 12

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

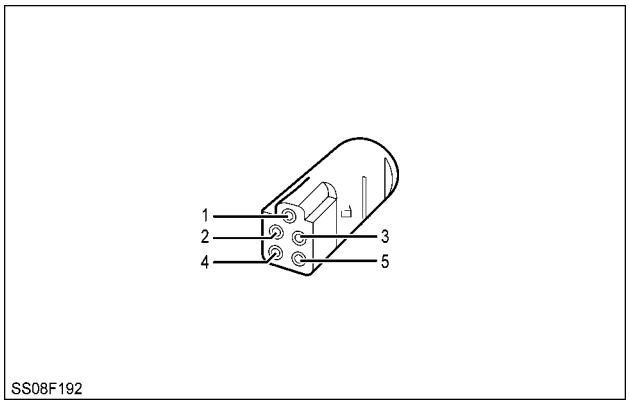
X121 HAND BRAKE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57BL (B)	EARTH (ALL)
2	3014B (R)	HANDBRAKE WARNING LAMP SIGNAL
3	9031B (P)	ADIC MEMORY B+
4	3150 (W)	HANDBRAKE SWITCH (N.C CONTACT) OFF SIG

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K164 1



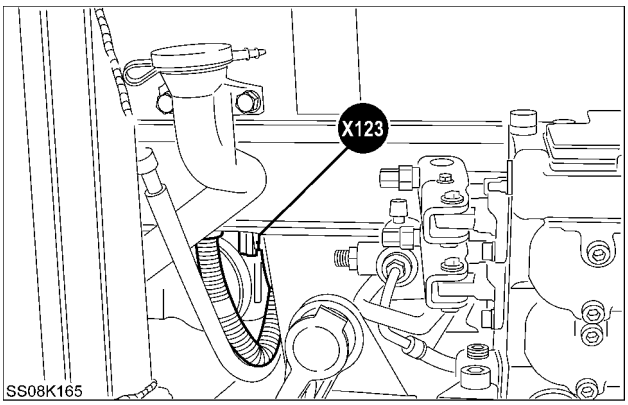
SS08F192 2

LEFT HAND SIDE OPERATOR'S SEAT

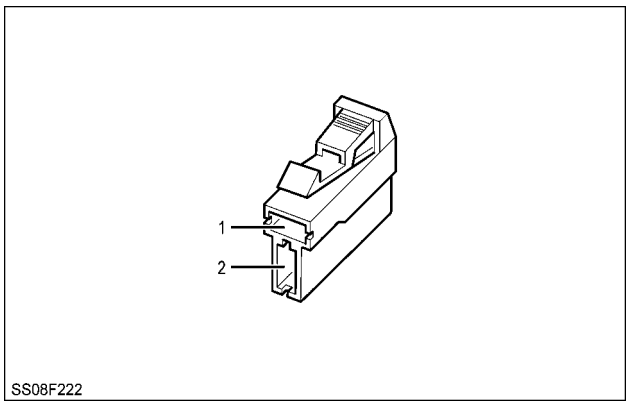
X123 WASHER MOTOR REAR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1121A (G)	HANDBRAKE SWITCH (N.C CONTACT) OFF SIG
2	57G (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K165 3



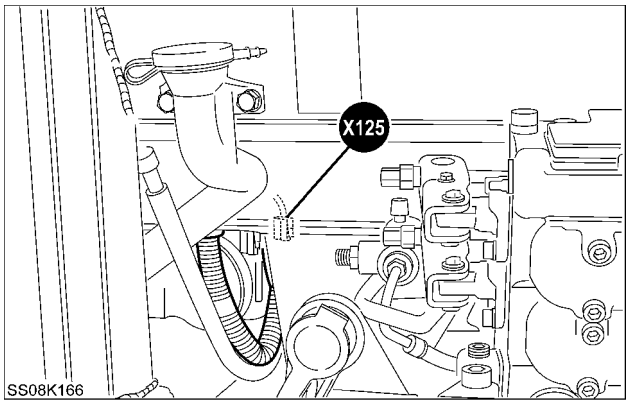
SS08F222 4

REAR OF TRACTOR UNDERNEATH CAB

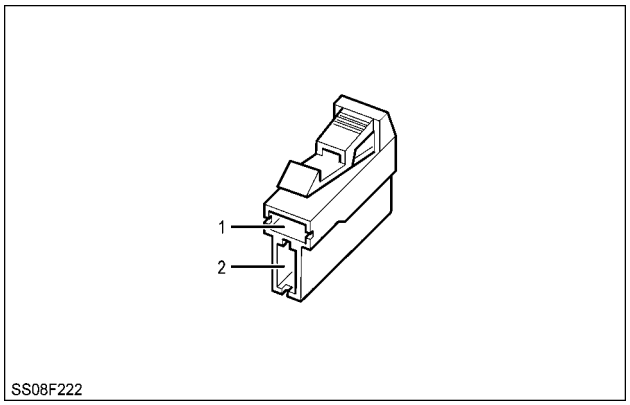
X125 WASHER MOTOR FRONT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	97 (LG)	WINDSHIELD WASHER FEED
2	57F (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K166 5



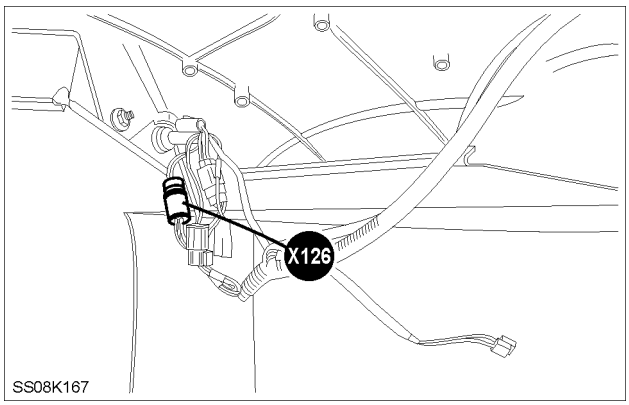
SS08F222 6

REAR OF TRACTOR UNDERNEATH CAB

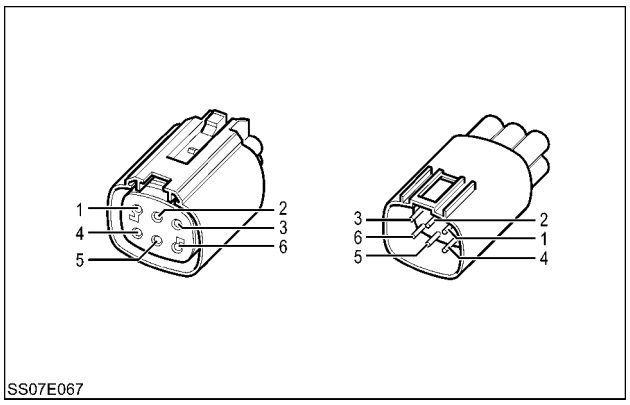
X126 LEFT HAND FENDER CONNECTOR 1 TAIL LAMP

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1014C (R) / 1013 (R)	LEFT HAND LAMPS
2	810B (G) / 810 (G)	STOPLAMPS
3	3005B (G) / 3004 (G)	LEFT HAND TURN SIGNAL WARNING LAMP
4	57AW (B) / 57AY (B)	EARTH (ALL)
5	998A (G) / 998 (G)	WORK LAMP-REAR FEED (INNER)
6	57AN (B) / 57AP (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K167 7



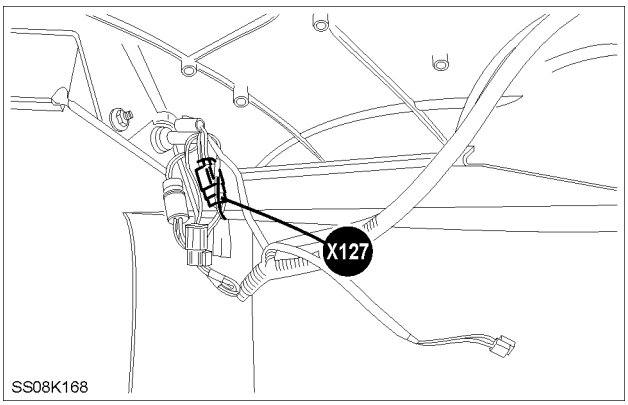
SS07E067 8

LEFT HAND REAR FENDER

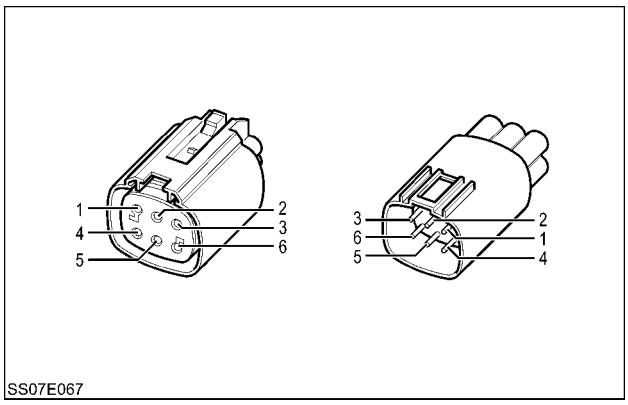
X127 LEFT HAND FENDER CONNECTOR 2 HPL RAISE /LOWER SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5100A (K) / 5100 (K)	EDC EXTERNAL SWITCH UP
2	5200C (N) / 5200 (N)	EDC VALVE SUPPLY
3	5095B (K) / 5095 (K)	EDC EXTERNAL SWITCH DOWN
4	2059 (W)	FENDER PTO SWITCH INPUT
5	2057 (W)	PTO FENDER SWITCH LH - RH LINK
6	2056B (W) / 2056 (W)	PTO FENDER PTO SWITCH ON

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K168 9



SS07E067 10

LEFT HAND REAR FENDER

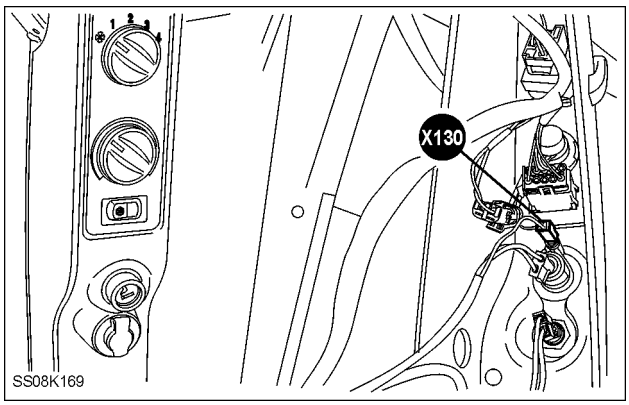
Connector - Component diagram 13

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

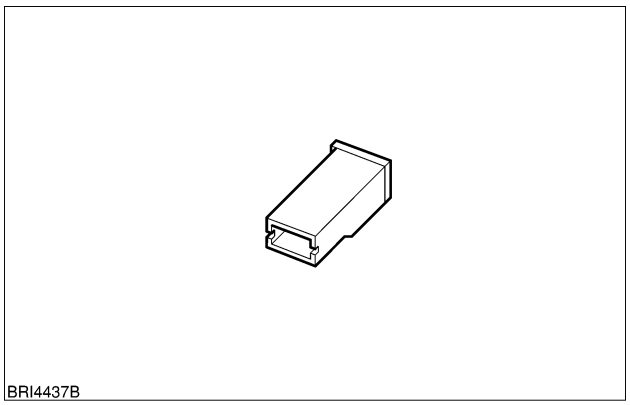
X130 CIGAR LIGHTER (ILLUMINATION)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1012G (R)	ILLUMINATION

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K169 1



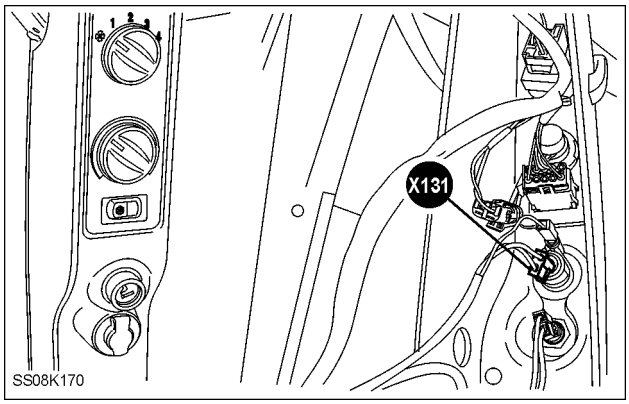
BRI4437B 2

REAR LEFT HAND C-PILLAR

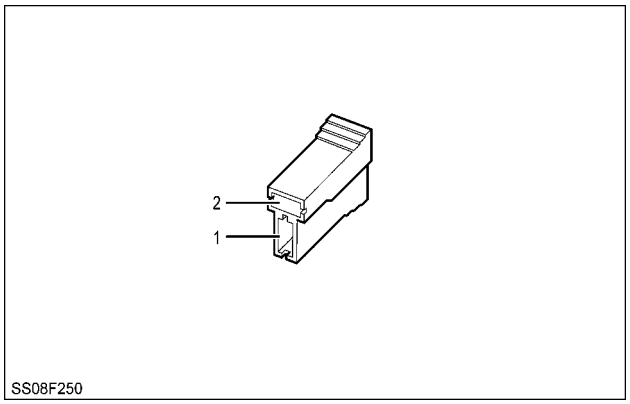
X131 CIGAR LIGHTER (POWER)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57CV (B)	EARTH (ALL)
2	150A (N)	BATTERY FEED (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K170 3



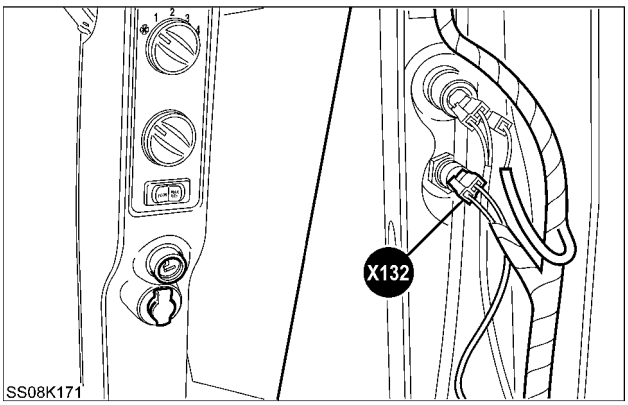
SS08F250 4

REAR LEFT HAND C-PILLAR

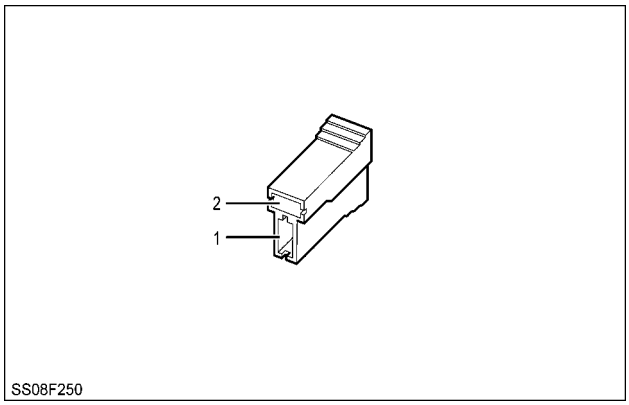
X132 8 AMPERE SOCKET

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57CT (B)	EARTH (ALL)
2	9032C (Y)	IGN+ TO POWER SKT.

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K171 5



SS08F250 6

REAR LEFT HAND C-PILLAR

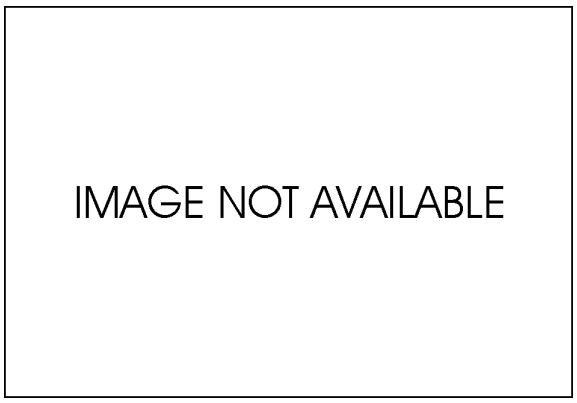
Connector - Component diagram 15

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

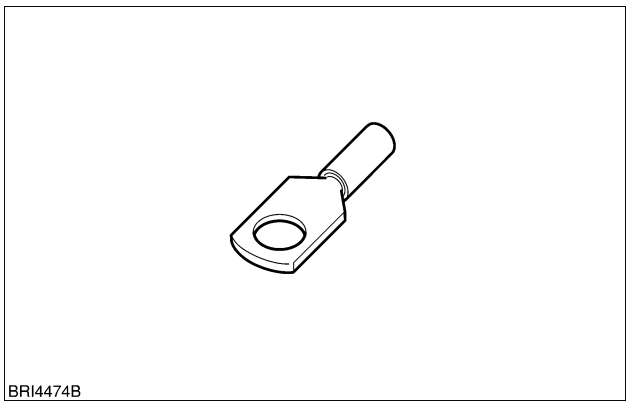
X151 ROOF EARTH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57,57A,57B (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 1



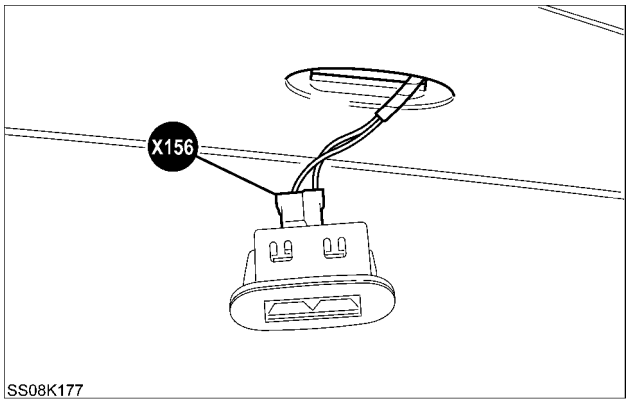
BRI4474B 2

BEHIND RIGHT HAND C-PILLAR COVER TOP

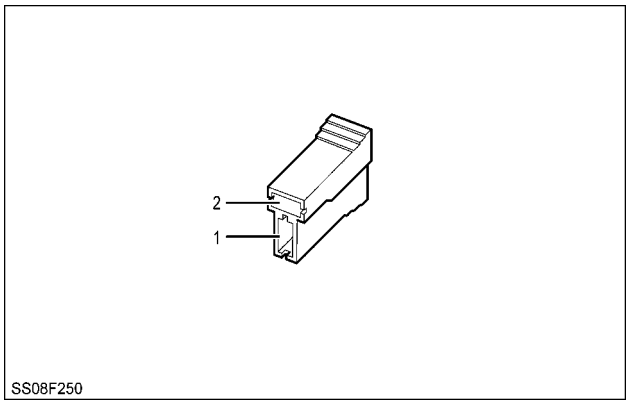
X156 CONSOLE LAMP RIGHT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57H (B)	EARTH (ALL)
2	1013B (R)	RIGHT HAND LAMPS

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K177 3



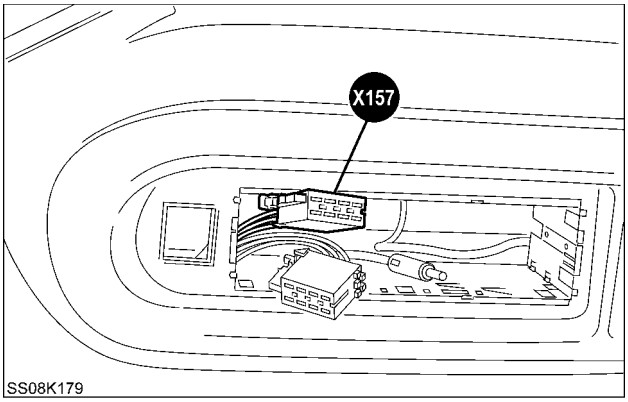
SS08F250 4

RIGHT HAND INSIDE CAB ROOF

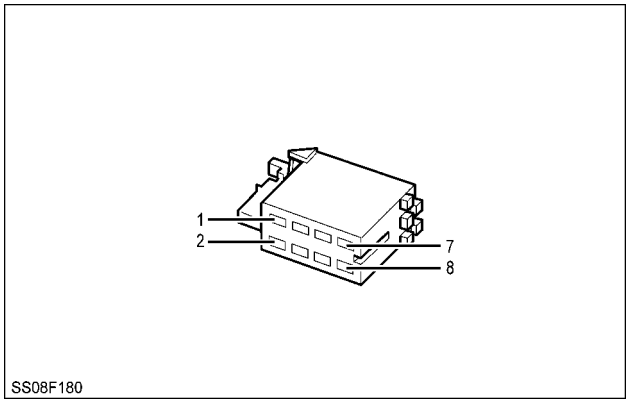
X157 RADIO 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
3	3091 (L)	SPEAKER RR-RHS +
4	3092 (L)	SPEAKER RR-RHS -
5	3097 (G)	SPEAKER RR-LHS +
6	3098 (G)	SPEAKER RR-LHS -

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K179 5



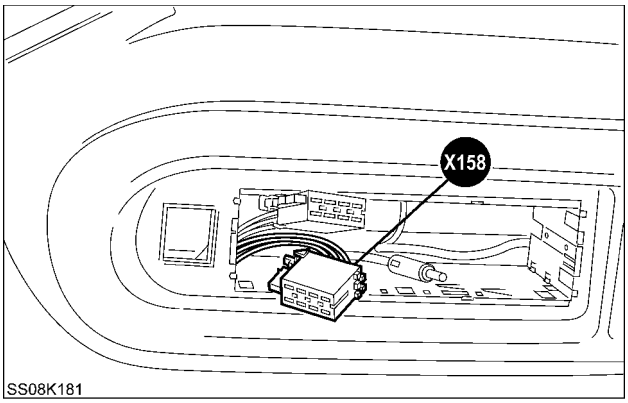
SS08F180 6

RIGHT HAND CAB ROOF

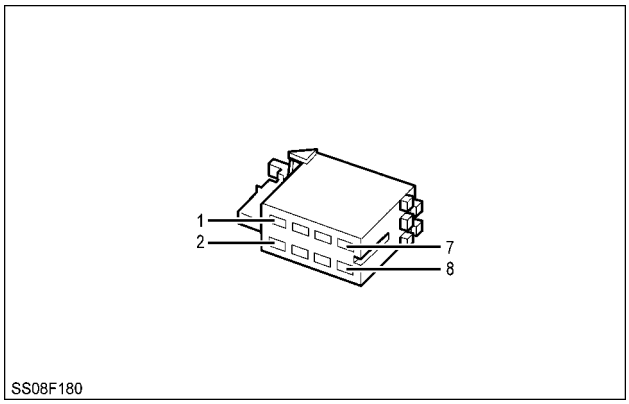
X158 RADIO 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
4	3077 (Y)	RADIO +12VB
6	3078 (O)	RADIO +12V ILLUMINATION
7	3079A (R)	RADIO +12V IGNITION
8	57 (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K181 7



SS08F180 8

RIGHT HAND CAB ROOF

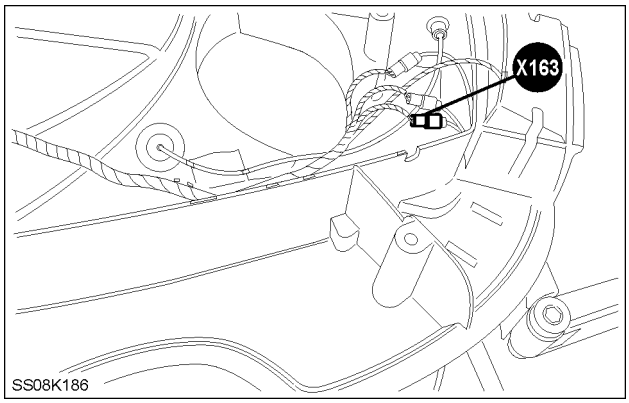
Connector - Component diagram 16

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

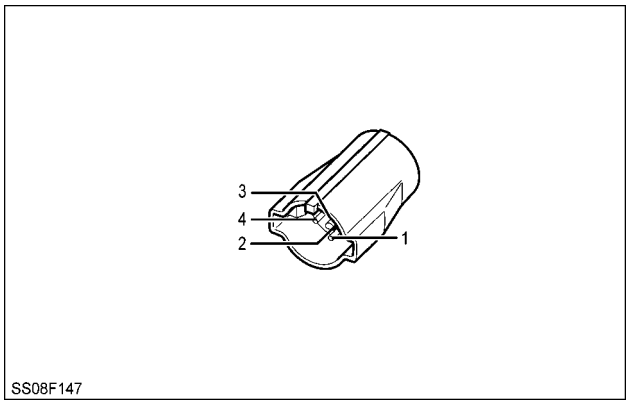
X163 GRABRAIL SIDE LAMP RIGHT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	249 (LTG)	SMV LAMPS RH
2	1013C (R)	RIGHT HAND LAMPS
4	57C (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K186 1



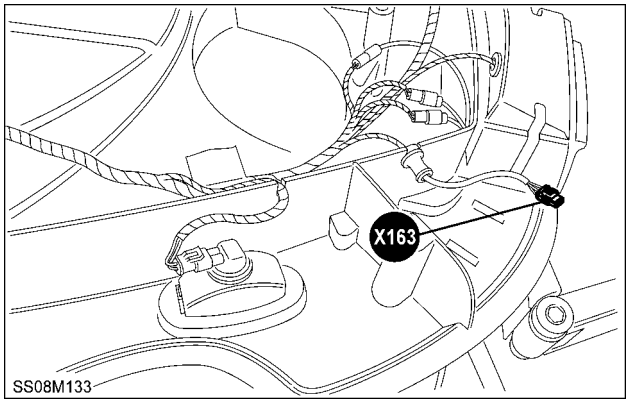
SS08F147 2

RIGHT HAND CAB ROOF

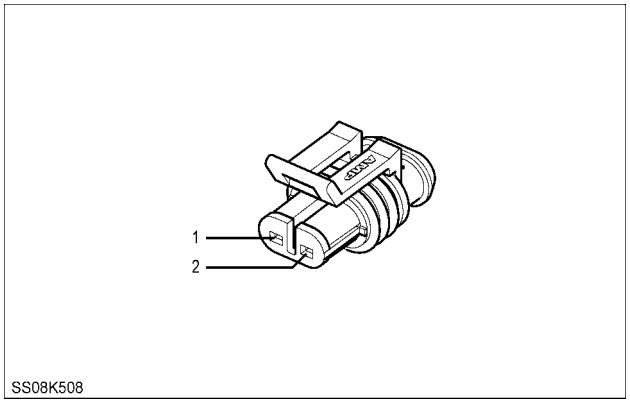
X163 SMV LAMP RIGHT HAND FRONT (NORTH AMERICA ONLY)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	249A (LTG)	SMV LAMPS RH
2	57K (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M133 3



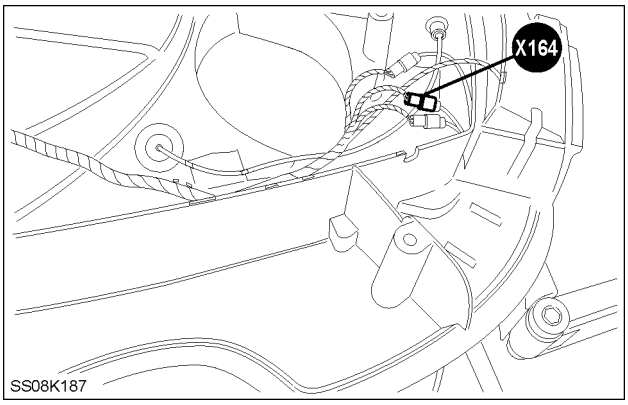
SS08K508 4

RIGHT HAND CAB ROOF

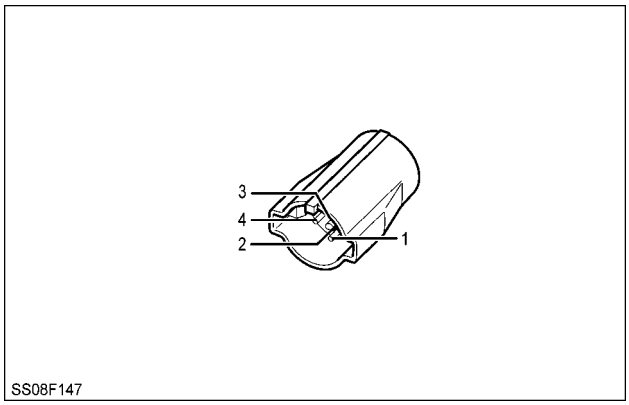
X164 WORKLAMP GRABRAIL RIGHT HAND FRONT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	1097B (R)	FEED FRONT WORKLAMP OUTER
4	57L (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K187 5



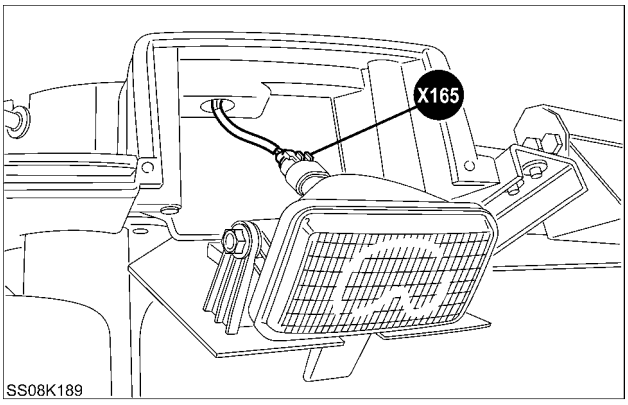
SS08F147 6

RIGHT HAND CAB ROOF

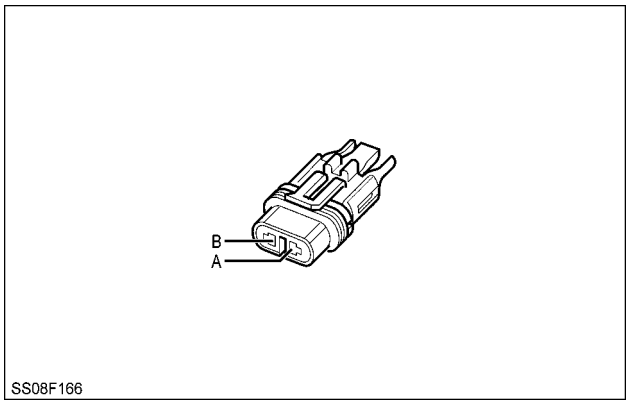
X165 WORKLAMP ROOF FRONT LEFT HAND 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	1098B (W)	FRONT WORKLAMP RELAY GROUND
B	57AA (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K189 7



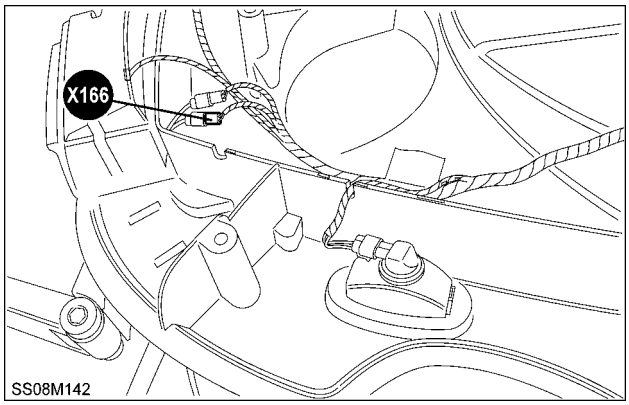
SS08F166 8

FRONT RIGHT HAND CAB ROOF

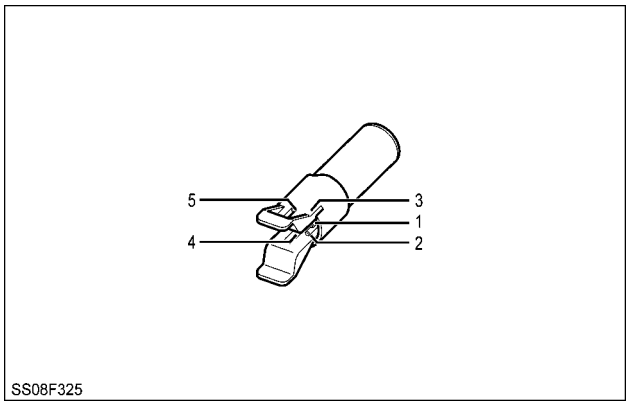
X166 ELECTRIC MIRROR LEFT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1922A (G)	MIRROR CONTROL COMMON
2	1920 (O)	LH MIRROR CONTROL SIDE-SIDE
3	1921 (Y)	LH MIRROR CONTROL UP-DOWN
4	1927A (R)	MIRROR ILLUMINATION
5	57AC (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M142 9



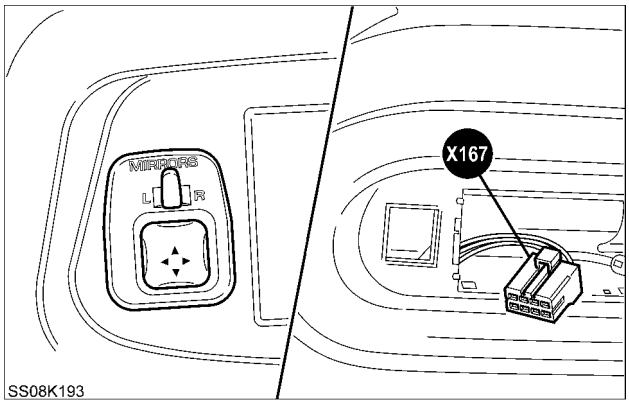
SS08F325 10

LEFT HAND FRONT CAB ROOF

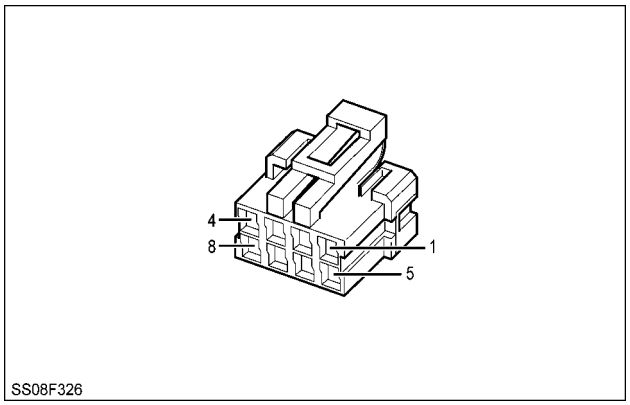
X167 MIRROR CONTROL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1920 (O)	LH MIRROR CONTROL SIDE-SIDE
2	1923 (O)	RH MIRROR CONTROL SIDE-SIDE
4	57AE (B)	EARTH (ALL)
5	1924 (Y)	RH MIRROR CONTROL UP-DOWN
6	1921 (Y)	LH MIRROR CONTROL UP-DOWN
7	1922 (G)	MIRROR CONTROL COMMON
8	1925 (R)	MIRROR CONTROL +12V

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K193 11



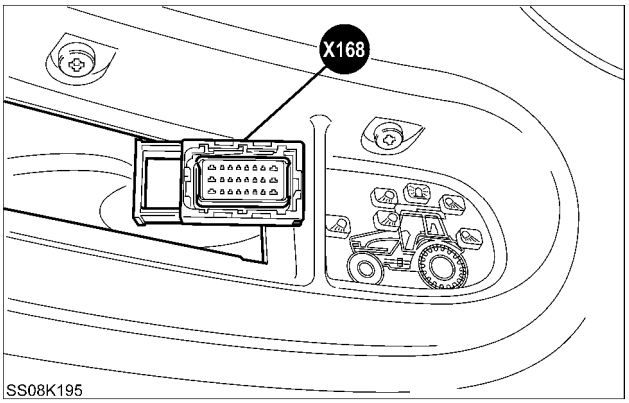
SS08F326 12

CAB ROOF

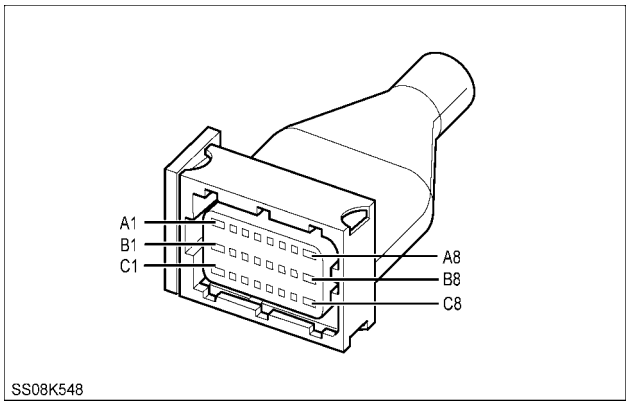
X168 WORKLAMPS ECU

POS.	WIRE NUMBER	CIRCUIT REFERENCE
B1	4011 (L)	ROTATING BEACON SWITCH SUPPLY
B2	138B (L)	RADIO KAM
B3	57X (B)	EARTH (ALL)
B4	1098A (W)	FRONT WORKLAMP RELAY GROUND
B5	1098B (W)	FRONT WORKLAMP RELAY GROUND
B6	1090 (R)	REAR WORKLAMP RELAY SIGNAL
B7	1097A (R)	FEED FRONT WORKLAMP OUTER
B8	1097B (R)	FEED FRONT WORKLAMP OUTER
C1	997 (G)	WORK LAMP-REAR FEED (OUTER)
C2	4012 (L)	ROTATING BEACON FEED
C3	998A (G)	WORK LAMP-REAR FEED (INNER)
C4	998B (G)	WORK LAMP-REAR FEED (INNER)
C5	1013AH (R)	RIGHT HAND LAMPS
C6	1092 (R)	FRONT WORKLAMP RELAY SIGNAL
C7	1071A (L)	WORKLAMP FRONT FEED
C8	1071B (L)	WORKLAMP FRONT FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K195 13



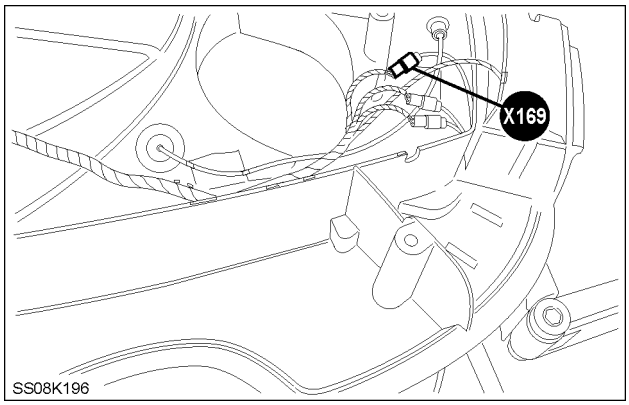
SS08K548 14

CAB ROOF

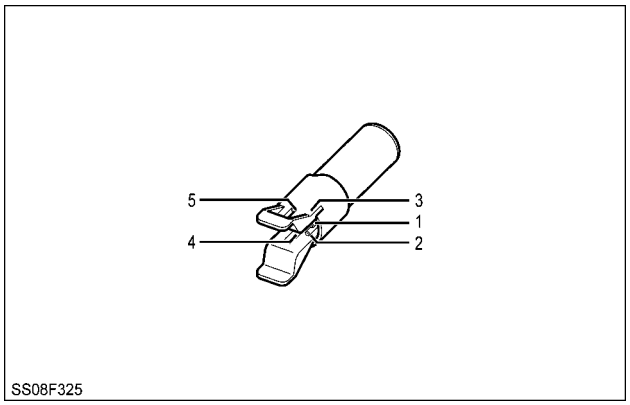
X169 ELECTRIC MIRROR RIGHT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1922B (G)	MIRROR CONTROL COMMON
2	1923 (O)	RH MIRROR CONTROL SIDE-SIDE
3	1924 (Y)	RH MIRROR CONTROL UP-DOWN
4	1927B (R)	MIRROR ILLUMINATION
5	57AD (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K196 15



SS08F325 16

FRONT RIGHT HAND CAB ROOF

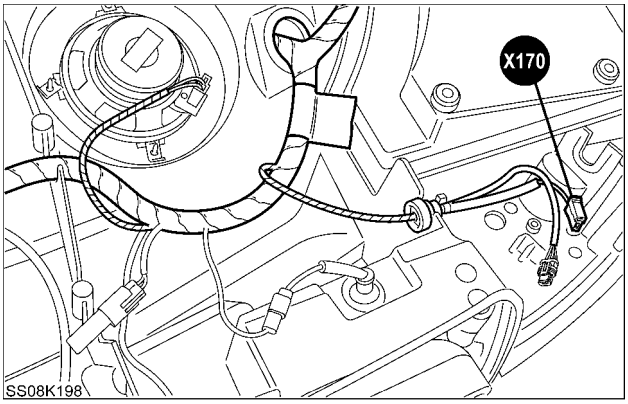
Connector - Component diagram 17

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

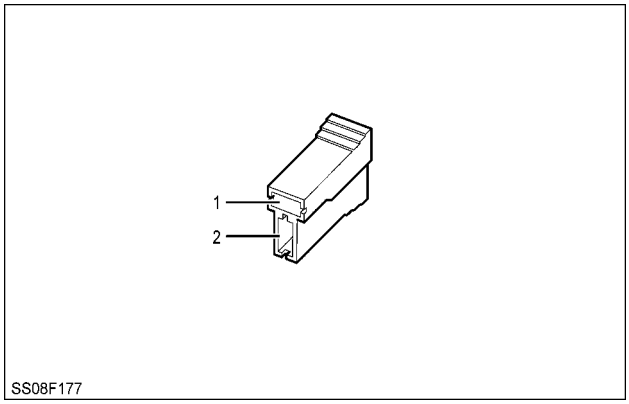
X170 ROTATING BEACON RIGHT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	4012B (L)	ROTATING BEACON FEED
2	57Y (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K198 1



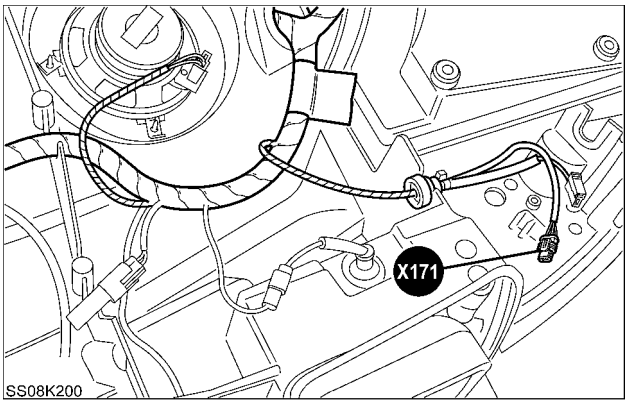
SS08F177 2

RIGHT HAND CAB ROOF

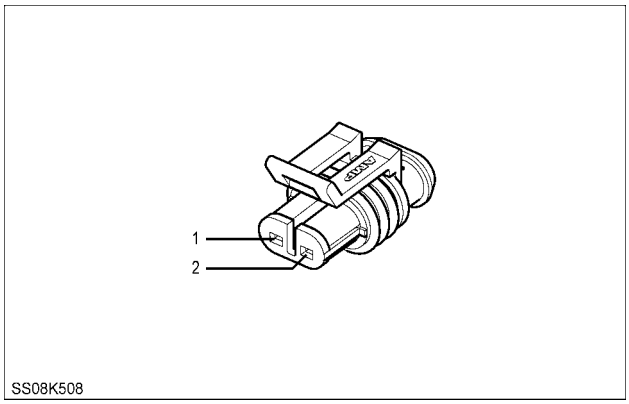
X171 SMV LAMP REAR RIGHT HAND (NORTH AMERICA ONLY)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	249B (LTG)	SMV LAMPS RH
2	57G (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K200 3



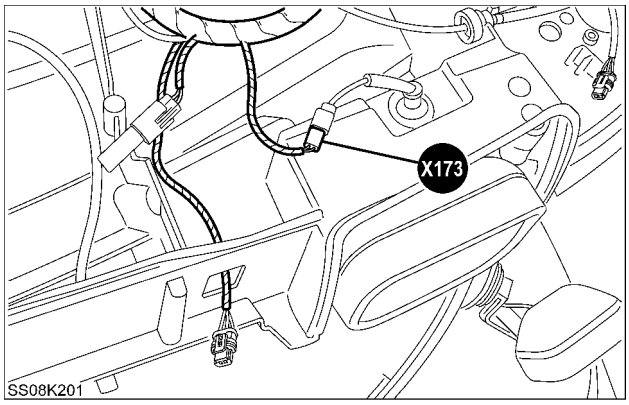
SS08K508 4

REAR RIGHT HAND CAB ROOF

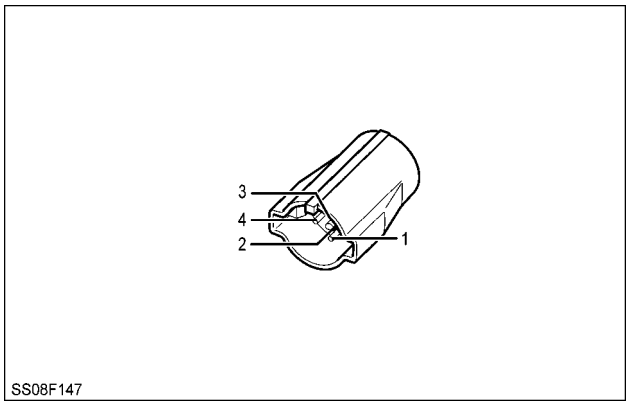
X173 WORKLAMP REAR RIGHT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	997B (G)	WORK LAMP-REAR FEED (OUTER)
4	57F (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K201 5



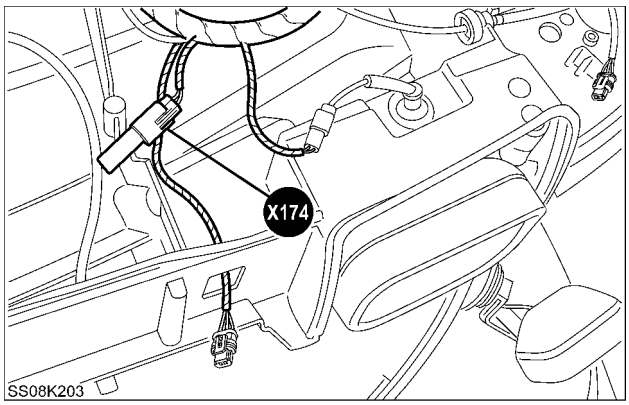
SS08F147 6

REAR RIGHT HAND CAB ROOF

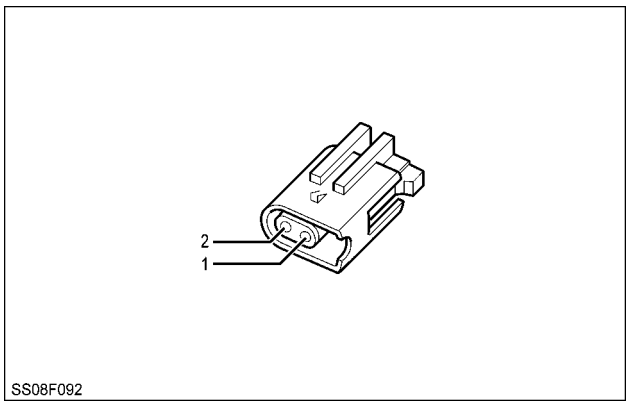
X174 LICENCE PLATE DIODE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	978 (W)	LICENCE PLATE LAMP
2	997C (G)	WORK LAMP-REAR FEED (OUTER)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K203 7



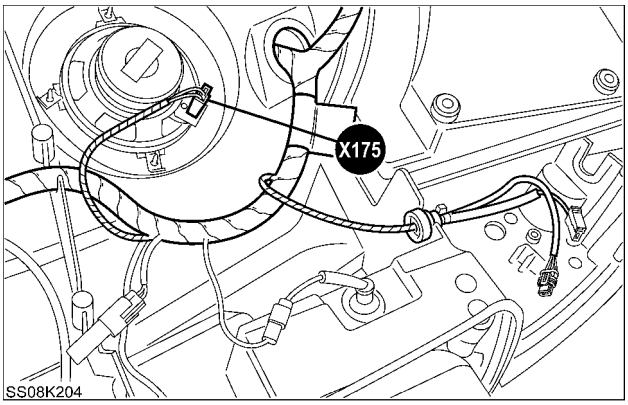
SS08F092 8

REAR RIGHT HAND CAB ROOF

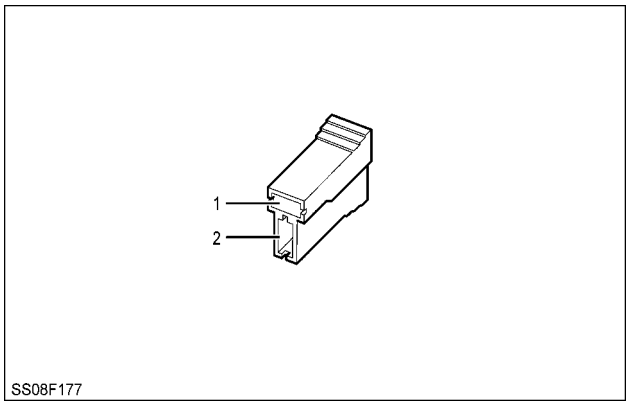
X175 RADIO SPEAKER RIGHT HAND REAR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3091 (L)	SPEAKER RR-RHS +
2	3092 (L)	SPEAKER RR-RHS -

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K204 9



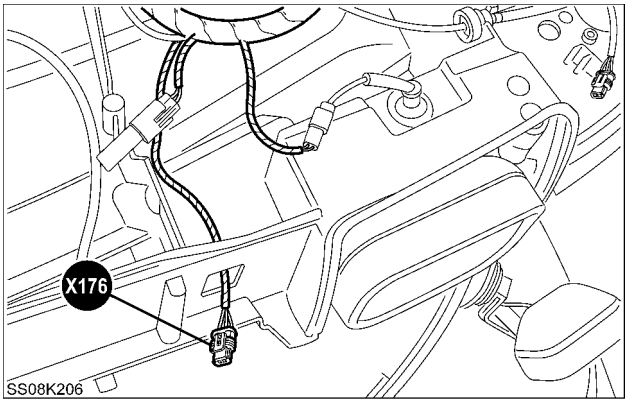
SS08F177 10

REAR RIGHT HAND CAB ROOF

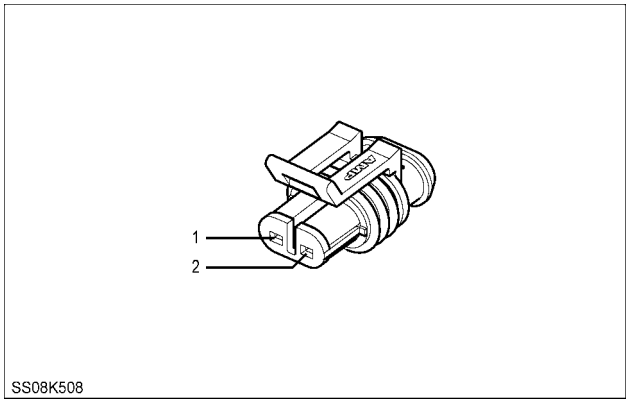
X176 LICENCE PLATE RIGHT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1014A (R)	LEFT HAND LAMPS
2	998A (W)	WORK LAMP-REAR FEED (INNER)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K206 11



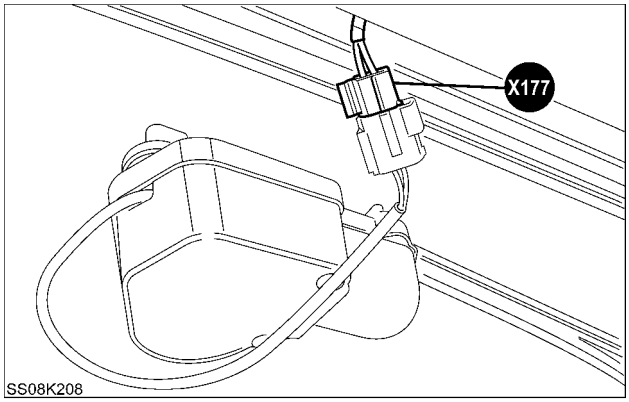
SS08K508 12

REAR RIGHT HAND CAB ROOF

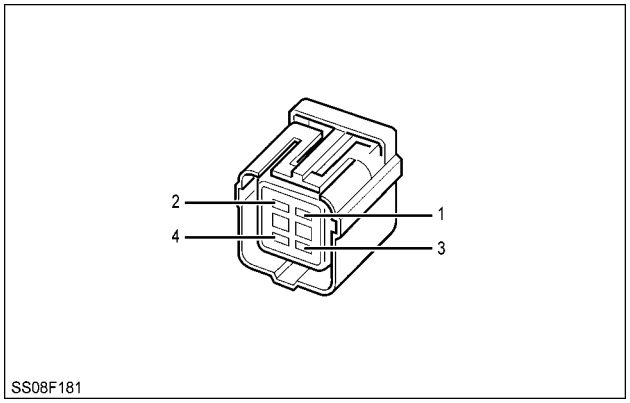
X177 WIPER MOTOR REAR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1120 (G)	RR WINDSHIELD WIPER PARK RETURN
2	57D (B)	EARTH (ALL)
3	1038 (TN)	WINDSHIELD WIPER FEED-REAR

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K208 13



SS08F181 14

REAR CAB ROOF

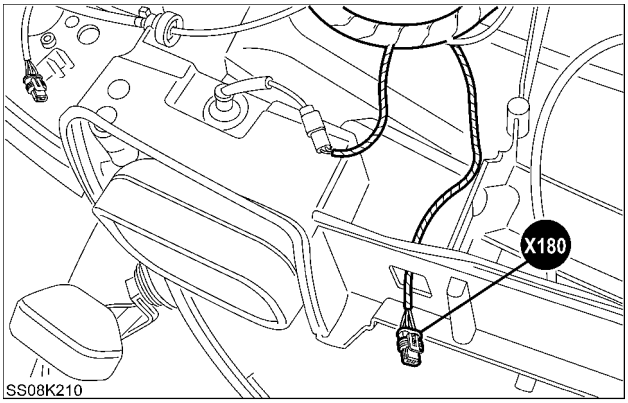
Connector - Component diagram 18

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

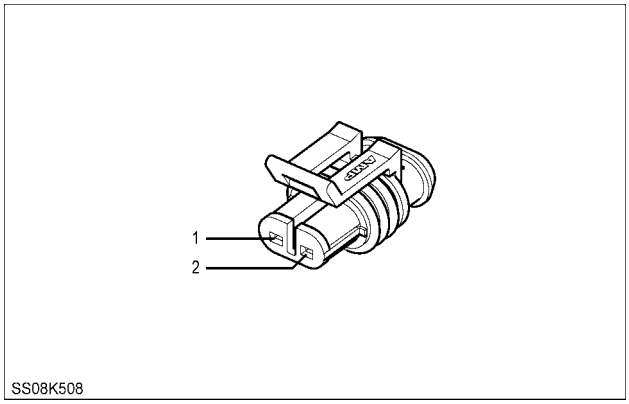
X180 LICENCE PLATE LEFT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1014B (R)	LEFT HAND LAMPS
2	978B (W)	LICENCE PLATE LAMP

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K210 1



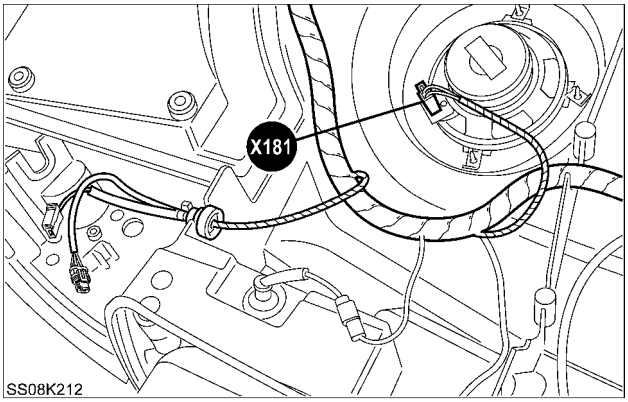
SS08K508 2

REAR LEFT HAND CAB ROOF

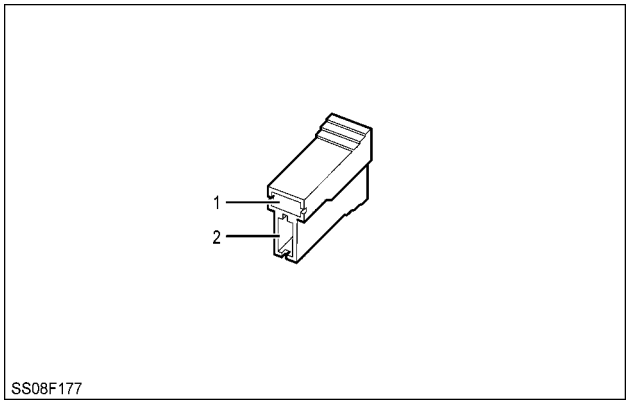
X181 RADIO SPEAKER LEFT HAND REAR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3097 (G)	SPEAKER RR-LHS +
2	3098 (G)	SPEAKER RR-LHS -

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K212 3



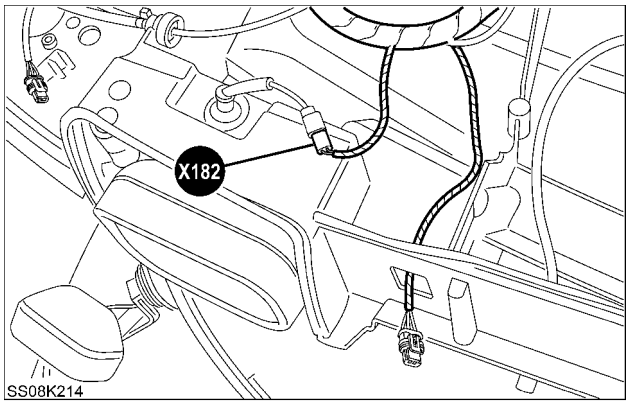
SS08F177 4

REAR LEFT HAND CAB ROOF

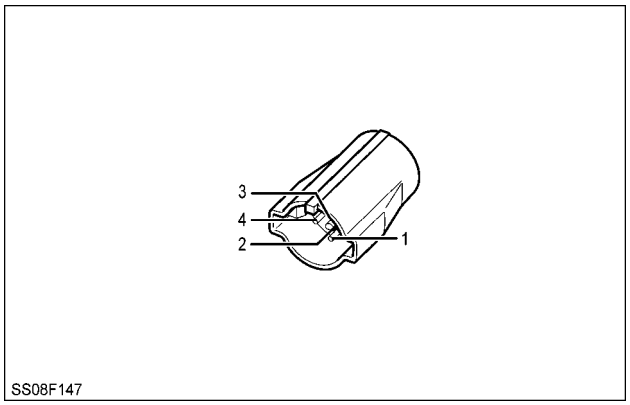
X182 WORKLAMP LEFT HAND REAR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	997A (G)	WORK LAMP-REAR FEED (OUTER)
4	57P (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K214 5



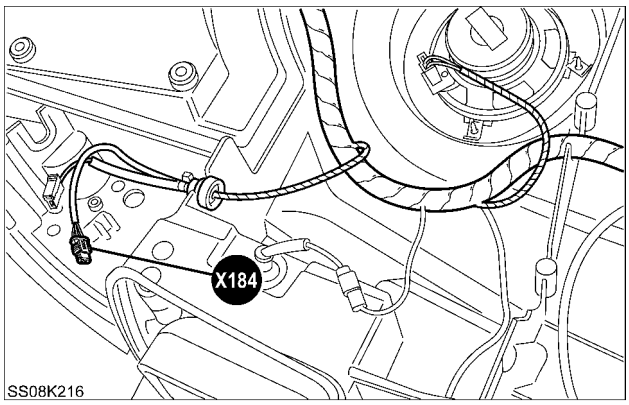
SS08F147 6

REAR LEFT HAND CAB ROOF

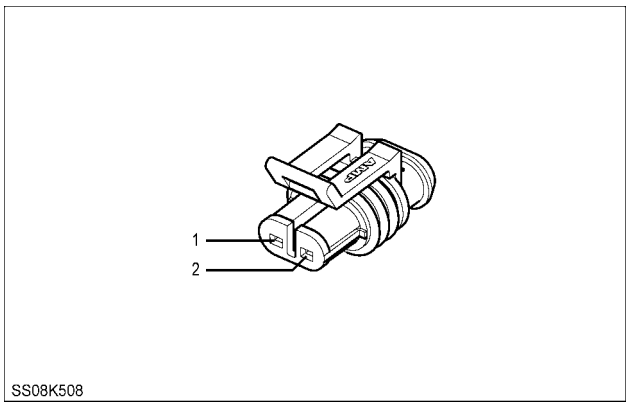
X184 SMV LAMP REAR LEFT HAND (NORTH AMERICA ONLY)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	250B (LTG)	SMV LAMPS LH
2	57Q (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K216 7



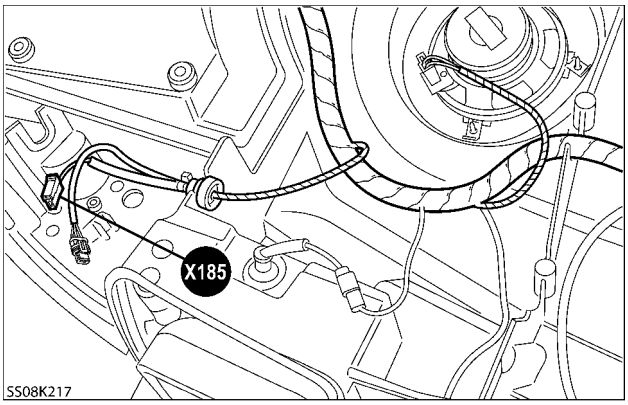
SS08K508 8

REAR LEFT HAND CAB ROOF

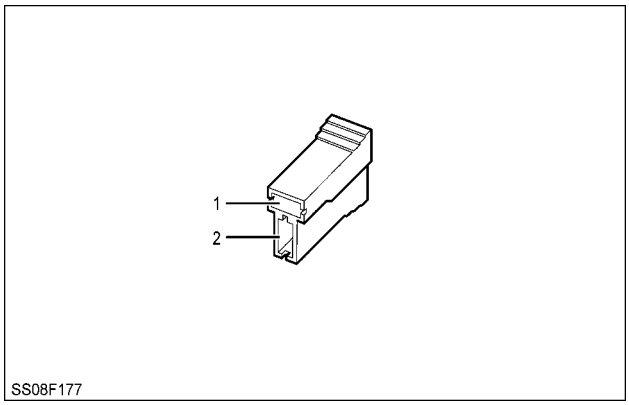
X185 ROTATING BEACON LEFT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	4012A (L)	ROTATING BEACON FEED
2	57Z (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K217 9



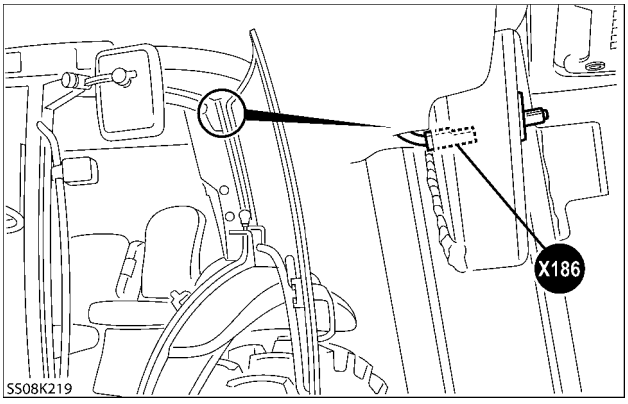
SS08F177 10

REAR LEFT HAND CAB ROOF

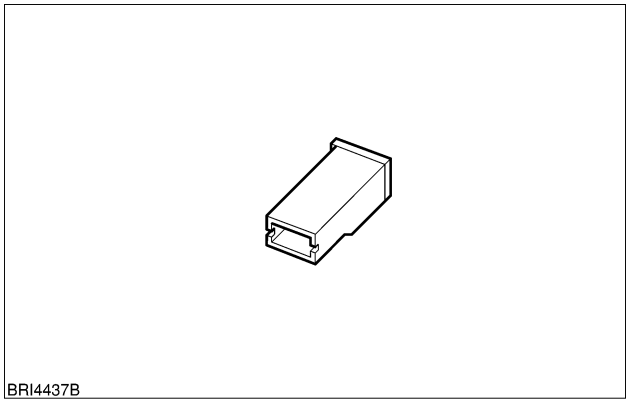
X186 DOOR SWITCH LEFT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3052B (L)	DOME LAMP TO DOOR SWITCH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K219 11



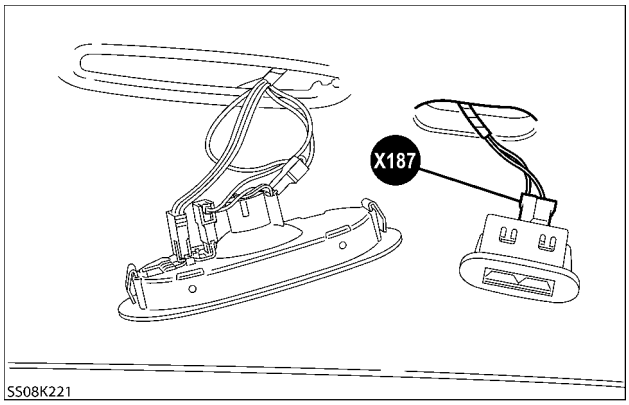
BRI4437B 12

TOP REAR LEFT HAND CAB DOOR

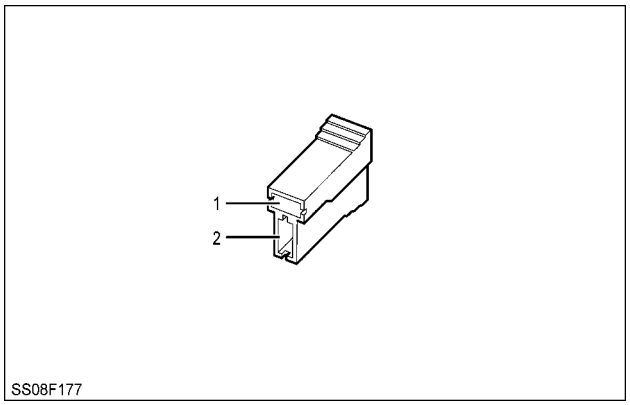
X187 CONSOLE LAMP LEFT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57W (B)	EARTH (ALL)
2	1014 (R)	LEFT HAND LAMPS

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K221 13



SS08F177 14

LEFT HAND CAB ROOF

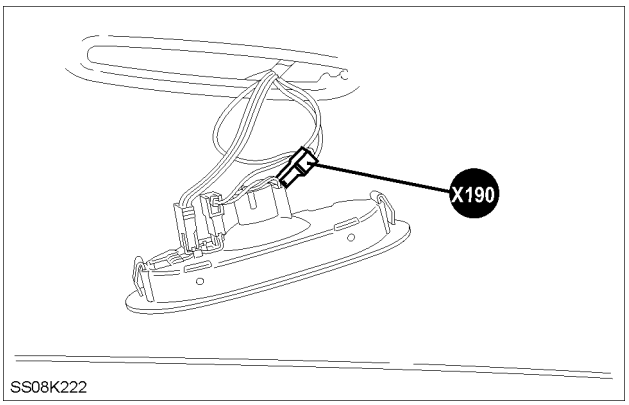
Connector - Component diagram 19

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

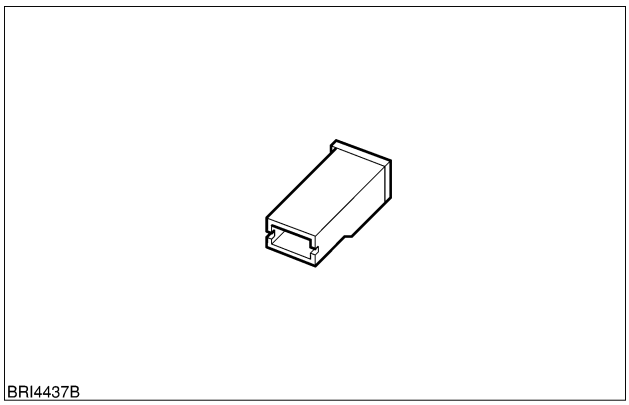
X190 INTERIOR LAMP A

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3057,3057A (P)	PUDDLE LAMP RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K222 1



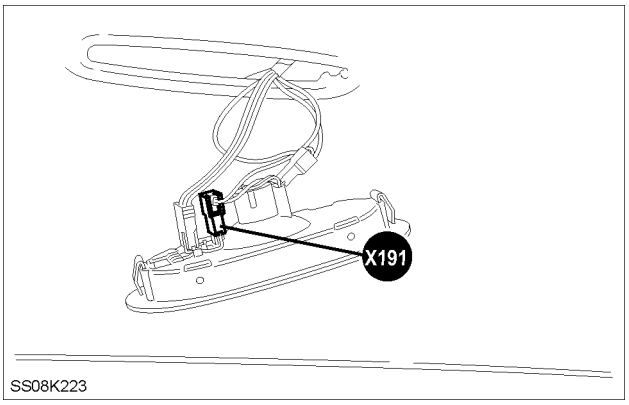
BRI4437B 2

CAB ROOF

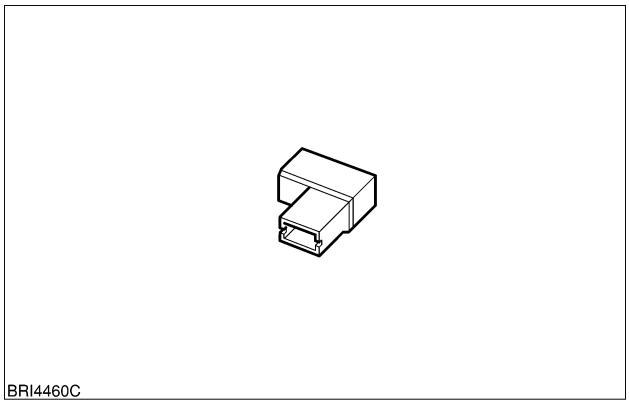
X191 INTERIOR LAMP B1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	666A (L)	DOMELAMP SWITCH FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K223 3



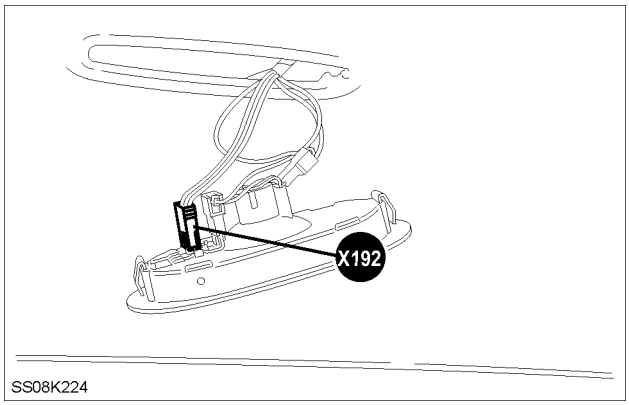
BRI4460C 4

CAB ROOF

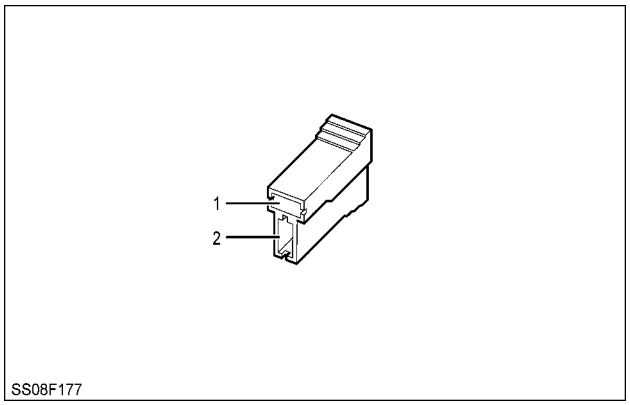
X192 INTERIOR LAMP B2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3052A,3052B (L)	DOME LAMP TO DOOR SWITCH
2	57R (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K224 5



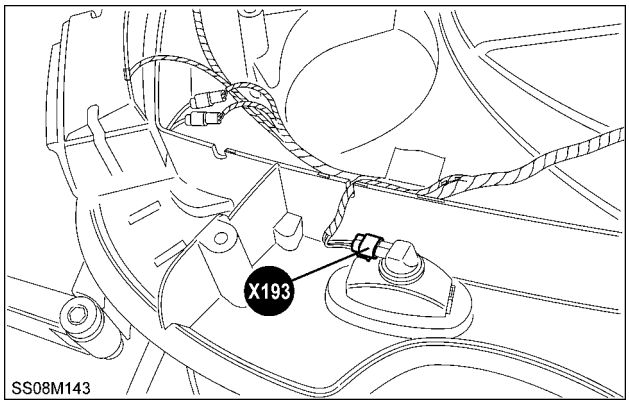
SS08F177 6

CAB ROOF

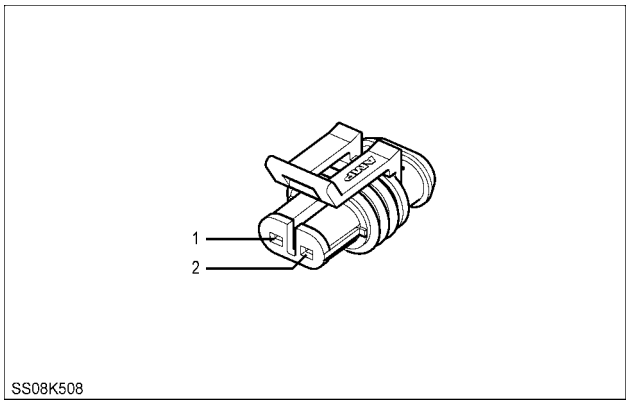
X193 PUDDLE LAMP LEFT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3057A (L)	PUDDLE LAMP RETURN
2	666C (L)	DOMELAMP SWITCH FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M143 7



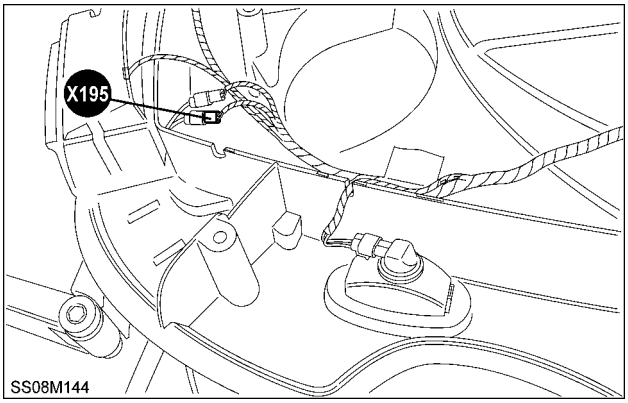
SS08K508 8

FRONT LEFT HAND CAB ROOF

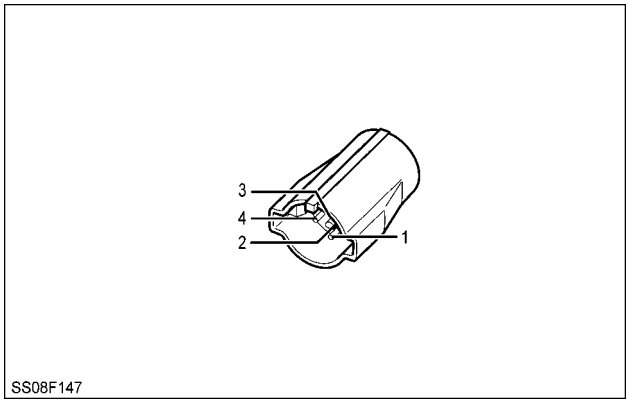
X195 SIDE LAMP GRABRAIL LEFT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	250 (LTG)	SMV LAMPS LH
2	1014C (R)	LEFT HAND LAMPS
4	57E (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M144 9



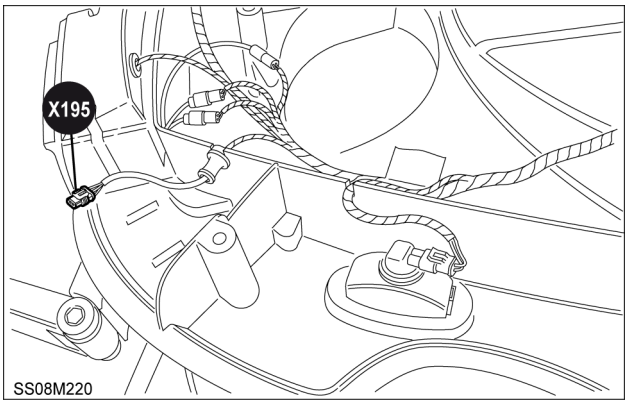
SS08F147 10

FRONT LEFT HAND CAB ROOF

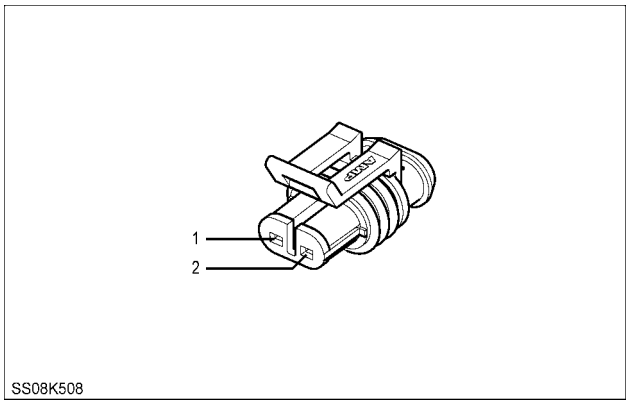
X195 SMV LAMP LEFT HAND FRONT (NORTH AMERICA ONLY)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	250A (LTG)	SMV LAMPS LH
2	57T (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M220 11



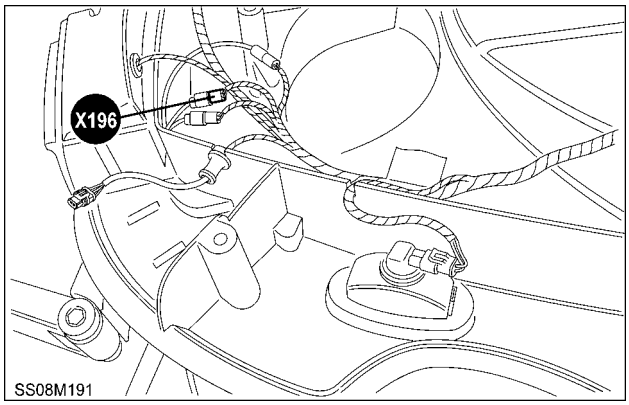
SS08K508 12

FRONT LEFT HAND CAB ROOF

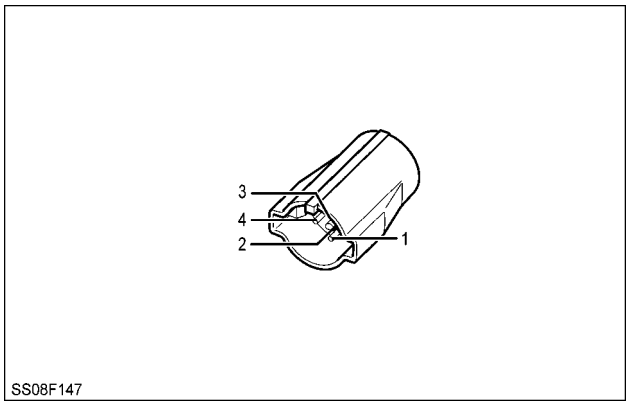
X196 WORKLAMP GRABRAIL LEFT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	1097A (R)	FEED FRONT WORKLAMP OUTER
4	57V (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M191 13



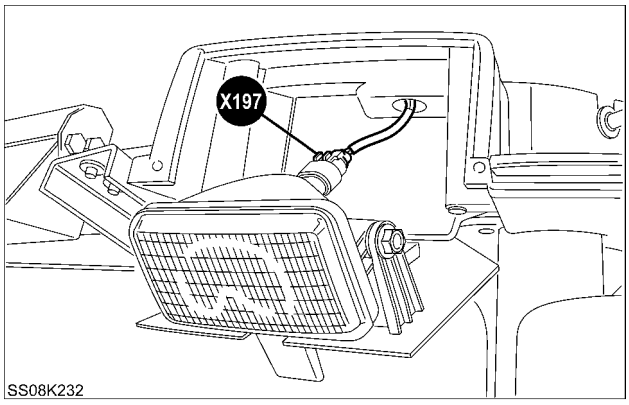
SS08F147 14

FRONT LEFT HAND CAB ROOF

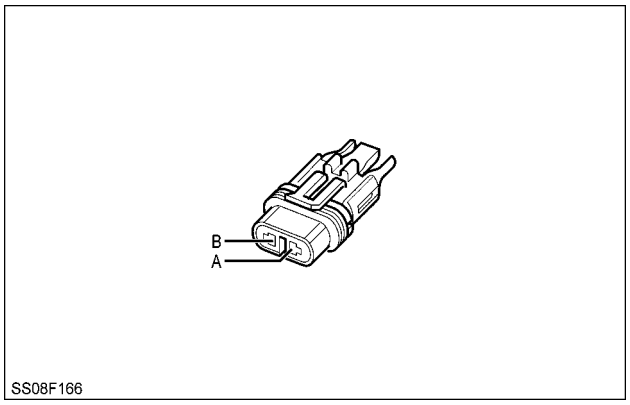
X197 WORKLAMP LEFT HAND FRONT UPPER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	1098A (W)	FRONT WORKLAMP RELAY GROUND
B	57AB (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K232 15



SS08F166 16

FRONT LEFT HAND CAB ROOF

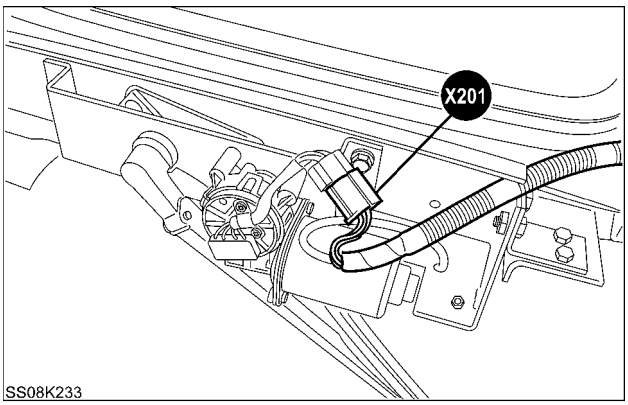
Connector - Component diagram 20

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

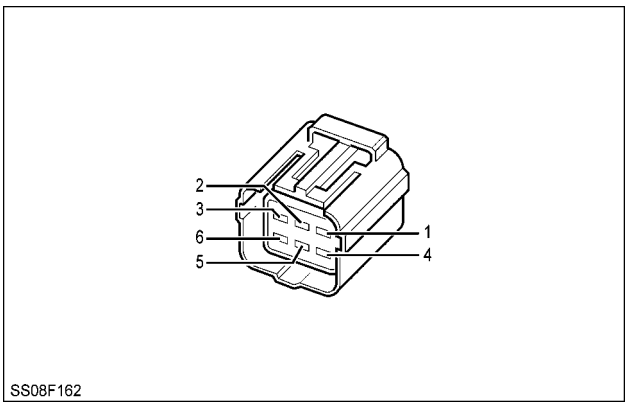
X201 WIPER MOTOR FRONT (CABINE)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	28 (Y)	WIPER MOTOR (PARK RETURN)
2	57M (B)	EARTH (ALL)
3	58 (R)	WIPER MOTOR-LOW
4	1019 (G)	WINDSHIELD WIPER FEED
6	56 (W)	WIPER MOTOR-HIGH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K233 1



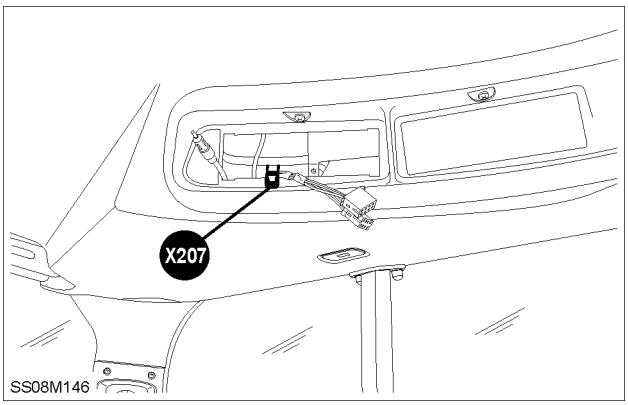
SS08F162 2

FRONT CAB ROOF

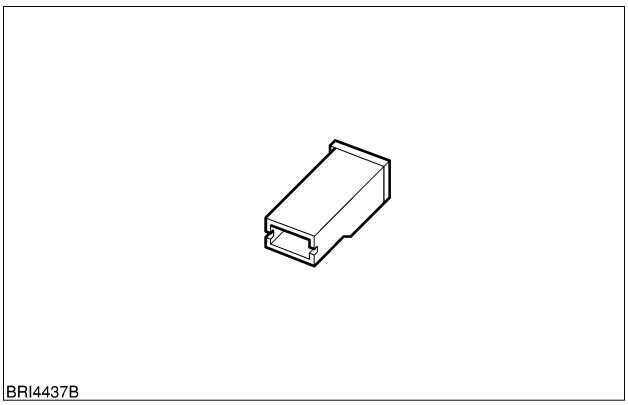
X207 ANTENNE PLUS

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3079B (R)	RADIO +12V IGNITION

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M146 3



BRI4437B 4

CAB ROOF

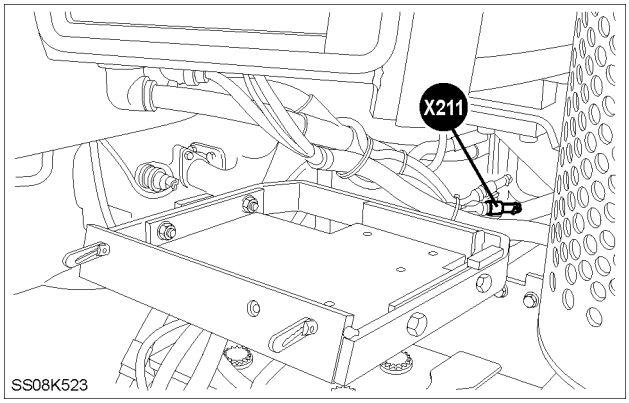
Connector - Component diagram 21

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

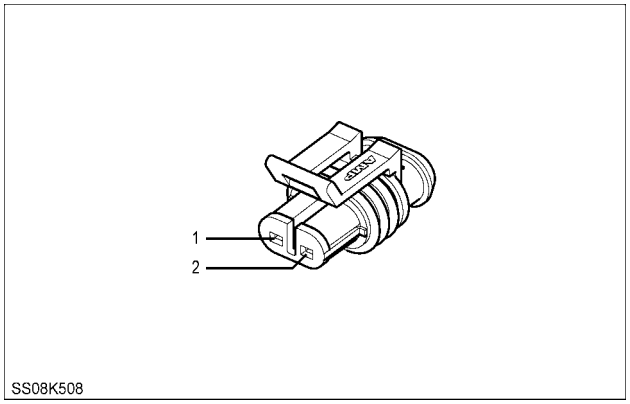
X211 LOADER VALVE OPTION A

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3272 (O)	LOADER VALVE #1 OUT
2	3273 (O)	LOADER VALVE #1 RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K523 1



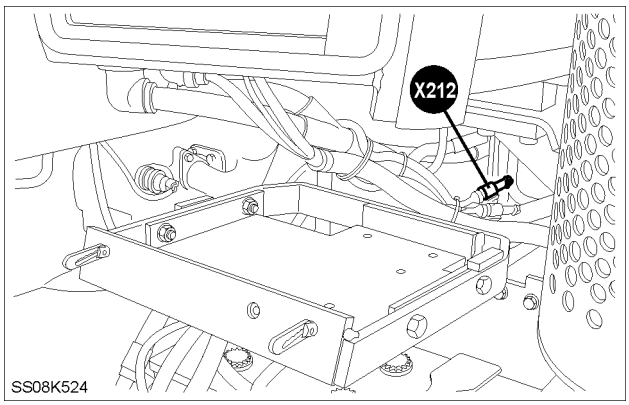
SS08K508 2

RIGHT HAND BEHIND STEPS

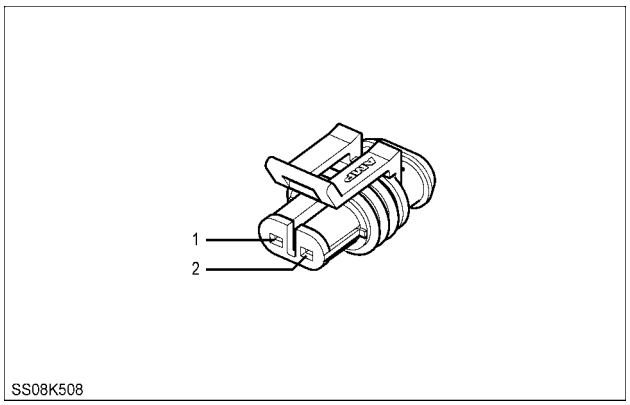
X212 LOADER VALVE OPTION B

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3274 (R)	LOADER VALVE #2 OUT
2	3275 (R)	LOADER VALVE #2 RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K524 3



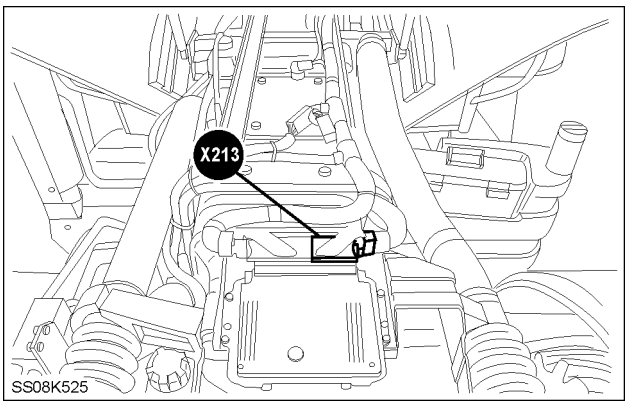
SS08K508 4

RIGHT HAND BEHIND STEPS

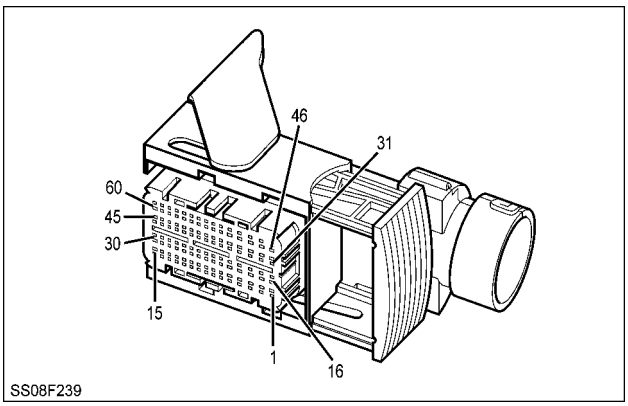
X213 ENGINE CONTROL UNIT - A

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	Y/B	
2	U/B	
3	W/G	
8	W/B	
9	N/B	
11	G	
12	W	
13	O/U	
16	S/Y	
17	S/B	
18	N/B	
19	G	
20	W	
21	B	
22	Y/G	
23	Y/B	
27	R	
28	S/B	
31	O/W	
32	O/U	
33	B/P	
36	K/N	
40	U/B	
41	W/Y	
43	R/G	
46	U/R	
47	N/W	
48	S/R	
49	O	
50	R	
51	O/B	
52	W/U	
53	W/R	
54	Y/R	
58	O/G	

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K525 5



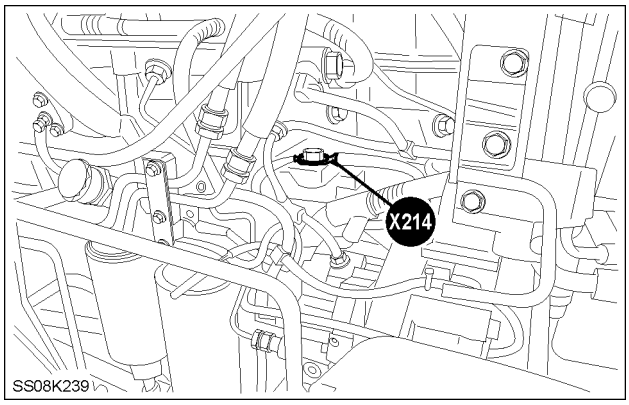
SS08F239 6

TOP ENGINE

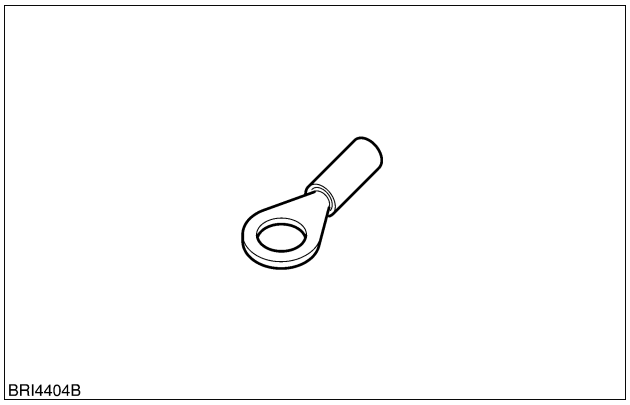
X214 EARTH POINT - ELECTRONIC MODULE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57AK (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K239 7



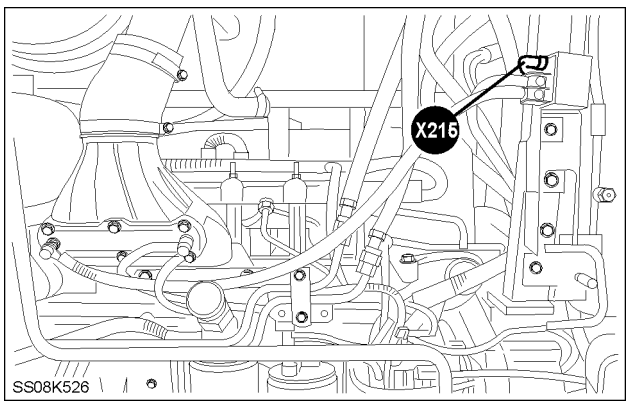
BRI4404B 8

LEFT HAND ENGINE

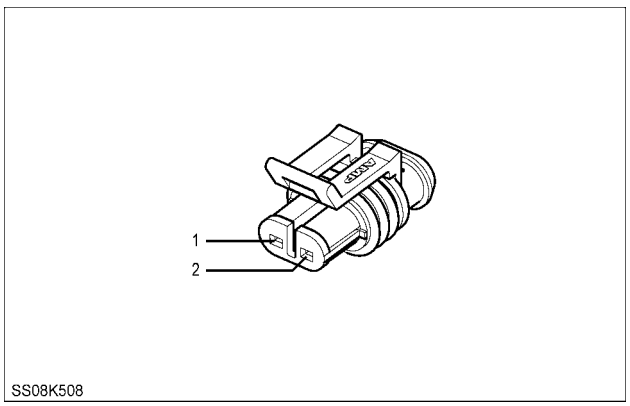
X215 GRID HEATER RELAY

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	6586 (P)	ECU TO GRID HEATER RELAY RETURN
2	6408H (G)	FUSED B+ TO ECU (1)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K526 9



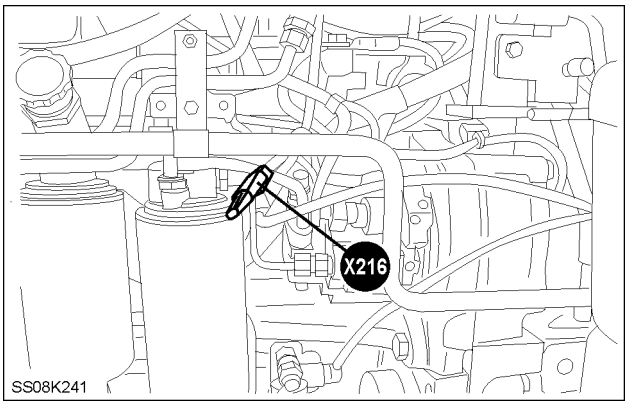
SS08K508 10

LEFT HAND ENGINE

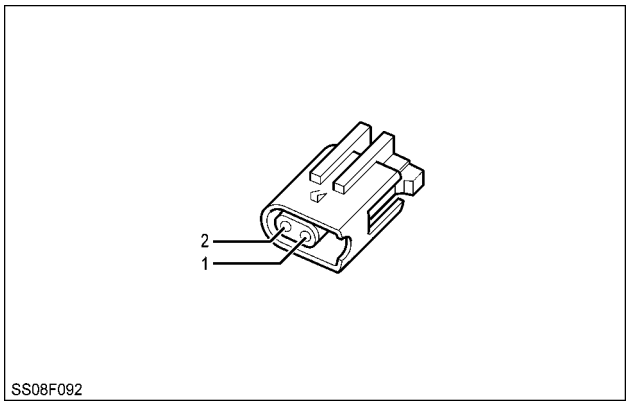
X216 FUEL HEATER RELAY

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	6570 (G)	ECU TO FUEL FILTER HEATER RETURN
2	6408J (G)	FUSED B+ TO ECU (1)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K241 11



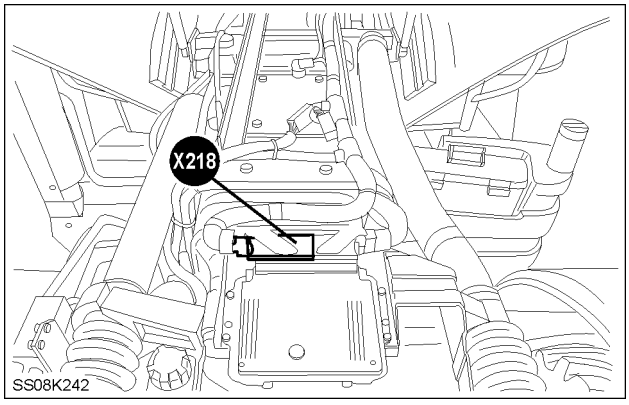
SS08F092 12

LEFT HAND ENGINE

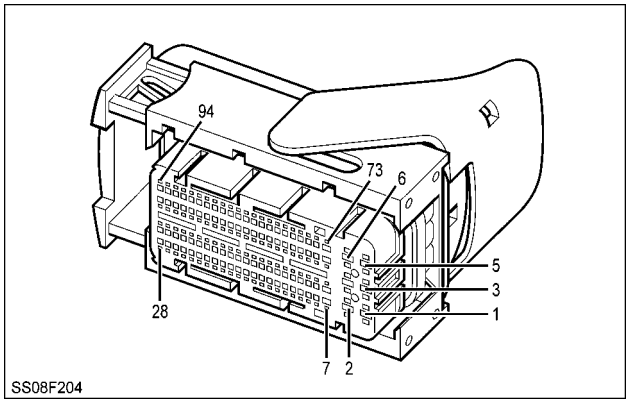
X218 ENGINE MODULE BOSCH EDC 16

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	6408P (G)	FUSED B+ TO ECU (1)
2	57FC (B)	EARTH (ALL)
4	57FE (B)	EARTH (ALL)
5	6408F (G)	FUSED B+ TO ECU (1)
6	57FD (B)	EARTH (ALL)
24	6320 (N)	FAN 5V REF.
25	6418 (K)	ECU TO J1941(ISO) INTERFACE #2 CONNECTOR ISO K
28	71C (W)	IGNITION SWITCHED FEEDS (UNFUSED)
29	2087 (O)	EXHAUST BRAKE SOLENOID
53	6331 (O)	FAN SPEED SENSOR GROUND
61	5420D (G)	CAN L
62	5400D (Y)	CAN H
68	6570 (G)	ECU TO FUEL FILTER HEATER RETURN
72	6407 (O)	ENGINE SHUTDOWN
75	6300 (N)	FAN SPEED
79	2040 (LG)	WATER IN FUEL SENSOR
90	6310 (N)	FAN SOLENOID
93	6586 (P)	ECU TO GRID HEATER RELAY RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K242 13



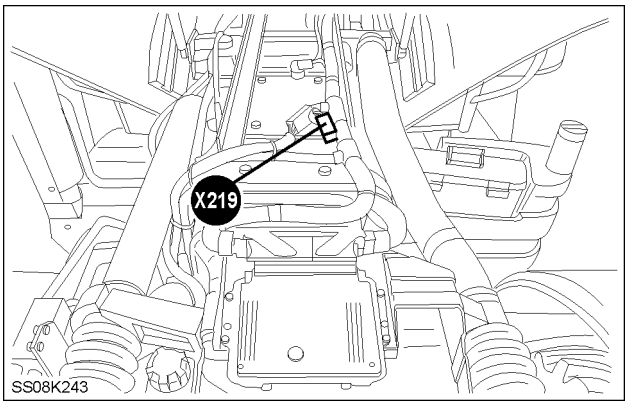
SS08F204 14

TOP ENGINE

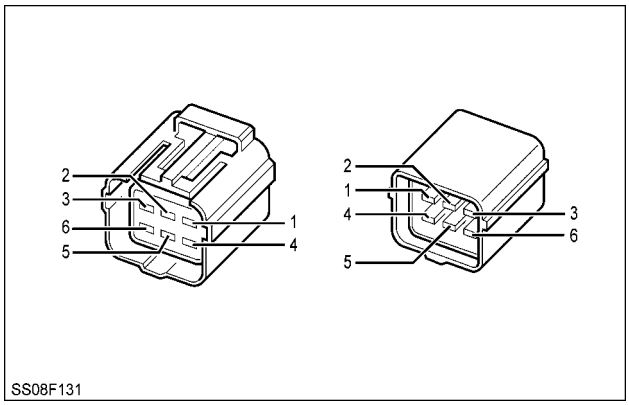
X219 VISCTRONIC FAN

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	6300 (N)	FAN SPEED
2	6331 (O)	FAN SPEED SENSOR GROUND
3	6408Z (G)	FUSED B+ TO ECU (1)
4	6310 (N)	FAN SOLENOID
5	6320 (N)	FAN 5V REF.

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K243 15



SS08F131 16

TOP ENGINE

Connector - Component diagram 22

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

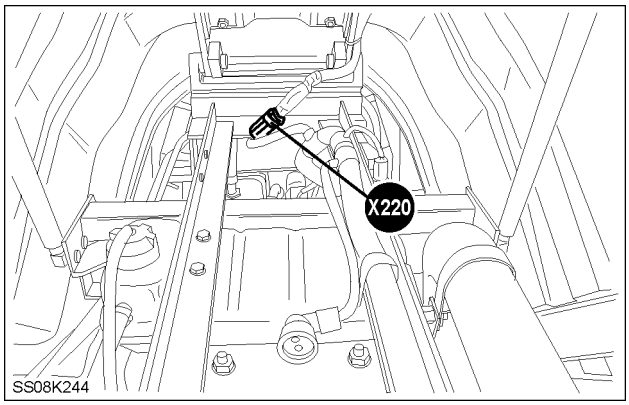
X220 FRONT LAMPS

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57JF (B) / 57AB (B)	EARTH (ALL)
2	376 (P)	HORN FEED
3	1030B (U)	HEADLAMP DIP BEAM
4	1027B (U)	HEADLAMP MAIN BEAM
5	1073A (P) / 1073 (L)	WORKLAMP FRONT FEED
6	57JG (B) / 57B (B)	EARTH (ALL)
7	1030A (U) / 1030 (U)	HEADLAMP DIP BEAM
8	1027A (U) / 1027 (U)	HEADLAMP MAIN BEAM

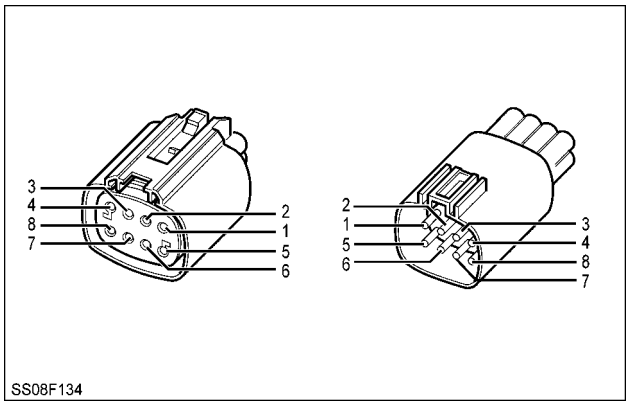
X220 FRONT LAMPS (NORTH AMERICA ONLY)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57JF (B) / 57AB (B)	EARTH (ALL)
2	376 (P)	HORN FEED
3	1030B (U)	HEADLAMP DIP BEAM
4	1027B (U)	HEADLAMP MAIN BEAM
5	1073A (P) / 1073 (L)	WORKLAMP FRONT FEED
6	57JG (B) / 57B (B)	EARTH (ALL)
7	1030A (U) / -	HEADLAMP DIP BEAM
8	1027A (U) / -	HEADLAMP MAIN BEAM

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K244 1



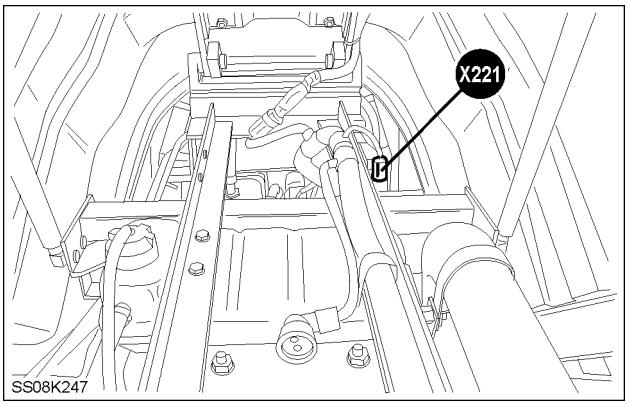
SS08F134 2

TOP LEFT HAND ENGINE

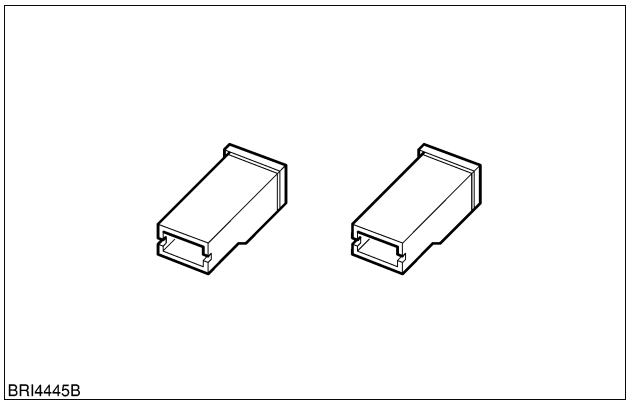
X221 BRAKE FLUID LEVEL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3016 (S)	BRAKE FLUID LEVEL SIGNAL
1	10M (G)	IGNITION SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K247 3



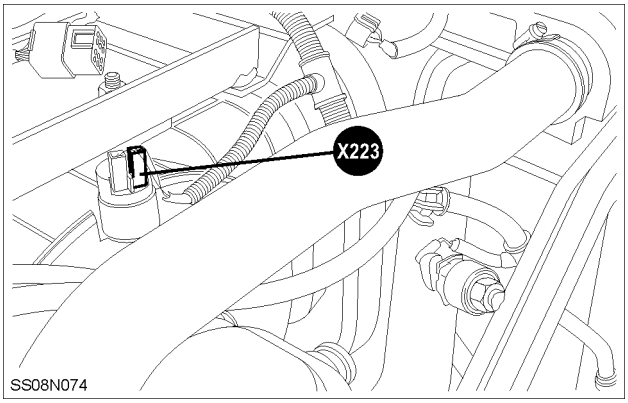
BRI4445B 4

TOP LEFT HAND ENGINE

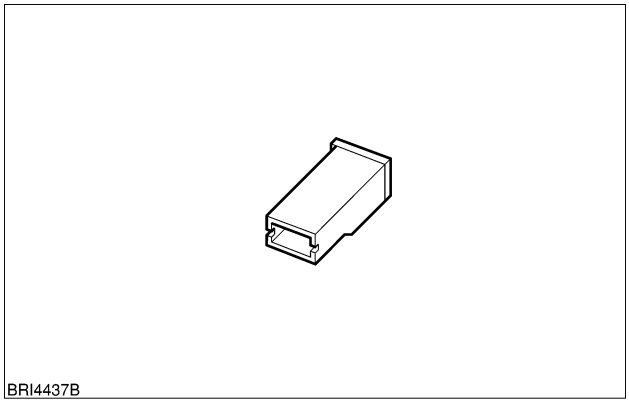
X223 AIR CLEANER SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1005 (S)	AIR CLEANER WARNING LAMP

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08N074 5



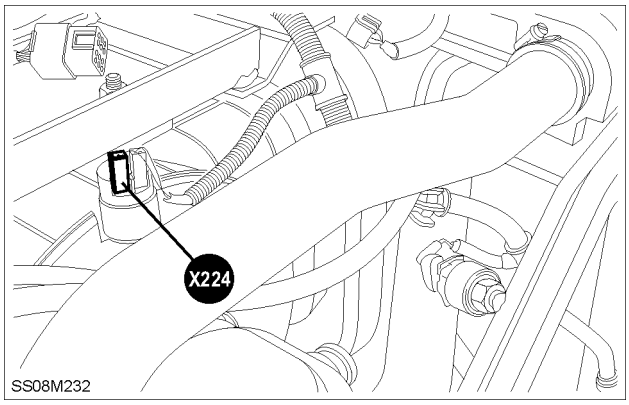
BRI4437B 6

TOP RIGHT HAND ENGINE

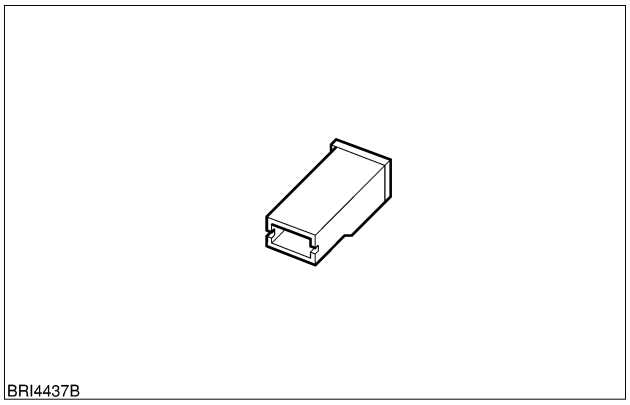
X224 AIR CLEANER SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57JB (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M232 7



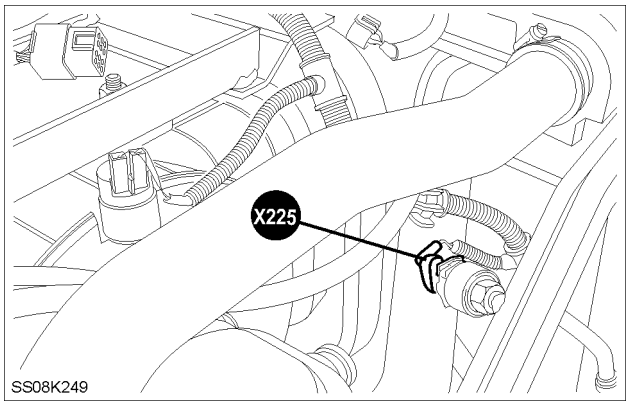
BRI4437B 8

TOP RIGHT HAND ENGINE

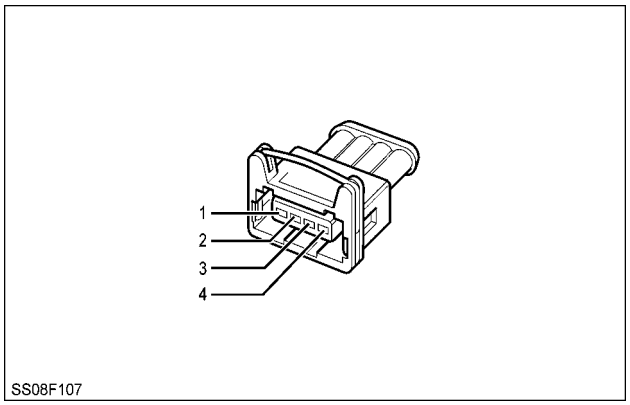
X225 A/C PRESSURE SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2006A (U)	DE-ICING SWITCH - AIR CONDITIONER
2	2006B (U)	DE-ICING SWITCH - AIR CONDITIONER
3	2007 (Y)	AIR CONDITIONER LOW PRESSURE
4	5200AA (N)	EDC VALVE SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K249 9



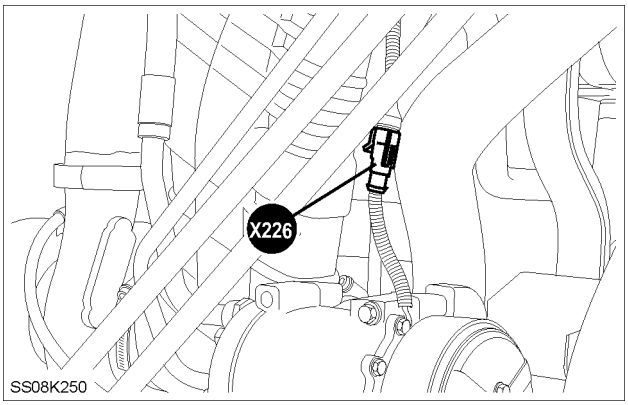
SS08F107 10

TOP RIGHT HAND ENGINE

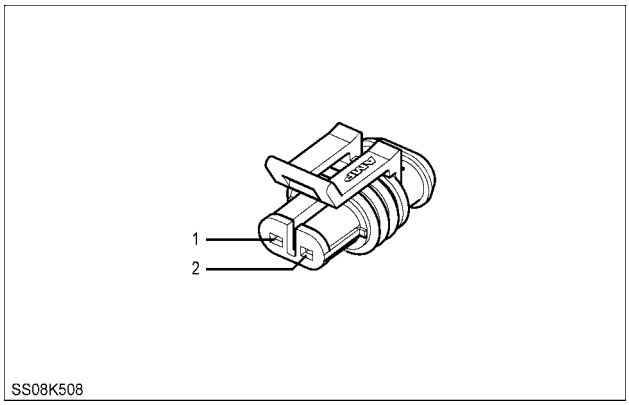
X226 A/C CLUTCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1018 (LG)	AIR CONDITIONER CLUTCH
2	57JC (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K250 11



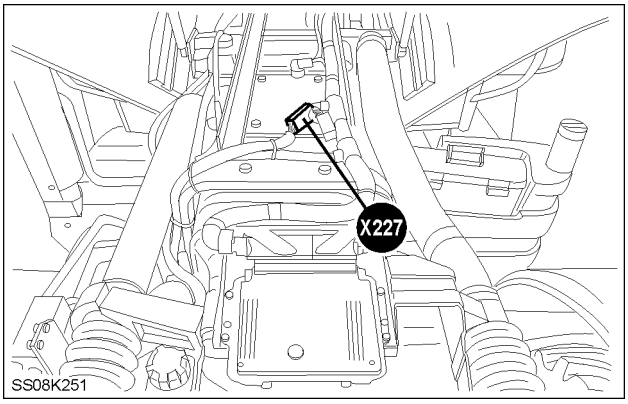
SS08K508 12

TOP RIGHT HAND ENGINE

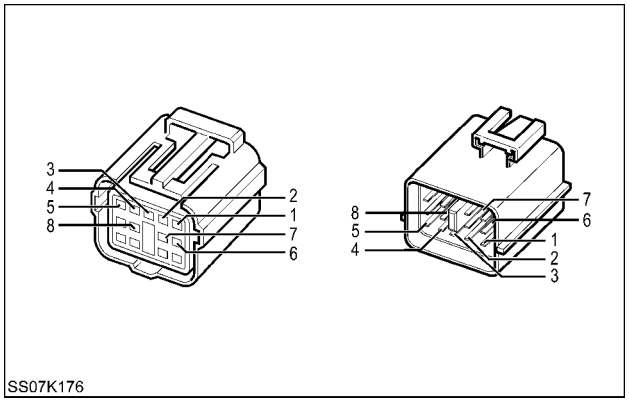
X227 FRONT HITCH AND FRONT PTO

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2044 (O)	PTO SOLENOID-FRONT RETURN(-)
2	2043 (O)	PTO SOLENOID-FRONT
3	2260 (O)	PTO FRONT - SPEED SIGNAL
4	60AE (B/W)	SENSOR GROUND
5	2570 (R)	FRONT HITCH RAISE SOLENOID
6	2530B (N)	FRONT HITCH V REF
7	2510 (N)	FRONT HITCH POSITION SIGNAL
8	57JT (B)	EARTH (ALL)
9	2250 (K)	PTO FRONT - SUPPLY
10	2556 (N) / 2556 (O)	FRONT HITCH SWITCH COMMON RAIL
11	2590 (TN)	EXTERNAL SWITCH FHPL UP
12	2591 (TN)	EXTERNAL SWITCH FHPL DOWN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K251 13



SS07K176 14

TOP OF ENGINE

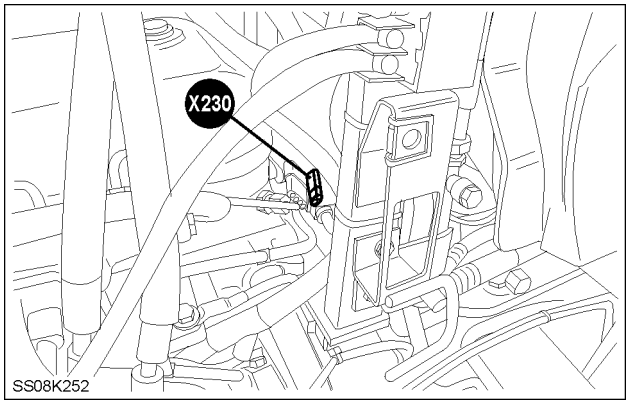
Connector - Component diagram 23

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

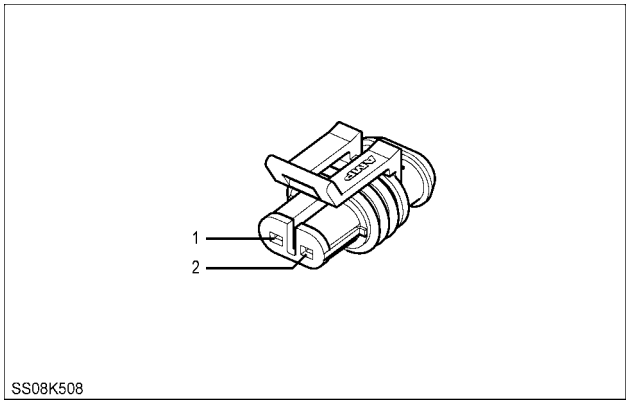
X230 D.I.A. ENGINE INLINE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57HB (B)	EARTH (ALL)
2	1010 (G)	IGNITION RELAY (COIL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K252 1



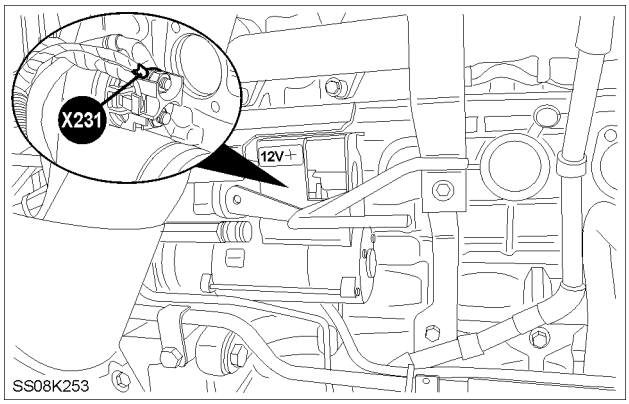
SS08K508 2

REAR LEFT HAND OF ENGINE

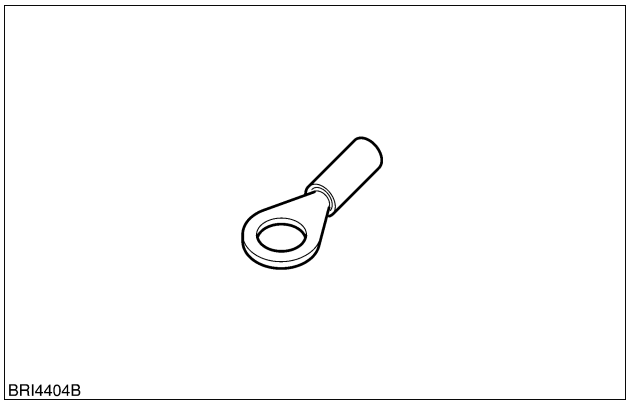
X231 STARTER SOLENOID B+

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	150 (R)	BATTERY FEED (UNFUSED)(ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K253 3



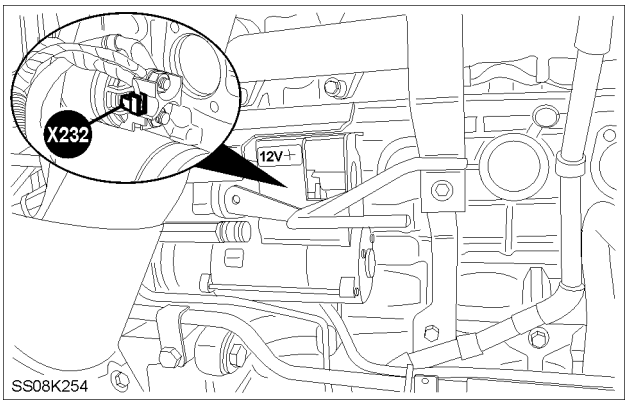
BRI4404B 4

REAR RIGHT HAND OF ENGINE

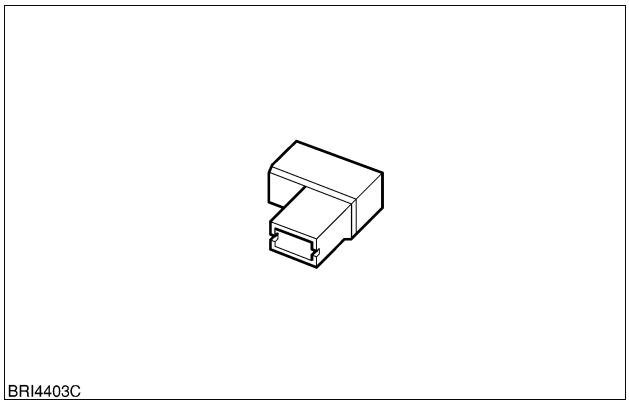
X232 STARTER SOLENOID 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1001 (W)	STARTER SOLENOID FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K254 5



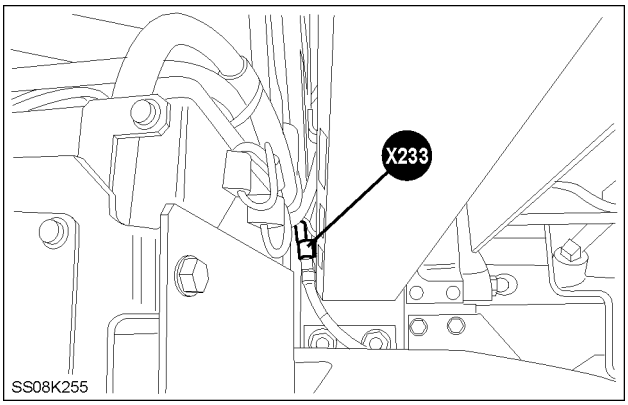
BRI4403C 6

REAR RIGHT HAND OF ENGINE

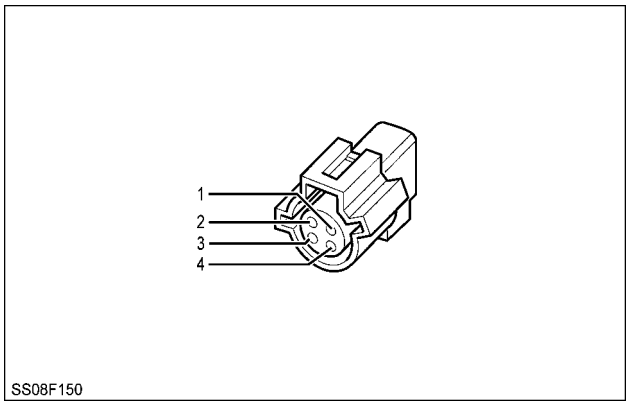
X233 RADAR GUN

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2028B (G)	RADAR ASSEMBLY (GUN) SIGNAL
2	57JD (B)	EARTH (ALL)
3	2027 (R)	RADAR ASSEMBLY (GUN) POWER
4	2031 (Y)	RADAR PRESENT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K255 7



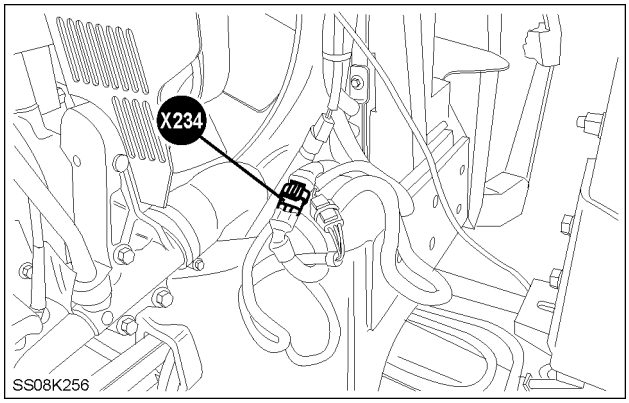
SS08F150 8

REAR RIGHT HAND ENGINE

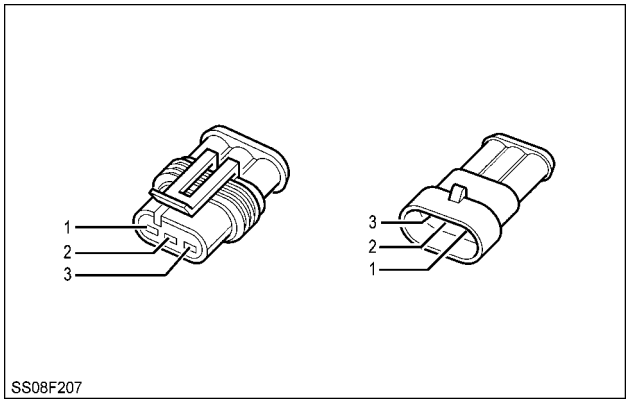
X234 FRONT AXLE (SELF LEVEL)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3220B (LG)	AXLE HEIGHT SENSOR 5V REF
2	3230 (U) / 3230 (O)	AXLE HEIGHT SENSOR POSITION
3	60AF (B/W)	SENSOR GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K256 9



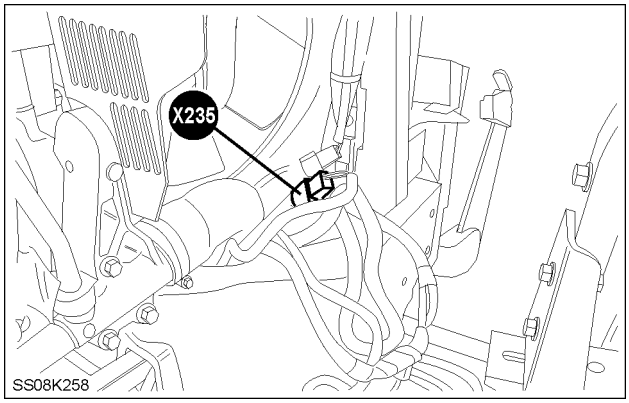
SS08F207 10

FRONT RIGHT HAND ENGINE

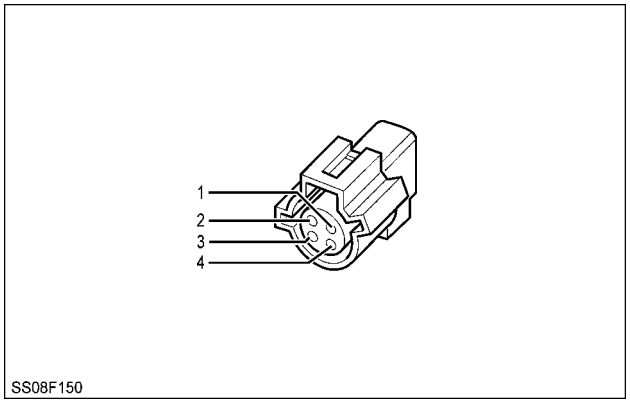
X235 STEERING ANGLE SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3120 (K)	STEERING SENSOR SIGNAL
2	2014 (G)	ENGINE OIL PRESSURE SENDER (+5 VOLT)
4	2095 (G)	INSTRUMENT SIGNAL GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K258 11



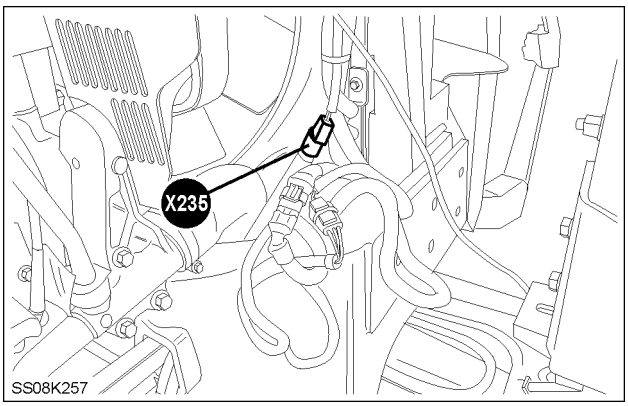
SS08F150 12

FRONT RIGHT HAND ENGINE

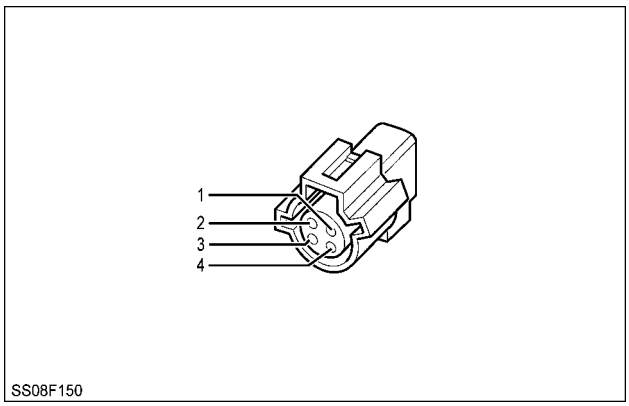
X235 STEERING ANGLE SENSOR (AUTO GUIDANCE)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3100 (G)	STEERING SENSOR +5v
2	3120 (K)	STEERING SENSOR SIGNAL
3	3140 (LTG)	STEERING SENSOR GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K257 13



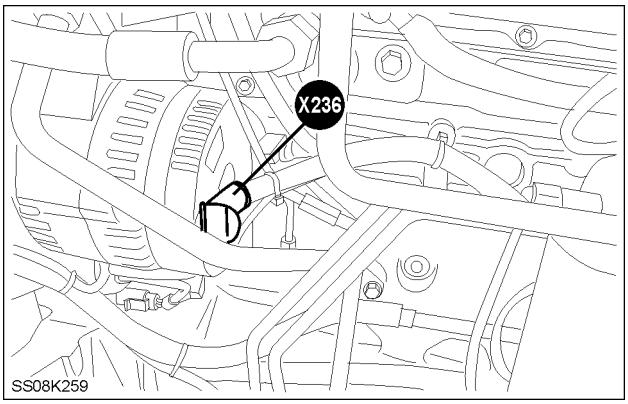
SS08F150 14

FRONT RIGHT HAND ENGINE

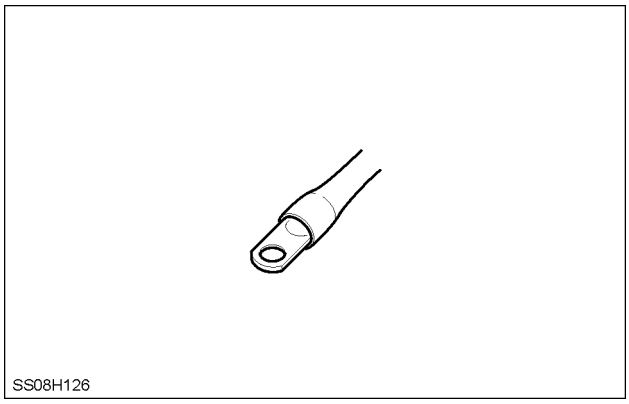
X236 ALTERNATOR B+

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	150 (R)	BATTERY FEED (UNFUSED)(ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K259 15



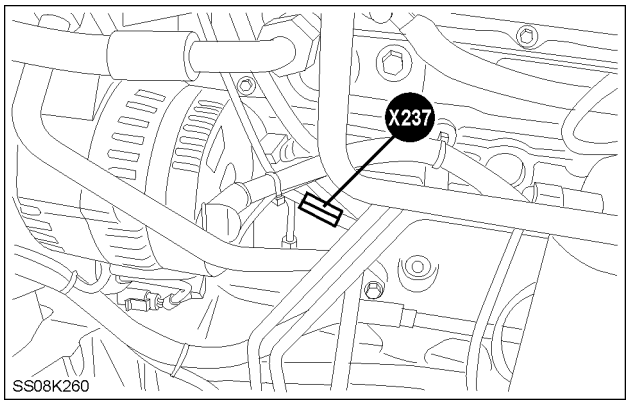
SS08H126 16

FRONT TOP LEFT HAND ENGINE

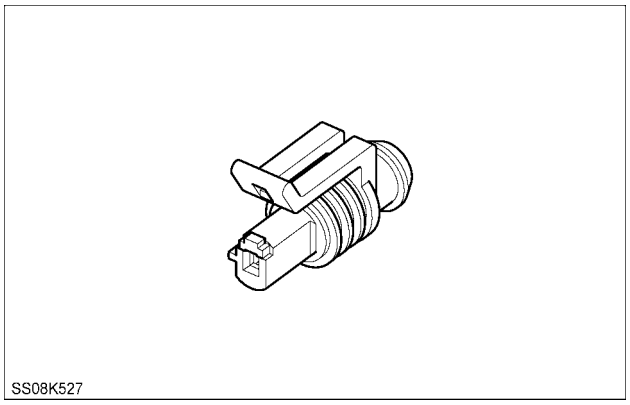
X237 ALTERNATOR D+

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1006 (N)	ALTERNATOR WARNING LAMP

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K260 17



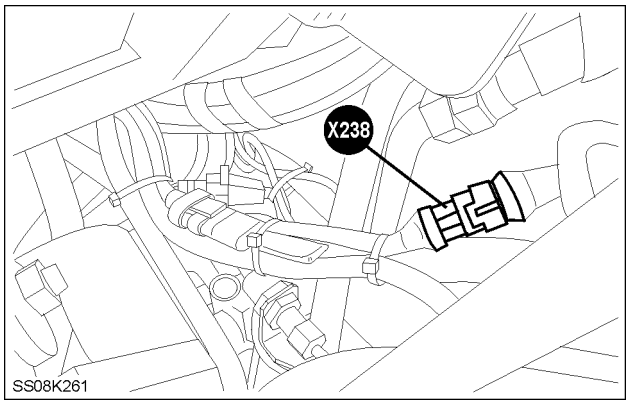
SS08K527 18

FRONT TOP LEFT HAND ENGINE

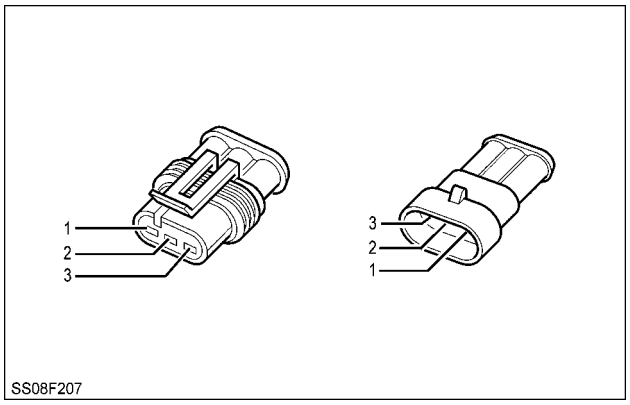
X238 BATTERY ISOLATOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	171B (W) / 171B (W/TQ/B)	BATTERY ISOLATOR RELAY COIL
2	57HA (B)	EARTH (ALL)
3	172A (W) / 172A (W/TQ/Y)	BATTERY ISOLATOR RELAY COIL (OFF)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K261 19



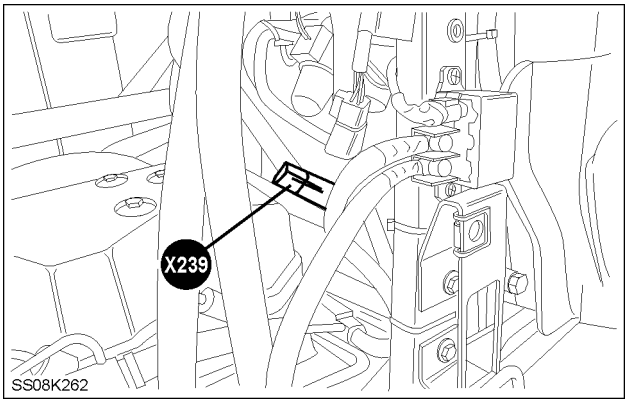
SS08F207 20

RIGHT HAND BEHIND STEPS

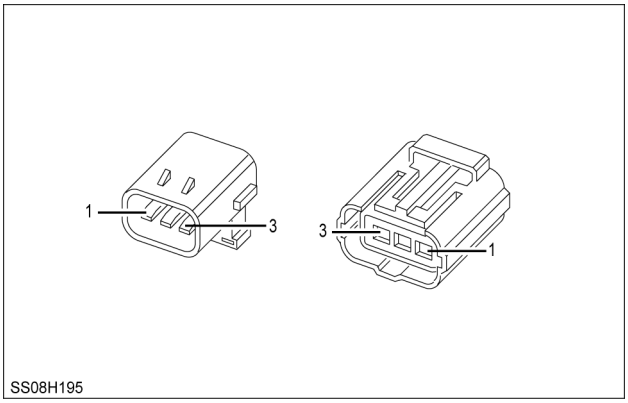
X239 REVERSIBLE FAN

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	6325 (N)	REVERSIBLE FAN OPTION - RELAY FEED
2	6315 (N) / 6315 (G)	REVERSIBLE FAN OPTION - RELAY CONTROL
3	57RJ (B) / 57RH (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K262 21



SS08H195 22

REAR LEFT HAND OF ENGINE

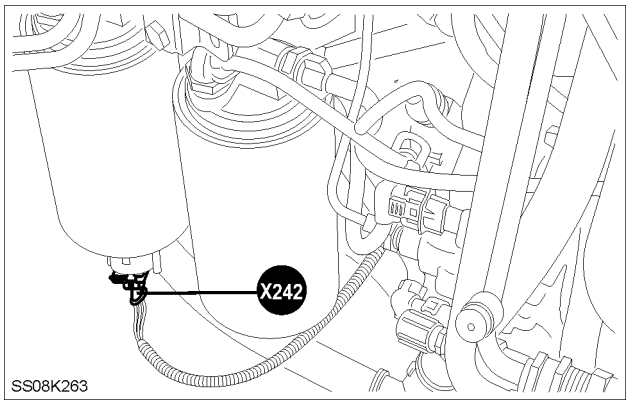
Connector - Component diagram 24

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

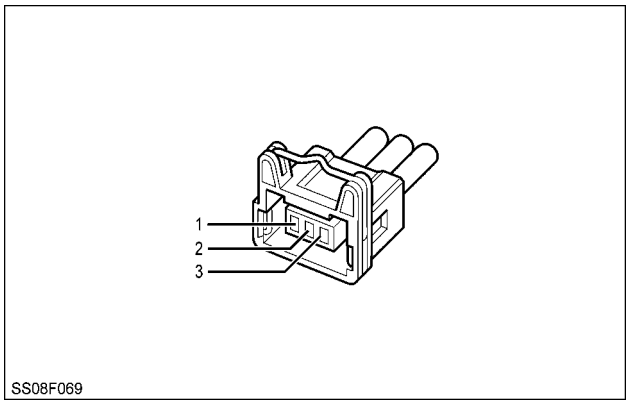
X242 WATER IN FUEL SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2040 (LG)	WATER IN FUEL SENSOR
2	57JE (B)	EARTH (ALL)
3	10N (G)	IGNITION SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K263 1



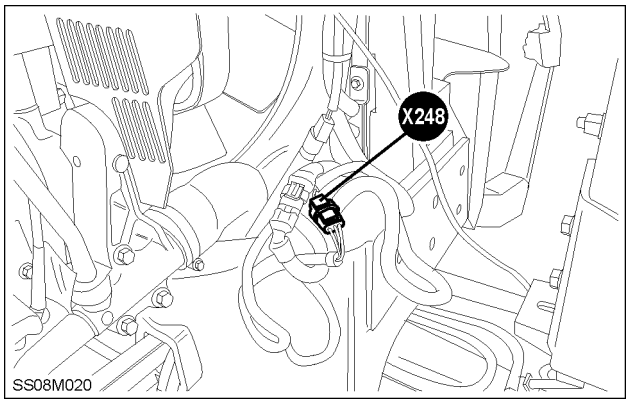
SS08F069 2

REAR LEFT HAND ENGINE

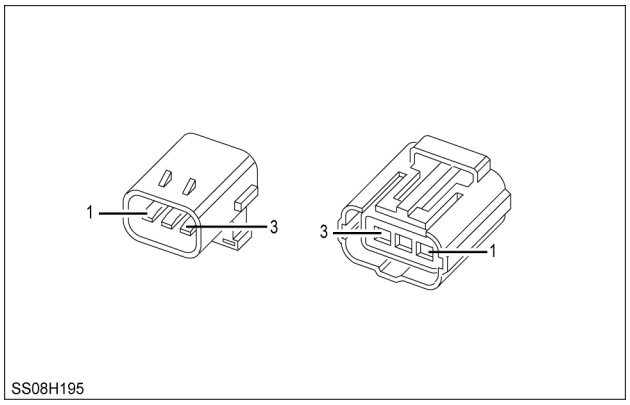
X248 SUSPENSION ACCELEROMETER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3235 (TN)	ACCELEROMETER SIGNAL
2	60AG (B/W)	SENSOR GROUND
3	3220C (LG)	AXLE HEIGHT SENSOR 5V REF

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M020 3



SS08H195 4

FRONT RIGHT HAND ENGINE

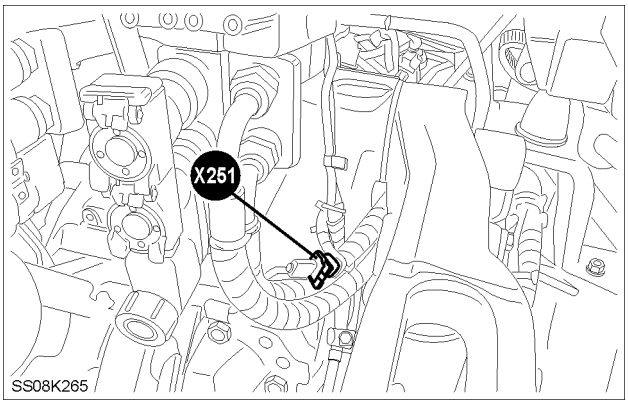
Connector - Component diagram 25

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

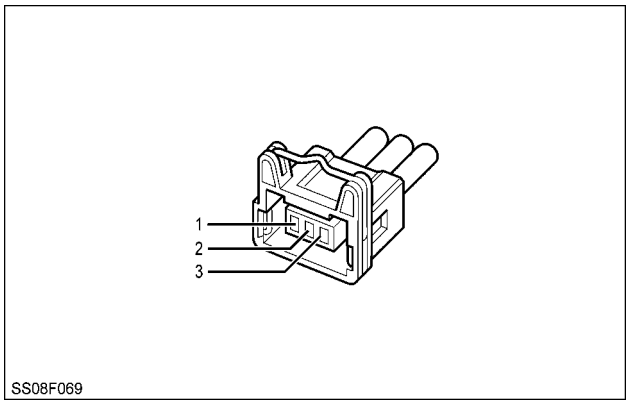
X251 PTO SPEED SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2050AV (G)	PTO SUPPLY / DOG SUPPLY
2	2140 (O)	PTO SPEED SENSOR
3	60AS (B/W)	SENSOR GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K265 1



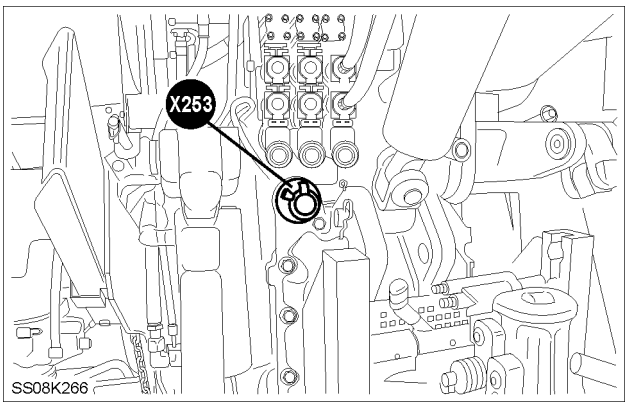
SS08F069 2

REAR RIGHT HAND TRANSMISSION

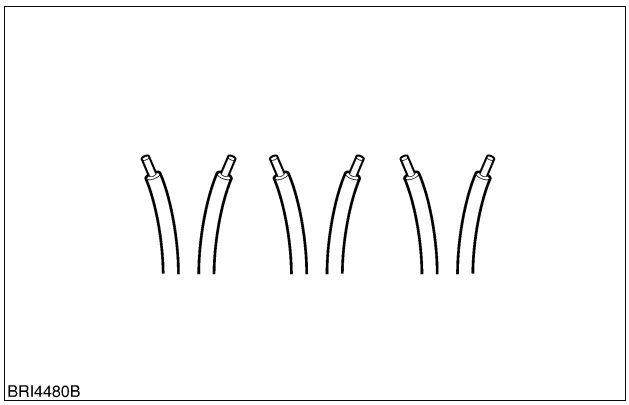
X253 TRAILER SOCKET

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1013D (N)	RIGHT HAND LAMPS
1	810A (R)	STOPLAMPS
1	1014E (B)	LEFT HAND LAMPS
1	349 (G)	TRAILER TURN LAMPS RH
1	57EG (W)	EARTH (ALL)
1	350 (Y)	TRAILER TURN LAMPS LH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K266 3



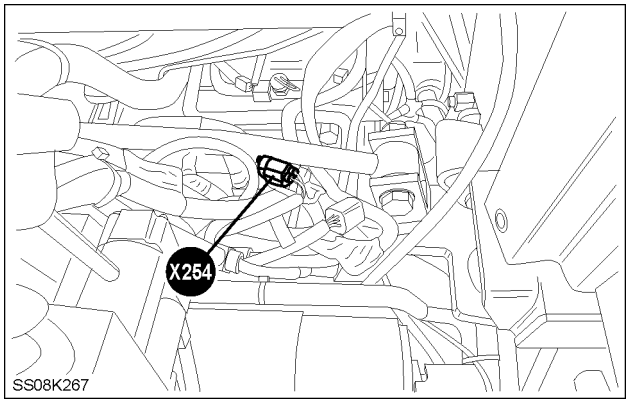
BRI4480B 4

REAR LEFT HAND TRANSMISSION

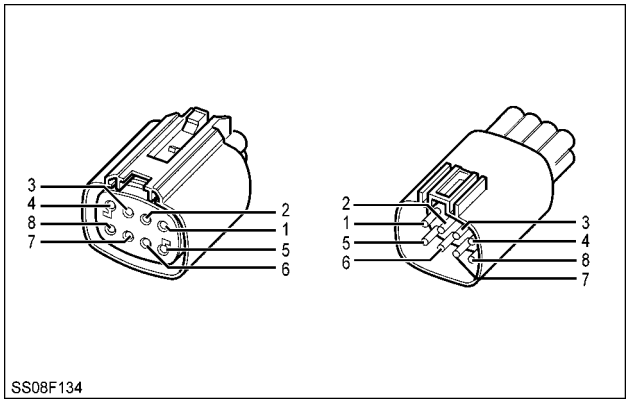
X254 TRAILER BRAKES - AIR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2095C (G) / 2095D (G)	INSTRUMENT SIGNAL GROUND
2	8000X (N)	TRAILER BRAKE SOLENOID
3	8010 (TN)	TRAILER BRAKE PRESSURE
4	8020B (TN)	TRAILER BRAKE PRESSURE
5	57EH (B)	EARTH (ALL)
6	8070 (P)	TRAILER PARK BRAKE SOLENOID
8	8060F (U)	TRAILER BRAKE SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K267 5



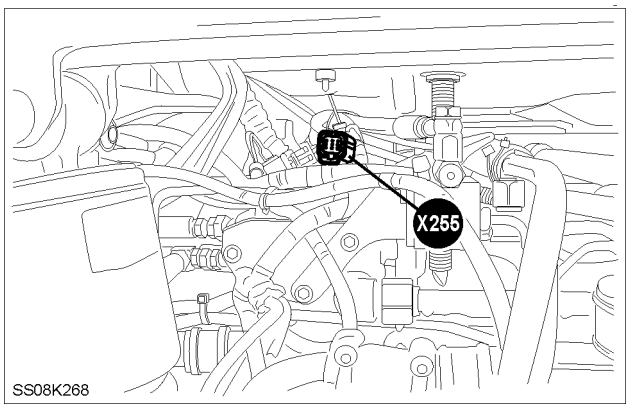
SS08F134 6

REAR RIGHT HAND TRANSMISSION

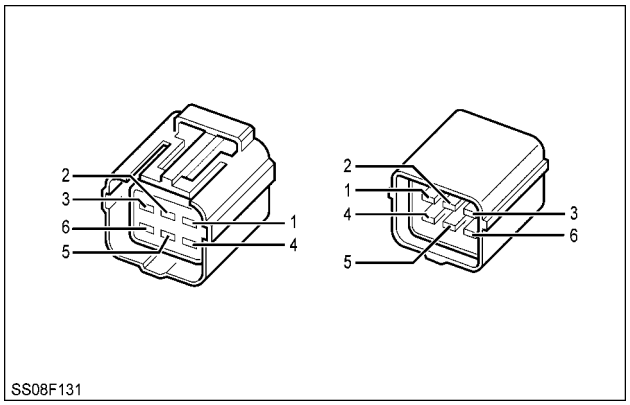
X255 TRAILER BRAKES HYDRAULIC

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	8000A (N)	TRAILER BRAKE SOLENOID
2	8010A (TN)	TRAILER BRAKE PRESSURE
3	8020A (TN)	TRAILER BRAKE PRESSURE
4	57FA (B)	EARTH (ALL)
5	8060E (U)	TRAILER BRAKE SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K268 7



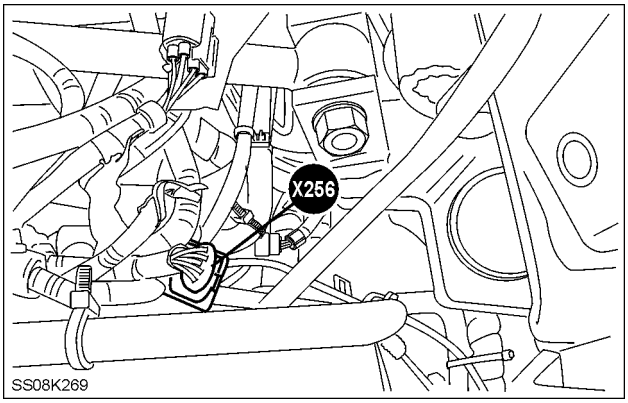
SS08F131 8

RIGHT HAND TRANSMISSION

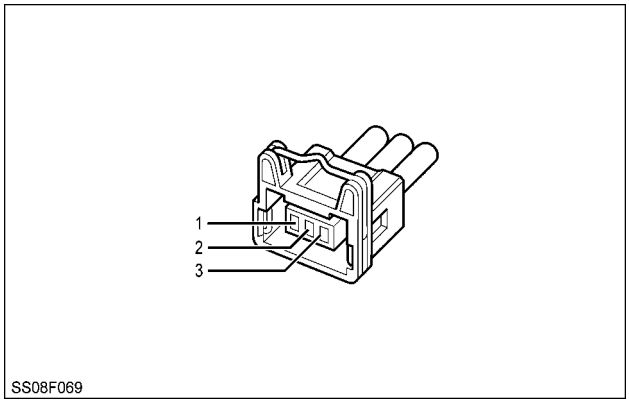
X256 DRAFT PIN RIGHT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	60H (B/W)	SENSOR GROUND
2	5065 (TN)	EDC RIGHT PIN
3	5075A (K)	EDC VOLTAGE TO PINS

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K269 9



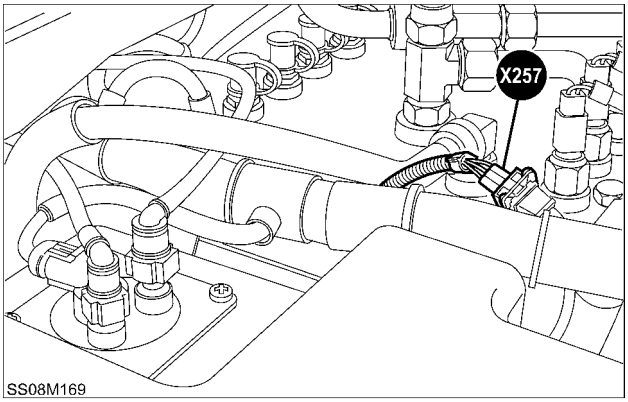
SS08F069 10

REAR RIGHT HAND TRANSMISSION

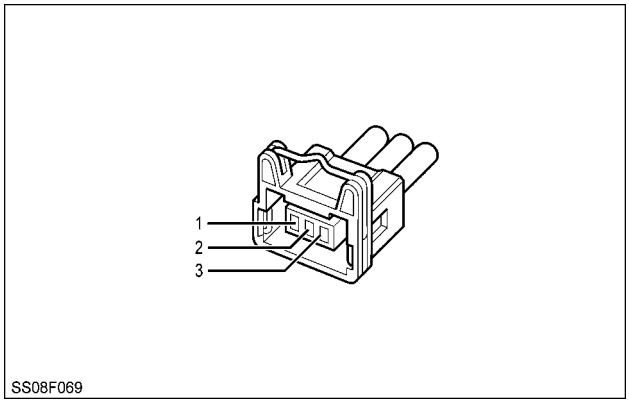
X257 AXLE SPEED SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7000BP (U)	TRANS CONTROL SUPPLY
2	7401 (P)	TRANS RPM SPEED SENSOR
3	60BC (B/W)	SENSOR GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M169 11



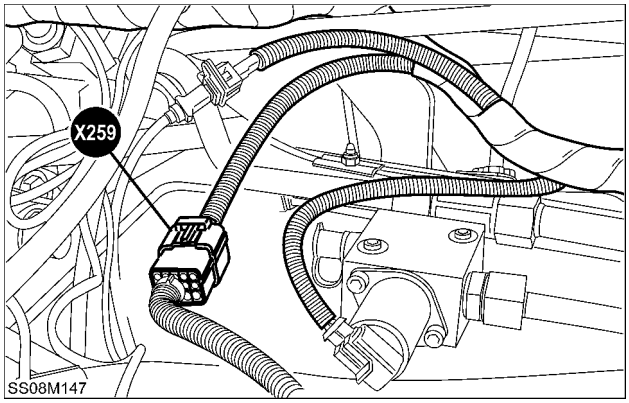
SS08F069 12

LEFT HAND TRANSMISSION

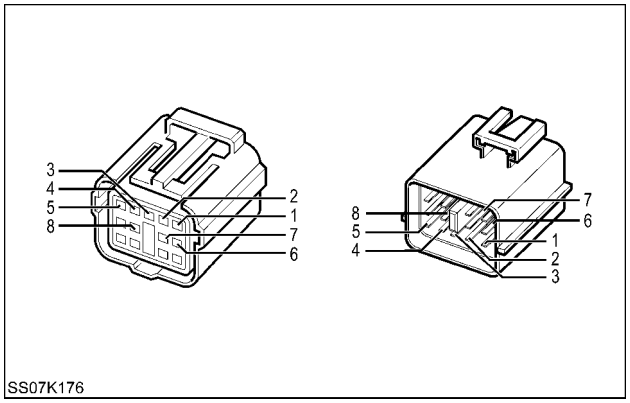
X259 FRONT SUSPENSION CONNECTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3240 (O)	RAISE SOLENOID PWR
2	3250 (O)	RAISE SOLENOID RET
3	3260 (O)	LOWER SOLENOID PWR
4	3270 (O)	LOWER SOLENOID RET
5	3280 (O)	SUSPENSION LOCKOUT SOLENOID UPPER
6	3281 (TN)	SUSPENSION LOCKOUT SOLENOID UPPER RETURN (-)
7	3285 (TN)	SUSPENSION LOCKOUT SOLENOID LOWER
8	3286 (TN)	SUSPENSION LOCKOUT SOLENOID LOWER RETURN (-)
9	- / 3295 (O)	FRONT SUSPENSION PRESSURE SWITCH SIGNAL
10	- / 57FK (B)	EARTH (ALL)
12	3295 (O) / -	FRONT SUSPENSION PRESSURE SWITCH SIGNAL
13	57 (B) / -	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M147 13



SS07K176 14

REAR RIGHT HAND TRANSMISSION

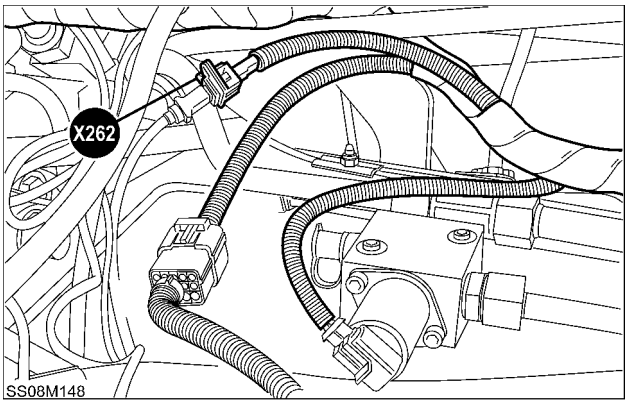
Connector - Component diagram 26

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

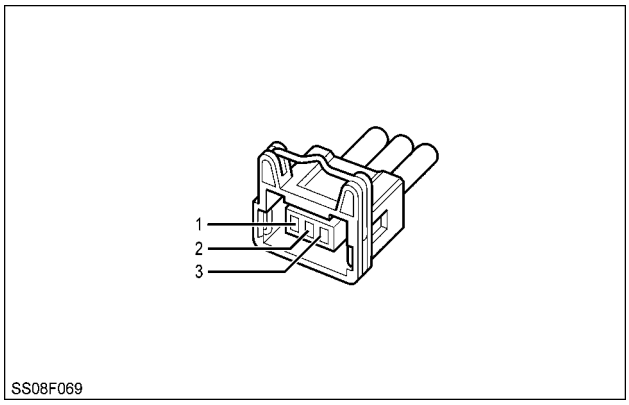
X262 PTO TWIST SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7000BN (U)	TRANS CONTROL SUPPLY
2	2062 (W)	PTO TWIST SENSOR
3	60N (B/W)	SENSOR GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M148 1



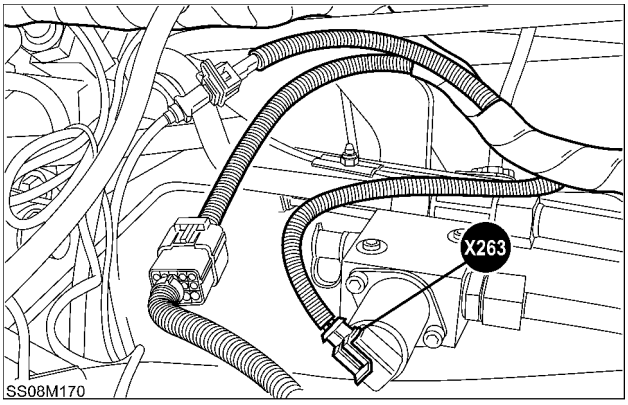
SS08F069 2

REAR RIGHT HAND TRANSMISSION

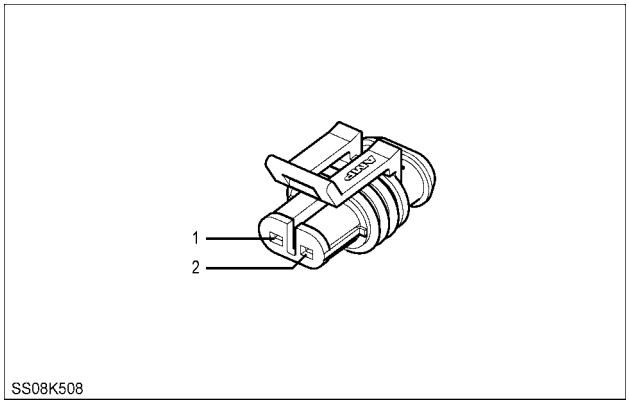
X263 19TH DUMP SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	9035 (TN)	50KPH DUMP SOLENOID
2	9036 (TN)	50KPH DUMP SOLENOID RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M170 3



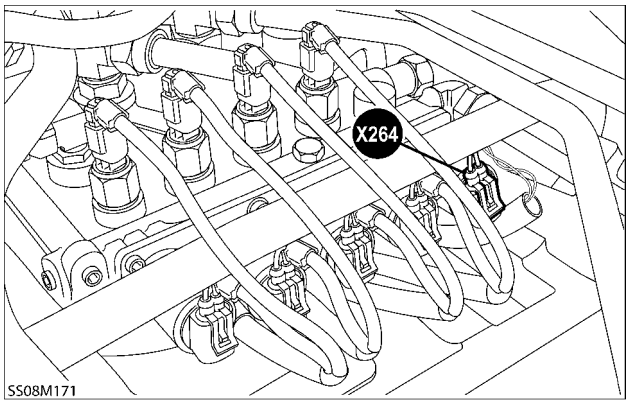
SS08K508 4

REAR RIGHT HAND TRANSMISSION

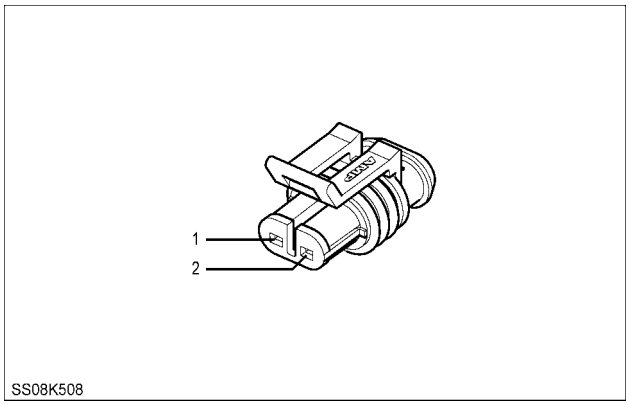
X264 19TH GEAR SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	9033 (TN)	50KPH SOLENOID+
2	9034 (TN)	50KPH SOLENOID-

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M171 5



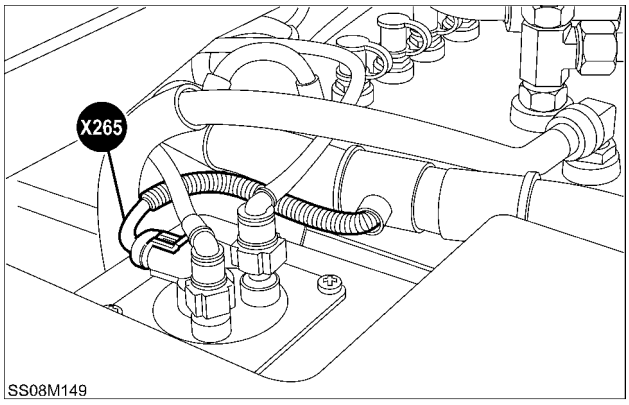
SS08K508 6

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

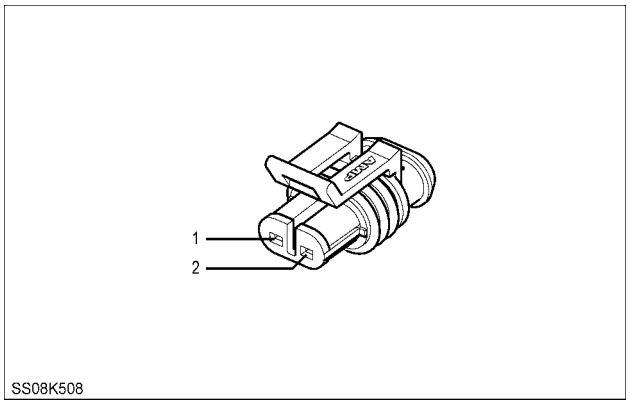
X265 FUEL TANK SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	29 (G)	MAIN FUEL SENDER SIGNAL
2	2095D (G)	INSTRUMENT SIGNAL GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M149 7



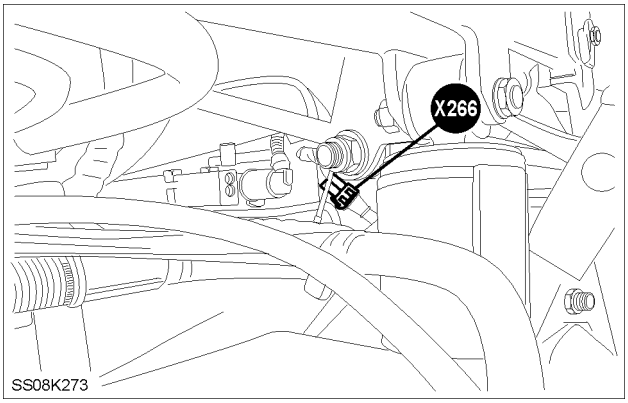
SS08K508 8

LEFT HAND SIDE BEHIND STEPS OF DRIVERS CAB

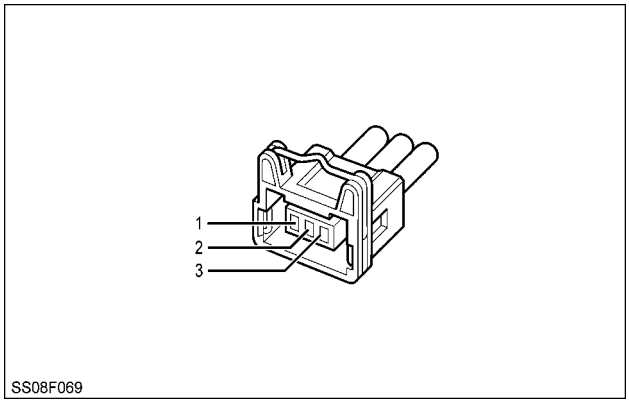
X266 DRAFT PIN LEFT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	60BA (B/W)	SENSOR GROUND
2	5070 (TN)	EDC LEFT PIN
3	5075B (K)	EDC VOLTAGE TO PINS

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K273 9



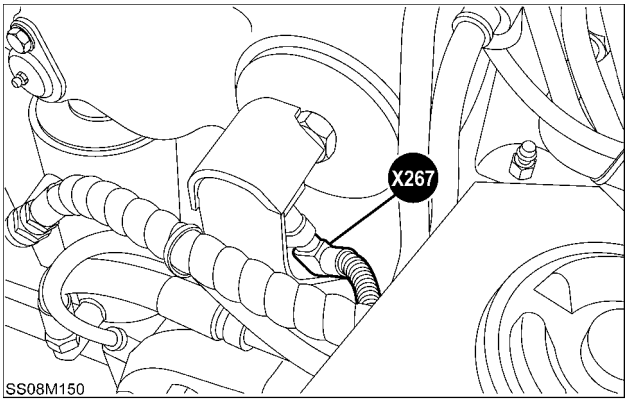
SS08F069 10

REAR LEFT HAND TRANSMISSION

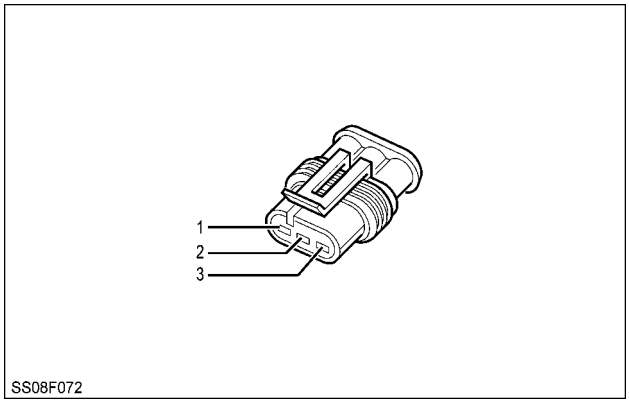
X267 ROCK SHAFT POTENTIOMETER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	60L (B/W)	SENSOR GROUND
2	5080 (K)	EDC ROCKSHAFT
3	5020M (TN)	EDC PROC +5V REF VOLTAGE DROP POSN/RATE

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M150 11



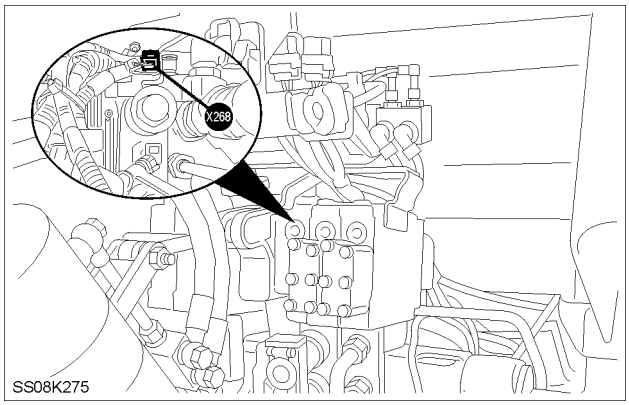
SS08F072 12

REAR RIGHT HAND TRANSMISSION

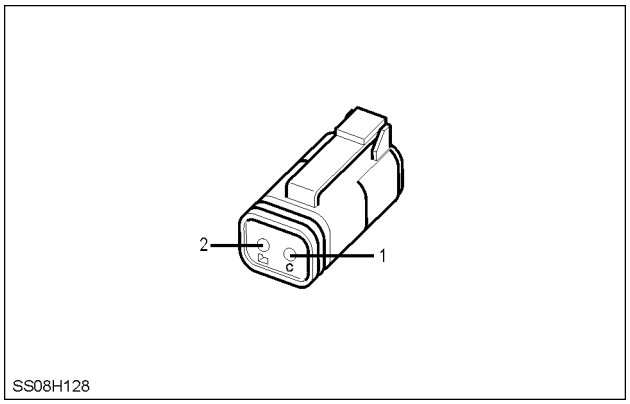
X268 EDC VALVE RAISE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5085 (K)	EDC VALVE UP
2	5087 (K)	EDC VALVE UP RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K275 13



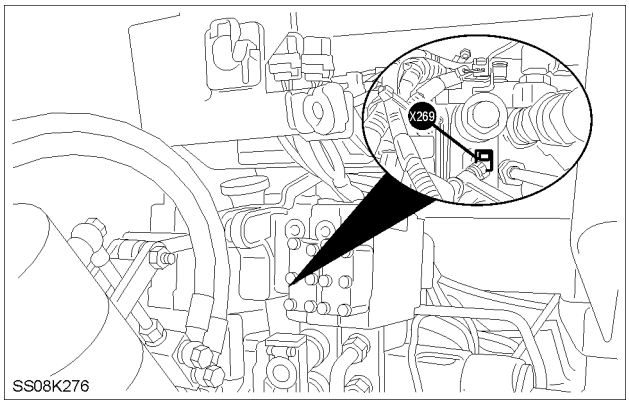
SS08H128 14

REAR RIGHT HAND TRANSMISSION

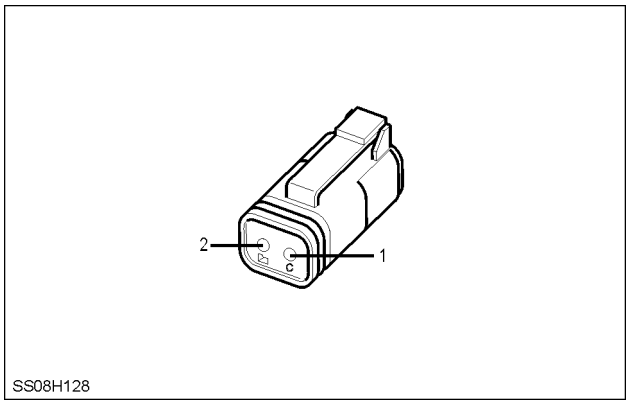
X269 EDC VALVE LOWER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5090 (K)	EDC VALVE DOWN
2	5097 (K)	EDC VALVE DOWN RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K276 15



SS08H128 16

REAR RIGHT HAND TRANSMISSION

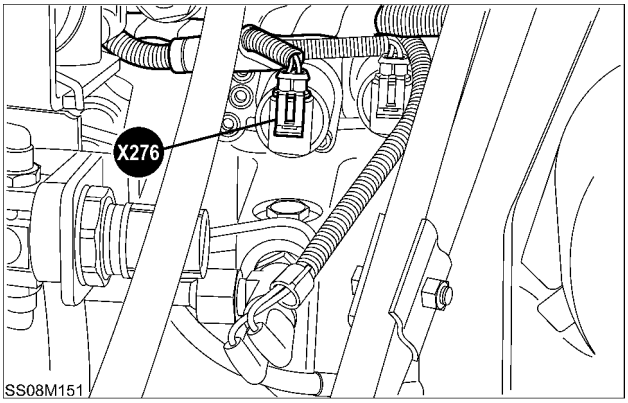
Connector - Component diagram 27

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

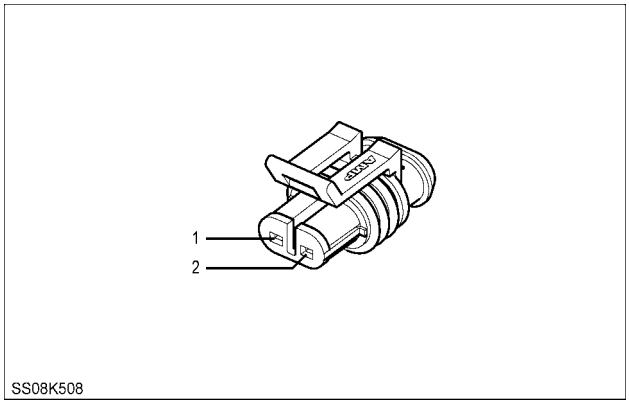
X276 DIFF. LOCK SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7080 (LG)	DIFF-LOCK SOLENOID FEED
2	57ES (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M151 1



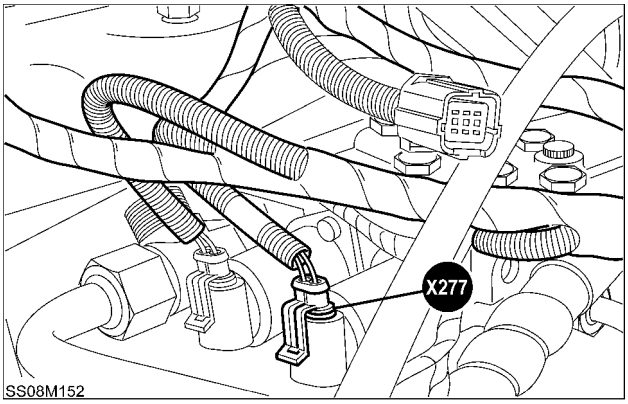
SS08K508 2

REAR RIGHT HAND TRANSMISSION

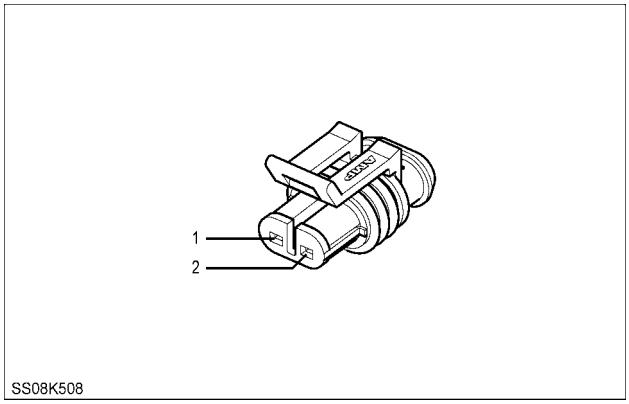
X277 REAR P.T.O BRAKE SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2130 (N)	PTO BRAKE SOLENOID
2	57ET (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M152 3



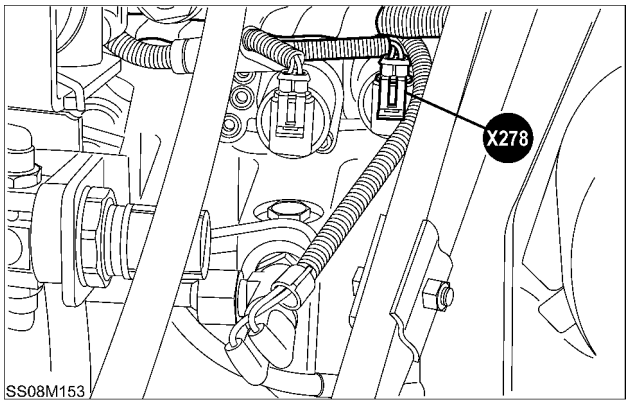
SS08K508 4

REAR LEFT HAND TRANSMISSION

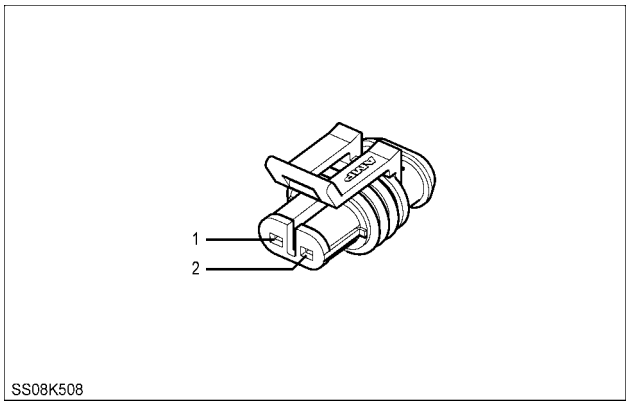
X278 REAR P.T.O SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2042 (O)	PTO SOLENOID-REAR
2	2051 (O)	PTO SOLENOID RETURN (-)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M153 5



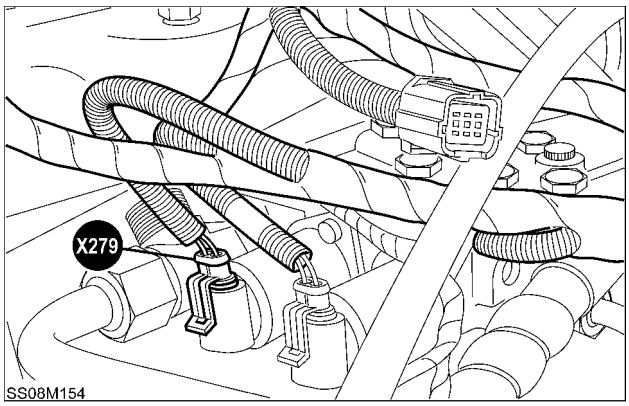
SS08K508 6

REAR RIGHT HAND TRANSMISSION

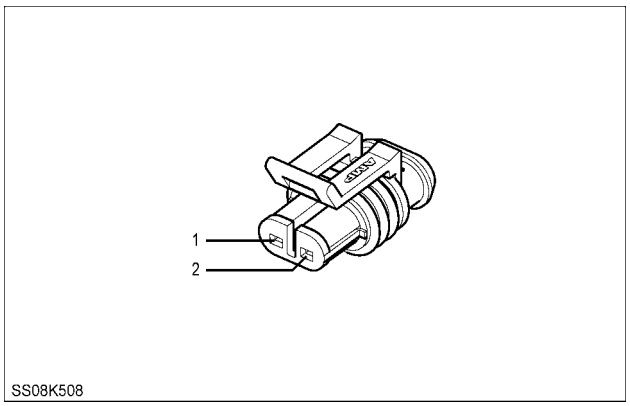
X279 4WD SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3024 (Y)	2WD SOLENOID
2	57EX (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M154 7



SS08K508 8

REAR LEFT HAND TRANSMISSION

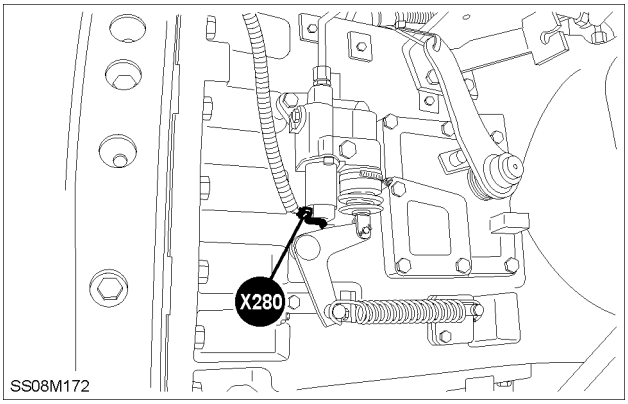
Connector - Component diagram 28

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

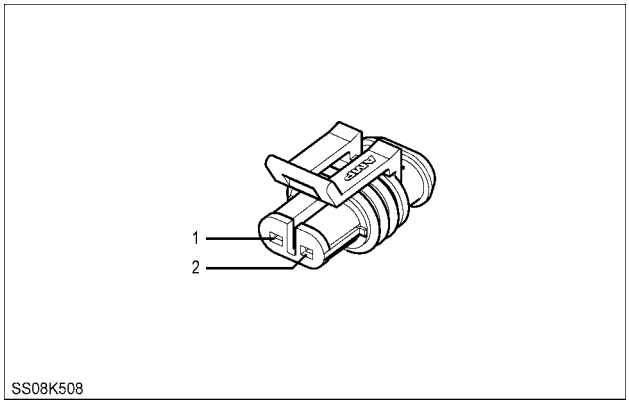
X280 CREEPER SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7005 (U/L/B)	TRANS CREEPER GR SOL
2	7580 (U/K/B)	CREEPER SOLENOID MONITOR

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M172 1



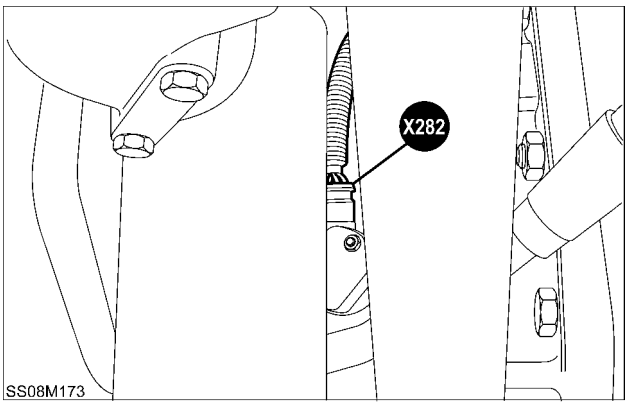
SS08K508 2

LEFT HAND REAR AXLE

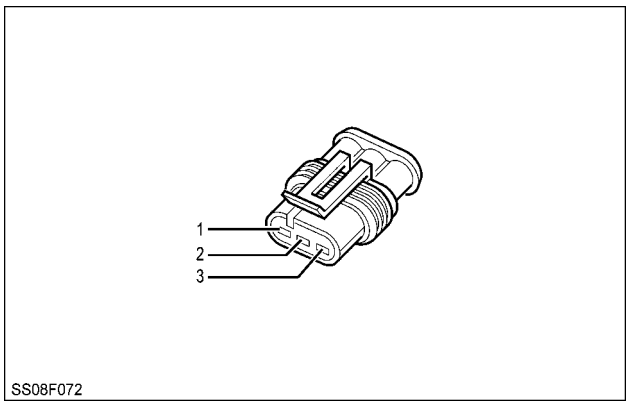
X282 CREEPER POTENTIOMETER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5020A (TN)	EDC PROC +5V REF VOLTAGE DROP POSN/RATE
2	7581 (O/L/B)	CREEPER POSITION SIGNAL
3	7570G (B)	SIGNAL GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M173 3



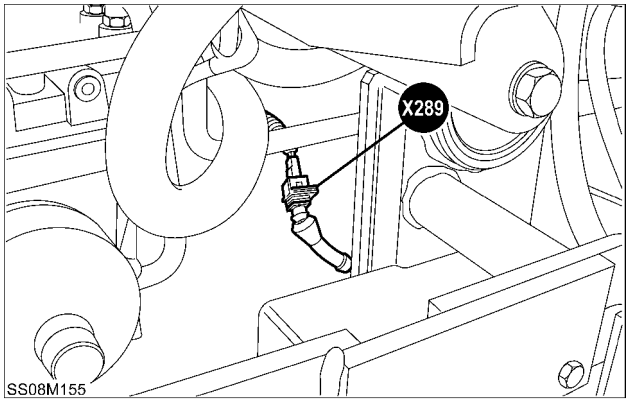
SS08F072 4

RIGHT HAND TRANSMISSION

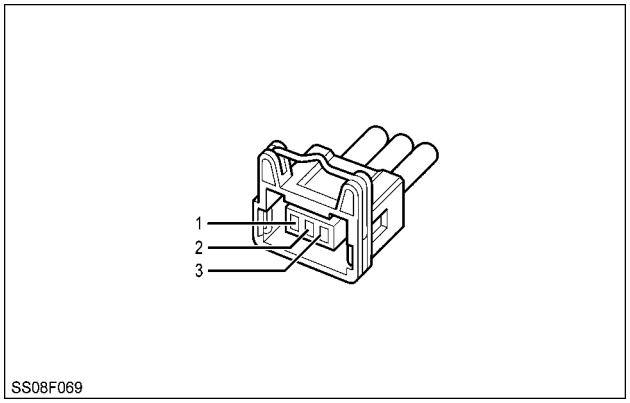
X289 FLY WHEEL SPEED SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7000BR (U)	TRANS CONTROL SUPPLY
2	7760 (W)	TORQUE SENSOR
3	60AV (B/W)	SENSOR GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M155 5



SS08F069 6

TOP OF TRANSMISSION

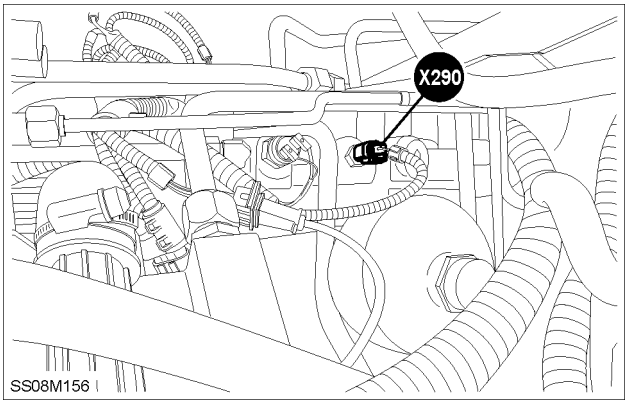
Connector - Component diagram 29

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

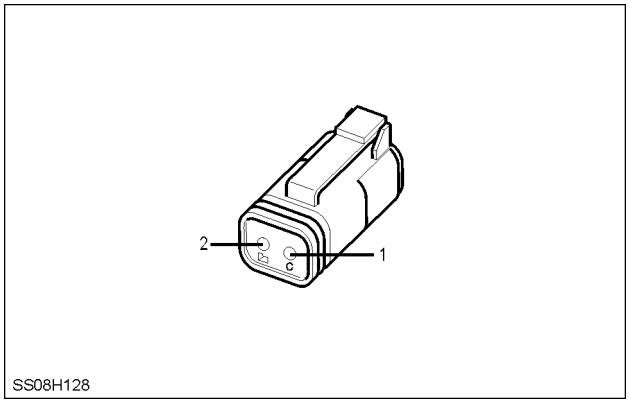
X290 TRANS OIL TEMPERATURE SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7500 (G)	TRANS OIL TEMP. SENSOR
2	60AT (B/W)	SENSOR GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M156 1



SS08H128 2

RIGHT HAND TRANSMISSION

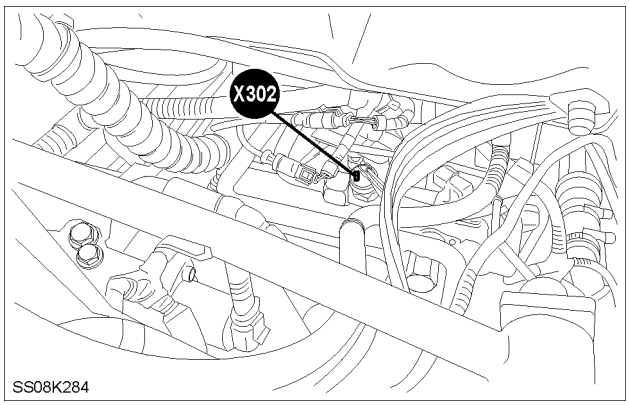
Connector - Component diagram 30

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

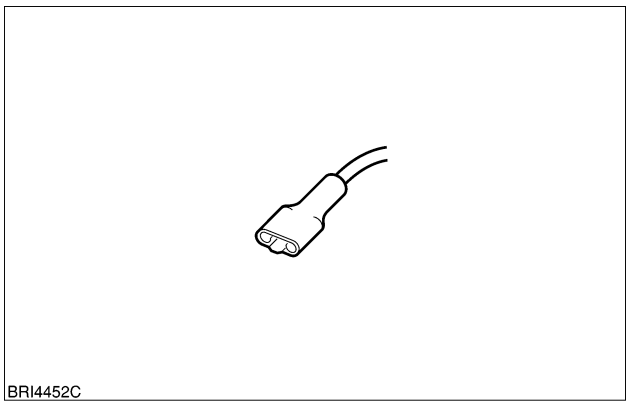
X302 POWER STEERING PRESSURE SWITCH PIN 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57NZ (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K284 1



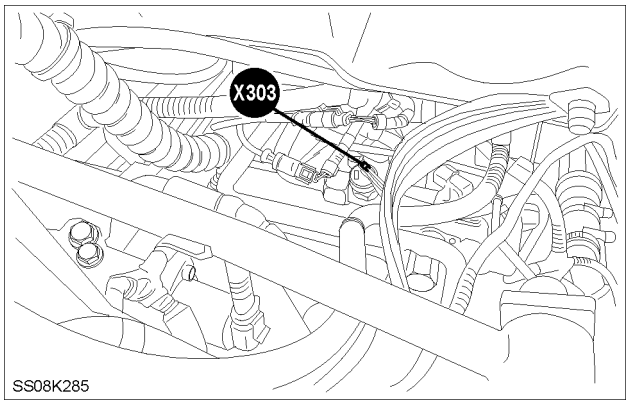
BRI4452C 2

TOP OF TRANSMISSION

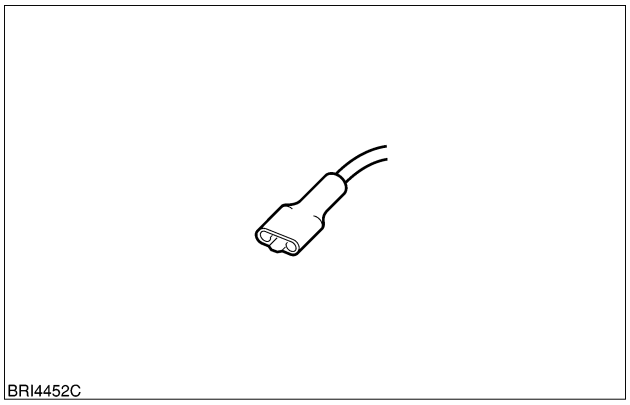
X303 POWER STEERING PRESSURE SWITCH PIN 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3500 (Y)	POWER STEERING PRESSURE SIGNAL

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K285 3



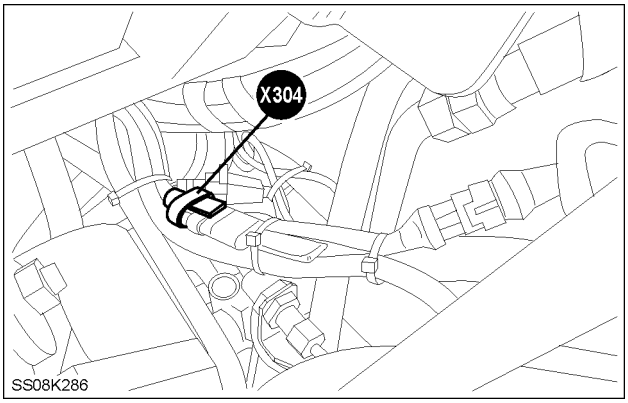
BRI4452C 4

TOP OF TRANSMISSION

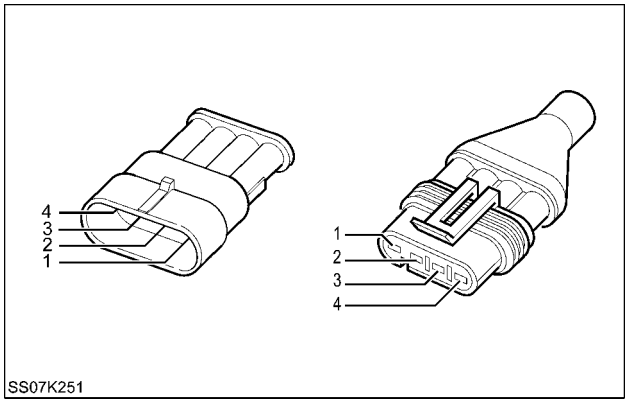
X304 CAN TERMINATOR RESISTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5515F (S)	EHR +12V IGN.
2	5510A (U) / 5510 (U)	EHR CAN LOW
3	5500A (R) / 5500 (R)	EHR CAN HIGH
4	57FM (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K286 5



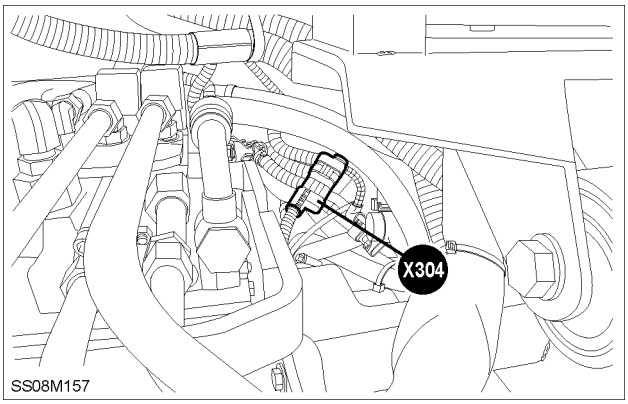
SS07K251 6

TOP OF TRANSMISSION

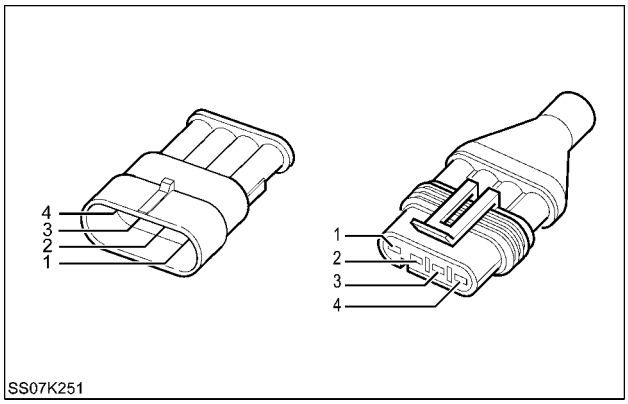
X304 MAIN EXTENSION

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5515F (S) / 5515C (S)	EHR +12V IGN.
2	5510A (U) / 5510M (U)	EHR CAN LOW
3	5500A (R) / 5500M (R)	EHR CAN HIGH
4	57FM (B) / 57MA (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M157 7



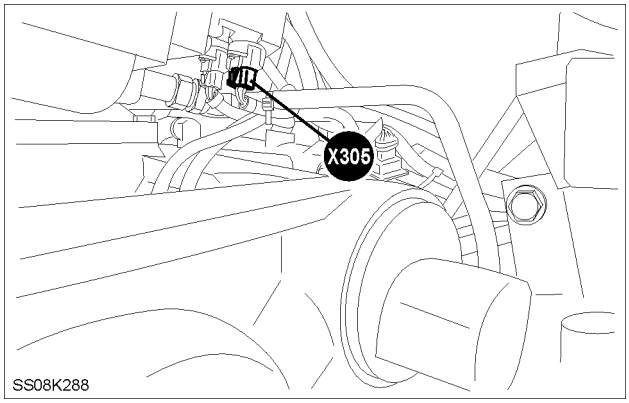
SS07K251 8

TOP OF TRANSMISSION

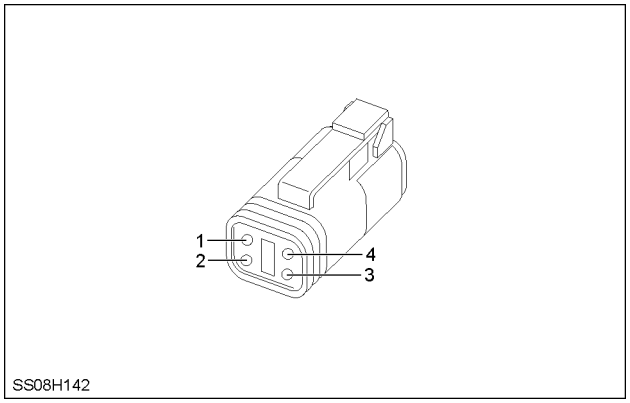
X305 EHR VALVE CONNECTOR 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5515A (S)	EHR +12V IGN.
2	5510K (U)	EHR CAN LOW
3	5500K (R)	EHR CAN HIGH
4	57FD (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K288 9



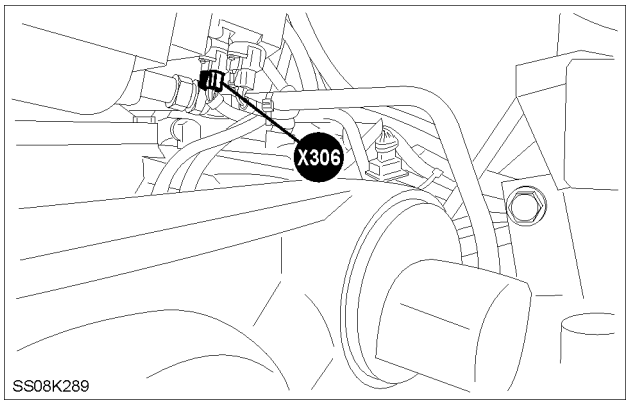
SS08H142 10

REAR RIGHT HAND TRANSMISSION

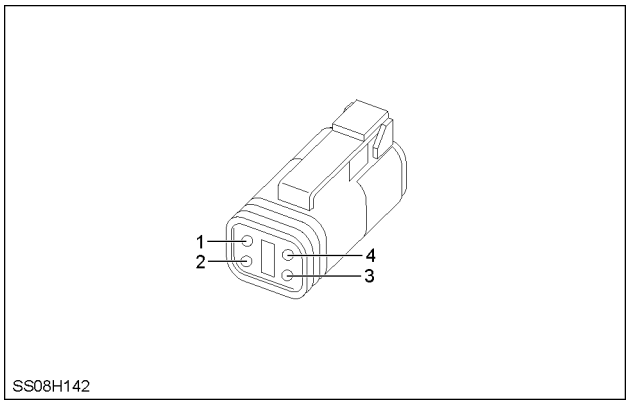
X306 EHR VALVE CONNECTOR 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5515B (S)	EHR +12V IGN.
2	5510H (U)	EHR CAN LOW
3	5500H (R)	EHR CAN HIGH
4	57FE (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K289 11



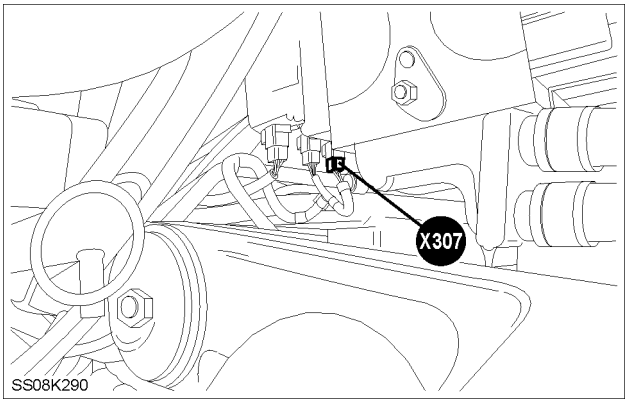
SS08H142 12

REAR RIGHT HAND TRANSMISSION

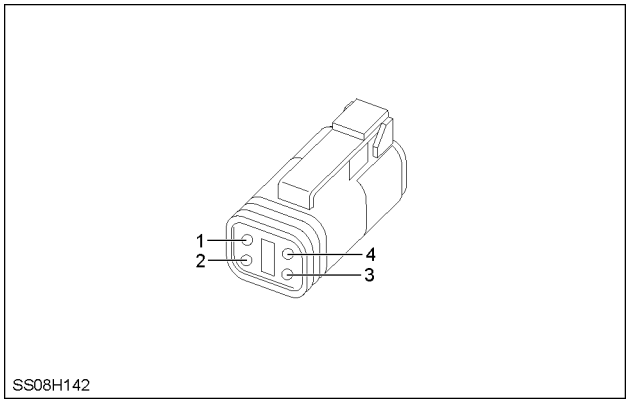
X307 EHR VALVE CONNECTOR 3

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5515C (S)	EHR +12V IGN.
2	5510F (U)	EHR CAN LOW
3	5500F (R)	EHR CAN HIGH
4	57FF (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K290 13



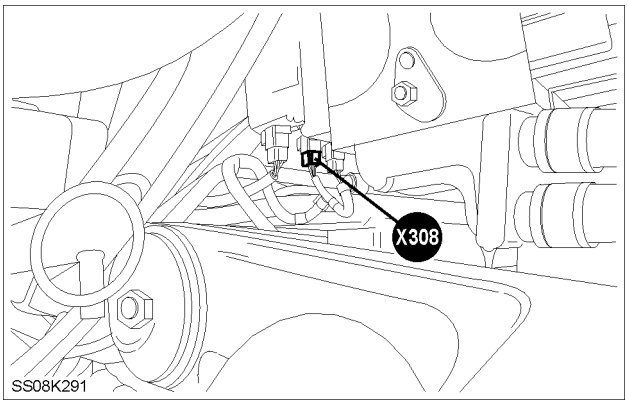
SS08H142 14

REAR LEFT HAND TRANSMISSION

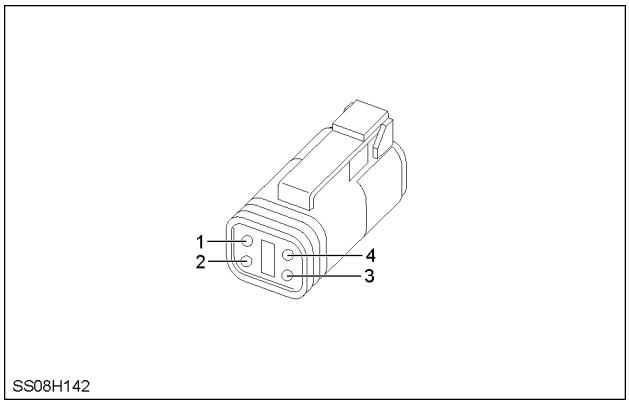
X308 EHR VALVE CONNECTOR 4

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5515D (S)	EHR +12V IGN.
2	5510D (U)	EHR CAN LOW
3	5500D (R)	EHR CAN HIGH
4	57FG (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K291 15



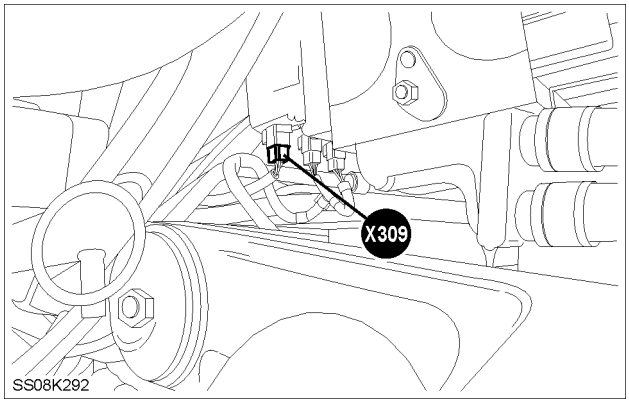
SS08H142 16

REAR LEFT HAND TRANSMISSION

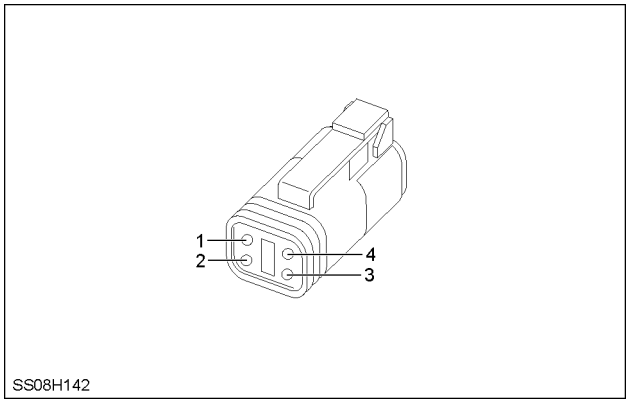
X309 EHR VALVE CONNECTOR 5

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5515E (S)	EHR +12V IGN.
2	5510B (U)	EHR CAN LOW
3	5500B (R)	EHR CAN HIGH
4	57FK (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K292 17



SS08H142 18

REAR LEFT HAND TRANSMISSION

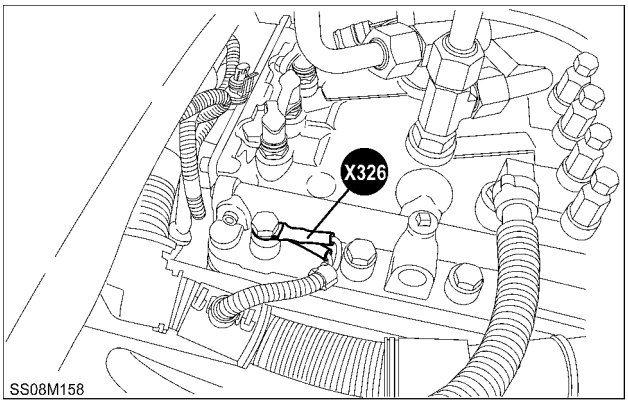
Connector - Component diagram 32

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

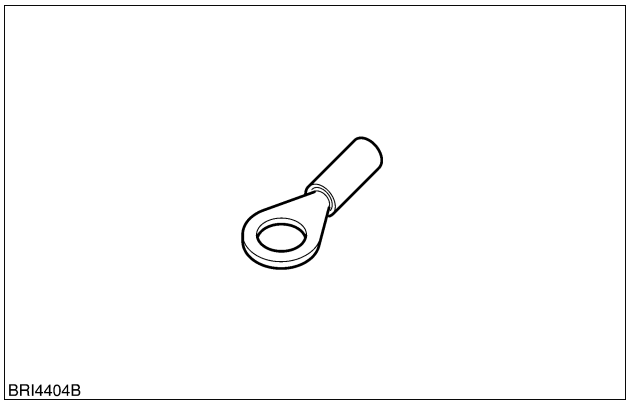
X326 EARTH TRANSMISSION

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57AA (B)	EARTH (ALL)
1	57EG (W)	EARTH (ALL)
1	57HZ (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M158 1



BRI4404B 2

LEFT HAND TOP OF TRANSMISSION

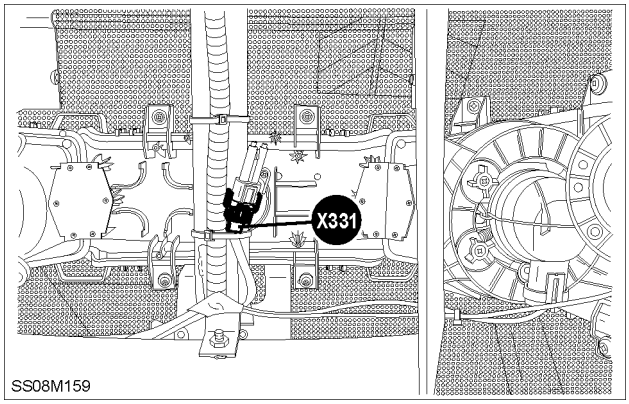
Connector - Component diagram 33

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

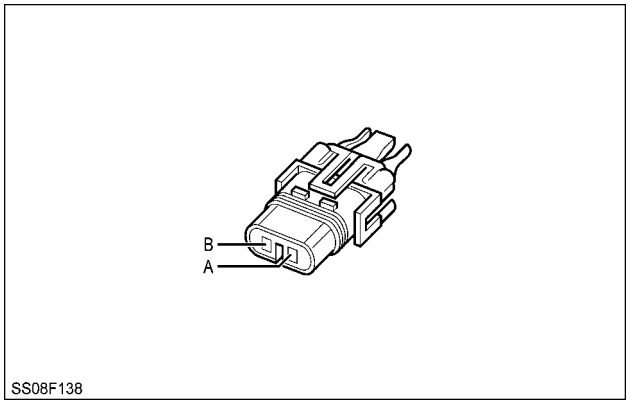
X331 WORKLAMP RIGHT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	1073C (L)	WORKLAMP FRONT FEED
B	57H (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M159 1



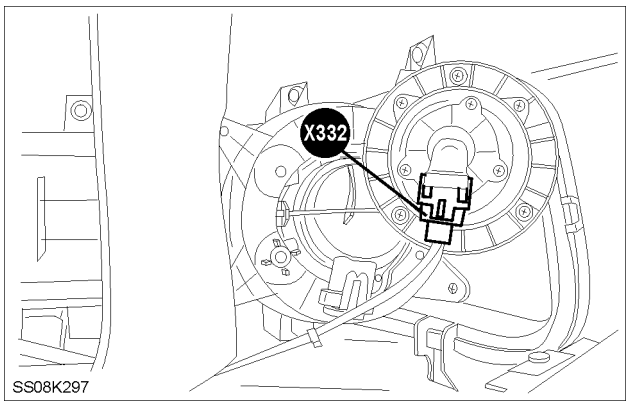
SS08F138 2

FRONT HOOD

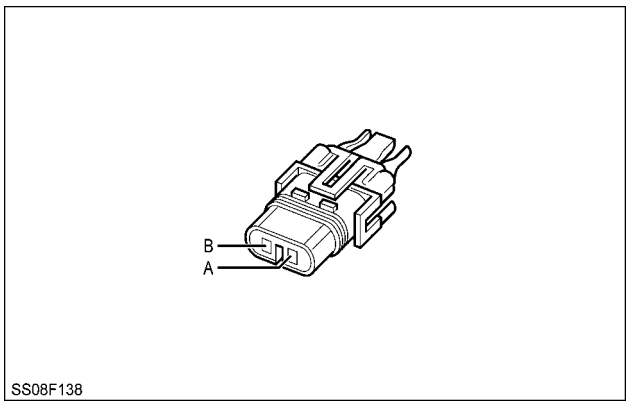
X332 CORNER LAMP RIGHT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	1073B (L)	WORKLAMP FRONT FEED
B	57H (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K297 3



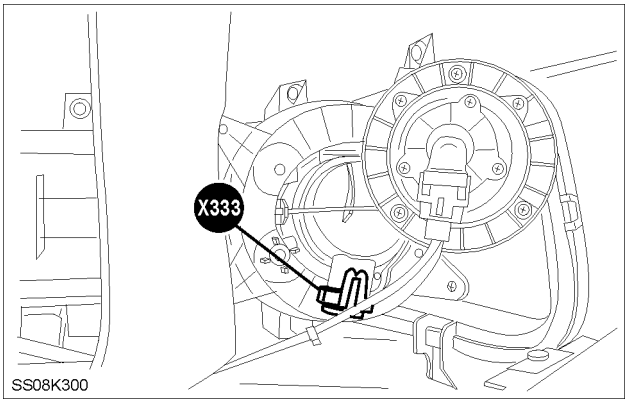
SS08F138 4

FRONT RIGHT HAND HOOD

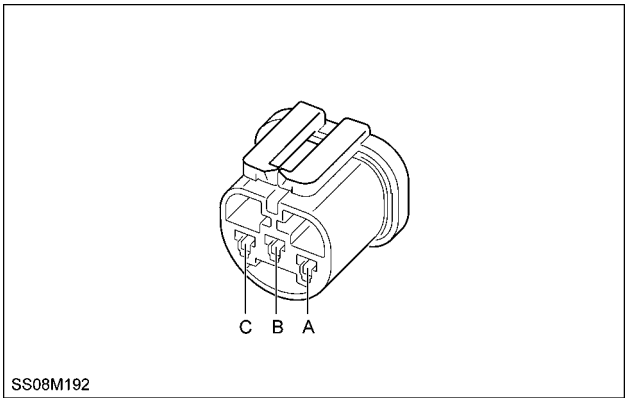
X333 HEADLAMP RIGHT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	1030C (U)	HEADLAMP DIP BEAM
B	57D (B)	EARTH (ALL)
C	1027C (U)	HEADLAMP MAIN BEAM

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K300 5



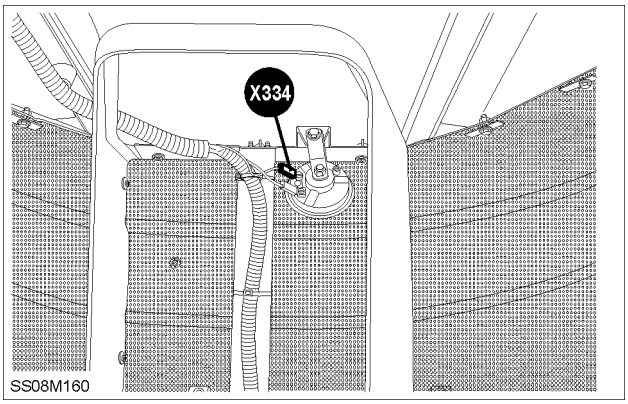
SS08M192 6

FRONT RIGHT HAND HOOD

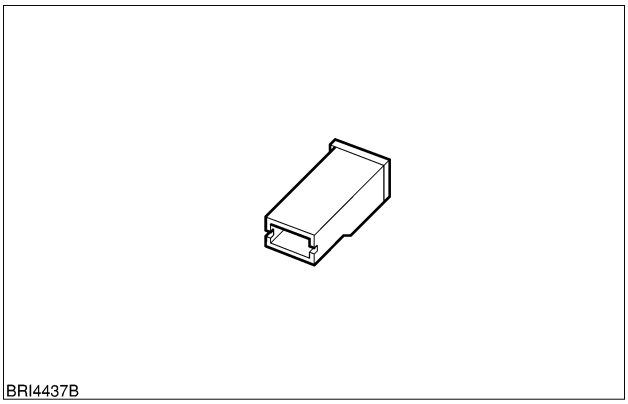
X334 HORN

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57E (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M160 7



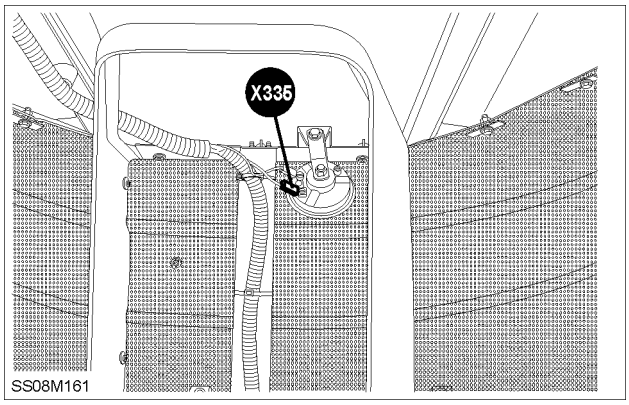
BRI4437B 8

FRONT HOOD

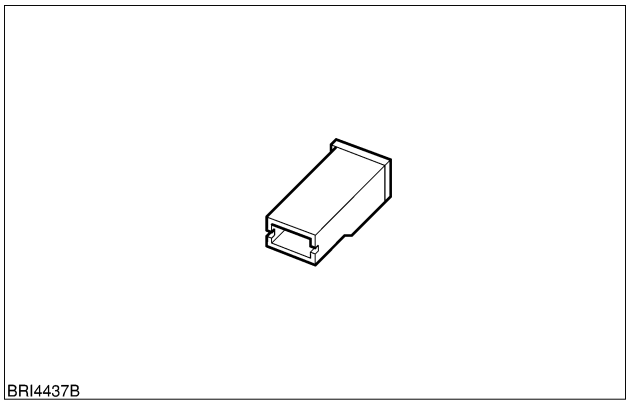
X335 HORN

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	376 (L)	HORN FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M161 9



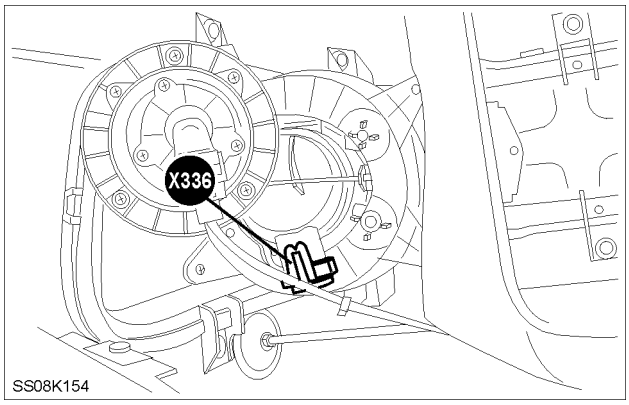
BRI4437B 10

FRONT HOOD

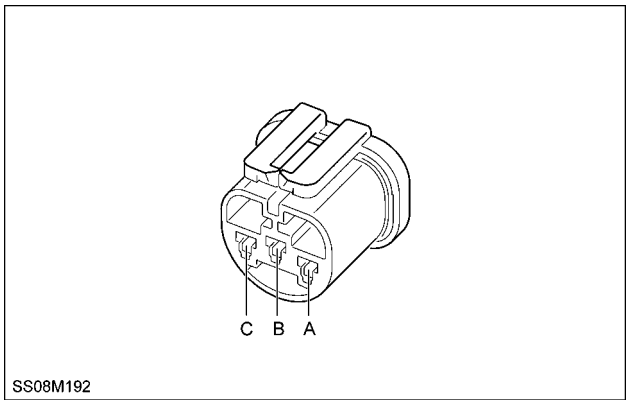
X336 HEADLAMP LEFT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	1030D (U)	HEADLAMP DIP BEAM
B	57C (B)	EARTH (ALL)
C	1027D (U)	HEADLAMP MAIN BEAM

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K154 11



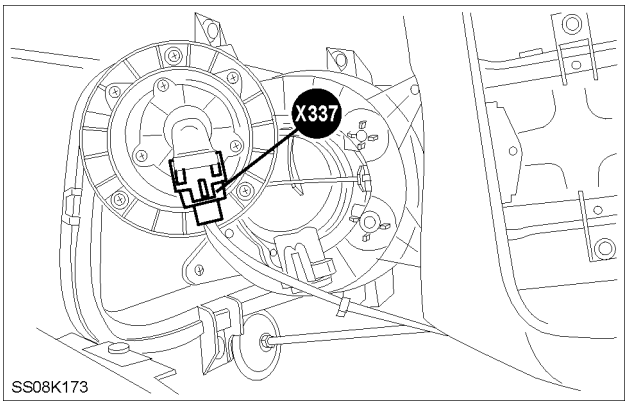
SS08M192 12

FRONT LEFT HAND HOOD

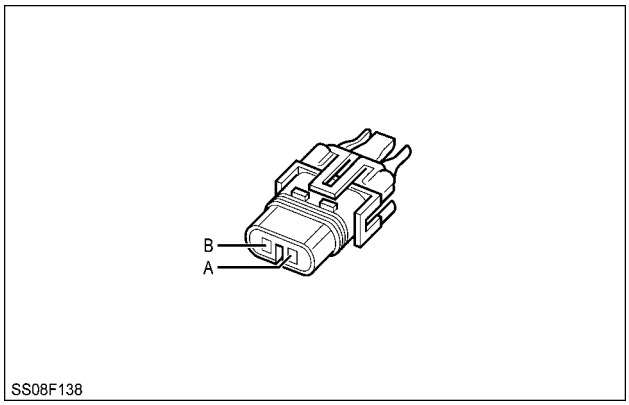
X337 CORNER LAMP LEFT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	1073A (L)	WORKLAMP FRONT FEED
B	57F (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K173 13



SS08F138 14

FRONT LEFT HAND HOOD

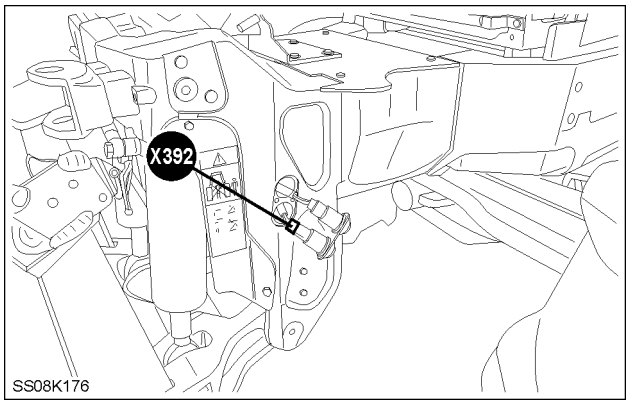
Connector - Component diagram 39

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

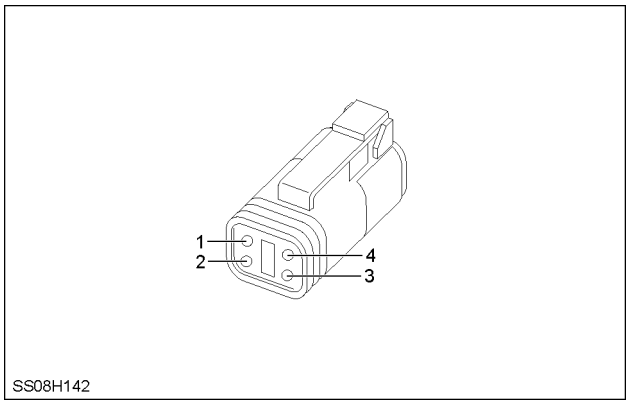
X392 FRONT HITCH LOWER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(R)	
2	(R)	
3	(Y)	
4	(U)	

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K176 1



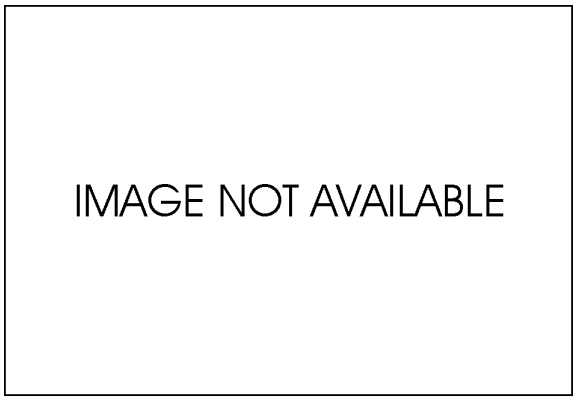
SS08H142 2

LEFT HAND FRONT HITCH

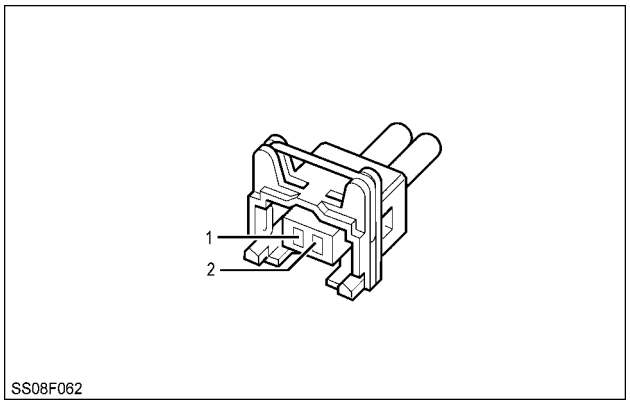
X393 FRONT PTO SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(N)	
2	(P)	

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 3



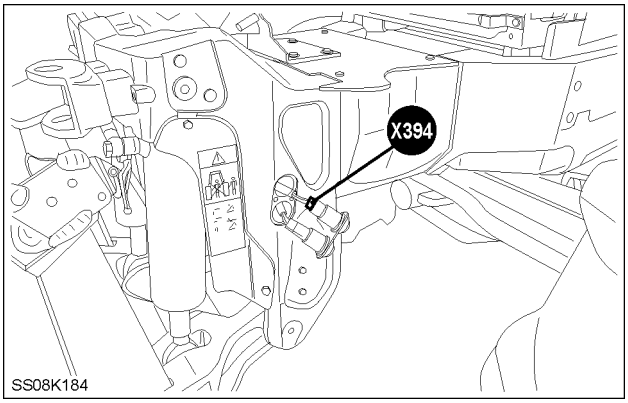
SS08F062 4

FRONT HITCH

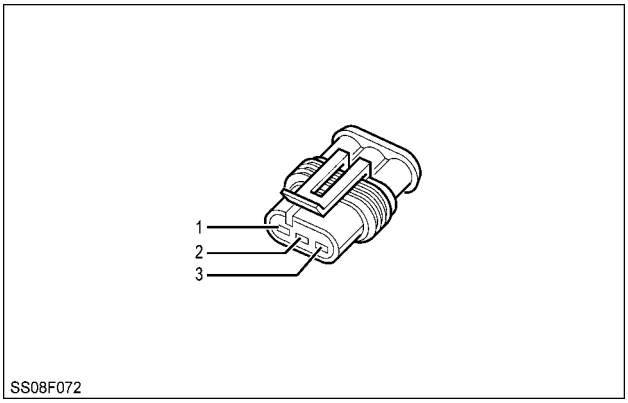
X394 FRONT HITCH RAISE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(R)	
2	(U)	
3	(G)	

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K184 5



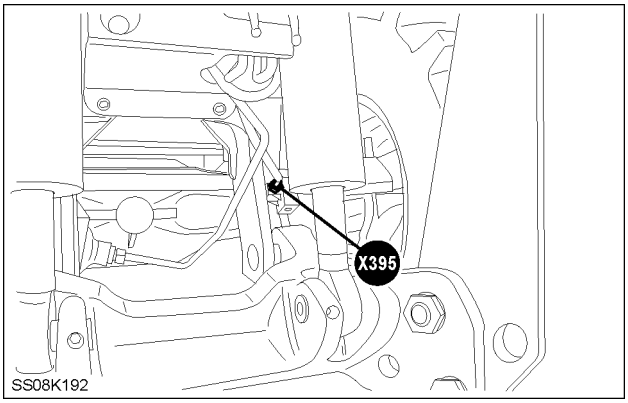
SS08F072 6

LEFT HAND FRONT HITCH

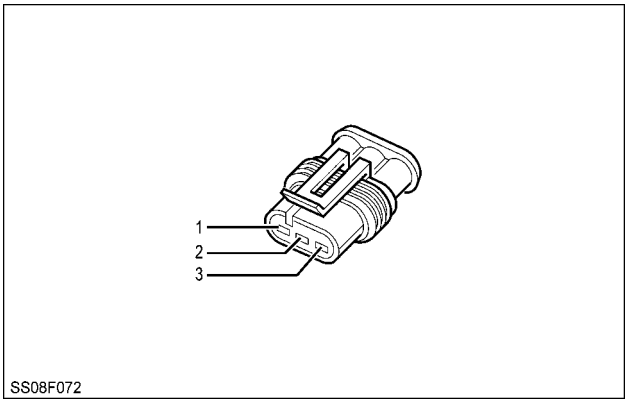
X395 FRONT HITCH POSITION SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(B)	
2	(R)	
3	(W)	

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K192 7



SS08F072 8

FRONT HITCH

Connector - Component diagram 40

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

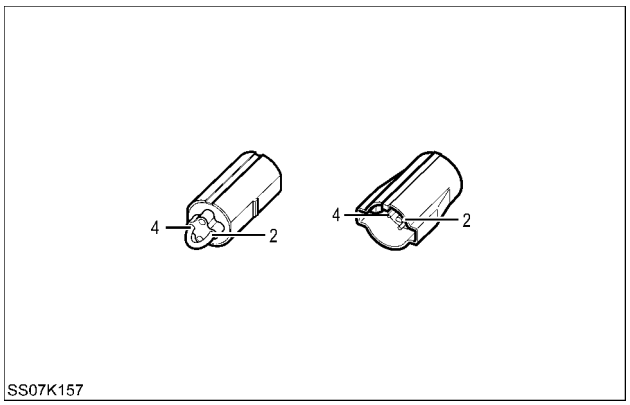
X400 DIVERTER SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	181AA (G)	BLOWER MOTOR FEED
4	9000B (N)	DIVERTER VALVE

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*

IMAGE NOT AVAILABLE

INA 1



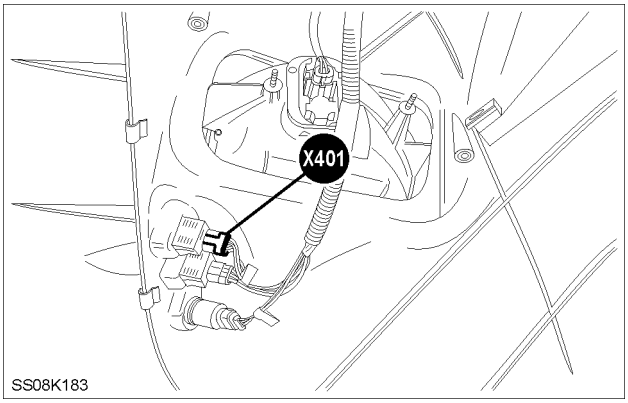
SS07K157 2

GARU

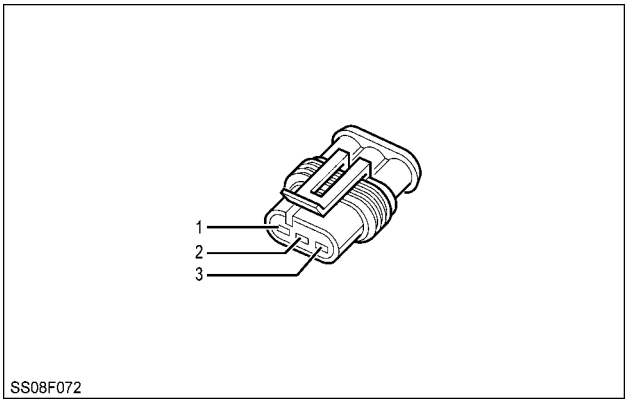
X401 EHR 3 SWITCH FENDER RIGHT AND LEFT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5574 (L)	FENDER 3RD EHR SWITCH – UP
2	5200W (N)	EDC VALVE SUPPLY
3	5576 (L)	FENDER 3RD EHR SWITCH – DOWN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*

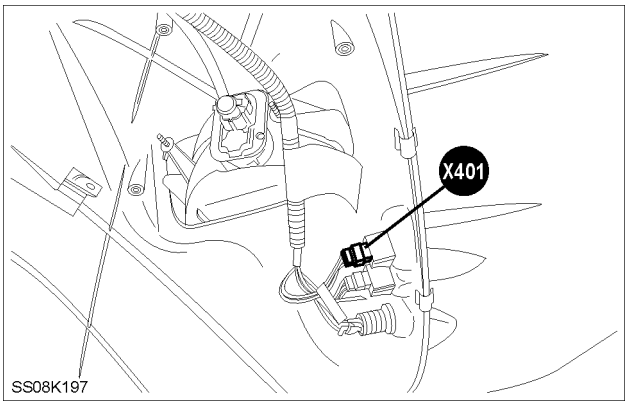


SS08K183 3

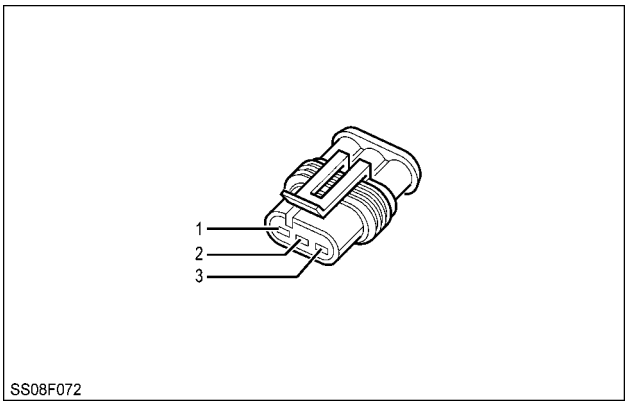


SS08F072 4

RIGHT HAND REAR FENDER



SS08K197 5



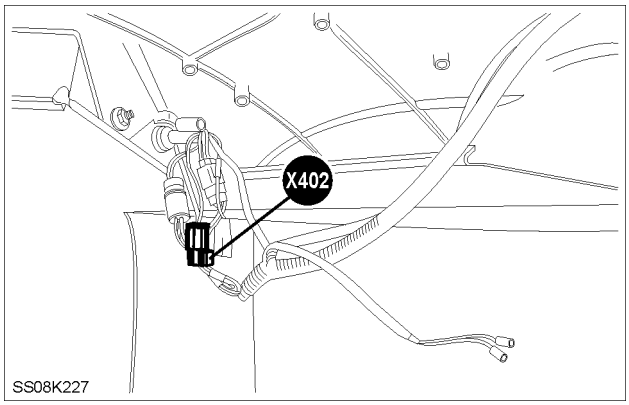
SS08F072 6

LEFT HAND REAR FENDER

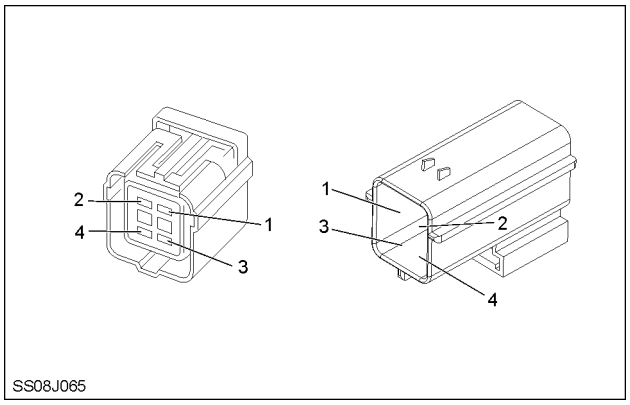
X402 REAR FENDER 3RD REMOTE LEFT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
3	5574B (P) / 5574 (L)	FENDER 3RD EHR SWITCH – UP
4	5576B (P) / 5576 (L)	FENDER 3RD EHR SWITCH – DOWN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K227 7



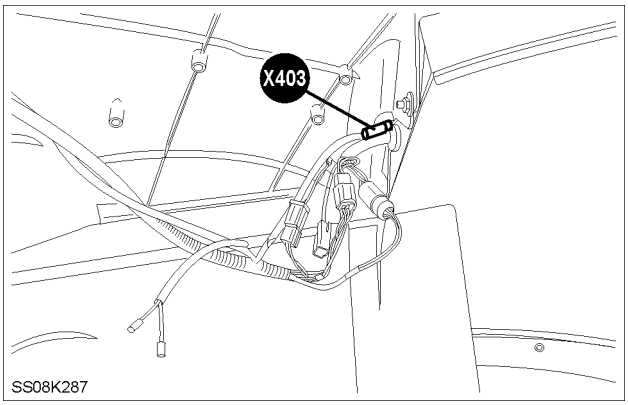
SS08J065 8

LEFT HAND REAR FENDER

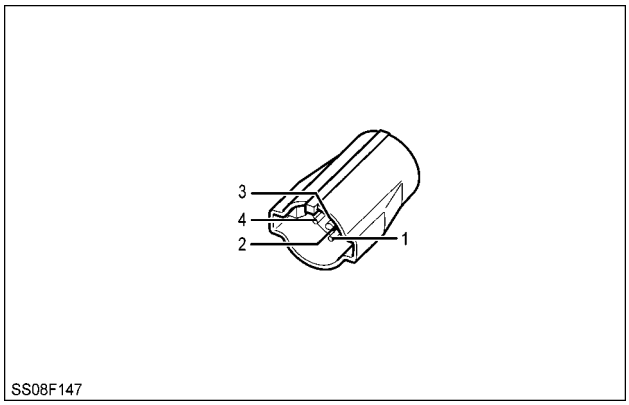
X403 WORKLAMP C - PILLAR RIGHT AND LEFT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	998 (G)	WORK LAMP-REAR FEED (INNER)
4	57AP (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*

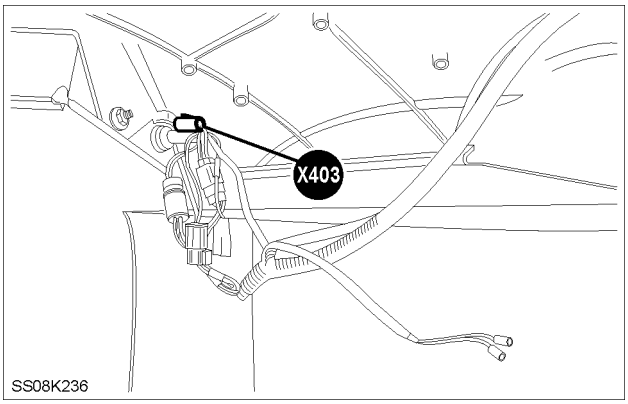


SS08K287 9

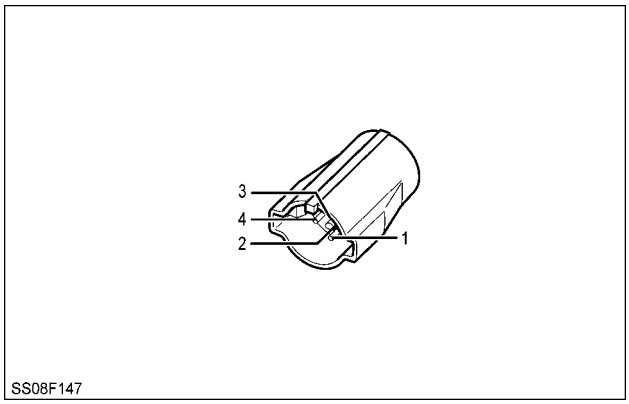


SS08F147 10

RIGHT HAND REAR FENDER



SS08K236 11



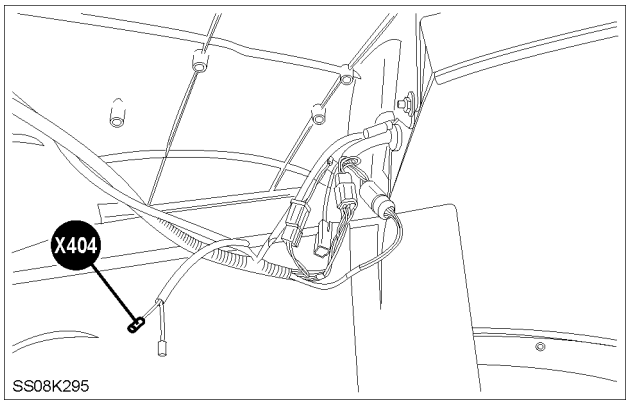
SS08F147 12

LEFT HAND REAR FENDER

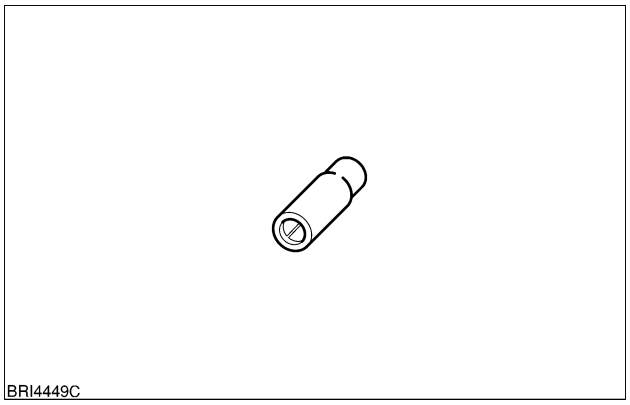
X404 LICENSE LAMP RIGHT AND LEFT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1013B (R) / 1013 (R)	RIGHT HAND LAMPS

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*

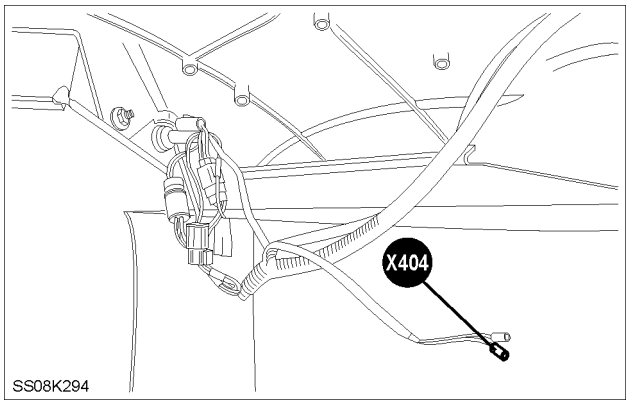


SS08K295 13

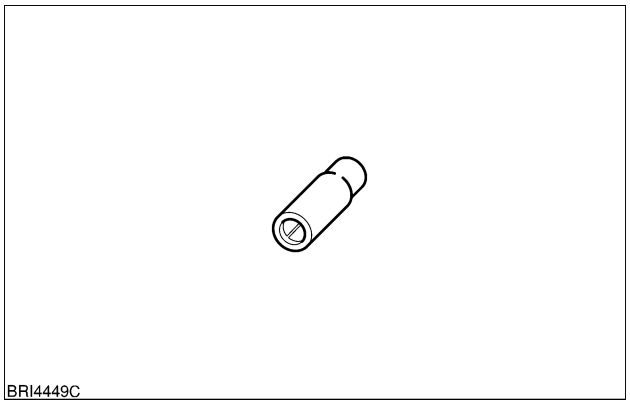


BRI4449C 14

RIGHT HAND REAR FENDER



SS08K294 15



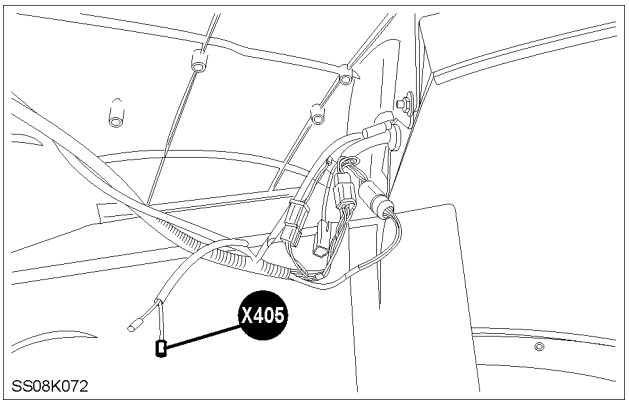
BRI4449C 16

LEFT HAND REAR FENDER

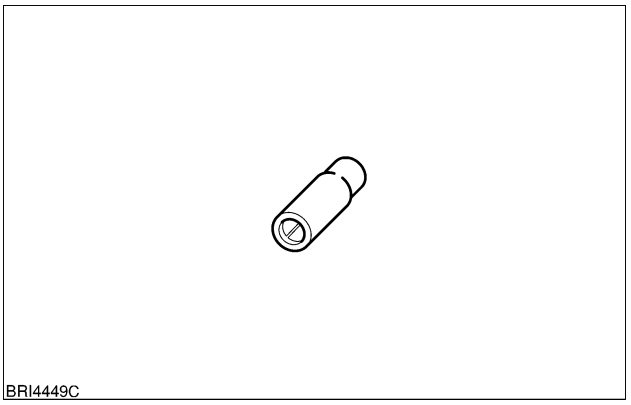
X405 LICENSE LAMP RIGHT AND LEFT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57AW (B) / 57 (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*

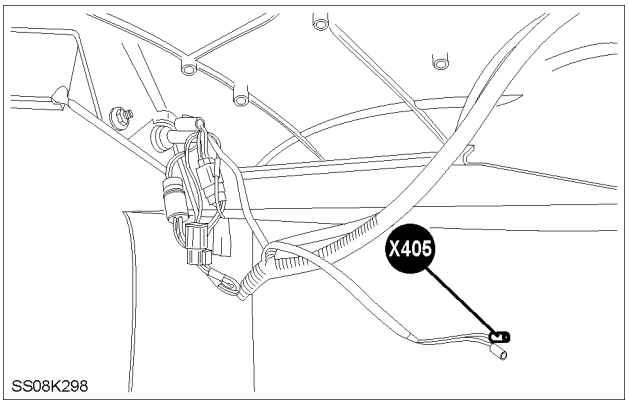


SS08K072 17

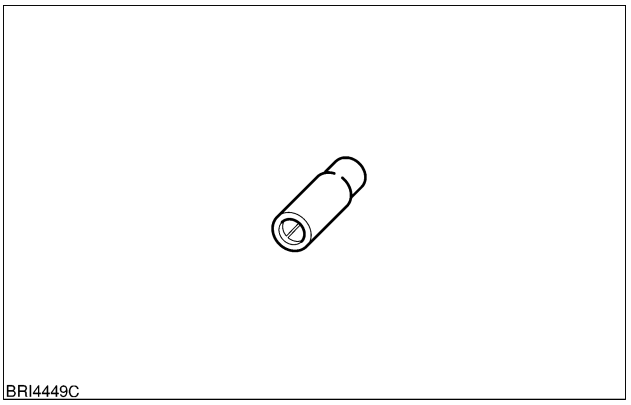


BRI4449C 18

RIGHT HAND REAR FENDER



SS08K298 19



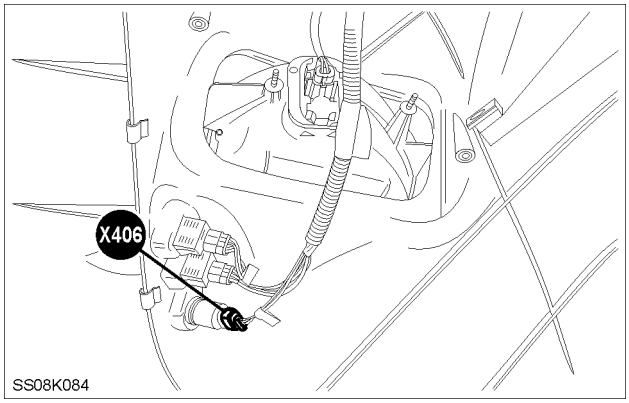
BRI4449C 20

LEFT HAND REAR FENDER

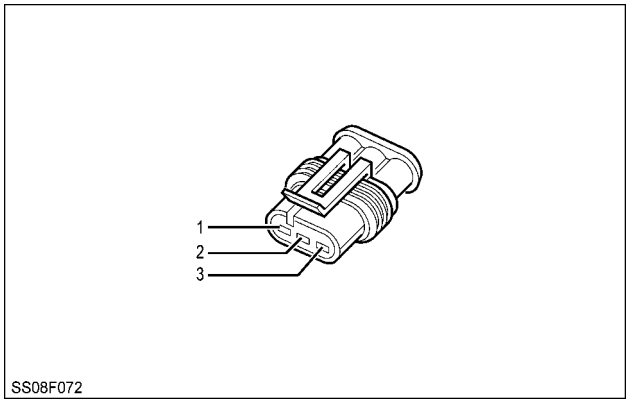
X406 REAR PTO SWITCH RIGHT AND LEFT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2050 (G)	PTO SUPPLY / DOG SUPPLY
2	2059 (W)	FENDER PTO SWITCH INPUT
3	2056 (W)	PTO FENDER PTO SWITCH ON

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*

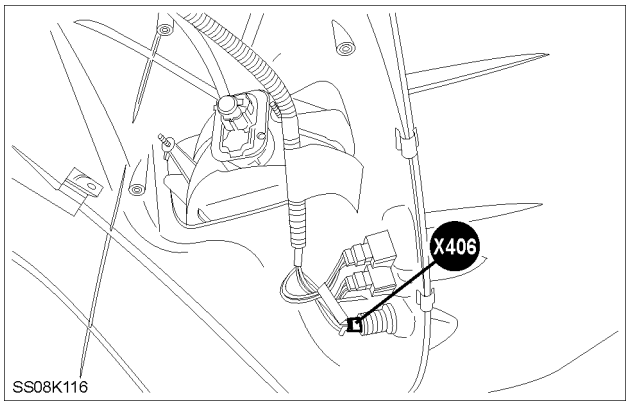


SS08K084 21

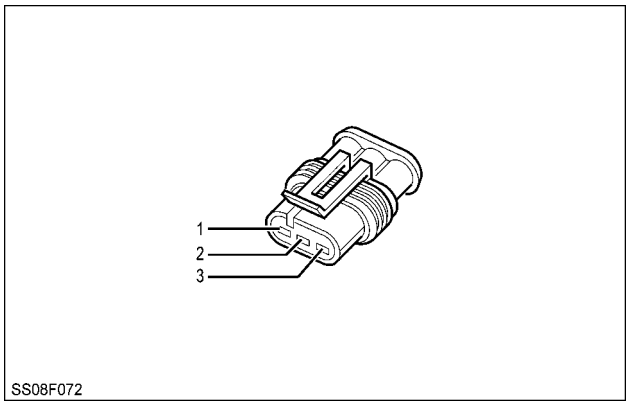


SS08F072 22

RIGHT HAND REAR FENDER



SS08K116 23



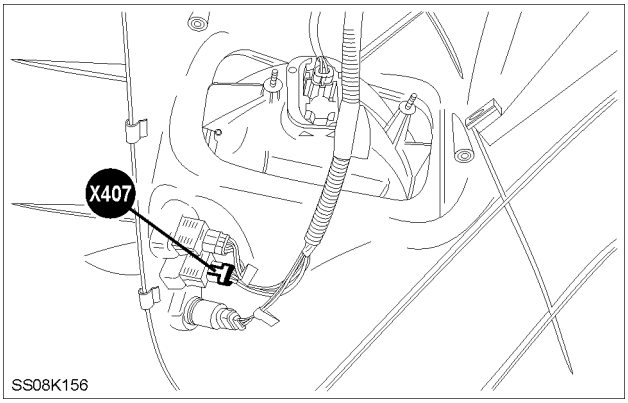
SS08F072 24

LEFT HAND REAR FENDER

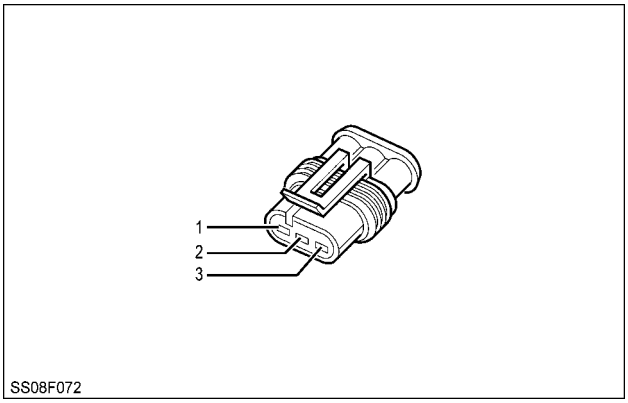
X407 HPL SWITCH RIGHT AND LEFT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5100 (K)	EDC EXTERNAL SWITCH UP
2	5200AP (N)	EDC VALVE SUPPLY
3	5095 (K)	EDC EXTERNAL SWITCH DOWN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*

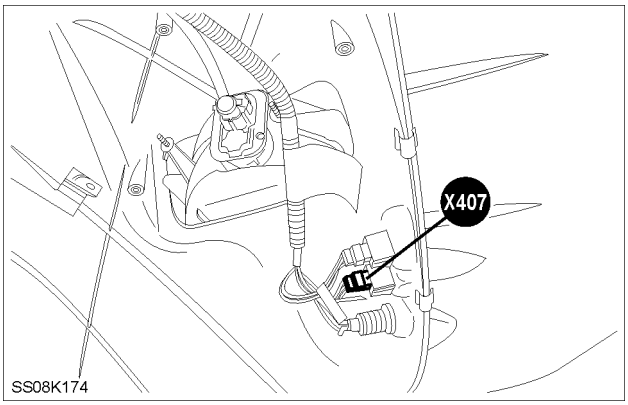


SS08K156 25

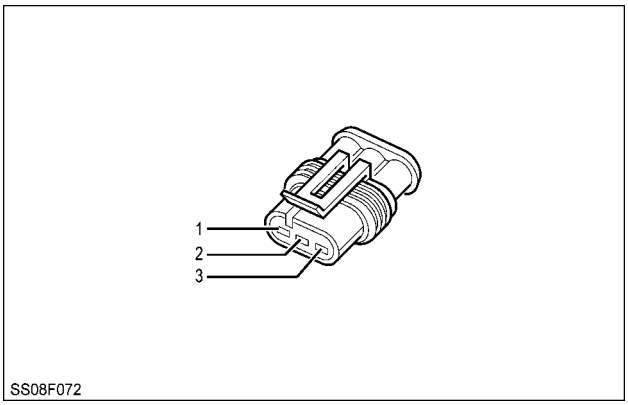


SS08F072 26

RIGHT HAND REAR FENDER



SS08K174 27



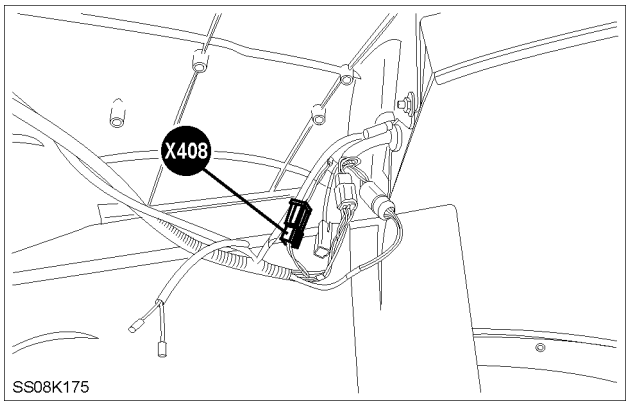
SS08F072 28

LEFT HAND REAR FENDER

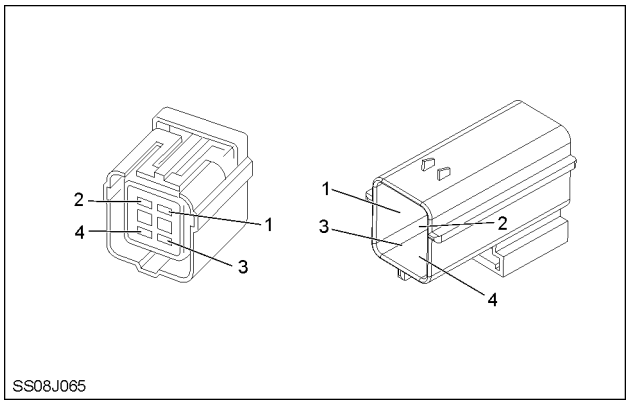
X408 REAR FENDER 3RD REMOTE RIGHT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
3	5574A (P) / 5574 (L)	FENDER 3RD EHR SWITCH – UP
4	5576A (P) / 5576 (L)	FENDER 3RD EHR SWITCH – DOWN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K175 29



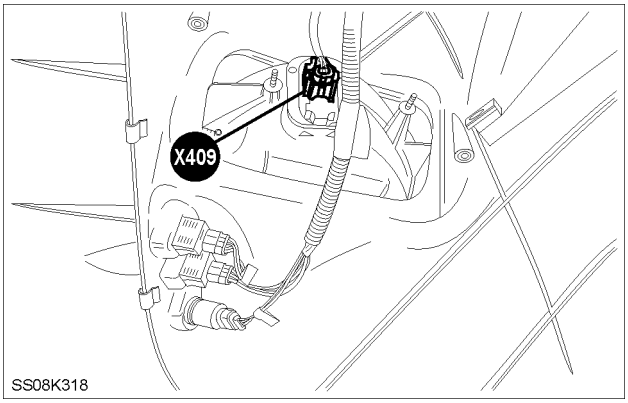
SS08J065 30

RIGHT HAND REAR FENDER

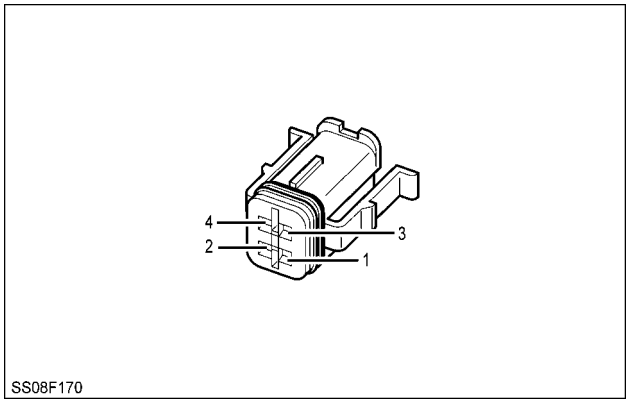
X409 STOP TAIL LIGHT RIGHT AND LEFT (LMP-018)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57AX (B)	EARTH (ALL)
2	3004 (G)	RIGHT HAND TURN SIGNAL WARNING LAMP
3	1013A (R)	RIGHT HAND LAMPS
4	810 (G)	STOPLAMPS

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*

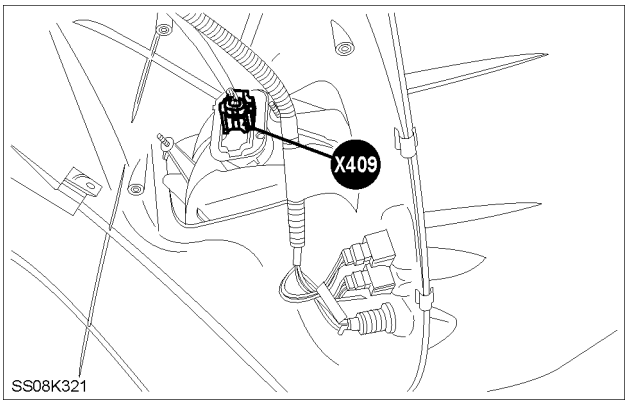


SS08K318 31

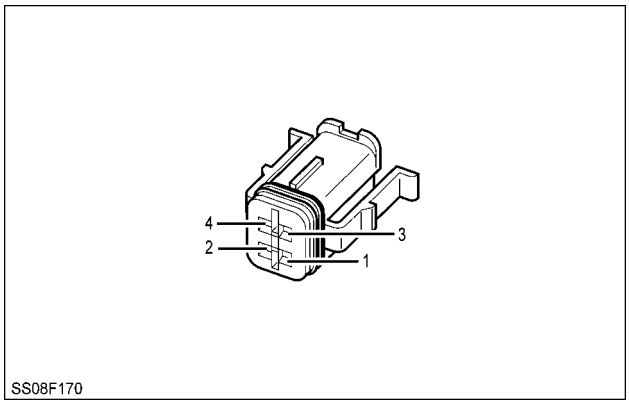


SS08F170 32

RIGHT HAND REAR FENDER



SS08K321 33



SS08F170 34

LEFT HAND REAR FENDER

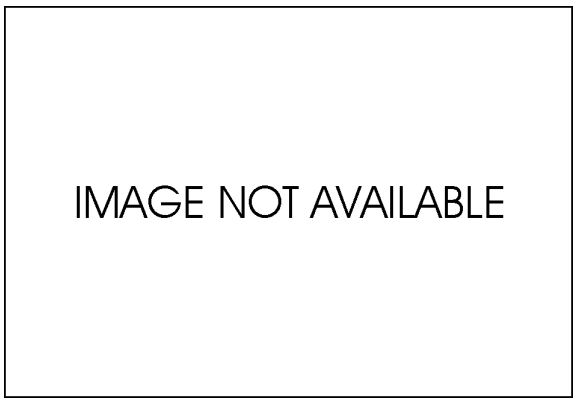
Connector - Component diagram 42

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

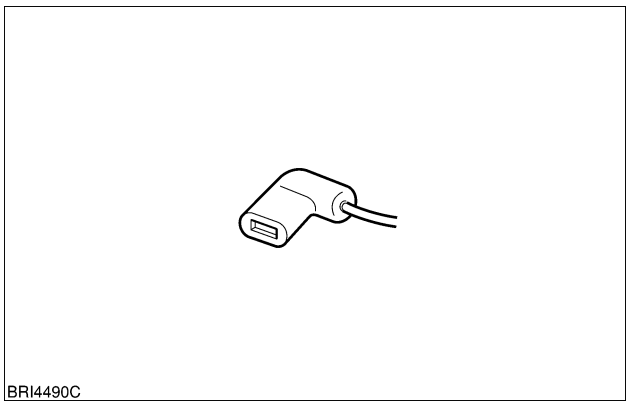
X422 LOW BRAKE PRESSURE LINE SWITCH 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	8020A (TN)	TRAILER BRAKE PRESSURE

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 1



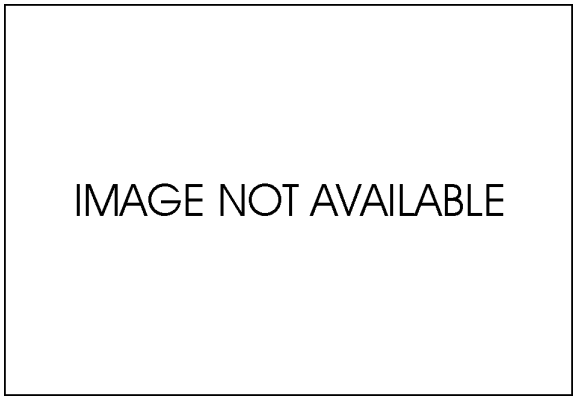
BRI4490C 2

REAR RIGHT HAND AXLE

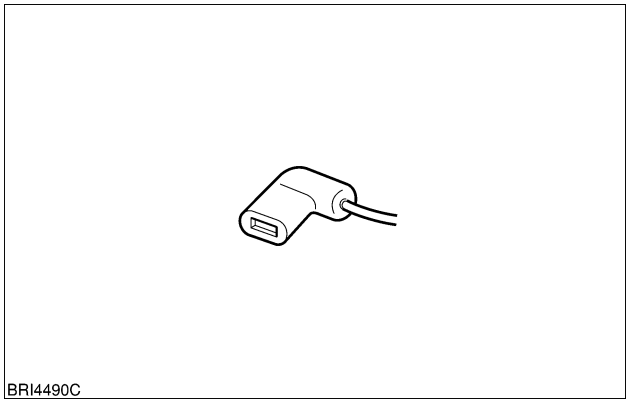
X423 LOW BRAKE PRESSURE LINE SWITCH 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57FA (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 3



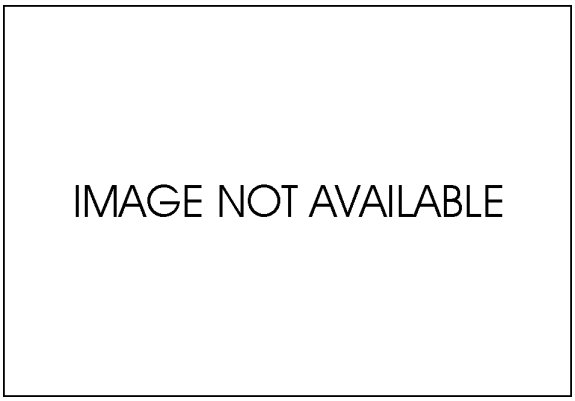
BRI4490C 4

REAR RIGHT HAND AXLE

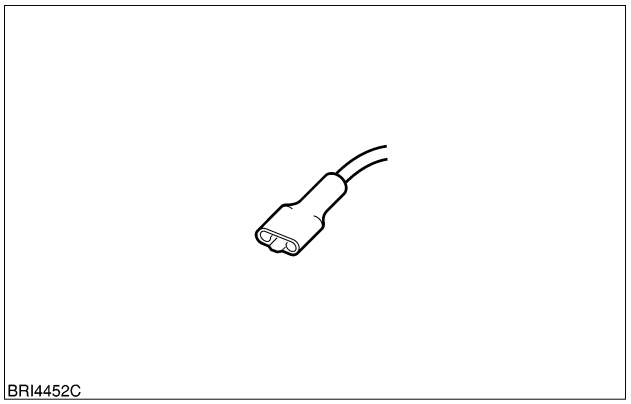
X424 HYDRAULIC TRAILER BRAKE SOLENOID 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	8000B (N)	TRAILER BRAKE SOLENOID

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 5



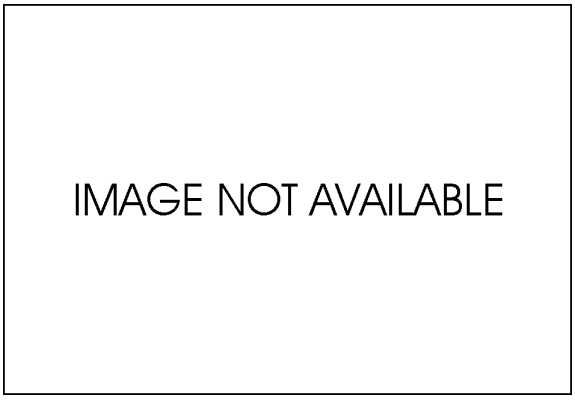
BRI4452C 6

REAR RIGHT HAND AXLE

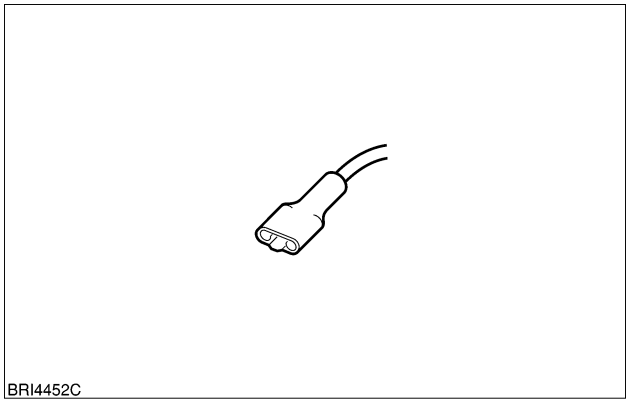
X425 HYDRAULIC TRAILER BRAKE SOLENOID 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	8000C (N)	TRAILER BRAKE SOLENOID

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 7



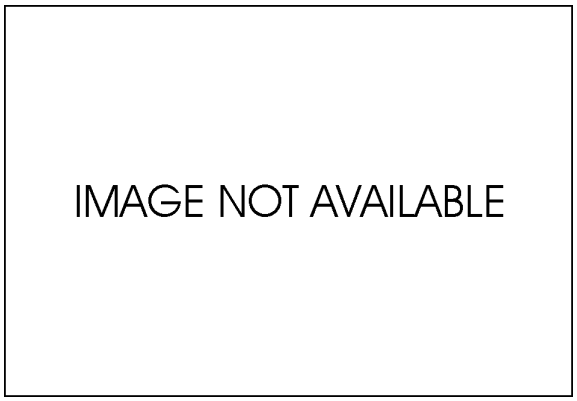
BRI4452C 8

REAR RIGHT HAND AXLE

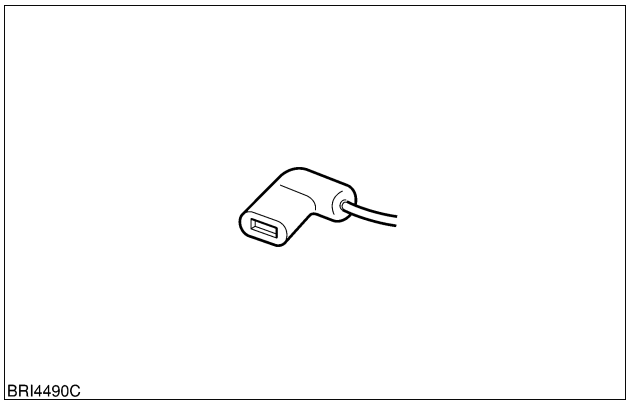
X426 LOW PUMP OUTPUT PRESS SWITCH 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	8010A (TN)	TRAILER BRAKE PRESSURE

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 9



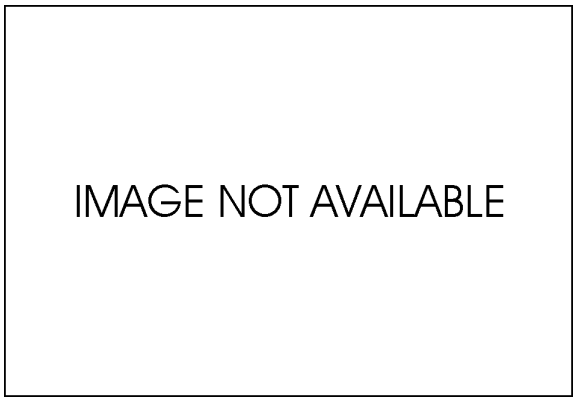
BRI4490C 10

REAR RIGHT HAND AXLE

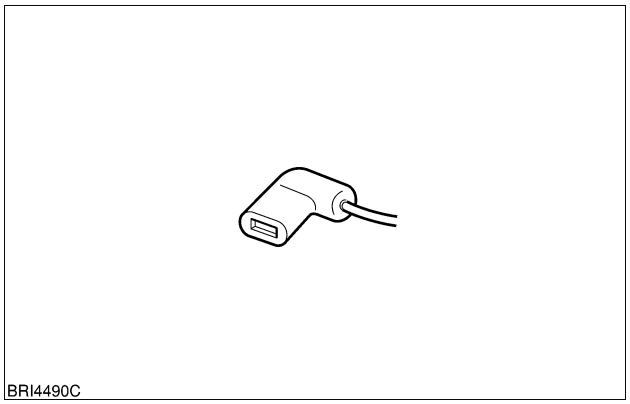
X427 LOW PUMP OUTPUT PRESS SWITCH 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	8060E (U)	TRAILER BRAKE SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 11



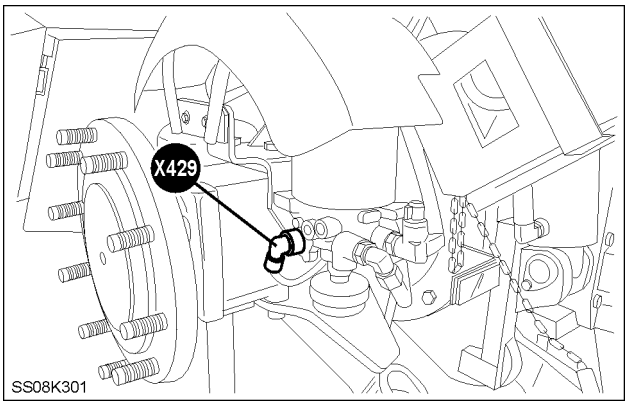
BRI4490C 12

REAR RIGHT HAND AXLE

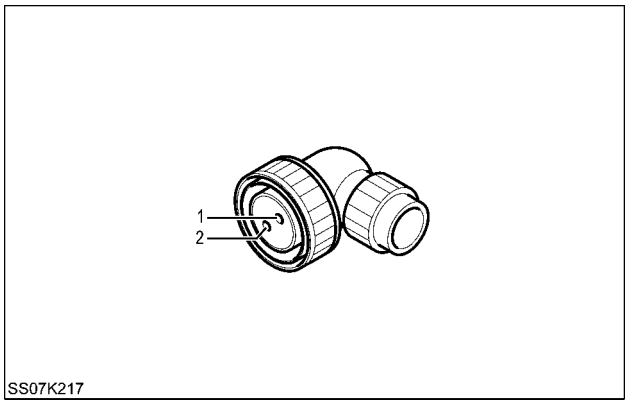
X429 BRAKE DE-ICER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	8060F (U)	TRAILER BRAKE SUPPLY
2	57FN (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K301 13



SS07K217 14

REAR LEFT HAND TRANSMISSION

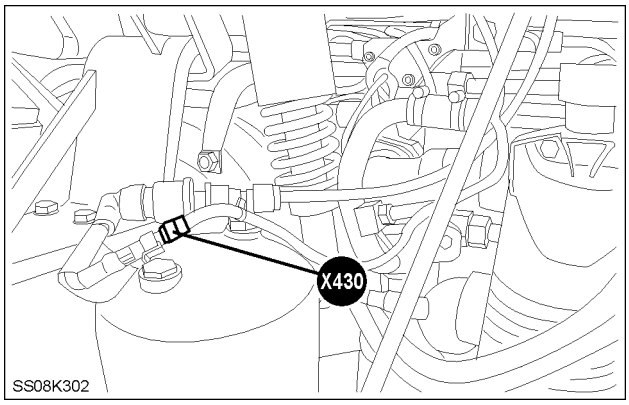
Connector - Component diagram 43

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

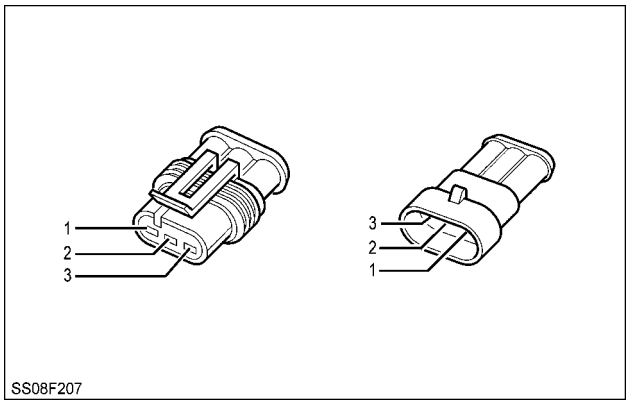
X430 AIR BRAKE PRESSURE SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	8010 (TN)	TRAILER BRAKE PRESSURE
2	8020B (TN)	TRAILER BRAKE PRESSURE
3	2095D (G)	INSTRUMENT SIGNAL GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K302 1



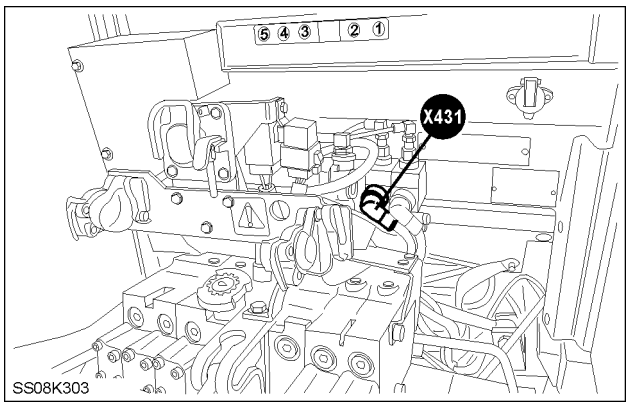
SS08F207 2

REAR RIGHT HAND TRANSMISSION

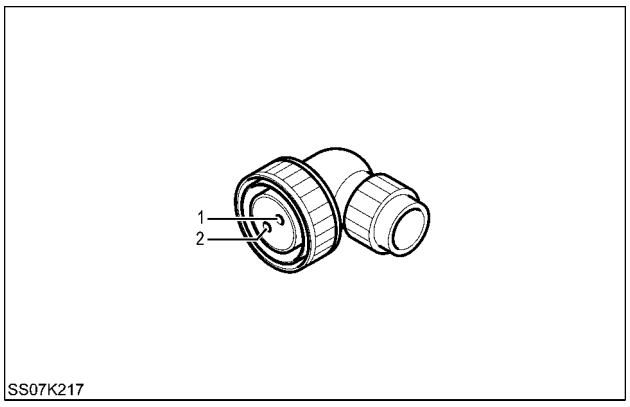
X431 PNEUMATIC TRAILER BRAKE SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	8000X (N)	TRAILER BRAKE SOLENOID
2	57EK (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K303 3



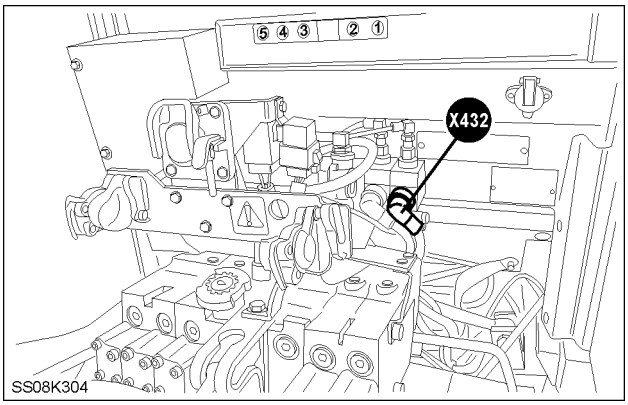
SS07K217 4

REAR OF TRACTOR

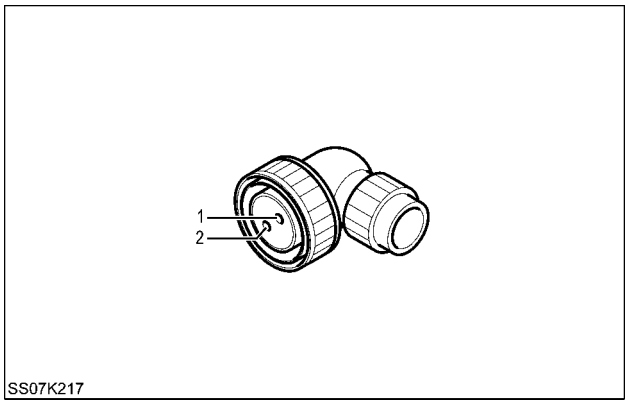
X432 PARK BRAKE SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	8070 (L)	TRAILER PARK BRAKE SOLENOID
2	57EL (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K304 5



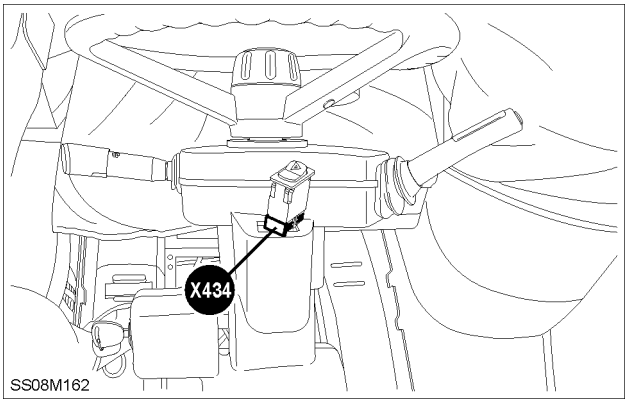
SS07K217 6

REAR OF TRACTOR

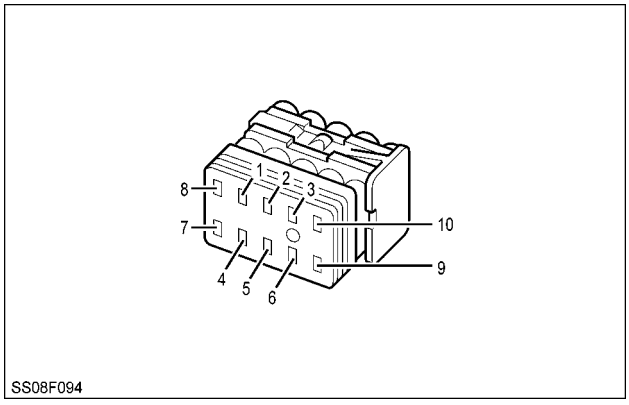
X434 HAZARD SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	1021 (P)	HAZARD SWITCH SUPPLY (BATTERY)
3	1020A (G/W)	HAZARD SWITCH SUPPLY
7	57BF (B)	EARTH (ALL)
8	1020 (G/S)	HAZARD SWITCH SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M162 7



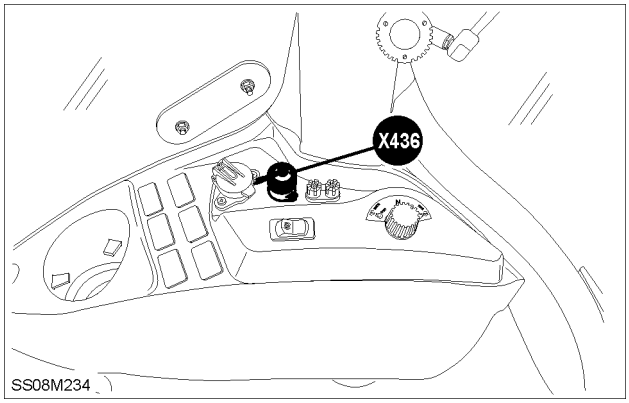
SS08F094 8

FRONT INSIDE CAB

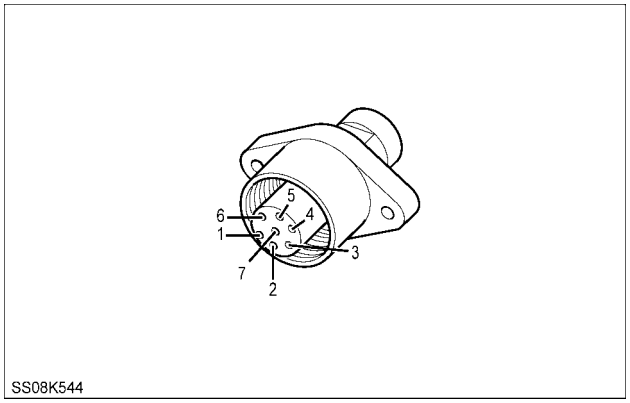
X436 ISO 11786 SIGNAL SOCKET

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2320 (L/K/Y)	TRUE GROUND SPEED ISO 11786 SKT.PIN#1
2	2300 (L/B/Y)	THEORETICAL GROUND SPEED ISO 11786 SKT.PIN#2
3	2330 (L/G/Y)	PTO SPEED ISO11876 SKT.PIN#3
4	2310 (L/G/Y)	IN/OUT OF WORK-HPL MODE ISO11786 SKT.PIN#4
5	5190B (R/W/B)	HPL INTERLOCK / LIFT-O-MATIC
6	1050 (G/W)	ACCESSORY FEED
7	61 (B)	CASE GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M234 9



SS08K544 10

RIGHT HAND SWITCH PANEL

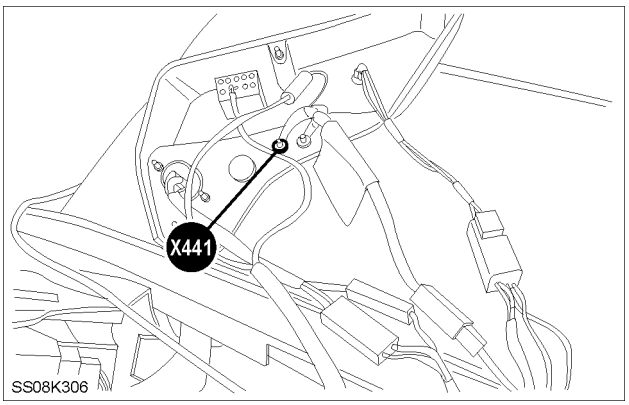
Connector - Component diagram 44

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

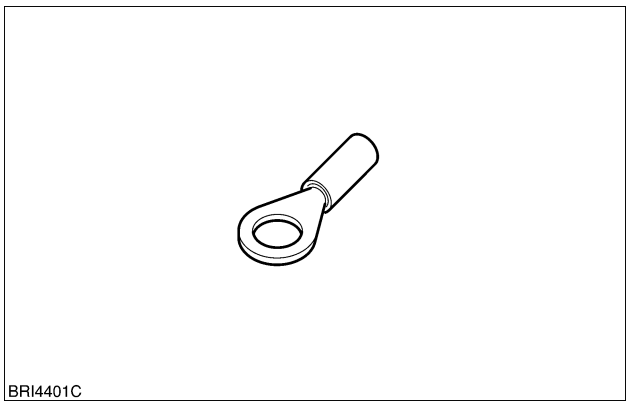
X441 STUD 8 AMPERE PLUS

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3070 (P/W)	'B' PILLAR SKT SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K306 1



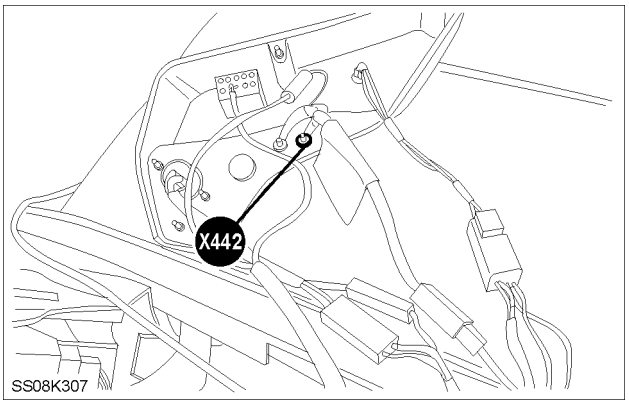
BRI4401C 2

BEHIND RIGHT HAND SWITCH PANEL

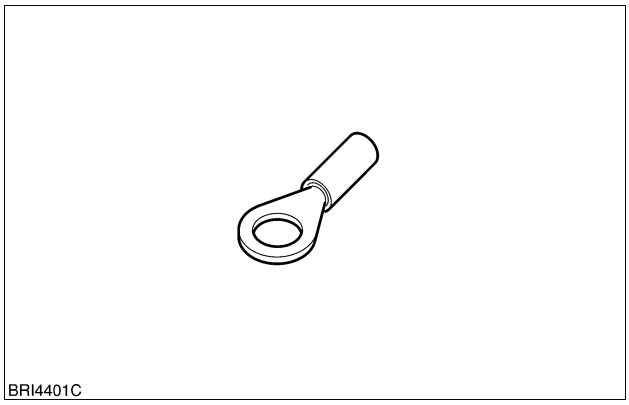
X442 STUD 8 AMPERE MINUS

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57 (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K307 3



BRI4401C 4

BEHIND RIGHT HAND SWITCH PANEL

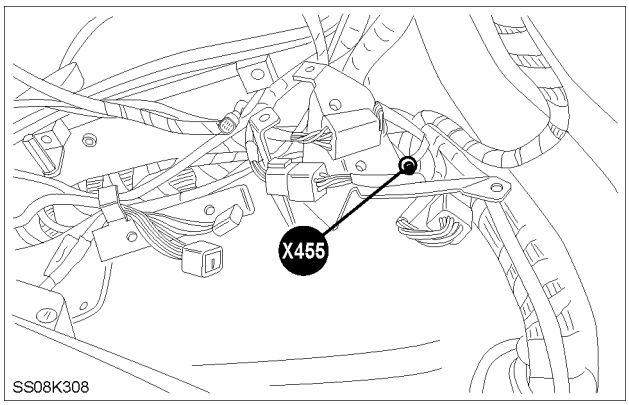
Connector - Component diagram 45

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

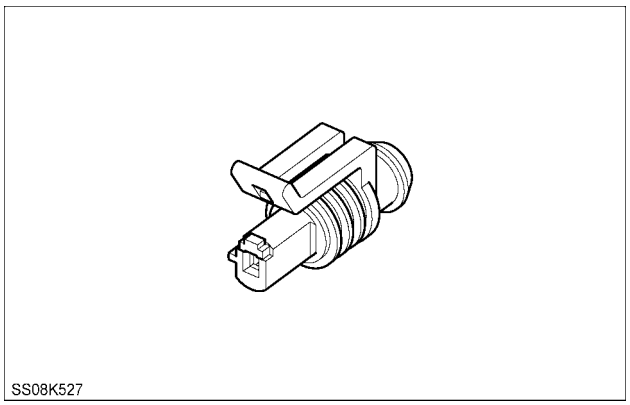
X455 REV. ALARM H58

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1P (R)	BATTERY SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K308 1



SS08K527 2

BEHIND RIGHT HAND TRIM

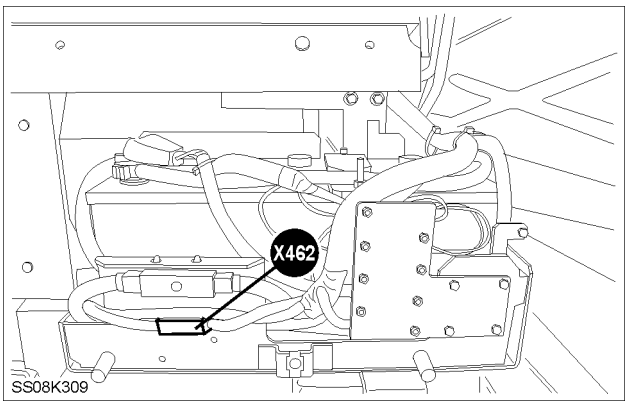
Connector - Component diagram 46

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

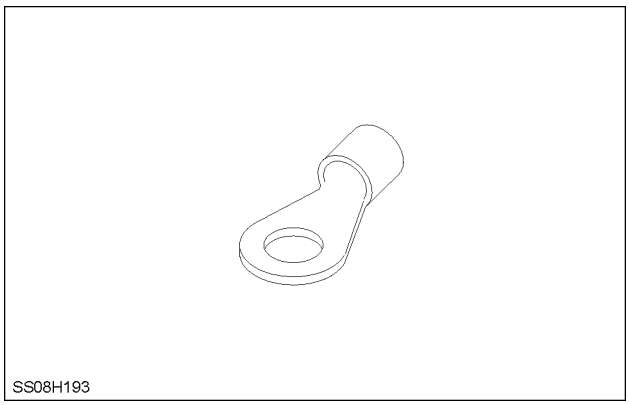
X462 FUSE PF2 / C

POS.	WIRE NUMBER	CIRCUIT REFERENCE
C	160 (U)	BATTERY SUPPLY ELECTRONICS

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K309 1



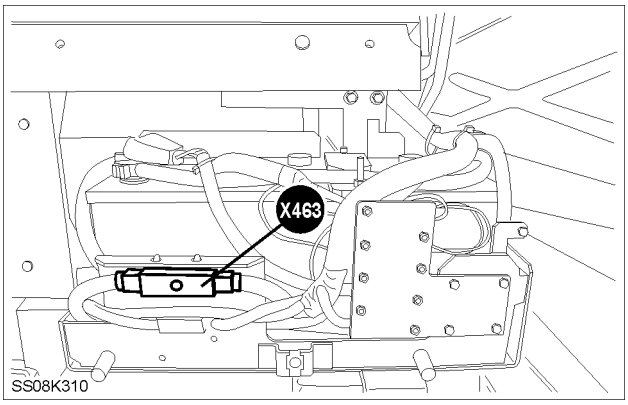
SS08H193 2

RIGHT HAND BEHIND STEPS

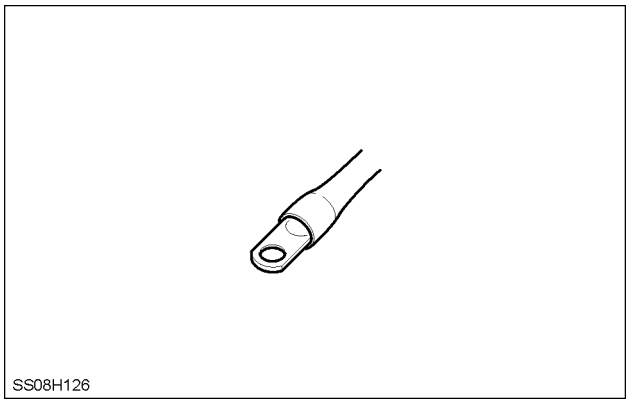
X463 FUSE PF1 / A

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	1 (R)	BATTERY SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K310 3



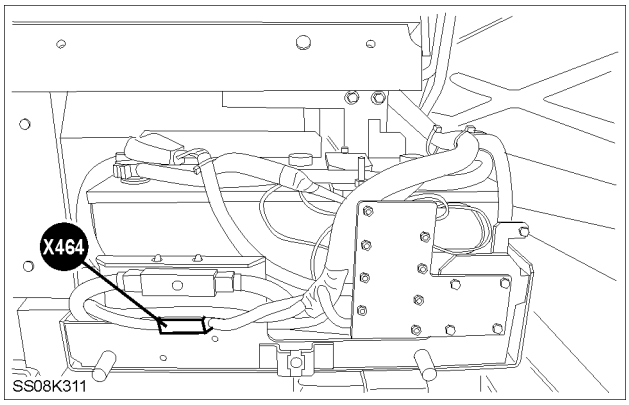
SS08H126 4

RIGHT HAND BEHIND STEPS

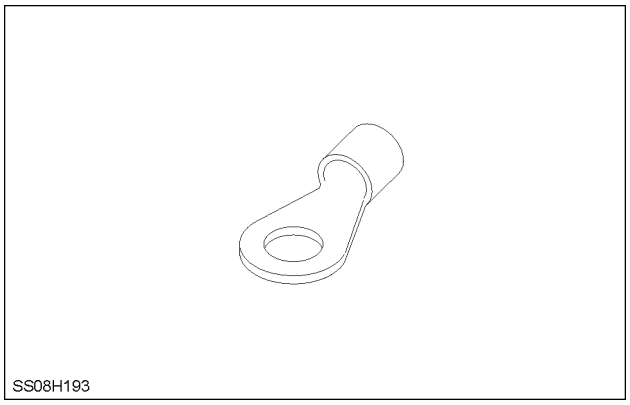
X464 FUSE PF2 / D

POS.	WIRE NUMBER	CIRCUIT REFERENCE
D	160A (U)	BATTERY SUPPLY ELECTRONICS

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K311 5



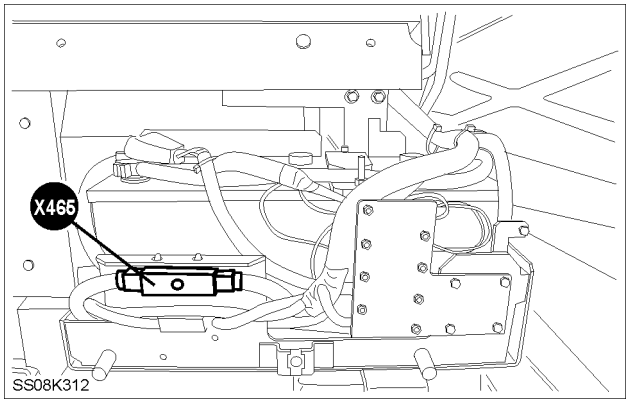
SS08H193 6

RIGHT HAND BEHIND STEPS

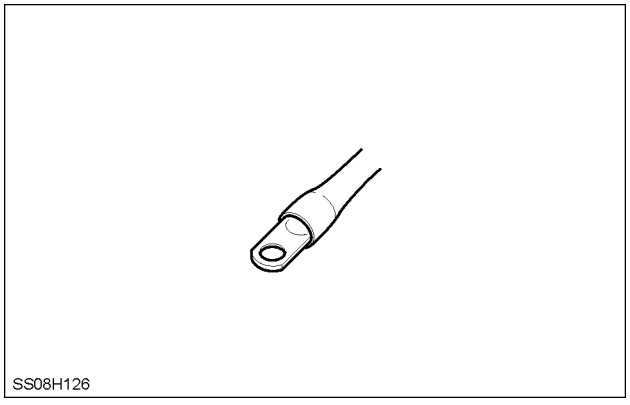
X465 FUSE PF1 / B

POS.	WIRE NUMBER	CIRCUIT REFERENCE
B	1A (R)	BATTERY SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K312 7



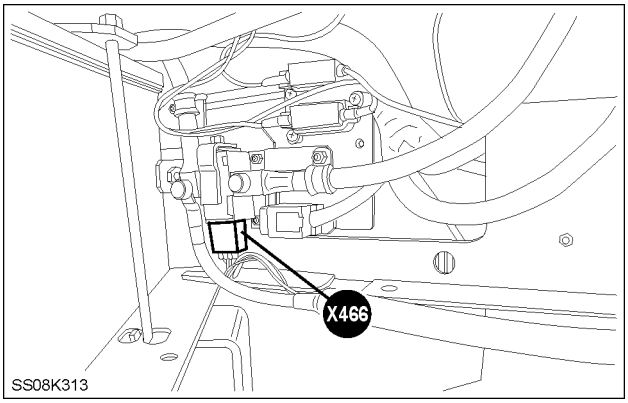
SS08H126 8

RIGHT HAND BEHIND STEPS

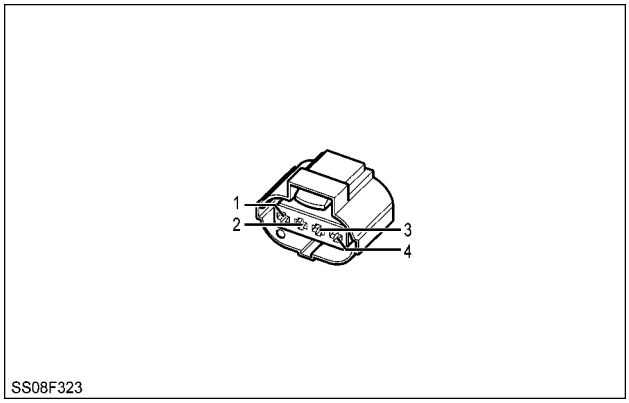
X466 BATTERY ISOLATOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	172A (W/TQ/Y)	BATTERY ISOLATOR RELAY COIL (OFF)
2	57NN (B)	EARTH (ALL)
3	57NP (B)	EARTH (ALL)
4	171B (W/TQ/B)	BATTERY ISOLATOR RELAY COIL

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K313 9



SS08F323 10

RIGHT HAND BEHIND STEPS

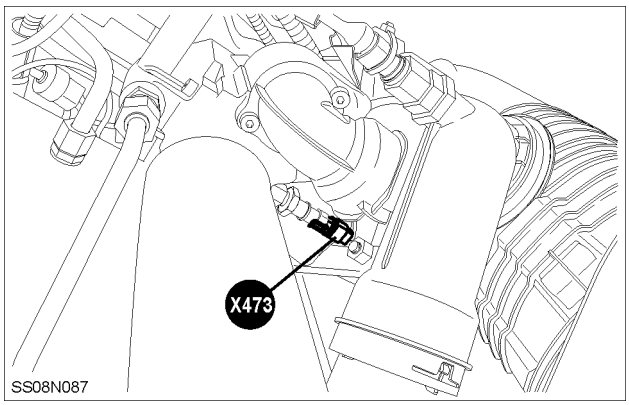
Connector - Component diagram 47

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

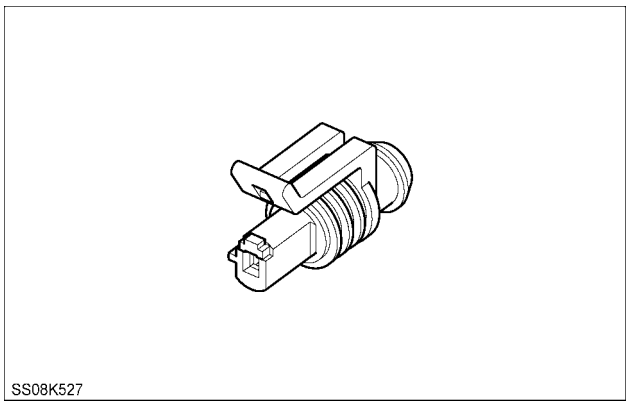
X473 LOW HYDRO CHARGE SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7160 (R)	HYD LOW CHARGE WARNING

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08N087 1



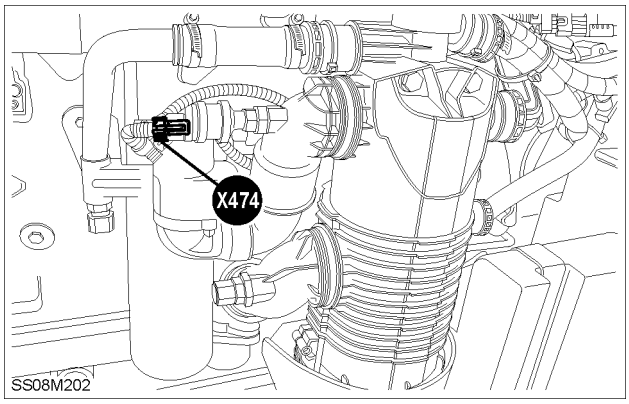
SS08K527 2

REAR RIGHT HAND TRANSMISSION

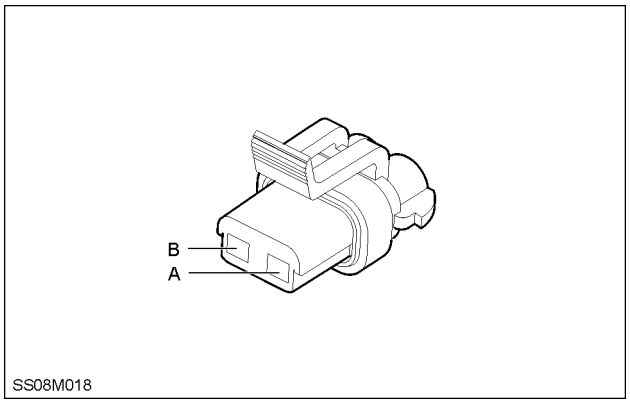
X474 HYDRAULIC FILTER BLOCKED (VACUUM SWITCH)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	7130A (N)	HYD FILTER WNG LP
B	57EV (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M202 3



SS08M018 4

REAR RIGHT HAND TRANSMISSION

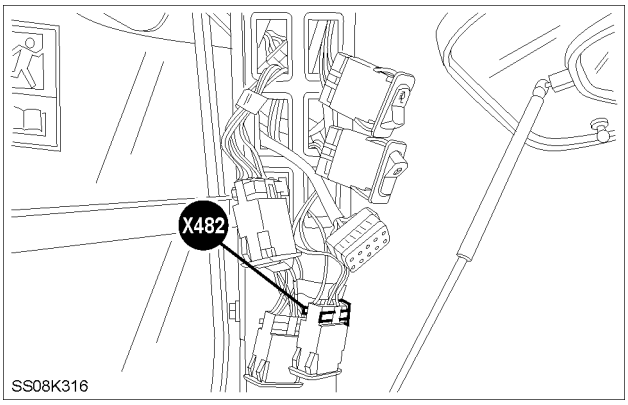
Connector - Component diagram 48

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

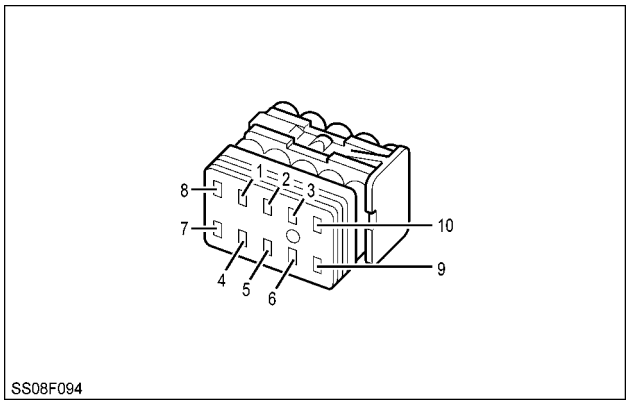
X482 BATTERY ISOLATOR CONTROL SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	171 (W)	BATTERY ISOLATOR RELAY COIL
2	1J (R)	BATTERY SUPPLY
3	172 (W)	BATTERY ISOLATOR RELAY COIL (OFF)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K316 1



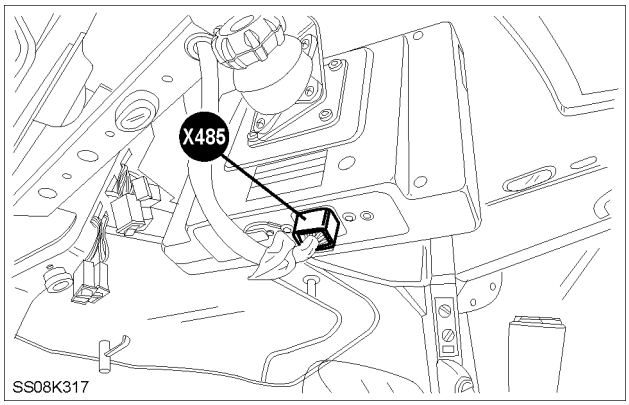
SS08F094 2

RIGHT HAND C-PILLAR

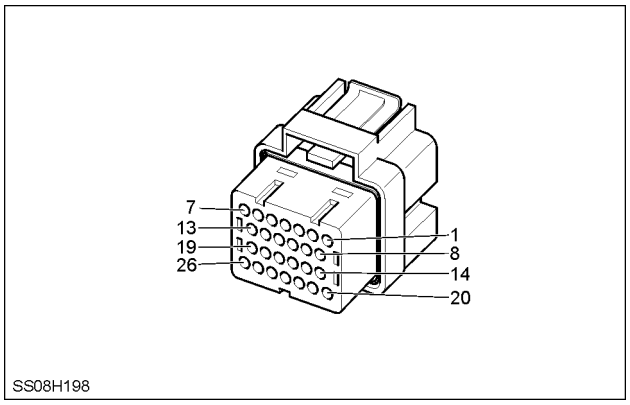
X485 COLOUR DISPLAY

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5500J (R)	EHR CAN HIGH
2	5510J (U)	EHR CAN LOW
5	5910F (Y)	ISO BUS CAN SIGNAL HIGH
6	5900F (G)	ISO BUS CAN SIGNAL LOW
9	5960 (Y)	RS232 OUTPUT TECU
10	5955 (Y)	RS232 INPUT TECU
13	5000 (L)	EDC MEMORY POWER
14	57 (B)	EARTH (ALL)
15	7000AT (U)	TRANS CONTROL SUPPLY
21	5962 (R)	USB + 5V Ref.
22	5966 (G)	USB Data +
23	5964 (W)	USB Data -
24	5968 (B)	USB Ground

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K317 3



SS08H198 4

IN CAB RIGHT HAND

X488 USB CONNECTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1		

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*

IMAGE NOT AVAILABLE

INA 5

IMAGE NOT AVAILABLE

INA 6

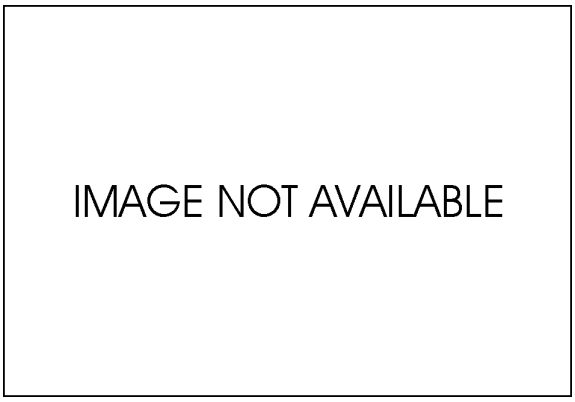
Connector - Component diagram 49

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

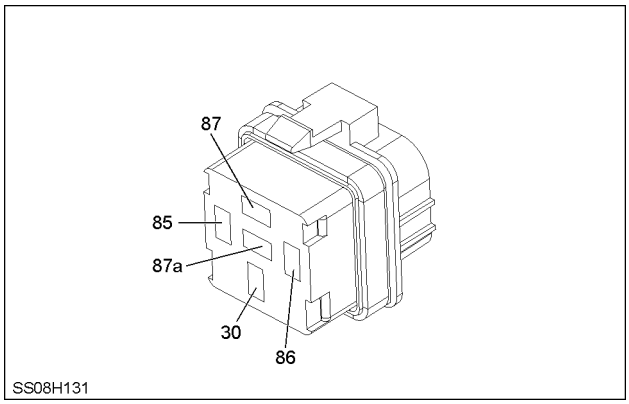
X491 RELAY 1 (FRONT LOADER)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
30	3271B (U)	LOADER RELAY FEED
85	3271C (U)	LOADER RELAY FEED
86	3274 (R)	LOADER VALVE #2 OUT
87	3272A (O)	LOADER VALVE #1 OUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 1



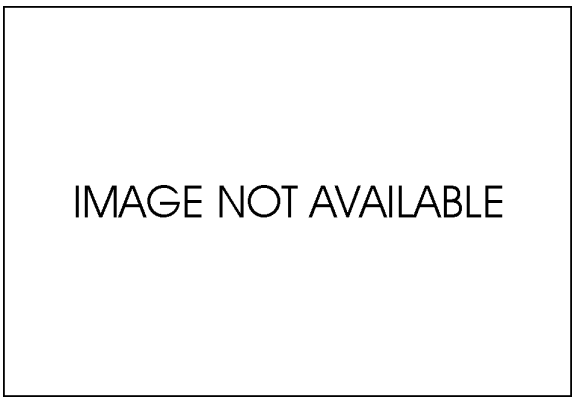
SS08H131 2

UNDER RIGHT HAND SIDE CAB TRIM

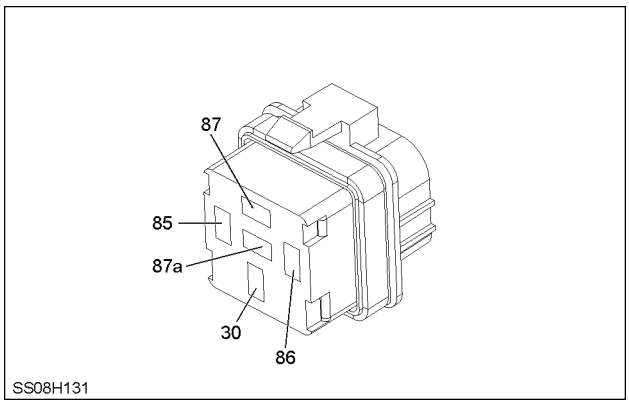
X492 RELAY 2 (FRONT LOADER)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
30	3271D (U)	LOADER RELAY FEED
85	3271E (U)	LOADER RELAY FEED
86	3275 (R)	LOADER VALVE #2 RETURN
87	3273B (O)	LOADER VALVE #1 RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 3



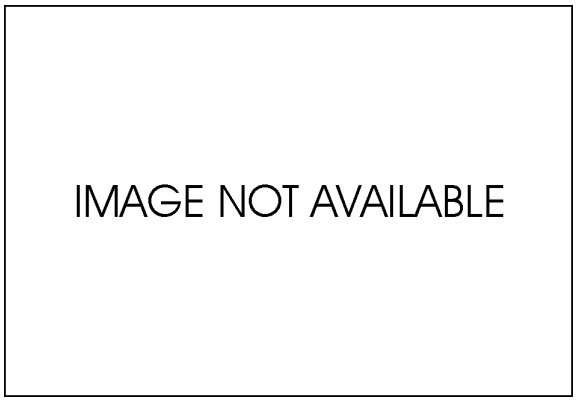
SS08H131 4

UNDER RIGHT HAND SIDE CAB TRIM

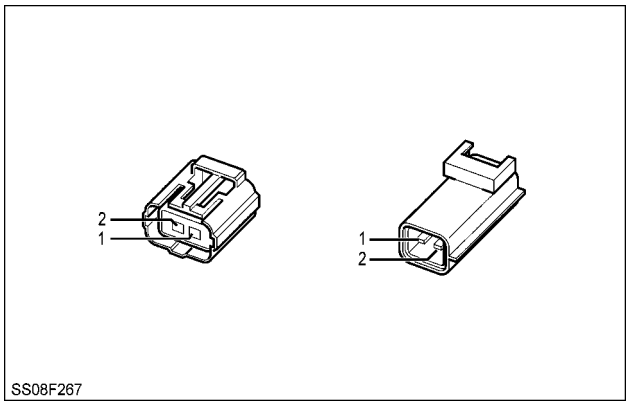
X493 FRONT LOADER CONTROL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3274A (R) / 3274 (R)	LOADER VALVE #2 OUT
2	3275A (R) / 3275 (R)	LOADER VALVE #2 RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 5



SS08F267 6

UNDER RIGHT HAND SIDE CAB TRIM

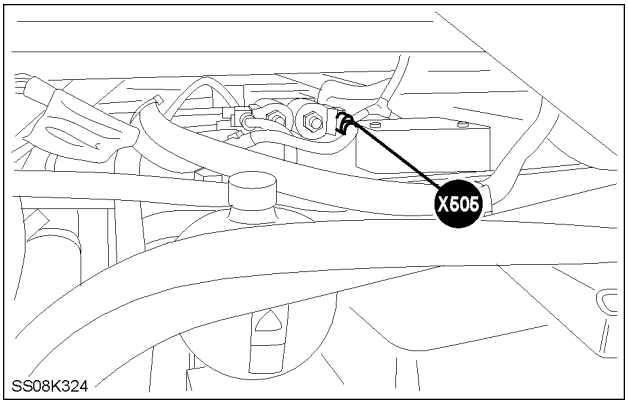
Connector - Component diagram 50

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

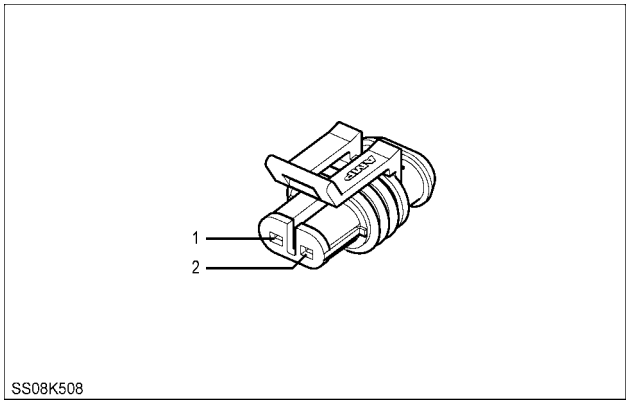
X505 SUSPENSION RAISE SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3260 (O)	LOWER SOLENOID PWR
2	3270 (O)	LOWER SOLENOID RET

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K324 1



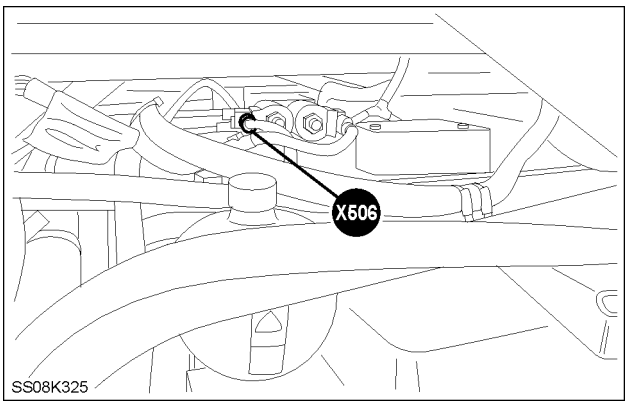
SS08K508 2

RIGHT HAND TOP OF TRANSMISSION

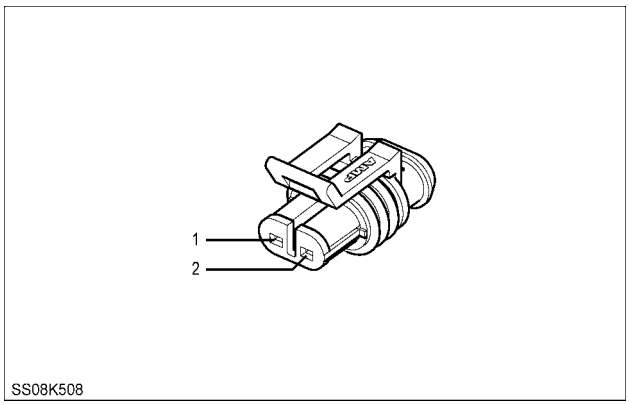
X506 SUSPENSION LOWER SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3240 (O)	RAISE SOLENOID PWR
2	3250 (O)	RAISE SOLENOID RET

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K325 3



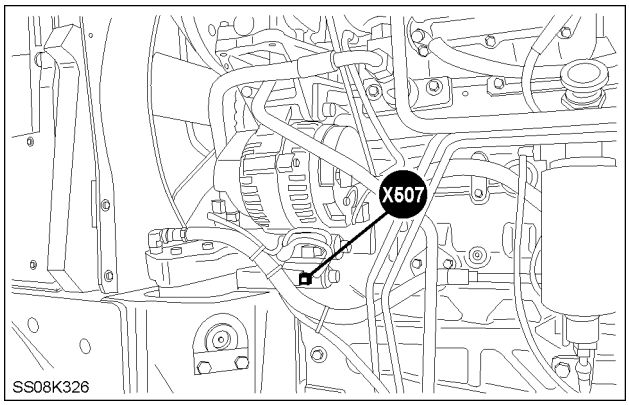
SS08K508 4

RIGHT HAND TOP OF TRANSMISSION

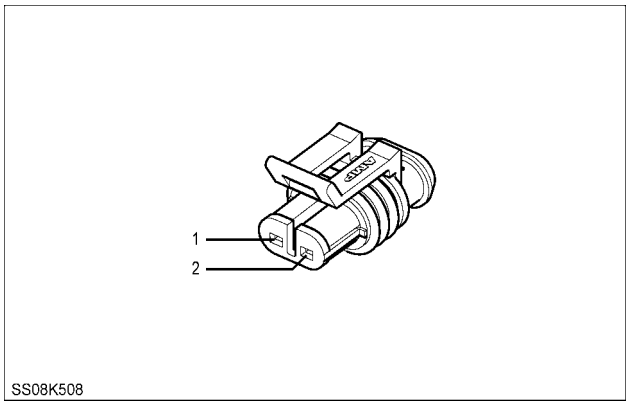
X507 UPPER LOCKOUT SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3280 (O)	SUSPENSION LOCKOUT SOLENOID UPPER
2	3281 (TN)	SUSPENSION LOCKOUT SOLENOID UPPER RETURN (-)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K326 5



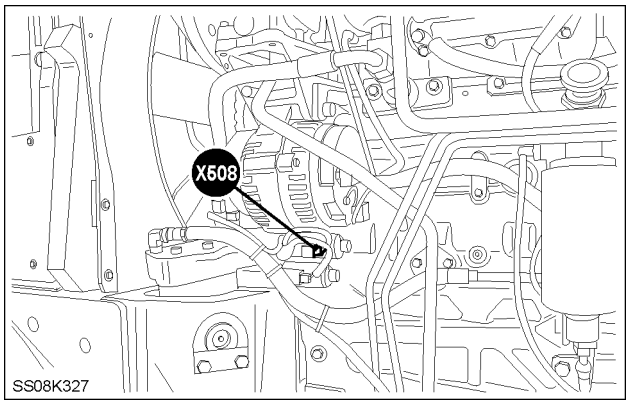
SS08K508 6

FRONT LEFT HAND ENGINE

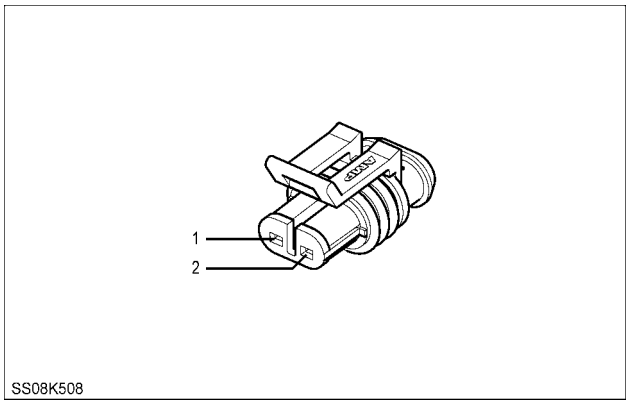
X508 LOWER LOCKOUT SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3285 (TN)	SUSPENSION LOCKOUT SOLENOID LOWER
2	3286 (TN)	SUSPENSION LOCKOUT SOLENOID LOWER RETURN (-)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K327 7



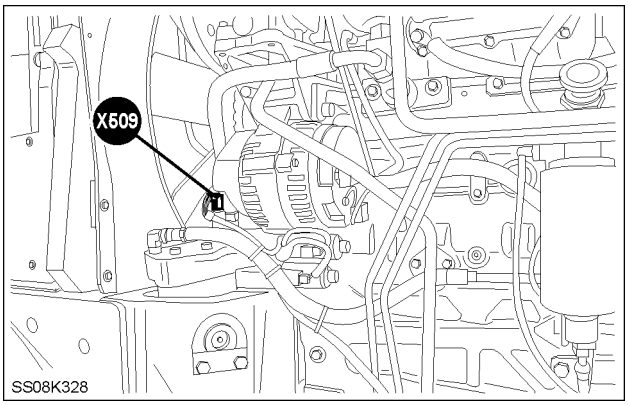
SS08K508 8

FRONT LEFT HAND ENGINE

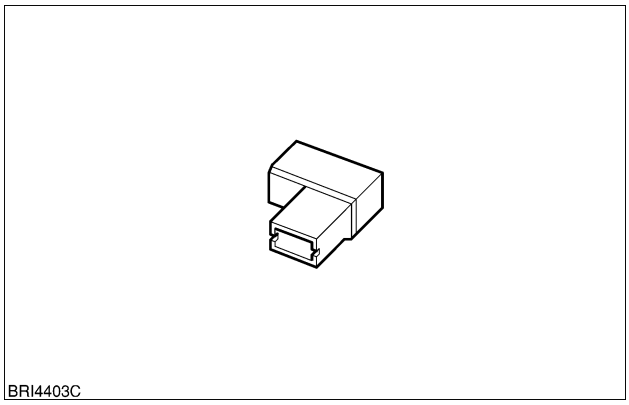
X509 FRONT SUSPENSION NOT PRESSURE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3290 (O)	SUSPENSION LOCKOUT LAMP (OR SOLENOID RET)
1	57FK (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K328 9



BRI4403C 10

FRONT LEFT HAND ENGINE

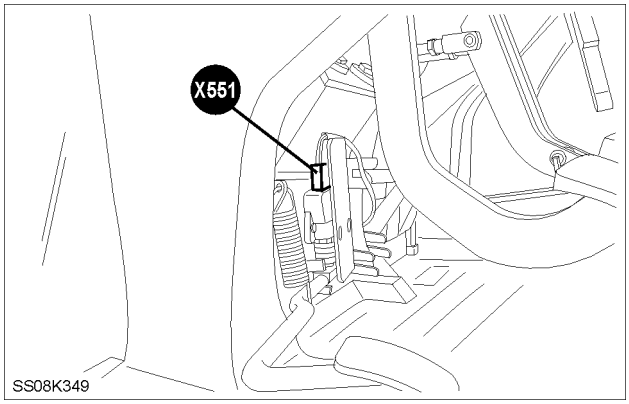
Connector - Component diagram 55

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

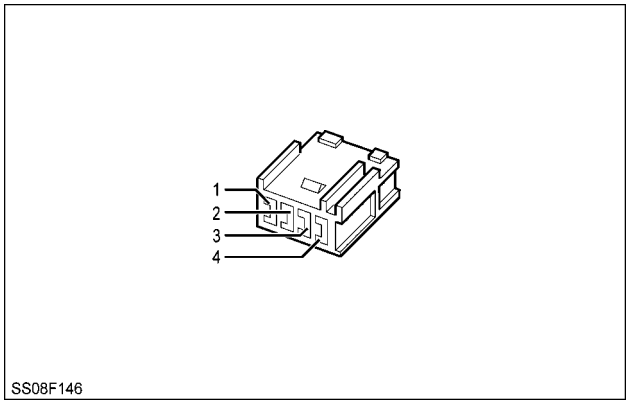
X551 EXHAUST BRAKE SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	10AA (G)	IGNITION SUPPLY
4	2087 (O)	EXHAUST BRAKE SOLENOID

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K349 1



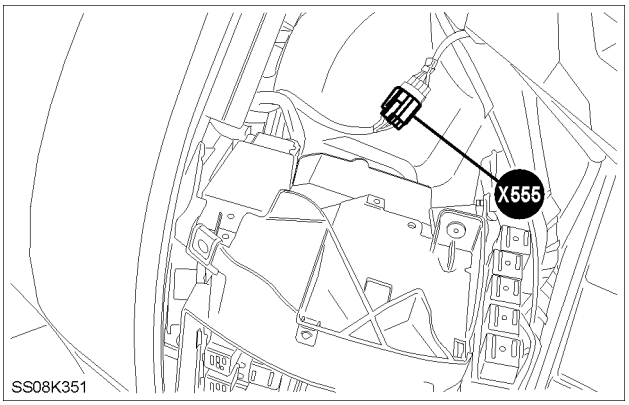
SS08F146 2

FRONT LEFT HAND CAB FLOOR

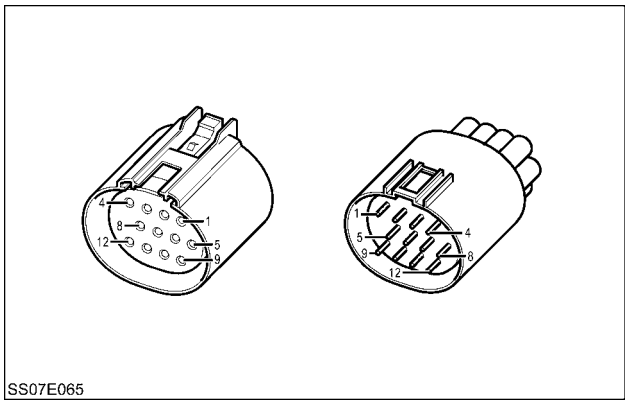
X555 ADDITIONAL ROOF HEADLAMPS

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1013AK (R)	RIGHT HAND LAMPS
2	3000C (G)	FLASHER UNIT SUPPLY (TERMINAL 49)
3	57 GE (B)	EARTH (ALL)
4	1072A (P)	WORKLAMP FRONT RELAY SUPPLY
5	1072B (P)	WORKLAMP FRONT RELAY SUPPLY
6	1099 (R)	FEED FRONT WORKLAMP INNER
7	1027AA (U)	HEADLAMP MAIN BEAM
9	1027B (U)	HEADLAMP MAIN BEAM
10	1030B (U)	HEADLAMP DIP BEAM
11	1027BB (U)	HEADLAMP MAIN BEAM
12	1030BB (U)	HEADLAMP DIP BEAM

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K351 3



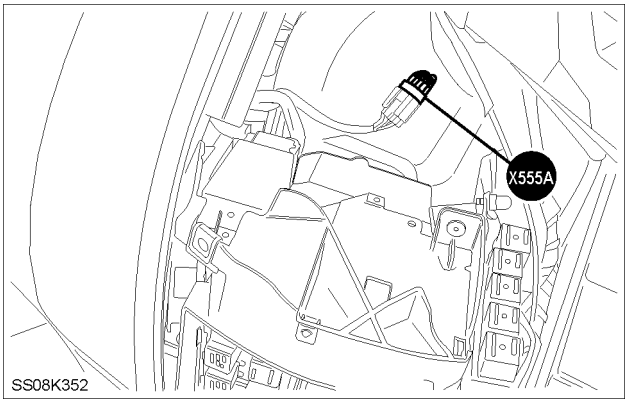
SS07E065 4

BEHIND RIGHT HAND TRIM TOP THE FUSEBOX

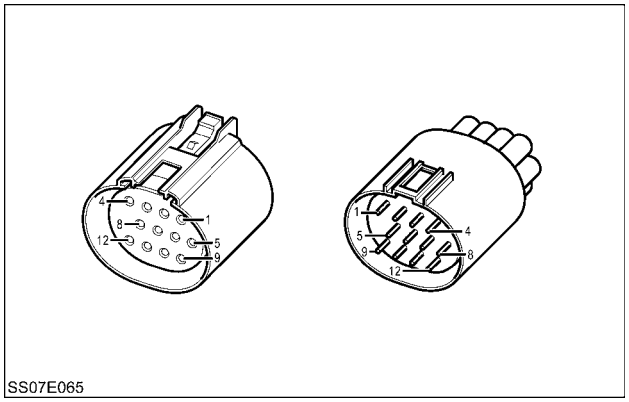
X555A CONNECTOR BRIDGE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
9	1027AB (U)	HEADLAMP MAIN BEAM
10	1027BC (U)	HEADLAMP MAIN BEAM
11	1027AB (U)	HEADLAMP MAIN BEAM
12	1027BC (U)	HEADLAMP MAIN BEAM

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K352 5



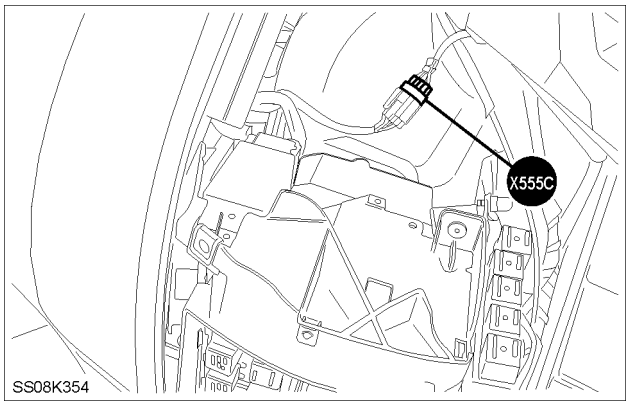
SS07E065 6

BEHIND RIGHT HAND TRIM TOP THE FUSEBOX

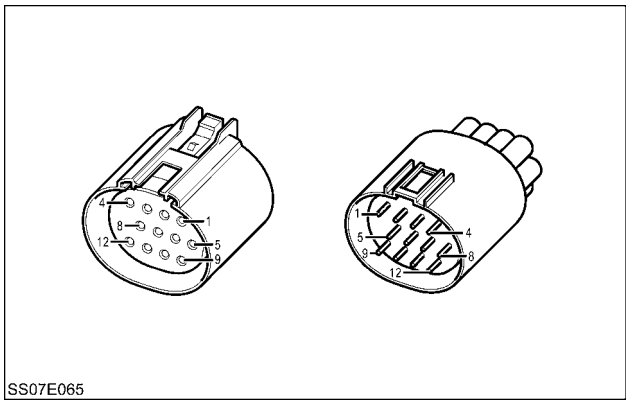
X555C MAIN REAR INTERFACE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
9	1027B (U)	HEADLAMP MAIN BEAM
10	1030B (U)	HEADLAMP DIP BEAM
11	1027BB (U)	HEADLAMP MAIN BEAM
12	1030BB (U)	HEADLAMP DIP BEAM

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K354 7



SS07E065 8

BEHIND RIGHT HAND TRIM TOP THE FUSEBOX

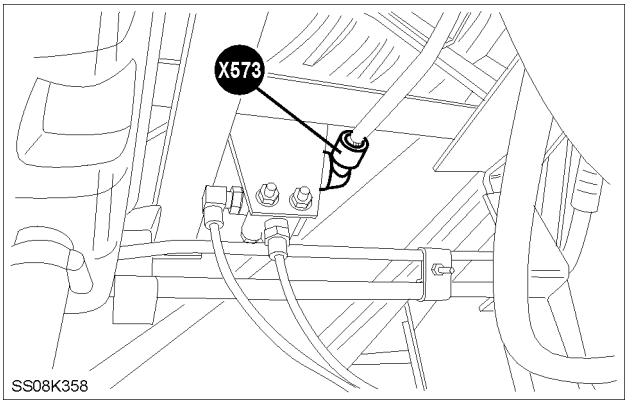
Connector - Component diagram 57

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

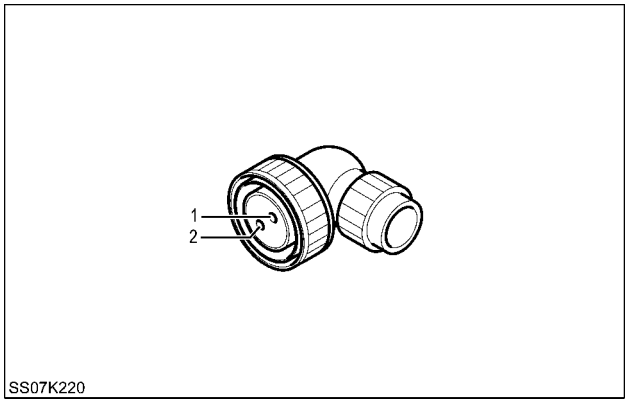
X573 EXHAUST BRAKE SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2087 (O)	EXHAUST BRAKE SOLENOID
2	6408P (G)	FUSED B+ TO ECU (1)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K358 1



SS07K220 2

TOP OF ENGINE

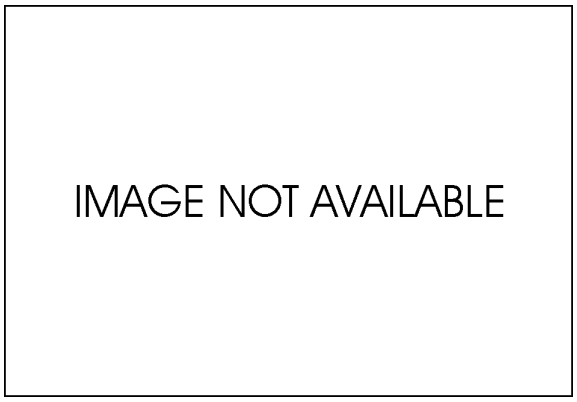
Connector - Component diagram 60

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

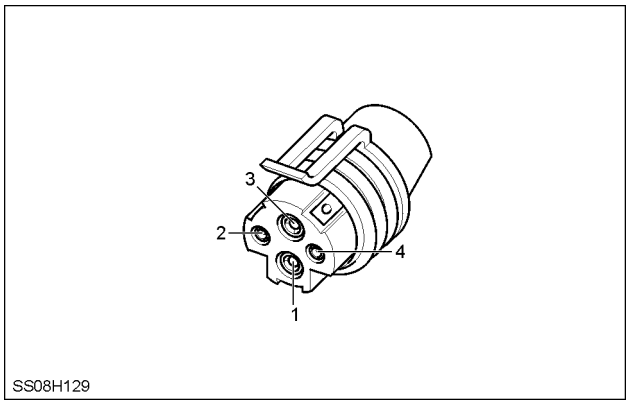
X600 ISO IMPLEMENT SOCKET (FRONT)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57MT (B)	EARTH (ALL)
2	57MV (B)	EARTH (ALL)
3	5975 (O)	ISO RELAY 2 POWER OUT
4	5985 (U)	ISO RELAY 1 POWER OUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 1

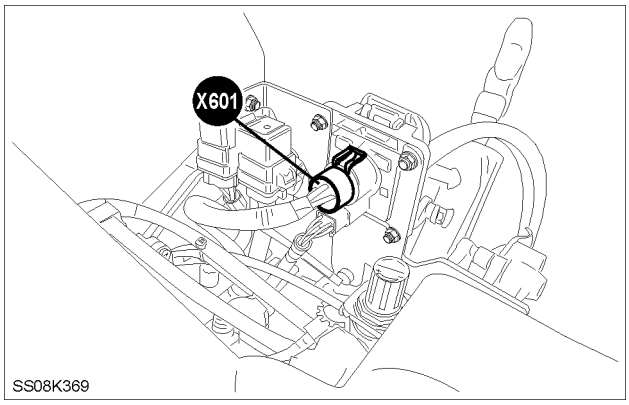


SS08H129 2

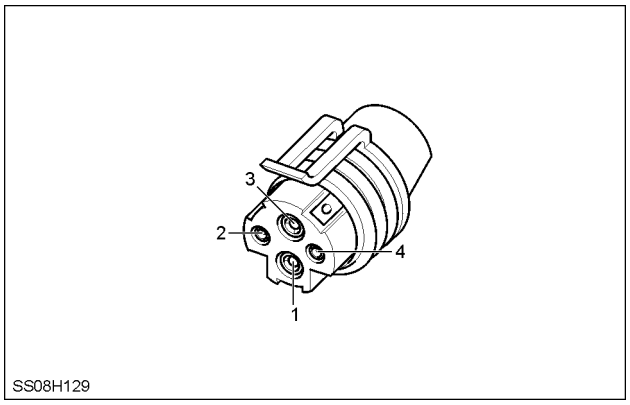
X601 ISO IMPLEMENT SOCKET (REAR)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57MT (B)	EARTH (ALL)
2	57MV (B)	EARTH (ALL)
3	5975 (O)	ISO RELAY 2 POWER OUT
4	5985 (U)	ISO RELAY 1 POWER OUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K369 3



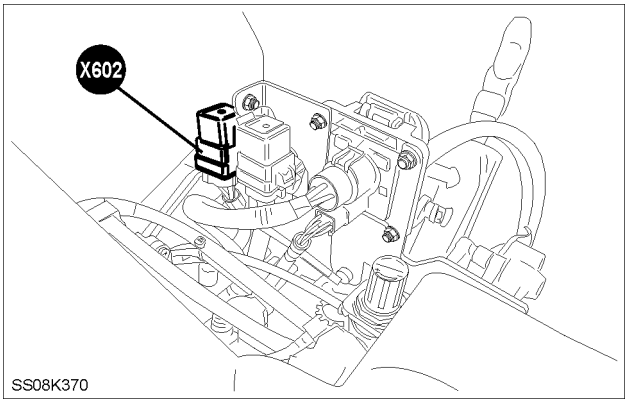
SS08H129 4

REAR OF TRACTOR

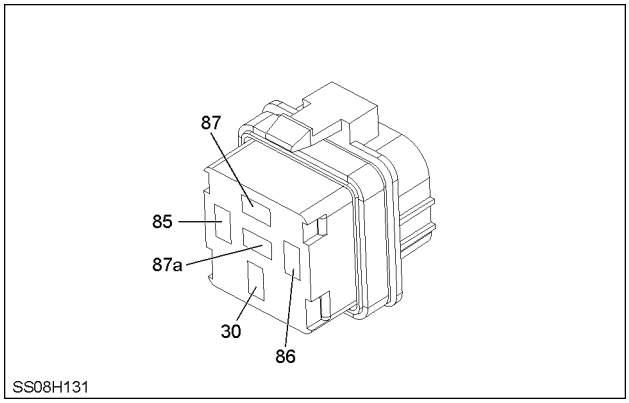
X602 ISO RELAY 1 REAR (K040)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
30	150AW (N)	BATTERY FEED (UNFUSED)(ALL)
85	5980 (U)	ISO BUS IMPLEMENT SIGNAL
86	57MX (B)	EARTH (ALL)
87	5985 (U)	ISO RELAY 1 POWER OUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K370 5



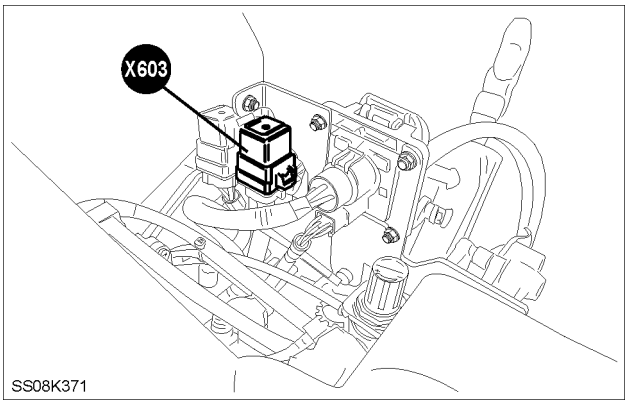
SS08H131 6

REAR OF TRACTOR

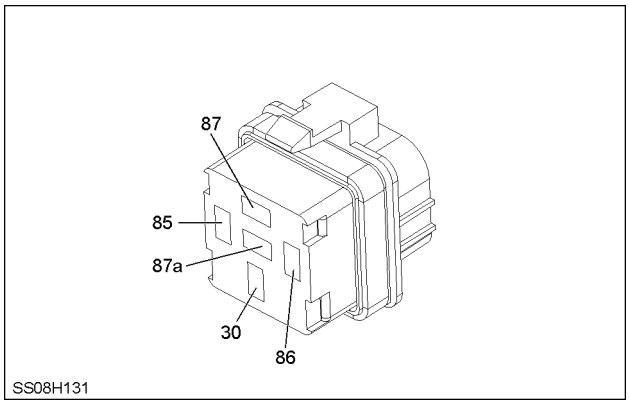
X603 ISO RELAY 2 REAR (K041)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
30	150AX (N)	BATTERY FEED (UNFUSED)(ALL)
85	5970A (O)	ISO BUS ECU SIGNAL
86	57MY (B)	EARTH (ALL)
87	5975 (O)	ISO RELAY 2 POWER OUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K371 7



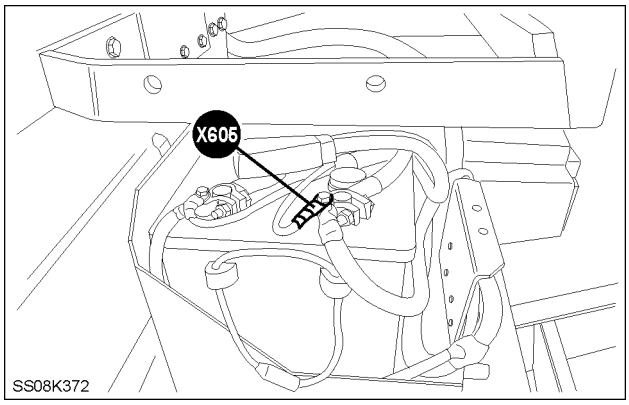
SS08H131 8

REAR OF TRACTOR

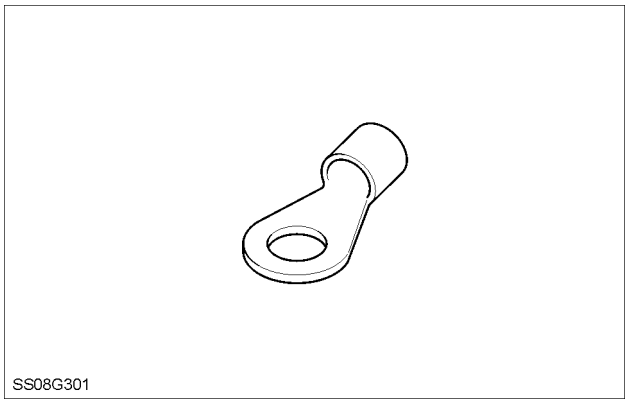
X605 EARTH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57MZ (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K372 9



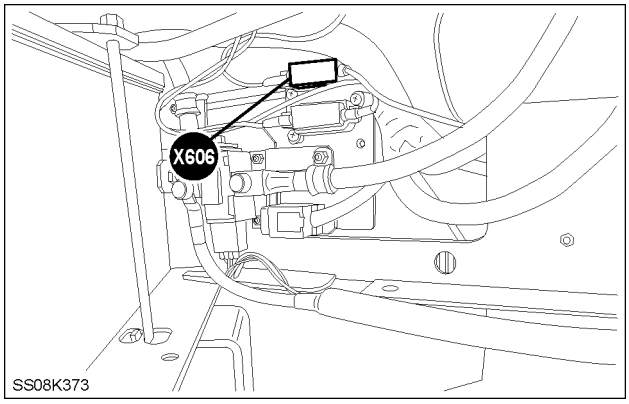
SS08G301 10

RIGHT HAND BEHIND STEPS

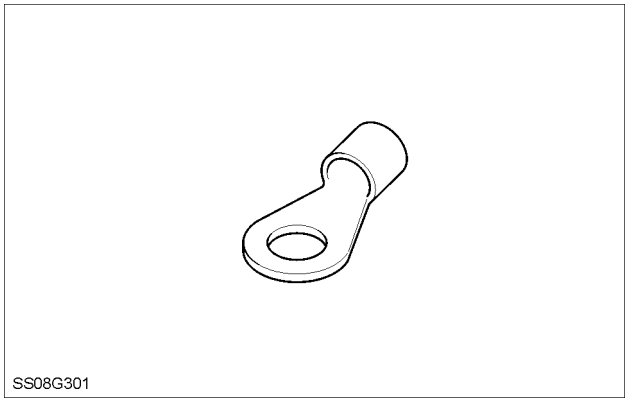
X606 FUSE PF4

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	150AT (N)	BATTERY FEED (UNFUSED)(ALL)
1	150AW (N)	BATTERY FEED (UNFUSED)(ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K373 11



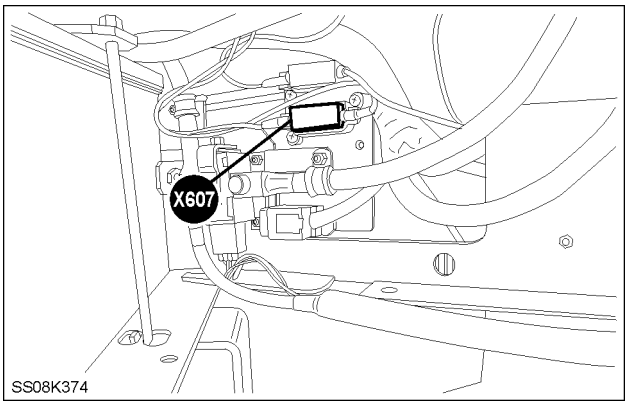
SS08G301 12

RIGHT HAND BEHIND STEPS

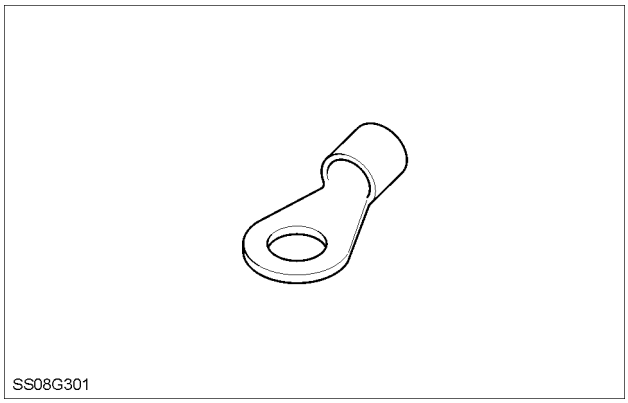
X607 FUSE PF5

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	150AX (N)	BATTERY FEED (UNFUSED)(ALL)
1	150AV (N)	BATTERY FEED (UNFUSED)(ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K374 13



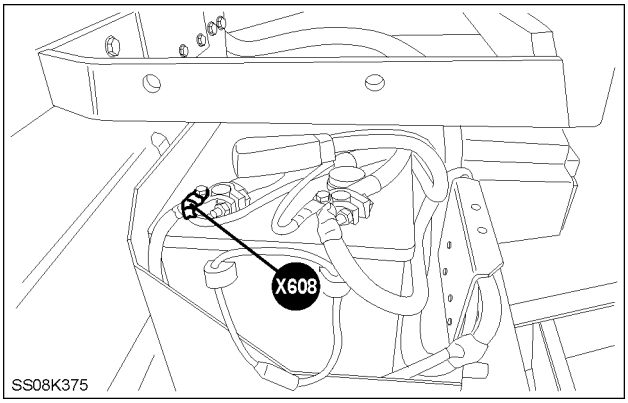
SS08G301 14

RIGHT HAND BEHIND STEPS

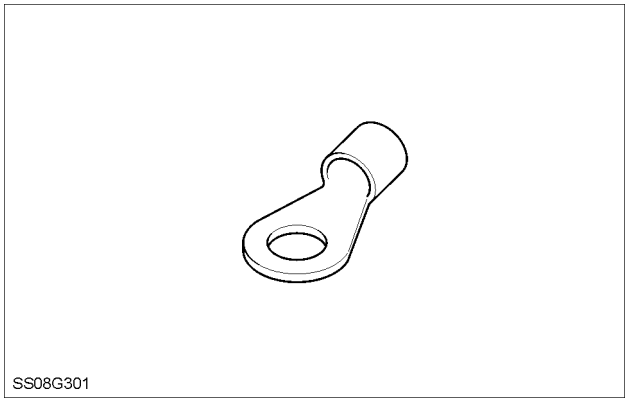
X608 ISO BUS POWER SUPPLY

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	150AS (N)	BATTERY FEED (UNFUSED)(ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K375 15



SS08G301 16

RIGHT HAND BEHIND STEPS

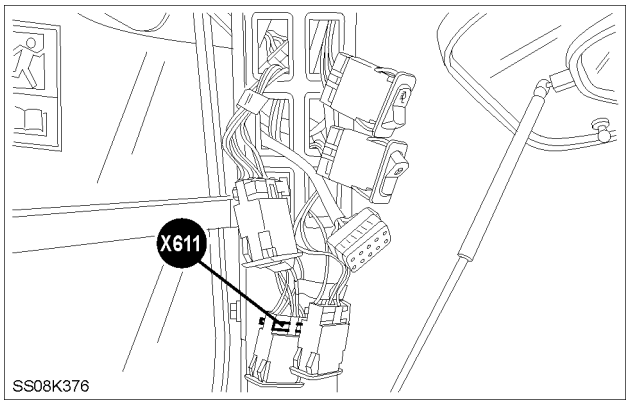
Connector - Component diagram 61

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

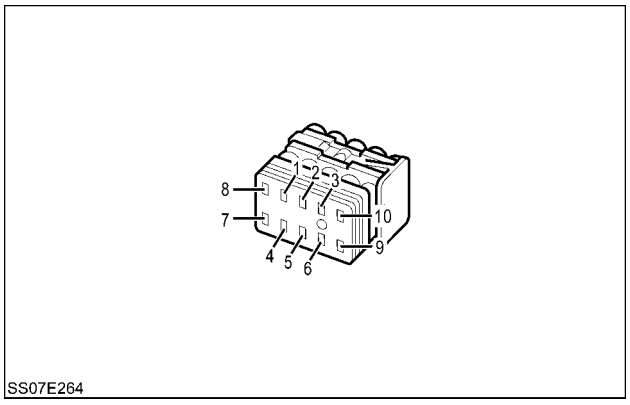
X611 HEATED MIRROR SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	1925A (R)	MIRROR CONTROL +12V
3	1928 (R)	HEATED MIRROR RELAY COIL +12V FROM SW
7	57CY (B)	EARTH (ALL)
8	1927B (R)	MIRROR ILLUMINATION
9	57PW (B)	EARTH (ALL)
10	1012M (R)	ILLUMINATION

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K376 1



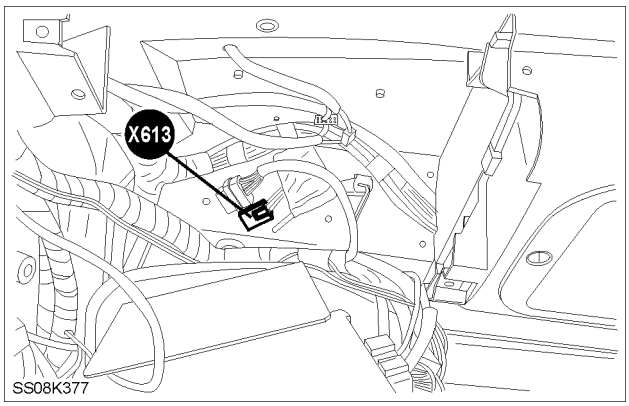
SS07E264 2

REAR RIGHT HAND C-PILLAR

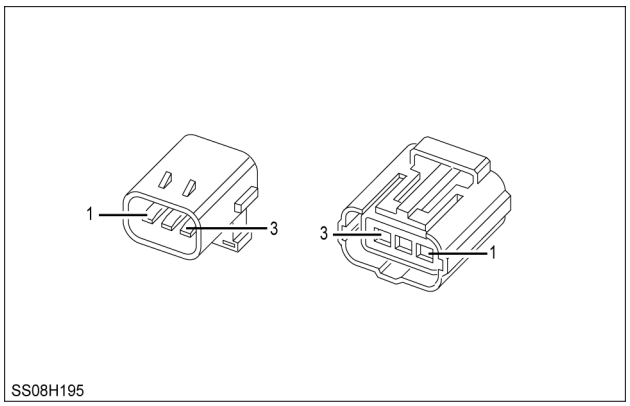
X613 TECU POWER IN / OUT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5980D (U)	ISO BUS IMPLEMENT SIGNAL
2	5970 (O)	ISO BUS ECU SIGNAL
3	7000AR (U)	TRANS CONTROL SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K377 3



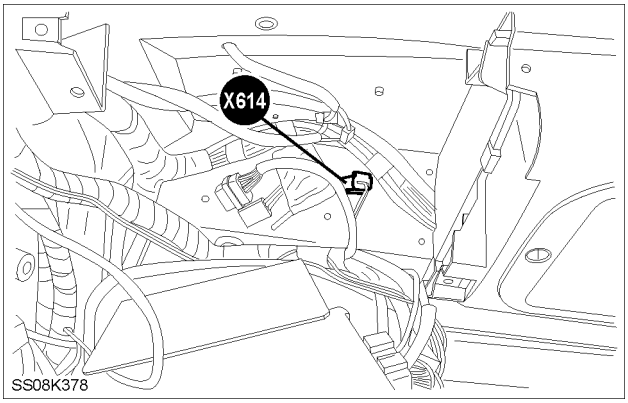
SS08H195 4

IN CAB RIGHT HAND BEHIND OPERATOR'S SEAT

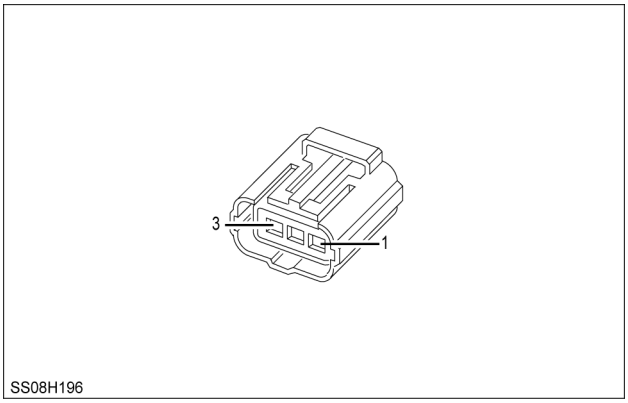
X614 TECU BY - PASS

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5980C (U)	ISO BUS IMPLEMENT SIGNAL
2	5970B (O)	ISO BUS ECU SIGNAL
3	7000AV (U)	TRANS CONTROL SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K378 5



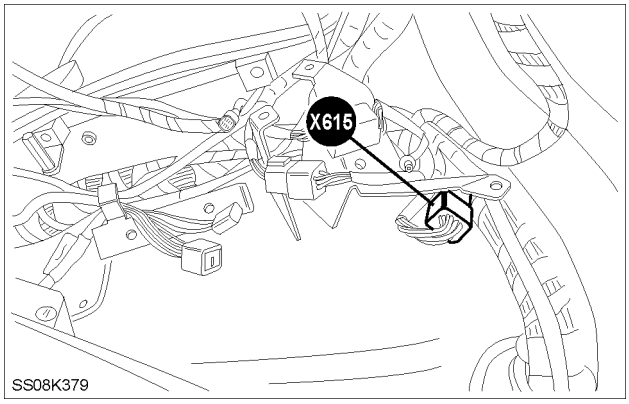
SS08H196 6

IN CAB RIGHT HAND BEHIND OPERATOR'S SEAT

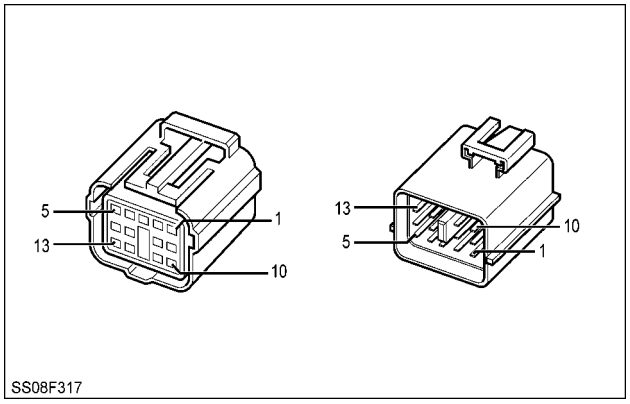
X615 TECU VT / SWCD INPUT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5900A (G) / 5900G (Y) / 5900G (G)	ISO BUS CAN SIGNAL LOW
2	5910A (Y) / 5910G (G) / 5910G (Y)	ISO BUS CAN SIGNAL HIGH
3	5920A (R) / 5920G (RB) / 5920G (R)	ISO BUS CAN SUPPLY GROUND
4	5915A (B) / 5915G (BA) / 5915G (B)	ISO BUS CAN SUPPLY POSITIVE
5	- / 5960B (O) / 5960B (Y)	RS232 OUTPUT TECU
6	5500B (R) / 5500AB (R) / 5500K (R)	EHR CAN HIGH
7	5510B (U) / 5510AB (U) / 5510K (U)	EHR CAN LOW
8	- / 5000 (L)	EDC MEMORY POWER
9	- / 5955 (O) / 5955 (Y)	RS232 INPUT TECU
11	- / 7000AS (U) / 7000AT (U)	TRANS CONTROL SUPPLY
12	- / 1012J (R)	ILLUMINATION
13	- / 57SW (B) / 57G (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K379 7



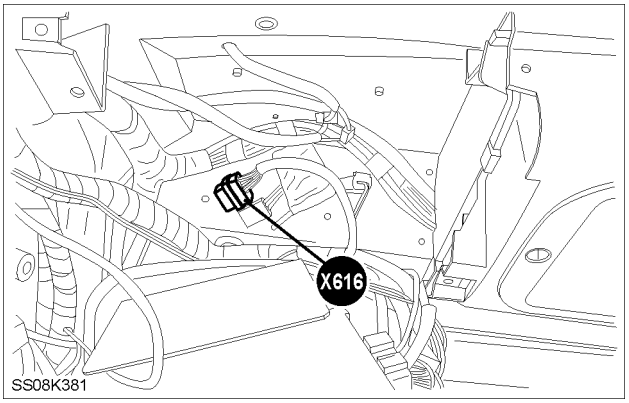
SS08F317 8

BEHIND RIGHT HAND TRIM

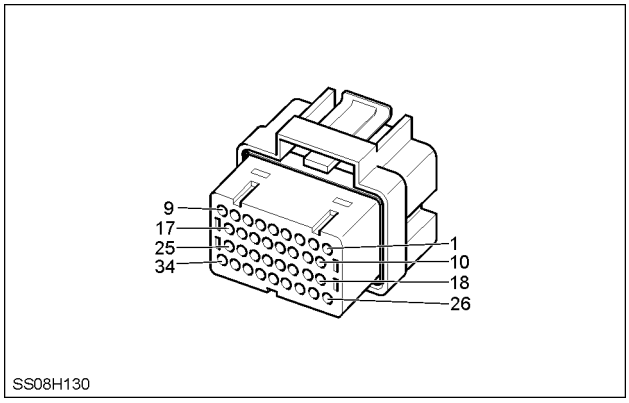
X616 TECU UNIT CN1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5910D (Y)	ISO BUS CAN SIGNAL HIGH
2	5900D (G)	ISO BUS CAN SIGNAL LOW
4	5400P (Y)	CAN H
5	5420P (G)	CAN L
10	5000C (P)	EDC MEMORY POWER
11	57TA (B)	EARTH (ALL)
14	5980D (U)	ISO BUS IMPLEMENT SIGNAL
15	5970 (O)	ISO BUS ECU SIGNAL
16	7000AR (U)	TRANS CONTROL SUPPLY
21	61T (B/O)	CASE GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K381 9

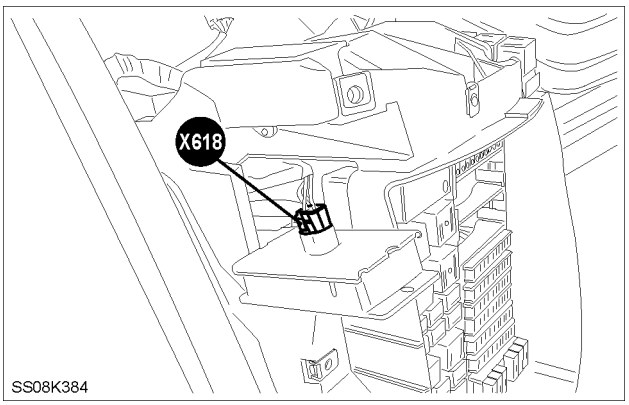


SS08H130 10

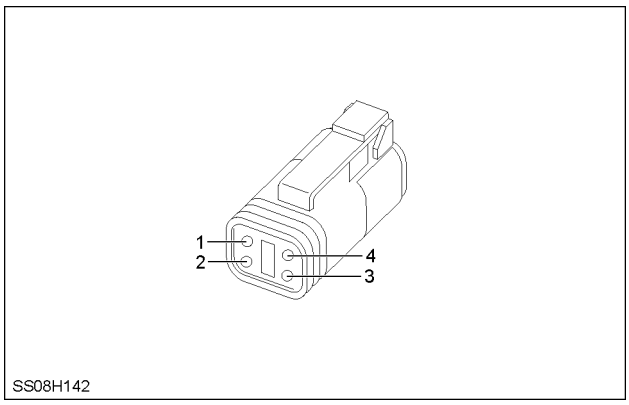
IN CAB RIGHT HAND BEHIND OPERATOR'S SEAT

X618 ISO BUS CAN TERMINATOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5920E (R	ISO BUS CAN SUPPLY POSITIVE
2	5910E (Y)	ISO BUS CAN SIGNAL HIGH
3	5915E (B)	ISO BUS CAN SUPPLY GROUND
4	5900E (G)	ISO BUS CAN SIGNAL LOW



SS08K384 11



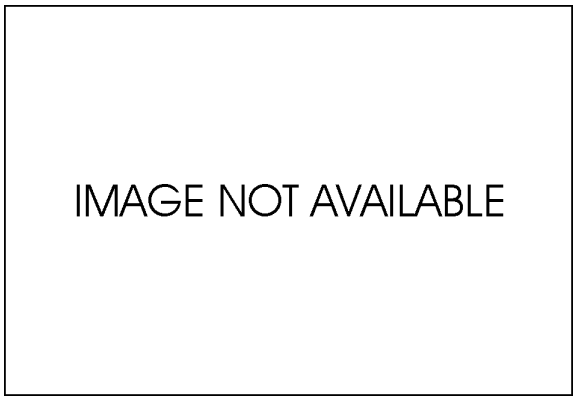
SS08H142 12

BEHIND RIGHT HAND TRIM TOP THE FUSEBOX

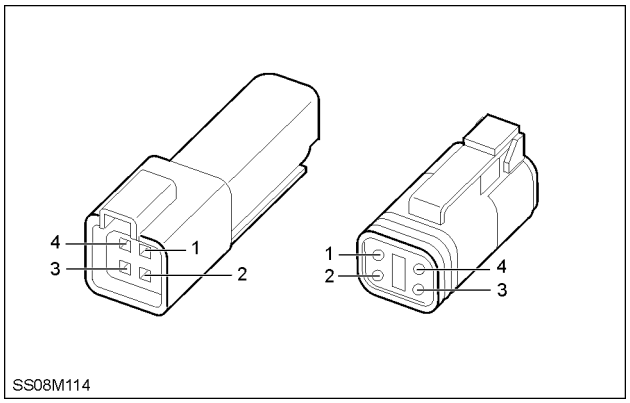
X618 ISO BUS CAN EXTENSION

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5920E (R)	ISO BUS CAN SUPPLY POSITIVE
2	5910E (Y)	ISO BUS CAN SIGNAL HIGH
3	5915E (B)	ISO BUS CAN SUPPLY GROUND
4	5900E (G)	ISO BUS CAN SIGNAL LOW

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 13



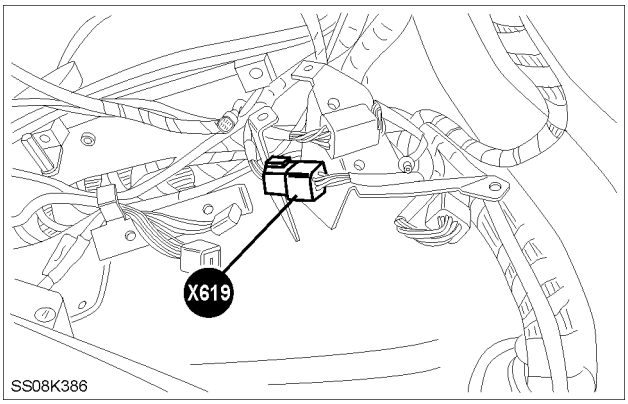
SS08M114 14

BEHIND RIGHT HAND TRIM TOP THE FUSEBOX

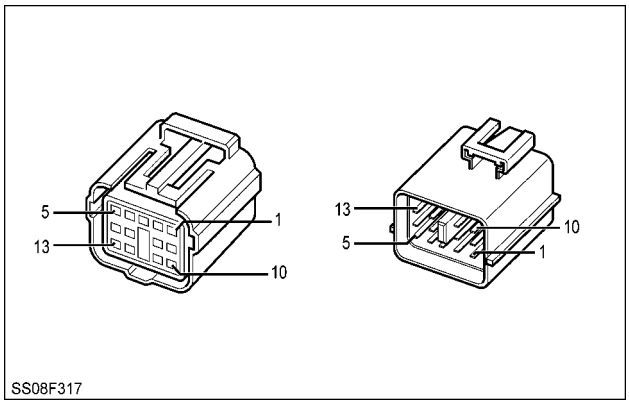
X619 TECU VT / SWCD OUTPUT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5900 (G) / 5900G (Y) / 5900C (G)	ISO BUS CAN SIGNAL LOW
2	5910 (Y) /5910G (G) / 5910C (Y)	ISO BUS CAN SIGNAL HIGH
3	5920 (R) / 5920C (R)	ISO BUS CAN SUPPLY GROUND
4	5915 (B) / 5915C (B)	ISO BUS CAN SUPPLY POSITIVE
5	5955E (G) / 5955 (O) / 5955 (Y)	RS232 OUTPUT TECU
6	5500W (R) / 5500M (R) / 5500A (R)	EHR CAN HIGH
7	5510W (U) / 5510M (U) / 5510A (U)	EHR CAN LOW
8	5000DE (P) / 5000 (L)	EDC MEMORY POWER
9	5960E (W) / 5960B (O) / 5960 (Y)	RS232 INPUT TECU
11	7000R (U) / 7000AS (U) / 7000AT (U)	TRANS CONTROL SUPPLY
12	1012J (R)	ILLUMINATION
13	57SW (B) / 57A (B)	EARTH /(ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K386 15



SS08F317 16

BEHIND RIGHT HAND TRIM

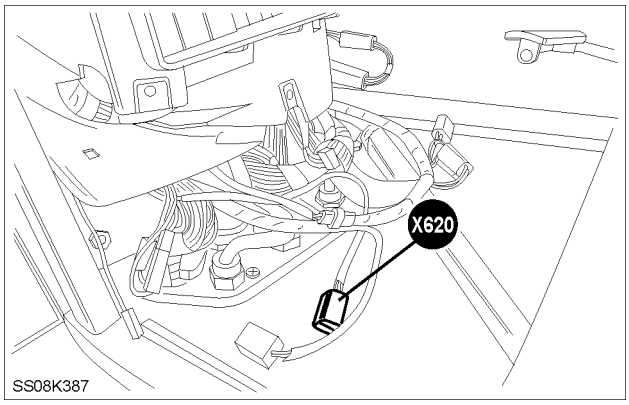
Connector - Component diagram 62

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

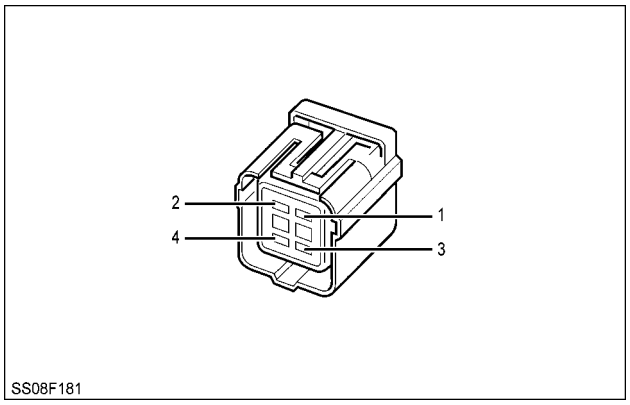
X620 FRONT BREAK AWAY (OPTION)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5980B (U) / 5980 (U)	ISO BUS IMPLEMENT SIGNAL
2	5970C (O) / 5970A (O)	ISO BUS ECU SIGNAL
3	2250P (K) / -	PTO FRONT - SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K387 1



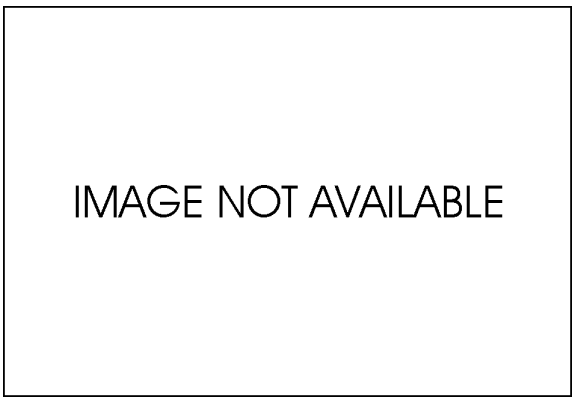
SS08F181 2

FRONT RIGHT HAND CAB FLOOR

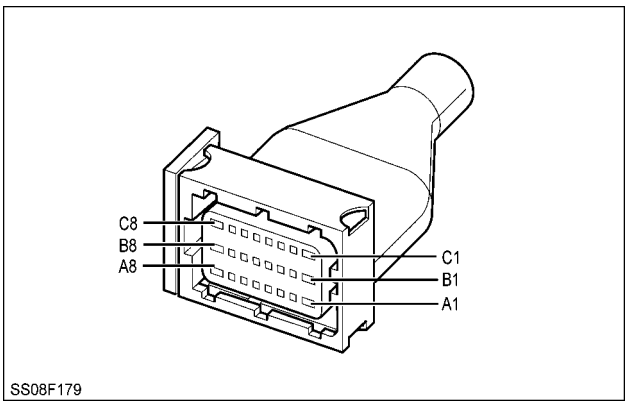
X621 CONTROL UNIT FAST STEER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A1	3170 (O)	FSS – ENABLE
A2	3173 (R)	FSS – HYDRAULIC VALVE HIGH SIDE DRIVER
A4	5400 (Y)	CAN H
A5	5420 (G)	CAN L
A6	3174 (G)	FSS – HYDRAULIC VALVE LOW SIDE DRIVER
A7	57C (B)	EARTH (ALL)
A8	57B (B)	EARTH (ALL)
B1	3171 (O)	FSS – LAMP
B4	3172 (L)	FSS – STEERING PROXIMITY SENSOR POSITION
B5	3178 (G/Y)	FSS – POSITION SENSOR SECONDARY POSITIVE
B6	3179 (N)	FSS – POSITION SENSOR SECONDARY NEGATIVE
B8	160 (U)	BATTERY SUPPLY ELECTRONICS
C1	3175 (W)	FSS – POSITION SENSOR PRIMARY POSITIVE
C2	3176 (B)	FSS – POSITION SENSOR PRIMARY NEGATIVE
C3	3177 (U)	FSS – POSITION SENSOR SECONDARY COMMON
C4	3180 (B)	FSS – SAFETY SWITCH
C8	10D (G)	IGNITION SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 3



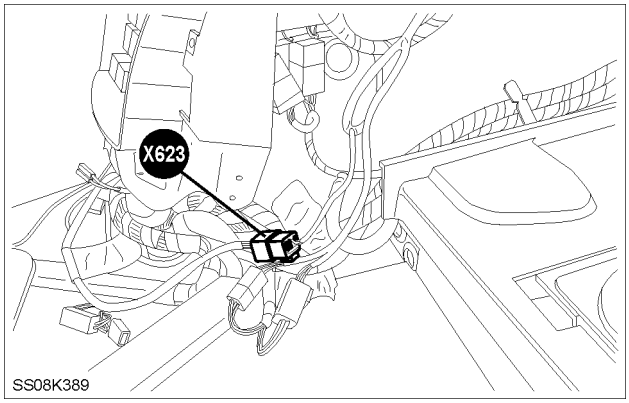
SS08F179 4

BEHIND RIGHT HAND TRIM TOP THE FUSEBOX

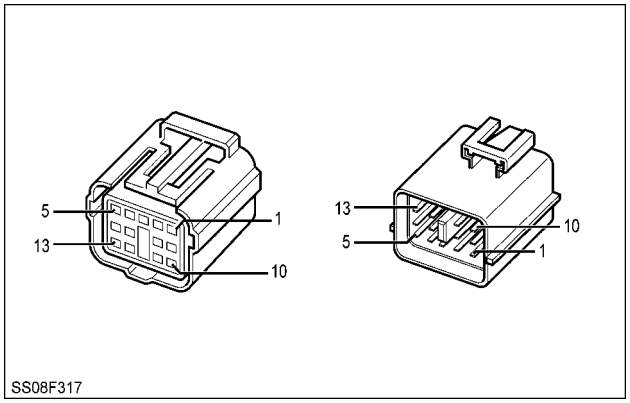
X623 FAST STEER CONNECTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5000D (P)	EDC MEMORY POWER
2	5200AB (N) / 5200AB (N)	EDC VALVE SUPPLY
3	57HV (B) / 57A (B)	EARTH (ALL)
4	5400V (Y) / 5400 (Y)	CAN H
5	5420 (G)	CAN L
6	1001AC (W)	STARTER SOLENOID FEED
12	3169 (O)	AUTO GUIDANCE DUMP SOLENOID RETURN (CURSEN)
13	3168 (O)	AUTO GUIDANCE DUMP SOLENOID FEED (HSD)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K389 5



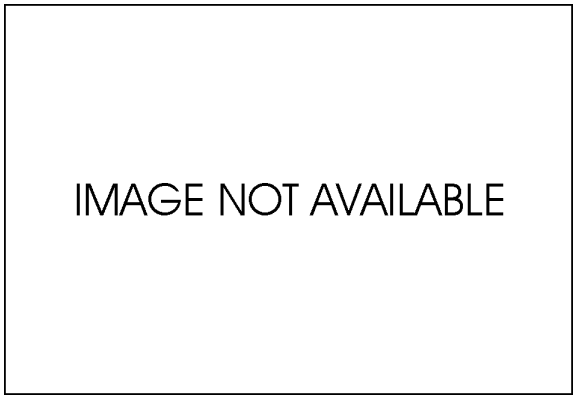
SS08F317 6

FRONT RIGHT HAND CAB FLOOR

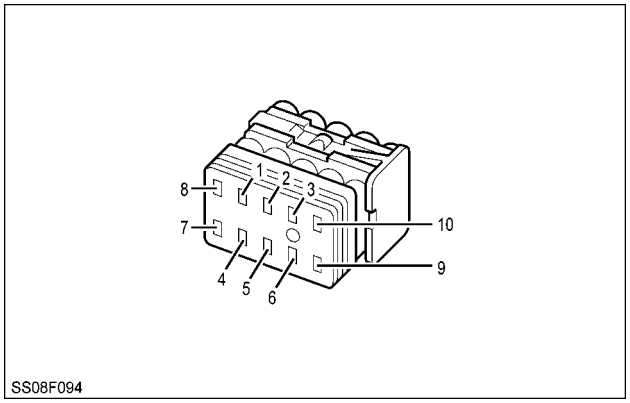
X624 FAST STEER CONTROL SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	10B (G)	IGNITION SUPPLY
3	3170 (O)	FSS – ENABLE
4	3180 (B)	FSS – SAFETY SWITCH
5	57 (B)	EARTH (ALL)
7	3171 (O)	FSS – LAMP
8	10E (G)	IGNITION SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 7



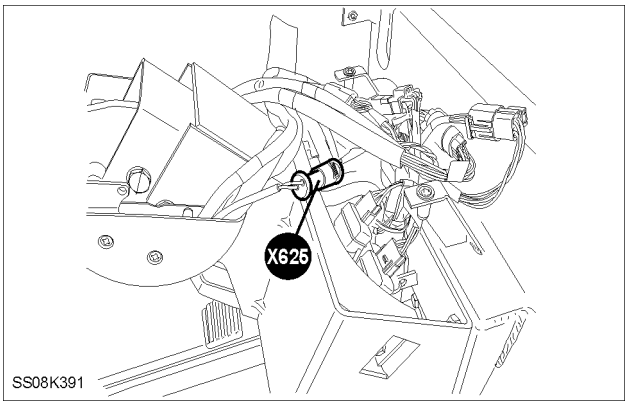
SS08F094 8

REAR RIGHT HAND C-PILLAR

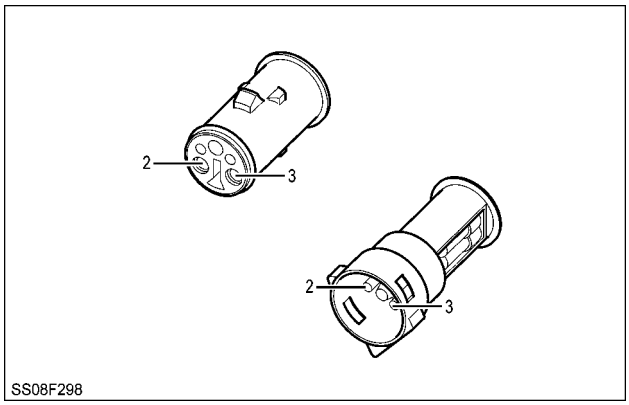
X625 PROXIMITY SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	3172 (L)	FSS – STEERING PROXIMITY SENSOR POSITION
3	10C (G)	IGNITION SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K391 9



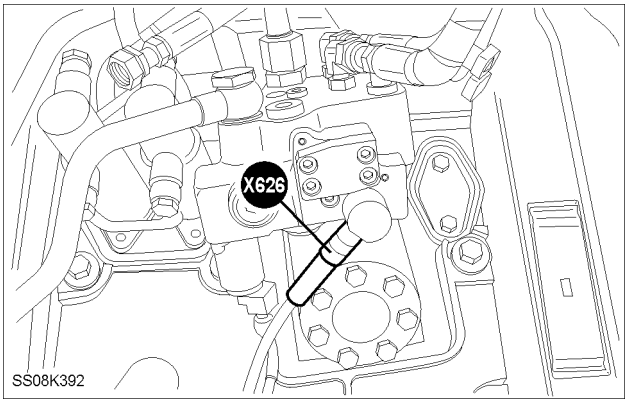
SS08F298 10

STEERING CONSOLE

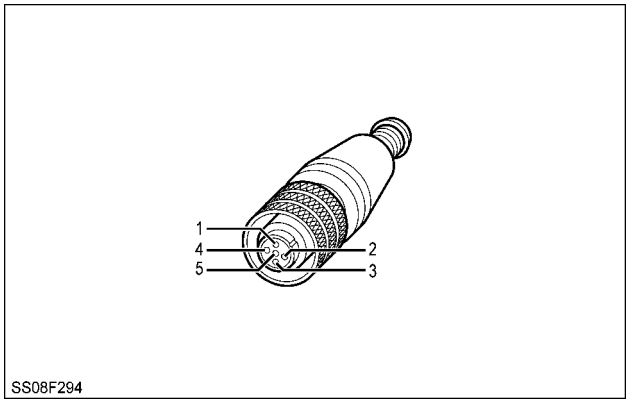
X626 POSITION TRANSDUCER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3179 (N)	FSS – POSITION SENSOR SECONDARY NEGATIVE
2	3175 (W)	FSS – POSITION SENSOR PRIMARY POSITIVE
3	3177 (U)	FSS – POSITION SENSOR SECONDARY COMMON
4	3176 (B)	FSS – POSITION SENSOR PRIMARY NEGATIVE
5	3178 (G/Y)	FSS – POSITION SENSOR SECONDARY POSITIVE

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K392 11



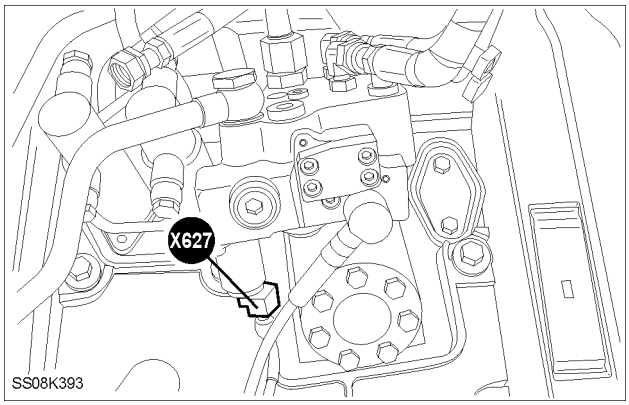
SS08F294 12

REAR OF ENGINE

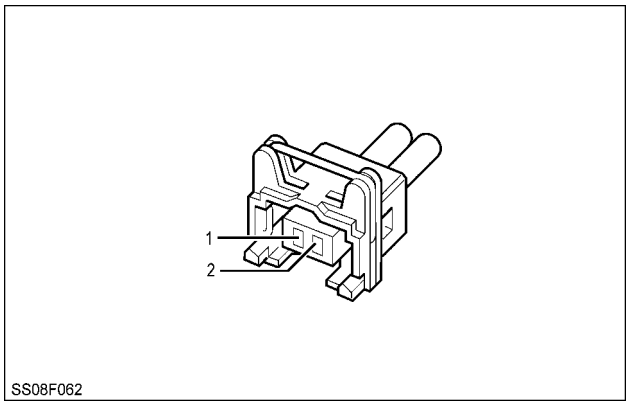
X627 FAST STEER SOLENOID VALVE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3173 (R)	FSS – HYDRAULIC VALVE HIGH SIDE DRIVER
2	3174 (G)	FSS – HYDRAULIC VALVE LOW SIDE DRIVER

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K393 13



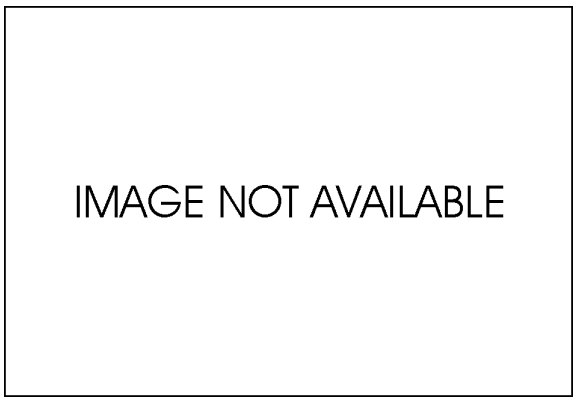
SS08F062 14

REAR OF ENGINE

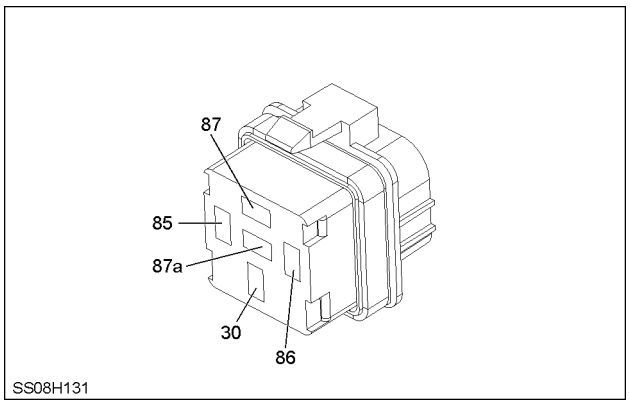
X628 ISO RELAY 2 FRONT (K043)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
30	150AX (N)	BATTERY FEED (UNFUSED)(ALL)
85	5970A (O)	ISO BUS ECU SIGNAL
86	57MY (B)	EARTH (ALL)
87	5975 (O)	ISO RELAY 2 POWER OUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 15



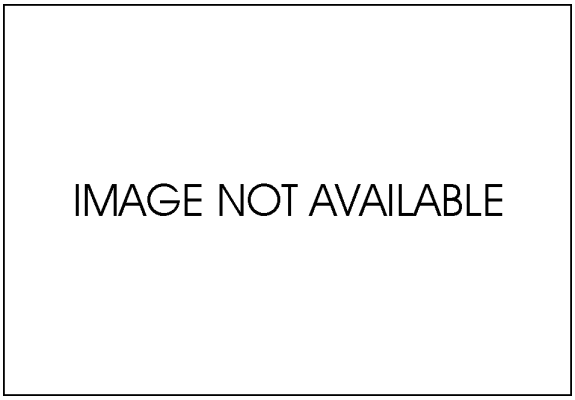
SS08H131 16

LEFT HAND ENGINE

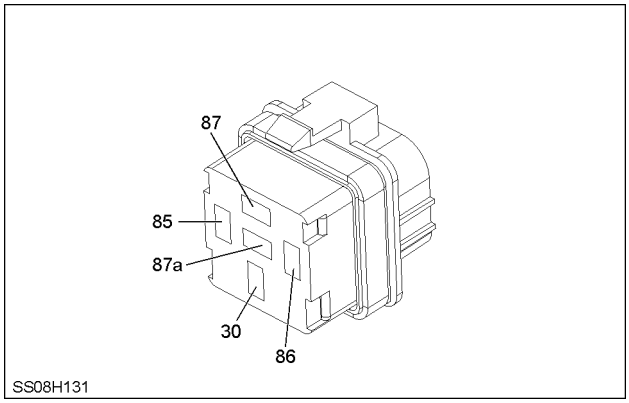
X629 ISO RELAY 1 FRONT (K042)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
30	150AW (N)	BATTERY FEED (UNFUSED)(ALL)
85	5980 (U)	ISO BUS IMPLEMENT SIGNAL
86	57MX (B)	EARTH (ALL)
87	5985 (U)	ISO RELAY 1 POWER OUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 17



SS08H131 18

LEFT HAND ENGINE

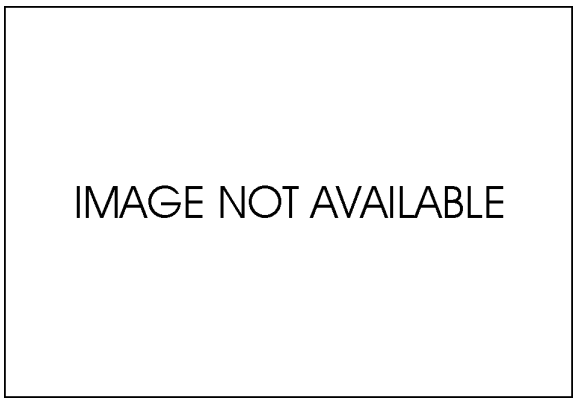
Connector - Component diagram 63

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

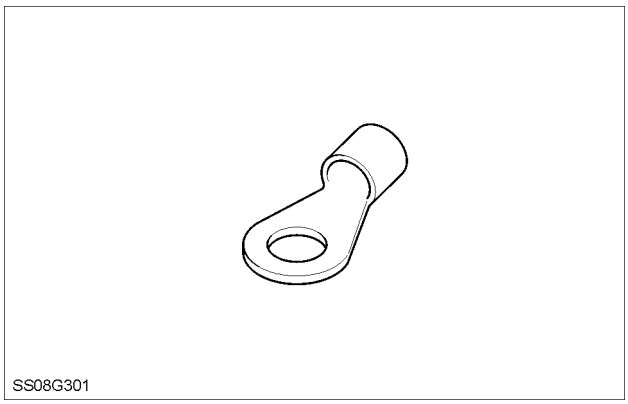
X630 EARTH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57MZ (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 1



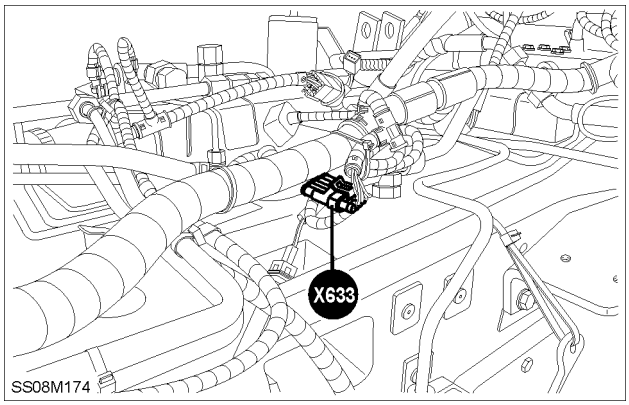
SS08G301 2

RIGHT HAND BEHIND STEPS

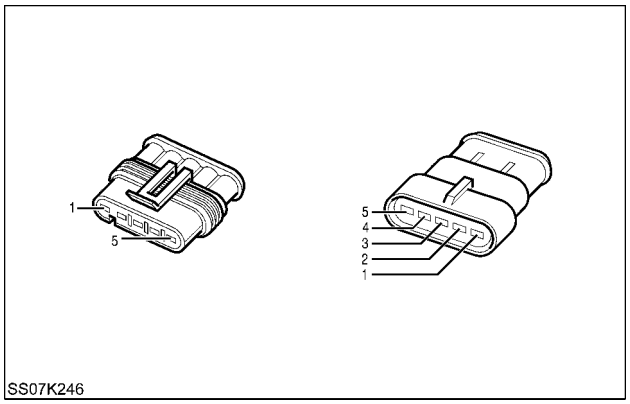
X633 CREEPER CONNECTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7005 (U)	TRANS CREEPER GR SOL
2	7580 (U)	CREEPER SOLENOID MONITOR
3	5020J (TN)	EDC PROC +5V REF VOLTAGE DROP POSN/RATE
4	7581 (O)	CREEPER POSITION SIGNAL
5	60BB (B/W)	SENSOR GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M174 3



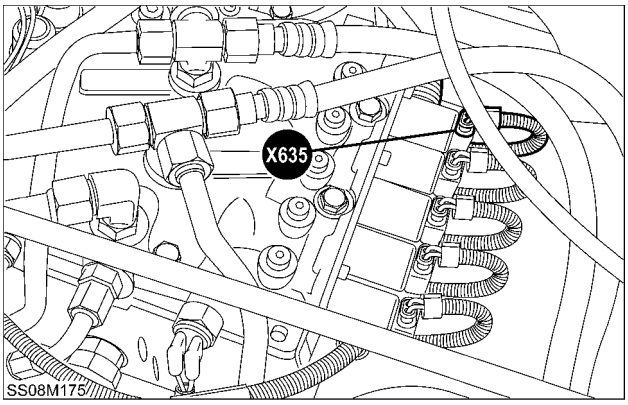
SS07K246 4

TOP OF TRANSMISSION

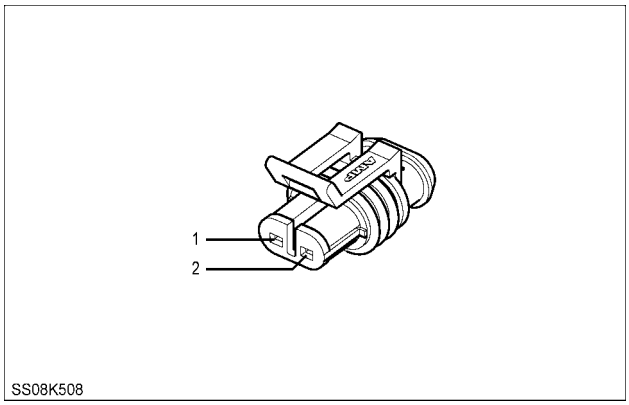
X635 CLUTCH SOLENOID A

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7431 (TQ)	CLUTCH 'A' SUPPY
2	7900 (TQ)	CLUTCH 'A' SIGNAL

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M175 5



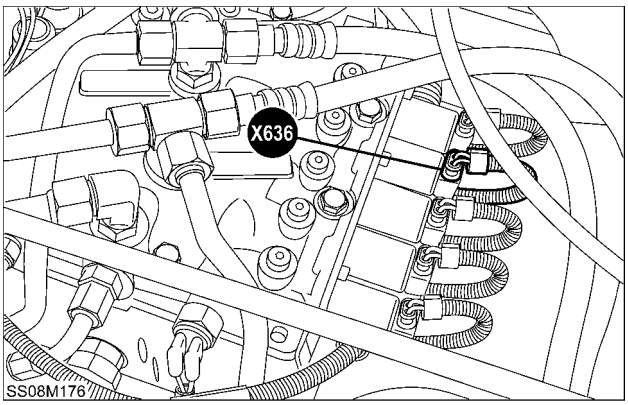
SS08K508 6

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

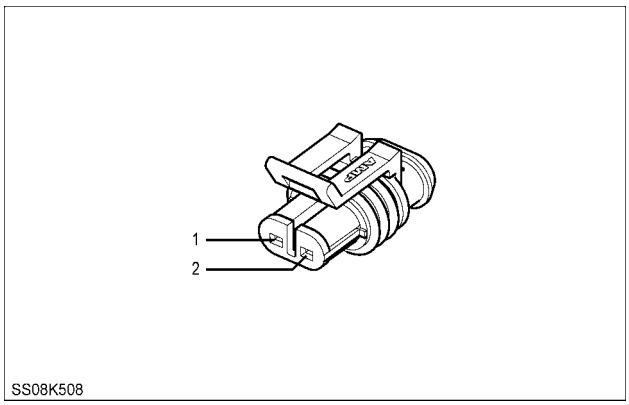
X636 CLUTCH SOLENOID B

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7910 (TQ)	CLUTCH 'B' SIGNAL
2	7915 (P)	TCM CLUTCH B RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M176 7



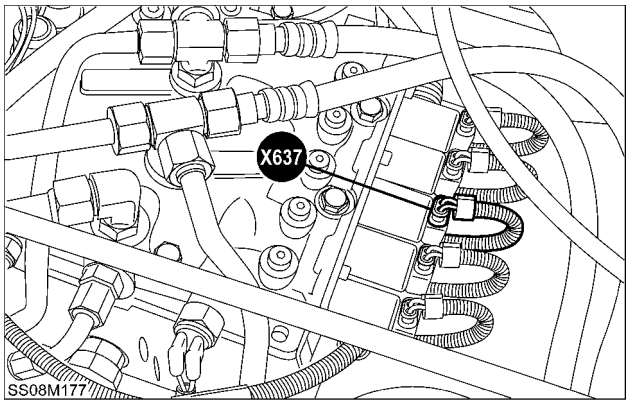
SS08K508 8

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

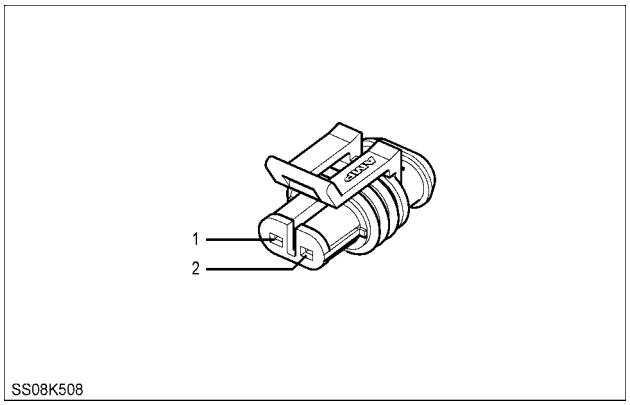
X637 CLUTCH SOLENOID C

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7920 (TQ)	CLUTCH 'C' SIGNAL
2	7925 (P)	TCM CLUTCH C RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M177 9



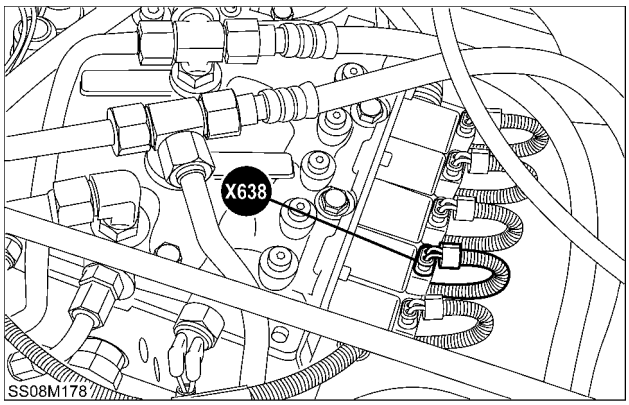
SS08K508 10

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

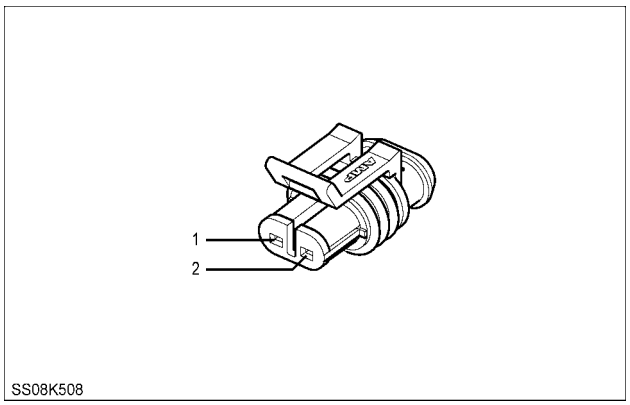
X638 CLUTCH SOLENOID D

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7930 (TQ)	CLUTCH 'D' SIGNAL
2	7935 (P)	TCM CLUTCH D RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M178 11



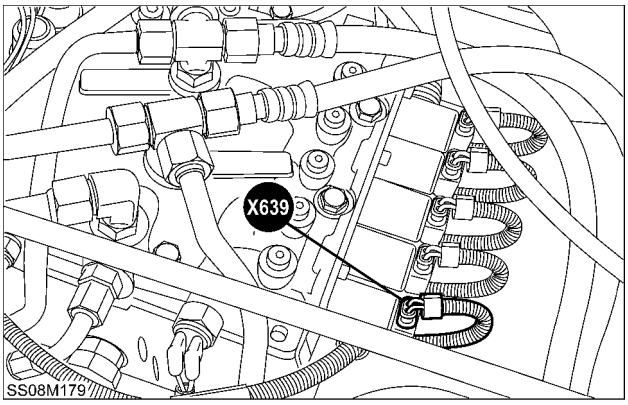
SS08K508 12

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

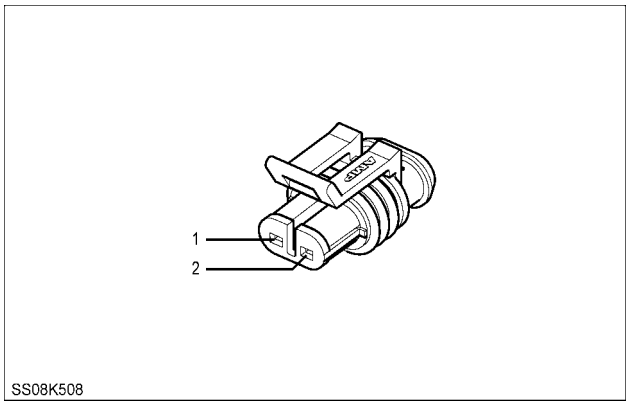
X639 CLUTCH SOLENOID E

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7940 (TQ)	CLUTCH 'E' SIGNAL
2	7945 (P)	TCM CLUTCH E RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M179 13



SS08K508 14

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

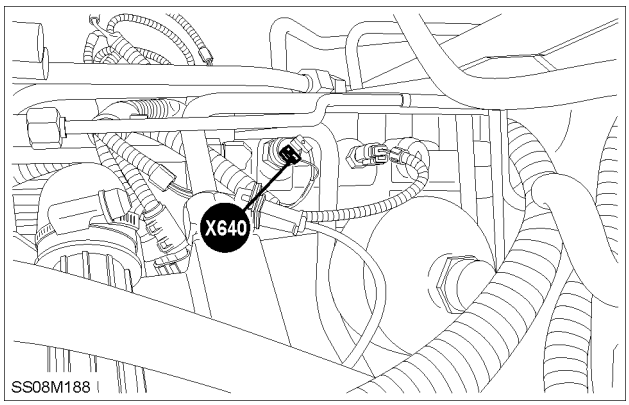
Connector - Component diagram 64

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

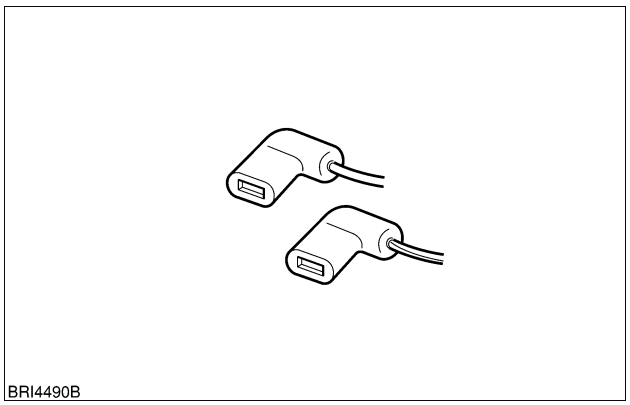
X640 TRANS OIL PRESSURE SWITCH PIN 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57EM (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M188 1



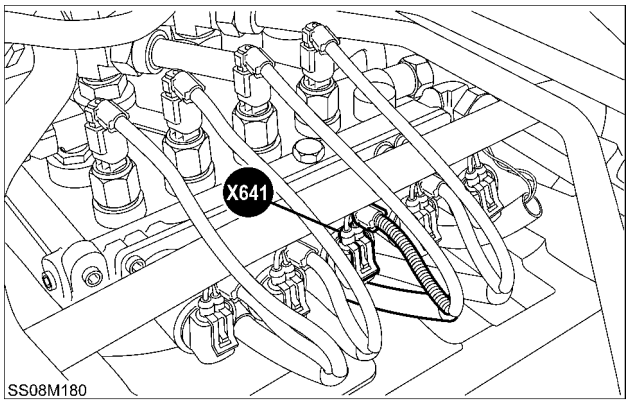
BRI4490B 2

RIGHT HAND SIDE SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

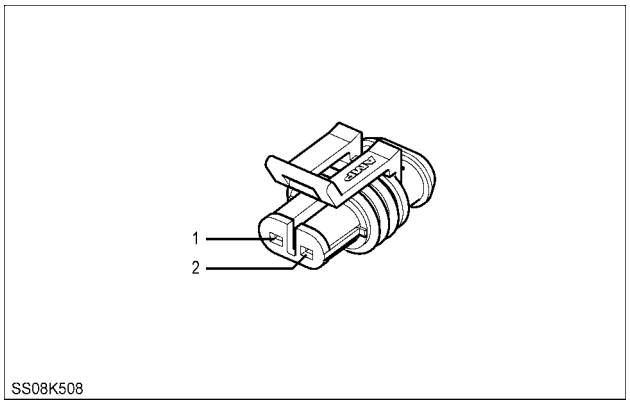
X641 LOW RANGE SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7230 (S)	TRANSMISSION LOW RANGE
2	7235 (Y)	TRANS LOW RANGE SOL - RET

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M180 3



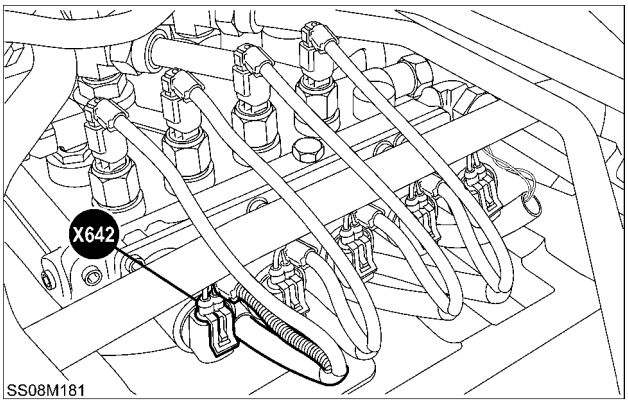
SS08K508 4

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

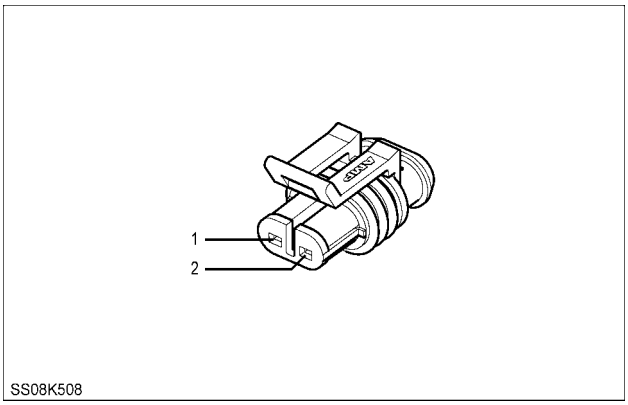
X642 MED RANGE SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7980 (K)	TRANS MED RANGE
2	7982 (W)	TRANS MED RANGE RET

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M181 5



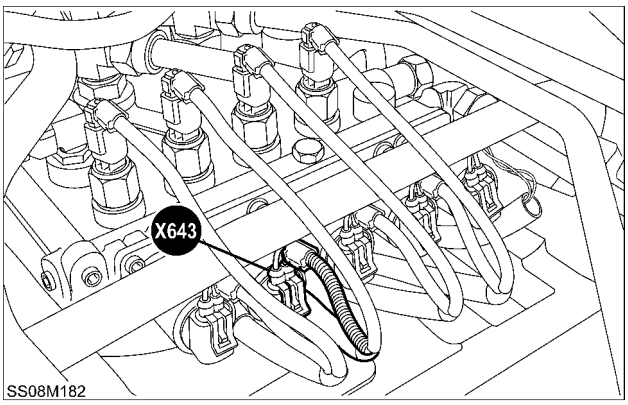
SS08K508 6

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

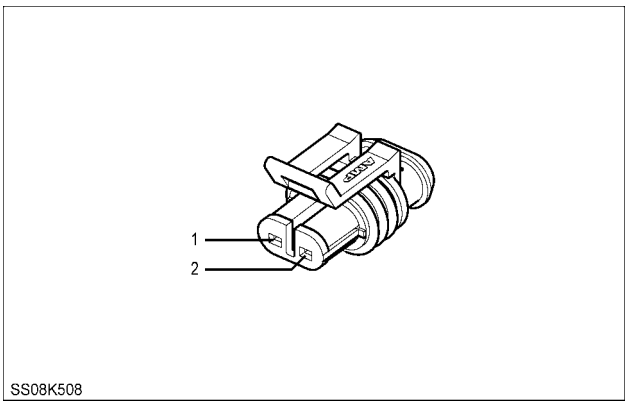
X643 HIGH RANGE SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7220 (S)	TRANSMISSION HIGH RANGE
2	7225 (W)	TRANS HI RANGE SOL - RET

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M182 7



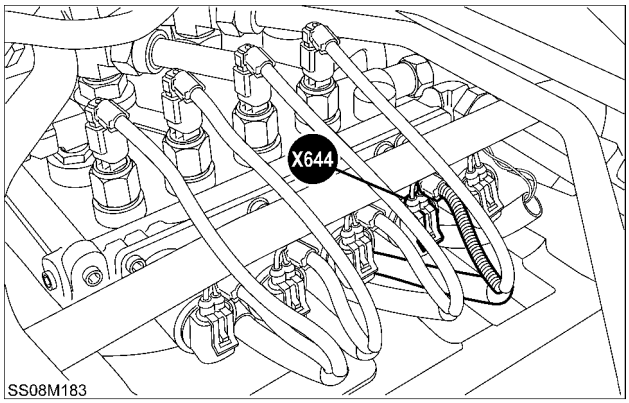
SS08K508 8

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

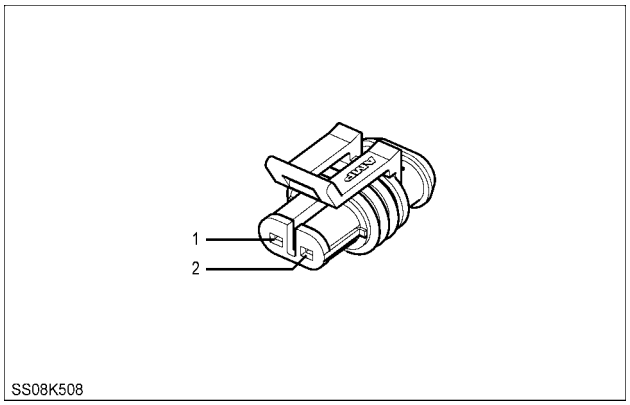
X644 REV RANGE SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7985 (G)	TRANS REVERSE RANGE
2	8045 (P)	TRANS REV SOL RET

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M183 9



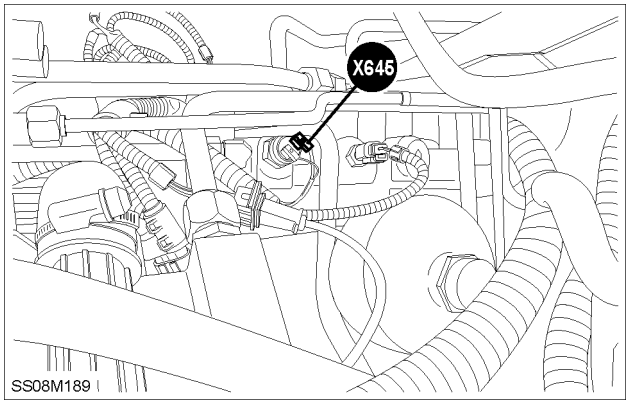
SS08K508 10

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

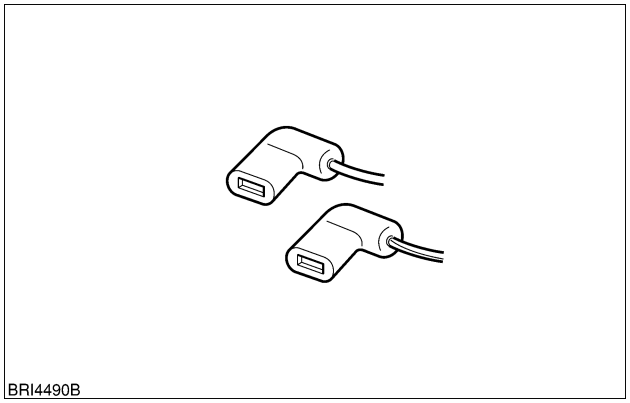
X645 TRANS OIL PRESSURE SWITCH PIN 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2012 (Y)	TRANS OIL PRESSURE WARNING LAMP

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M189 11



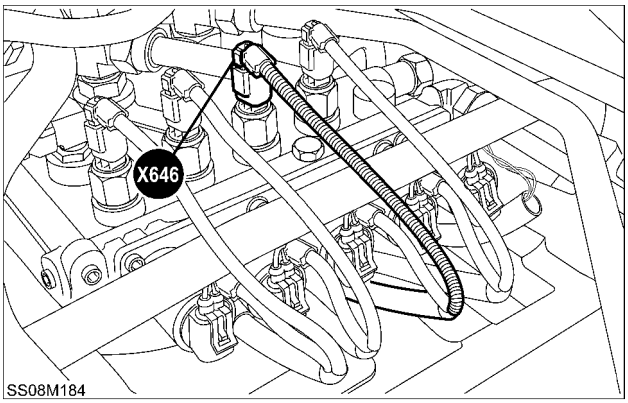
BRI4490B 12

RIGHT HAND SIDE SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

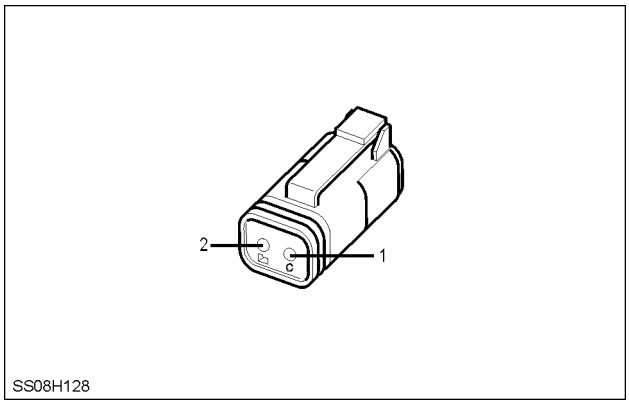
X646 LOW RANGE PRESS SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7770C (U)	TRANS FORWARD PRESSURE SWITCH
2	7000BD (U)	TRANS CONTROL SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M184 13



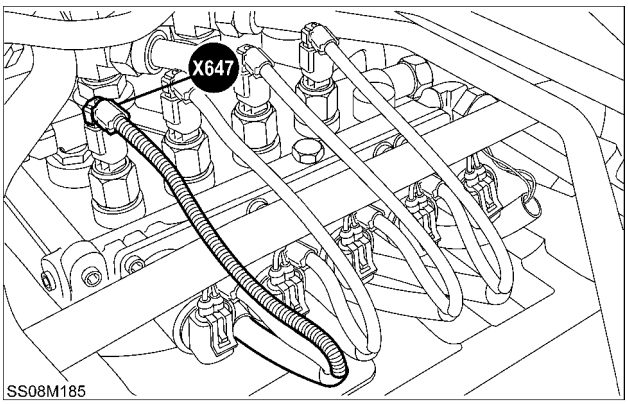
SS08H128 14

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

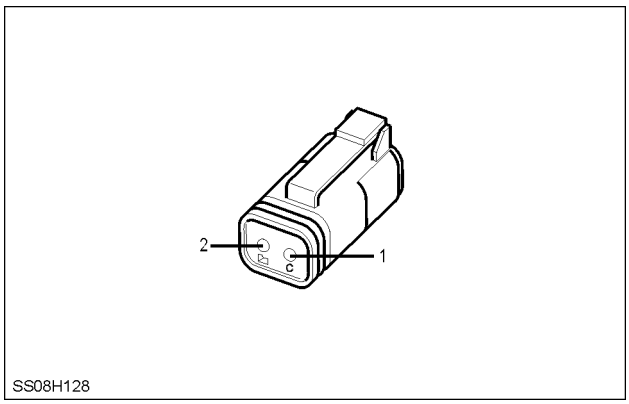
X647 MED RANGE PRESS SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7770B (U)	TRANS FORWARD PRESSURE SWITCH
2	7000BF (U)	TRANS CONTROL SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M185 15



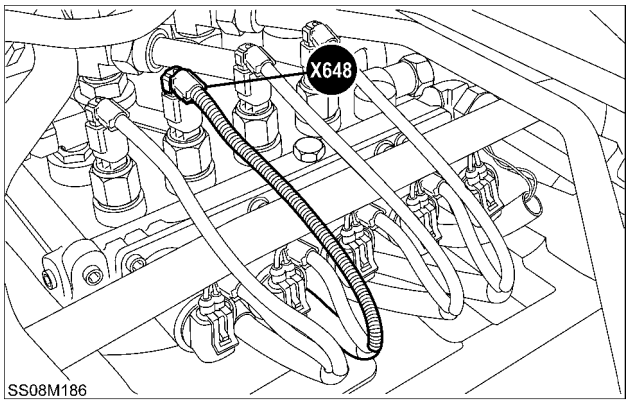
SS08H128 16

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

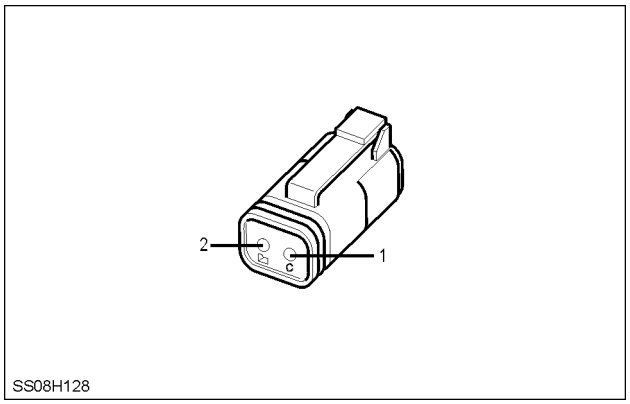
X648 HIGH RANGE PRESS SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7770A (U)	TRANS FORWARD PRESSURE SWITCH
2	7000BE (U)	TRANS CONTROL SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M186 17



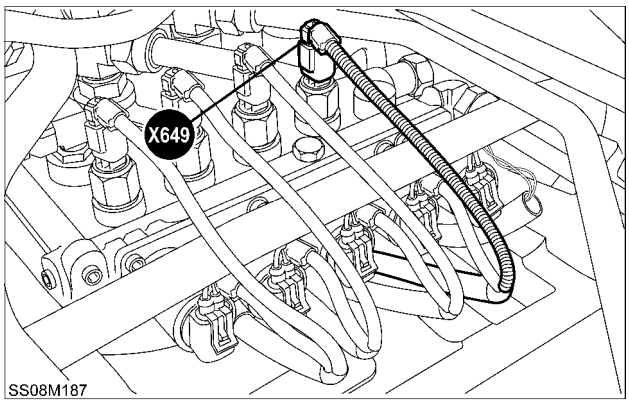
SS08H128 18

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

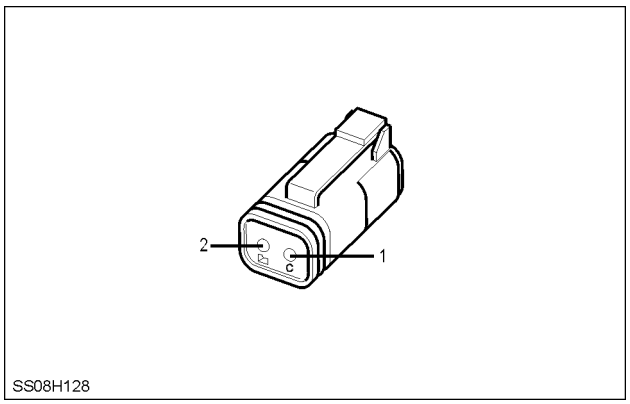
X649 REV RANGE PRESS SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	8050 (R)	TRANS REV PRESSURE
2	7000BC (U)	TRANS CONTROL SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M187 19



SS08H128 20

SLIDE VALVE HOUSING OF THE TRANSMISSION CONTROLS

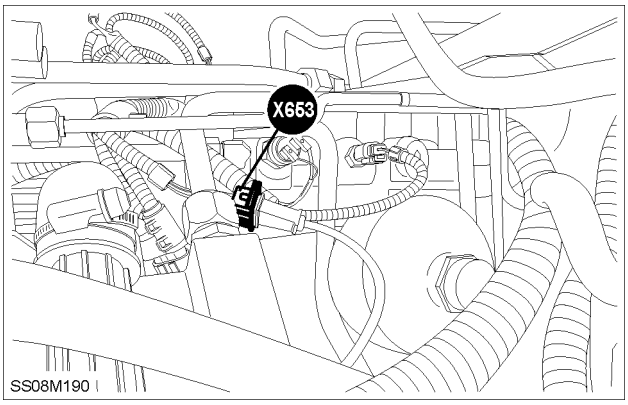
Connector - Component diagram 65

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

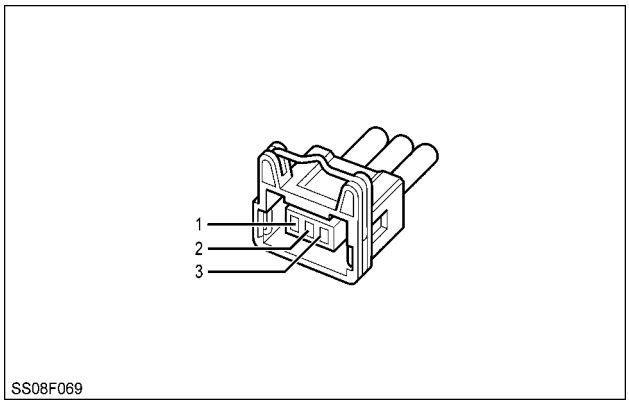
X653 MID SPEED SENSOR OUTPUT SPEED P.U

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	7000BS (U)	TRANS CONTROL SUPPLY
2	7400 (Y)	TRANS RPM SPEED SENSOR TO TCM INPUT
3	60BE (B/W)	SENSOR GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M190 1



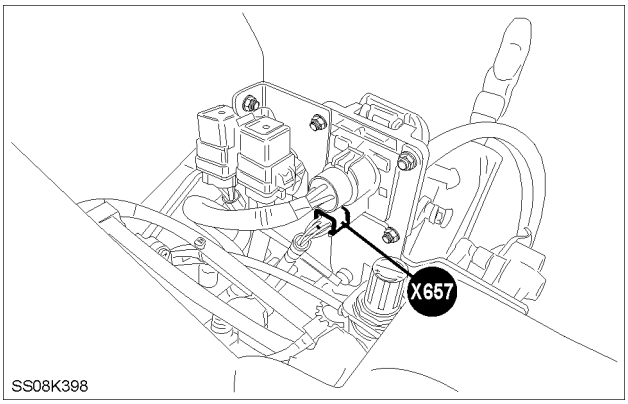
SS08F069 2

RIGHT HAND TRANSMISSION

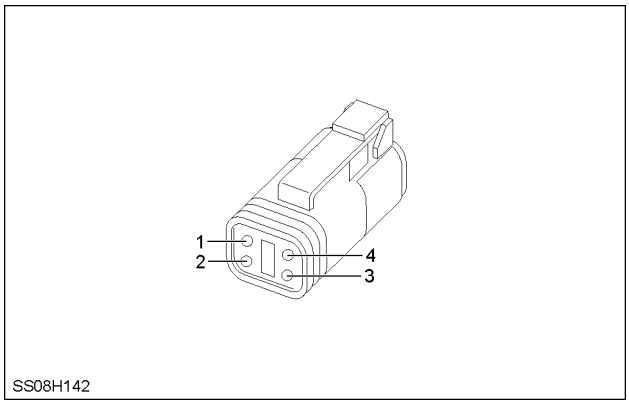
X657 ISO BUS IMPLEMENT SOCKET (REAR)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5920B (R)	ISO BUS CAN SUPPLY POSITIVE
2	5900B (Y)	ISO BUS CAN SIGNAL LOW
3	5915B (B)	ISO BUS CAN SUPPLY GROUND
4	5910B (G)	ISO BUS CAN SIGNAL HIGH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K398 3



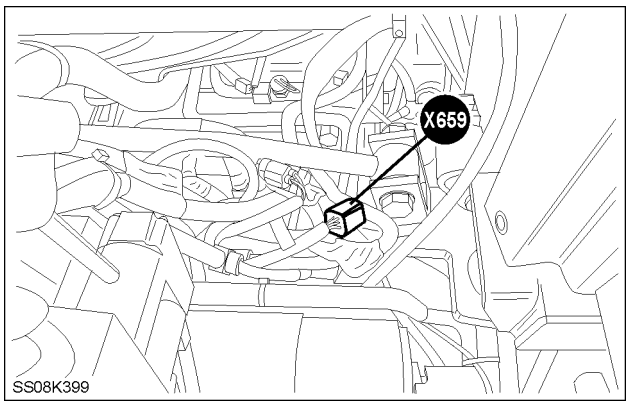
SS08H142 4

REAR OF TRACTOR TOP OF TRANSMISSION

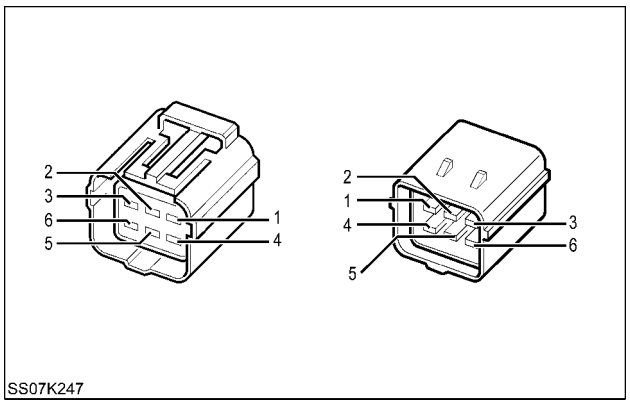
X659 LINK LEVEL (EXTERNAL CONNECTION)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57EY (B)	EARTH (ALL)
2	4055 (W)	LINK LEVEL TOP LINK EXTEND SOLENOID
3	4056 (W)	LINK LEVEL TOP LINK RETRACT SOLENOID
4	4057 (W)	LINK LEVEL RIGHT LINK RAISE SOLENOID
5	4058 (W)	LINK LEVEL RIGHT LINK LOWER SOLENOID
6	4054 (W)	LINK LEVEL DUMP SOLENOID

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K399 5



SS07K247 6

REAR OF TRACTOR UNDERNEATH CAB

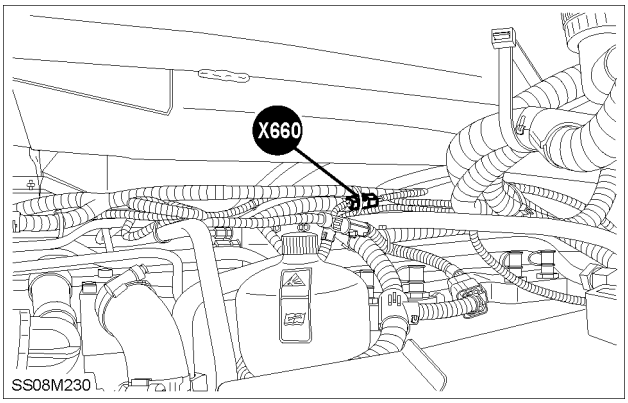
Connector - Component diagram 66

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

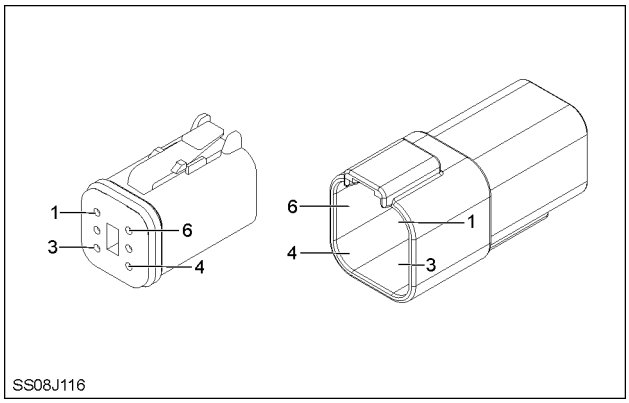
X660 ISO IMPLEMENT CONNECTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5920B (R)	ISO BUS CAN SUPPLY POSITIVE
2	5910B (Y)	ISO BUS CAN SIGNAL HIGH
3	5915B (B)	ISO BUS CAN SUPPLY GROUND
4	5900B (G)	ISO BUS CAN SIGNAL LOW
5	5970A (O)	ISO BUS ECU SIGNAL
6	5980 (U)	ISO BUS IMPLEMENT SIGNAL

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M230 1



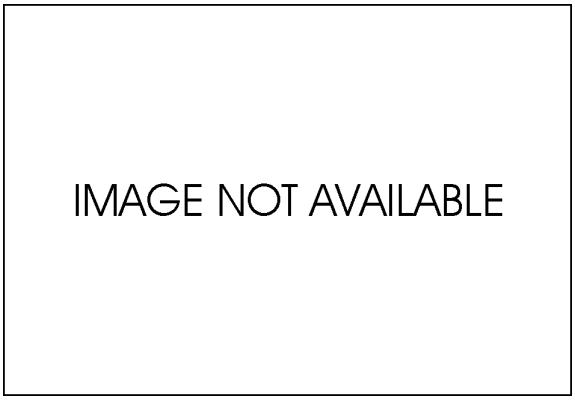
SS08J116 2

RIGHT HAND TOP OF TRANSMISSION

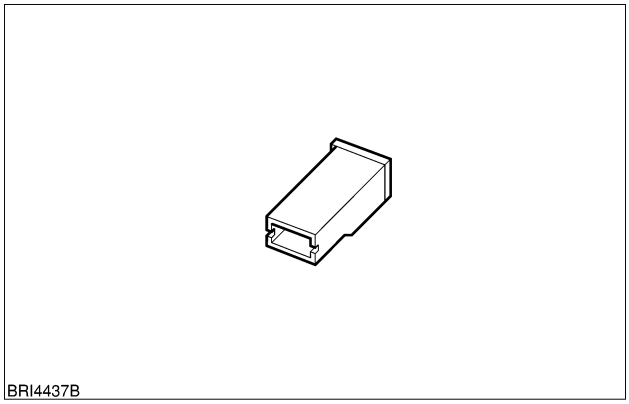
X661 HIGH FLOW PUMP (DETECTION)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5830 (U)	HIGH FLOW PUMP LINK

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 3



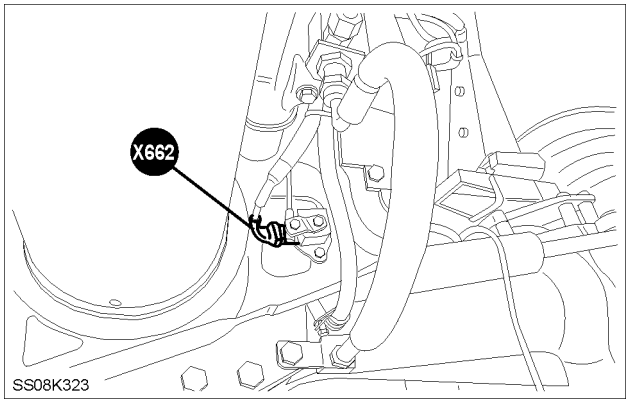
BRI4437B 4

REAR RIGHT HAND TRANSMISSION

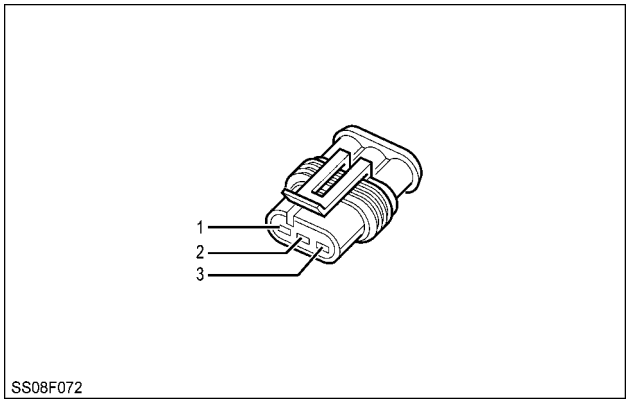
X662 FRONT AXLE POSITION SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3220 (O)	AXLE HEIGHT SENSOR 5V REF
2	3230 (O)	AXLE HEIGHT SENSOR POSITION
3	60 (B)	SENSOR GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K323 5



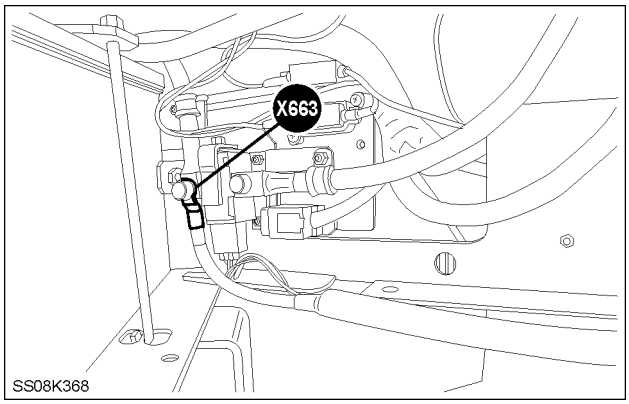
SS08F072 6

RIGHT HAND FRONT AXLE

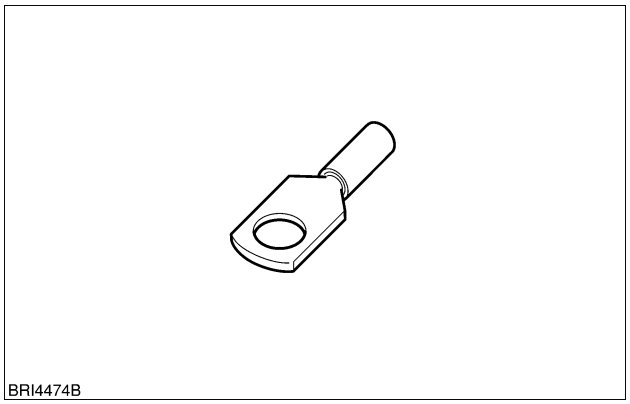
X663 ELECTRICAL BATTERY ISOLATOR PLUS 30

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1AA (R)	BATTERY SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K368 7



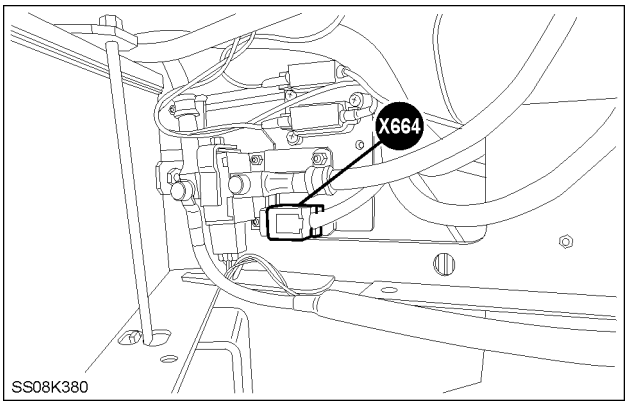
BRI4474B 8

RIGHT HAND BEHIND STEPS

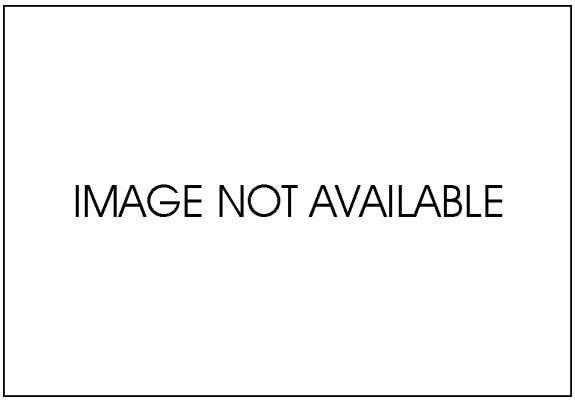
X664 ELECTRICAL BATTERY ISOLATOR FUSE PF3

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1B (R)	BATTERY SUPPLY
2	1C R)	BATTERY SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K380 9



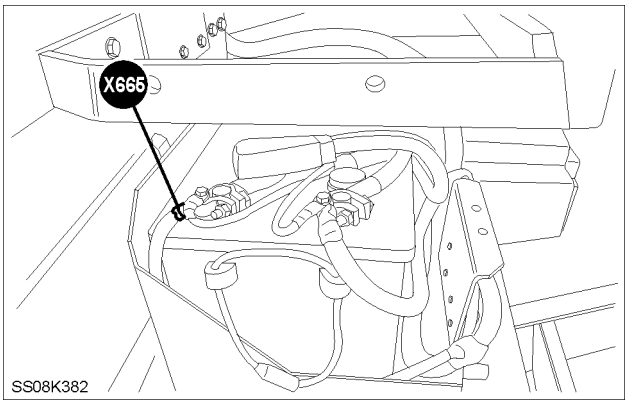
INA 10

RIGHT HAND BEHIND STEPS

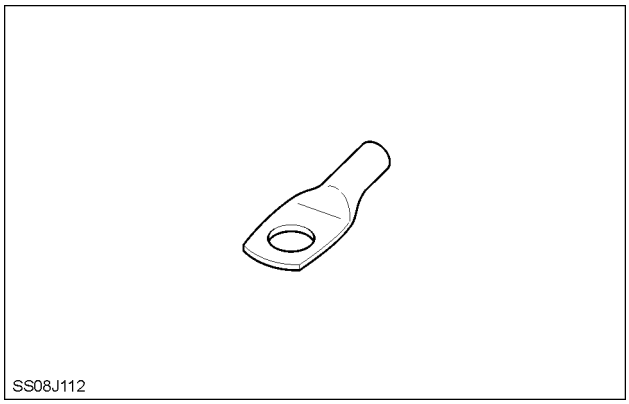
X665 BATTERY TO CAB. PLUS SUPPLY

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1A (R) / 1B (R)	BATTERY SUPPLY
2	160A (U) / -	BATTERY SUPPLY ELECTRONICS

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K382 11



SS08J112 12

RIGHT HAND BEHIND STEPS

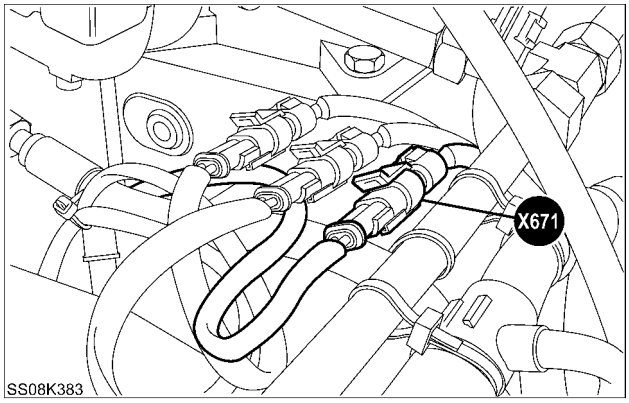
Connector - Component diagram 67

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

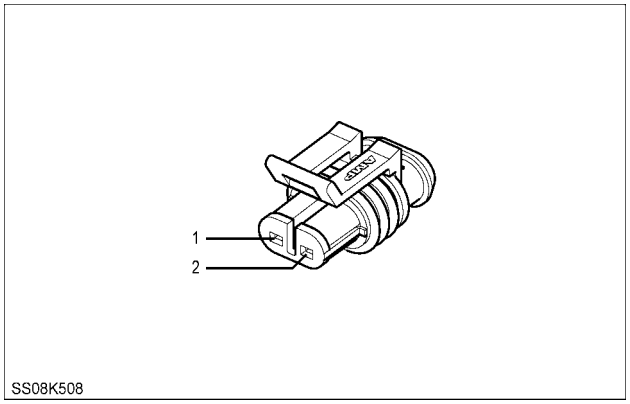
X671 LINK LEVELLING VALVE 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	4054 (W)	LINK LEVEL DUMP SOLENOID
2	57MJ (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K383 1



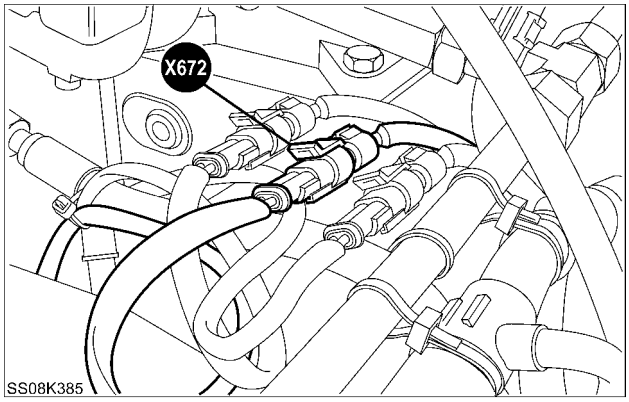
SS08K508 2

REAR AXLE

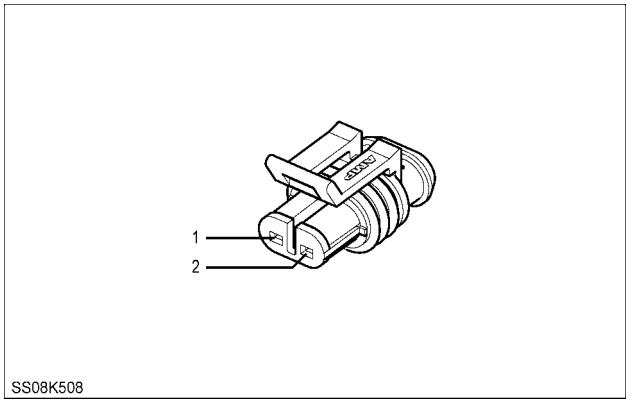
X672 LINK LEVELLING VALVE 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	4055 (W)	LINK LEVEL TOP LINK EXTEND SOLENOID
2	57MK (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K385 3



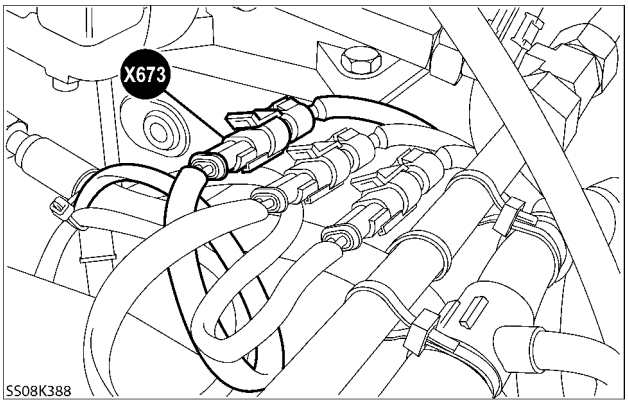
SS08K508 4

REAR AXLE

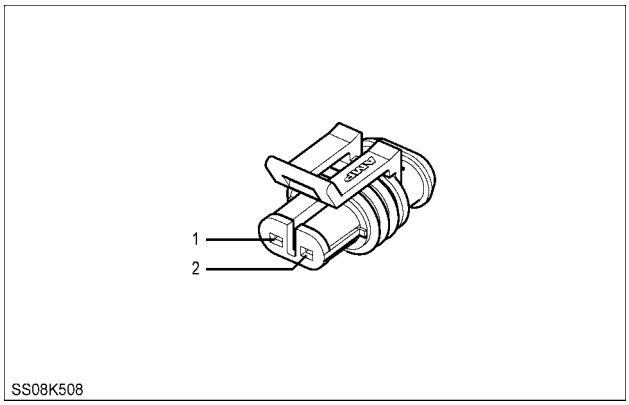
X673 LINK LEVELLING VALVE 3

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	4056 (W)	LINK LEVEL TOP LINK RETRACT SOLENOID
2	57ML (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K388 5



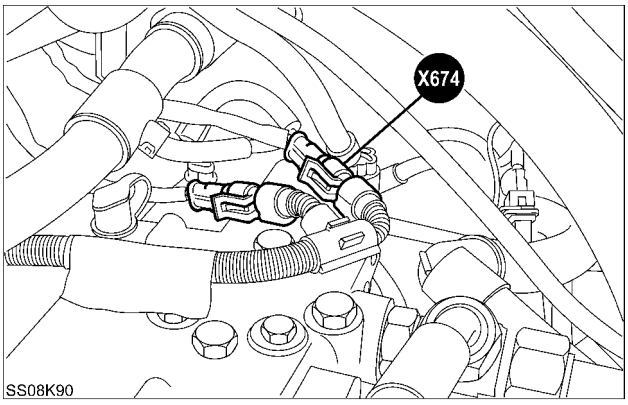
SS08K508 6

REAR AXLE

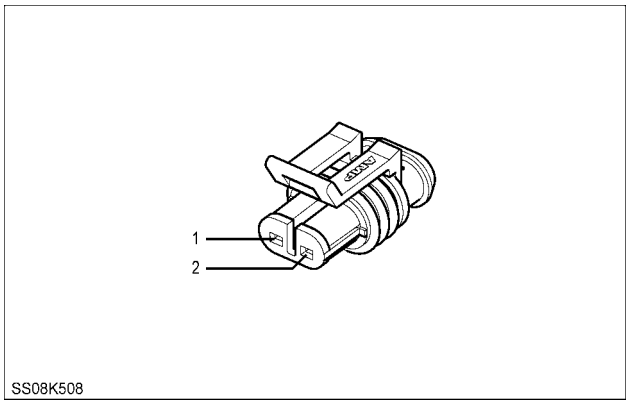
X674 LINK LEVELLING VALVE 4

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	4057 (W)	LINK LEVEL RIGHT LINK RAISE SOLENOID
2	57MM (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K390 7



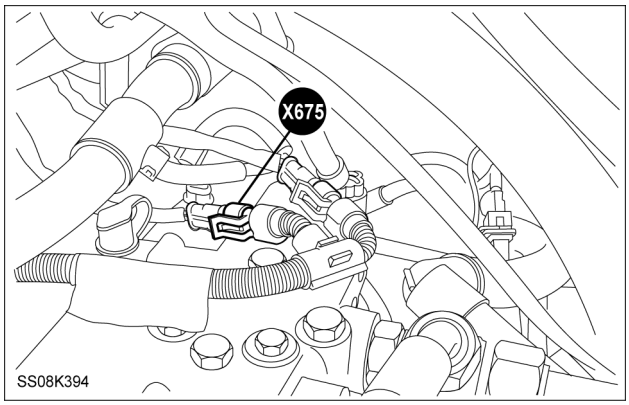
SS08K508 8

REAR AXLE

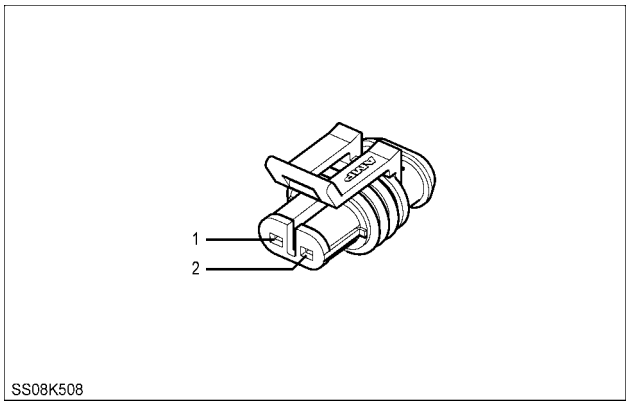
X675 LINK LEVELLING VALVE 5

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	4058 (W)	LINK LEVEL RIGHT LINK LOWER SOLENOID
2	57MN (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K394 9



SS08K508 10

REAR AXLE

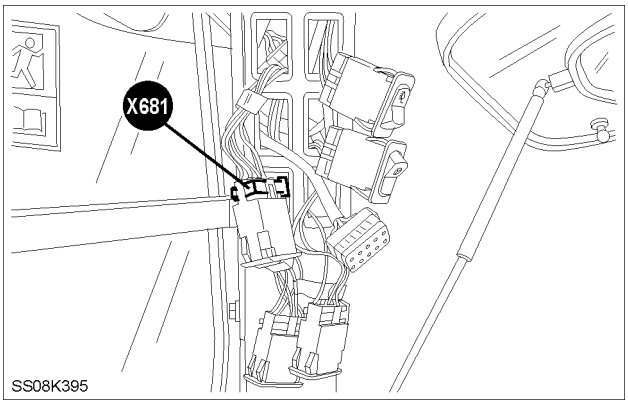
Connector - Component diagram 68

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

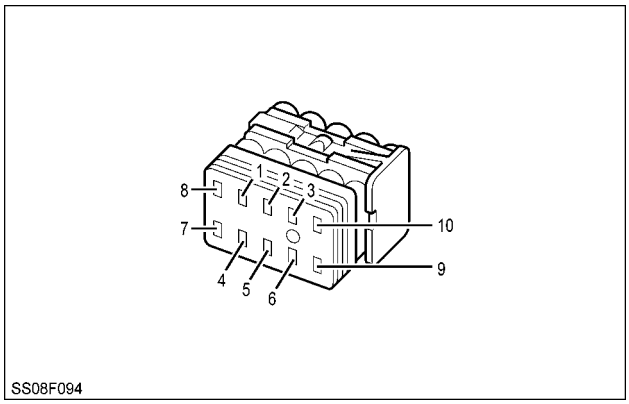
X681 HYDRAULICS MASTER SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5210 (O)	EDC VALVE ENABLE
2	7000M (U)	TRANS CONTROL SUPPLY
3	5597 (S)	EHR MASTER ENABLE
5	5835(S)	HYDRAULIC MASTER SWITCH HIGH FLOW PUMP LINK
7	57PV (B)	EARTH (ALL)
8	1012L (R)	ILLUMINATION
9	57RP (B)	EARTH (ALL)
10	1012X (R)	ILLUMINATION

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K395 1



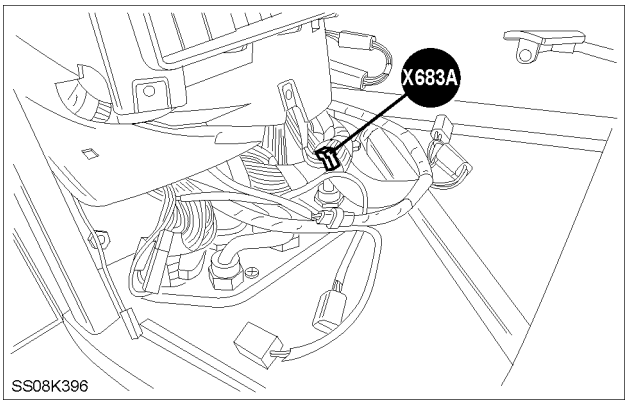
SS08F094 2

RIGHT HAND C PILLAR

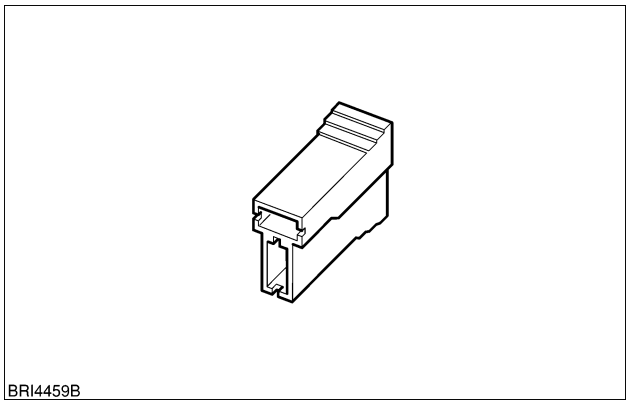
X683A HEATED SCREEN B+

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1P (R)	BATTERY SUPPLY
2	1N (R)	BATTERY SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K396 3



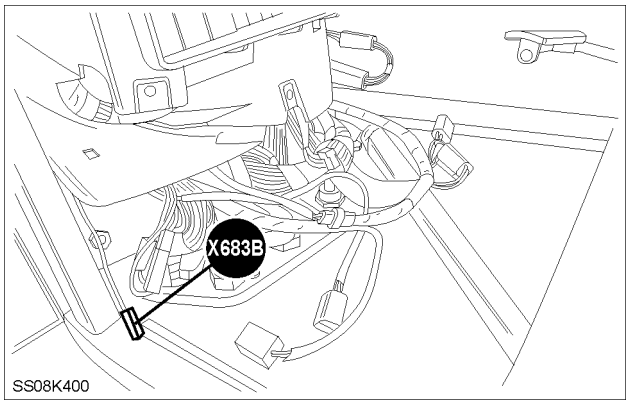
BRI4459B 4

BEHIND RIGHT HAND TRIM

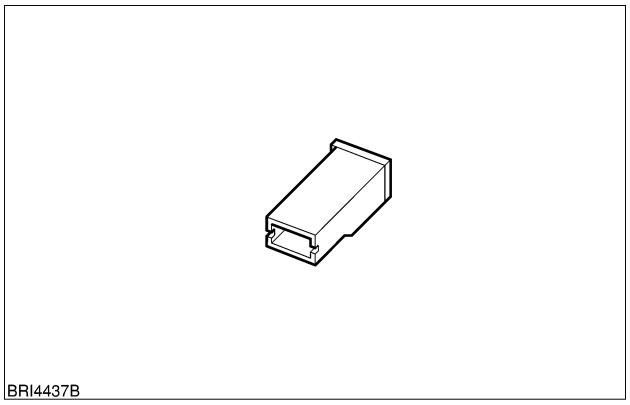
X683B HEATED SCREEN D+

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1006B (N) / 1006D (N)	ALTERNATOR WARNING LAMP

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K400 5



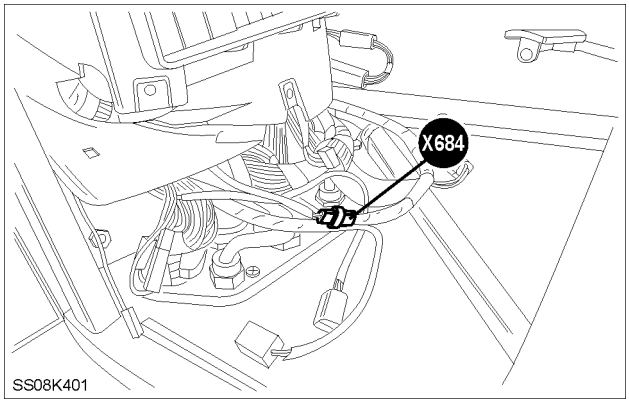
BRI4437B 6

BEHIND RIGHT HAND TRIM

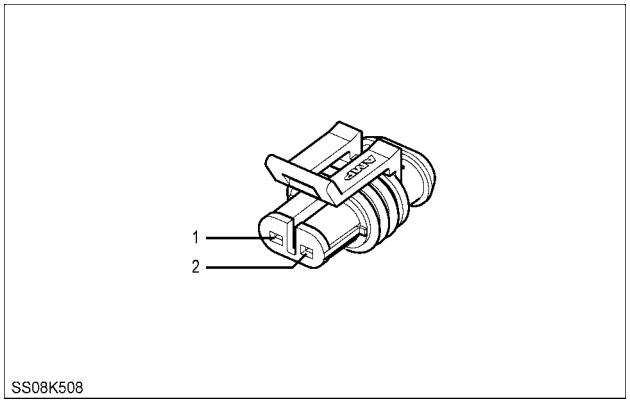
X684 FRONT HITCH DETECT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5200L (N)	EDC VALVE SUPPLY
2	5840 (W)	FRONT HITCH DETECT INPUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K401 7



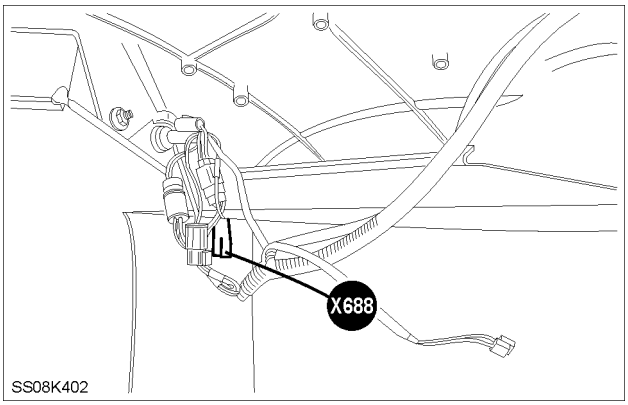
SS08K508 8

BEHIND RIGHT HAND TRIM

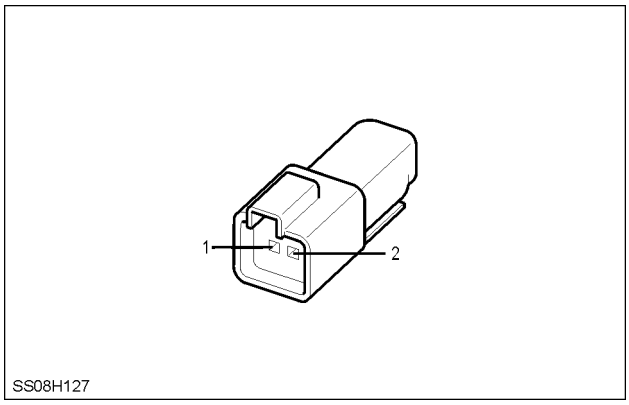
X688 EXTREMITY LAMP LEFT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	50A (G)	LEFT HAND TURN SIGNAL
2	57MS (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K402 9



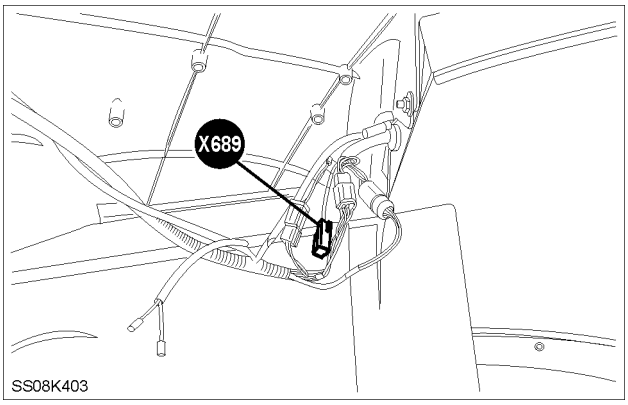
SS08H127 10

LEFT HAND REAR FENDER

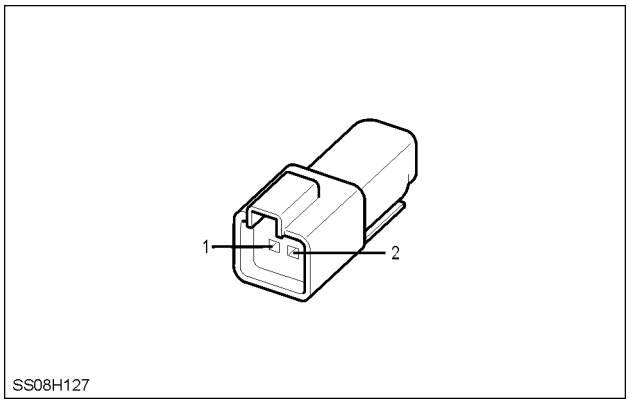
X689 EXTREMITY LAMP RIGHT HAND

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	49A (G)	RIGHT HAND TURN SIGNAL
2	57MR (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K403 11



SS08H127 12

RIGHT HAND REAR FENDER

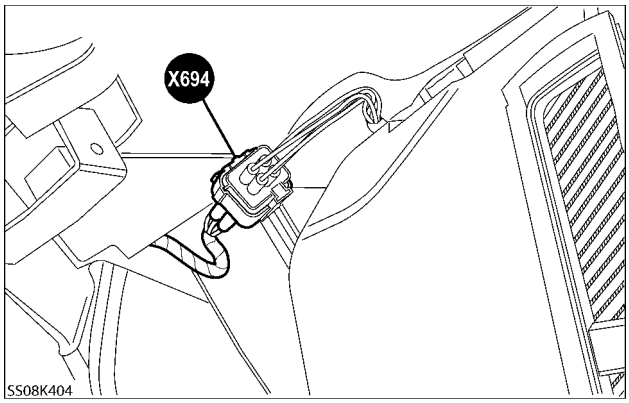
Connector - Component diagram 69

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

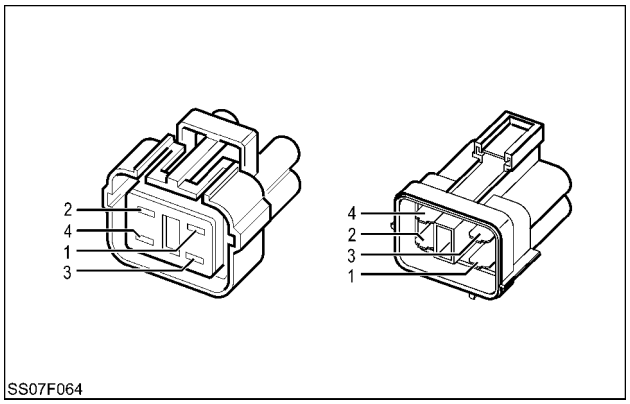
X694 AIR CON POWER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	982B (G) / 982B (R)	BLOWER MOTOR FEED
2	982C (G) / 982C (R)	BLOWER MOTOR FEED
3	57NZ (B) / 57ZA (B)	EARTH (ALL)
4	57PA (B) / 57ZB (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K404 1



SS07F064 2

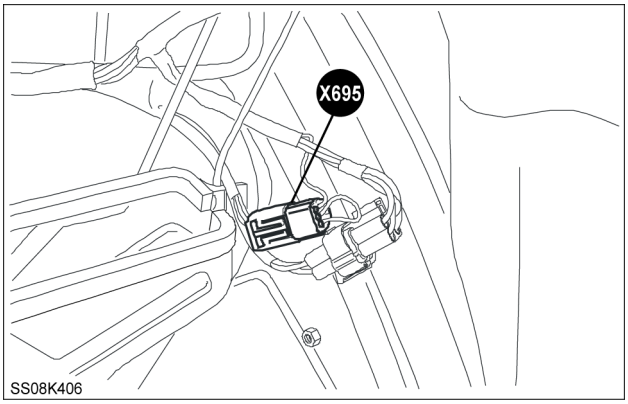
LEFT HAND REAR TRACTOR BEHIND OPERATOR'S SEAT

X695 AIR CON CONTROL

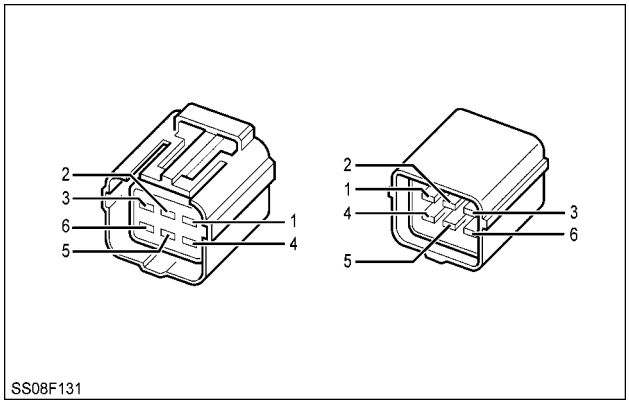
MANUAL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5420M (G)	CAN L
2	5400M (Y)	CAN H
3	- / (O/R)	DEFOG OUTPUT
4	2006A (U)	DE-ICING SWITCH - AIR CONDITIONER
5	2006B (U)	DE-ICING SWITCH - AIR CONDITIONER
6	2005 (O) / 2006B (U)	AIR CON CLUTCH RELAY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K406 3



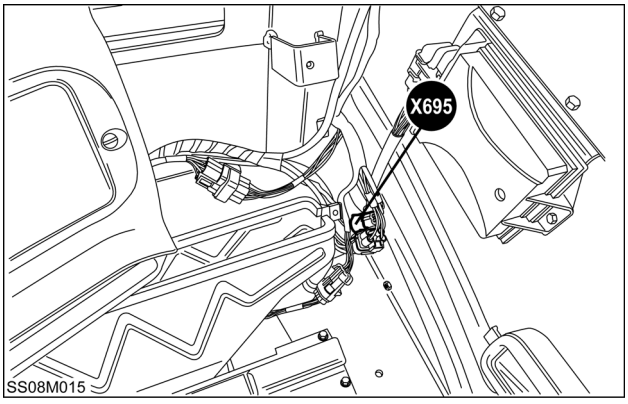
SS08F131 4

LEFT HAND REAR TRACTOR BEHIND OPERATOR'S SEAT

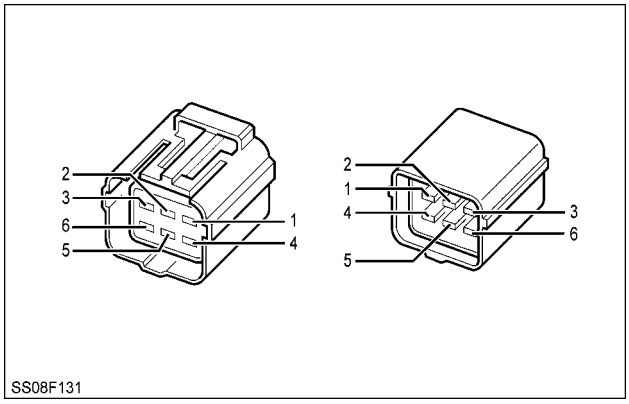
ATC

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5420Z (G)	CAN L
2	5400Z (Y)	CAN H
3	9229 (O/R) / 9229 (O)	DEFOG OUTPUT
4	2006A (U)	DE-ICING SWITCH - AIR CONDITIONER
5	2006B (U) / 2006 (U)	DE-ICING SWITCH - AIR CONDITIONER
6	2005 (O) / 2005 (P)	AIR CON CLUTCH RELAY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M015 5



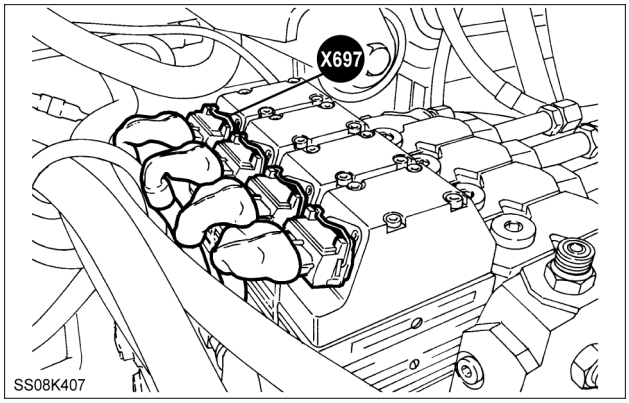
SS08F131 6

LEFT HAND REAR TRACTOR BEHIND OPERATOR'S SEAT

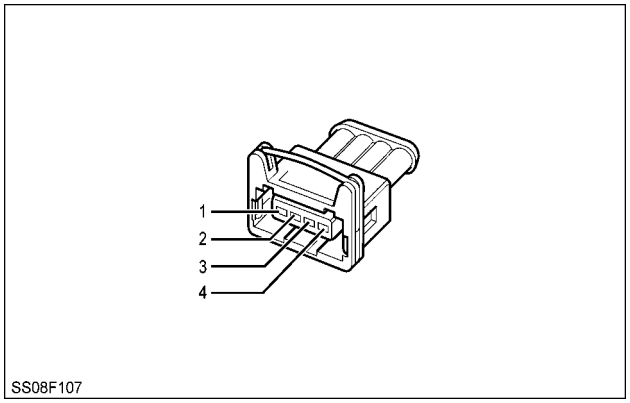
X697 MEHR 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5515J (S)	EHR +12V IGN.
2	5610H (U)	HTS PROGRAM
3	5500H (R)	EHR CAN HIGH
4	57WC (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K407 7



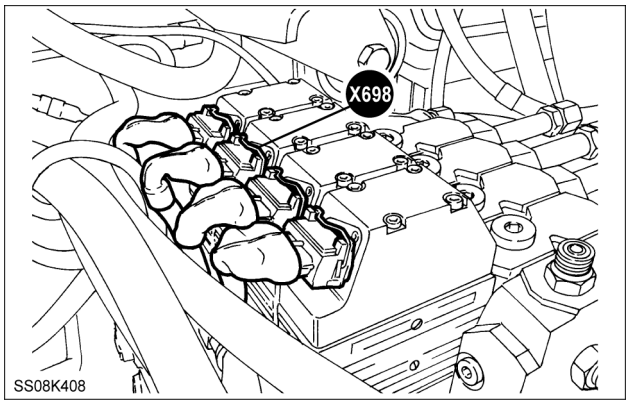
SS08F107 8

RIGHT HAND BEHIND STEPS

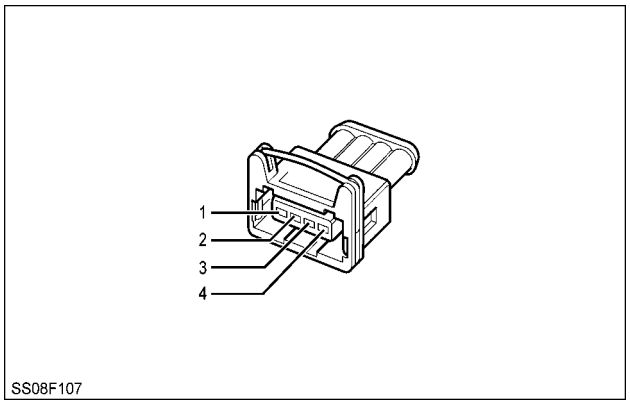
X698 MEHR 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5515K (S)	EHR +12V IGN.
2	5510Q (U)	EHR CAN LOW
3	5500Q (R)	EHR CAN HIGH
4	57MD (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K408 9



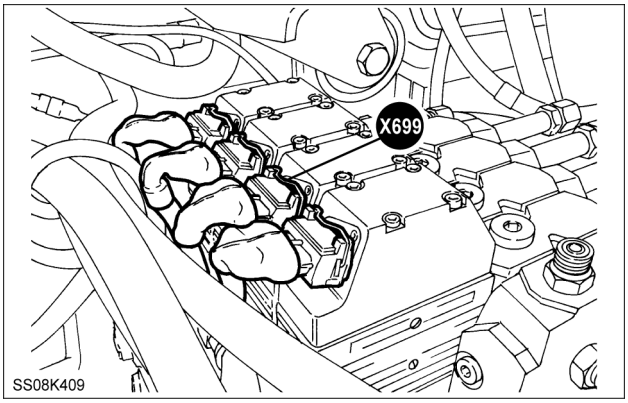
SS08F107 10

RIGHT HAND BEHIND STEPS

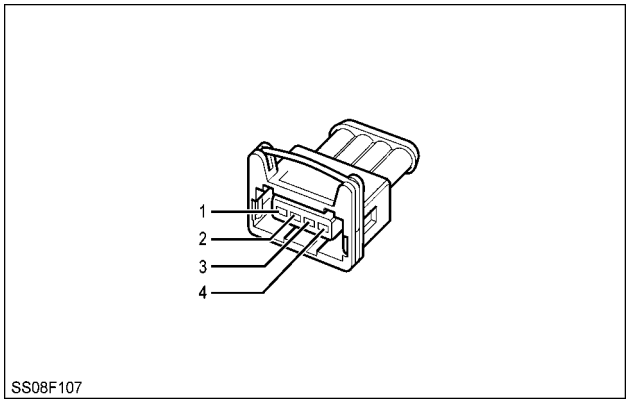
X699 MEHR 3

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5515L (S)	EHR +12V IGN
2	5510S (U)	EHR CAN LOW
3	5500S (R)	EHR CAN HIGH
4	57WE (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K409 11



SS08F107 12

RIGHT HAND BEHIND STEPS

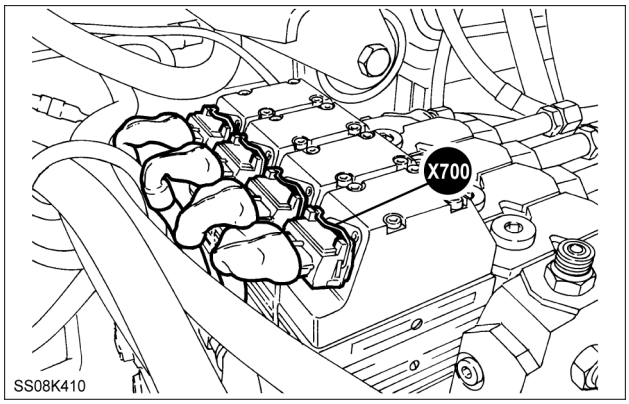
Connector - Component diagram 70

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

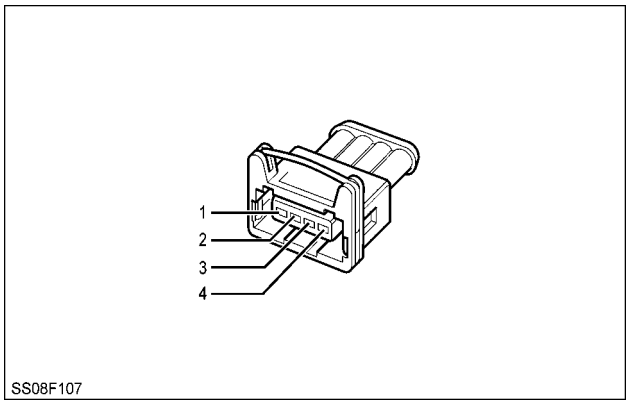
X700 MEHR 4

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5515M (S)	EHR +12V IGN.
2	5510U (U)	EHR CAN LOW
3	5500U (R)	EHR CAN HIGH
4	57MF (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K410 1



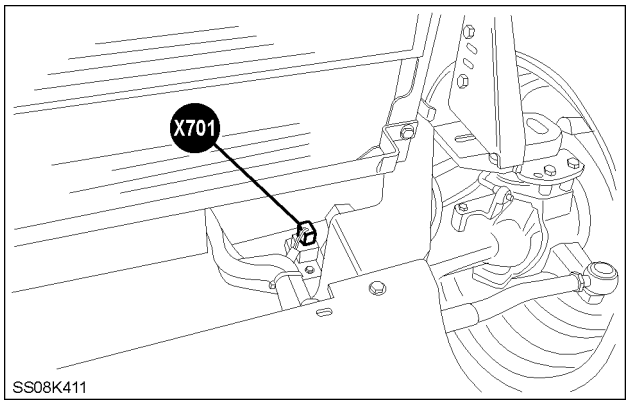
SS08F107 2

RIGHT HAND BEHIND STEPS

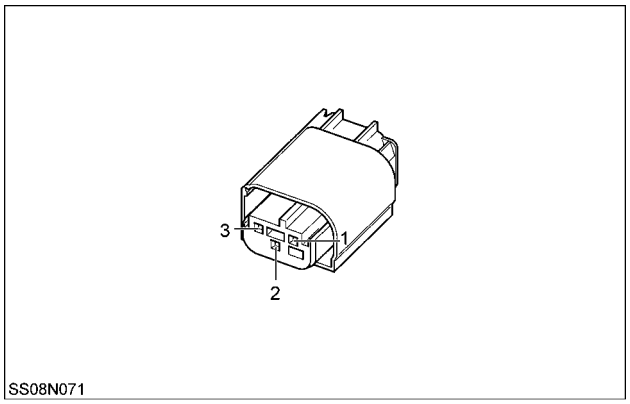
X701 SUSPENSION ACCELEROMETER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3235 (TN)	ACCELEROMETER SIGNAL
2	60AG (B/W)	SENSOR GROUND
3	5520D (G)	EHR 5V REF.

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K411 3



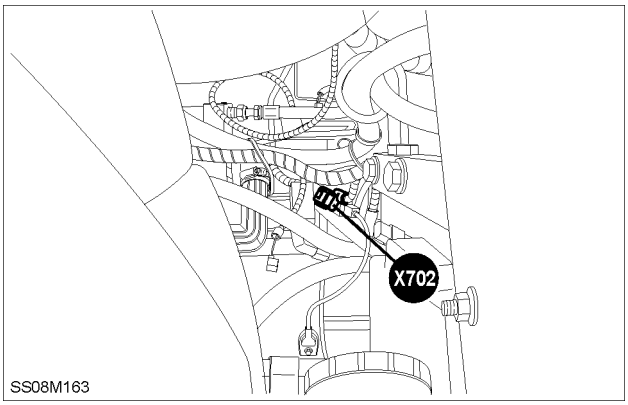
SS08N071 4

FRONT LEFT HAND ENGINE

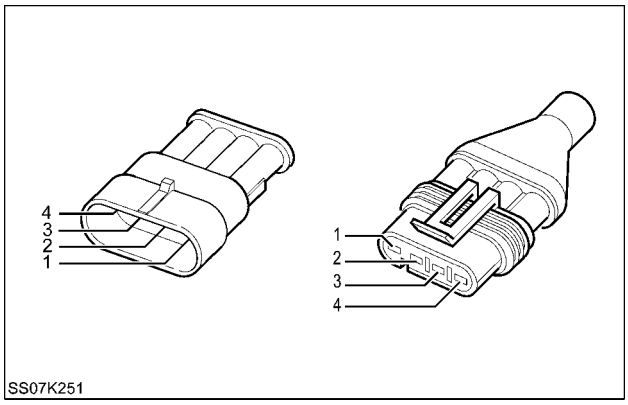
X702 TERMINATING RESISTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	5510V (U)	EHR CAN LOW
3	5500V (R)	EHR CAN HIGH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M163 5



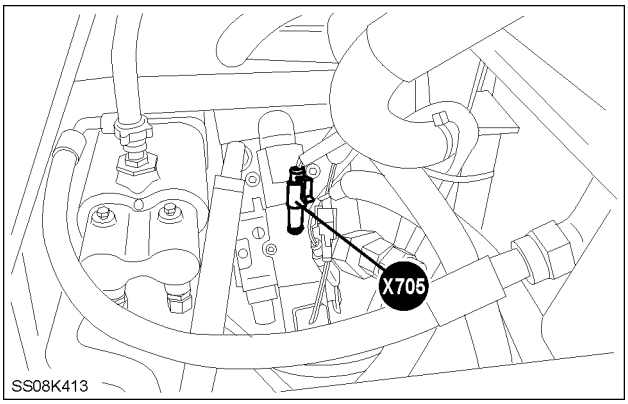
SS07K251 6

RIGHT HAND BEHIND STEPS

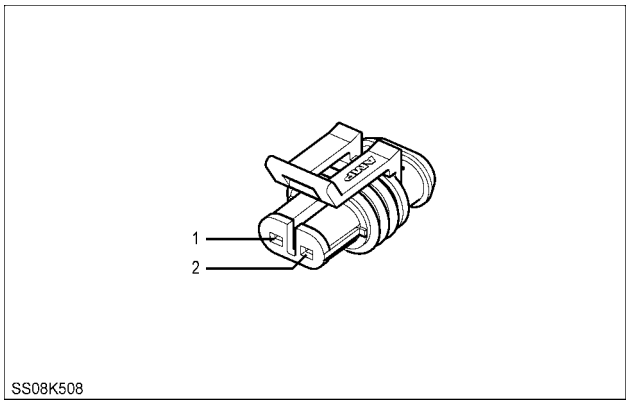
X705 TURN RIGHT (TOP)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3163 (O)	AUTO GUIDANCE STEERING SOLENOID VLV R FEED
2	3164 (O)	AUTO GUIDANCE STEERING SOLENOID VLV R RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K413 7



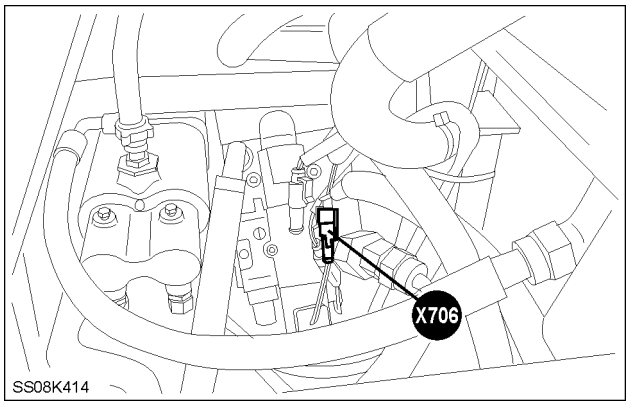
SS08K508 8

REAR TOP OF ENGINE

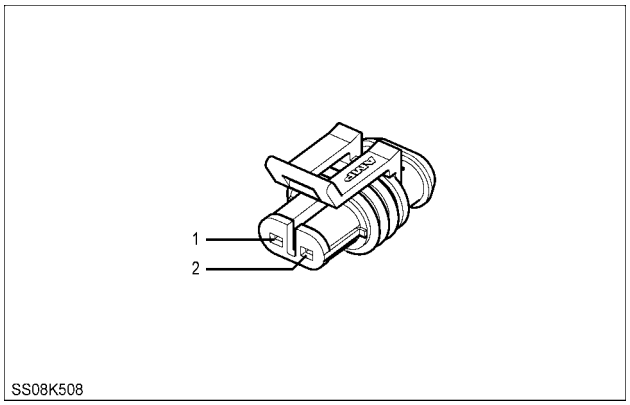
X706 TURN LEFT (BOTTON)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3165 (O)	AUTO GUIDANCE STEERING SOLENOID VLV L FEED
2	3166 (O)	AUTO GUIDANCE STEERING SOLENOID VLV L RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K414 9



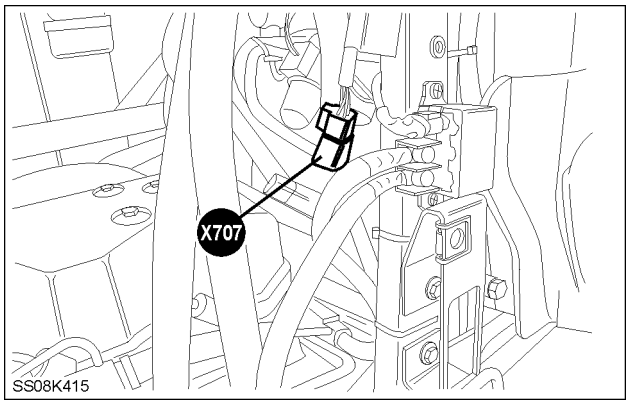
SS08K508 10

REAR TOP OF ENGINE

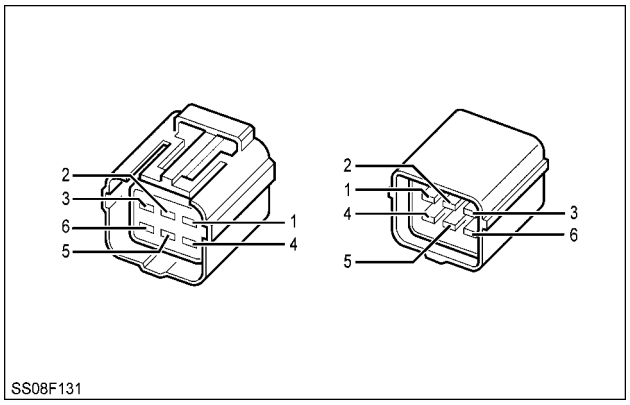
X707 SOLENOIDS CONNECTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3163 (O)	AUTO GUIDANCE STEERING SOLENOID VLV R FEED
2	3164 (O)	AUTO GUIDANCE STEERING SOLENOID VLV R RETURN
3	3165 (O)	AUTO GUIDANCE STEERING SOLENOID VLV L FEED
4	3166 (O)	AUTO GUIDANCE STEERING SOLENOID VLV L RETURN
5	3168 (O)	AUTO GUIDANCE DUMP SOLENOID FEED (HSD)
6	3169 (O)	AUTO GUIDANCE DUMP SOLENOID RETURN (CURSEN)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K415 11



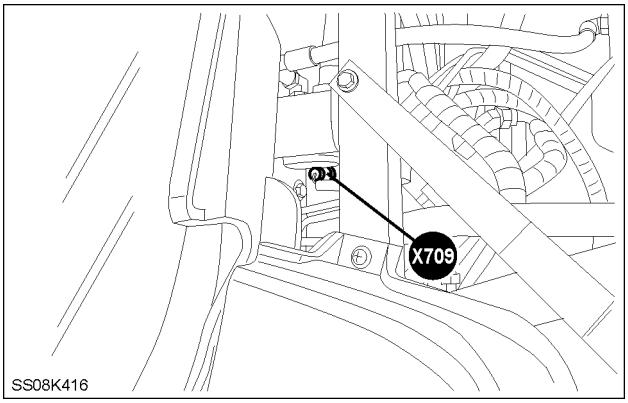
SS08F131 12

LEFT HAND ENGINE

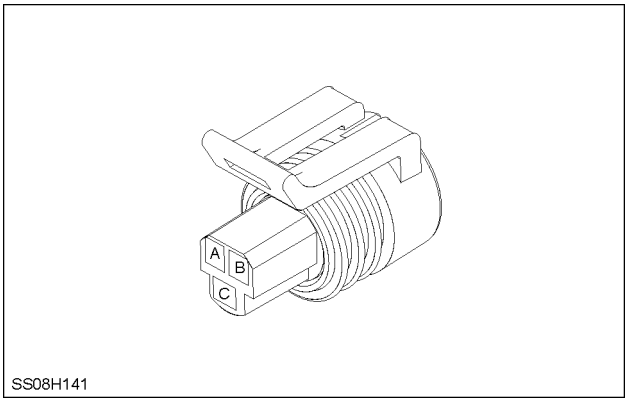
X709 STEERING PRESSURE SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	3161 (O)	AUTO GUIDANCE STEERING PRESS SENSOR RETURN
B	3167 (O)	AUTO GUIDANCE STEERING PRESS SNSR +5V REF
C	3160 (O)	AUTO GUIDANCE STEERING PRESS SENSOR SIGNAL

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K416 13



SS08H141 14

REAR TOP OF ENGINE

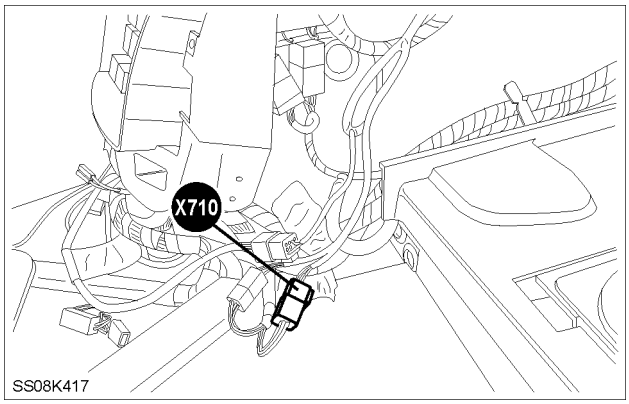
Connector - Component diagram 71

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

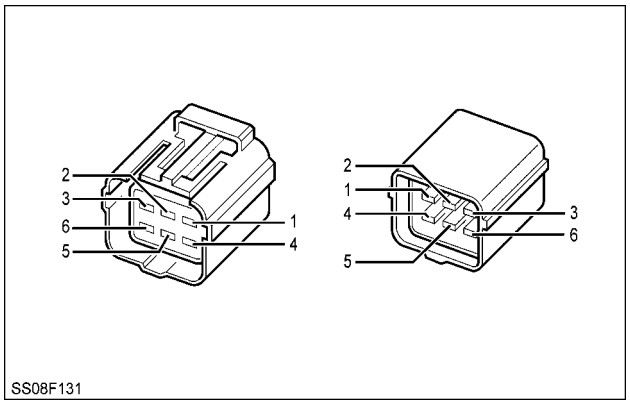
X710 AUTO GUIDANCE SOLENOIDS

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3169 (O)	AUTO GUIDANCE DUMP SOLENOID RETURN (CURSEN)
2	3168 (O)	AUTO GUIDANCE DUMP SOLENOID FEED (HSD)
3	3163A (O) / 3163 (O)	AUTO GUIDANCE STEERING SOLENOID VLV R FEED
4	3164 (O)	AUTO GUIDANCE STEERING SOLENOID VLV R RETURN
5	3165A (O) / 3165 (O)	AUTO GUIDANCE STEERING SOLENOID VLV L FEED
6	3166 (O)	AUTO GUIDANCE STEERING SOLENOID VLV L RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K417 1



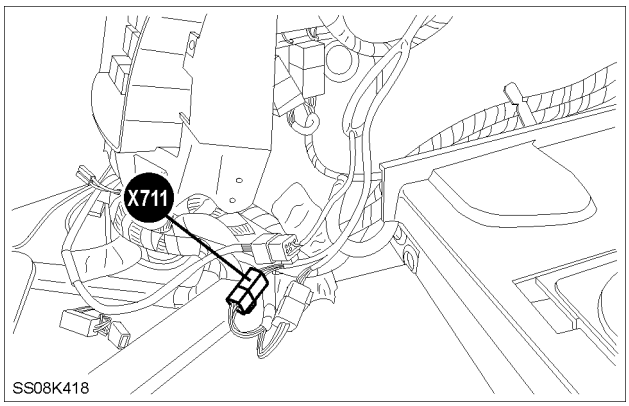
SS08F131 2

BEHIND RIGHT HAND TRIM

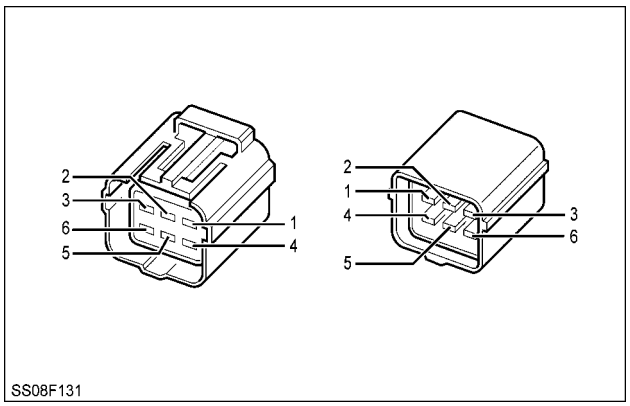
X711 AUTO GUIDANCE SENSORS

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3100 (G)	STEERING SENSOR +5V
2	3120 (K)	STEERING SENSOR SIGNAL
3	3140 (LTG)	STEERING SENSOR GROUND
4	3160 (O)	AUTO GUIDANCE STEERING PRESS SENSOR SIGNAL
5	3161 (O)	AUTO GUIDANCE STEERING PRESS SENSOR RETURN
6	3167 (O)	AUTO GUIDANCE STEERING PRESS SNSR +5V REF

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K418 3



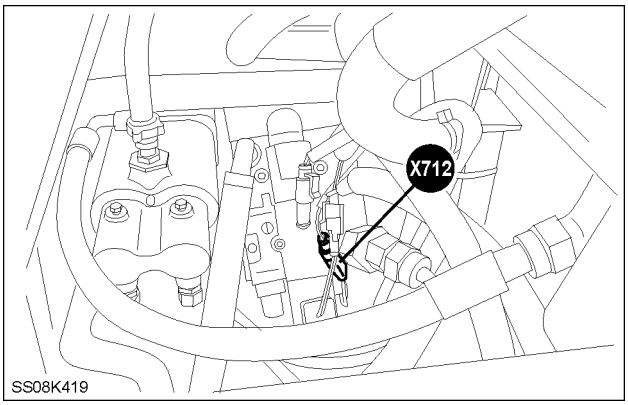
SS08F131 4

BEHIND RIGHT HAND TRIM

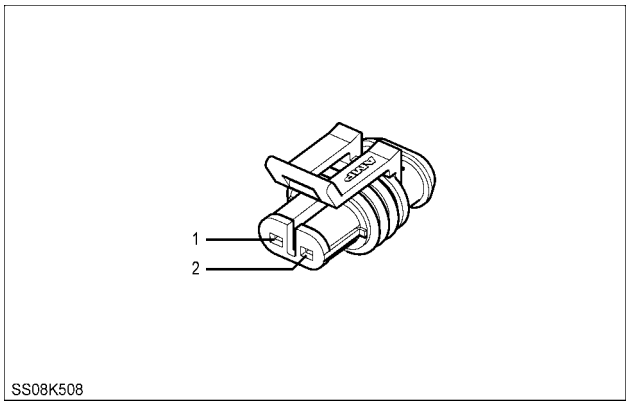
X712 AG DUMP SOLENOID

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3168 (O)	AUTO GUIDANCE DUMP SOLENOID FEED (HSD)
2	3169 (O)	AUTO GUIDANCE DUMP SOLENOID RETURN (CURSEN)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K419 5



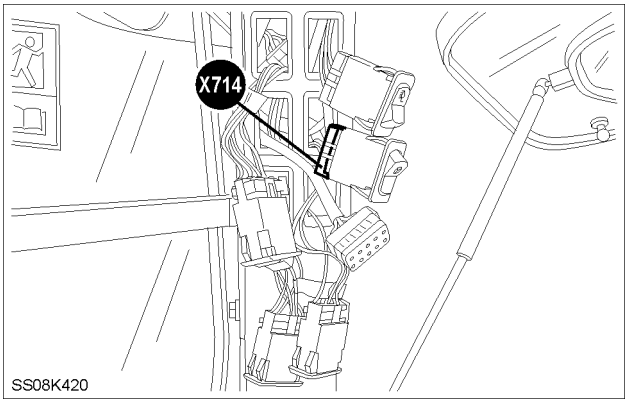
SS08K508 6

REAR TOP LEFT HAND ENGINE

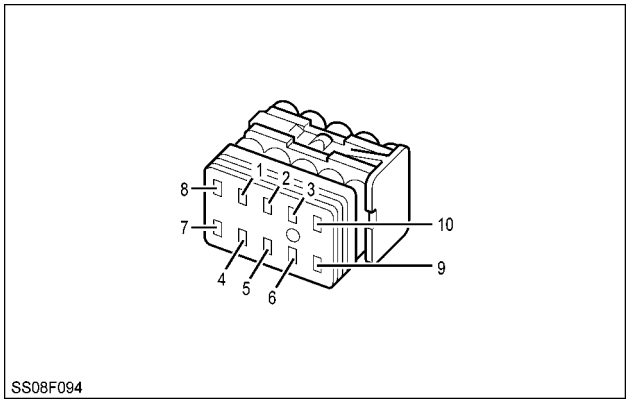
X714 AUTO GUIDANCE CONTROL SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	5200AK (N)	EDC VALVE SUPPLY
3	3185 (N)	AUTO GUIDANCE REMOTE ENGAGE
5	5200AL (N)	EDC VALVE SUPPLY
6	3187A (N)	AUTO GUIDANCE ROADING SELECT
7	57NB (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K420 7



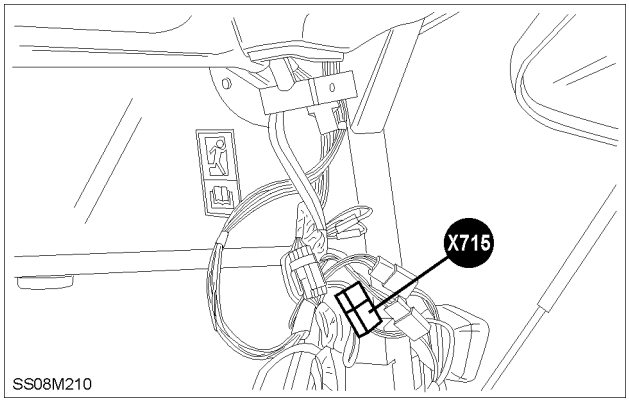
SS08F094 8

RIGHT HAND C-PILLAR

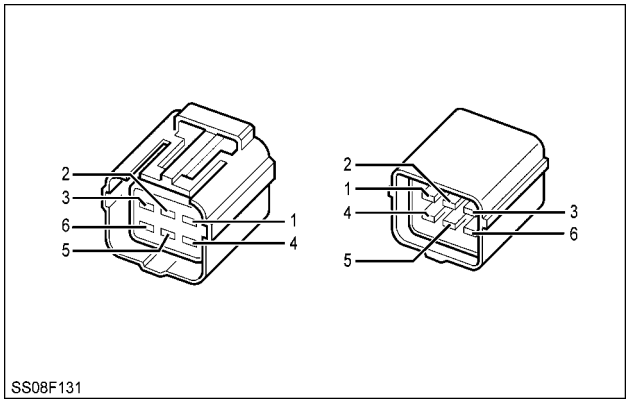
X715 ROOF CONNECTOR DATA 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5500T (R) / 5500R (R)	EHR CAN HIGH
2	5510T (U) / 5510R (U)	EHR CAN LOW
5	7655G (Y)	RS232 GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M210 9



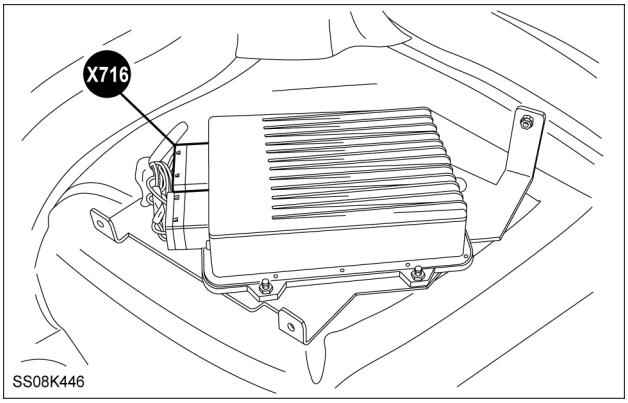
SS08F131 10

BEHIND RIGHT HAND C-PILLAR COVER TOP

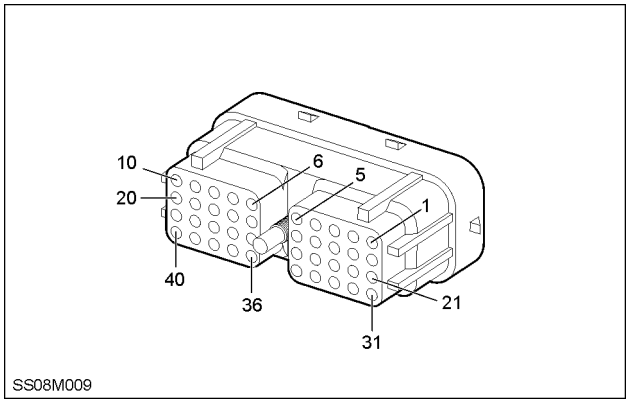
X716 CERES CONTROLLER A

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57NC (B)	EARTH (ALL)
2	7640G (TN)	DIAGNOSTIC PLUG RS232 IN
3	5500P (R)	EHR CAN HIGH
6	3185 (N)	AUTO GUIDANCE REMOTE ENGAGE
9	3140 (LTG)	STEERING SENSOR GROUND
10	3163 (O)	AUTO GUIDANCE STEERING SOLENOID VLV R FEED
11	5200AJ (N)	EDC VALVE SUPPLY
12	7655G (Y)	RS232 GROUND
13	5510P (U)	EHR CAN LOW
18	3120 (K)	STEERING SENSOR SIGNAL
19	3160 (O)	AUTO GUIDANCE STEERING PRESS SENSOR SIGNAL
20	3165 (O)	AUTO GUIDANCE STEERING SOLENOID VLV L FEED
21	3186 (S)	CERES PPS IN
29	3167 (O)	AUTO GUIDANCE STEERING PRESS SNSR +5V REF
30	3164 (O)	AUTO GUIDANCE STEERING SOLENOID VLV R RETURN
31	7650G (W)	DIAGNOSTIC PLUG RS232 OUT
38	3100 (G)	STEERING SENSOR +5V
39	3161 (O)	AUTO GUIDANCE STEERING PRESS SENSOR RETURN
40	3166 (O)	AUTO GUIDANCE STEERING SOLENOID VLV L RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K446 11



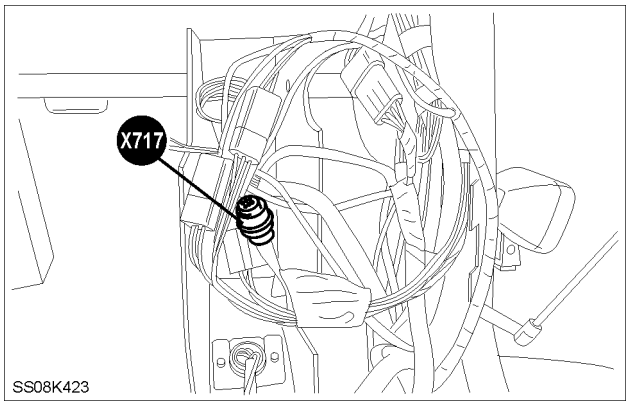
SS08M009 12

REAR LEFT HAND CAB BENEATH STORAGE TRAY

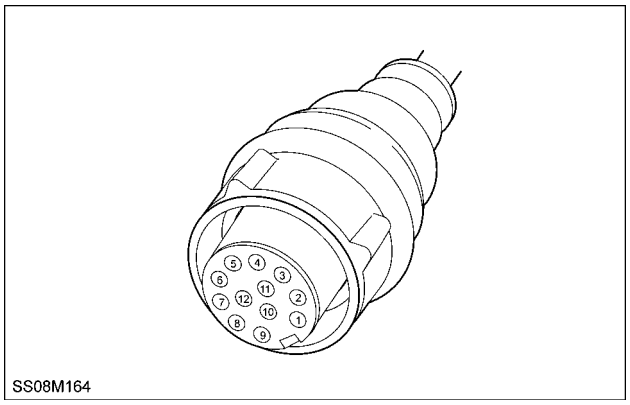
X717 DATA LOGGER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	7640D (N)	DIAGNOSTIC PLUG RS232 IN
3	7650 (W)	DIAGNOSTIC PLUG RS232 OUT
5	7655D (Y)	RS232 GROUND
10	3181 (S)	AUTO GUIDANCE PPS SIGNAL INPUT TO GPS
11	57NE (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K423 13



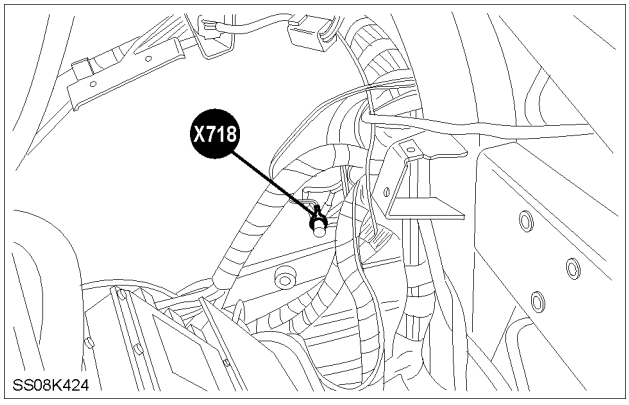
SS08M164 14

BEHIND RIGHT HAND C-PILLAR COVER

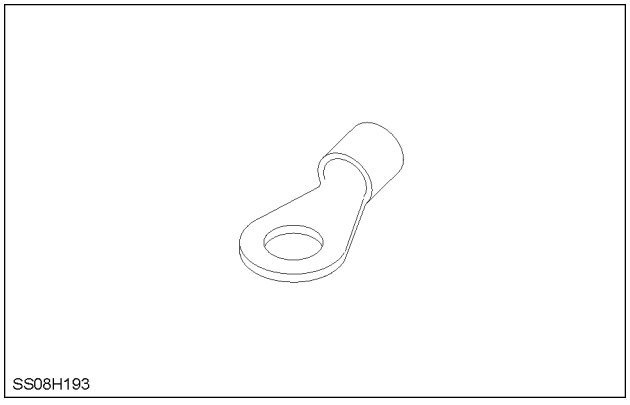
X718 EARTH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57NC; 57NL (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K424 15



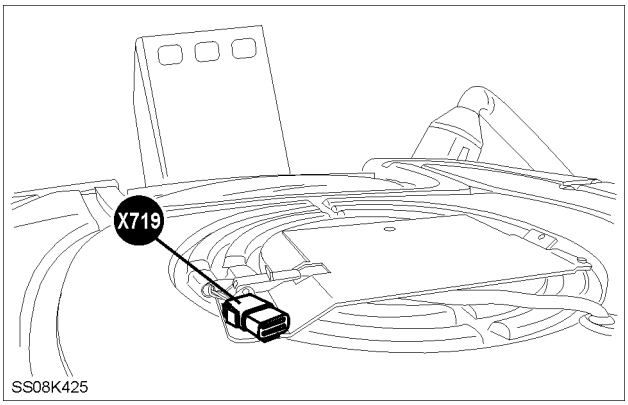
SS08H193 16

BEHIND REAR RIGHT HAND TRIM

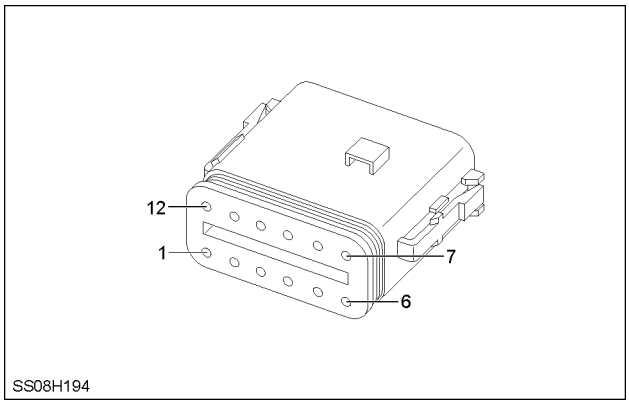
X719 GPS RECEIVER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5500AC (R)	EHR CAN HIGH
2	7640G (TN)	DIAGNOSTIC PLUG RS232 IN
3	7650G (W)	DIAGNOSTIC PLUG RS232 OUT
4	3186 (S)	CERES PPS IN
5	7655G (Y)	RS232 GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K425 17



SS08H194 18

TOP CAB ROOF

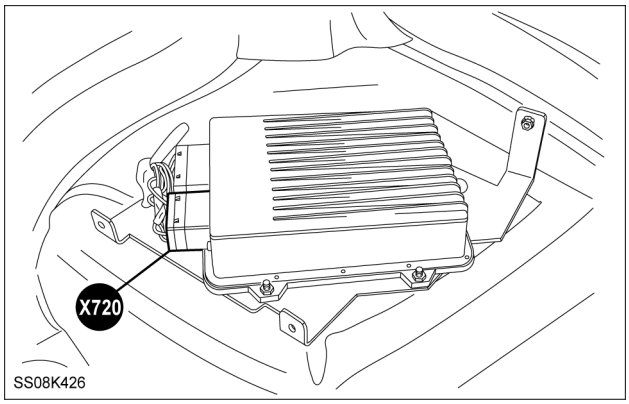
Connector - Component diagram 72

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

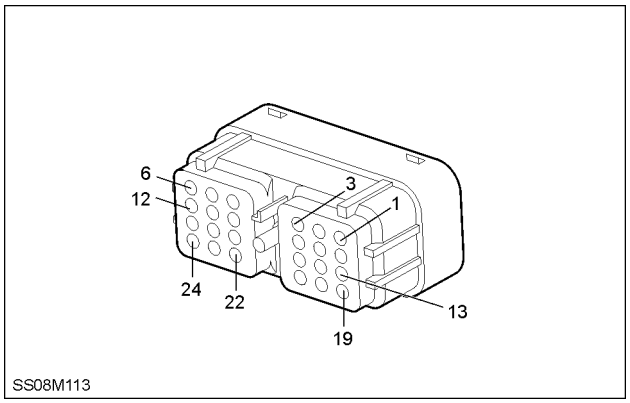
X720 CERES CONTROLLER B

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57NE (B)	EARTH (ALL)
2	7650D (W)	DIAGNOSTIC PLUG RS232 OUT
3	3187 (N)	AUTO GUIDANCE ROADING SELECT
7	3181 (S)	AUTO GUIDANCE PPS SIGNAL INPUT TO GPS
8	7640D (TN)	DIAGNOSTIC PLUG RS232 IN
14	7655D (Y)	RS232 GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K426 1



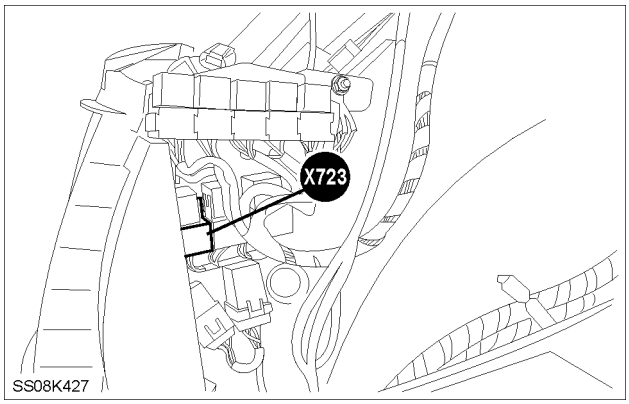
SS08M113 2

REAR LEFT HAND CAB BENEATH STORAGE TRAY

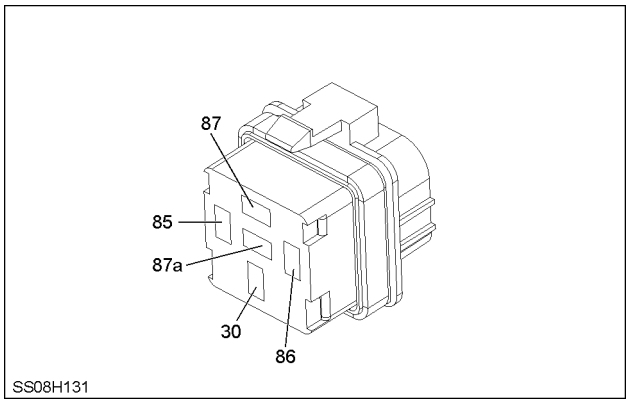
X723 RELAY BASE CRANK ISOLATE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
30	5200AB (N)	EDC VALVE SUPPLY
85	57NH (B)	EARTH (ALL)
86	1001AC (W)	STARTER SOLENOID FEED
87A	5200AG (N)	EDC VALVE SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K427 3



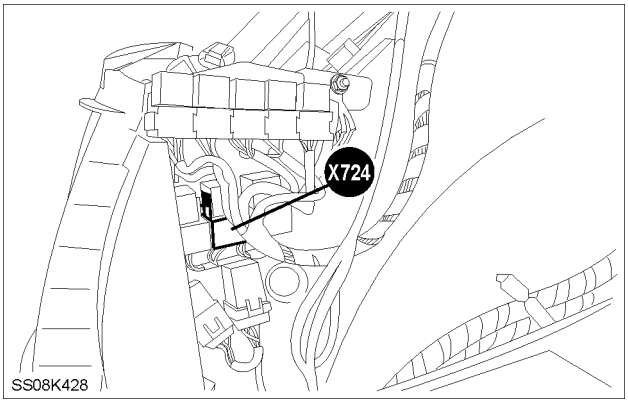
SS08H131 4

BEHIND RIGHT HAND TRIM

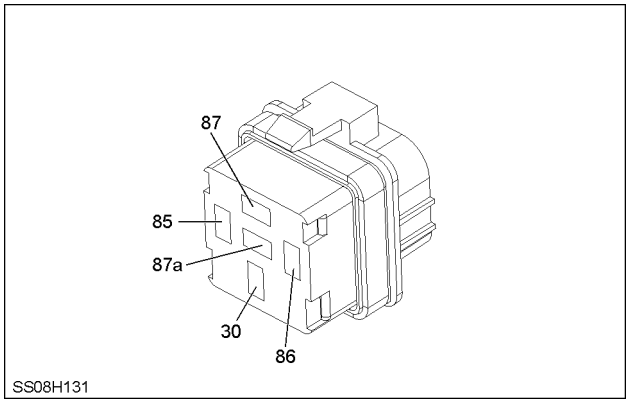
X724 RELAY BASE SOL VALVE B

POS.	WIRE NUMBER	CIRCUIT REFERENCE
30	3163A (O)	AUTO GUIDANCE STEERING SOLENOID VLV R FEED
85	57NJ (B)	EARTH (ALL)
86	3187B (N)	AUTO GUIDANCE ROADING SELECT
87	3163 (O)	AUTO GUIDANCE STEERING SOLENOID VLV R FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K428 5



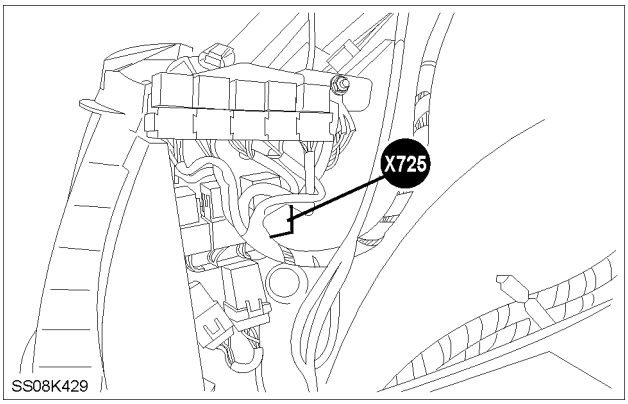
SS08H131 6

BEHIND RIGHT HAND TRIM

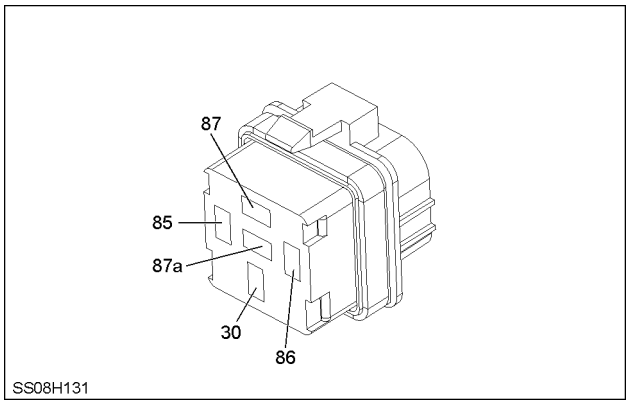
X725 RELAY BASE SOL VALVE A

POS.	WIRE NUMBER	CIRCUIT REFERENCE
30	3165A (O)	AUTO GUIDANCE STEERING SOLENOID VLV L FEED
85	57NK (B)	EARTH (ALL)
86	3187C (N)	AUTO GUIDANCE ROADING SELECT
87	3165 (O)	AUTO GUIDANCE STEERING SOLENOID VLV L FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K429 7



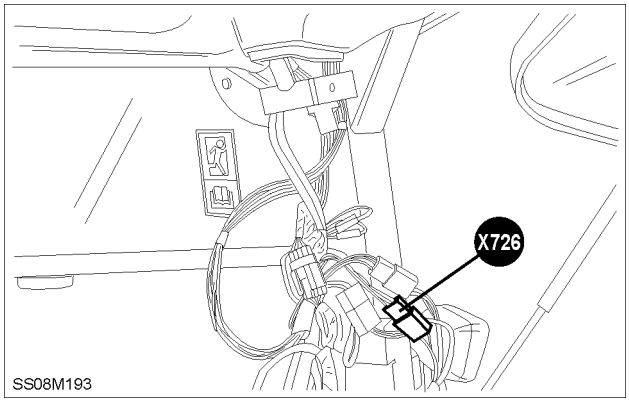
SS08H131 8

BEHIND RIGHT HAND TRIM

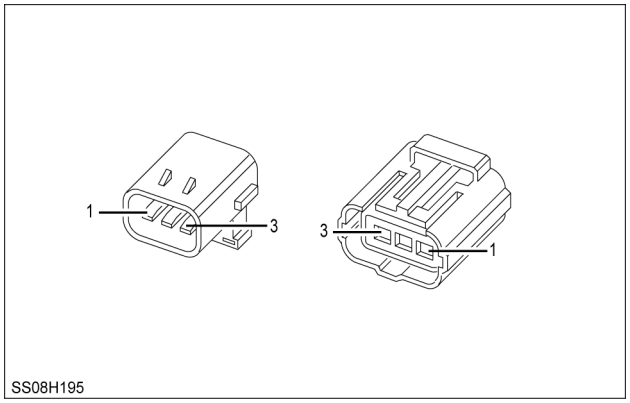
X726 ROOF CONNECTOR POWER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5200AH (N)	EDC VALVE SUPPLY
2	3186 (S)	CERES PPS IN
3	57NA (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M193 9



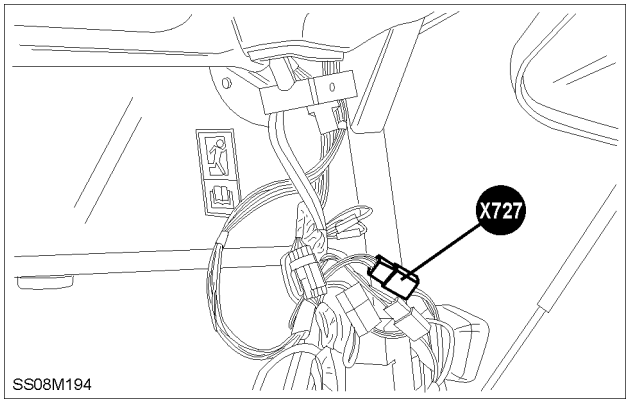
SS08H195 10

BEHIND RIGHT HAND C-PILLAR COVER

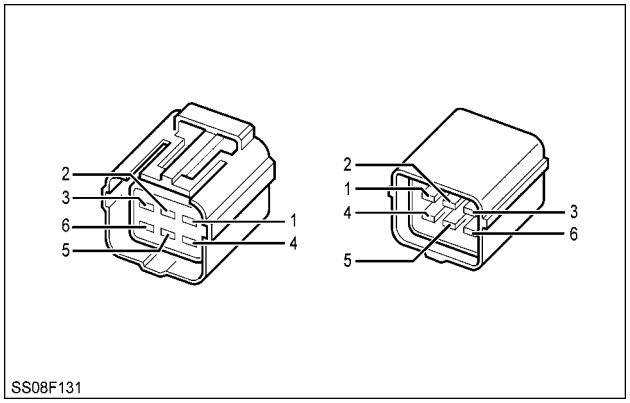
X727 ROOF CONNECTOR DATA 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5500AB (R)	EHR CAN HIGH
2	5510AB (U)	EHR CAN LOW
5	7640G (TN)	DIAGNOSTIC PLUG RS232 IN
6	7650G (W)	DIAGNOSTIC PLUG RS232 OUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M194 11



SS08F131 12

BEHIND RIGHT HAND C-PILLAR COVER

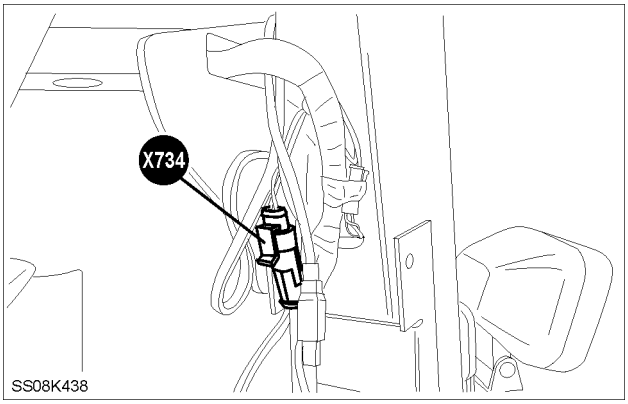
Connector - Component diagram 73

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

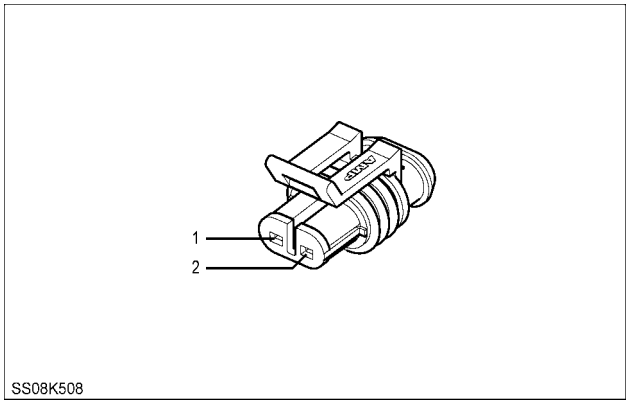
X734 LAMP FEED

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1012L (R)	ILLUMINATION
2	57PW (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K438 1



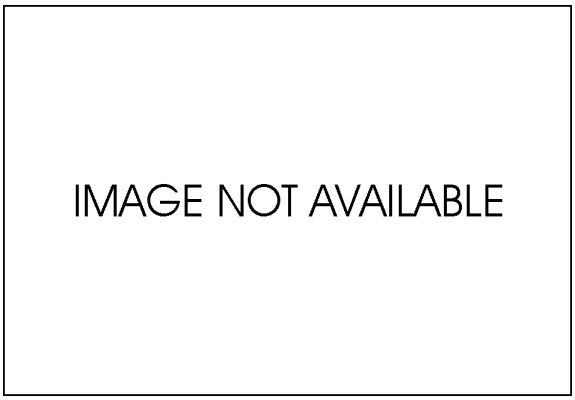
SS08K508 2

BEHIND RIGHT HAND C-PILLAR COVER

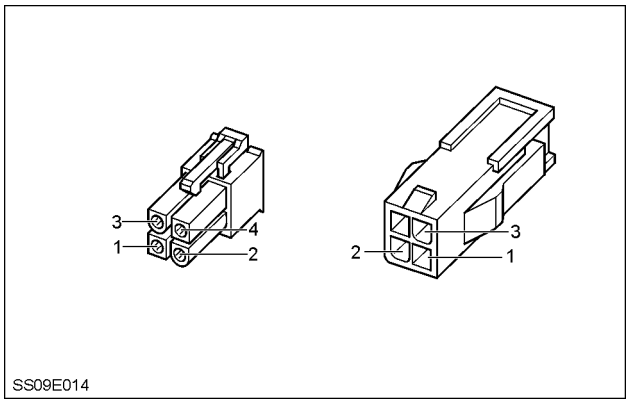
X736 USB INTERFACE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5962 (R)	USB + 5V REF.
2	5964 (W)	USB DATA -
3	5966 (G)	USB DATA +
4	5968 (B)	USB GROUND

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 3

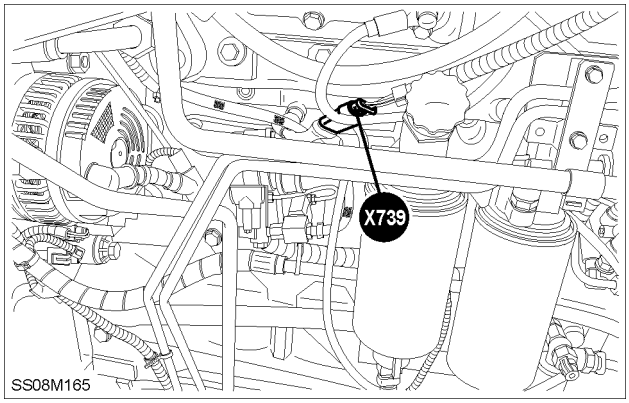


SS09E014 4

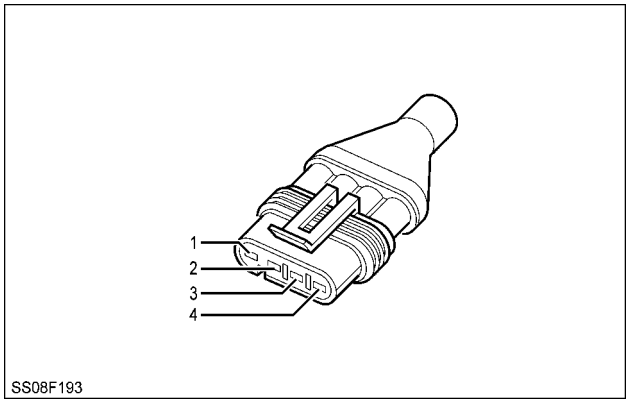
X739 REVERSIBLE FAN COMPRESSOR / VALVE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	6327A (N)	REVERSIBLE FAN RELAY POWER OUT
2	57SD (B)	EARTH (ALL)
3	6327B (N)	REVERSIBLE FAN RELAY POWER OUT
4	57SC (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M165 5



SS08F193 6

LEFT HAND ENGINE

Connector - Component diagram 74

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

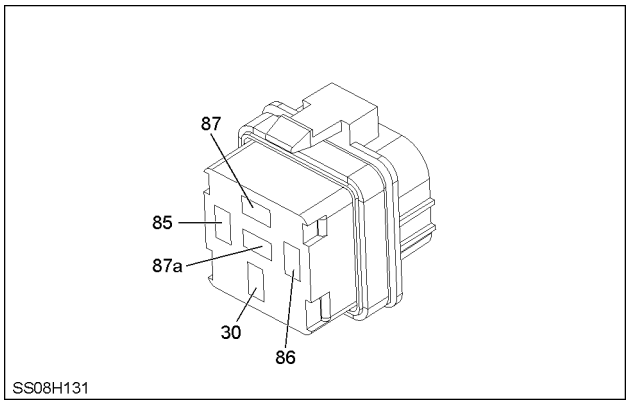
X740 REVERSIBLE FAN RELAY

POS.	WIRE NUMBER	CIRCUIT REFERENCE
30	6325A (R)	REVERSIBLE FAN OPTION - RELAY FEED
85	6325B (N)	REVERSIBLE FAN OPTION - RELAY FEED
86	6315 (G)	REVERSIBLE FAN OPTION - RELAY CONTROL
87	6327 (R)	REVERSIBLE FAN RELAY POWER OUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*

IMAGE NOT AVAILABLE

INA 1



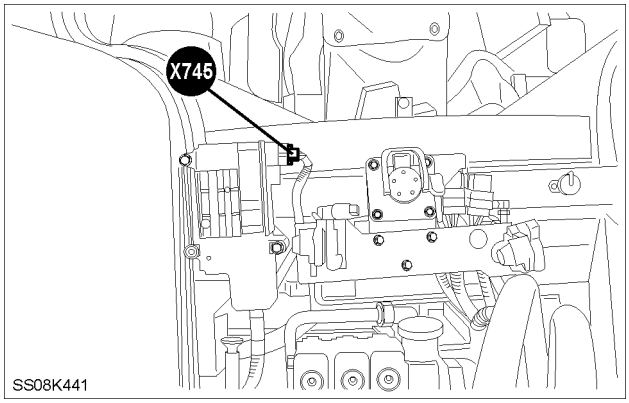
SS08H131 2

LEFT HAND ENGINE

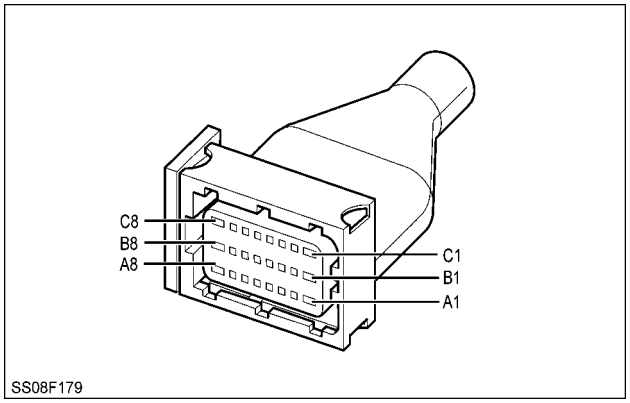
X745 ELECTRONIC PARK BRAKE INTERFACE CONN

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A1	3031 (N)	EPB +12 HOT
A2	3150A (W)	HANDBRAKE SWITCH (N.C CONTACT) OFF SIG
A4	3036 (O)	EPB SHUTTLE PARK SWITCH INPUT
A7	3017 (G)	EPB SYSTEM FAILURE WARNING LIGHT
A8	57RK (B)	EARTH (ALL)
B3	3150 (W)	HANDBRAKE SWITCH (N.C CONTACT) OFF SIG
B4	1001AG (W)	STARTER SOLENOID FEED
C1	10X (G)	IGNITION SUPPLY
C2	5400NC (Y)	CAN H
C3	5420NC (G)	CAN L
C7	3039 (U)	EPB SHUTTLE PARK SWITCH OUTPUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K441 3



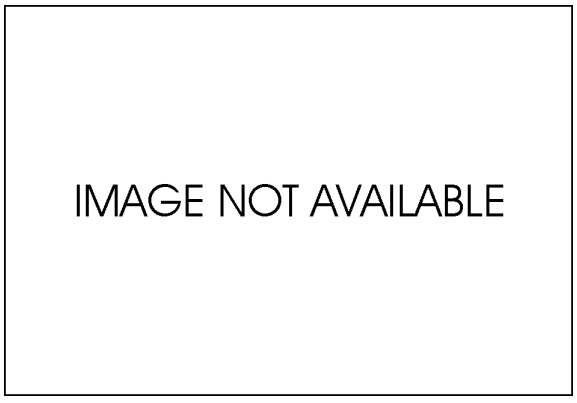
SS08F179 4

REAR LEFT HAND CAB

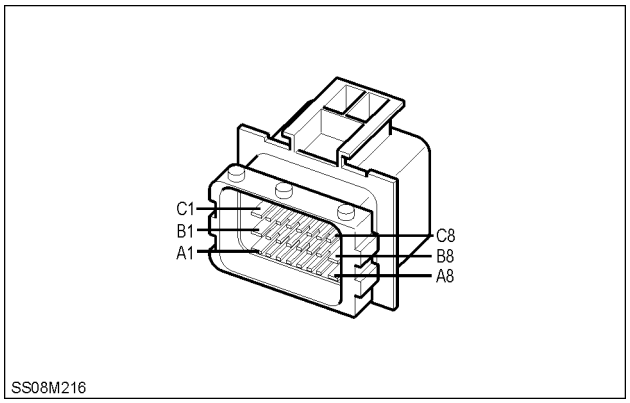
X745 ELECTRONIC PARK BRAKE LESS EPL OPTION

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A1	3031A (U)	EPB +12 HOT
A2	3150A (W)	HANDBRAKE SWITCH (N.C CONTACT) OFF SIG
B3	3150B (W)	HANDBRAKE SWITCH (N.C CONTACT) OFF SIG

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 5



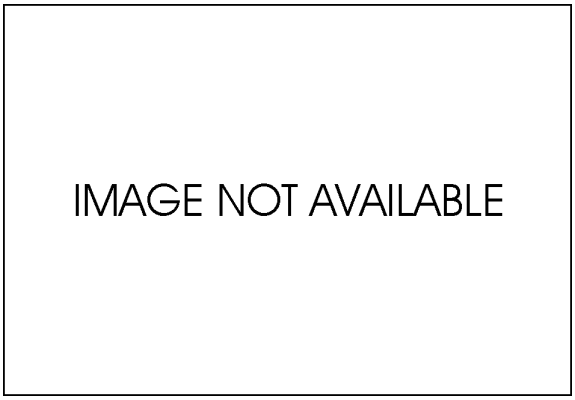
SS08M216 6

REAR LEFT HAND CAB

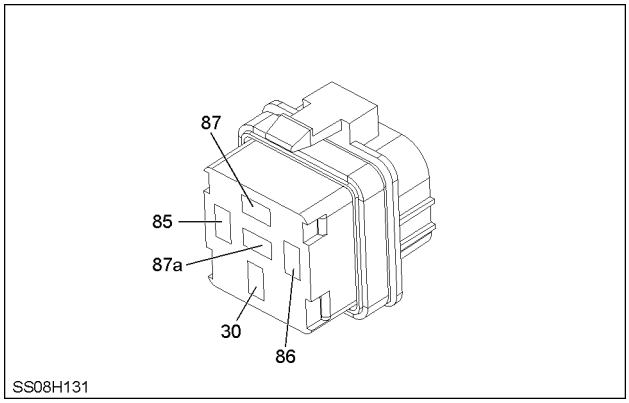
X746 RELAY - LESS ELECTRONIC PARK BRAKE

POS.	WIRE NUMBER	CIRCUIT REFERENCE
30	3031B (U)	EPB +12 HOT
85	3031C (U)	EPB +12 HOT
86	3150B (W)	HANDBRAKE SWITCH (N.C CONTACT) OFF SIG
87	3150A (W)	HANDBRAKE SWITCH (N.C CONTACT) OFF SIG

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 7



SS08H131 8

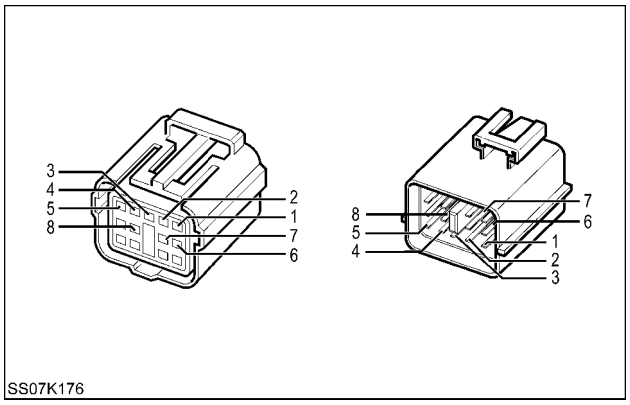
X748 ELECTRIC SHIFT PTO

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2050AW (G) / 2050AW (B)	PTO SUPPLY / DOG SUPPLY
2	5020Z (TN) / 5020AB (TN)	EDC PROC +5V REF VOLTAGE DROP POSN/RATE
3	2151 (K)	EPTO DRIVE RELAY UPPER SPEED
4	2152 (K)	ESPTO DRIVE RELAY LOWER SPEED
5	2155 (N)	ESPTO ACTUATOR POWER +12V
6	60BY (B/W)	SENSOR GROUND
7	2156 (N)	ESPTO ACTUATOR POS SIGNAL
8	2157 (U) / 2157 (N)	ESPTO NEUTRAL
9	2158 (U)	ESPTO LOWER SPEED
10	2159 (U)	PTO UPPER SPEED
11	2153 (R)	ESPTO ACTUATOR UPPER SPEED
12	2154 (N)	ESPTO ACTUATOR LOWER SPEED
13	3155A (N)	HANDBRAKE TRANS INTERLOCK

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*

IMAGE NOT AVAILABLE

INA 9



SS07K176 10

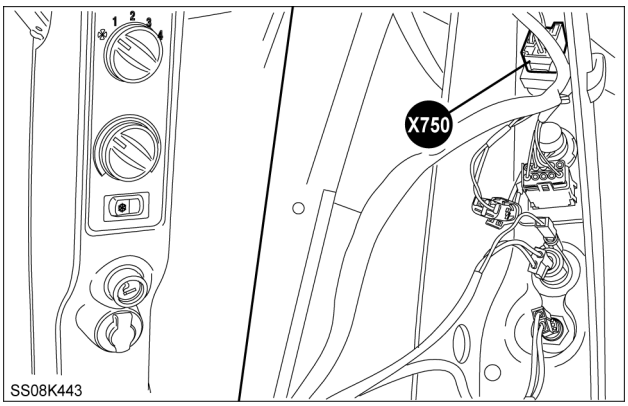
Connector - Component diagram 75

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

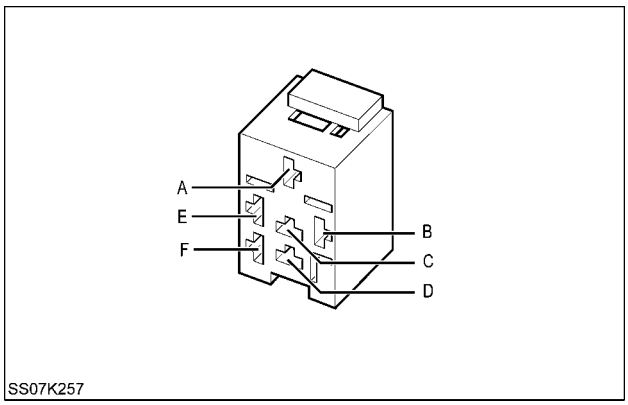
X750 HEATER BLOWER SPEED SWITCH H.V.A.C. ATC

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	9228 (G)	AC-AUTOMATIC BLOWER SPEED
B	9211 (G)	AC-BLOWER SPEED LOW (1)
C	9212 (K)	AC-BLOWER SPEED MED.1 (2)
D	9213 (K)	AC-BLOWER SPEED MED.2 (3)
E	9227 (P)	AC-BLOWER SWITCH SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K443 1



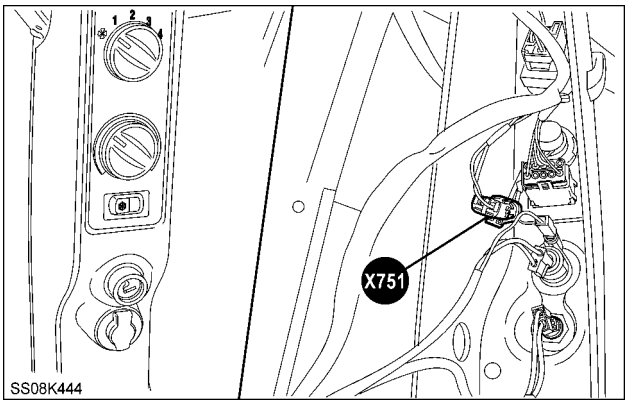
SS07K257 2

CAB LEFT HAND C-PILLAR

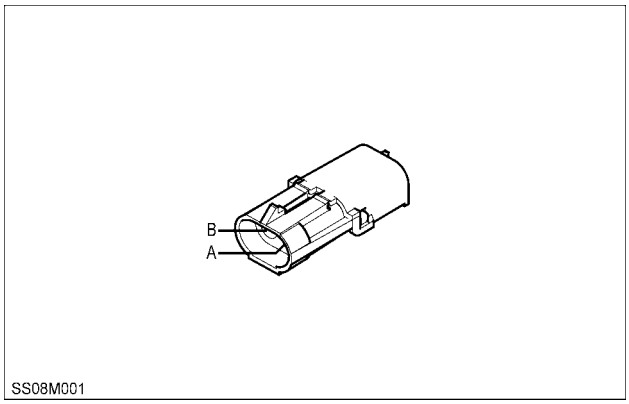
X751 POTENTIOMETER TEMPERATURE ADJUSTMENT H.V.A.C ATC

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	9216 (LTG)	AC-TEMPERATURE POTI CAB
B	57ZN (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K444 3



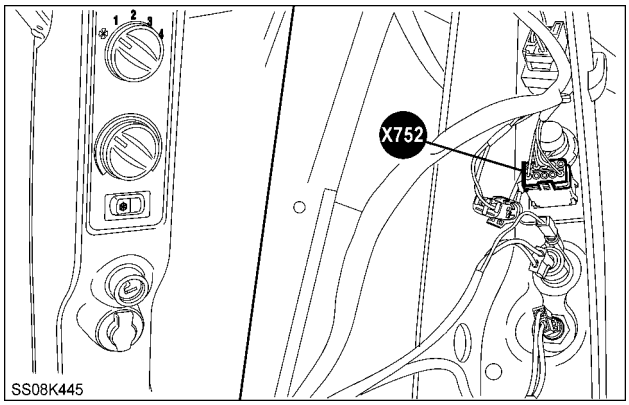
SS08M001 4

CAB LEFT HAND C-PILLAR

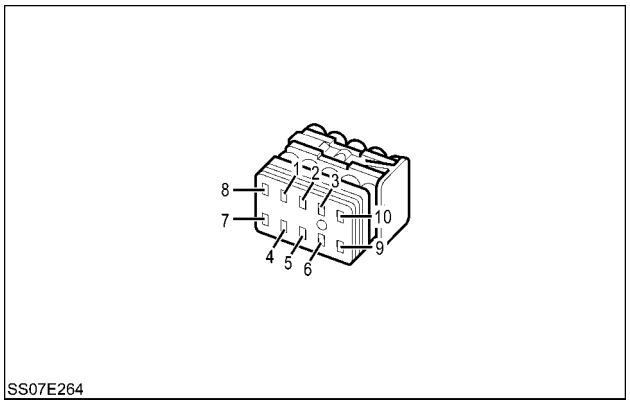
X752 AIR CONDITION MODE SWITCH H.V.A.C ATC

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	9217A (N)	AC-SWITCH MAX DEFROST
2	982L (R)	BLOWER MOTOR FEED
3	9218A (S)	AC-SWITCH ECONOMY
7	57ZM (B)	EARTH (ALL)
9	57ZL (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K445 5



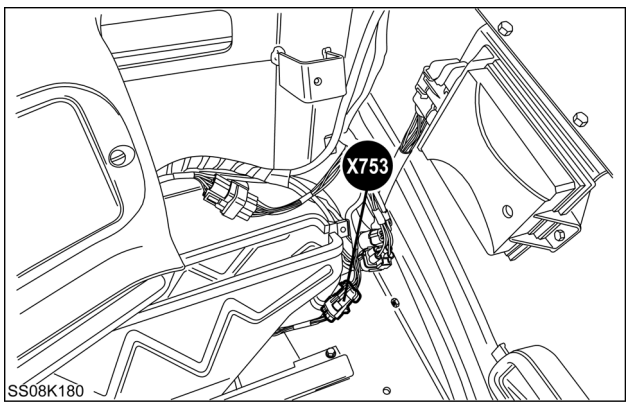
SS07E264 6

CAB LEFT HAND C-PILLAR

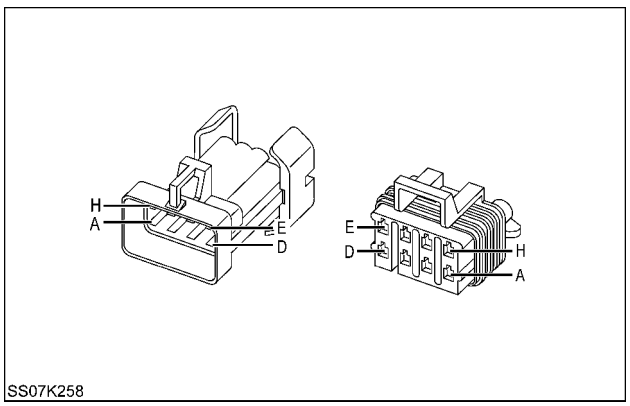
X753 ASSEMBLY H.V.A.C ATC

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	9222 (Y)	AC-SIGNAL OUTLET TEMPERATURE SENSOR
B	9221 (P)	AC-EVAPORATOR TEMPERATURE SENSOR
C	9220 (U)	AC-LOW PRESSURE SWITCH INPUT
D	57ZH (B)	EARTH (ALL)
E	982D (R)	BLOWER MOTOR FEED
F	9226 (Y)	AC-SIGNAL WATER VALVE
G	9219 (U)	AC-LOW PRESSURE SWITCH OUTPUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K180 7



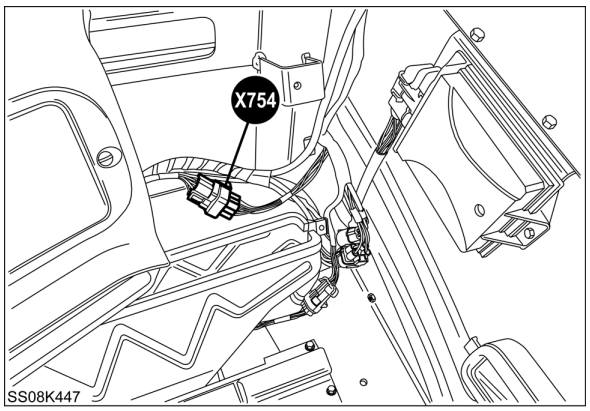
SS07K258 8

CAB REAR LEFT HAND

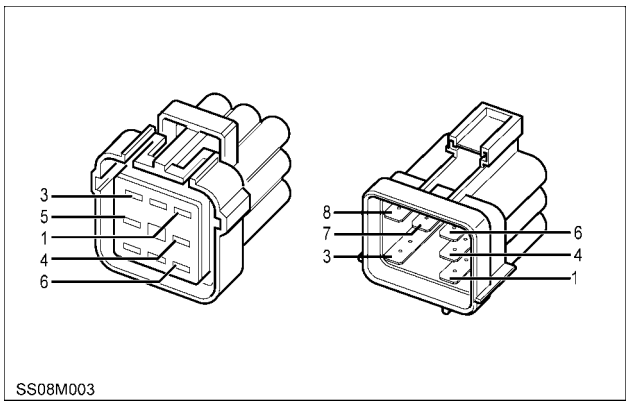
X754 BLOWER MOTOR ASSEMBLY H.V.A.C ATC

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	982F (R)	BLOWER MOTOR FEED
3	57ZD (B)	EARTH (ALL)
4	9225 (U)	AC-BLOWER SPEED
6	9224 (O)	AC-SIGNAL AMBIENT TEMPERATURE SENSOR
7	9223 (R)	AC-SIGNAL CAB TEMPERATURE SENSOR
8	57ZC (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K447 9



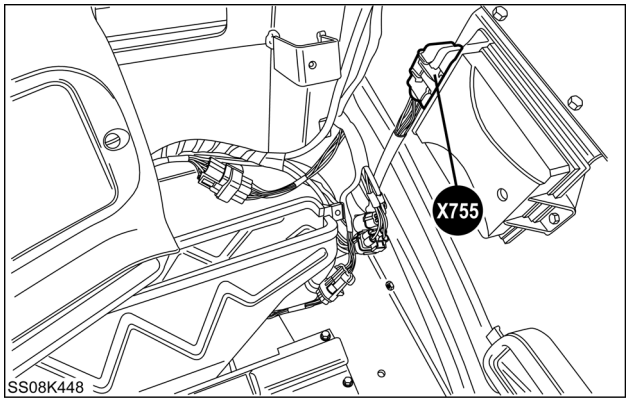
SS08M003 10

CAB REAR LEFT HAND

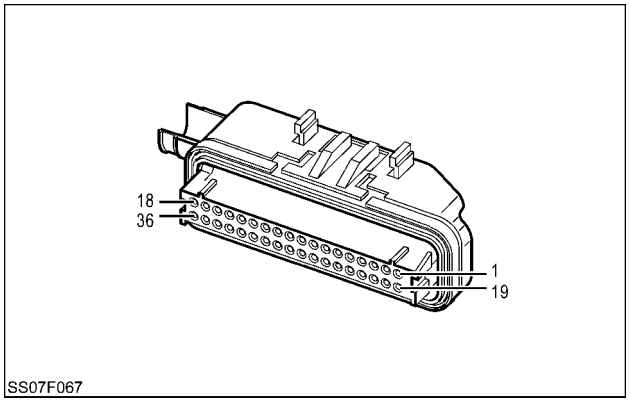
X755 AUTOMATIC TEMPERATURE CONTROL H.V.A.C

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5420Z (G)	CAN L
2	5400Z (Y)	CAN H
3	9226 (Y)	AC-SIGNAL WATER VALVE
4	982G (W)	BLOWER MOTOR FEED
5	9225 (U)	AC-BLOWER SPEED
6	982H (R)	BLOWER MOTOR FEED
15	2005 (P)	AIR CON CLUCH RELAY
16	9229 (O)	AC-DE-FOG
17	982J (R)	BLOWER MOTOR FEED
18	57ZE (B)	EARTH (ALL)
21	9223 (R)	AC-SIGNAL CAB TEMPERATURE SENSOR
22	9222 (Y)	AC-SIGNAL OUTLET TEMPERATURE SENSOR
23	9221 (P)	AC-EVAPORATOR TEMPERATURE SENSOR
24	9224 (O)	AC-SIGNAL AMBIENT TEMPERATURE SENSOR
25	9217 (N)	AC-SWITCH MAX DEFROST
26	9218 (S)	AC-SWITCH ECONOMY
27	9228 (G)	AC-AUTOMATIC BLOWER SPEED
28	9211 (G)	AC-BLOWER SPEED LOW (1)
29	9216 (LTG)	AC-TEMPERATURE POTI CAB
30	9212 (K)	AC-BLOWER SPEED MED.1 (2)
31	9213 (K)	AC-BLOWER SPEED MED.2 (3)
33	2006A (U)	DE-ICING SWITCH - AIR CONDITIONER
34	2006 (U)	DE-ICING SWITCH - AIR CONDITIONER
35	9220 (U)	AC-LOW PRESSURE SWITCH INPUT
36	9219 (U)	AC-LOW PRESSURE SWITCH OUTPUT

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K448 11



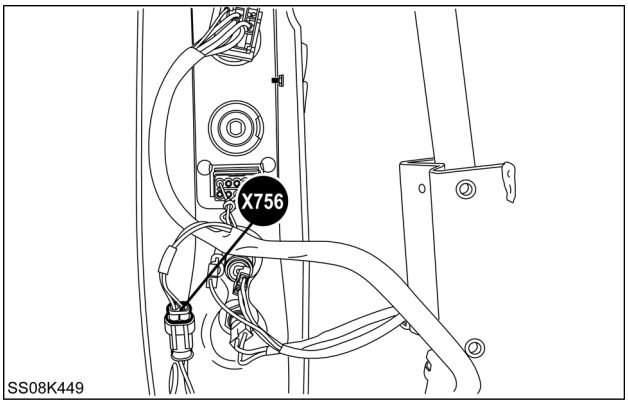
SS07F067 12

CAB REAR LEFT HAND

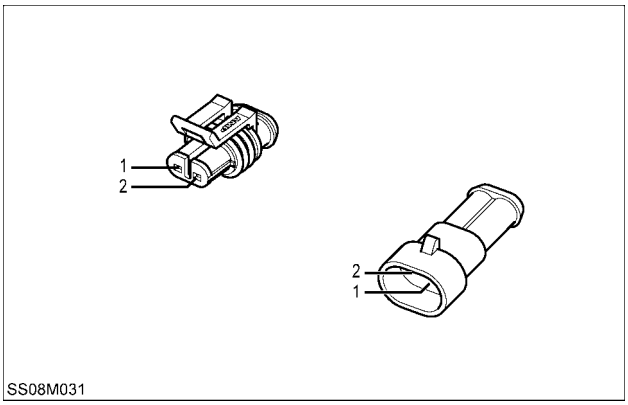
X756 LOW PRESSURE SWITCH H.V.A.C SYSTEM MANUAL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	9215 (U) / (U/K)	AC-SWITCH ON
2	2006A (U) / (U/R)	DE-ICING SWITCH - AIR CONDITIONER

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K449 13



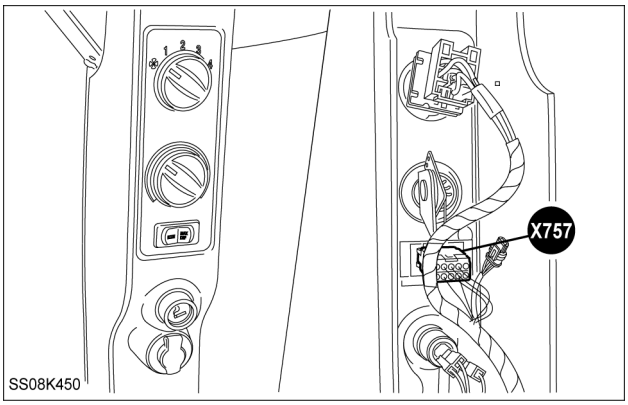
SS08M031 14

CAB LEFT HAND C-PILLAR

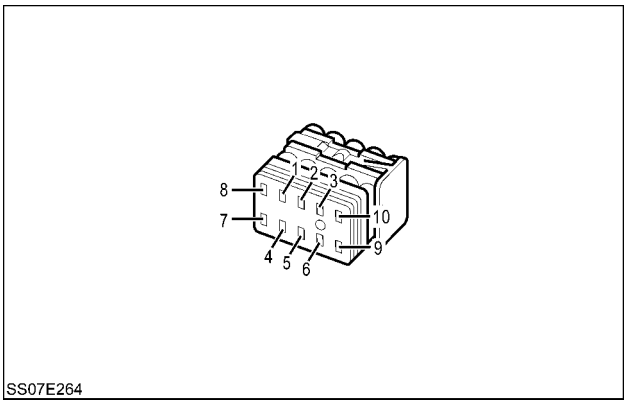
X757 OPERATING MODE SWITCH H.V.A.C SYSTEM MANUAL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	9210 (G)	AC-SWITCH POWER
3	9215 (U)	AC-SWITCH ON
7	57A (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K450 15



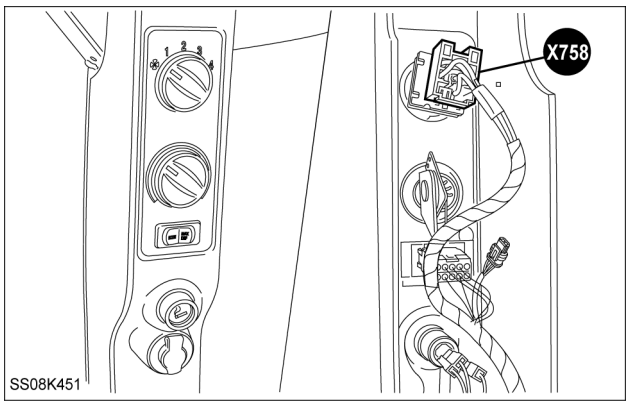
SS07E264 16

CAB LEFT HAND C-PILLAR

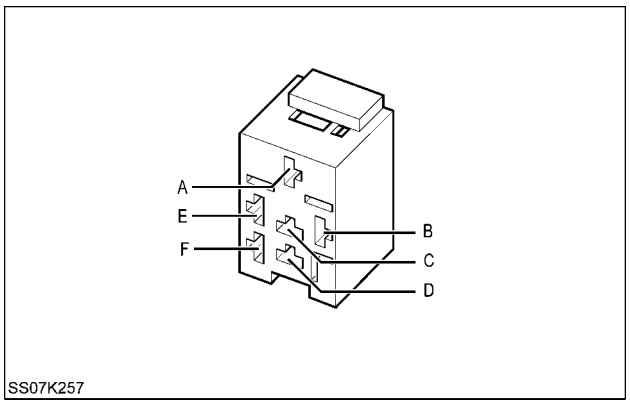
X758 BLOWER SPEED SWITCH H.V.A.C SYSTEM MANUAL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A	9211 (G)	AC-BLOWER SPEED LOW (1)
B	9212 (K)	AC-BLOWER SPEED MED.1 (2)
C	9213 (K)	AC-BLOWER SPEED MED.2 (3)
D	9214 (G)	AC-BLOWER SPEED HIGH.2 (2)
E	982A (R)	BLOWER MOTOR FEED
F	9210 (G)	AC-SWITCH POWER

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K451 17



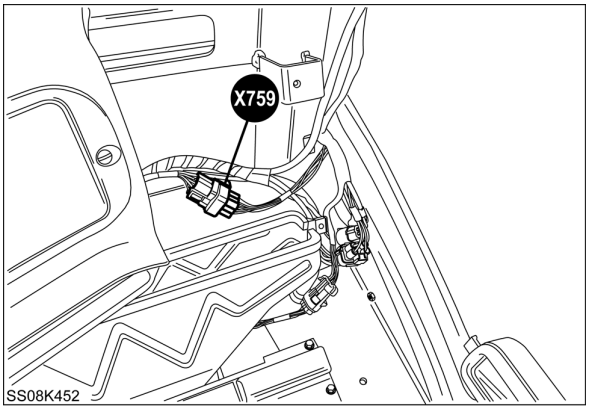
SS07K257 18

CAB LEFT HAND C-PILLAR

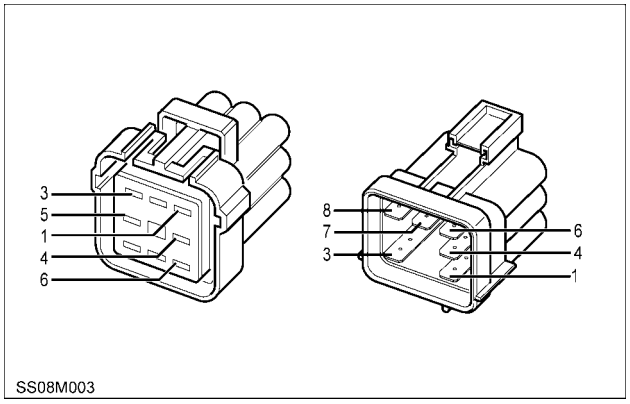
X759 BLOWER MOTOR H.V.A.C MANUAL SYSTEM

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57B (B)	EARTH (ALL)
3	9211 (G)	AC-BLOWER SPEED LOW (1)
4	9212 (K)	AC-BLOWER SPEED MED.1 (2)
5	9213 (K)	AC-BLOWER SPEED MED.2 (3)
8	9214 (G)	AC-BLOWER SPEED HIGH.2 (2)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K452 19



SS08M003 20

CAB REAR LEFT HAND

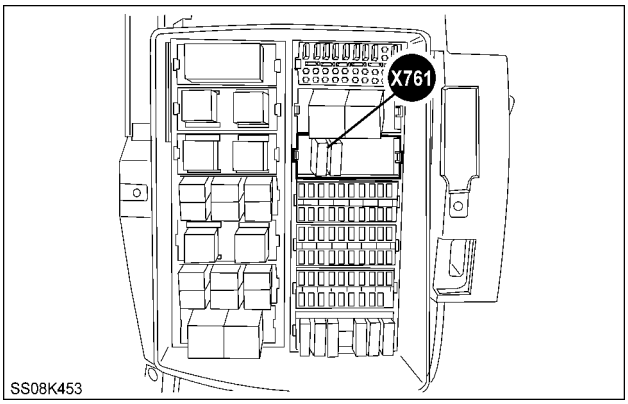
Connector - Component diagram 76

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

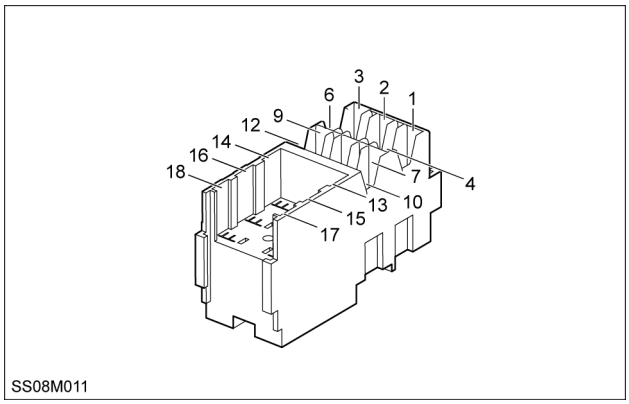
X761 MAXI FUSEHOLDER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
13	150BG (N)	BATTERY FEED (UNFUSED)(ALL)
14	150BJ (N)	BATTERY FEED (UNFUSED)(ALL)
15	150BH (N)	BATTERY FEED (UNFUSED)(ALL)
16	150BK (N)	BATTERY FEED (UNFUSED)(ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K453 1



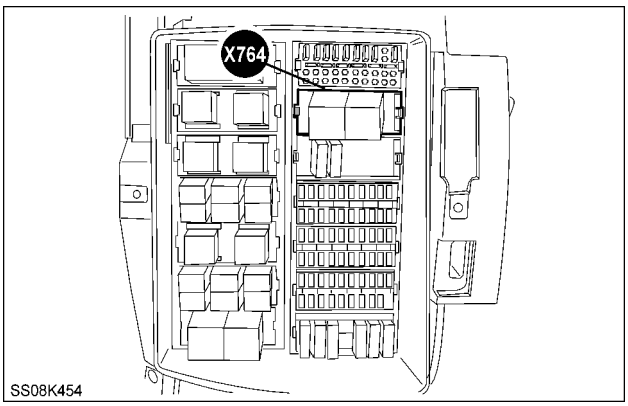
SS08M011 2

FRONT RIGHT HAND CAB

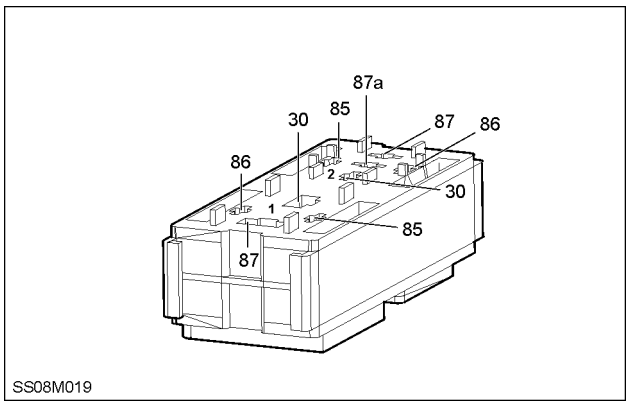
X764 FRONT SCREEN HEATER RELAY

POS.	WIRE NUMBER	CIRCUIT REFERENCE
A30	150BK (N)	BATTERY FEED (UNFUSED)(ALL)
A85	57RZ (B)	EARTH (ALL)
A86	1085 (N)	FRONT SCREEN HEATER RELAY CONTROL
A87	1082 (Y)	REAR SCREEN HEATER
B30	150BJ (N)	BATTERY FEED (UNFUSED)(ALL)
B85	57RY (B)	EARTH)ALL)
B86	1086 (N)	REAR SCREEN HEATER RELAY CONTROL
B87	1080 (R)	FRONT SCREEN HEATER

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K454 3



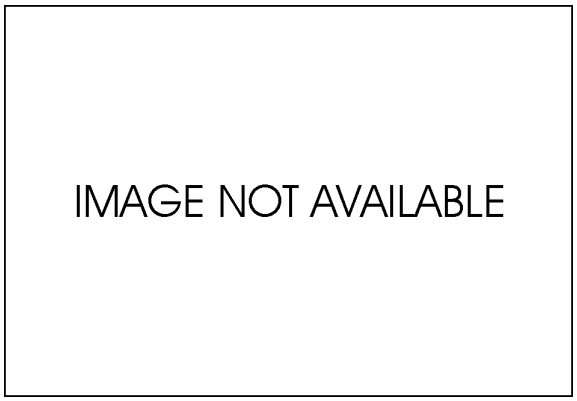
SS08M019 4

FRONT RIGHT HAND CAB

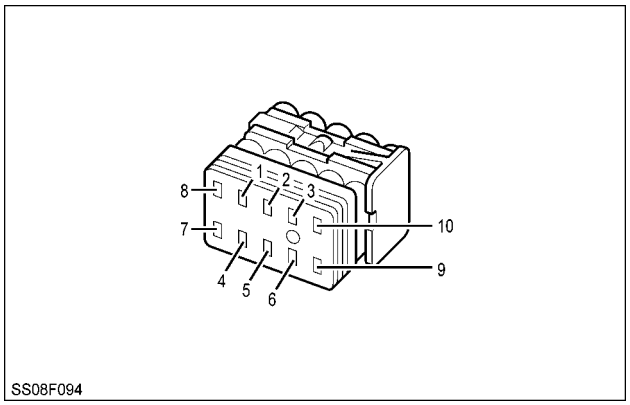
X766 SCREEN HEATER SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1085 (N)	FRONT SCREEN HEATER RELAY CONTROL
2	1006D (N)	ALTERNATOR WARNING LAMP
3	1086 (N)	REAR SCREEN HEATER RELAY CONTROL
7	57SA (B)	EARTH (ALL)
9	57SB (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 5



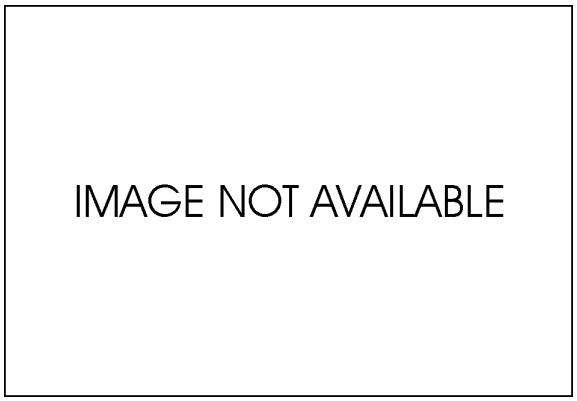
SS08F094 6

RIGHT HAND C-PILLAR

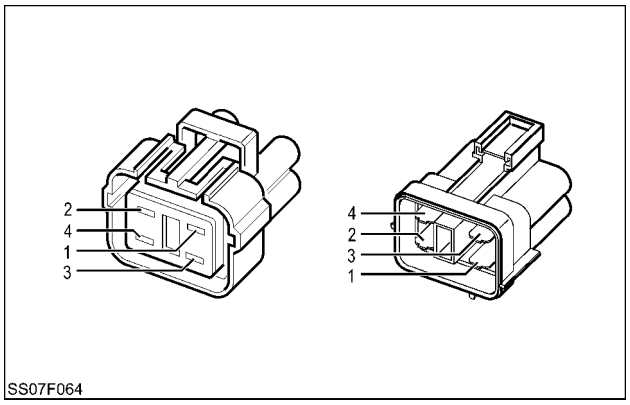
X767 SCREEN HEATER ROOF CONNECTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1080A (R)	FRONT SCREEN HEATER
2	1080B (R)	FRONT SCREEN HEATER
3	1082A (Y)	REAR SCREEN HEATER
4	1082B (Y)	REAR SCREEN HEATER

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 7



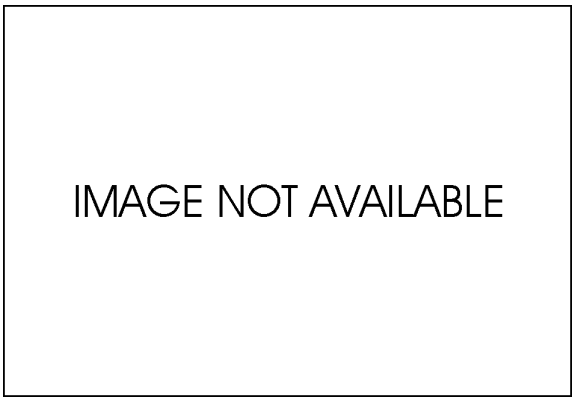
SS07F064 8

LEFT HAND C-PILLAR

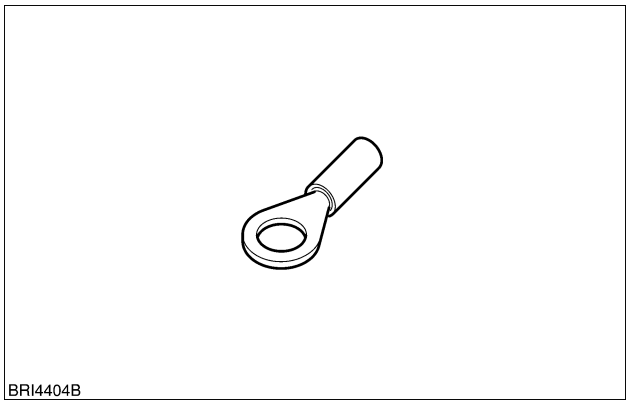
X768 MAIN EARTH POINT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57RX (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 9



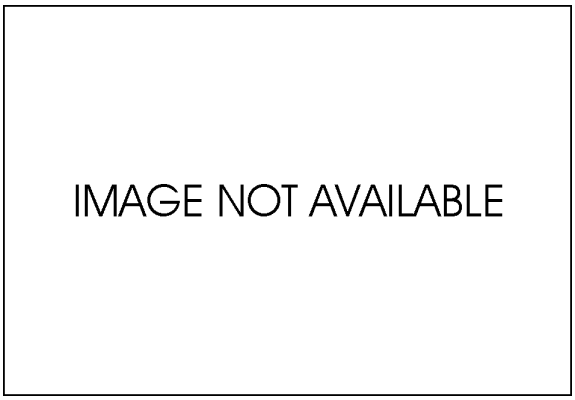
BRI4404B 10

TOP LEFT HAND C-PILLAR

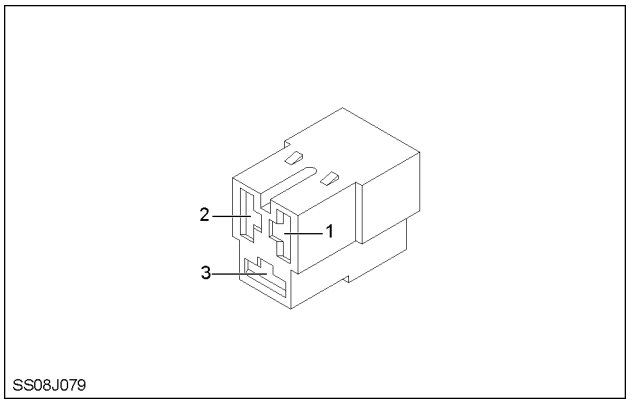
X769 REAR SCREEN HEATER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1082A (Y)	REAR SCREEN HEATER
2	1082B (Y)	REAR SCREEN HEATER
3	57TY (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 11



SS08J079 12

REAR CAB ROOF

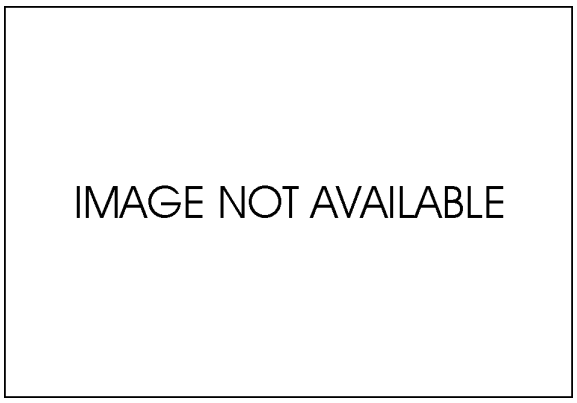
Connector - Component diagram 77

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

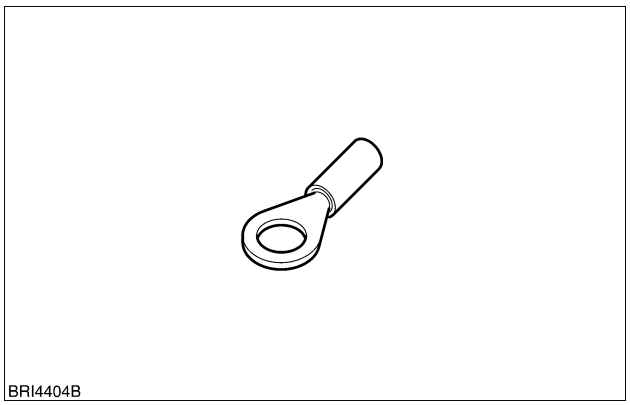
X770 EARTH CONNECTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57TX (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 1



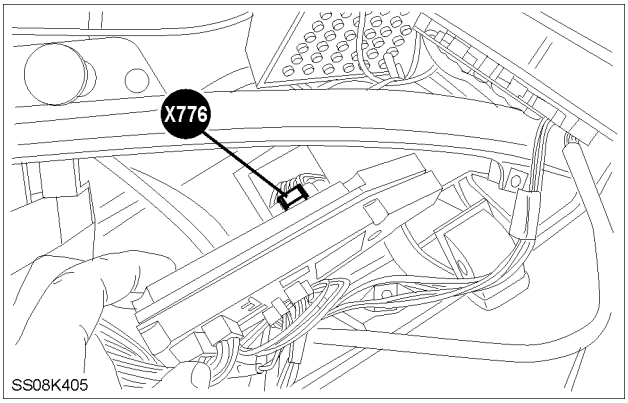
BRI4404B 2

LEFT HAND C PILLAR

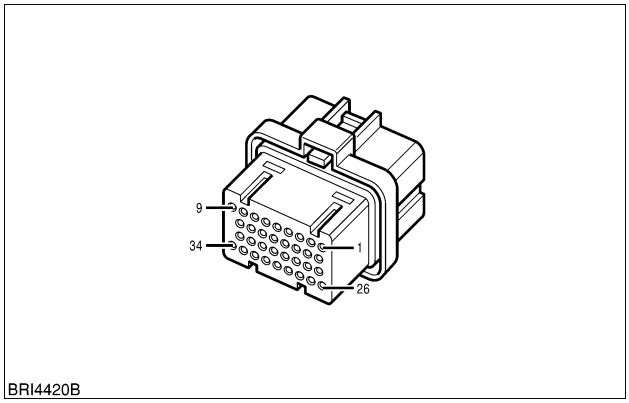
X776 ARMREST (GARU)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5200AT (N)	EDC VALVE SUPPLY
2	7000BM (U)	TRANS CONTROL SUPPLY
4	2250S (K)	PTO FRONT - SUPPLY
5	2045 (O)	PTO SWITCH TO MODULE
6	2046 (O)	PTO SWITCH (VCC)
7	2248 (K)	PTO FRONT - SWITCH (VCCS)
8	2245 (K)	PTO FRONT - SWITCH TO MODULE (MOM)
9	2065 (N)	PTO ENGAGED
10	2270 (O)	PTO FRONT - WARNING LAMP
11	5910 (Y)	ISO BUS CAN SIGNAL HIGH
12	5900 (G)	ISO BUS CAN SIGNAL LOW
13	5910F (Y)	ISO BUS CAN SIGNAL HIGH
14	5900F (G)	ISO BUS CAN SIGNAL LOW
18	5400E (Y)	CAN H
19	5420E (G)	CAN L
21	5400G (Y)	CAN H
22	5420G (G)	CAN L
23	5500B (R)	EHR CAN HIGH
24	5510B (U)	EHR CAN LOW
26	5500D (R)	EHR CAN HIGH
27	5510D (U)	EHR CAN LOW
30	5955C (G)	RS232 INPUT TECU
31	5960C (W)	RS232 OUTPUT TECU
32	57RE (B)	EARTH (ALL)
33	57RF (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K405 3



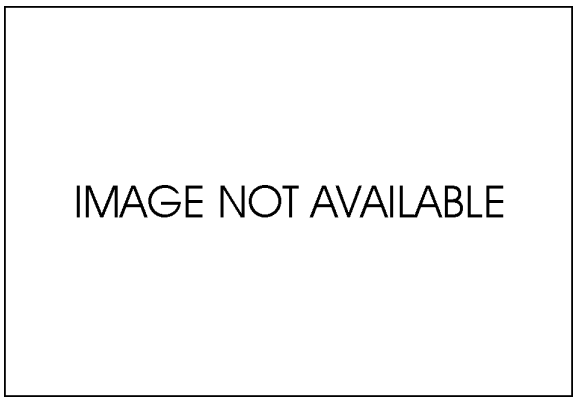
BRI4420B 4

GARU

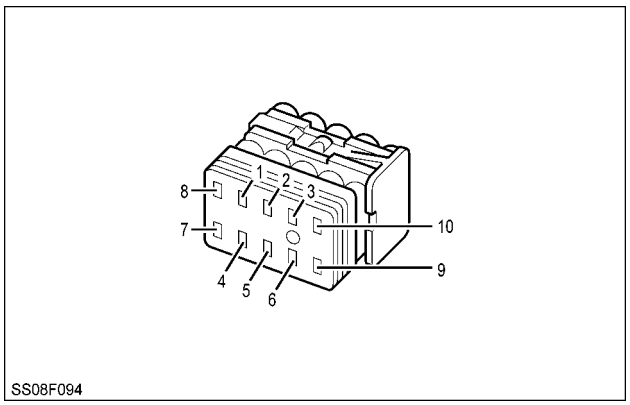
X777 SWITCH ADJUST MOTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	181R (G)	BLOWER MOTOR FEED
2	57D (B)	EARTH (ALL)
3	57B (B)	EARTH (ALL)
4	57C (B)	EARTH (ALL)
5	181T (G)	BLOWER MOTOR FEED
6	181N (G)	BLOWER MOTOR FEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 5



SS08F094 6

LEFT HAND ON GARU

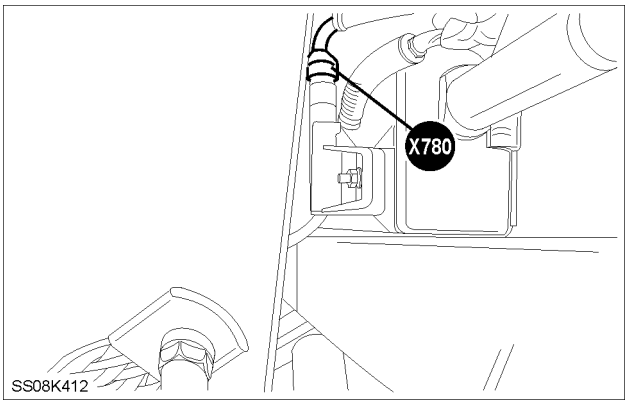
Connector - Component diagram 78

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

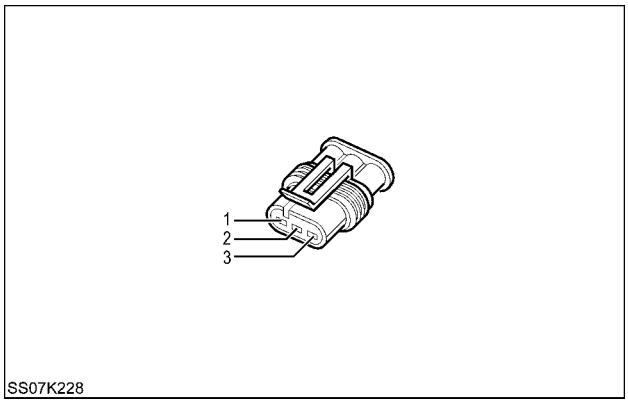
X780 REAR PTO SHIFT POSITION SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	60BY (B/W)	SENSOR GROUND
2	5020AB (TN)	EDC PROC +5V REF VOLTAGE DROP POSN/RATE
3	2156 (N)	ESPTO ACTUATOR POS SIGNAL

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K412 1



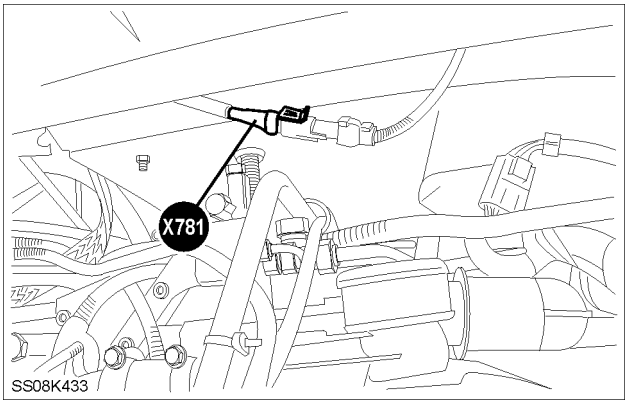
SS07K228 2

REAR RIGHT HAND UNDERSIDE OF CAB

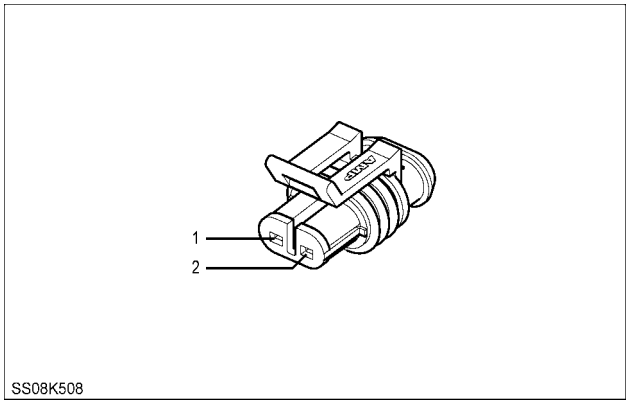
X781 ACTUATOR PTO SHIFT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2154 (N)	ESPTO ACTUATOR LOWER SPEED
2	2153 (R)	ESPTO ACTUATOR UPPER SPEED

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K433 3



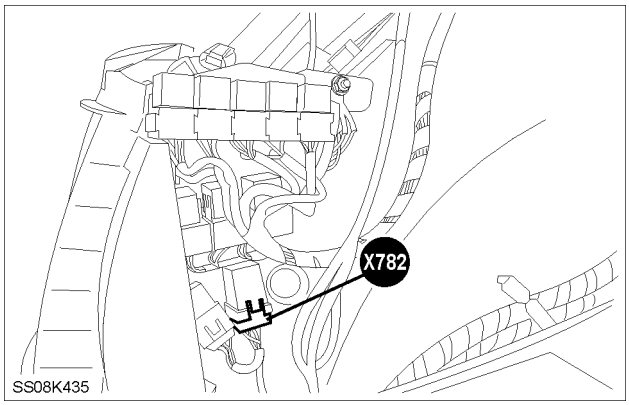
SS08K508 4

REAR RIGHT HAND UNDERSIDE OF CAB

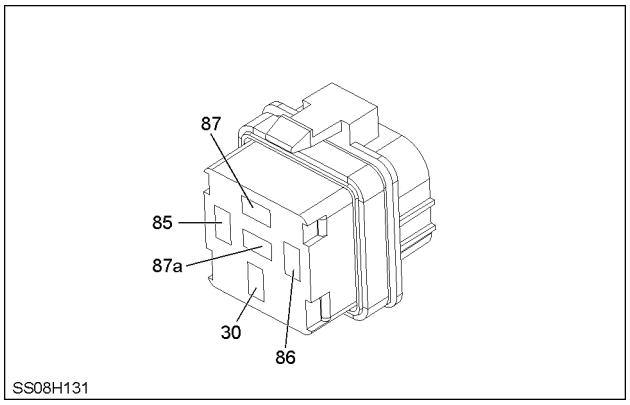
X782 ESPTO DRIVE UPPER SPEED RELAY

POS.	WIRE NUMBER	CIRCUIT REFERENCE
30	2153 (R)	ESPTO ACTUATOR UPPER SPEED
85	2050BA (G)	PTO SUPPLY / DOG SUPPLY
86	2151 (K)	EPTO DRIVE RELAY UPPER SPEED
87A	2155A (N)	ESPTO ACTUATOR POWER +12V
87	2050AY (G)	PTO SUPPLY / DOG SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K435 5



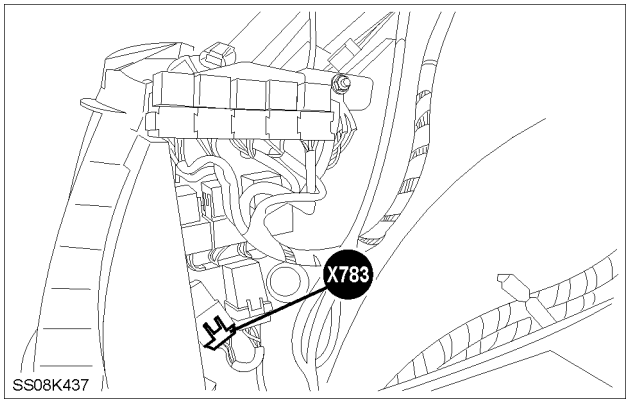
SS08H131 6

BEHIND RIGHT HAND TRIM

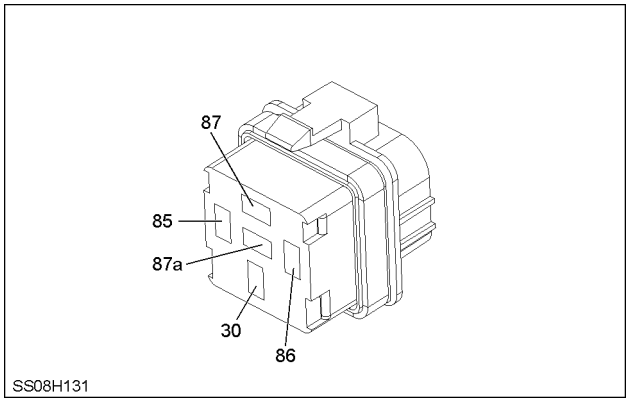
X783 ESPTO DRIVE LOWER SPEED RELAY

POS.	WIRE NUMBER	CIRCUIT REFERENCE
30	2154 (N)	ESPTO ACTUATOR LOWER SPEED
85	2050BB (G)	PTO SUPPLY / DOG SUPPLY
86	2152 (K)	ESPTO DRIVE RELAY LOWER SPEED
87A	2155B (N)	ESPTO ACTUATOR POWER +12V
87	2050AZ (G)	PTO SUPPLY / DOG SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K437 7



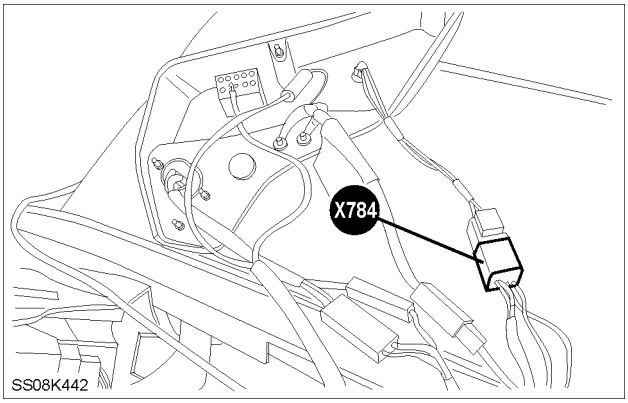
SS08H131 8

BEHIND RIGHT HAND TRIM

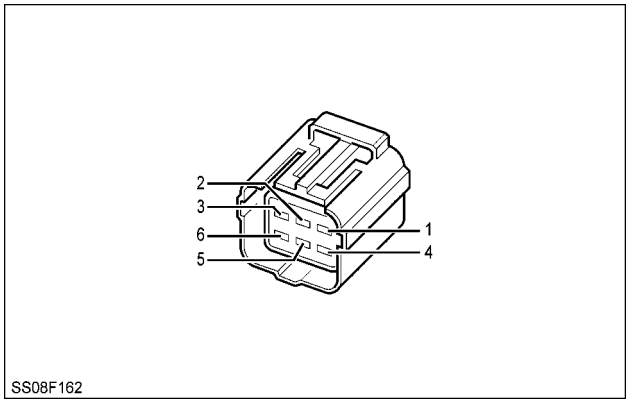
X784 PTO SPEED SELECT SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2050BC (G)	PTO SUPPLY / DOG SUPPLY
2	2159 (U)	ESPTO UPPER SPEED
3	2158 (U)	ESPTO LOWER SPEED
6	2157 (N)	ESPTO NEUTRAL

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K442 9



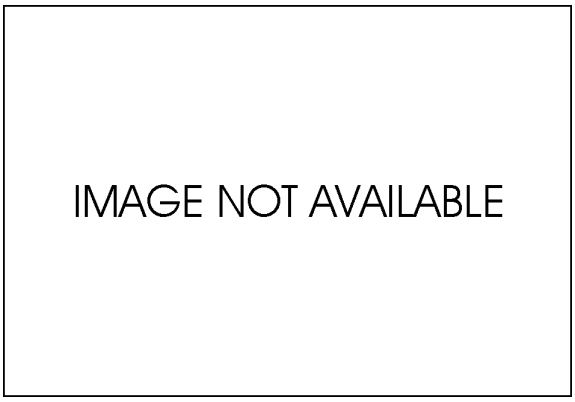
SS08F162 10

BEHIND RIGHT HAND SWITCH PANEL

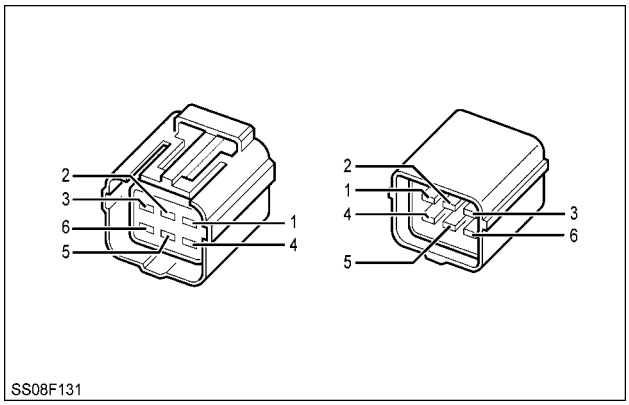
X787 CONNECTOR ADJUST MOTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	181M (G) / 181P (G)	BLOWER MOTOR FEED
2	57A (B) / 57B (B)	EARTH (ALL)
3	57D (B) / 57E (B)	EARTH (ALL)
4	181T (G) / 181S (G)	BLOWER MOTOR FEED
5	9000B (N) / 9000A (N)	DIVERTER VALVE

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 11



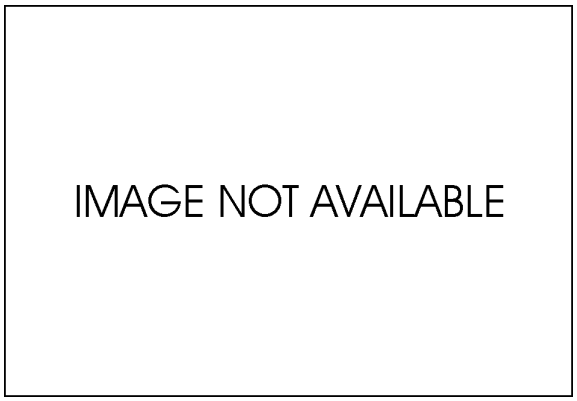
SS08F131 12

INSIDE OF THE ARMREST UNIT

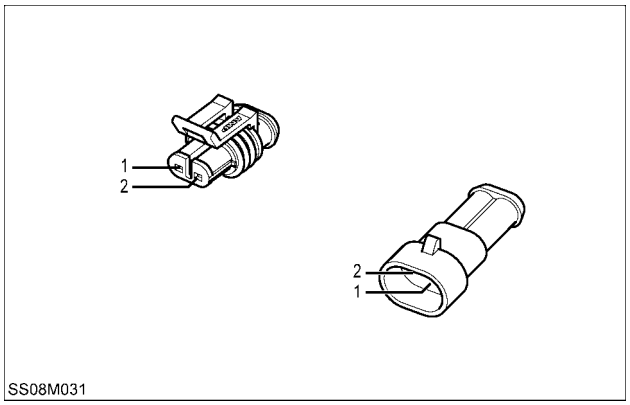
X788 ELECTRIC ADJUST MOTOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	181S (G)	BLOWER MOTOR FEED
2	57E (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 13



SS08M031 14

INSIDE OF THE ARMREST UNIT

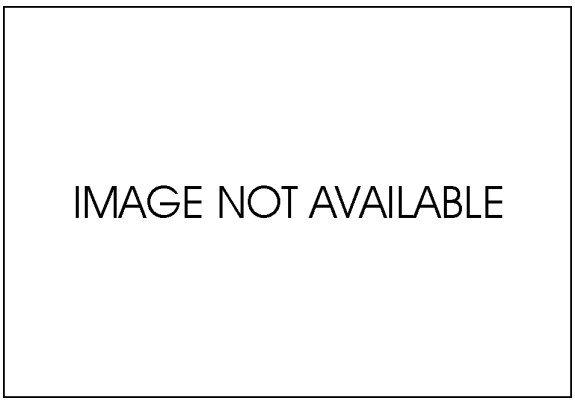
Connector - Component diagram 80

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

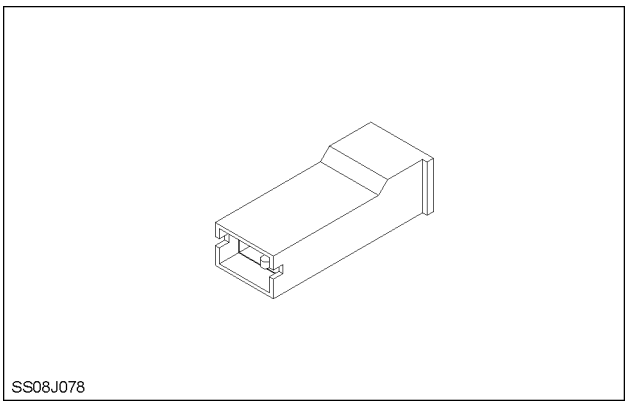
X800 FRONT SCREEN HEATER A+

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1080A (R)	FRONT SCREEN HEATER

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 1



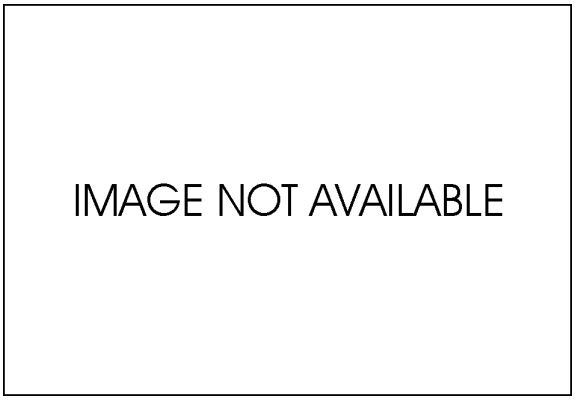
SS08J078 2

FRONT CAB

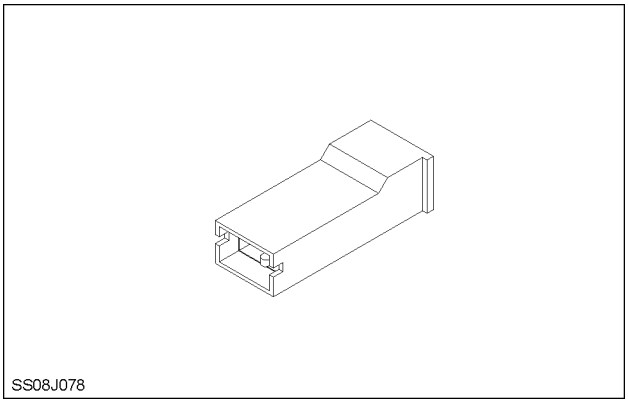
X801 FRONT SCREEN HEATER A-

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57VA (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 3



SS08J078 4

FRONT CAB

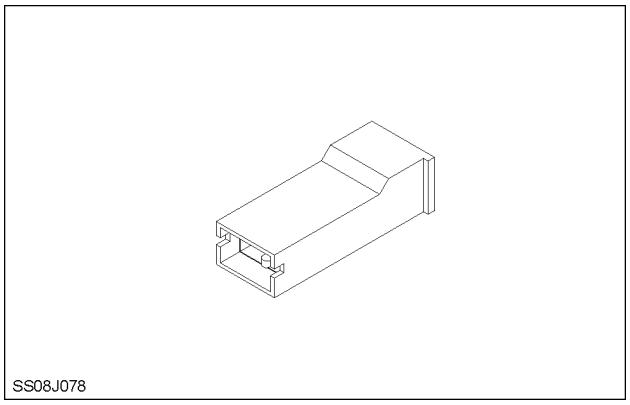
X802 FRONT SCREEN HEATER B+

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1080B (R)	FRONT SCREEN HEATER

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*

IMAGE NOT AVAILABLE

INA 5



SS08J078 6

FRONT CAB

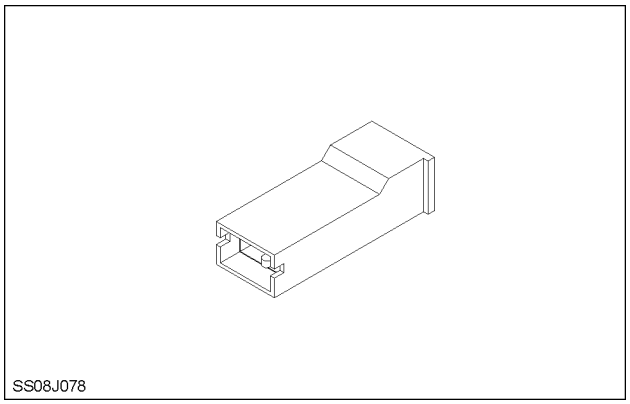
X803 FRONT SCREEN HEATER B-

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57TZ (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*

IMAGE NOT AVAILABLE

INA 7



SS08J078 8

FRONT CAB

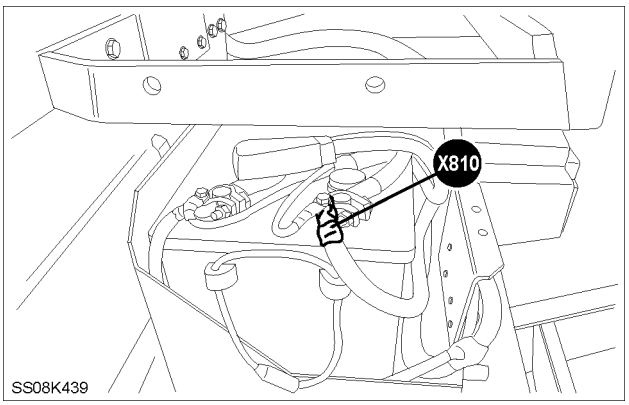
Connector - Component diagram 81

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

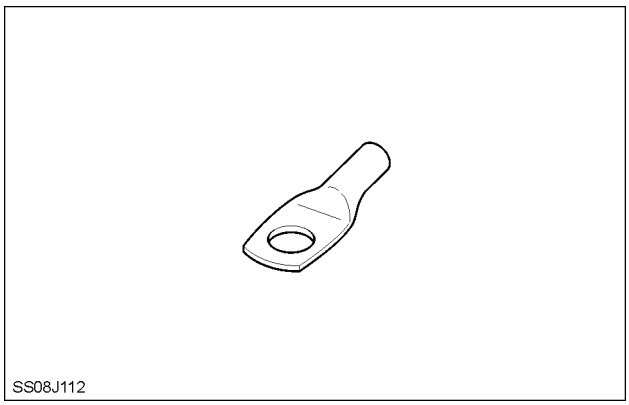
X810 BATTERIE TO CAB. MINUS SUPPLY

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	57 (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K439 1



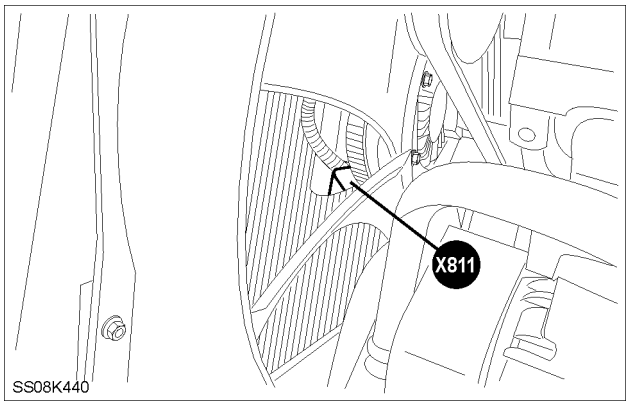
SS08J112 2

RIGHT HAND BEHIND STEPS

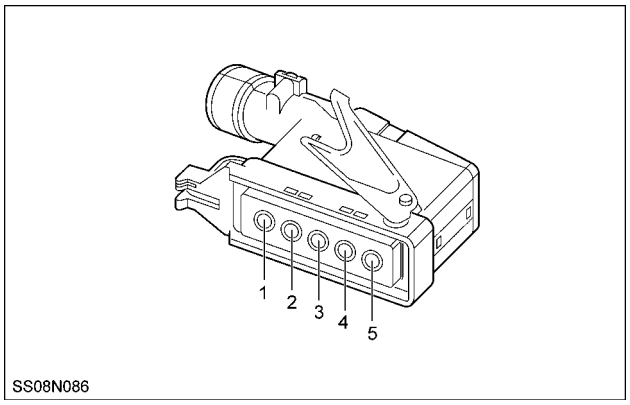
X811 VISTRONIC FAN

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	6300 (N)	FAN SPEED
2	57U (B)	EARTH (ALL)
3	57V (B)	EARTH (ALL)
4	6330 (N)	VISTRONIC FAN INPUT
5	6320 (N)	FAN 5V REF.

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K440 3



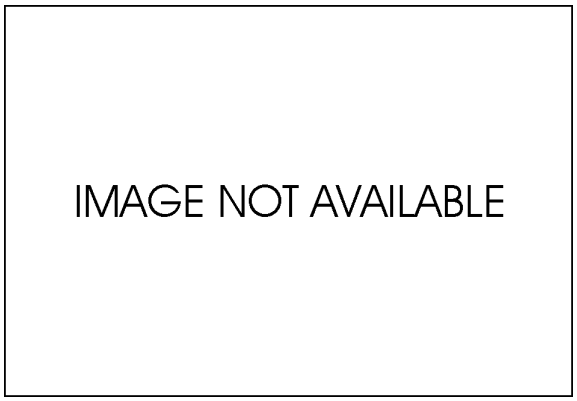
SS08N086 4

FRONT LEFT HAND ENGINE

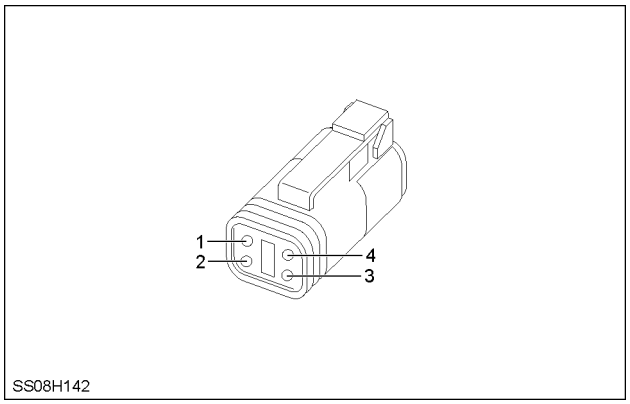
X812 ISO BUS BREAK AWAY FRONT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5920E (R)	ISO BUS CAN SUPPLY POSITIVE
2	5900E (Y)	ISO BUS CAN SIGNAL LOW
3	5915E (B)	ISO BUS CAN SUPPLY GROUND
4	5910E (G)	ISO BUS CAN SIGNAL HIGH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 5

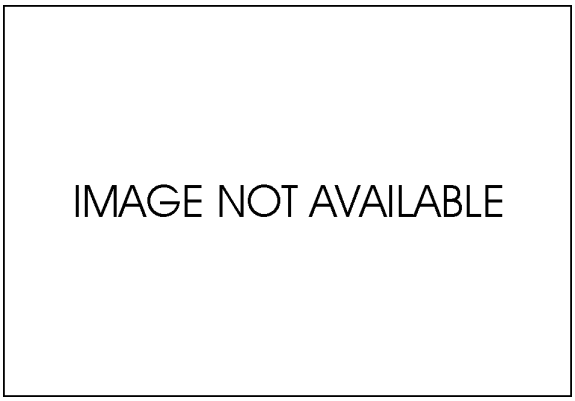


SS08H142 6

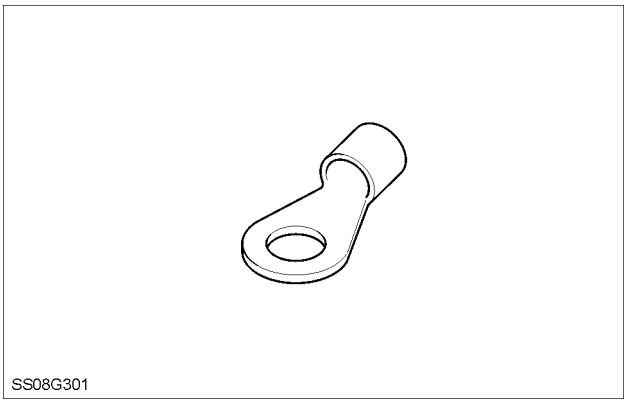
X813 POWER FUSE PF 6 ISO BUS FRONT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	150AT (N)	BATTERY FEED (UNFUSED)(ALL)
1	150AW (N)	BATTERY FEED (UNFUSED)(ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 7



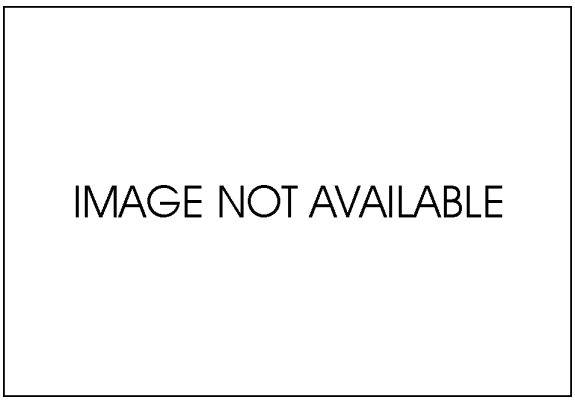
SS08G301 8

RIGHT HAND BEHIND STEPS

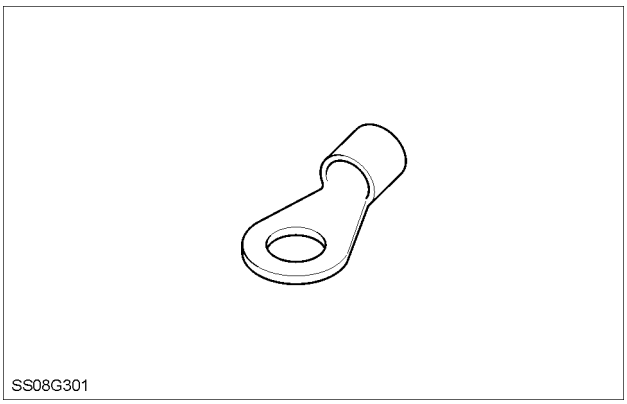
X814 POWER FUSE PF 7 ISO BUS FRONT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	150AV (N)	BATTERY FEED (UNFUSED)(ALL)
1	150AX (N)	BATTERY FEED (UNFUSED)(ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 9



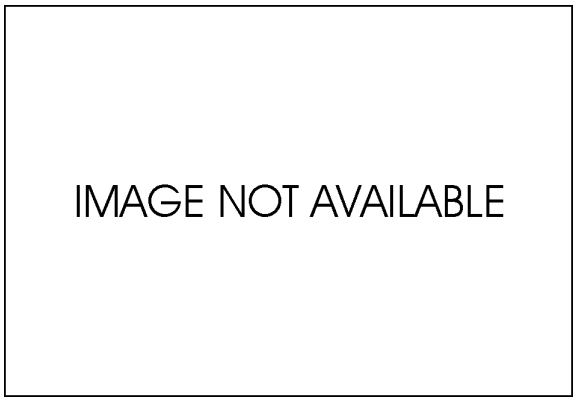
SS08G301 10

RIGHT HAND BEHIND STEPS

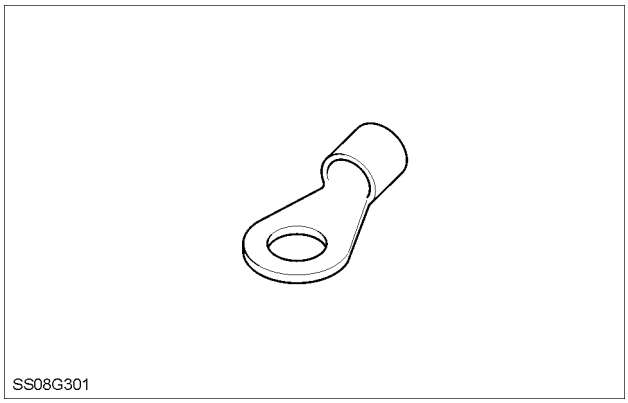
X815 ISO BUS POWER SUPPLY FRONT

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	150AS (N)	BATTERY FEED (UNFUSED)(ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 11



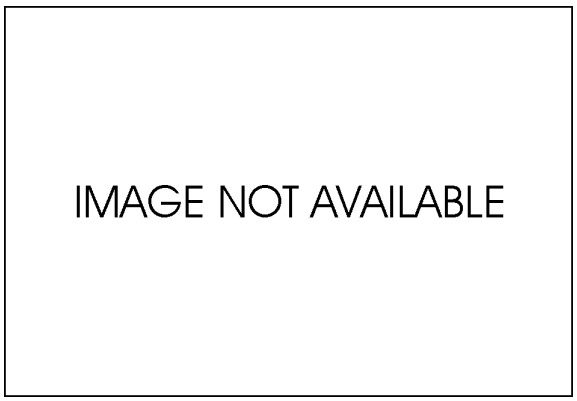
SS08G301 12

RIGHT HAND BEHIND STEPS

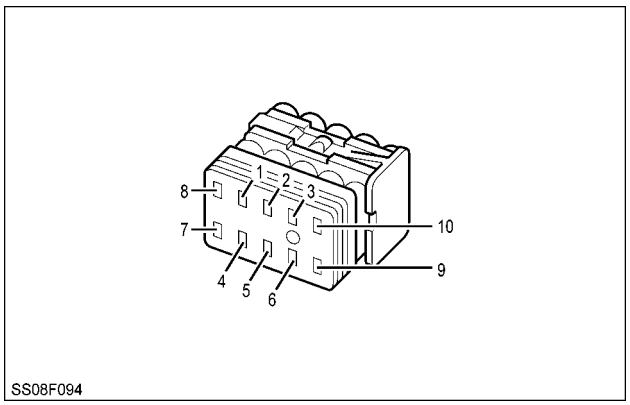
X816 HIGH MOUNT HEADLAMP SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1027BB (U)	HEADLAMP MAIN BEAM
2	1027B (U)	HEADLAMP MAIN BEAM
3	1027A (U)	HEADLAMP MAIN BEAM
4	1030BB (U)	HEADLAMP DIP BEAM
5	1030B (U)	HEADLAMP DIP BEAM
6	1030A (U)	HEADLAMP DIP BEAM

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 13



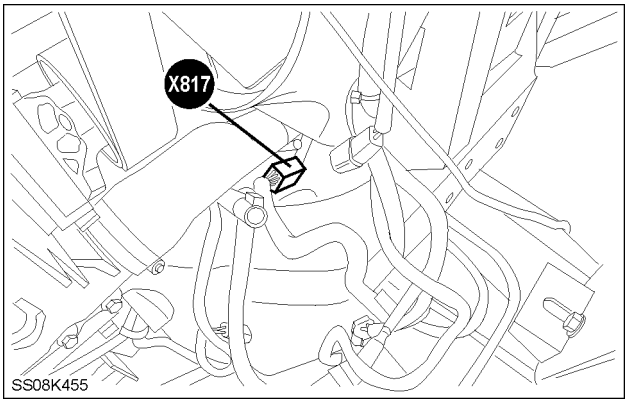
SS08F094 14

REAR RIGHT HAND C-PILLAR

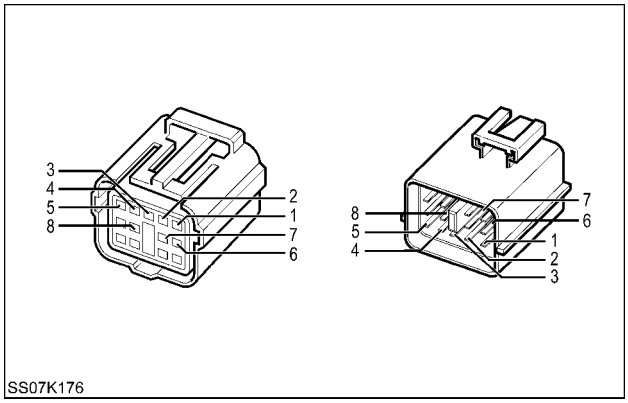
X817 FRONT HITCH AND FRONT PTO

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	2044 (O) / (N)	PTO SOLENOID-FRONT RETURN(-)
2	2043 (O) / (P)	PTO SOLENOID-FRONT
3	2260 (O)	PTO FRONT - SPEED SIGNAL
4	60AE (B/W) / (S)	SENSOR GROUND
5	2570 (R) / -	FRONT HITCH RAISE SOLENOID
6	2530B (N) / -	FRONT HITCH V REF
7	2510 (N) / (W)	FRONT HITCH POSITION SIGNAL
8	57JT (B)	EARTH (ALL)
9	1010B (G) / (R)	IGNITION RELAY (COIL)
10	2556 (O) / (U)	FRONT HITCH SWITCH COMMON RAIL
11	2590 (TN) / (G)	EXTERNAL SWITCH FHPL UP
12	2591 (TN) / (Y)	EXTERNAL SWITCH FHPL DOWN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K455 15



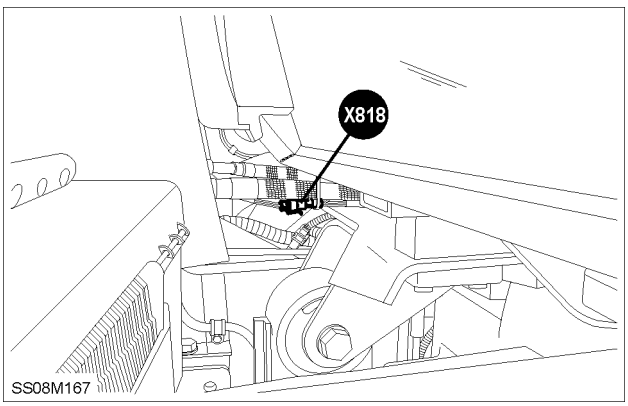
SS07K176 16

FRONT RIGHT HAND ENGINE

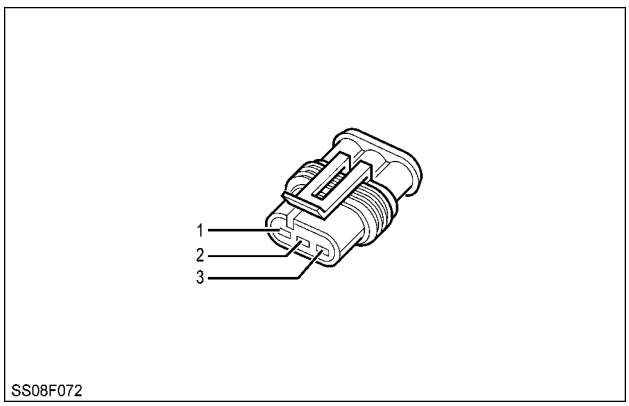
X818 HEADLAMP 2 LEFT HAND GRAB RAIL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1027B (UW)	HEADLAMP MAIN BEAM
2	1030B (UR)	HEADLAMP DIP BEAM
3	57B (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M167 17



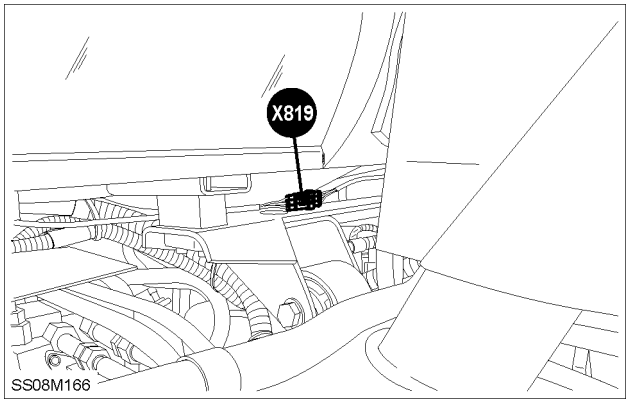
SS08F072 18

LEFT HAND UNDER SIDE OF CAB

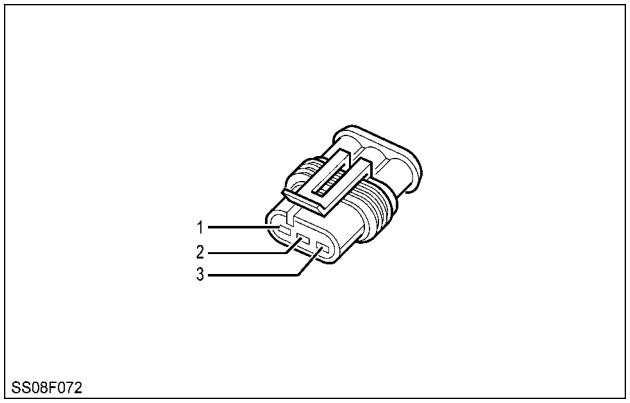
X819 HEADLAMP 1 RIGHT HAND GRAB RAIL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	1027A (UW)	HEADLAMP MAIN BEAM
2	1030A (UR)	HEADLAMP DIP BEAM
3	57A (B)	EARTH (ALL)

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M166 19



SS08F072 20

RIGHT HAND UNDER SIDE OF CAB

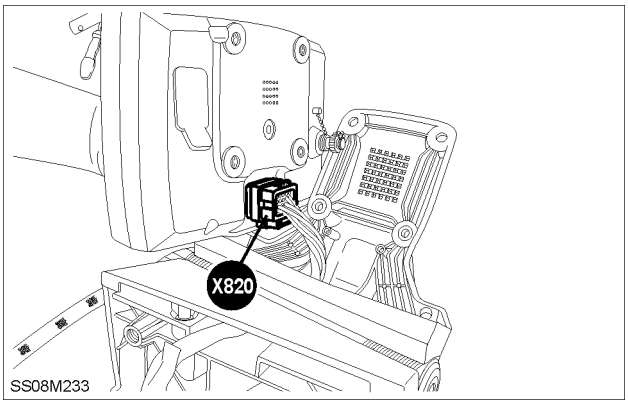
Connector - Component diagram 82

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

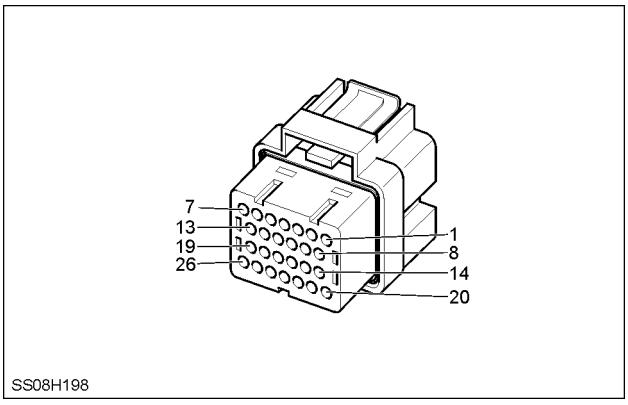
X820 GARU SWCD

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5500J (R)	EHR CAN HIGH
2	5510J (U)	EHR CAN LOW
3	5000 (L)	EDC MEMORY POWER
5	5910F (G)	ISO BUS CAN SIGNAL HIGH
6	5900F (Y)	ISO BUS CAN SIGNAL LOW
9	5960 (Y)	RS232 OUTPUT TECU
10	5955 (Y)	RS232 INPUT TECU
13	5000 (L)	EDC MEMORY POWER
14	57 (B)	EARTH (ALL)
15	7000AT (U)	TRANS CONTROL SUPPLY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M233 1



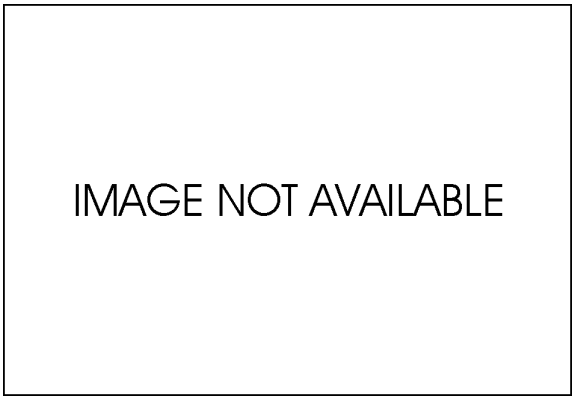
SS08H198 2

RIGHT HAND SIDE CAB

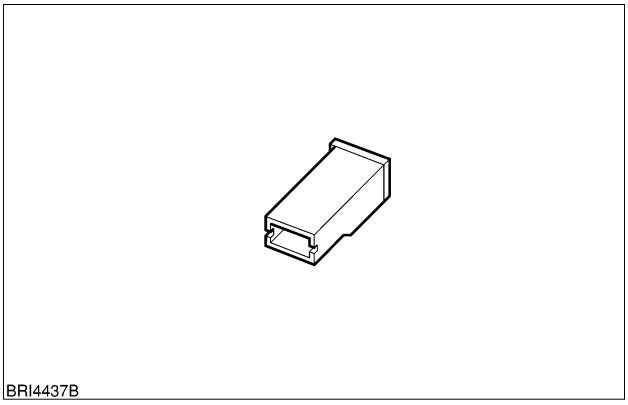
X821 LOADER VALVE 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3272 (L)	LOADER VALVE #1 OUT
1	3273 (U)	LOADER VALVE #1 RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 3



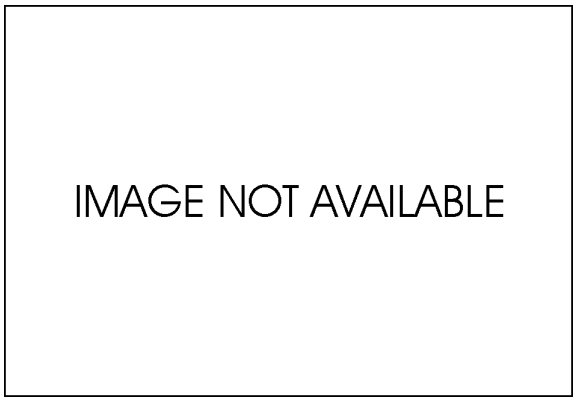
BRI4437B 4

FRONT LOADER CONSOLE RIGHT HAND SIDE OF ENGINE

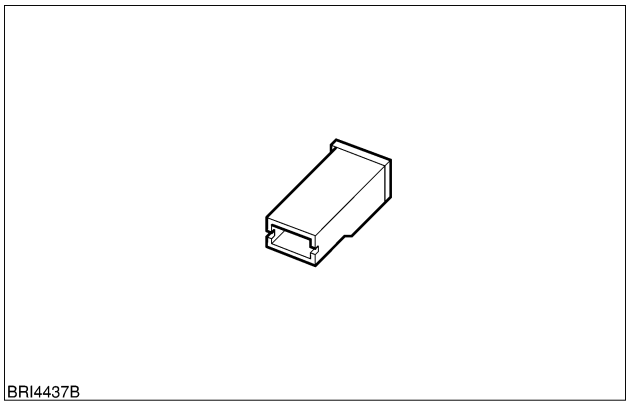
X822 LOADER VALVE 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	3274 (L)	LOADER VALVE #2 OUT
1	3275 (U)	LOADER VALVE #2 RETURN

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 5



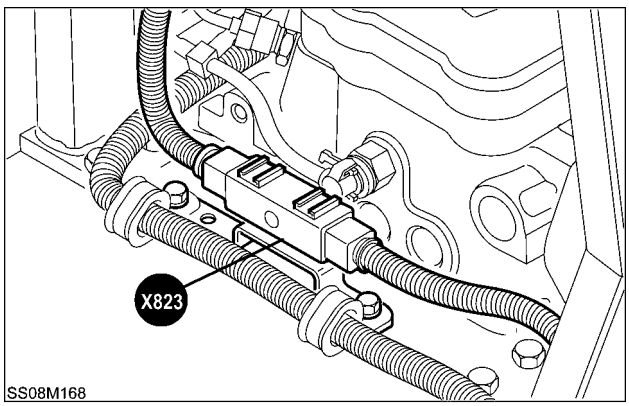
BRI4437B 6

FRONT LOADER CONSOLE RIGHT HAND SIDE OF ENGINE

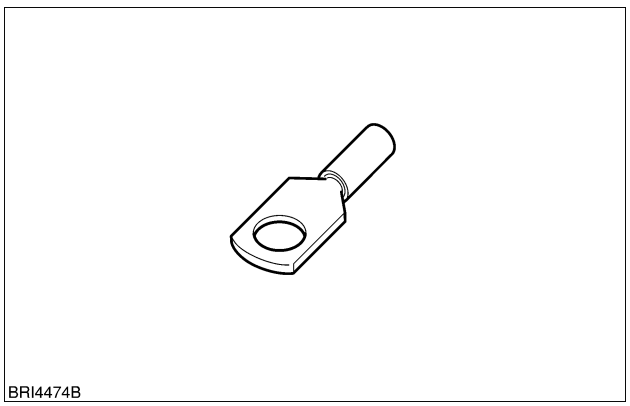
X823 MEGA FUSE (125A) GRIDHEATER / FUELHEATER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(R)	SUPPLY B+
2	(R)	HIGH CURRENT RELAY

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M168 7



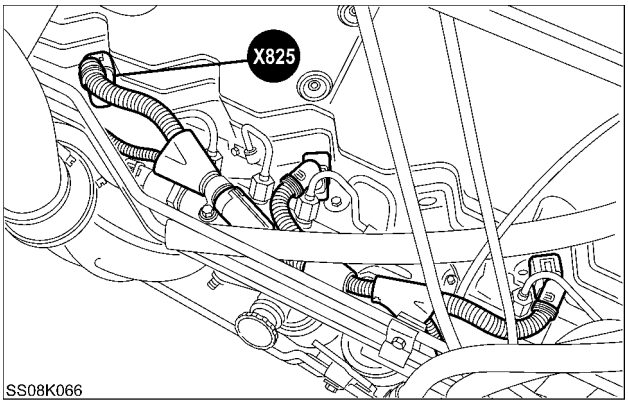
BRI4474B 8

BOTTOM REAR ENGINE

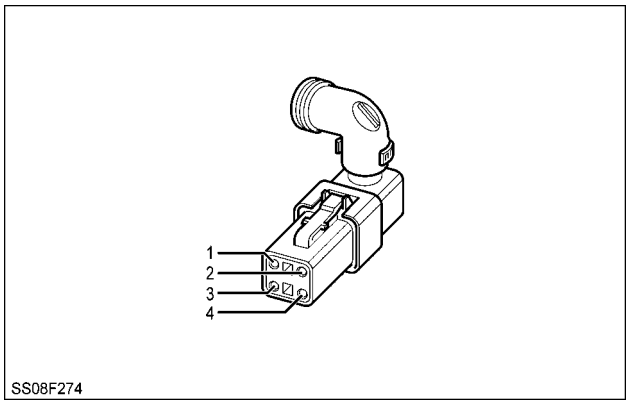
X825 INJECTOR CYLINDER 1 & 2 (EDC16)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	N/B	PLUS
2	S/R	MINUS
3	S/Y	PLUS
4	N/W	MINUS

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K066 9



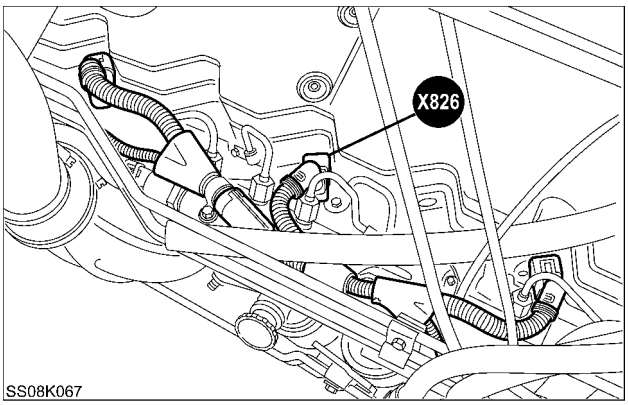
SS08F274 10

LEFT HAND TOP ENGINE

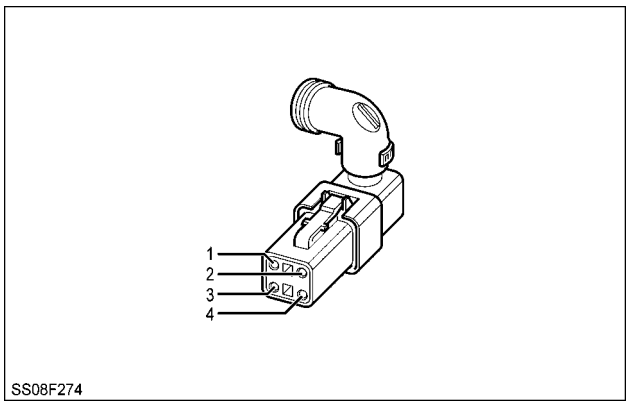
X826 INJECTOR CYLINDER 3 & 4 (EDC16)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	W/G	PLUS
2	U/O	MINUS
3	S/B	PLUS
4	B/P	MINUS

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K067 11



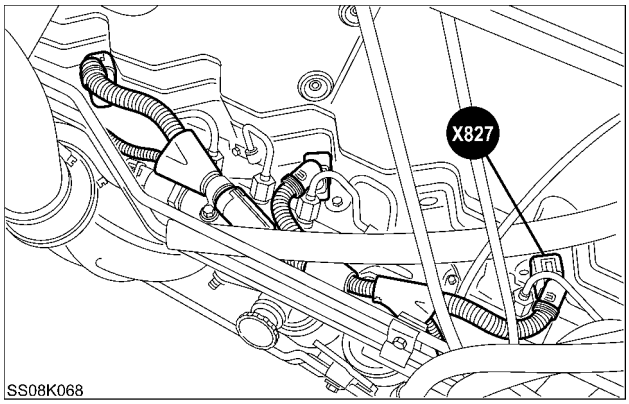
SS08F274 12

LEFT HAND TOP ENGINE

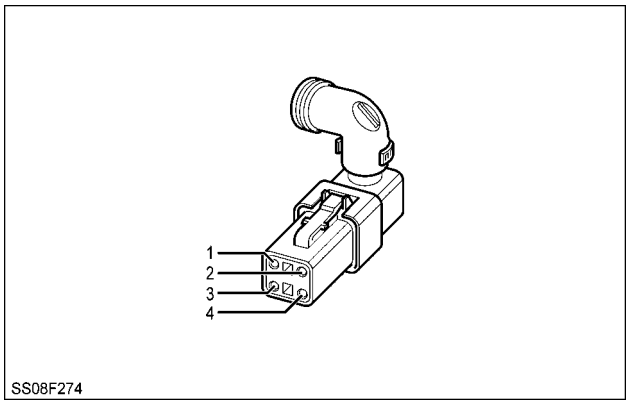
X827 INJECTOR CYLINDER 5 & 6 (EDC16)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	U/B	PLUS
2	O/W	MINUS
3	U/R	PLUS
4	Y/B	MINUS

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K068 13



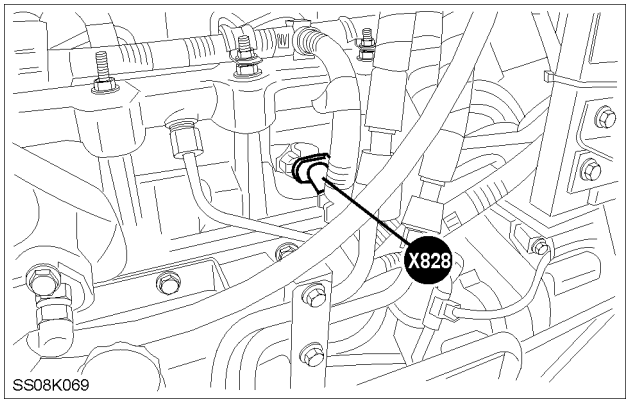
SS08F274 14

LEFT HAND TOP ENGINE

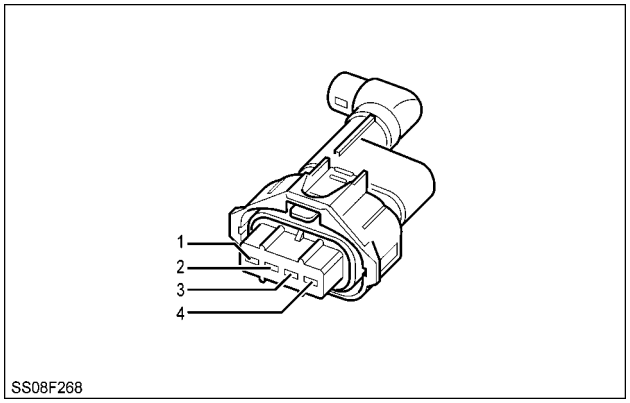
X828 BOOST PRESSURE / TEMPERATURE SENSOR (EDC16)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	Y/B	
2	W/R	
3	O/U	
4	U/B	

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K069 15



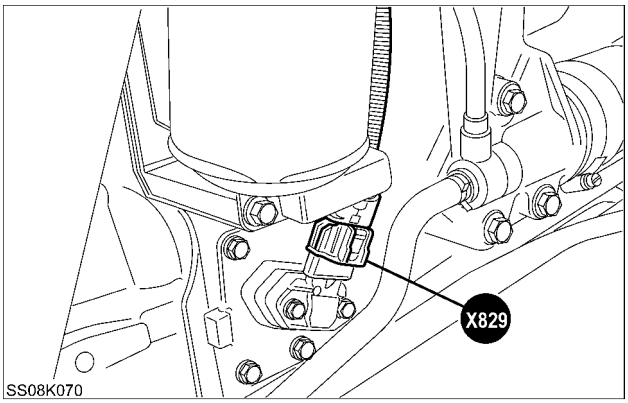
SS08F268 16

LEFT HAND ENGINE

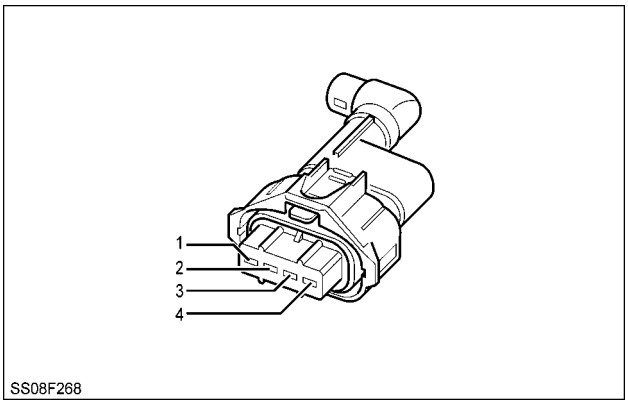
X829 OIL PRESSURE / TEMPERATURE SENSOR (EDC16)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	Y/G	
2	K/B	
3	N/B	
4	Y/R	

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K070 17



SS08F268 18

FRONT LOWER RIGHT HAND ENGINE

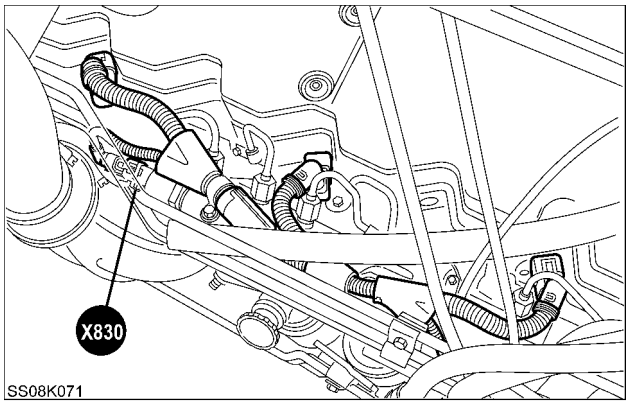
Connector - Component diagram 83

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

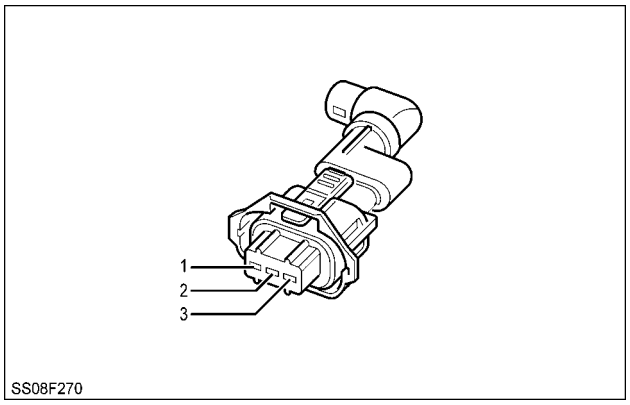
X830 RAIL PRESSURE SENSOR (EDC16)

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	W/B	
2	R/G	
3	S/B	

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K071 1



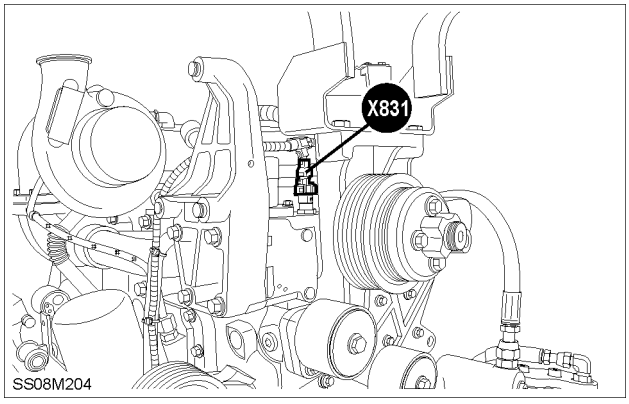
SS08F270 2

LEFT HAND TOP ENGINE

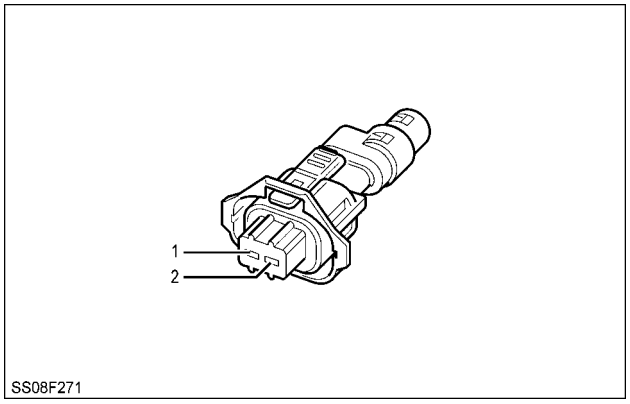
X831 COOLANT TEMPERATURE SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	O/G	
2	W/Y	

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M204 3



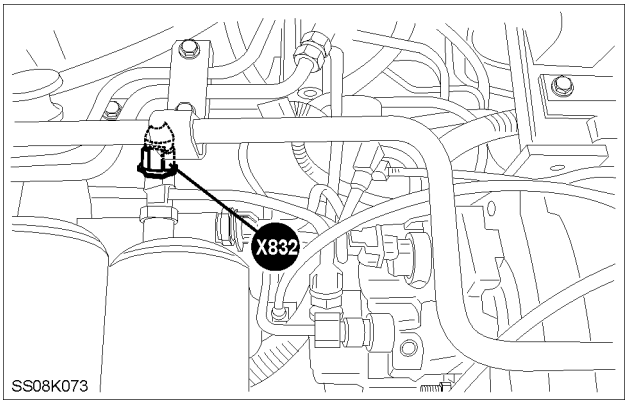
SS08F271 4

FRONT RIGHT HAND ENGINE

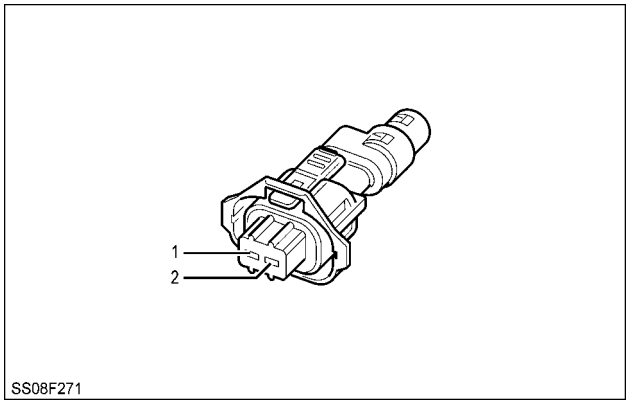
X832 FUEL TEMPERATURE SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	W/U	
2	O/B	

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K073 5



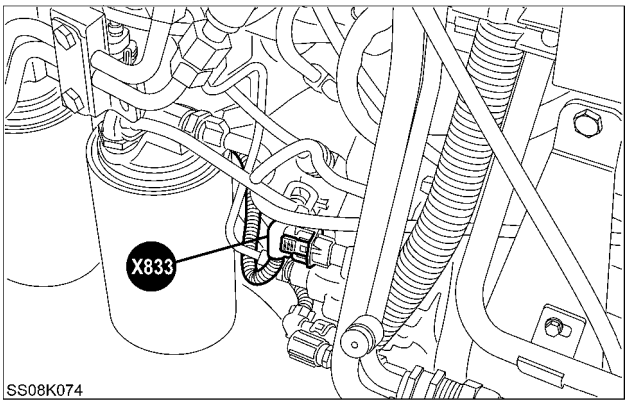
SS08F271 6

LEFT HAND ENGINE

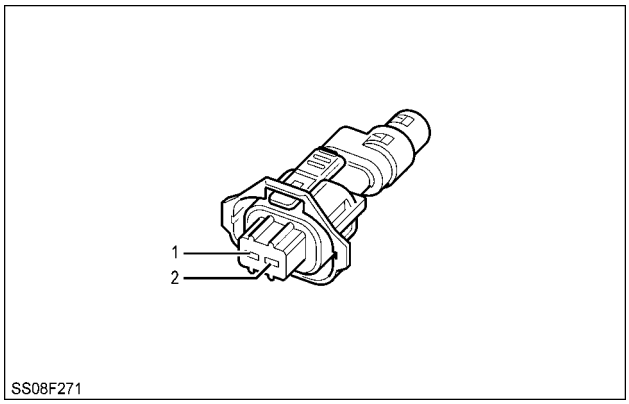
X833 HIGH PRESSURE PUMP

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	G	
2	O	

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K074 7



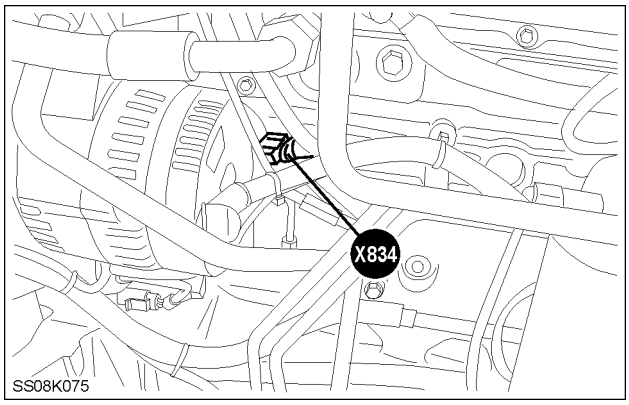
SS08F271 8

REAR LEFT HAND ENGINE

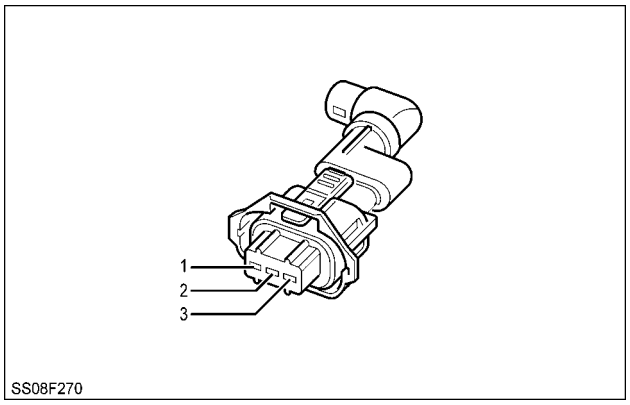
X834 INCREMENT SPEED SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	W	
2	R	
3	B	

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K075 9



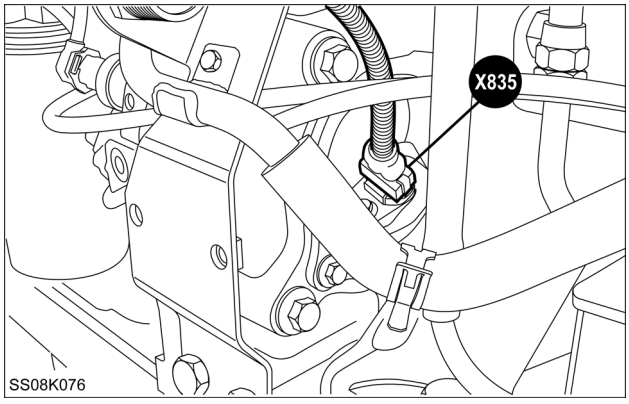
SS08F270 10

FRONT LEFT HAND ENGINE

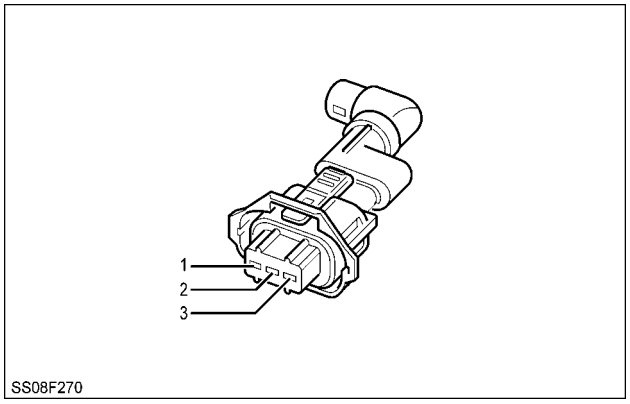
X835 CAMSHAFT SPEED SENSOR

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	W	
2	R	
3	G	

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08K076 11



SS08F270 12

REAR LEFT HAND ENGINE

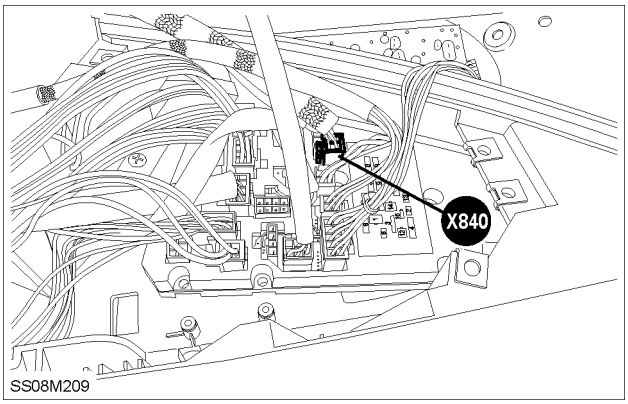
Connector - Component diagram 84

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

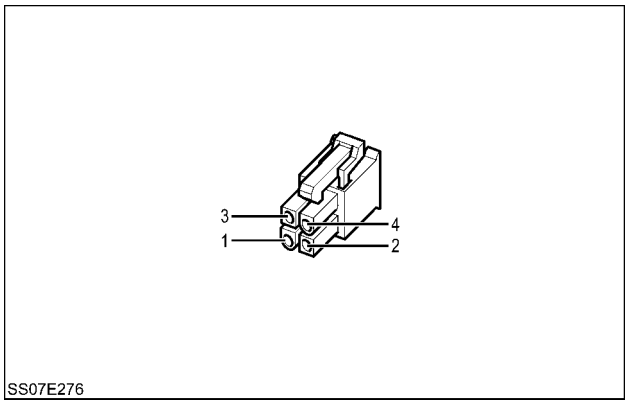
X840 REAR PTO SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(Y)	NORMALY OPEN
2	(W)	NORMALY CLOSED
3	(B)	PTO LAMP
4	(R)	SUPPLY +12V

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M209 1



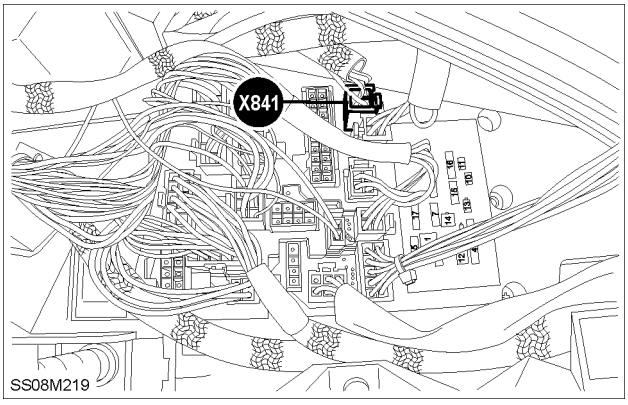
SS07E276 2

IN ARMREST

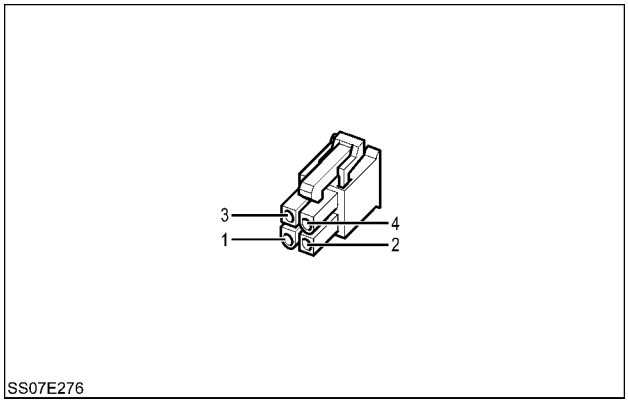
X841 FRONT PTO SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(Y)	NORMALY OPEN
2	(W)	NORMALY CLOSED
3	(B)	PTO LAMP
4	(R)	SUPPLY +12V

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M219 3



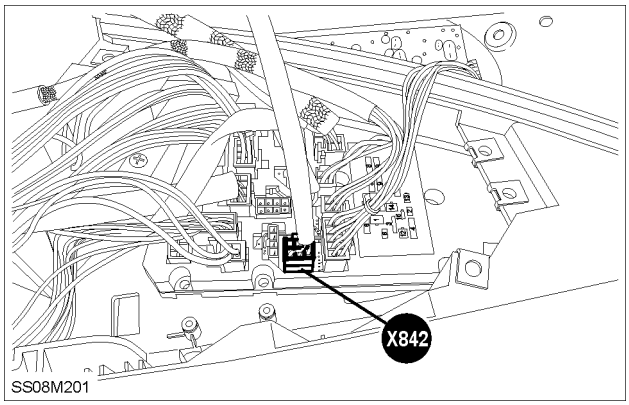
SS07E276 4

IN ARMREST

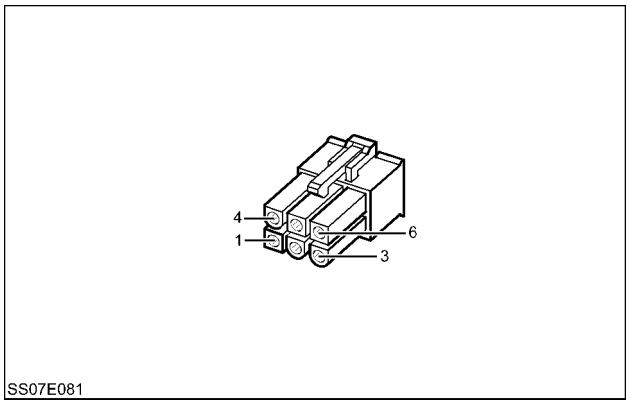
X842 EHR FLOW CONTROL ENCODER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(G)	OUTPUT SIGNAL SWITCH
2	(U)	ENCODER OUTPUT B
3	(Y)	ENCODER OUTPUT A
4	(B)	GROUND
5	(R)	SUPPLY +5V

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M201 5



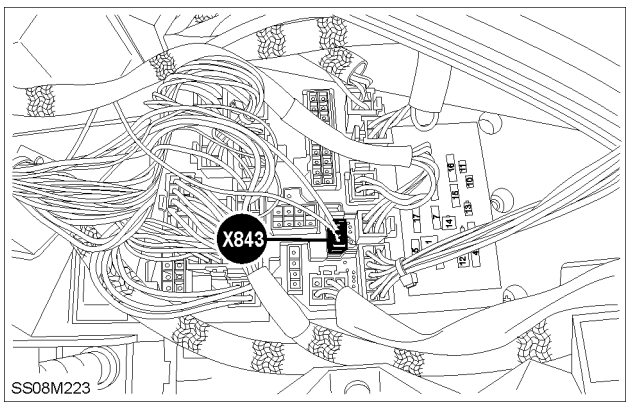
SS07E081 6

IN ARMREST

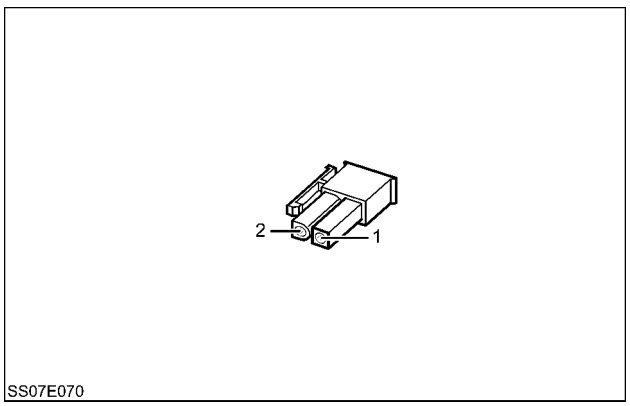
X843 EHR FLOAT / JOYSTICK

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(R)	SUPPLY +5V
2	(B)	OUTPUT SWITCH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M223 7



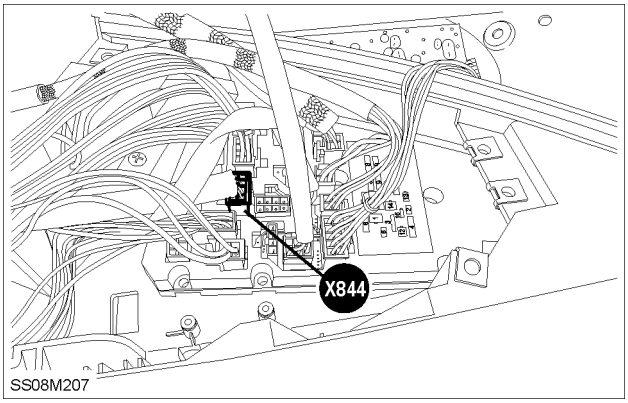
SS07E070 8

IN ARMREST

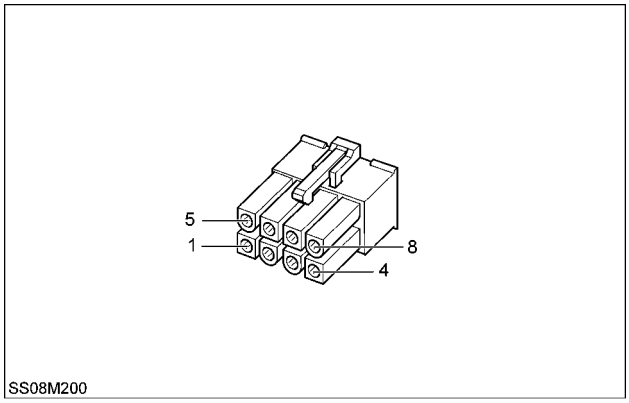
X844 JOYSTICK 1

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	(G)	OUTPUT 3 BUTTON
3	(Y)	OUTPUT 2 BUTTON
4	(B)	OUTPUT 1 BUTTON
5	(W)	OUTPUT SIGNAL Y-AXIS
6	(W)	OUTPUT SIGNAL X-AXIS
7	(N)	GROUND
8	(R)	SUPPLY +5V

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M207 9



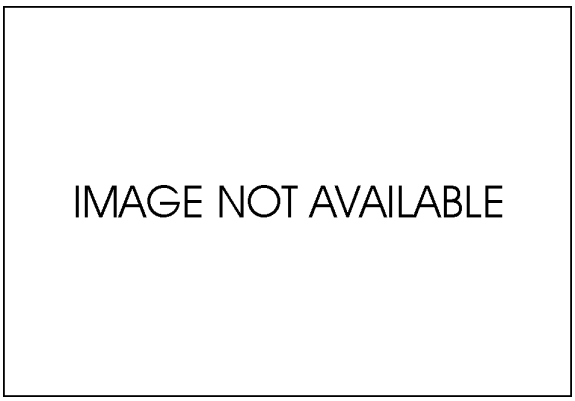
SS08M200 10

IN ARMREST

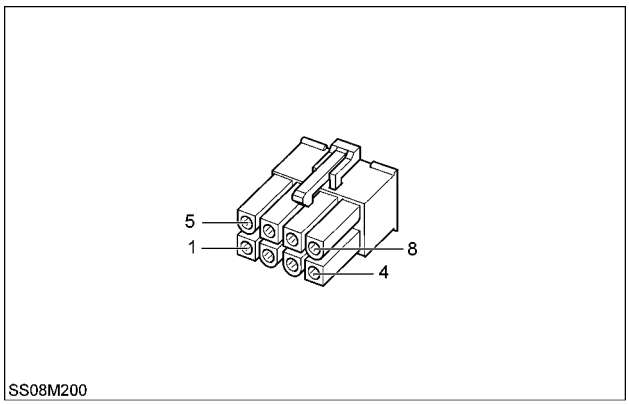
X845 JOYSTICK 2

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(W)	OUTPUT SIGNAL Z-AXIS
4	(B)	OUTPUT 1 BUTTON
5	(W)	OUTPUT SIGNAL Y-AXIS
6	(W)	OUTPUT SIGNAL X-AXIS
7	(N)	GROUND
8	(R)	SUPPLY +5V

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



INA 11



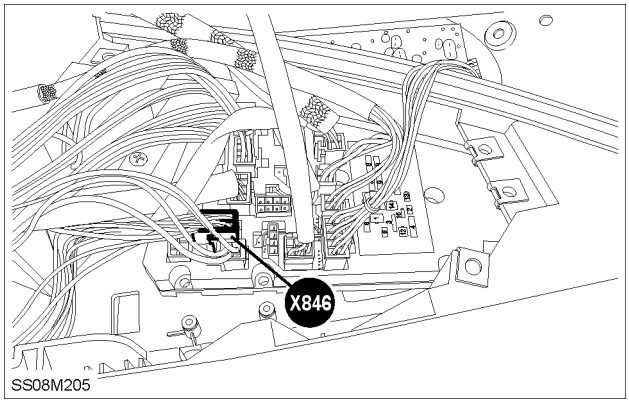
SS08M200 12

IN ARMREST

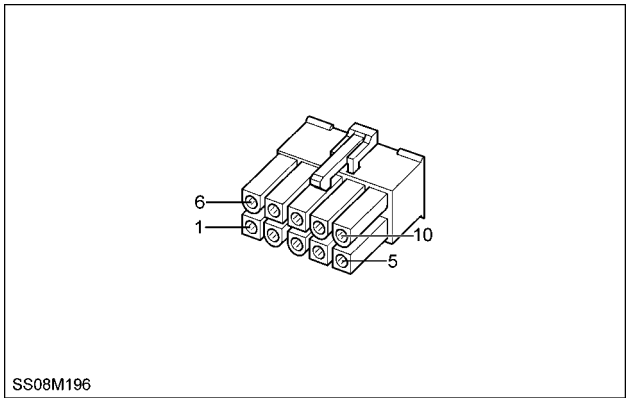
X846 SENSOR TRANSMISSION RATIO

POS.	WIRE NUMBER	CIRCUIT REFERENCE
4	(N)	SENSOR GROUND
5	(R)	SENSOR +5V
6	(W)	SENSOR SIGNAL OUTPUT
7	(Y)	SERIAL LINK CLOCK
8	(W)	SERIAL LINK DATA
9	(N)	GROUND
10	(R)	SUPPLY +5V SWITCH PANEL

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M205 13



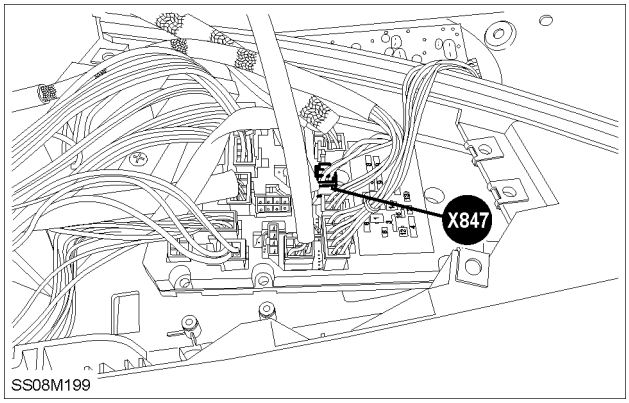
SS08M196 14

IN ARMREST

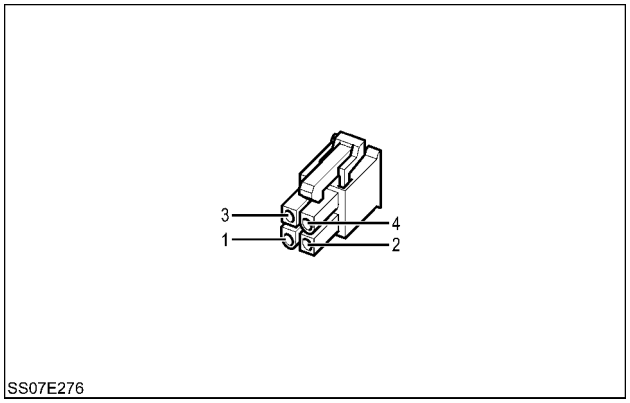
X847 INTEGRATED CONTROL SWITCH PANEL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(B)	CAN LOW
2	(Y)	CAN HIGH
3	(S)	GROUND
4	(W)	SUPPLY +12V

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M199 15



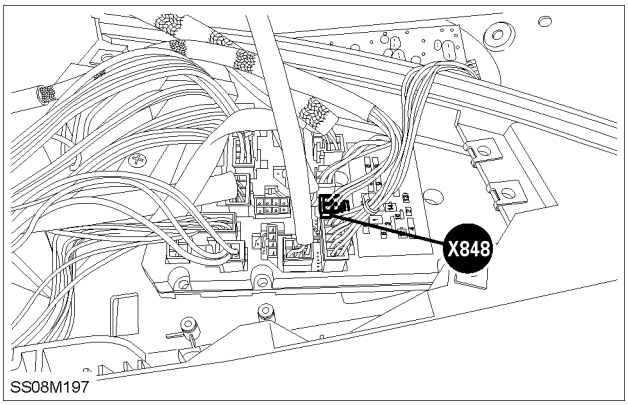
SS07E276 16

IN ARMREST

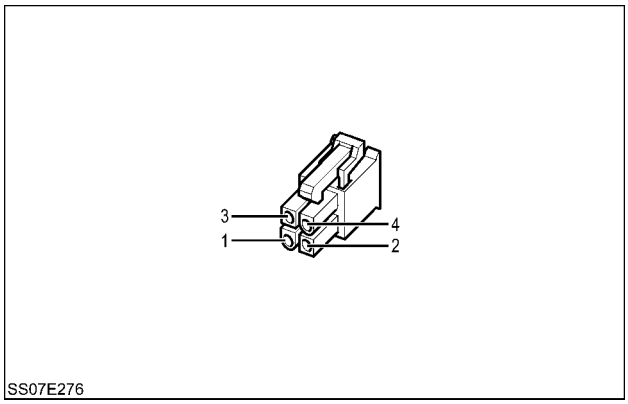
X848 REAR HITCH POSITION / DRAFT POTENTIOMETER

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(N)	SIGNAL POSITION OUTPUT REAR
2	(G)	SIGNAL DRAFT OUTPUT REAR
3	(O)	GROUND
4	(U)	SUPPLY +5V

NOTE: For the wiring color code refer to, **Wiring harness - Overview (A.30.A)**.



SS08M197 17



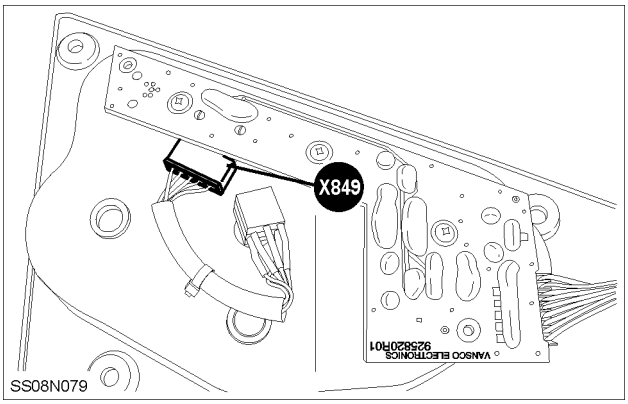
SS07E276 18

IN ARMREST

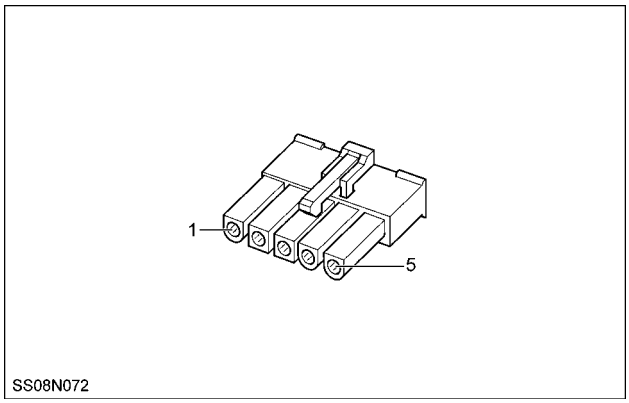
X849 FRONT EDC SETTING

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(S)	SWITCH OUTPUT
2	(R)	SUPPLY SWITCH +5V
3	(Y)	SIGNAL POTENTIOMETER OUTPUT
4	(B)	GROUND
5	(R)	SUPPLY +5V

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08N079 19



SS08N072 20

IN ARMREST

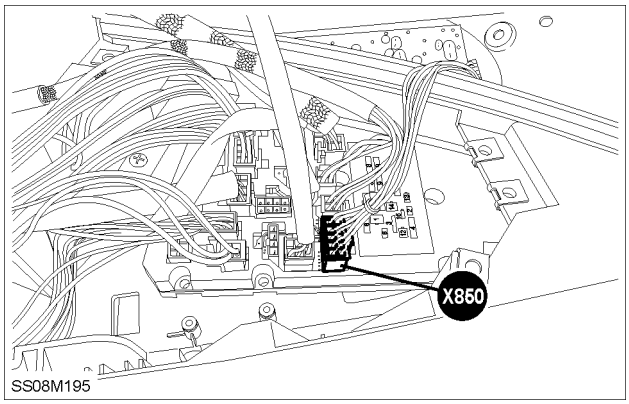
Connector - Component diagram 85

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

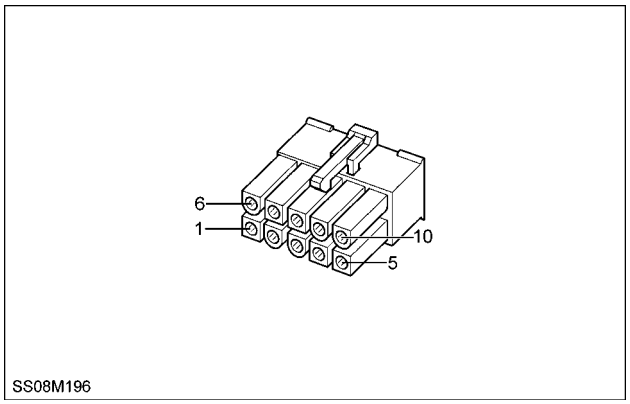
X850 EL. DRAFT CONTROL REAR POTENTIOMETER PANEL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(U)	REAR SENSITIVITY OUTPUT
2	(Y)	REAR DROP RATE OUTPUT
3	(G)	REAR SLIP OUTPUT
4	(O)	REAR HEIGHT LIMIT OUTPUT
5	(B)	GROUND
6	(R)	SUPPLY +5V
9	(W)	FRONT HEIGHT OUTPUT
10	(S)	FRONT HEIGHT ENABLE SWITCH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M195 1



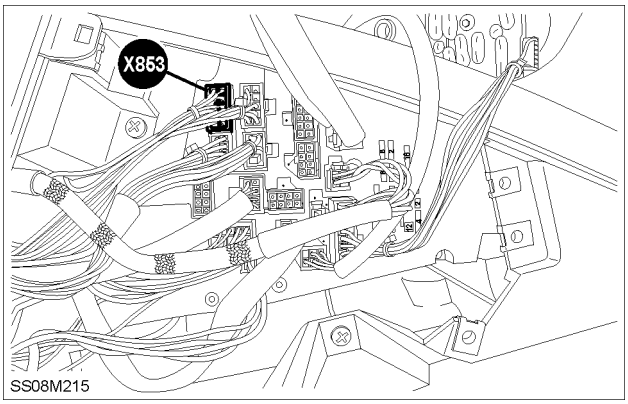
SS08M196 2

IN ARMREST

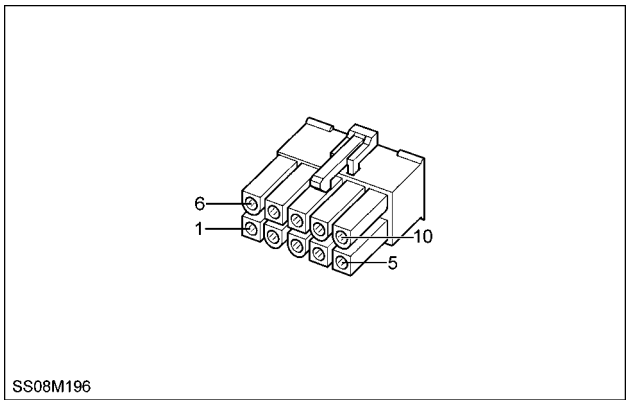
X853 EL. HYDRAULIC REMOTE 1&2 CONTROL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(G)	EHR2 POTENTIOMETER SIGNAL OUTPUT TRACK 1
2	(G)	EHR1 POTENTIOMETER SIGNAL OUTPUT TRACK 1
3	(B)	GROUND
4	(R)	SUPPLY +5V
5	(B)	GROUND
6	(R)	SUPPLY +5V
7	(W)	EHR2 POTENTIOMETER SIGNAL OUTPUT TRACK 2
8	(W)	EHR1 POTENTIOMETER SIGNAL OUTPUT TRACK 2

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M215 3



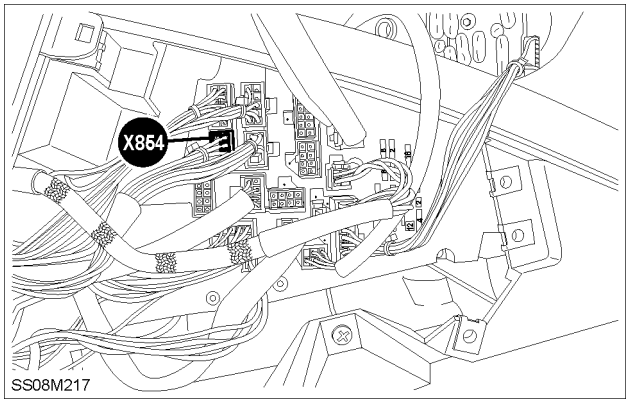
SS08M196 4

IN ARMREST

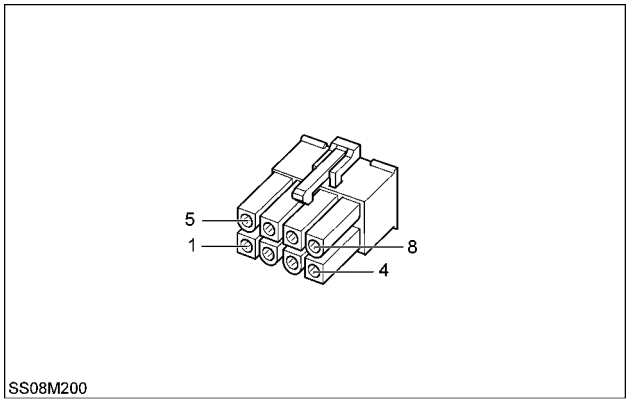
X854 EL. HYDRAULIC REMOTE LAMPS 1&2 SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	(W)	EHR2 TIMER LED OUTPUT
3	(W)	EHR2 MOTOR MODE LED OUTPUT
4	(W)	EHR1 TIMER LED OUTPUT
5	(W)	EHR1 MOTOR MODE LED OUTPUT
6	(W)	LED POWER OUTPUT +12V
7	(W)	EHR2 MOTOR / PROGRAM SWITCH
8	(W)	EHR1 MOTOR / PROGRAM SWITCH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M217 5



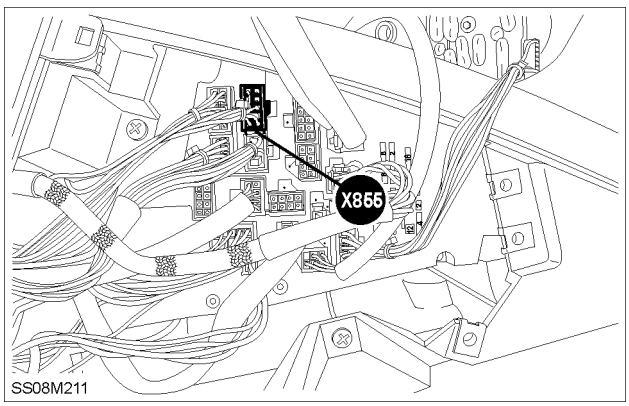
SS08M200 6

IN ARMREST

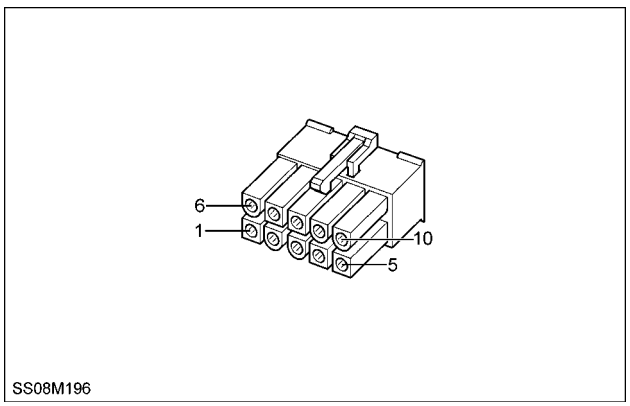
X855 EL. HYDRAULIC REMOTE 3&4 CONTROL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(G)	EHR4 POTENTIOMETER SIGNAL OUTPUT TRACK 1
2	(G)	EHR3 POTENTIOMETER SIGNAL OUTPUT TRACK 1
3	(B)	GROUND
4	(R)	SUPPLY +5V
5	(B)	GROUND
6	(R)	SUPPLY +5V
7	(W)	EHR4 POTENTIOMETER SIGNAL OUTPUT TRACK 2
8	(W)	EHR3 POTENTIOMETER SIGNAL OUTPUT TRACK 2

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M211 7



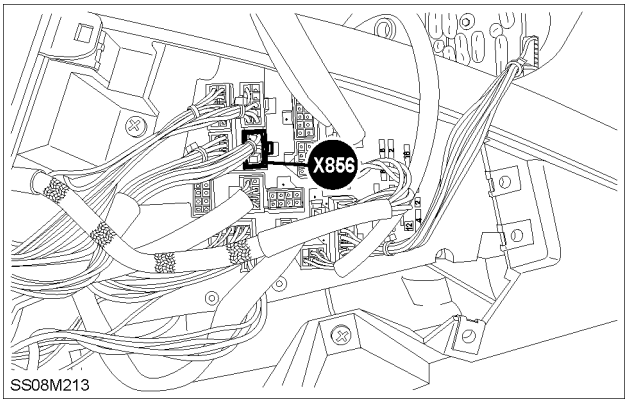
SS08M196 8

IN ARMREST

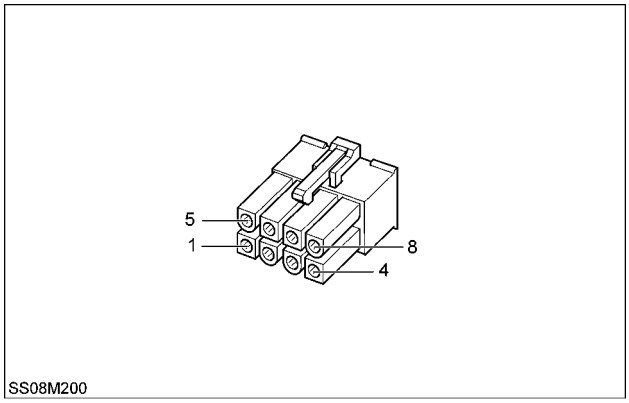
X856 EL. HYDRAULIC REMOTE LAMPS 3&4 SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	(W)	EHR4 TIMER LED OUTPUT
3	(W)	EHR4 MOTOR MODE LED OUTPUT
4	(W)	EHR3 TIMER LED OUTPUT
5	(W)	EHR3 MOTOR MODE LED OUTPUT
6	(W)	LED POWER OUTPUT +12V
7	(W)	EHR4 MOTOR / PROGRAM SWITCH
8	(W)	EHR3 MOTOR / PROGRAM SWITCH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M213 9



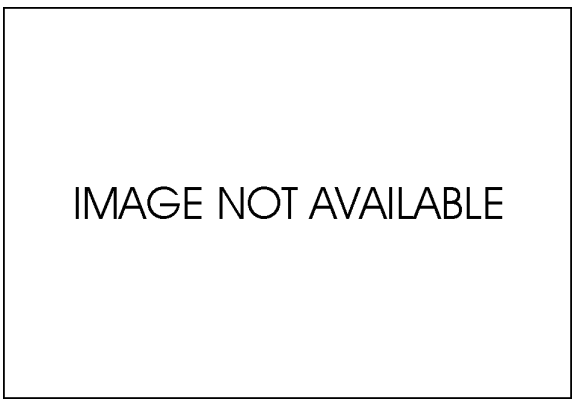
SS08M200 10

IN ARMREST

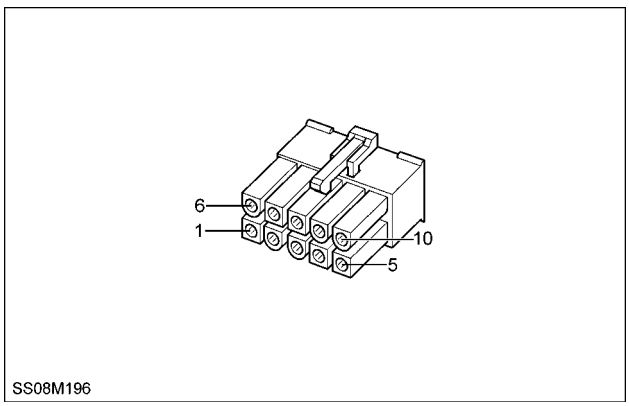
X857 EL. HYDRAULIC REMOTE 5 & 6 CONTROL

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	(G)	EHR6 POTENTIOMETER SIGNAL OUTPUT TRACK 1
2	(G)	EHR5 POTENTIOMETER SIGNAL OUTPUT TRACK 1
3	(B)	GROUND
4	(R)	SUPPLY +5V
5	(B)	GROUND
6	(R)	SUPPLY +5V
7	(W)	EHR6 POTENTIOMETER SIGNAL OUTPUT TRACK 2
8	(W)	EHR5 POTENTIOMETER SIGNAL OUTPUT TRACK 2

NOTE: For the wiring color code refer to, **Wiring harness - Overview (A.30.A)**.



INA 11



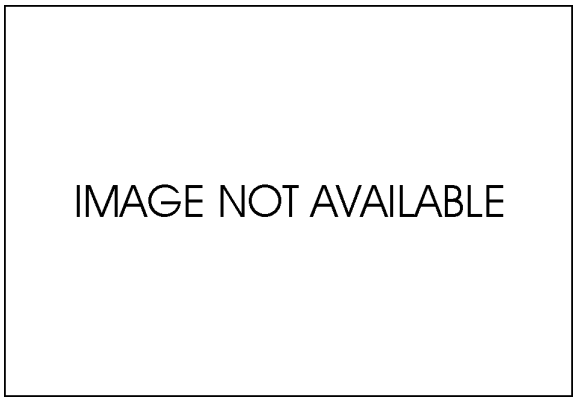
SS08M196 12

IN ARMREST

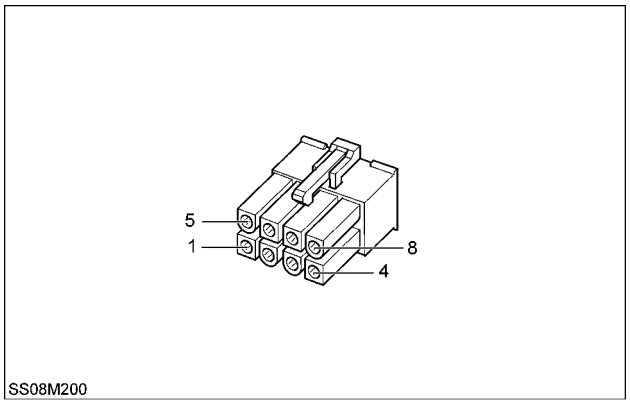
X858 EL. HYDRAULIC REMOTE LAMPS 5 & 6 SWITCH

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	(W)	EHR6 TIMER LED OUTPUT
3	(W)	EHR6 MOTOR MODE LED OUTPUT
4	(W)	EHR5 TIMER LED OUTPUT
5	(W)	EHR5 MOTOR MODE LED OUTPUT
6	(W)	LED POWER OUTPUT +12V
7	(W)	EHR6 MOTOR / PROGRAM SWITCH
8	(W)	EHR5 MOTOR / PROGRAM SWITCH

NOTE: For the wiring color code refer to, **Wiring harness - Overview (A.30.A)**.



INA 13



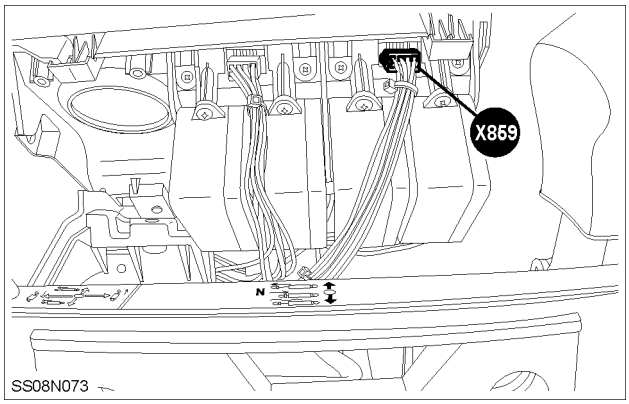
SS08M200 14

IN ARMREST

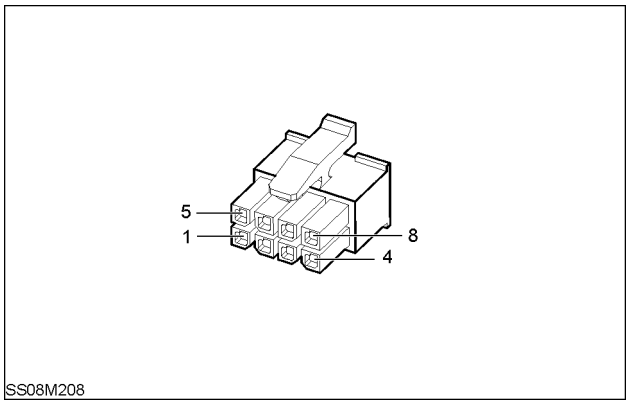
X859 EL. HYDRAULIC REMOTE 1&2 TIMER LED

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	(W)	EHR2 TIMER LED OUTPUT
3	(W)	EHR2 MOTOR MODE LED OUTPUT
4	(W)	EHR1 TIMER LED OUTPUT
5	(W)	EHR1 MOTOR MODE LED OUTPUT
6	(W)	LED POWER OUTPUT +12V
7	(W)	EHR2 MOTOR / PROGRAM SWITCH
8	(W)	EHR1 MOTOR / PROGRAM SWITCH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08N073 15



SS08M208 16

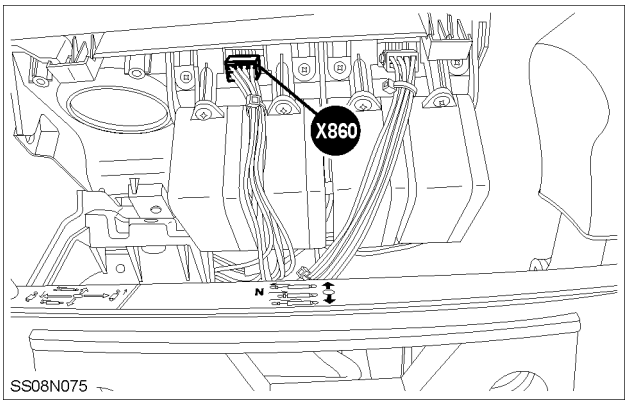
Connector - Component diagram 86

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

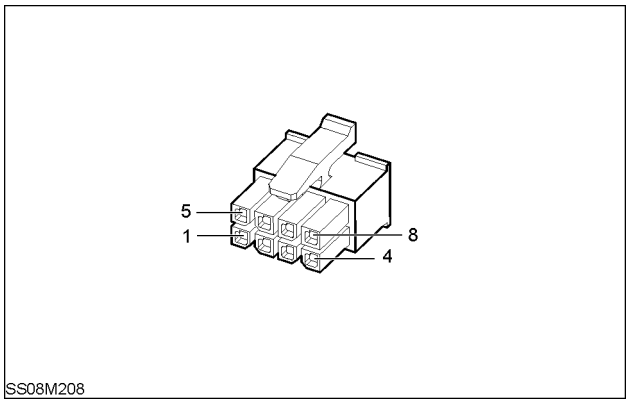
X860 EL. HYDRAULIC REMOTE 3&4 TIMER LED

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	(W)	EHR4 TIMER LED OUTPUT
3	(W)	EHR4 MOTOR MODE LED OUTPUT
4	(W)	EHR3 TIMER LED OUTPUT
5	(W)	EHR3 MOTOR MODE LED OUTPUT
6	(W)	LED POWER OUTPUT +12V
7	(W)	EHR4 MOTOR / PROGRAM SWITCH
8	(W)	EHR3 MOTOR / PROGRAM SWITCH

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08N075 1



SS08M208 2

IN ARMREST

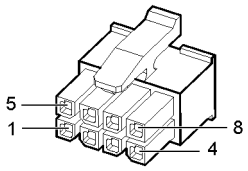
X861 EL. HYDRAULIC REMOTE 5&6 TIMER LED

POS.	WIRE NUMBER	CIRCUIT REFERENCE
2	(W)	EHR6 TIMER LED OUTPUT
3	(W)	EHR6 MOTOR MODE LED OUTPUT
4	(W)	EHR5 TIMER LED OUTPUT
5	(W)	EHR5 MOTOR MODE LED OUTPUT
6	(W)	LED POWER OUTPUT +12V
7	(W)	EHR6 MOTOR / PROGRAM SWITCH
8	(W)	EHR5 MOTOR / PROGRAM SWITCH

NOTE: For the wiring color code refer to, **Wiring harness - Overview (A.30.A)**.

IMAGE NOT AVAILABLE

INA 3



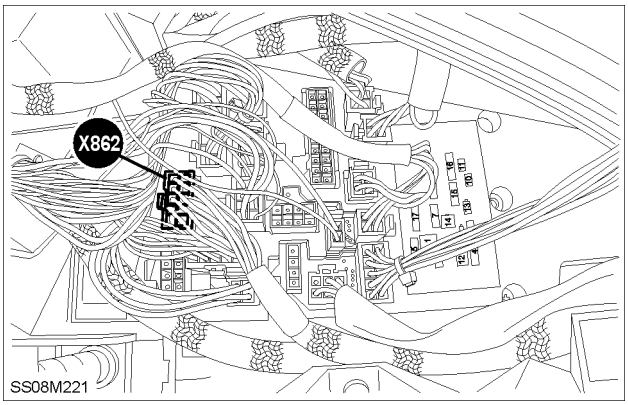
SS08M208

SS08M208 4

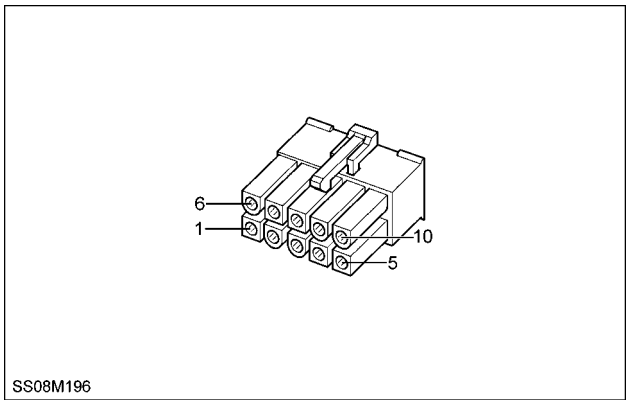
X862 GARU PCB SWCD

POS.	WIRE NUMBER	CIRCUIT REFERENCE
1	5500J (R)	EHR CAN HIGH
2	5510J (U)	EHR CAN LOW
3	5000 (L)	EDC MEMORY POWER
4	7000AT (U)	TRANS CONTROL SUPPLY
6	5900F (Y)	ISO BUS CAN SIGNAL LOW
7	5910F (G)	ISO BUS CAN SIGNAL HIGH
8	57 (B)	EARTH (ALL)
9	5955 (Y)	RS232 INPUT TECU
10	5960 (Y)	RS232 OUTPUT TECU

NOTE: *For the wiring color code refer to,* ***Wiring harness - Overview (A.30.A)****.*



SS08M221 5



SS08M196 6

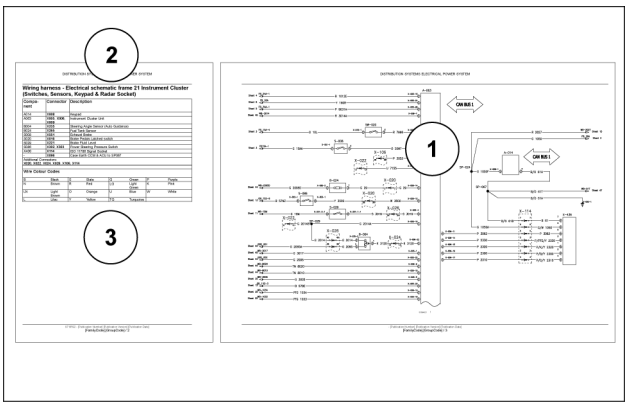
IN ARMREST

Wiring harness - Static description

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

The wiring diagrams have been drawn in a horizontal style. They have been divided into sub sections whereby an individual function is contained to one sheet wherever possible. The diagrams are split into various build configurations depending on the type of transmissions fitted, cab controls and type of hydraulic remote valves.
There are a number of guides to help assist in reading and understanding the wiring diagrams.

1. The wiring diagrams **(1)** are designed to be read in a landscape format. The titles and diagram keys **(2)** are located on the opposite pages along with the wire colour code table, **(3)** which is located below the key.
   The title and key details the frame number and frame decription. The key then details all the components used within that particular page.



SS09B053 1

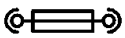
2. Every component and connector has its own unique reference number.
3. Every wire has a code assigned to it, this code refers to its function, the code is also physically marked on the actual wire. A key of all wire codes can be found in this section, refer to **Wiring harness - Overview (A.30.A)**. Letters before the number indicate the wire colour. For example, 'B, 57' indicates that the wire colour is black and the wire reference of 57, indicates it is a ground (earth) wire.
4. The wiring diagrams are drawn in sections according to a vehicle function. However where a single component is used in a number of circuits such as a processor or multi function switch, it is drawn either on its own or on the circuit which it influences the most.
5. The wiring is drawn with the battery and all of the power supplies, ie, fuses and relays in the opening pages. Each supply is then given a reference to the page of the associated function. On the referenced page there will be a corresponding reference back to the power supply page.
   As an example, the references are written as 'WB055 sheet 14'. The WB055 is a unique sequential reference (WB is an abbreviation for Wire Break), and the Sheet 14 is the location for the continuation of the circuit.
6. The components, ie, switches, solenoids, etc, are given an identifying reference within the drawing and to easier identify the type of component a key is provided before a numerical reference. For example a switch will have the prefix, 'S-' a solenoid will have the prefix 'Y-'. The table below provides a complete listing of these codes. Each component will also have another number assigned to each terminal, for example 'X377-7', this is the connector number reference and pin reference for that connector.

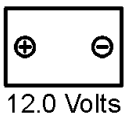
Component Type	Component reference
Alternator	G-002
Audible Device	H-001
Battery	G-001
Circuit Breaker	Q-001
Connector	X-001
Capacitor	C-001
Diode	V-001
Mini Fuse	F-001
Maxi Fuse	MF-001
Power Fuse	PF-001
Ground	GND-001
Lamp	E-001
Module	A-001
Motor	M-001
Relay	K-001
Resistor	R-001
Sensor / Sender	B-001
Solenoid / Injector	Y-001
Splice	SP-001
Switch	S-001
Sockets	J-001
Splice Blocks, Antenna	W-001
Sub - Assembly	Z-001

Wire Break Description	Abbreviation
Wire Break	WB-001
Mini Fuse Break	FB-001
Maxi Fuse Break	MFB-001
Mega Fuse Break	MGFB-001
Power Fuse Break	PFB-001
Ground Break	GB-001

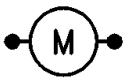
Wiring harness - Electrical symbol

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]


Fuse



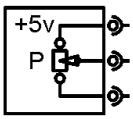
Battery



Motor


Earth / Ground Point

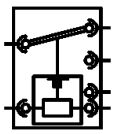

L.E.D. (Light emitting diode)

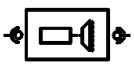


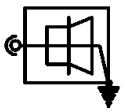
Potentiometer or Sensor

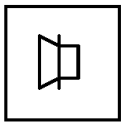

Lamp


Connector

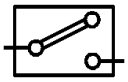

Timer Relay

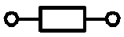

Electrical Clutch AC


Horn

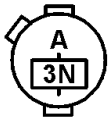

Speaker


Diode


Switch


Resistor

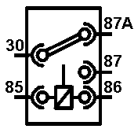

Solenoid



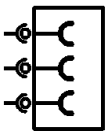
Alternator


Page Break


Pressure Switch



Relay


Sockets

Wiring harness - Overview

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Wire Colour Codes							
B	Black	S	Slate (Grey)	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		

Wire Code References

CIRC	COLOUR	DESCRIPTION
1	R	BATTERY SUPPLY
10	G	IGNITION SUPPLY
11	G	IGNITION SUPPLY (2ND)
12	U	MAIN BEAM HEADLAMP FUSE SUPPLY
13	U	DIP BEAM HEADLAMP FUSE SUPPLY
15	U	LIGHTING SWITCH SUPPLY
28	Y	WIPER MOTOR (PARK RETURN)
29	G	MAIN FUEL SENDER SIGNAL
31	Y	ENGINE OIL PRESSURE SENDER SIGNAL
39	G	TEMPERATURE GAUGE SIGNAL
44	L	FLASHER UNIT (49A)
49	G	RIGHT HAND TURN SIGNAL
50	G	LEFT HAND TURN SIGNAL
56	W	WIPER MOTOR-HIGH
57	B	EARTH (ALL)
58	R	WIPER MOTOR-LOW
60	B/W	SENSOR GROUND
61	B	CASE GROUND
63	U	WIPER MOTOR-PARK FEED
65	W	DUAL POWER/4 WHEEL DRIVE SWITCH FEED
71	W	IGNITION SWITCHED FEEDS (UNFUSED)
84	G	WINDSHIELD WASHER SWITCH FEED
90	G	DUAL POWER / FOUR WHEEL DRIVE SWITCH
97	LG	WINDSHIELD WASHER FEED
137	W	RADIO FEED
138	P	RADIO KAM
150	N	BATTERY FEED (ALL)
155	G	BATTERY FEED (FUSED)
160	U	BATTERY SUPPLY ELECTRONICS
170	K/N/B	BATTERY ISOLATOR CONTROL SWITCH
171	W/TQ/B	BATTERY ISOLATOR RELAY COIL
172	W/TQ/Y	BATTERY ISOLATOR RELAY COIL (OFF)
173	W	BATTERY ISOLATOR RELAY COIL +12V
181	G	BLOWER MOTOR FEED
182	P	THERMOSTATIC SWITCH FEED
249	LG	SMV LAMPS RH
250	LG	SMV LAMPS LH
252	N	ALTERNATOR FIELD
349	LN	TRAILER TURN LAMPS RH
350	LN	TRAILER TURN LAMPS LH
365	G	LOW FUEL WARNING LAMP (DELAY ON)
366	O	LOW FUEL WARNING LAMP (DELAY SWITCH)

CIRC	COLOUR	DESCRIPTION
376	P	HORN FEED
587	LG	WINDSHIELD WIPER INTERMITTENT DELAY
649	O	COOLANT TEMPERATURE SWITCH
650	TQ	COOLANT LEVEL SWITCH
666	P	DOMELAMP SWITCH FEED
787	G	AUXILIARY FUEL PUMP SUPPLY
810	G	STOPLAMPS
820	R	STOPLAMP SWITCH LH
825	Y	PNEUMATIC TRAILER SOLENOID +12V
830	U	STOPLAMP SWITCH RH
840	G	R & L STOPLAMP SIGNAL
976	W/N/B	LICENCE PLATE LAMP / WORKLAMP DIODE
978	W	LICENCE PLATE LAMP
979	S	BLOWER MOTOR HIGH SPEED (4th)
980	N	THERMOSTAT SWITCH SUPPLY
981	G	A/C CLUTCH RELAY FEED
982	G	BLOWER MOTOR FEED
984	P	TEMPERATURE CONTROL POT. INPUT
986	P	TEMPERATURE CONTROL POT. OUTPUT
989	P	BLOWER MOTOR MEDIUM SPEED (2nd)
996	P	BLOWER MOTOR HIGH SPEED (3RD)
997	G	WORK LAMP-REAR FEED (OUTER)
998	G	WORK LAMP-REAR FEED (INNER)
999	G	BLOWER MOTOR LOW SPEED (1st)
1000	W	SAFETY START SWITCH SUPPLY
1001	W	STARTER SOLENOID FEED
1002	P	IMPLEMENT LAMP SWITCH SUPPLY
1003	G	SUPPLY TO GAUGES
1004	G	SUPPLY TO HORN AND HEADLAMP FLASH
1005	S	AIR CLEANER WARNING LAMP
1006	N	ALTERNATOR WARNING LAMP
1007	W	ETHER START BUTTON SUPPLY
1008	N	ETHER START SOLENOID SUPPLY
1009	N	ALTERNATOR FIELD
1010	G	IGNITION RELAY (COIL)
1011	Y	SUPPLY TO FUSES
1012	R	ILLUMINATION
1013	R	RIGHT HAND LAMPS
1014	R	LEFT HAND LAMPS
1015	P	DOME LAMP SWITCH FEED
1016	P	HORN FEED
1017	LG	AIR CON. THERMOSTATIC SWITCH FEED
1018	LG	AIR CONDITIONER CLUTCH
1019	G	WINDSHIELD WIPER FEED
1020	G	HAZARD SWITCH SUPPLY
1021	P	HAZARD SWITCH SUPPLY (BATTERY)
1022	N	THERMOSTART
1023	N	LIGHT SWITCH FEED
1024	R	RIGHT & LEFT HAND SIDELAMP FEED
1025	G	HZD SWITCH IGN FEED
1026	U	HIGH BEAM INDICATOR LAMP
1027	U	HEADLAMP MAIN BEAM
1028	U	HEADLAMP MAIN BEAM FUSE
1029	U	HEADLAMP DIP BEAM FUSE
1030	U	HEADLAMP DIP BEAM
1031	R	INSTRUMENT ILLUMINATION

CIRC	COLOUR	DESCRIPTION
1032	LG	TURN SIGNAL WARNING LAMP (TERM C)
1033	LG	TURN SIGNAL WARNING LAMP (TERM C2)
1034	LG	TURN SIGNAL WARNING LAMP (TERM C3)
1035	W	ENGINE OIL PRESSURE WARNING LAMP
1036	N	IGNITION SWITCH (BATTERY)
1037	LG	FLASHER UNIT (TERM 49A)
1038	LN	WINDSHIELD WIPER FEED-REAR
1039	LTG	NASO LIGHTS INPUT
1040	LG	FLASHER SWITCH TO RELAY-RHS CUT OUT
1041	LG	FLASHER SWITCH TO RELAY-LHS CUT OUT
1042	U	RELAY FEED ELECTRONICS
1043	U	RELAY FEED TO FUSES
1044	W/U/S	GRID HEATER FEEDBACK
1050	G	ACCESSORY FEED
1051	Y	SIDE LIGHTS RELAY COIL FEED
1052	Y	GET YOU HOME LIGHTS RELAY
1070	R	FRONT WORKLAMP SWITCH FEED
1071	P	WORKLAMP FRONT FEED
1072	P	WORKLAMP FRONT RELAY SUPPLY
1073	P	WORKLAMP FRONT FEED
1080	R	FRONT SCREEN HEATER
1082	Y	REAR SCREEN HEATER
1085	N	FRONT SCREEN HEATER RELAY CONTROL
1086	N	REAR SCREEN HEATER RELAY CONTROL
1090	R	REAR WORKLAMP RELAY SIGNAL
1091	R	FRONT WORKLAMP LOWER RELAY SIGNAL
1092	R	FRONT WORKLAMP RELAY SIGNAL
1093	R	FENDER WORKLAMP RELAY SIGNAL
1096	R	WORKLAMP FENDER MOUNTED
1097	R	FEED FRONT WORKLAMP OUTER
1098	W	FRONT WORKLAMP RELAY GROUND
1099	R	FEED FRONT WORKLAMP INNER
1119	G	RR WINDSHIELD WIPER
1120	G	RR WINDSHIELD WIPER PARK RETURN
1121	G	RR WINDSHIELD WASH
1130	N	ENGINE HEATER CONTROL TO IGN SWITCH
1135	G	THERMOSTART WARNING LAMP
1140	K	THERMOSTART INITIATE SIGNAL TO RELAY
1141	N	GRID HEATER +
1142	N	GRID HEATER FUSE TO PWR. RELAY
1143	N	POWER RELAY TO GRID HEATER
1150	N	CAL/SEL SWITCH
1160	R	REVERSE ALARM
1900	LG/B/S	HEATED FRONT WINDSCREEN SW SIGNAL
1901	LN/LG/S	HEATED FRONT WINDSCREEN POWER
1902	O/LN/S	HEATED FRONT WINDSCREEN WARNING LAMP
1903	P/B/S	HEATED REAR SCREEN SW SIGNAL
1904	Y/B/S	HEATED REAR SCREEN POWER
1905	U/W/S	HEATED REAR SCREEN WARNING LAMP
1920	O	LH MIRROR CONTROL SIDE-SIDE
1921	Y	LH MIRROR CONTROL UP-DOWN
1922	G	MIRROR CONTROL COMMON
1923	O	RH MIRROR CONTROL SIDE-SIDE
1924	Y	RH MIRROR CONTROL UP-DOWN
1925	R	MIRROR CONTROL +12V
1927	R	MIRROR ILLUMINATION
1928	R	HEATED MIRROR RELAY COIL +12V FROM SW

CIRC	COLOUR	DESCRIPTION
2001	N	BATTERY TEMPERATURE SENSOR
2002	N	BATTERY TEMP SENSOR (ALT OUTPUT)
2003	W	STARTER SOLENOID FEED
2005	O/U	AIR CON CLUTCH RELAY
2006	U	DE-ICING SWITCH - AIR CONDITIONER
2007	Y/U	AIR CONDITIONER LOW PRESSURE
2008	N/TQ	LIFT PUMP SUPPLY
2009	G	FUEL PUMP SUPPLY
2010	LG	AIRCON PLUG TO DE-ICING SWITCH
2011	P	HORN RETURN
2012	Y	TRANS OIL PRESSURE WARNING LAMP
2013	Y	PTO OVERSPEED WARNING LAMP
2014	G	ENGINE OIL PRESSURE SENDER (+5 VOLT)
2015	W	TACHOMETER SENSOR-SIGNAL
2016	Y	REAR AXLE SPEED SENSOR-SIGNAL
2017	B	BULB TEST (EIC)
2018	B	RADAR PRESENT
2019	B	ENGINE RPM (TACHO MODULE TO TPM)
2020	Y	ENGINE SHUT DOWN (TACHO MODULE TO TPM)
2021	Y	AXLE GROUND SPEED (TACHO MODULE TO TPM)
2022	B	PTO 540/1000 RPM (TACHO MODULE TO TPM)
2023	S	TPM TO EIC (AXLE SPEED DRIVE)
2024	S	RADAR SIGNAL DRIVE
2025	S	AUDIO ALARM CONTROL
2026	S	IMPLEMENT SWITCH SIGNAL
2027	R	RADAR ASSEMBLY (GUN) POWER
2028	G	RADAR ASSEMBLY (GUN) SIGNAL
2029	P	INSTRUMENT MEMORY SUPPLY
2030	N	ELECTRONIC DRAFT CONTROL
2031	Y	RADAR PRESENT
2040	LG	WATER IN FUEL SENSOR
2041	P	FUEL SHUT OFF
2042	O	PTO SOLENOID-REAR
2043	O	PTO SOLENOID-FRONT
2044	O	PTO SOLENOID-FRONT RETURN(-)
2045	O	PTO SWITCH TO MODULE
2046	O	PTO SWITCH (VCC)
2047	O	PTO SWITCH (VCCO)
2048	O	PTO SWITCH (VCCS)
2049	O	PTO SWITCH 1000RPM WARNING LAMP
2050	G	PTO SUPPLY / DOG SUPPLY
2051	O	PTO SOLENOID RETURN (-)
2052	W	PTO LUBE SOL
2053	P	PTO LUBE SOL RETURN
2055	W	PTO SYNCHRO GROUND SPEED ENGAGED
2056	W	PTO FENDER PTO SWITCH ON
2057	W	PTO FENDER SWITCH LH - RH LINK
2059	W	FENDER PTO SWITCH INPUT
2060	O	PTO 540/1000 SWITCH
2062	W	PTO TWIST SENSOR
2065	N	PTO ENGAGED
2068	N	PTO SOFT START
2069	U	PTO MANAGEMENT ON
2070	O	ENGINE SHUT OFF RELAY +12V
2080	O	ENGINE SHUT OFF RELAY
2087	O	EXHAUST BRAKE SOLENOID

CIRC	COLOUR	DESCRIPTION
2090	W/U	STARTER RELAY TO START INHIBIT SWITCH
2095	G	INSTRUMENT SIGNAL GROUND
2100	G	A/C CONDENSER MOTOR FEED
2120	LN	PTO BRAKE SIGNAL
2130	N	PTO BRAKE SOLENOID
2140	O	PTO SPEED SENSOR
2150	P	PTO EXT. SWITCH OFF
2151	K	EPTO DRIVE RELAY UPPER SPEED
2152	K	ESPTO DRIVE RELAY LOWER SPEED
2153	R	ESPTO ACTUATOR UPPER SPEED
2154	N	ESPTO ACTUATOR LOWER SPEED
2155	N	ESPTO ACTUATOR POWER +12V
2156	N	ESPTO ACTUATOR POS SIGNAL
2157	U	ESPTO NEUTRAL
2158	N	ESPTO LOWER SPEED
2159	U	ESPTO UPPER SPEED
2200	G	SERVICE MODE INITIATE
2245	K	PTO FRONT - SWITCH TO MODULE (MOM)
2248	K	PTO FRONT - SWITCH (VCCS)
2250	K	PTO FRONT - SUPPLY
2260	O	PTO FRONT - SPEED SIGNAL
2270	O	PTO FRONT - WARNING LAMP
2300	P	THEORETICAL GROUND SPEED ISO 11786 SKT.PIN#2
2310	P	IN/OUT OF WORK-HPL MODE ISO11786 SKT.PIN#4
2320	P	TRUE GROUND SPEED ISO 11786 SKT.PIN#1
2330	P	PTO SPEED ISO11876 SKT.PIN#3
2500	N	FRONT HITCH SOLENOID
2510	N	FRONT HITCH POSITION SIGNAL
2520	N	FRONT HITCH SET POSITION SIGNAL
2530	N	FRONT HITCH V REF
2540	N	FRONT HITCH +12v IGN
2550	N	FRONT HITCH OVERIDE SWITCH
2556	N/Y/S	FRONT HITCH SWITCH COMMON RAIL
2560	N	FRONT HITCH 0v REF
2570	R	FRONT HITCH RAISE SOLENOID
2571	S	FRONT HITCH RAISE SOLENOID RETURN(-)
2575	W	STEYR EFH TRANSPORT SIGNAL – BOSCH EFH MODULE
2576	W	STEYR EFH WORK SIGNAL – BOSCH EFH MODULE
2577	P	STEYR EFH DIAGNOSTIC LAMP – BOSCH EFH MODULE
2578	G	STEYR EFH TRANSPORT SWITCH – EOLBAU ARMREST
2579	N	STEYR EFH WORK SWITCH – EOLBAU ARMREST
2580	R	FRONT HITCH LOWER SOLENOID
2581	S	FRONT HITCH LOWER SOLENOID RETURN (-)
2582	LG	STEYR - EXT SWITCHES
2583	LN	STEYR - EXT SWITCHES
2584	W	OILMOTOR MODE
2585	LN	EFH RAISE SWITCH
2586	LN	EFH WORK SWITCH
2587	N	EFH EXTERNAL SWITCH +
2588	P	EFH EXTERNAL SWITCH UP
2589	R	EFH EXTERNAL SWITCH DOWN
2590	LN	EXTERNAL SWITCH FHPL UP
2591	LN	EXTERNAL SWITCH FHPL DOWN
2592	N	EFH VALVE DOWN +
2593	N	EFH VALVE DOWN -
2594	O	EFH POSITION SENSOR +
2595	P	EFH POSITION SENSOR SIGNAL

CIRC	COLOUR	DESCRIPTION
2596	R	EFH POSITION SENSOR -
2597	LN	EFH PRESSURE SENSOR SIGNAL
2598	S	EFH ACCUMULATOR 14 BAR
2599	N	EFH ACCUMULATOR 40 BAR
2600	Y	REAR AXLE SPEED MONITOR
3000	G	FLASHER UNIT SUPPLY (TERMINAL 49)
3001	G	LEFT HAND FLASHER CIRCUIT
3002	G	RIGHT HAND FLASHER CIRCUIT
3003	W	RADIO FEED
3004	G	RIGHT HAND TURN SIGNAL WARNING LAMP
3005	G	LEFT HAND TURN SIGNAL WARNING LAMP
3006	G	AUXILIARY FUEL TANK SENDER
3007	G	FUEL GAUGE FEED
3008	U	WORKLAMP WARNING LIGHT
3009	G	FLASHER UNIT SUPPLY B+
3010	R	FOGLAMP FEED
3011	R	FOGLAMP FEED
3012	G	HANDBRAKE WARNING FEED
3013	LG	AUXILIARY FUEL TANK SIGNAL
3014	R	HANDBRAKE WARNING LAMP SIGNAL
3015	P	ACCESSORY SOCKET (POWER)
3016	S	BRAKE FLUID LEVEL SIGNAL
3017	G	EPB SYSTEM FAILURE WARNING LIGHT
3018	G	FLASHER UNIT BUZZER FEED
3019	G	EPB SYSTEM OPERATION STATUS LIGHT
3020	Y	DUAL POWER SOLENOID SUPPLY
3022	Y	DUAL POWER (HIGH) WARNING LAMP
3023	P	EPB SYSTEM BATTERY ISOLATOR INTERLOCK
3024	Y	2WD SOLENOID
3025	Y	FOUR WHEEL DRIVE SOLENOID (MANUAL)
3026	Y	BRAKE PEDAL SWITCH - RIGHT
3027	Y	FOUR WHEEL DRIVE SOLENOID (AUTO)
3028	Y/G	BRAKE PEDAL SWITCH - LEFT
3029	LN	EPB +5V REFERENCE
3030	W	ACCESSORY RELAY SIGNAL
3031	N	EPB +12 HOT
3032	G	EPB +12 IGNITION
3033	O	EPB MOTOR SUPPLY “A”
3034	Y	EPB POSITION SIGNAL
3035	O	EPB MOTOR SUPPLY “B”
3036	O	EPB SHUTTLE PARK SWITCH INPUT
3037	Y	EPB PROPORTIONAL BRAKE SIGNAL
3038	Y	EPB HAND THROTTLE SWITCH
3039	O	EPB SHUTTLE PARK SWITCH OUTPUT
3045	Y	FOUR WHEEL DRIVE WARNING LAMP
3050	P	AUXILIARY FEED CONNECTOR SUPPLY
3051	P	CIGAR LIGHTER SUPPLY
3052	P	DOME LAMP TO DOOR SWITCH
3053	S	SPEAKER RIGHT HAND
3054	S	SPEAKER NEGATIVE RH
3055	S	SPEAKER LEFT HAND
3056	N	SPEAKER NEGATIVE LH
3057	P	PUDDLE LAMP RETURN
3060	P	IMPLEMENT SOCKET RELAY
3061	P	IMPLEMENT SOCKET
3062	P	IMPLEMENT SOCKET SWITCH
3070	P	’B’ PILLAR SKT SUPPLY

CIRC	COLOUR	DESCRIPTION
3073	W	MICROPHONE
3074	B	SCREEN FOR 3073
3075	O	TRAILER SOCKET (ACCESSORY FEED)
3076	O	ACCESSORY SWITCH FEED
3077	Y	RADIO +12VB
3078	O	RADIO +12V ILLUMINATION
3079	R	RADIO +12V IGNITION
3080	P	CONSOLE LAMP
3081	Y	TELEPHONE OUT
3082	O	TELEPHONE OUT 1
3083	N	TELEPHONE MUTE
3084	V	AUXILIARY INPUT COMMON RAIL
3085	W	AUXILIARY INPUT (LEFT CHANNEL)
3086	R	AUXILIARY INPUT (RIGHT CHANNEL)
3087	S	BUTTONS COMMON
3088	G	BUTTONS ‘TELEPHONE’
3089	U	BUTTONS ‘VOICE’
3090	Y	SEAT PUMP SUPPLY
3091	P	SPEAKER RR-RHS +
3092	P	SPEAKER RR-RHS -
3093	S	SPEAKER FRT-RHS +
3094	S	SPEAKER FRT-RHS -
3095	W	SPEAKER FRT-LHS +
3096	S	SPEAKER FRT-LHS -
3097	G	SPEAKER RR-LHS +
3098	G/B	SPEAKER RR-LHS -
3099	TQ	BUTTONS ‘REMOTE’
3100	G	STEERING SENSOR +5v
3120	K	STEERING SENSOR SIGNAL
3140	LG	STEERING SENSOR GROUND
3150	W	HANDBRAKE SWITCH (N.C CONTACT) OFF SIG
3155	W	HANDBRAKE TRANS INTERLOCK
3160	O/G/Y	AUTO GUIDANCE STEERING PRESS SENSOR SIGNAL
3161	O/G/B	AUTO GUIDANCE STEERING PRESS SENSOR RETURN
3163	O/W	AUTO GUIDANCE STEERING SOLENOID VLV R FEED
3164	O/W/B	AUTO GUIDANCE STEERING SOLENOID VLV R RETURN
3165	O/R	AUTO GUIDANCE STEERING SOLENOID VLV L FEED
3166	O/R/B	AUTO GUIDANCE STEERING SOLENOID VLV L RETURN
3167	O/N	AUTO GUIDANCE STEERING PRESSURE SENSOR +5V REF
3168	O/K	AUTO GUIDANCE DUMP SOLENOID FEED (HSD)
3169	O/S	AUTO GUIDANCE DUMP SOLENOID RETURN (CURSEN)
3170	O	FAST STEER SYSTEM (FSS)- ENABLE
3171	O/R	FSS - LAMP
3172	L	FSS - STEERING PROXIMITY SENSOR POSITION
3173	R/G	FSS - HYD. VALVE HIGH SIDE DRIVER
3174	G/B	FSS - HYD. VALVE LOW SIDE DRIVER
3175	W	FSS - POSITION SENSOR PRIMARY POSITIVE
3176	B	FSS - POSITION SENSOR PRIMARY NEGATIVE
3177	U	FSS - POSITION SENSOR SECONDARY COMMON
3178	G/Y	FSS - POSITION SENSOR SECONDARY POSITIVE
3179	N	FSS - POSITION SENSOR SECONDARY NEGATIVE
3180	B	FSS - SAFETY SWITCH
3181	S/O	AUTO GUIDANCE PPS SIGNAL INPUT TO GPS
3185	N/R/Y	AUTO GUIDANCE REMOTE ENGAGE
3186	S	CERES PPS IN
3187	N/O/Y	AUTO GUIDANCE ROADING SELECT
3200	O	SUSPENSION SWITCH FEED

CIRC	COLOUR	DESCRIPTION
3210	U	SUSPENSION SWITCH RETURN
3215	U	SUSPENSION LAMP
3220	O	AXLE HEIGHT SENSOR 5V REF
3230	U	AXLE HEIGHT SENSOR POSITION
3235	O/R/S	ACCELEROMETER SIGNAL
3240	O	RAISE SOLENOID PWR
3250	O	RAISE SOLENOID RET
3260	O	LOWER SOLENOID PWR
3270	O	LOWER SOLENOID RET
3271	U	LOADER RELAY FEED
3272	O	LOADER VALVE #1 OUT
3273	O	LOADER VALVE #1 RETURN
3274	R	LOADER VALVE #2 OUT
3275	R	LOADER VALVE #2 RETURN
3276	G	LOADER VALVE
3277	U	LOADER VALVE #3 COIL
3278	U	LOADER VALVE #3 RELAY
3280	O	SUSPENSION LOCKOUT SOLENOID UPPER
3281	LN	SUSPENSION LOCKOUT SOLENOID UPPER RETURN (-)
3285	LN	SUSPENSION LOCKOUT SOLENOID LOWER
3286	LN	SUSPENSION LOCKOUT SOLENOID LOWER RETURN (-)
3290	O	SUSPENSION LOCKOUT LAMP (OR SOLENOID RET)
3295	LN/U/Y	FRONT SUSPENSION PRESSURE SWITCH SIGNAL
3300	O	SENSE LINE CONTROL SOLENOID
3310	U	RAISE LOCKOUT SOLENOID
3500	W	POWER STEERING PRESSURE SIGNAL
4001	R	TRANSMISSION OIL WARNING LAMP (TEMP)
4002	R	TRANSMISSION OIL WARNING LAMP SWITCH
4010	N	RETURN TO DIG
4011	P	ROTATING BEACON SWITCH SUPPLY
4012	P	ROTATING BEACON FEED
4013	U	TRANS CONTROL FEED
4014	U	FORWARD CLUTCH SOLENOID FEED
4015	U	REVERSE CLUTCH SOLENOID FEED
4016	U	TORQUE CONVERTOR LOCK-UP RELAY FEED
4017	U	TORQUE CONVERTOR LOCK-UP LAMP
4018	S	TORQUE CONVERTOR LOCK-UP SOLENOID FEED
4019	S	HYDRAULIC FILTER BY-PASS SWITCH FEED
4020	S	HYDRAULIC FILTER BY-PASS LAMP
4021	S	BACK-UP ALARM RELAY FEED
4022	S	BACK-UP ALARM FEED
4025	Y	4 IN 1 BUCKET FEED
4040	G	LINK LEVEL SWITCH SUPPLY
4050	W	LINK LEVEL RAISE
4051	W	LINK LEVEL LOWER
4052	W	LINK LEVEL EXTEND SIDE
4053	W	LINK LEVEL RETRACT SIDE
4054	W	LINK LEVEL SAFETY VALVE (DUMP)
4055	W	LINK LEVEL TOP LINK EXTEND SOLENOID
4056	W	LINK LEVEL TOP LINK RETRACT SOLENOID
4057	W	LINK LEVEL RIGHT LINK RAISE SOLENOID
4058	W	LINK LEVEL RIGHT LINK LOWER SOLENOID
4060	W/G/Y	HYDRAULIC SELECT FRONT
4061	W/R/Y	HYDRAULIC SELECT REAR
4100	TQ	TRANS RANGE ENABLE SWITCH SUPPLY
4101	TQ	TRANS RANGE ENABLE
4120	P/R	BEACON RELAY COIL

CIRC	COLOUR	DESCRIPTION
5000	P	EDC MEMORY POWER
5005	N	EDC KEY SWITCH FEED
5010	B/W	EDC EARTH
5011	B	EDC EARTH CASE RFI
5015	R	EDC CONTROLS BACKLIGHTING
5020	LN	EDC PROC +5V REF VOLTAGE DROP POSN/RATE
5021	K	EDC PROCESSOR REF VOLT (+5V) ROCKSHAFT
5022	K	EDC PROCESSOR REF VOLT +5V QUADRANT
5023	K	EDC PROCESSOR REF VOLT +5V HEIGHT LIMIT
5025	LN	EDC LOWER SIGNAL
5030	LN	EDC RAISE SIGNAL
5035	LN	EDC RETURN REF. VOLTAGE EARTH
5040	LN	EDC DRAFT POSITION
5045	LN	EDC DROP RATE
5050	LN	EDC QUADRANT
5055	LN	EDC CLOCK LINE TO DISPLAY
5060	LN	SERIAL DATA TO CLUSTER
5065	LN	EDC RIGHT PIN
5070	LN	EDC LEFT PIN
5075	K	EDC VOLTAGE TO PINS
5080	K	EDC ROCKSHAFT
5085	K/U	EDC VALVE UP
5087	K	EDC VALVE UP RETURN
5090	K	EDC VALVE DOWN
5095	K	EDC EXTERNAL SWITCH DOWN
5097	K	EDC VALVE DOWN RETURN
5100	K	EDC EXTERNAL SWITCH UP
5105	S	EDC IMPLEMENT STATUS SWITCH
5110	K	EDC LAMP SIGNAL
5115	K	EDC SLIP SIGNAL
5120	K	EDC HEIGHT LIMIT SIGNAL
5125	TQ	EDC RAISE SIGNAL-RAISE WORK SWITCH
5130	TQ	EDC WORK SIGNAL-RAISE WORK SWITCH
5132	TQ	EDC FLOAT
5133	TQ	EDC STOP
5135	TQ	EDC +WHEEL SPEED SIGNAL
5140	TQ	EDC -WHEEL SPEED SIGNAL
5145	TQ	EDC SLIP LIMIT POT
5150	G	EDC EXTERNAL SWITCH SUPPLY
5155	U	EDC LOWER LIMIT POT
5160	TQ	EDC HEIGHT LIMIT POT FEED
5170	LN	SERIAL DATA FROM CLUSTER
5175	R	ADIC KEY PAD DISABLE
5180	TQ	EDC SLIP INDICATOR LAMP
5190	R	HPL INTERLOCK / LIFT-O-MATIC
5200	N	EDC VALVE SUPPLY
5205	N	INTERNAL FENDER HITCH SWITCH - UP
5210	N	EDC VALVE ENABLE
5215	N	INTERNAL FENDER HITCH SWITCH - DOWN
5220	Y	EDC RAISE LAMP
5230	Y	EDC LOWER LAMP
5240	O	EDC RAISE SIGNAL-RAISE WORK SWITCH No.2
5250	O	EDC WORK SIGNAL-RAISE WORK SWITCH No.2
5260	LN	HYDRAULIC MASTER SW #1
5265	LN	HYDRAULIC MASTER SW #2
5270	N	JOYSTICK LED – FRONT
5300	K	ECU FLASH PROGRAM SIGNAL

CIRC	COLOUR	DESCRIPTION
5400	Y	CAN H
5420	G	CAN L
5500	Y	EHR CAN HIGH
5510	G	EHR CAN LOW
5515	S	EHR +12V IGN.
5520	LG	EHR 5V Ref
5521	LG	EHR Motor #1
5522	LG	EHR Motor #2
5523	LG	EHR Motor #3
5524	LG	EHR Motor #4
5531	LG	EHR NEUTRAL SWITCH VALVE #1
5532	G	EHR NEUTRAL SWITCH VALVE #2
5533	K	EHR NEUTRAL SWITCH VALVE #3
5534	LG	EHR NEUTRAL SWITCH VALVE #4
5535	LG	EHR FLOAT SWITCH VALVE#1
5536	LN	EHR FLOAT SWITCH VALVE#2
5537	N	EHR FLOAT SWITCH VALVE#3
5538	O	EHR FLOAT SWITCH VALVE#4
5541	O	EHR MAX.FLOW SWITCH VALVE #1
5542	B	EHR MAX.FLOW SWITCH VALVE #2
5543	S	EHR MAX.FLOW SWITCH VALVE #3
5544	TQ	EHR MAX.FLOW SWITCH VALVE #4
5551	O	EHR POTENTIOMETER SIGNAL VALVE#1
5552	U	EHR POTENTIOMETER SIGNAL VALVE#2
5553	W	EHR POTENTIOMETER SIGNAL VALVE#3
5554	U	EHR POTENTIOMETER SIGNAL VALVE#4
5561	O	EHR TIMED FLOW SWITCH #1
5562	O	EHR TIMED FLOW SWITCH #2
5563	O	EHR TIMED FLOW SWITCH #3
5564	P	EHR TIMED FLOW SWITCH #4
5570	P	FENDER 3RD EHR SWITCH (RES)
5571	P	FENDER 3RD EHR SWITCH (RES)
5572	P	FENDER 3RD EHR SWITCH (RES)
5574	P	FENDER 3RD EHR SWITCH – UP
5576	P	FENDER 3RD EHR SWITCH – DOWN
5580	TQ	JOYSTICK REAR LAMP (MC)
5585	TQ	JOYSTICK FRONT LAMP (MC)
5591	P	EHR WARNING LAMP#1
5592	P	EHR WARNING LAMP#2
5593	P	EHR WARNING LAMP#3
5594	P	EHR WARNING LAMP#4
5595	S	EHR MASTER STOP SWITCH
5596	S	EHR MASTER STOP LAMP
5597	S	EHR MASTER ENABLE
5600	R	HTS LIVE SIGNAL
5610	R	HTS PROGRAM
5620	R	HTS ON/OFF SWITCH
5625	R	LIFT-O-MATIC SWITCH
5630	R/U/Y	HTS MANUAL SWITCH
5640	R/S/Y	HTS AUTO SWITCH
5700	W	EHR J-STICK X+
5710	W	EHR J-STICK X ACTIVE SWITCH
5720	W	EHR J-STICK X FULL FLOW SWITCH
5730	W	EHR J-STICK X FLOAT SWITCH
5740	W	EHR J-STICK Y+
5750	W	EHR J-STICK Y ACTIVE SWITCH
5760	W	EHR J-STICK Y FULL FLOW SWITCH

CIRC	COLOUR	DESCRIPTION
5770	W	EHR J-STICK Y FLOAT SWITCH
5820	S	EDC ROCKSHAFT POT
5830	S/R/Y	HIGH FLOW PUMP LINK
5835	S/U/Y	HYDRAULIC MASTER SWITCH HIGH FLOW PUMP LINK
5840	W	FRONT HITCH DETECT INPUT
5900	G	ISO BUS CAN SIGNAL LOW
5910	Y	ISO BUS CAN SIGNAL HIGH
5915	B	ISO BUS CAN SUPPLY GROUND
5920	R	ISO BUS CAN SUPPLY POSITIVE
5930	LN	ROTARY ENCODER SUPPLY
5935	O	ROTARY ENCODER SIGNAL - "HOME"
5940	O	ROTARY ENCODER SIGNAL - "ESC"
5945	TQ	ROTARY ENCODER SIGNAL - "P1"
5950	TQ	ROTARY ENCODER SIGNAL - "P2"
5955	B/LN	RS232 INPUT T.E.C.U.
5960	W/LN	RS232 OUTPUT T.E.C.U.
5962	R	USB + 5V REF.
5964	W	USB DATA -
5966	G	USB DATA +
5968	B	USB GROUND
5970	O	ISO BUS ECU SIGNAL
5975	O	ISO RELAY 2 POWER OUT
5980	U	ISO BUS IMPLEMENT SIGNAL
5985	U	ISO RELAY 1 POWER OUT
5990	O	ROTARY ENCODER SIGNAL - "ENTER"
6000	K	ENGINE SPEED SIGNAL
6001	B	ENGINE ECU RESISTOR #1
6002	W	ENGINE ECU RESISTOR #2
6003	R	ENGINE ECU RESISTOR #3
6004	G	ENGINE ECU RESISTOR #4
6057	TQ	ENGINE STARTER RELAY GROUND
6010	Y	THROTTLE POSITION SWITCH
6100	U	ENGINE COLD ADVANCE CONTROL
6200	R	MANIFOLD (GRID) HEATER SUPPLY
6300	N	FAN SPEED
6305	N	REVERSIBLE FAN OPTION - MOTOR FEED
6310	N	FAN SOLENOID
6315	N	REVERSIBLE FAN OPTION - RELAY CONTROL
6320	N	FAN SPEED SENSOR 5V REF.
6325	N	REVERSIBLE FAN OPTION - RELAY FEED
6327	R	REVERSIBLE FAN RELAY POWER OUT
6330	N	VISTRONIC FAN INPUT
6331	O	FAN SPEED SENSOR GROUND
6355	N	+5V LOW POWER REFERENCE
6400	LN	ECU BATTERY SUPPLY
6401	G	ECU TO THROTTLE POT.+5V
6402	G	ECU TO THROTTLE POT. VAR
6403	G	ECU TO THROTTLE POT.-
6404	G	THROTTLE POT. TO LOW IDLE SWITCH
6405	G	ECU TO THROTTLE POT. SWITCH
6407	O/Y/B	ENGINE SHUTDOWN SIGNAL (EDC16)
6408	G	FUSED B+ TO ECU (1)
6409	G	FUSED B+ TO ECU (2)
6410	G	FUSED B+ TO ECU (3)
6411	G	FUSED B+ TO ECU (4)
6413	O	ENGINE SHUTDOWN RELAY SUPPLY
6414	G	FUSED IGN.+ TO ECU

CIRC	COLOUR	DESCRIPTION
6415	G	ECU TO J1939 INTERFACE CAN#1 CONN.(HI)
6416	G	ECU TO J1939 INTERFACE CAN#1 CONN.(LO)
6417	N/A	SCREEN BRAID FOR 6415 & 6416
6418	K	ECU TO J1941(ISO) INTERFACE #2 CONNECTOR ISO K
6419	K	ECU TO J1941(ISO) INTERFACE #2 CONNECTOR ISO L
6420	K	ECU SINK DRIVER#6 TO DIAGNOSTIC LAMP
6421	K	ECU SINK DRIVER#6 TO DIAGNOSTIC LAMP
6422	K	ENGINE MOUNTED B- TO ECU (1)
6423	K	ENGINE MOUNTED B- TO ECU (2)
6424	K	ENGINE MOUNTED B- TO ECU (3)
6425	K	ENGINE MOUNTED B- TO ECU (4)
6427	K	ECU TO MULTIPLE STATE SWITCH (PASS.INPUT#06)
6428	K	ECU TO MULTIPLE STATE SWITCH (PASS.INPUT#06)
6431	K	ECU TO DIAGNOSTIC REQUEST SWITCH (DIG 15)
6432	K	ECU SWITCHED BATTERY OUTPUT TO DIAGNOSTIC REQUEST SWITCH
6440	S	HAND THROTTLE POSITION 1
6450	S	HAND THROTTLE POSITION 2
6460	S	HAND THROTTLE SWITCH (NOT IDLE)
6500	N	CONSTANT ERPM ON/OFF
6510	N	CONSTANT ERPM SET 1
6520	N	CONSTANT ERPM SET 2
6530	N	CONSTANT ERPM INCREASE
6540	N	CONSTANT ERPM DECREASE
6550	N	CONSTANT ERPM SET LAMP
6560	U	ECU TO FUEL FILTER HEATER
6570	G	ECU TO FUEL FILTER HEATER RETURN
6580	K	ECU TO GRID HEATER RELAY#1
6585	O	ECU TO GRID HEATER RELAY#2
6586	P	ECU TO GRID HEATER RELAY RETURN
6590	LG	ECU DIGITAL GROUND
6600	LN	ECU BATTERY SUPPLY
6610	N	ECU IGNITION SUPPLY
6620	O	ECU COOLANT TEMP. SIGNAL
6630	O	ECU COOLANT TEMP. GROUND
6640	O	ECU AC PRESSURE NOT HIGH SWITCH
6650	O	ECU BOOST GROUND
6660	O	ECU BOOST TEMP.
6670	O	ECU 5V BOOST
6680	O	ECU BOOST PRESSURE
6690	O	ECU SOLENOID VALVE SHUT OFF
6700	O	ECU CRANK SHAFT OUTPUT SHAFT
6710	O	ECU ENGINE SPEED
7000	U	TRANS CONTROL SUPPLY
7001	U	TRANS DISPLAY ILLUMINATION
7002	U	TRANS MAIN CLUTCH SOL (C3/C4)
7003	U	TRANS DUMP SOL
7004	U	TRANS FRONT CLUTCH SOL (C1/C2)
7005	U	TRANS CREEPER GR SOL
7007	R	TRANS DUAL POWER PRESSURE SWITCH HIGH
7008	R	TRANS DUAL POWER PRESSURE SWITCH LOW
7009	W	TRANS RANGE DISABLE SWITCH
7010	U	TRANS RANGE INDICATOR SWITCH (GR 1-4)
7020	U	TRANS RANGE INDICATOR SWITCH (GR 5-8)
7022	S	REVERSE ALARM GROUND SIGNAL
7025	R/TQ/Y	TRANS DISPLAY ENABLE

CIRC	COLOUR	DESCRIPTION
7030	U	TRANS RANGE INDICATOR SWITCH COMMON
7035	N	TRANS DUMP SOLENOID FEED
7040	N	TRANS CREEPER SWITCH
7050	R	TRANS RELAY SUPPLY - RUN
7060	R	TRANS RELAY SUPPLY - START
7068	U	TRANS CVT POWER SUPPLY (CVT)
7070	R	TRANS FEED (IGN +)
7071	N	FEED HYD FILTER RESTRICTION IND LAMP
7080	LG	DIFF-LOCK SOLENOID FEED
7090	LG	DIFF-LOCK SWITCH TO BRAKE SWITCH
7100	N	DIFF-LOCK RELAY TO BRAKE SWITCH
7110	R	PTO INHIBITOR SWITCH TO TRANS
7120	Y	DIFF-LOCK WNG LP (MANUAL)
7125	LG	DIFF-LOCK WNG LP (AUTO)
7126	LG	DIFF LOCK PRESSURE SWITCH
7130	N	HYD FILTER WNG LP
7135	N	HYD FILTER PRESSURE SWITCH
7140	O	DIFF-LOCK OFF SOLENOID
7150	S	LOW OIL PRESSURE WRN FEED
7155	U	VANE PUMP PRESSURE SENSOR SIGNAL
7160	R	HYD LOW CHARGE WARNING
7170	W	DIFF LOCK SWITCH (AUTO ON)
7175	Y	DIFF LOCK SWITCH (MANUAL ON)
7180	U	CREEPER SWITCH MOM SIGNAL
7190	K	TRANS SOLENOID VALVE SUPPLY
7195	K	TRANS SOLENOID VALVE RETURN
7196	Y	TRANS FR/REV LOW SIDE RETURN (CVT)
7197	Y	TRANS RANGE LOW SIDE RETURN (CVT)
7198	U	TRANS HYDROSTATIC LOW SIDE RETURN (CVT)
7200	S	TRANSMISSION SHIFT DOWN
7210	S	TRANSMISSION SHIFT UP
7220	S	TRANSMISSION HIGH RANGE
7225	W	TRANS HI RANGE SOL - RET
7230	S	TRANSMISSION LOW RANGE
7235	Y	TRANS LOW RANGE SOL - RET
7240	S	TRANSMISSION DISPLAY SWITCH
7245	LN	DEADMAN
7250	S	TRANSMISSION FORWARD SIGNAL
7260	S	TRANSMISSION REVERSE SIGNAL
7265	K	TRANS NEUTRAL SWITCH TO PROCESSOR (GR.SW 1)
7267	LG	TRANS NEUTRAL SWITCH 2 TO PROCESSOR
7270	R	TCM SERIAL DATA IN-DISPLAY DATA OUT
7275	W	TCM SERIAL DATA OUT-DISPLAY DATA IN
7280	W	LIMP HOME SWITCH 18x18 TRANS.
7290	W	DIRECTIONAL INTERRUPT RELAY TO SOLENOID
7295	W	DRIVE DISABLE SIGNAL
7300	W	SOLENOID 1 18x9 TRANSMISSION
7301	Y	SOLENOID 1 18x9 RETURN
7320	W	SOLENOID 2 18x9 TRANSMISSION
7321	P	SOLENOID 2 18x9 RETURN
7330	W	SOLENOID 3 18x9 TRANSMISSION
7331	Y	SOLENOID 3 18x9 RETURN
7340	W	SOLENOID F1 18x9 TRANSMISSION
7341	Y	SOLENOID F1 18x9 RETURN
7350	W	SOLENOID F2 18x9 TRANSMISSION
7351	S	SOLENOID F2 18x9 RETURN

CIRC	COLOUR	DESCRIPTION
7355	S	SOLENOID R 18x9 TRANSMISSION
7356	U	SOLENOID R 18x9 RETURN
7360	W	SOLENOID A 18x9 TRANSMISSION
7361	P	SOLENOID A 18x9 RETURN
7370	Y	SOLENOID B 18x9 TRANSMISSION
7371	P	SOLENOID B 18x9 RETURN
7380	Y	SOLENOID C 18x9 TRANSMISSION
7381	P	SOLENOID C 18x9 RETURN
7390	Y	SOLENOID PMW (F1) 18x9 TRANSMISSION
7391	P	SOLENOID PWM (F1) 18x9 RETURN
7392	O	SOLENOID PWM (F2) 18x9 TRANSMISSION
7393	O	SOLENOID PWM (F2) 18x9 RETURN
7395	P	SOLENOID CREEP 18x9 TRANSMISSION
7396	P	SOLENOID CREEP 18x9 RETURN
7400	Y	TRANS RPM SPEED SENSOR TO TCM INPUT
7401	P	TRANS RPM SPEED SENSOR
7402	Y	TRANS WHLSP FORWARD (CVT)
7403	Y	TRANS WHLSP REVERSE (CVT)
7404	Y	TRANS HYDROSTAT FORWARD (CVT)
7405	Y	TRANS HYDROSTAT REVERSE (CVT)
7406	LG	TRANS BI-DI SPEED SENSOR RET (CVT)
7407	K	HYDROSTAT 1 SOLENOID +
7408	L	HYDROSTAT 1 SOLENOID GND
7410	Y	TRANS RPM SPEED SENSOR TO TCM OUTPUT
7411	Y/K/B	TRANS HYDROSTAT INPUT SPEED SENSOR (CVT)
7420	Y	TCM TO CLUTCH POSITION SWITCH
7425	Y	DRIVE SIGNAL
7430	Y	CLUTCH POSITION SIGNAL
7431	TQ	CLUTCH 'A' SUPPLY
7440	Y	TCM TO TRACTOR EIC-AXLE OUTPUT
7450	W	TRANS CREEPER INTERLOCK SUPPLY
7460	W	TRANS CREEPER CLUTCH ENGAGED
7470	S	TRANS CREEPER CLUTCH DISENGAGED
7475	R	TRANS AUTO OFF
7476	R	TRANS AUTO ON
7480	G	TRANS AUTO FUNCTION 1
7482	G	TRANS AUTO ON/INCREASE
7485	K	TRANS AUTO FUNCTION LAMP 1
7490	G	TRANS AUTO FUNCTION 2
7492	G	TRANS AUTO OFF/DECREASE
7495	K	TRANS AUTO FUNCTION LAMP 2
7500	G	TRANS OIL TEMP. SENSOR
7520	G	TRANS SENSOR SUPPLY 8v
7525	G	TRANS SENSOR SUPPLY 5v
7560	G	TRANS WARNING LAMP
7570	B/W	SIGNAL GROUND
7579	U	PARKLOCK SWITCH
7580	U	CREEPER SOLENOID MONITOR
7581	O	CREEPER POSITION SIGNAL
7582	U	CREEPER RAIL SWITCH NOT
7583	U	PARKLOCK SWITCH #2
7584	U	PARKLOCK SENSOR SWITCH SIGNAL
7585	U	PARKLOCK SOLENOID #2
7586	U/G/Y	PARKLOCK SOLENOID
7587	U	PARKLOCK OVERRIDE SWITCH
7588	U	PARKLOCK POSITION SIGNAL

CIRC	COLOUR	DESCRIPTION
7589	U	BRAKE PRESSURE SIGNAL
7590	O	TRANS CREEPER GEAR STATUS LAMP
7600	N	TRANS FEATHERING SOLENOID
7620	N	TRANS FEATHERING SOL. MONITOR
7630	N	TRANS MAIN CLUTCH PRESSURE SWITCH
7640	LN	DIAGNOSTIC PLUG RS232 IN
7650	W	DIAGNOSTIC PLUG RS232 OUT
7655	Y/LN	RS232 GROUND
7660	R	TRANS CLUTCH DISCONNECT
7670	R	TRANS FRONT SYNCHRO POSITION
7700	LN	TRANS SHUTTLE DUMP SWITCH
7710	LN	TRANS OIL TEMPERATURE SWITCH
7730	TN	NOT IN PARKLOCK
7735	LN	TRANS MID SPEED SIGNAL +
7740	LN	TRANS MID SPEED SIGNAL -
7750	R	TCM TO DOG 30/40 KPH SELECT
7755	P/G/S	DOG ENABLE
7760	W	TORQUE SENSOR
7770	U	TRANS FORWARD PRESSURE SWITCH
7775	K	B CLUTCH PRESSURE SIGNAL
7780	U	TRANS FORWARD PRESSURE SWITCH
7785	O	A CLUTCH PRESSURE SIGNAL
7790	TQ	TRANS RANGE INPUT DIGITAL FEEDBACK (CVT)
7800	TQ	TRANS FR / REV INPUT DIGITAL FEEDBACK (CVT)
7810	K	TRANS PWM SOLENOID C1
7815	K	TRANS PWM SOLENOID C1 RETURN
7820	K	TRANS PWM SOLENOID C2
7825	K	TRANS PWM SOLENOID C2 RETURN
7830	K	TRANS PWM SOLENOID C3
7835	K	TRANS PWM SOLENOID C3 RETURN
7840	K	TRANS PWM SOLENOID C4
7845	K	TRANS PWM SOLENOID C4 RETURN
7846	TQ	TRANS BRAKE SOLENOID (CVT)
7847	TQ	TRANS HYDROSTATIC - POSITIVE SOLENOID (CVT)
7848	TQ	TRANS HYDROSTATIC - NEGATIVE SOLENOID (CVT)
7850	G	TRANS DIAGNOSTIC PROGRAM VOLTAGE
7855	G	TRANS DIAGNOSTIC EA
7860	G	TRANS DIAGNOSTIC RCV
7865	G	TRANS DIAGNOSTIC XMT
7870	G	TRANS DIAGNOSTIC RTS
7875	K	TRANS DIAGNOSTIC CTS
7880	B/W	T C M SIGNAL GROUND
7890	TQ	TRANS L-LINE DIAGNOSTIC (CVT)
7900	TQ	CLUTCH 'A' SIGNAL
7910	TQ	CLUTCH 'B' SIGNAL
7915	P	TCM CLUTCH B RETURN
7920	TQ	CLUTCH 'C' SIGNAL
7925	P	TCM CLUTCH C RETURN
7930	TQ	CLUTCH 'D' SIGNAL
7935	P	TCM CLUTCH D RETURN
7940	TQ	CLUTCH 'E' SIGNAL
7945	P	TCM CLUTCH E RETURN
7950	TQ	CLUTCH SUPPLY
7960	P	TRANS SLOW/FAST
7965	P	HI/LO SYNCHRO SIGNAL
7970	P	TRANS MED/REV
7980	K	TRANS MED RANGE

CIRC	COLOUR	DESCRIPTION
7982	W	TRANS MED RANGE RET
7985	G	TRANS REVERSE RANGE
7990	K	TRANS BRAKE
7995	K	BRAKE FLUID LEVEL
7996	R	BRAKE PEDALS UNLATCHED SIGNAL
8000	N	TRAILER BRAKE SOLENOID
8010	LN	TRAILER BRAKE PRESSURE
8020	LN	TRAILER BRAKE PRESSURE
8030	LG	TRANS FWD SOLENOID
8035	P	TRANS FWD SOL RET
8040	LG	TRANS REV SOLENOID
8045	P	TRANS REV SOL RET
8050	R	TRANS REV PRESSURE
8060	U	TRAILER BRAKE SUPPLY
8070	P/W/S	TRAILER PARK BRAKE SOLENOID
9000	LN	DIVERTER VALVE
9010	LN	DIVERTER VALVE SUPPLY
9020	LN	HYDRAULIC REMOTE VALVE SOL
9025	LN	HYDRAULIC REMOTE VALVE SWITCH
9027	W	CAL/ SEL INPUT ADIC
9028	W	ADIC MEMORY B+
9031	P	ADIC MEMORY B+
9032	Y	IGN.+ TO POWER SKT.
9033	LN	50KPH SOLENOID+
9034	LN	50KPH SOLENOID-
9035	LN	50KPH DUMP SOLENOID
9036	LN	50KPH DUMP SOLENOID RETURN
9050	L	CN1A 92 -10
9051	L	CN2 98 -13
9200	U	SPARE FUNCTION 97-12
9201	R	SPARE FUNCTION 97-13
9210	G	AC-SWITCH POWER
9211	G	AC-BLOWER SPEED LOW (1)
9212	K	AC-BLOWER SPEED MED.1 (2)
9213	K	AC-BLOWER SPEED MED.2 (3)
9214	G	AC-BLOWER SPEED HIGH.2 (2)
9215	U	AC-SWITCH ON
9216	LTG	AC-TEMPERATURE POTI CAB
9217	N	AC-SWITCH MAX DEFROST
9218	S	AC-SWITCH ECONOMY
9219	U	AC-LOW PRESSURE SWITCH OUTPUT
9220	U	AC-LOW PRESSURE SWITCH INPUT
9221	L	AC-EVAPORATOR TEMPERATURE SENSOR
9222	Y	AC-SIGNAL OUTLET TEMPERATURE SENSOR
9223	R	AC-SIGNAL CAB TEMPERATURE SENSOR
9224	O	AC-SIGNAL AMBIENT TEMPERATURE SENSOR
9225	U	AC-BLOWER SPEED
9226	Y	AC-SIGNAL WATER VALVE
9227	(L/B)	AC-BLOWER SWITCH SUPPLY
9228	G	AC-AUTOMATIC BLOWER SPEED
9229	O	AC-DE-FOG

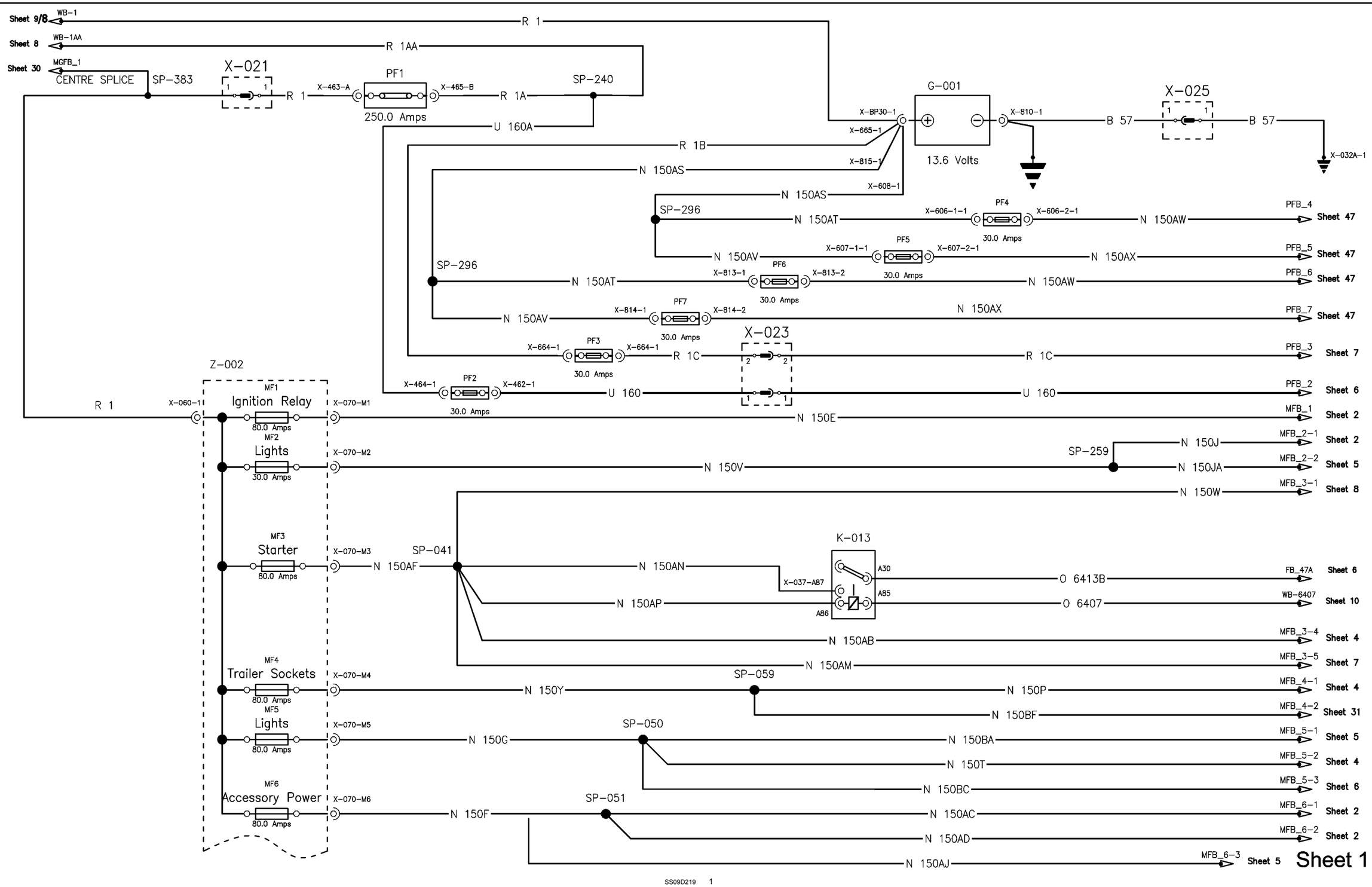
Wiring harness - Electrical schematic frame 01 Power Distribution (Power - Maxi Fuses)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Compo-nent	Connector	Description
G001	**X608**, **X665**, **X815**, XBP30, **X810**	**12 V** Battery
K013	**X037**	Engine Shutdown
MF1	**X060**, **X070**	Supply to F009, F013, F018, F021, F045, F050
MF2	**X070**	Supply to F006, F007, F008, F036, F037, F038
MF3	**X070**	Supply to V019, F030, K005, K013
MF4	**X070**	Supply to F027, K015
MF5	**X070**	Supply to F026, F031, F051
MF6	**X070**	Supply to F001, F002, F003, F004, F005, F044
PF1	**X463**, **X465**	Power Fuse, Main power supply B+ (**250 A**)
PF2	**X462**, **X464**	Power Fuse, Power Supply CCU
PF3	**X664**	Power Fuse, Power Supply Memory
PF4	**X606**	Power Fuse, ISO Bus Rear
PF5	**X607**	Power Fuse, ISO Bus Rear
PF6	**X813**	Power Fuse, ISO Bus Front
PF7	**X814**	Power Fuse, ISO Bus Front
Z002	**X070**	Maxi Fuseholder
-	**X032A**	Earth Header 2
Additional Connectors: **X021**, **X023**, **X025**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


Sheet 9/8
WB-1
R 1
Sheet 8
WB-1AA
R 1AA
Sheet 30
MGFB_1
CENTRE SPLICE
SP-383
X-021
R 1
X-463-A
PF1
X-465-B
250.0 Amps
R 1A
SP-240
U 160A
R 1B
N 150AS
X-BP30-1
X-665-1
X-815-1
X-608-1
G-001
13.6 Volts
X-810-1
B 57
X-025
B 57
X-032A-1
SP-296
N 150AT
X-606-1-1
PF4
X-606-2-1
30.0 Amps
N 150AW
PFB_4
Sheet 47
N 150AV
X-607-1-1
PF5
X-607-2-1
N 150AX
PFB_5
Sheet 47
SP-296
N 150AT
X-813-1
PF6
X-813-2
30.0 Amps
N 150AW
PFB_6
Sheet 47
N 150AV
X-814-1
PF7
X-814-2
30.0 Amps
N 150AX
PFB_7
Sheet 47
X-664-1
PF3
X-664-1
30.0 Amps
R 1C
X-023
R 1C
PFB_3
Sheet 7
Z-002
X-464-1
PF2
X-462-1
30.0 Amps
U 160
U 160
PFB_2
Sheet 6
R 1
X-060-1
MF1
Ignition Relay
80.0 Amps
X-070-M1
N 150E
MFB_1
Sheet 2
MF2
Lights
30.0 Amps
X-070-M2
N 150V
SP-259
N 150J
MFB_2-1
Sheet 2
N 150JA
MFB_2-2
Sheet 5
N 150W
MFB_3-1
Sheet 8
MF3
Starter
80.0 Amps
X-070-M3
N 150AF
SP-041
N 150AN
K-013
X-037-A87
A30
A85
A86
O 6413B
FB_47A
Sheet 6
N 150AP
O 6407
WB-6407
Sheet 10
N 150AB
MFB_3-4
Sheet 4
N 150AM
MFB_3-5
Sheet 7
MF4
Trailer Sockets
80.0 Amps
X-070-M4
N 150Y
SP-059
N 150P
MFB_4-1
Sheet 4
N 150BF
MFB_4-2
Sheet 31
MF5
Lights
80.0 Amps
X-070-M5
N 150G
SP-050
N 150BA
MFB_5-1
Sheet 5
N 150T
MFB_5-2
Sheet 4
N 150BC
MFB_5-3
Sheet 6
MF6
Accessory Power
80.0 Amps
X-070-M6
N 150F
SP-051
N 150AC
MFB_6-1
Sheet 2
N 150AD
MFB_6-2
Sheet 2
N 150AJ
MFB_6-3
Sheet 5
Sheet 1
SS09D219 1

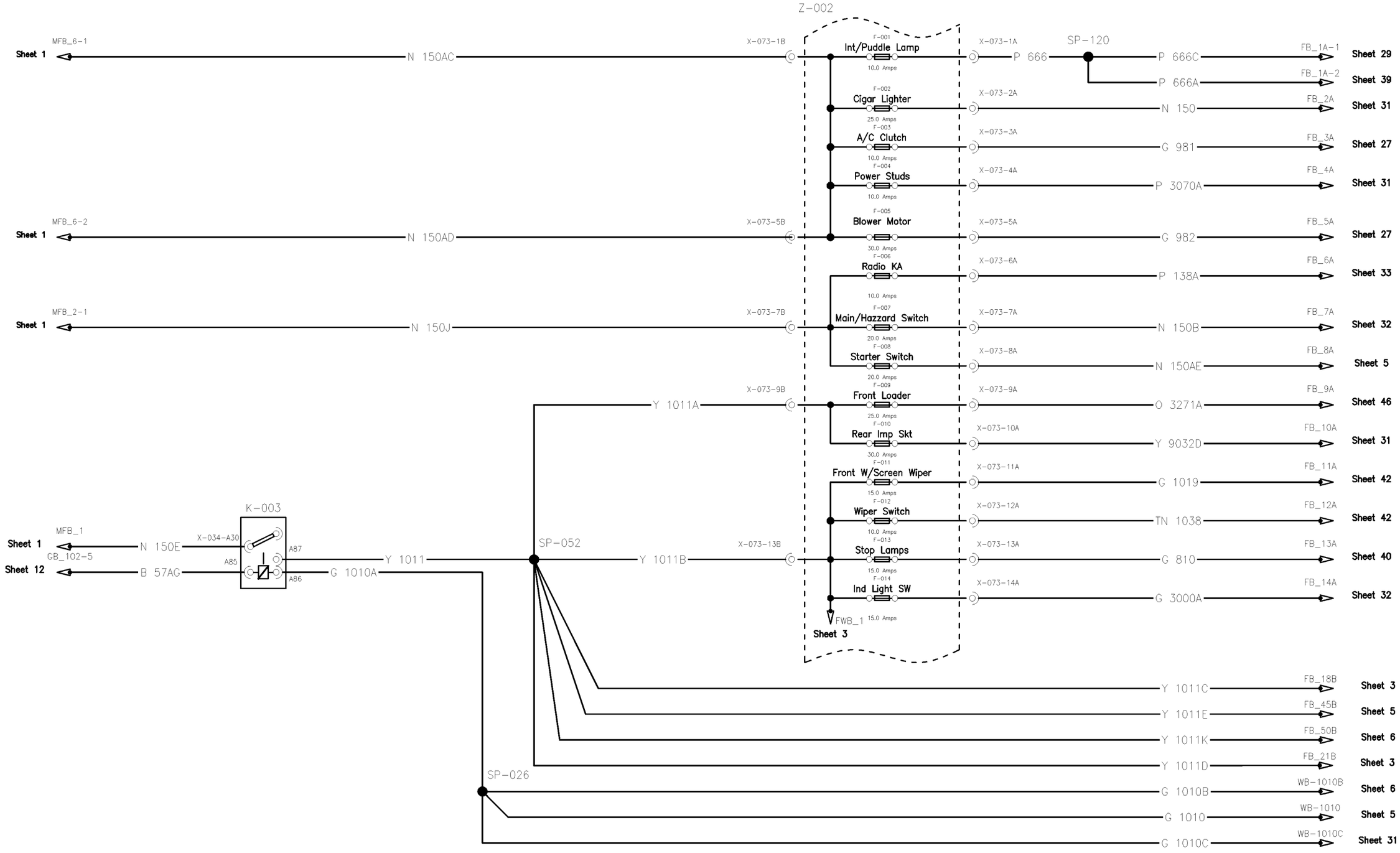
Wiring harness - Electrical schematic frame 02 Power Distribution (Fuses 1 - 14)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
F001	**X073**	Interior and step lighting and relay mirror heating
F002	**X073**	Cigar lighter and power socket, cab (potential 30)
F003	**X073**	Coupling of the A/C compressor
F004	**X073**	Screw terminal red (potential 30)
F005	**X073**	Blower Motor
F006	**X073**	Station memory and work lamp control unit
F007	**X073**	Switch - Main headlights and hazard light switch
F008	**X073**	Starter Switch
F009	**X073**	Front Loader Power
F010	**X073**	Rear Power Socket (Potential 15)
F011	**X073**	Front Windscreen Wiper
F012	**X073**	Rear Windscreen Wiper / Switch, Windscreen Washing System, Front / Rear
F013	**X073**	Relay, Brake Lights
F014	**X073**	Headlight Switch and Flasher
K003	**X034**	Ignition Relay
Z002	**X073**	Fusemodul
Additional Connectors: -		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 2

SS09D220 1

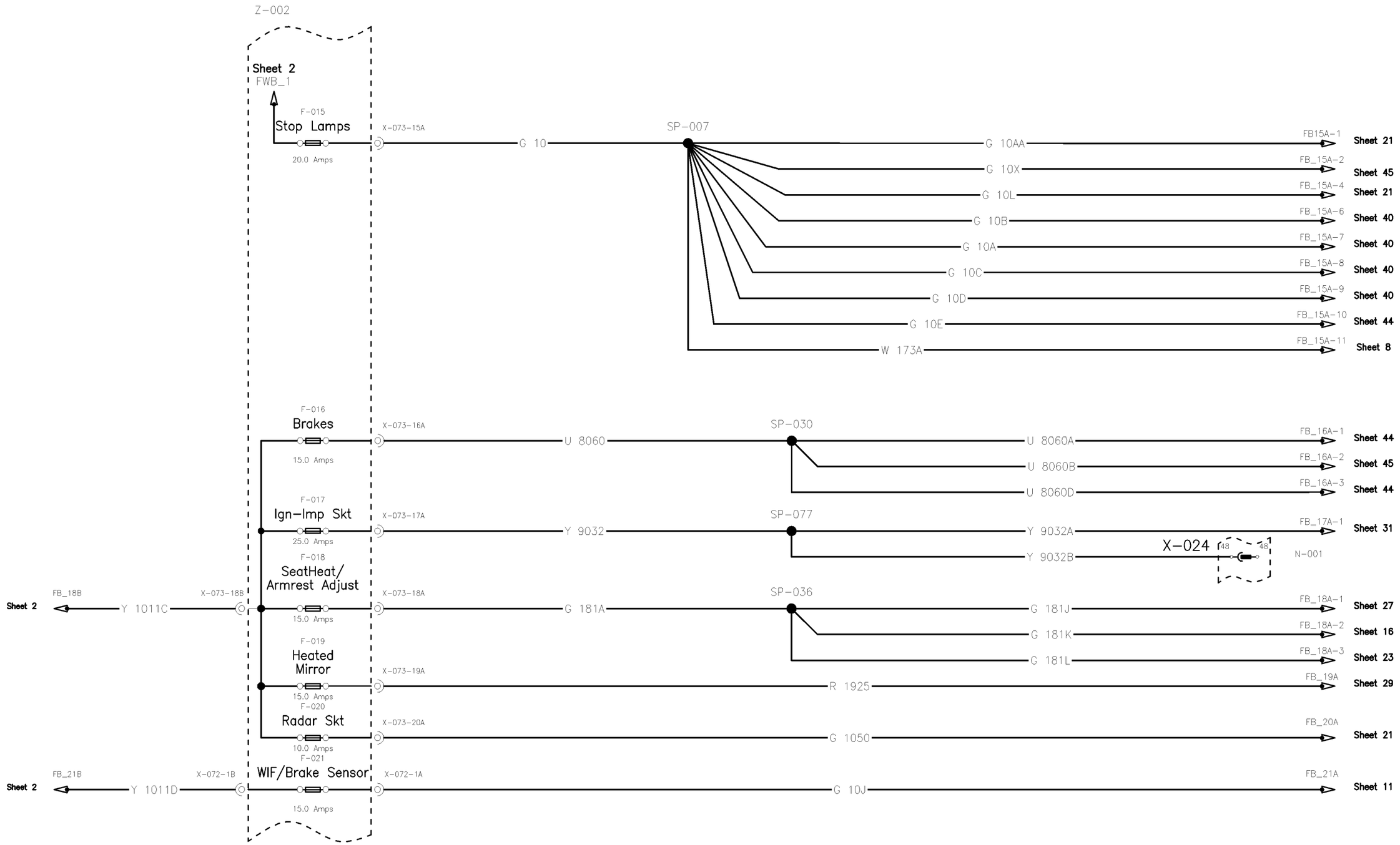
Wiring harness - Electrical schematic frame 03 Power Distribution (Fuses 15 - 21)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
F015	**X073**	Brake light switch and pedal lock
F016	**X073**	Trailer brake
F017	**X073**	Power socket, cab (potential 15)
F018	**X073**	Air blower motor relay and driver’s seat / Armrest adjust
F019	**X073**	Heated mirrors
F020	**X073**	Radar sensor, normal signal socket / keypad
F021	**X072**	Water sensor for the fuel filter, Brake fluid level switch
Z002	**X073**	Fusemodul
Z002	**X072**	Fusemodul
Additional Connectors: **X024**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 3

SS09D221 1

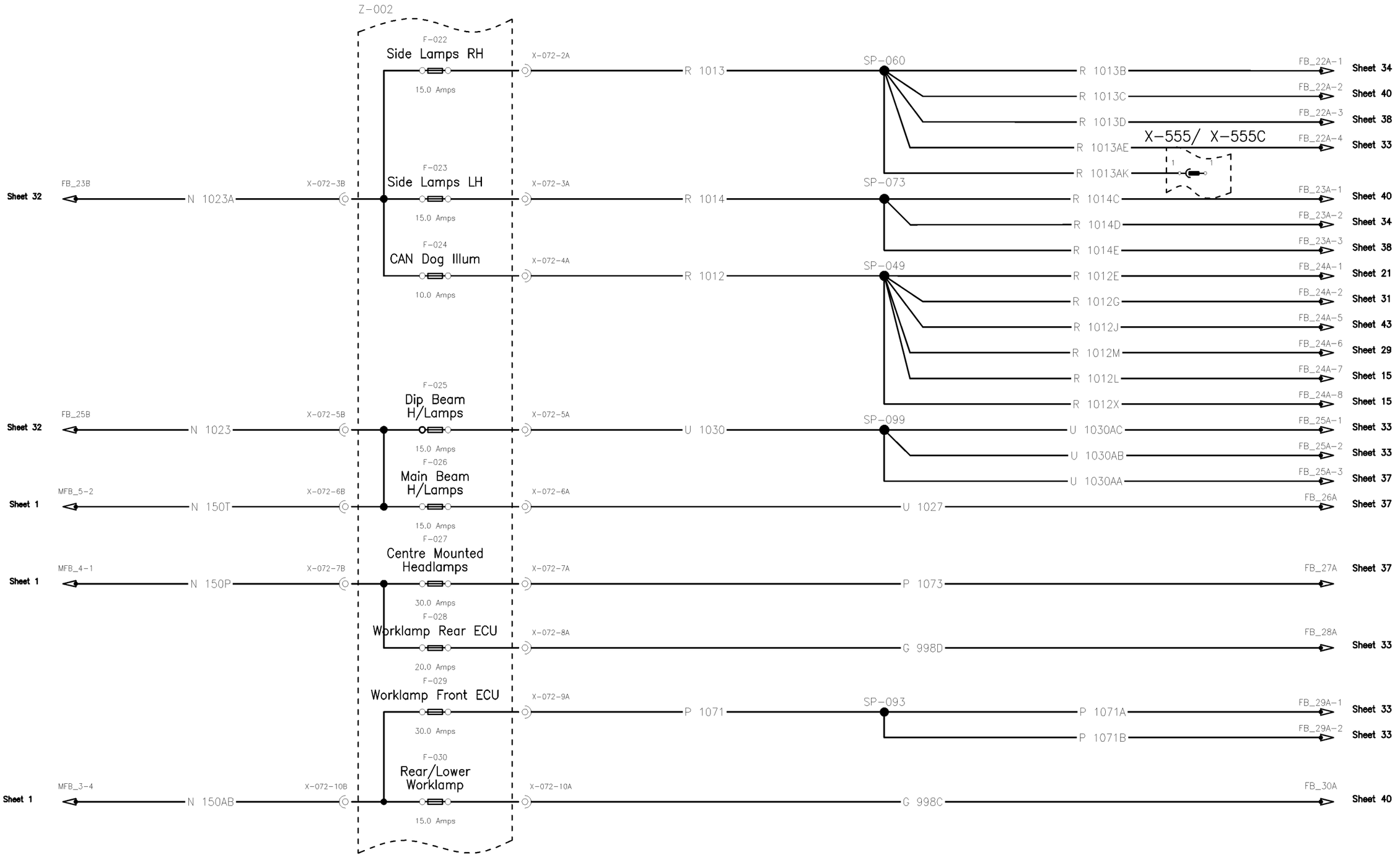
Wiring harness - Electrical schematic frame 04 Power Distribution (Fuses 22 - 30)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
F022	**X072**	Side marker lights, right
F023	**X072**	Side marker lights, left / licence plate lights
F024	**X072**	Illumination - Lighting / cigar lighter - ICU - VT - heated mirror switch - EHR-lock switch
F025	**X072**	Dipped beam headlights relay, get you home
F026	**X072**	Main beam headlights
F027	**X072**	Front work lamp (bonnet)
F028	**X072**	Work lamp control unit / Roof rear worklamps
F029	**X072**	Work lamp control unit / Roof front worklamps and grabrail
F030	**X072**	Work lamp (C-pillar)
Z002	**X072**	Fusemodul
Additional Connectors: **X555**, **X555C**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 4

SS09D222 1

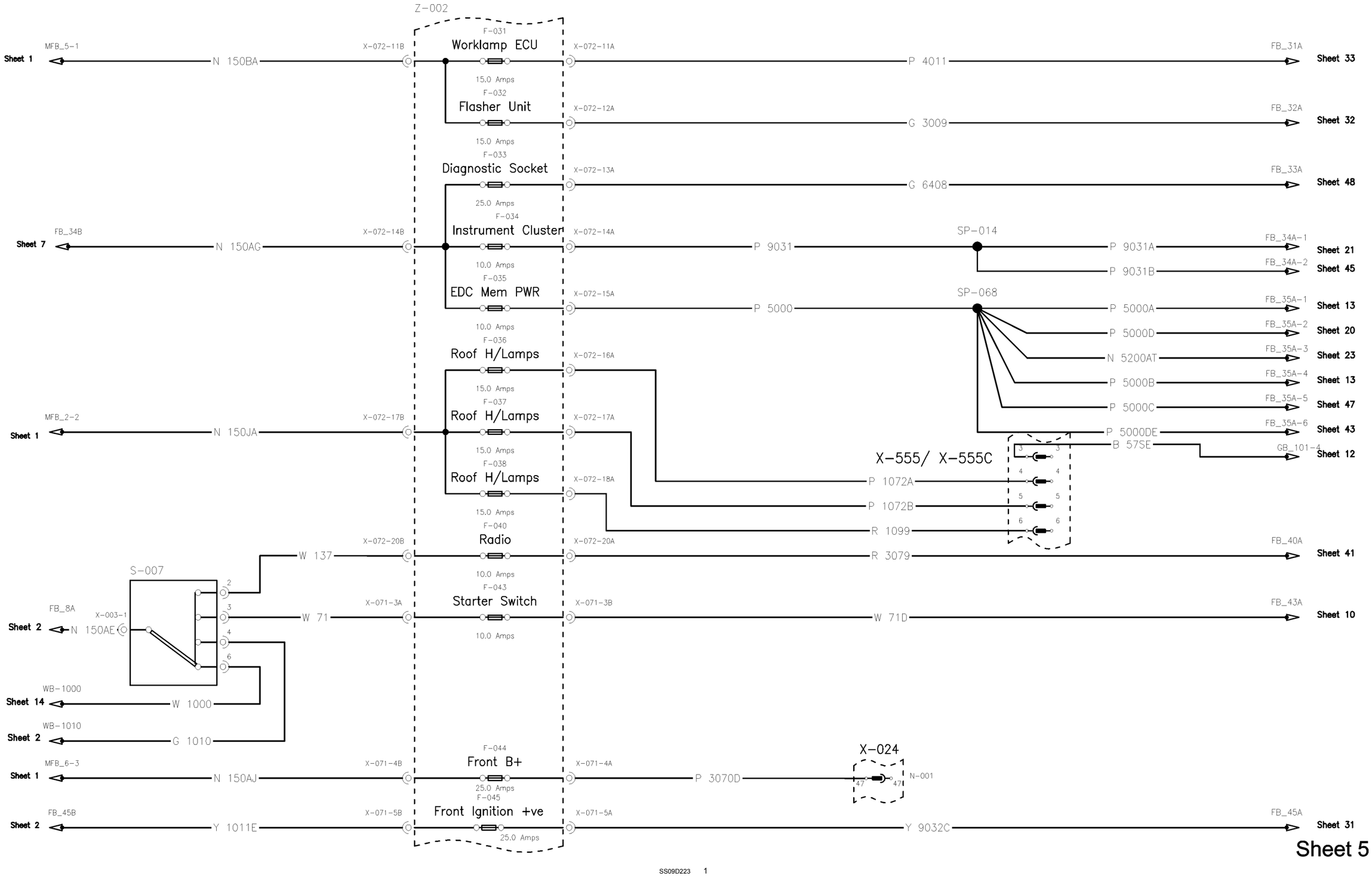
Wiring harness - Electrical schematic frame 05 Power Distribution (Fuses 31 - 45)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
F031	**X072**	Rotating beacon (via work lamp control unit)
F032	**X072**	Flasher unit
F033	**X072**	Diagnostics plug 1/2
F034	**X072**	ICU 3 and hand brake switch
F035	**X072**	Potential 30 for electronics
F036	**X072**	4 Work lamps front roof relay
F037	**X072**	4 Work lamps rear roof relay
F038	**X072**	6 Work lamps front roof relay
F040	**X072**	Radio memory
F043	**X071**	Engine electronics (potential 15)
F044	**X071**	Front-mounted equipment socket (B+)
F045	**X071**	Power supply - 8 A socket (potential 15) C-pillar left
S007	**X003**	Starter Switch
Z002	**X072**	Fusemodul
Z002	**X071**	Fusemodul
Additional Connectors: **X024**, **X555**, **X555C**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


Z-002
F-031
Worklamp ECU
15.0 Amps
F-032
Flasher Unit
15.0 Amps
F-033
Diagnostic Socket
25.0 Amps
F-034
Instrument Cluster
10.0 Amps
F-035
EDC Mem PWR
10.0 Amps
F-036
Roof H/Lamps
15.0 Amps
F-037
Roof H/Lamps
15.0 Amps
F-038
Roof H/Lamps
15.0 Amps
F-040
Radio
10.0 Amps
F-043
Starter Switch
10.0 Amps
F-044
Front B+
25.0 Amps
F-045
Front Ignition +ve
25.0 Amps
MFB_5-1
Sheet 1
N 150BA
X-072-11B
X-072-11A
P 4011
FB_31A
Sheet 33
X-072-12B
X-072-12A
G 3009
FB_32A
Sheet 32
X-072-13B
X-072-13A
G 6408
FB_33A
Sheet 48
FB_34B
Sheet 7
N 150AG
X-072-14B
X-072-14A
P 9031
SP-014
P 9031A
FB_34A-1
Sheet 21
P 9031B
FB_34A-2
Sheet 45
X-072-15B
X-072-15A
P 5000
SP-068
P 5000A
FB_35A-1
Sheet 13
P 5000D
FB_35A-2
Sheet 20
N 5200AT
FB_35A-3
Sheet 23
P 5000B
FB_35A-4
Sheet 13
P 5000C
FB_35A-5
Sheet 47
P 5000DE
FB_35A-6
Sheet 43
B 57SE
GB_101-4
Sheet 12
X-555/ X-555C
X-072-16B
X-072-16A
P 1072A
X-072-17B
X-072-17A
P 1072B
X-072-18B
X-072-18A
R 1099
MFB_2-2
Sheet 1
N 150JA
X-072-19B
X-072-19A
R 3079
FB_40A
Sheet 41
X-072-20B
X-072-20A
W 137
S-007
FB_8A
Sheet 2
X-003-1
N 150AE
X-071-3A
X-071-3B
W 71
W 71D
FB_43A
Sheet 10
WB-1000
Sheet 14
W 1000
WB-1010
Sheet 2
G 1010
X-024
MFB_6-3
Sheet 1
N 150AJ
X-071-4B
X-071-4A
P 3070D
N-001
FB_45B
Sheet 2
Y 1011E
X-071-5B
X-071-5A
Y 9032C
FB_45A
Sheet 31
Sheet 5
SS09D223 1

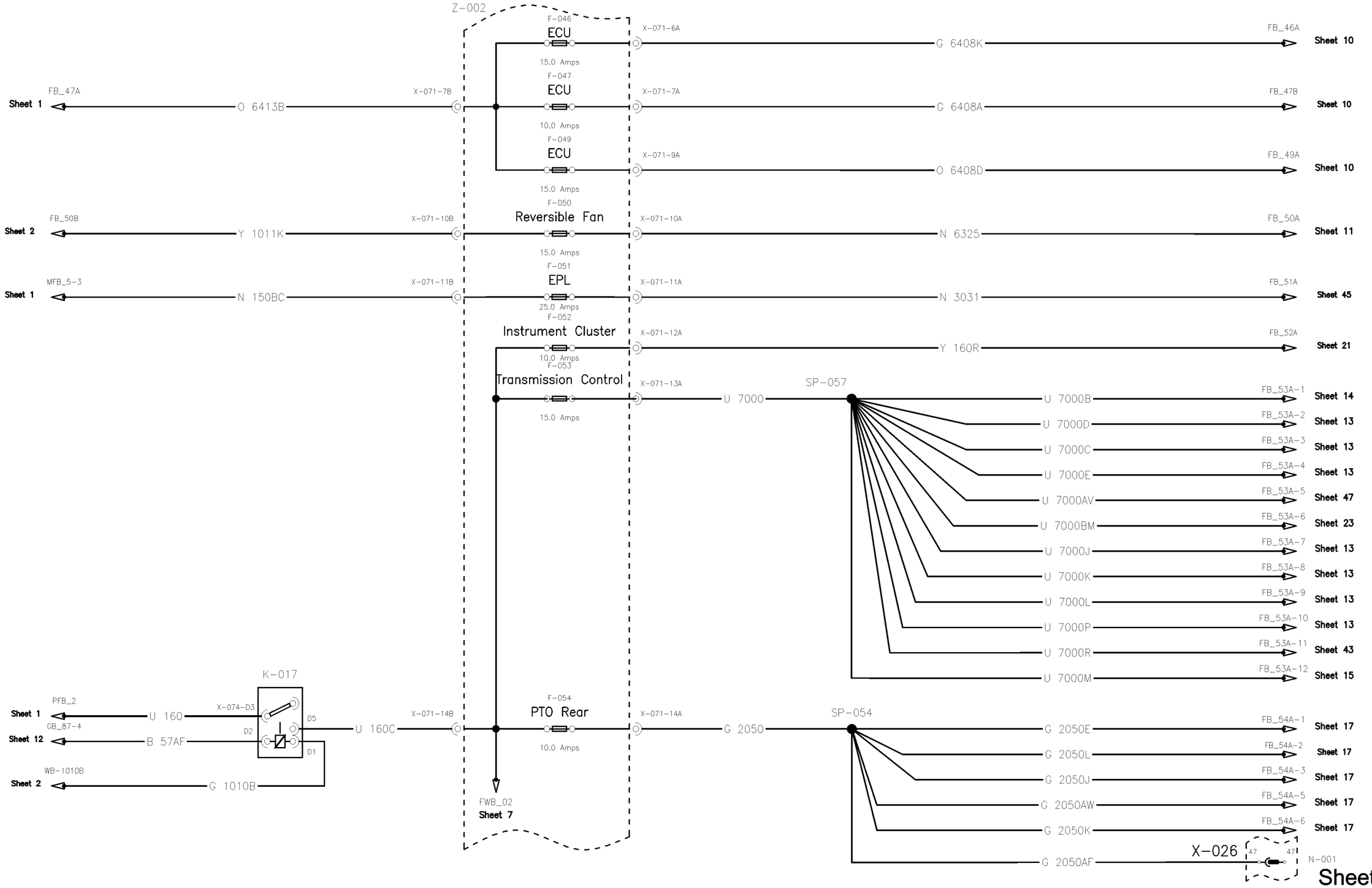
Wiring harness - Electrical schematic frame 06 Power Distribution (Fuses 46 - 54)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
F046	**X071**	Engine controller B+ supply
F047	**X071**	Engine controller B+ supply
F049	**X071**	Viscotronic fan, relay heater grid, relay fuel filter heater, exhaust brake
F050	**X071**	Reversible fan
F051	**X071**	Electronic park brake
F052	**X071**	ICU 3 supply
F053	**X071**	Transmission control supply (potential 15)
F054	**X071**	PTO rear
K017	**X074**	Power Supply ECU
Z002	**X071**	Fusemodul
Additional Connectors: **X026**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


Z-002
F-046
ECU
15.0 Amps
X-071-6A
G 6408K
FB_46A
Sheet 10
F-047
ECU
10.0 Amps
FB_47A
Sheet 1
O 6413B
X-071-7B
X-071-7A
G 6408A
FB_47B
Sheet 10
F-049
ECU
15.0 Amps
X-071-9A
O 6408D
FB_49A
Sheet 10
F-050
Reversible Fan
15.0 Amps
FB_50B
Sheet 2
Y 1011K
X-071-10B
X-071-10A
N 6325
FB_50A
Sheet 11
F-051
EPL
25.0 Amps
MFB_5-3
Sheet 1
N 150BC
X-071-11B
X-071-11A
N 3031
FB_51A
Sheet 45
F-052
Instrument Cluster
10.0 Amps
X-071-12A
Y 160R
FB_52A
Sheet 21
F-053
Transmission Control
15.0 Amps
X-071-13A
U 7000
SP-057
U 7000B
FB_53A-1
Sheet 14
U 7000D
FB_53A-2
Sheet 13
U 7000C
FB_53A-3
Sheet 13
U 7000E
FB_53A-4
Sheet 13
U 7000AV
FB_53A-5
Sheet 47
U 7000BM
FB_53A-6
Sheet 23
U 7000J
FB_53A-7
Sheet 13
U 7000K
FB_53A-8
Sheet 13
U 7000L
FB_53A-9
Sheet 13
U 7000P
FB_53A-10
Sheet 13
U 7000R
FB_53A-11
Sheet 43
U 7000M
FB_53A-12
Sheet 15
K-017
PFB_2
Sheet 1
U 160
X-074-D3
D5
GB_87-4
Sheet 12
B 57AF
D2
D1
WB-1010B
Sheet 2
G 1010B
U 160C
X-071-14B
F-054
PTO Rear
10.0 Amps
X-071-14A
G 2050
SP-054
G 2050E
FB_54A-1
Sheet 17
G 2050L
FB_54A-2
Sheet 17
G 2050J
FB_54A-3
Sheet 17
G 2050AW
FB_54A-5
Sheet 17
G 2050K
FB_54A-6
Sheet 17
G 2050AF
X-026
47
47
N-001
FWB_02
Sheet 7
Sheet 6

SS09D224 1

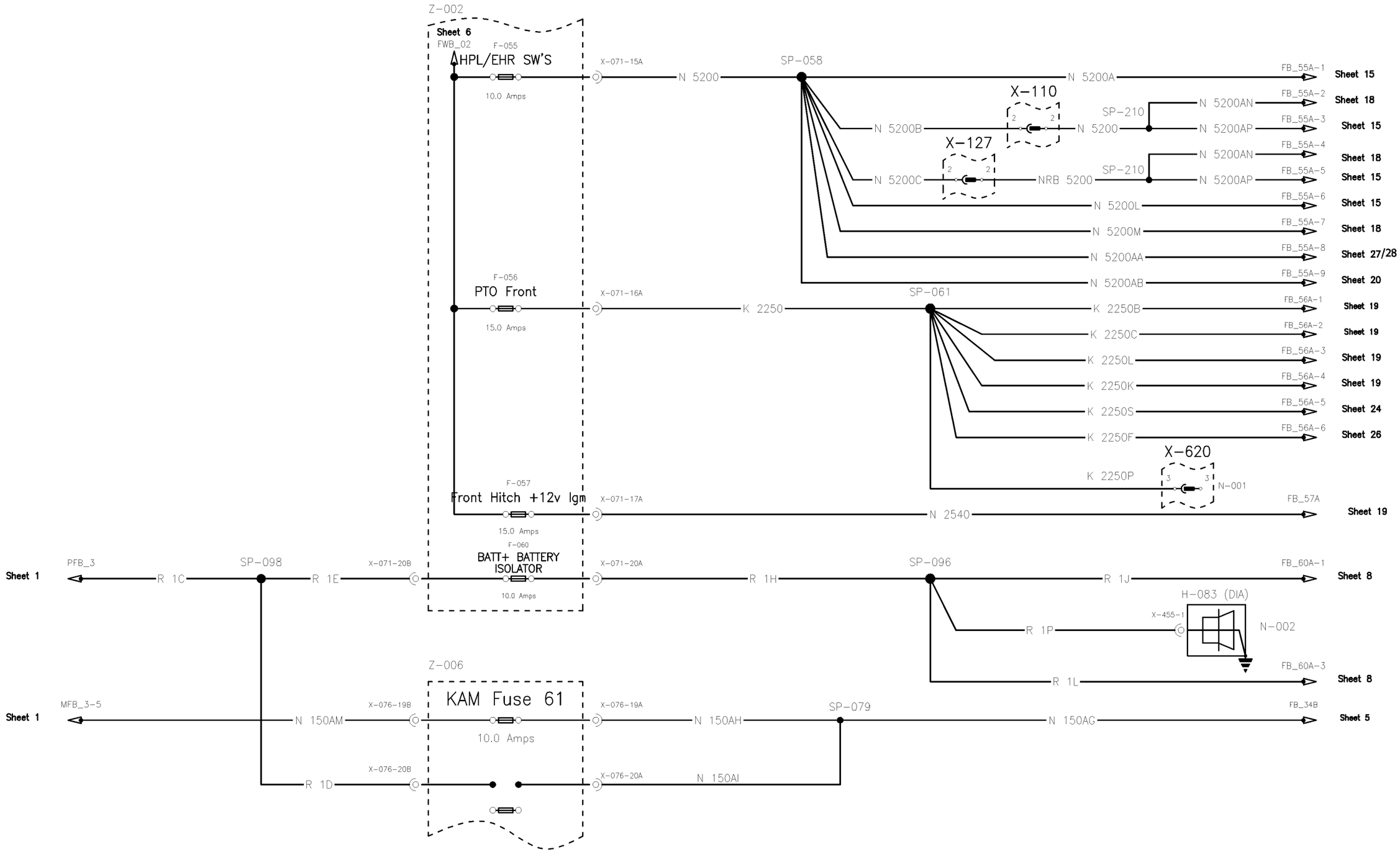
Wiring harness - Electrical schematic frame 07 Power Distribution (Fuses 55 - 60)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
F055	**X071**	Supply Ignition Fast Steer / ARU 1 / A/C pressure switch / ACU-CN1a / CCM-CN1a
F056	**X071**	PTO front
F057	**X071**	Supply Ignition / ACU auxiliary unit CN1a front hitch
F060	**X071**	Time relay battery isolator - battery isolator control switch
F061	**X076**	Battery Isolator
H083	**X455**	Reverse Alarm
Z002	**X071**	Fusemodul
Z006	**X076**	Diode Block
Additional Connectors: **X110**, **X127**, **X620**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 7

SS09D225 1

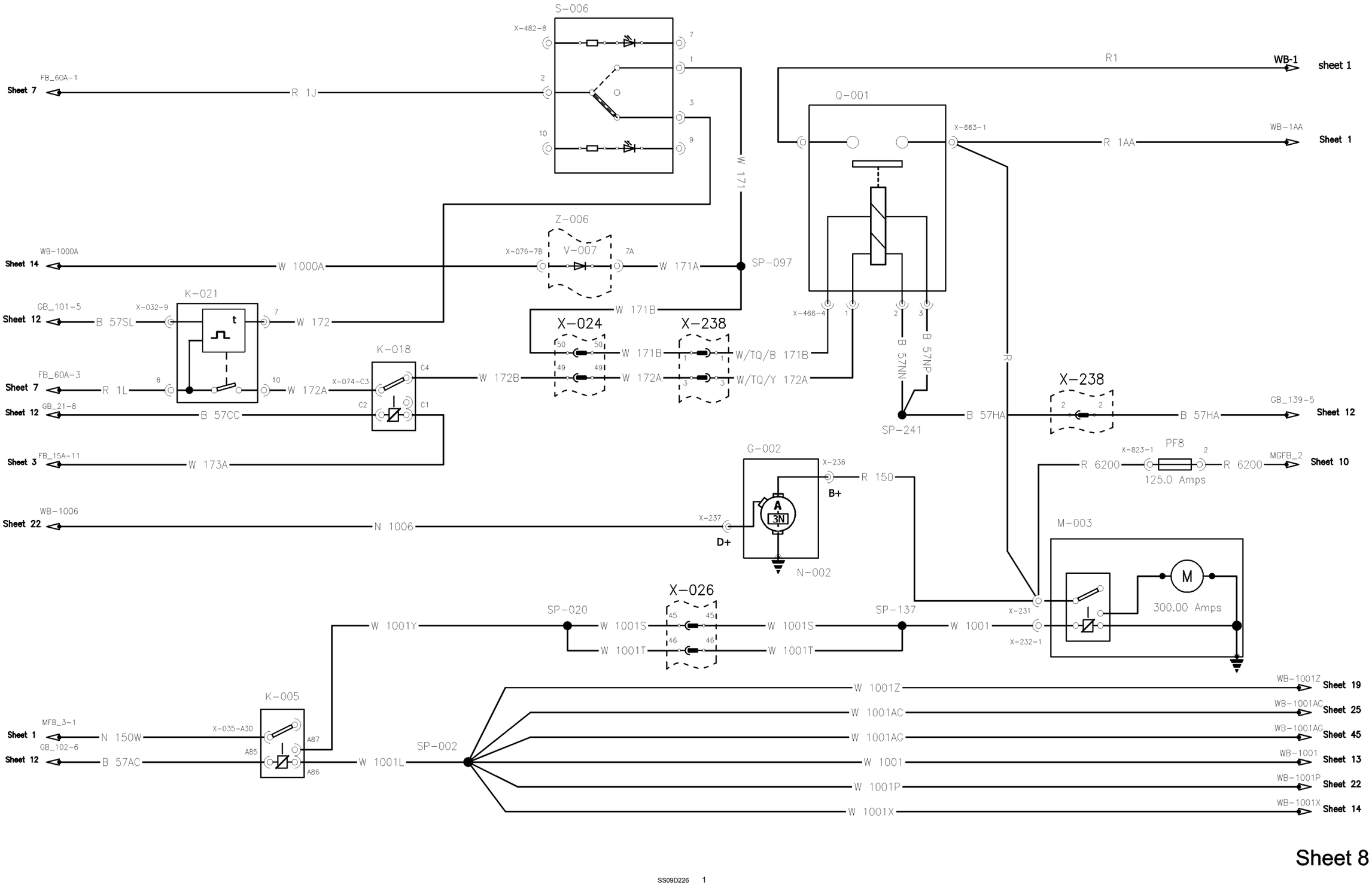
Wiring harness - Electrical schematic frame 08 Start/Charging (Start & Charging W/Isolator)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
G002	**X236**, **X237**	Alternator
K005	**X035**	Starter Motor On
K018	**X074**	EL.Battery Isolator
K021	**X032**	Timer Relay Battery Isolator
M003	**X231**, **X232**	Starter Motor
PF8	**X823**	Mega Fuse, Grid & Fuel Heater (**125 A**)
Q001	**X466**, **X663**	Battery Isolator
S006	**X482**	Battery Isolator Control Switch
V007	**X076**	El. Battery Isolator Diode
Z006	**X076**	Diode Block
Additional Connectors: **X024**, **X026**, **X238**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 8

SS09D226 1

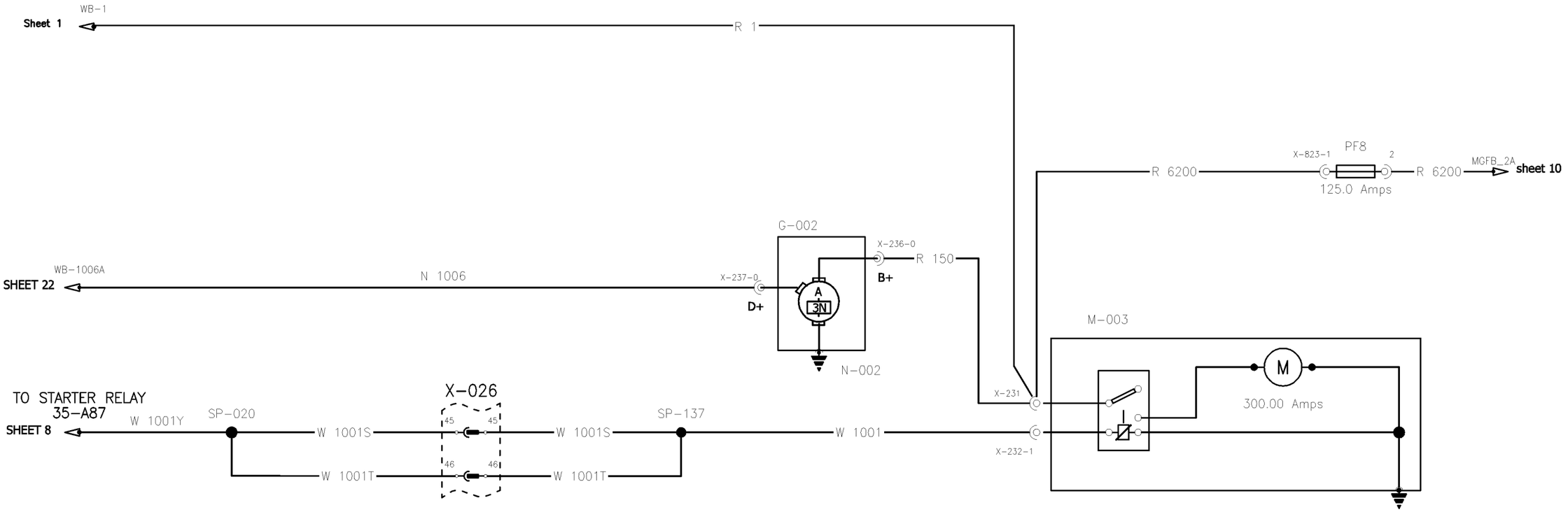
Wiring harness - Electrical schematic frame 09 Start / Charging (without Isolator)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
G002	**X236**, **X237**	Alternator
M003	**X231**, **X232**	Starter Motor
PF8	**X823**	Mega Fuse, Grid & Fuel Heater (**125 A**)
Additional Connectors: **X026**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 9

SS09D227 1

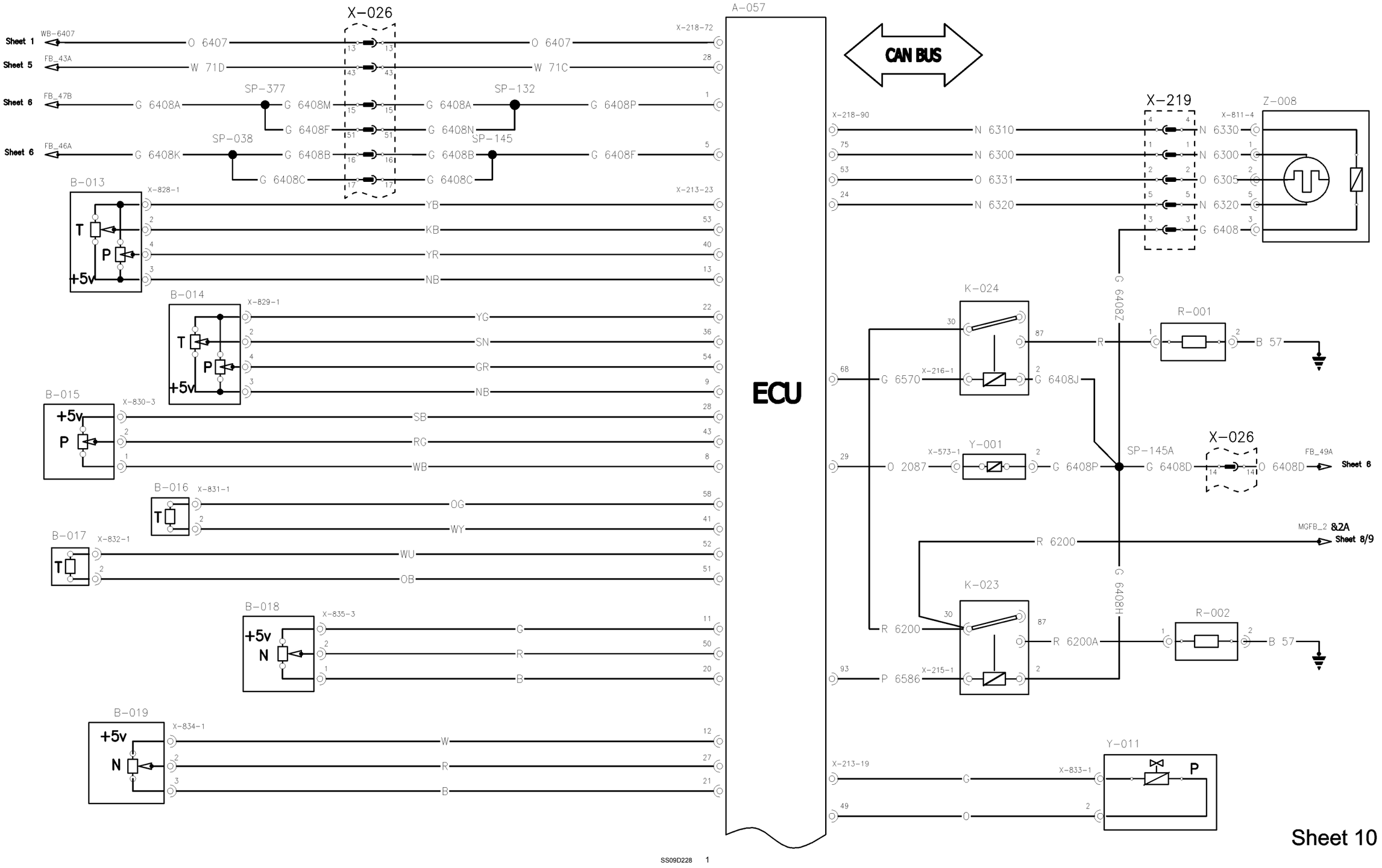
Wiring harness - Electrical schematic frame 10 Engine Controller (Supply, Sensors)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A057	**X213**, **X218**	Engine Control Unit
B013	**X828**	Boost Pressure Sensor
B014	**X829**	Oil Pressure Sensor
B015	**X830**	Rail Pressure Sensor
B016	**X831**	Coolant Temperature Sensor
B017	**X832**	Fuel Temperature Sensor
B018	**X835**	Camshaft Speed Sensor
B019	**X834**	Increment Speed Sensor
K023	**X215**	Grid Heater Relay
K024	**X216**	Fuel Heater Relay
R001	-	Fuel Heater
R002	-	Grid Heater
Y001	**X573**	Exhaust Brake Solenoid
Y011	**X833**	High Pressure Pump
Z008	**X811**	Visctronic Fan
Additional Connectors: **X026**, **X219**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


X-026
A-057
ECU
CAN BUS
X-219
Z-008
K-024
K-023
R-001
R-002
Y-001
Y-011
SP-377
SP-132
SP-038
SP-145
SP-145A
B-013
B-014
B-015
B-016
B-017
B-018
B-019
T
P
N
+5v
Sheet 1
Sheet 5
Sheet 6
Sheet 6
WB-6407
FB_43A
FB_47B
FB_46A
X-218-72
X-218-90
X-828-1
X-829-1
X-830-3
X-831-1
X-832-1
X-835-3
X-834-1
X-213-23
X-811-4
X-216-1
X-215-1
X-573-1
X-833-1
X-213-19
FB_49A
MGFB_2 &2A
Sheet 8/9
Sheet 6
SS09D228 1
Sheet 10

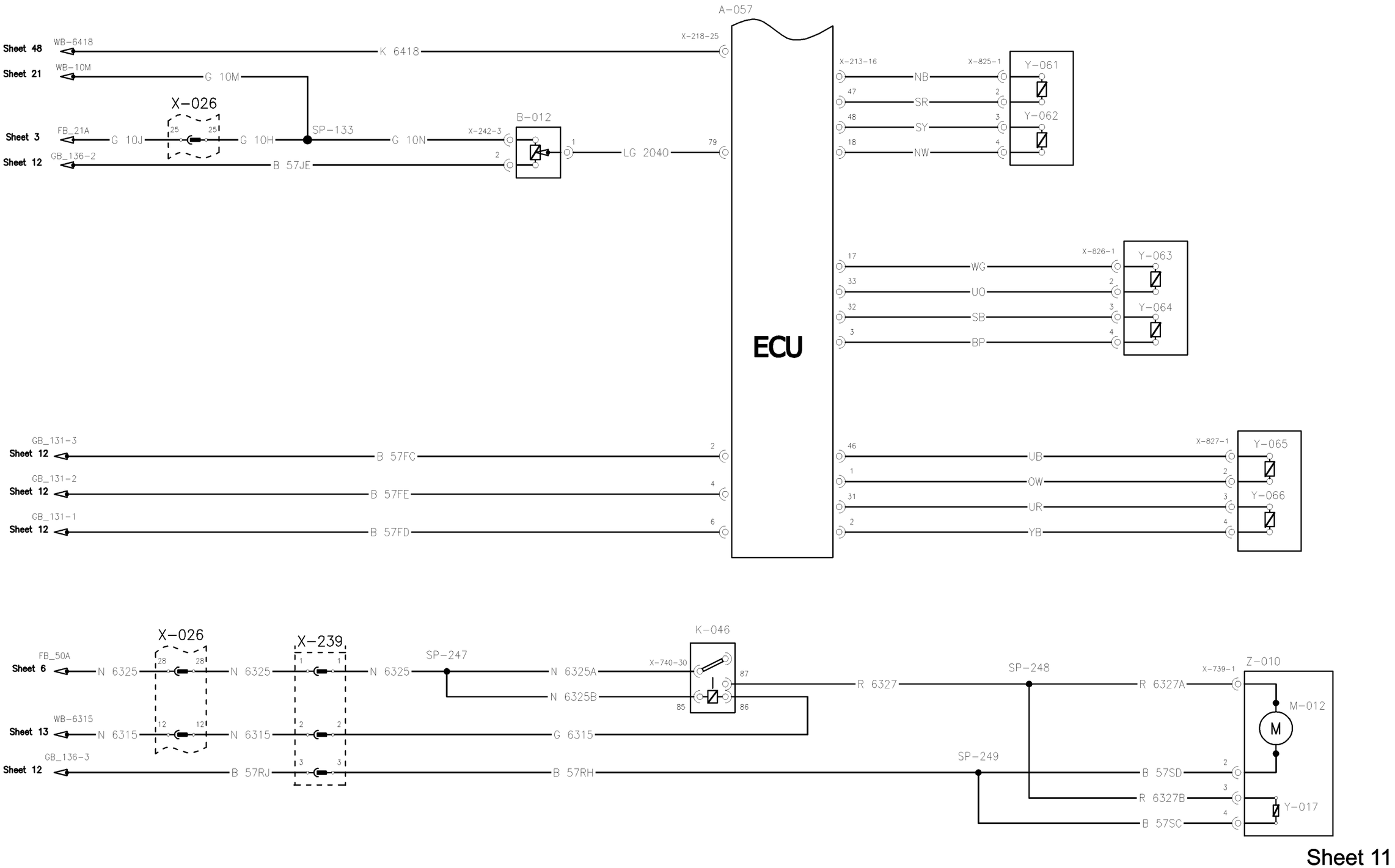
Wiring harness - Electrical schematic frame 11 Engine Controller (Supply, Injectors)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A057	**X213**, **X218**	Engine Control Unit
Y061	**X825**	Injector 1
Y062	**X825**	Injector 2
Y063	**X826**	Injector 3
Y064	**X826**	Injector 4
Y065	**X827**	Injector 5
Y066	**X827**	Injector 6
B012	**X242**	Water In Fuel Sensor
K046	**X740**	Reversible Fan Relay
M012	**X739**	Reversible Fan Compressor
Y017	**X739**	Reversible Fan Valve
Z010	**X739**	Reversible Fan Compressor / Valve
Additional Connectors: **X026**, **X239**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 11

SS09D229 1

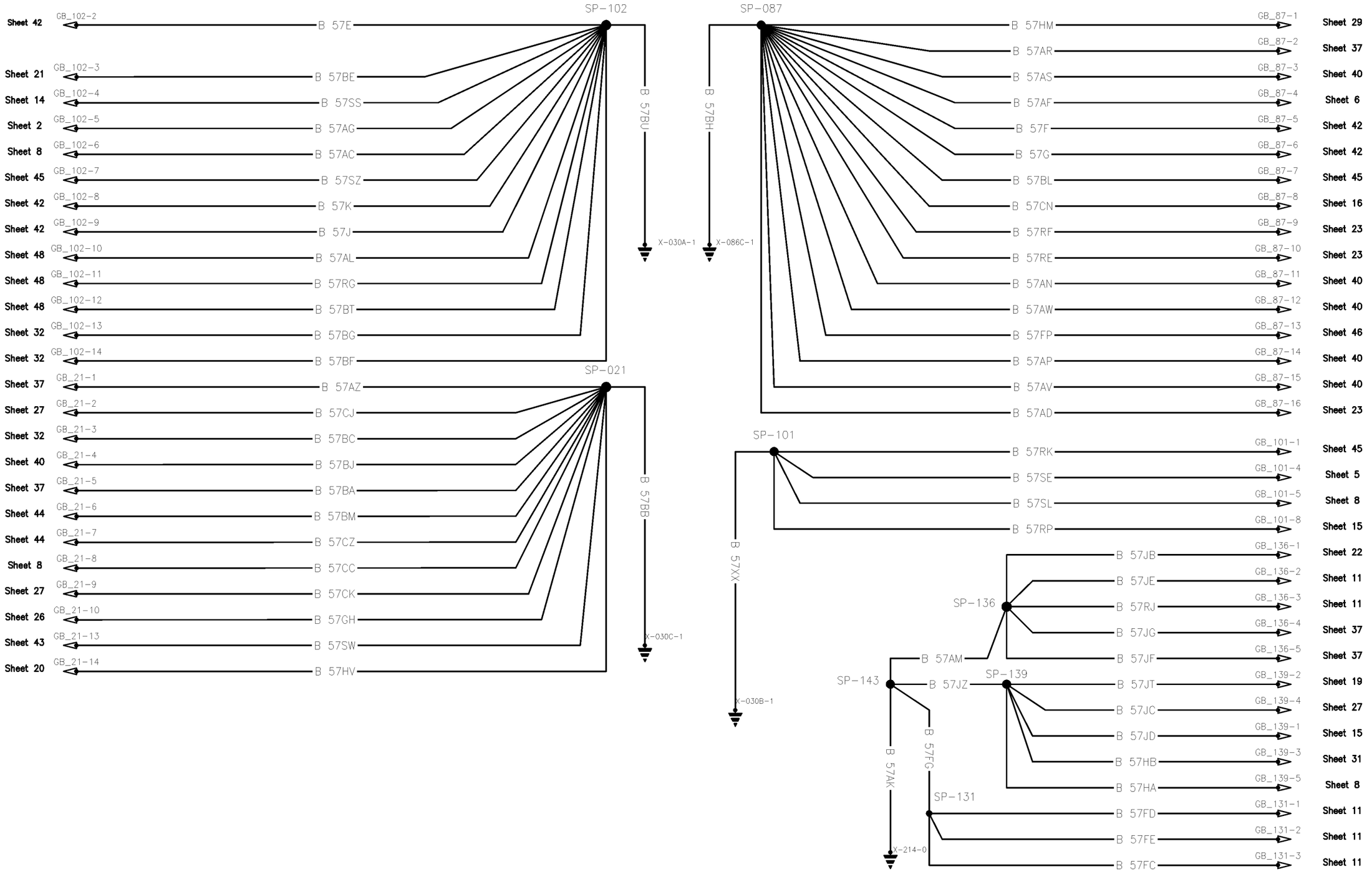
Wiring harness - Electrical schematic frame 12 Power Distribution (Power Earthing)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
-	**X030A**	Earth Header 2 to SP102
-	**X030B**	Earth Header 2 to SP101
-	**X030C**	Earth Header 2 to SP021
-	**X086C**	Earth Header 1 to SP087
-	**X214**	Earth Point - Electronic Module to SP131, 136, 139, 143
Additional Connectors: -		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 12

SS09D230 1

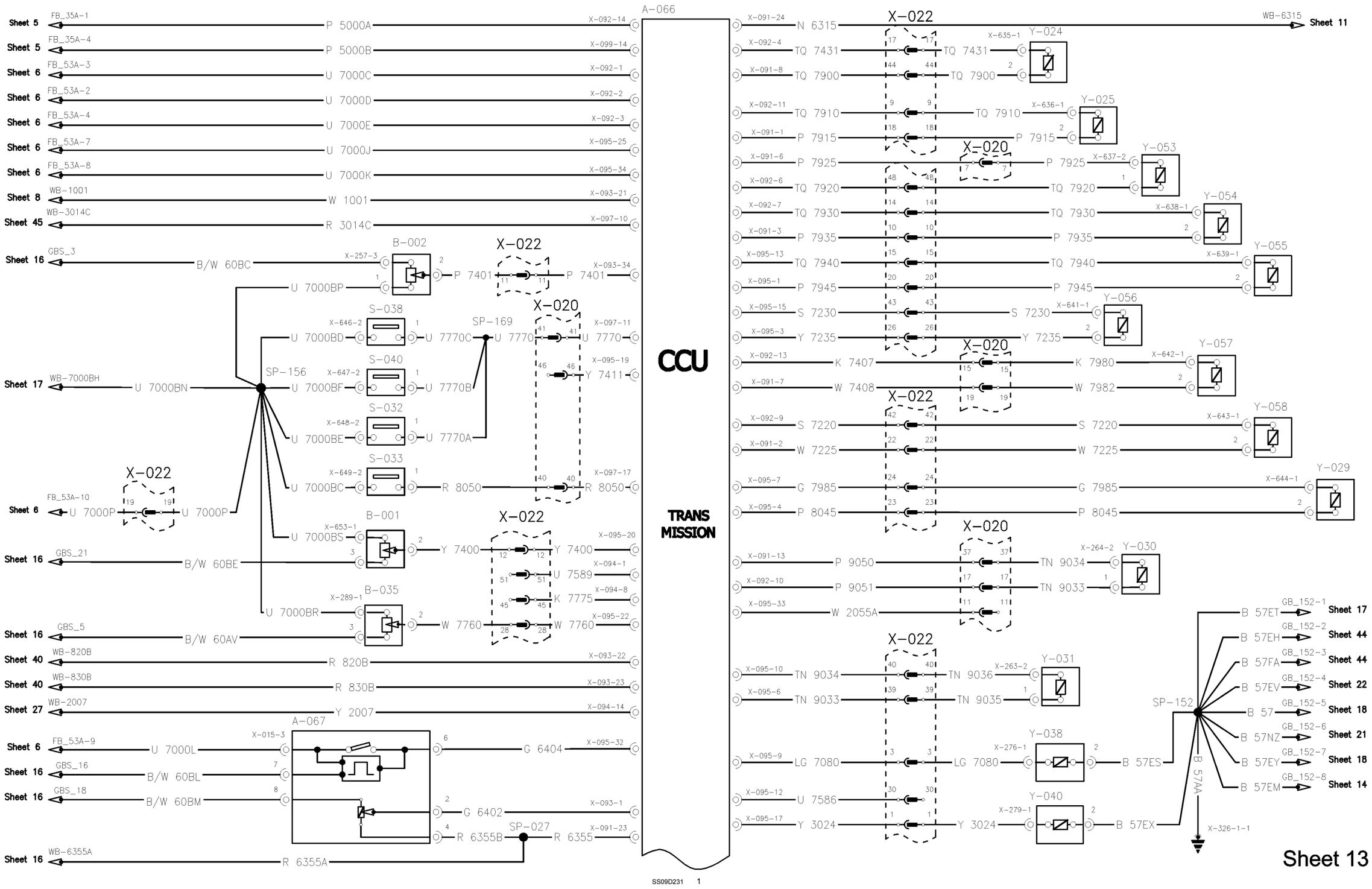
Wiring harness - Electrical schematic frame 13 Main Controller (Transmission Control)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A066	**X091**, **X092**, **X093**, **X094**, **X095**, **X097**, **X099**	Central Control Unit
A067	**X015**	Foot Throttle
B001	**X653**	Mid Speed Sensor Output speed P.U.
B002	**X257**	Axel speed Sensor
B035	**X289**	Fly Wheel Speed Sensor
S032	**X648**	High Range Press Switch
S033	**X649**	Rev Range Press Switch
S038	**X646**	Low Range Press Switch
S040	**X647**	Med Range Press Switch
Y024	**X635**	Clutch Solenoid A
Y025	**X636**	Clutch Solenoid B
Y029	**X644**	Rev Range Solenoid
Y030	**X264**	19th Gear Solenoid
Y031	**X263**	19th Dump Solenoid
Y038	**X276**	Diff Lock Solenoid
Y040	**X279**	4WD Solenoid
Y053	**X637**	Clutch Solenoid C
Y054	**X638**	Clutch Solenoid D
Y055	**X639**	Clutch Solenoid E
Y056	**X641**	Low Range Solenoid
Y057	**X642**	Med Range Solenoid
Y058	**X643**	High Range Solenoid
Additional Connectors: **X020**, **X022**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


A-066
CCU
TRANS MISSION
Sheet 5 FB_35A-1 P 5000A X-092-14
Sheet 5 FB_35A-4 P 5000B X-099-14
Sheet 6 FB_53A-3 U 7000C X-092-1
Sheet 6 FB_53A-2 U 7000D X-092-2
Sheet 6 FB_53A-4 U 7000E X-092-3
Sheet 6 FB_53A-7 U 7000J X-095-25
Sheet 6 FB_53A-8 U 7000K X-095-34
Sheet 8 WB-1001 W 1001 X-093-21
Sheet 45 WB-3014C R 3014C X-097-10
Sheet 16 GBS_3 B/W 60BC
B-002
X-257-3
P 7401
X-022
X-093-34
U 7000BP
X-020
S-038
X-646-2
U 7000BD
SP-169
U 7770C
X-097-11
U 7770
Sheet 17 WB-7000BH U 7000BN
SP-156
S-040
X-647-2
U 7000BF
U 7770B
X-095-19
Y 7411
S-032
X-648-2
U 7000BE
U 7770A
X-022
FB_53A-10 Sheet 6 U 7000P
S-033
X-649-2
U 7000BC
R 8050
X-097-17
B-001
X-653-1
U 7000BS
Y 7400
X-095-20
Sheet 16 GBS_21 B/W 60BE
X-094-1
U 7589
X-094-8
K 7775
B-035
X-289-1
U 7000BR
W 7760
X-095-22
Sheet 16 GBS_5 B/W 60AV
Sheet 40 WB-820B R 820B X-093-22
Sheet 40 WB-830B R 830B X-093-23
Sheet 27 WB-2007 Y 2007 X-094-14
A-067
Sheet 6 FB_53A-9 U 7000L
X-015-3
G 6404
X-095-32
Sheet 16 GBS_16 B/W 60BL
Sheet 16 GBS_18 B/W 60BM
G 6402
X-093-1
SP-027
R 6355B
R 6355
X-091-23
Sheet 16 WB-6355A R 6355A
X-091-24 N 6315 WB-6315 Sheet 11
X-092-4 TQ 7431
X-091-8 TQ 7900
X-092-11 TQ 7910
X-091-1 P 7915
X-091-6 P 7925
X-092-6 TQ 7920
X-092-7 TQ 7930
X-091-3 P 7935
X-095-13 TQ 7940
X-095-1 P 7945
X-095-15 S 7230
X-095-3 Y 7235
X-092-13 K 7407
X-091-7 W 7408
X-092-9 S 7220
X-091-2 W 7225
X-095-7 G 7985
X-095-4 P 8045
X-091-13 P 9050
X-092-10 P 9051
X-095-33 W 2055A
X-095-10 TN 9034
X-095-6 TN 9033
X-095-9 LG 7080
X-095-12 U 7586
X-095-17 Y 3024
Y-024
X-635-1
Y-025
X-636-1
Y-053
X-637-2
Y-054
X-638-1
Y-055
X-639-1
Y-056
X-641-1
Y-057
X-642-1
Y-058
X-643-1
Y-029
X-644-1
Y-030
X-264-2
Y-031
X-263-2
Y-038
X-276-1
Y-040
X-279-1
SP-152
B 57ET GB_152-1 Sheet 17
B 57EH GB_152-2 Sheet 44
B 57FA GB_152-3 Sheet 44
B 57EV GB_152-4 Sheet 22
B 57 GB_152-5 Sheet 18
B 57NZ GB_152-6 Sheet 21
B 57EY GB_152-7 Sheet 18
B 57EM GB_152-8 Sheet 14
B 57ES
B 57EX
B 57AA
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Sheet 13
SS09D231 1

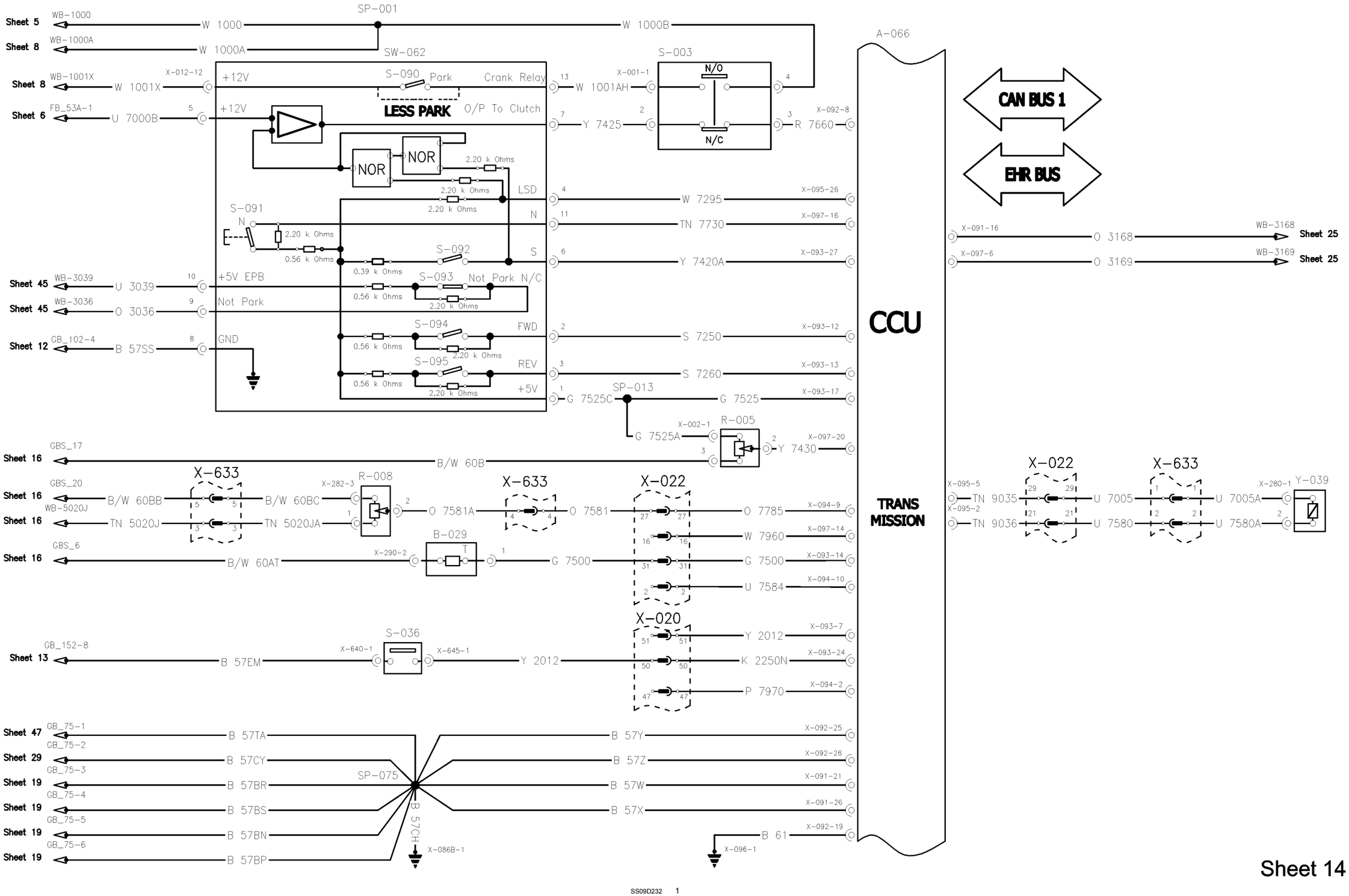
Wiring harness - Electrical schematic frame 14 Main Controller (Transmission Control)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A066	**X091**, **X092**, **X093**, **X094**, **X095**, **X097**	Central Control Unit
B029	**X290**	Transmission Oil Pressure Sensor
R005	**X002**	Clutch Potentiometer
R008	**X282**	Creeper Potentiometer
S003	**X001**	Clutch Switch
S036	**X640**, **X645**	Trans Oil Pressure Switch
S090	**X012**	Park Switch
S091	**X012**	Neutral- Switch
S092	**X012**	FWD- OR- REV Switch
S093	**X012**	Not Park- Switch
S094	**X012**	FWD- Switch
S095	**X012**	REV- Switch
Y039	**X280**	Creeper Solenoid
Z062	**X012**	Shuttle Lever
-	**X086B**	EARTH Header 1 to SP075
-	**X096**	Case Earth CCM & ACU
Additional Connectors: **X020**, **X022**, **X633**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


SP-001
SW-062
S-003
A-066
CCU
TRANS MISSION
CAN BUS 1
EHR BUS
LESS PARK
+12V
Park
Crank Relay
O/P To Clutch
N/O
N/C
NOR
2.20 k Ohms
LSD
N
S
S-091
S-092
S-093
S-094
S-095
Not Park N/C
FWD
REV
+5V
+5V EPB
Not Park
GND
0.56 k Ohms
0.39 k Ohms
SP-013
R-005
SP-075
B 57CH
X-086B-1
X-096-1
X-633
X-022
X-020
R-008
B-029
S-036
W 1000
W 1000A
W 1000B
W 1001X
U 7000B
W 1001AH
Y 7425
R 7660
W 7295
TN 7730
Y 7420A
U 3039
O 3036
B 57SS
S 7250
S 7260
G 7525C
G 7525
G 7525A
Y 7430
B/W 60B
B/W 60BB
B/W 60BC
TN 5020J
TN 5020JA
O 7581A
O 7581
O 7785
W 7960
G 7500
U 7584
B/W 60AT
B 57EM
Y 2012
K 2250N
P 7970
B 57TA
B 57CY
B 57BR
B 57BS
B 57BN
B 57BP
B 57Y
B 57Z
B 57W
B 57X
B 61
O 3168
O 3169
TN 9035
TN 9036
U 7005
U 7005A
U 7580
U 7580A
Y-039
Sheet 5
Sheet 8
Sheet 6
Sheet 45
Sheet 12
Sheet 16
Sheet 13
Sheet 47
Sheet 29
Sheet 19
Sheet 25
SS09D232 1

Sheet 14

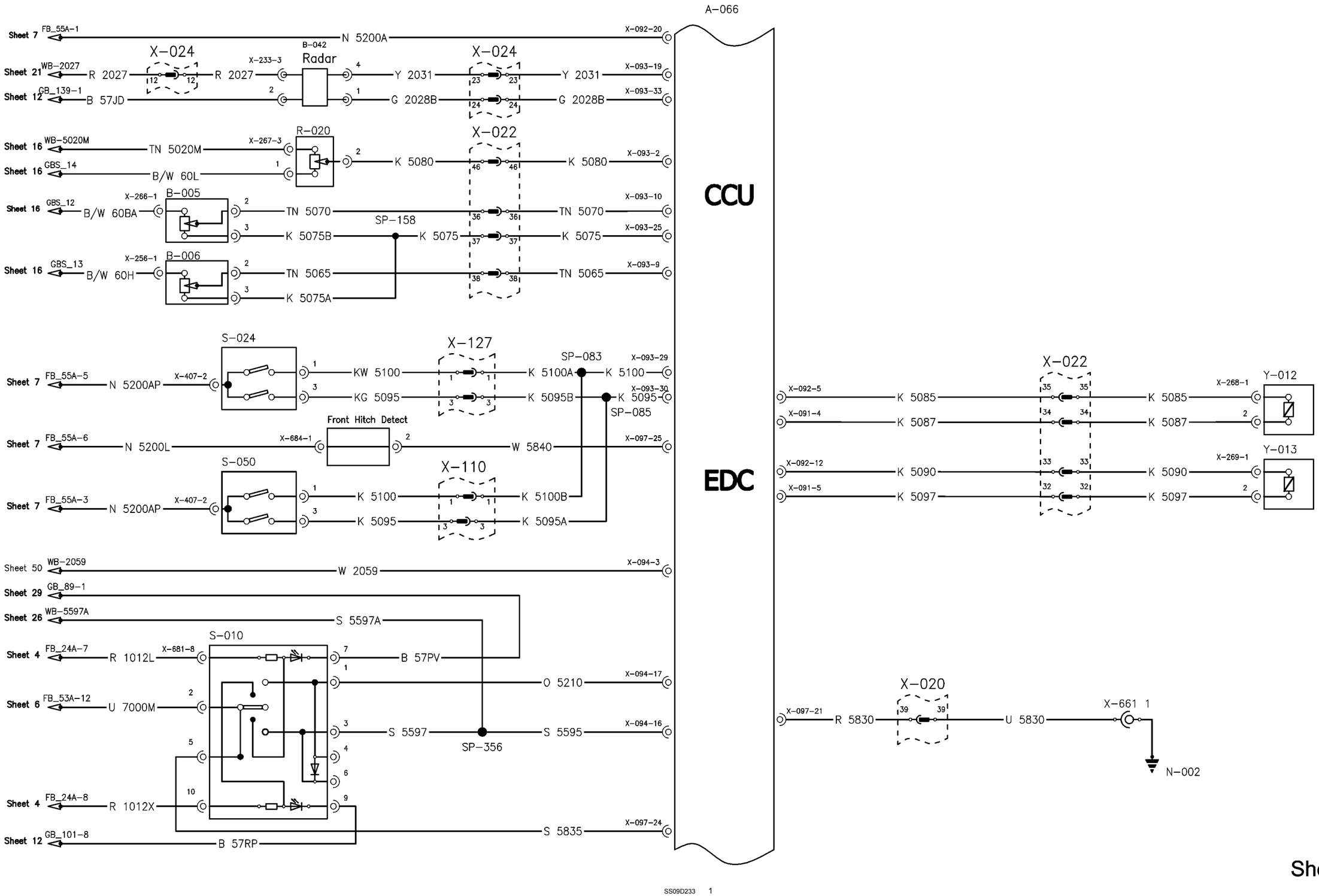
Wiring harness - Electrical schematic frame 15 Main - Controller (Electronic Draft Control)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A066	**X091**, **X092**, **X093**, **X094**, **X097**	Central Control Unit
B005	**X266**	Draft Pin Left Hand
B006	**X256**	Draft Pin Right Hand
B042	**X233**	Radar Sensor
R020	**X267**	Rockshaft Potentiometer
S010	**X681**	Hydraulics Master Switch
S024	**X407**	Rear Hitch Switch Left Hand
S050	**X407**	Rear Hitch Switch Right Hand
-	**X661**	High Flow Pump (detection)
-	**X684**	Front Hitch Detect
Y012	**X268**	EDC Valve Raise
Y013	**X269**	EDC Valve Lower
Additional Connectors: **X020**, **X022**, **X024**, **X110**, **X127**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


A-066
CCU
EDC
Sheet 7 FB_55A-1 N 5200A X-092-20
X-024
B-042
Radar
X-233-3
Sheet 21 WB-2027 R 2027
Sheet 12 GB_139-1 B 57JD
Y 2031 X-093-19
G 2028B X-093-33
R-020
X-267-3
Sheet 16 WB-5020M TN 5020M
Sheet 16 GBS_14 B/W 60L
K 5080 X-093-2
X-022
B-005
X-266-1
Sheet 16 GBS_12 B/W 60BA
TN 5070 X-093-10
SP-158
K 5075B
K 5075 X-093-25
B-006
X-256-1
Sheet 16 GBS_13 B/W 60H
TN 5065 X-093-9
K 5075A
S-024
X-127
Sheet 7 FB_55A-5 N 5200AP X-407-2
KW 5100
KG 5095
K 5100A
K 5095B
SP-083
X-093-29
X-093-30
SP-085
Front Hitch Detect
Sheet 7 FB_55A-6 N 5200L X-684-1
W 5840 X-097-25
S-050
X-110
Sheet 7 FB_55A-3 N 5200AP X-407-2
K 5100
K 5095
K 5100B
K 5095A
Sheet 50 WB-2059 W 2059 X-094-3
Sheet 29 GB_89-1
Sheet 26 WB-5597A S 5597A
S-010
Sheet 4 FB_24A-7 R 1012L X-681-8
B 57PV
O 5210 X-094-17
Sheet 6 FB_53A-12 U 7000M
S 5597
S 5595 X-094-16
SP-356
Sheet 4 FB_24A-8 R 1012X
S 5835 X-097-24
Sheet 12 GB_101-8 B 57RP
X-022
X-092-5 K 5085
X-091-4 K 5087
Y-012
X-268-1
Y-013
X-269-1
X-092-12 K 5090
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X-020
X-097-21 R 5830
U 5830
X-661 1
N-002
SS09D233 1
Sheet 15

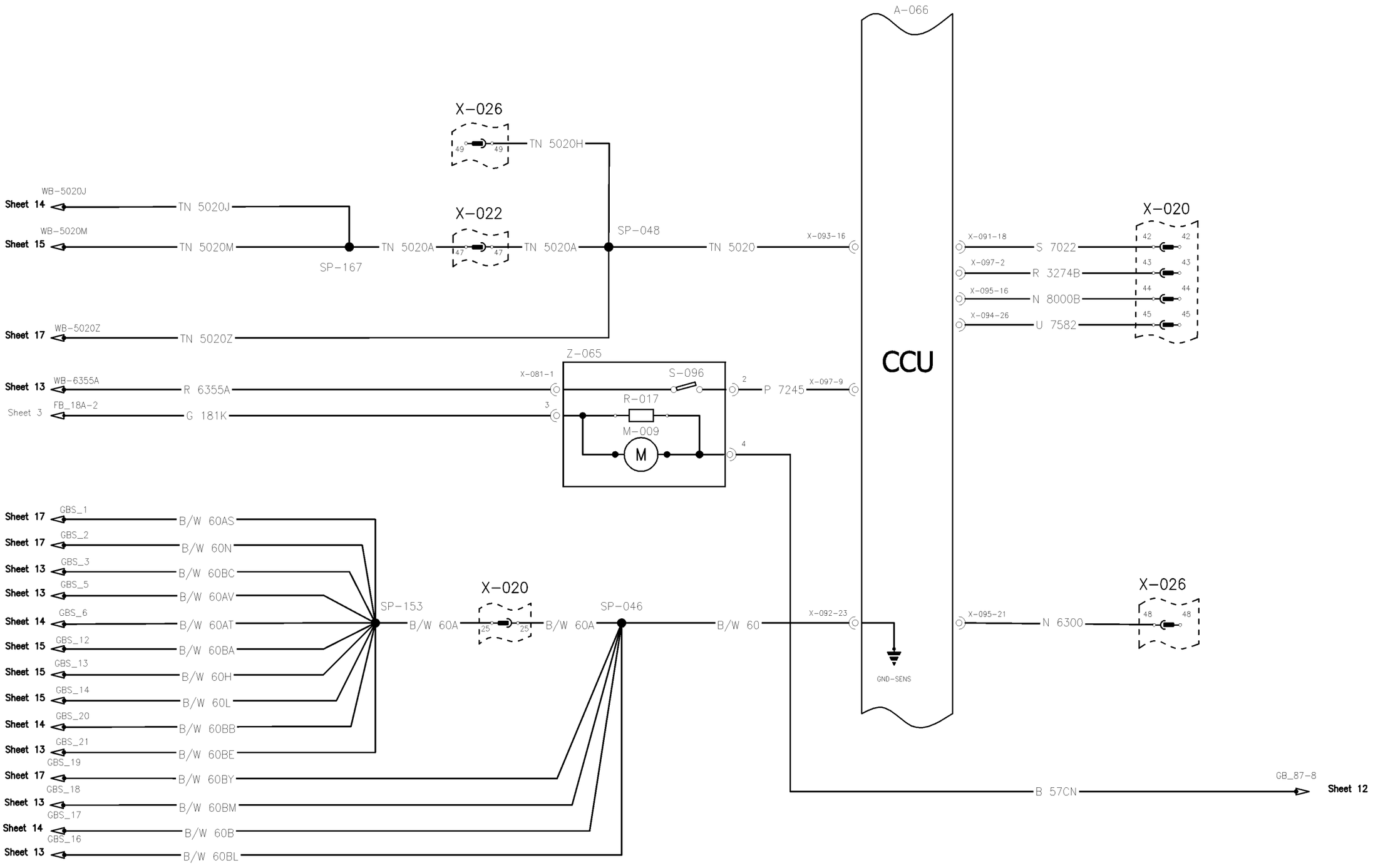
Wiring harness - Electrical schematic frame 16 Main - Controller (5V Supply, Sensor Ground, Seat)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A066	**X091**, **X092**, **X093**, **X094**, **X095**, **X097**	Central Control Unit
M009	**X081**	Seat- Compressor
R017	**X081**	Seat- Heating
S096	**X081**	Seat- Switch
Z065	**X081**	Seat Assembly
Additional Connectors: **X020**, **X022**, **X026**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 16

SS09D234 1

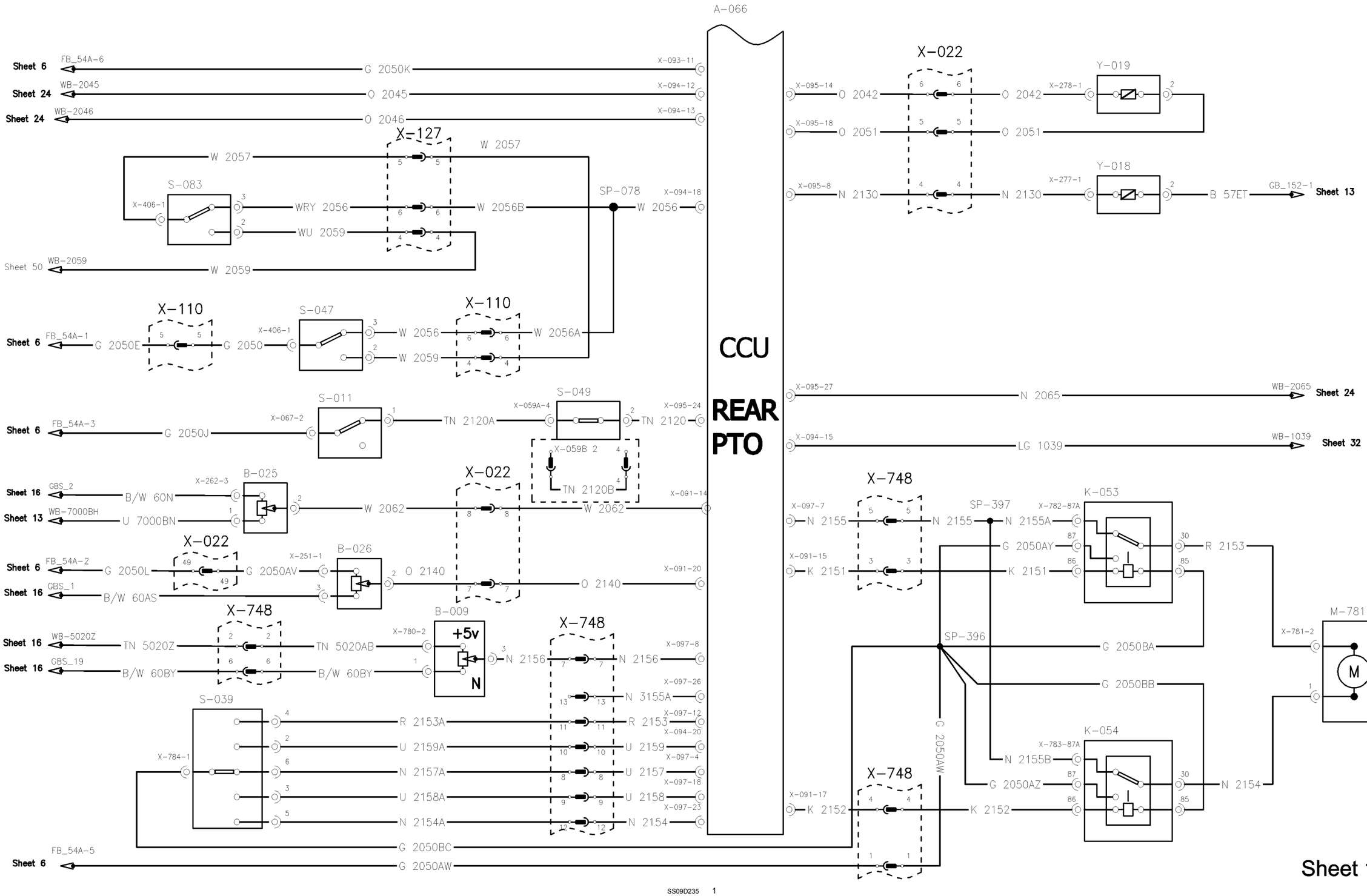
Wiring harness - Electrical schematic frame 17 Transmission (Power Take Off)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A066	**X091**, **X093**, **X094**, **X095**, **X097**	Central Control Unit
B009	**X780**	Rear PTO Shift Position Sensor
B025	**X262**	PTO Twist Sensor
B026	**X251**	PTO Speed Sensor
K053	**X782**	EL.Shiftable PTO Drive Upper Speed Relay
K054	**X783**	EL.Shiftable PTO Drive Lower Speed Relay
M781	**X781**	Actuator PTO Shift
S011	**X067**	Rear PTO Brake Switch
S039	**X784**	PTO Speed Select Switch
S047	**X406**	Rear PTO Switch Right Hand
S049	**X059A**	Lever Mounted PTO Brake Switch
S083	**X406**	Rear PTO Switch Left Hand
Y018	**X277**	Rear PTO Brake Solenoid
Y019	**X278**	Rear PTO Solenoid
-	**X059B**	Lever Mounted PTO Mating Half
Additional Connectors: **X022**, **X059B**, **X110**, **X127**, **X748**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


A-066
CCU
REAR
PTO
Sheet 6 FB_54A-6 G 2050K X-093-11
Sheet 24 WB-2045 O 2045 X-094-12
Sheet 24 WB-2046 O 2046 X-094-13
X-127
W 2057
W 2057
S-083
X-406-1
WRY 2056
W 2056B
WU 2059
SP-078
X-094-18
W 2056
Sheet 50 WB-2059 W 2059
X-110
Sheet 6 FB_54A-1 G 2050E G 2050
S-047
X-406-1
W 2056
W 2059
X-110
W 2056A
S-011
X-067-2
Sheet 6 FB_54A-3 G 2050J
TN 2120A
S-049
X-059A-4
X-095-24
TN 2120
X-059B 2
TN 2120B
B-025
X-262-3
Sheet 16 GBS_2 B/W 60N
Sheet 13 WB-7000BH U 7000BN
W 2062
X-022
W 2062
X-091-14
X-022
Sheet 6 FB_54A-2 G 2050L
G 2050AV
X-251-1
B-026
O 2140
O 2140
X-091-20
Sheet 16 GBS_1 B/W 60AS
X-748
Sheet 16 WB-5020Z TN 5020Z
Sheet 16 GBS_19 B/W 60BY
TN 5020AB
B/W 60BY
B-009
X-780-2
+5v
N
N 2156
X-748
N 2156
X-097-8
S-039
X-784-1
R 2153A
U 2159A
N 2157A
U 2158A
N 2154A
N 3155A
R 2153
U 2159
U 2157
U 2158
N 2154
X-097-26
X-097-12
X-094-20
X-097-4
X-097-18
X-097-23
G 2050BC
Sheet 6 FB_54A-5 G 2050AW
X-095-14 O 2042 O 2042
X-095-18 O 2051 O 2051
X-095-8 N 2130 N 2130
X-022
Y-019
X-278-1
Y-018
X-277-1
B 57ET
GB_152-1
Sheet 13
X-095-27 N 2065
WB-2065
Sheet 24
X-094-15 LG 1039
WB-1039
Sheet 32
X-748
X-097-7 N 2155 N 2155
X-091-15 K 2151 K 2151
SP-397
N 2155A
K-053
X-782-87A
G 2050AY
R 2153
SP-396
G 2050BA
G 2050BB
G 2050AW
M-781
X-781-2
M
K-054
X-783-87A
N 2155B
G 2050AZ
N 2154
X-748
X-091-17 K 2152 K 2152
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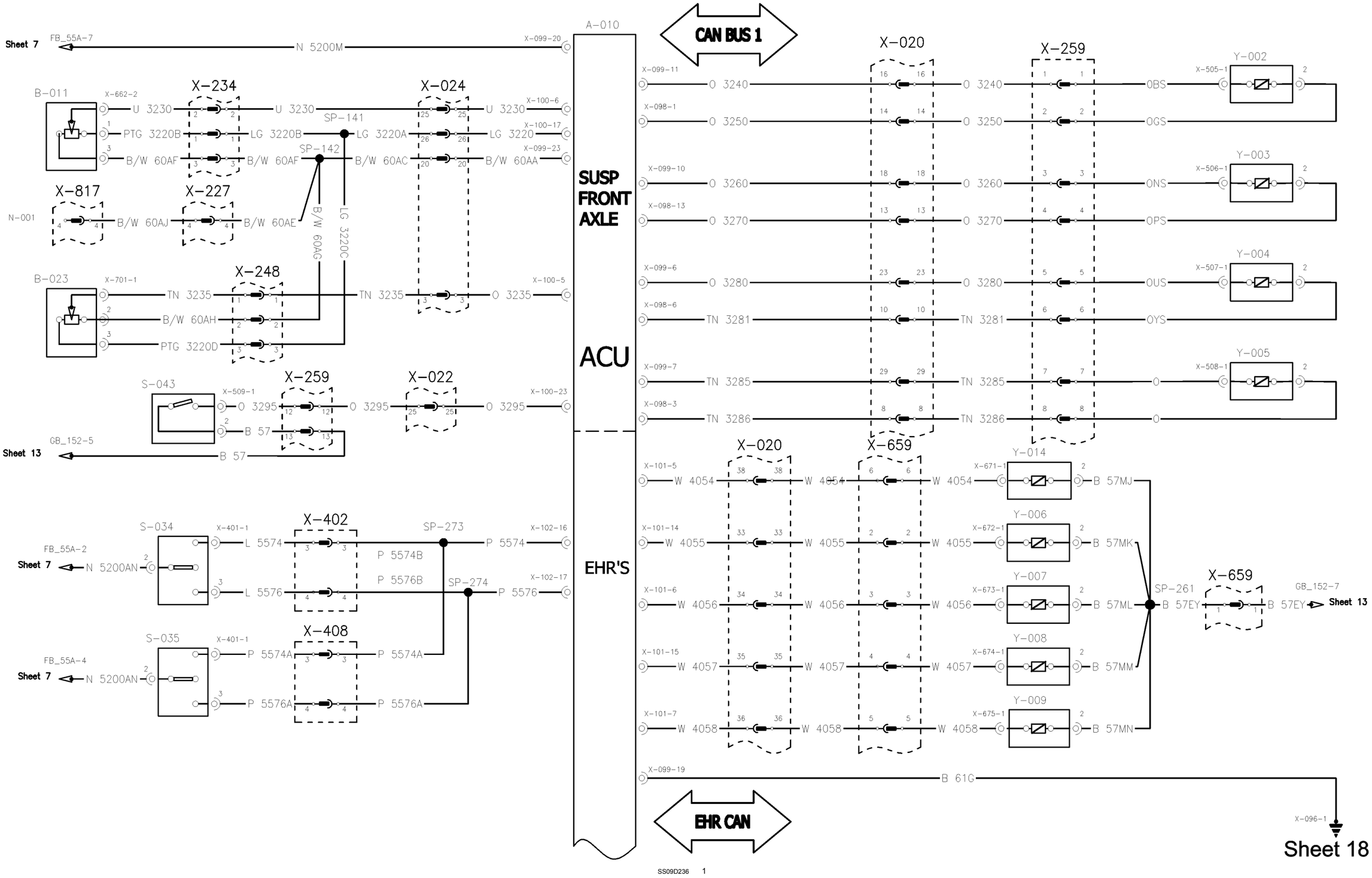
Wiring harness - Electrical schematic frame 18 Auxiliary Controller (SFA, EHR'S, Link Levelling)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A010	**X098**, **X099**, **X100**, **X101**, **X102**	Auxiliary Control Unit
B011	**X662**	Front Axle Position Sensor
B023	**X701**	Suspension Accelerometer
S034	**X401**	EHR 3 Switch Fender Right
S035	**X401**	EHR 3 Switch Fender Left
S043	**X509**	Front Suspension Not Pressure
Y002	**X505**	Suspension Raise Solenoid
Y003	**X506**	Suspension Lower Solenoid
Y004	**X507**	Upper Lockout Solenoid
Y005	**X508**	Lower Lockout Solenoid
Y006	**X672**	Link Levelling Solenoid 2
Y007	**X673**	Link Levelling Solenoid 3
Y008	**X674**	Link Levelling Solenoid 4
Y009	**X675**	Link Levelling Solenoid 5
Y014	**X671**	Link Levelling Solenoid 1
Additional Connectors: **X020**, **X022**, **X024**, **X227**, **X234**, **X248**, **X259**, **X402**, **X408**, **X659**, **X817**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


A-010
SUSP FRONT AXLE
ACU
EHR'S
CAN BUS 1
EHR CAN
Sheet 7
FB_55A-7
N 5200M
X-099-20
B-011
X-662-2
U 3230
PTG 3220B
B/W 60AF
X-234
LG 3220B
B/W 60AF
SP-141
SP-142
X-024
LG 3220A
B/W 60AC
LG 3220
B/W 60AA
X-100-6
X-100-17
X-099-23
X-817
N-001
B/W 60AJ
X-227
B/W 60AE
B/W 60AG
LG 3220C
B-023
X-701-1
TN 3235
B/W 60AH
PTG 3220D
X-248
X-100-5
O 3235
S-043
X-509-1
O 3295
B 57
X-259
X-022
X-100-23
Sheet 13
GB_152-5
B 57
S-034
X-401-1
L 5574
L 5576
X-402
SP-273
P 5574B
P 5576B
SP-274
P 5574
P 5576
X-102-16
X-102-17
FB_55A-2
N 5200AN
S-035
P 5574A
P 5576A
X-408
FB_55A-4
X-099-11
X-098-1
X-099-10
X-098-13
X-099-6
X-098-6
X-099-7
X-098-3
X-020
X-259
O 3240
O 3250
O 3260
O 3270
O 3280
TN 3281
TN 3285
TN 3286
OBS
OGS
ONS
OPS
OUS
OYS
O
Y-002
Y-003
Y-004
Y-005
X-505-1
X-506-1
X-507-1
X-508-1
X-101-5
X-101-14
X-101-6
X-101-15
X-101-7
X-659
W 4054
W 4055
W 4056
W 4057
W 4058
X-671-1
X-672-1
X-673-1
X-674-1
X-675-1
Y-014
Y-006
Y-007
Y-008
Y-009
B 57MJ
B 57MK
B 57ML
B 57MM
B 57MN
SP-261
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X-096-1
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SS09D236 1

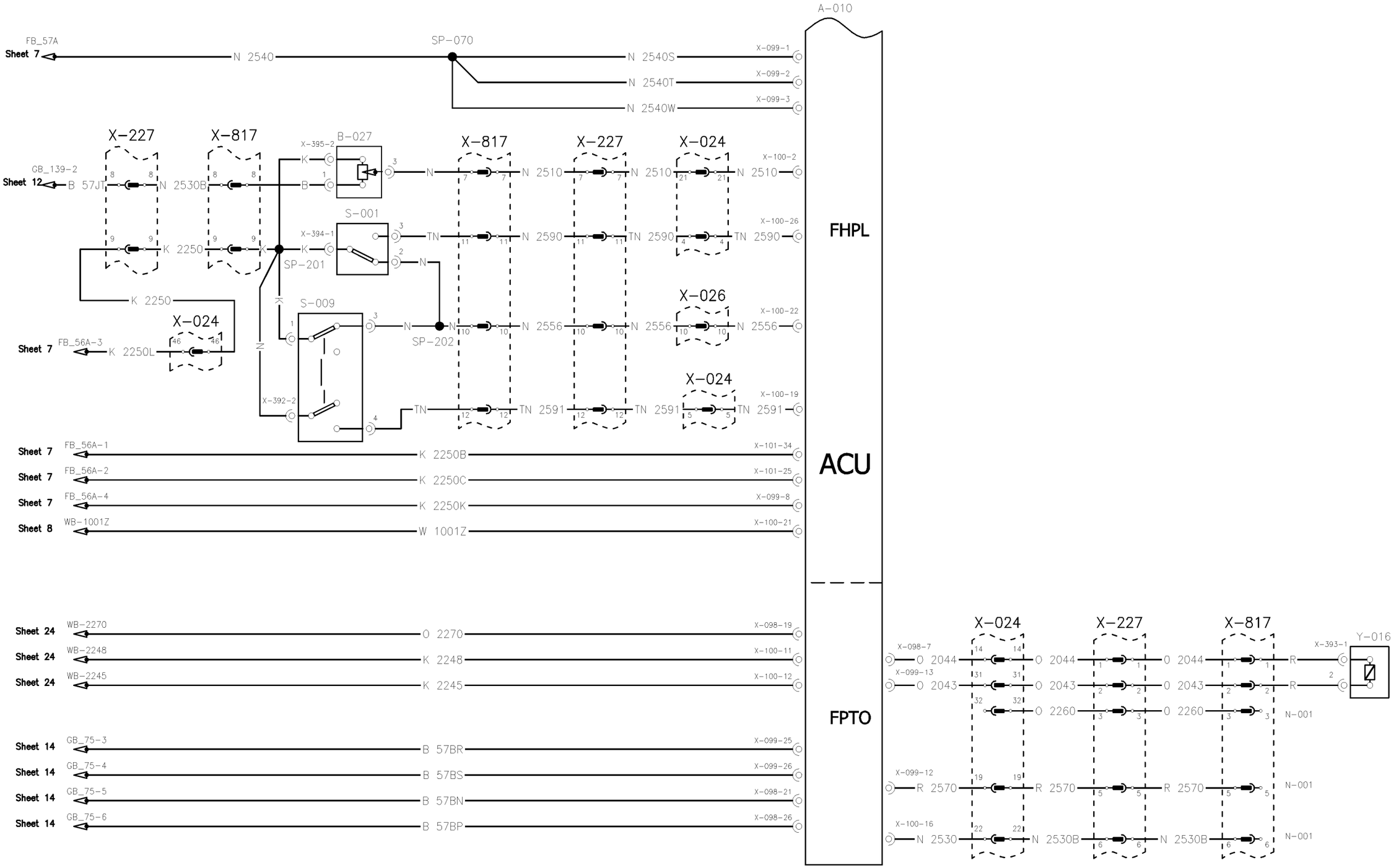
Wiring harness - Electrical schematic frame 19 Auxiliary Controller (Front Hitch, PTO)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A010	**X098**, **X099**, **X100**, **X101**	Auxiliary Control Unit
B027	**X395**	Front Hitch Position Sensor
S001	**X394**	Front Hitch Raise
S009	**X392**	Front Hitch Lower
Y016	**X393**	Front PTO Solenoid
Additional Connectors: **X024**, **X026**, **X227**, **X817**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 19

SS09D237 1

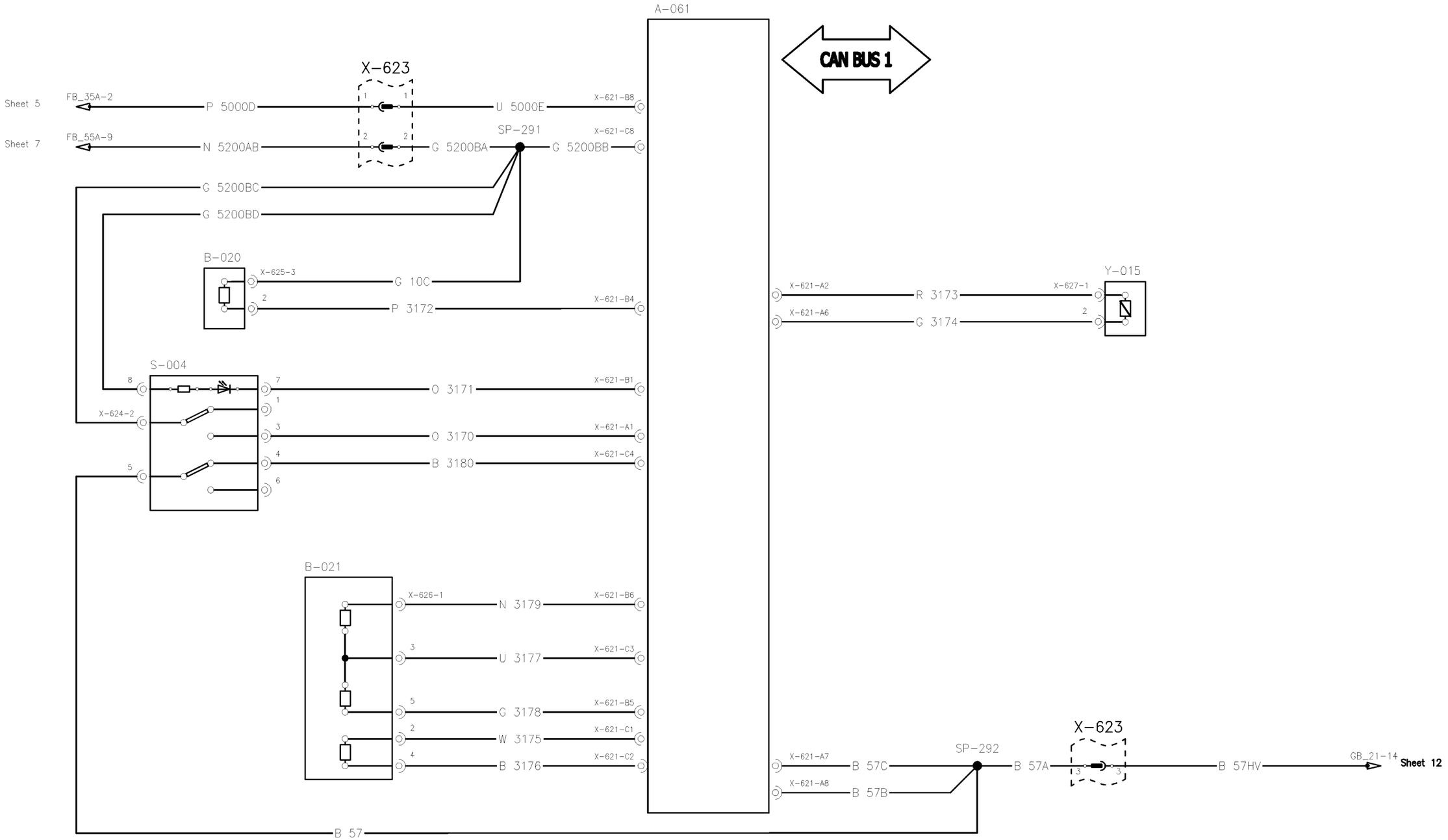
Wiring harness - Electrical schematic frame 20 Fast Steer (Steering Control)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A061	**X621**	Control Unit Fast Steer
B020	**X625**	Proximity Sensor
B021	**X626**	Position Transducer
S004	**X624**	Fast Steer Control Switch
Y015	**X627**	Fast Steer Solenoid
Additional Connectors: **X623**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 20

SS09D238 1

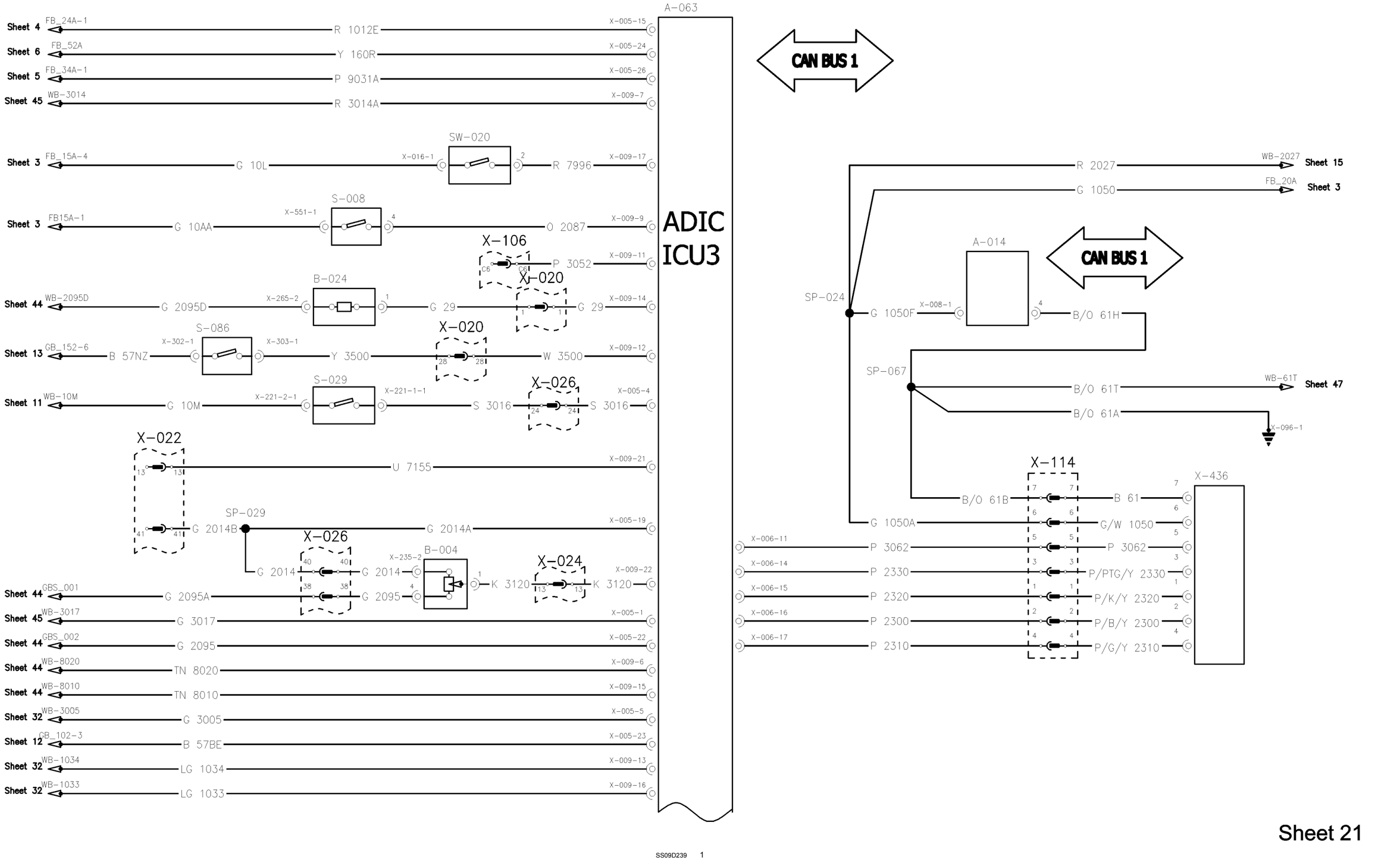
Wiring harness - Electrical schematic frame 21 Instrument Cluster (Switches, Sensors, Keypad & Radar Socket)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A014	**X008**	Keypad
A063	**X005**, **X006**, **X009**	Instrument Cluster Unit
B004	**X235**	Steering Angle Sensor (Auto Guidance)
B024	**X265**	Fuel Tank Sensor
S008	**X551**	Exhaust Brake
S020	**X016**	Brake Pedals Latched switch
S029	**X221**	Brake Fluid Level
S086	**X302**, **X303**	Power Steering Pressure Switch
X436	**X114**	ISO 11786 Signal Socket
-	**X096**	Case Earth CCM & ACU to SP067
Additional Connectors: **X020**, **X022**, **X024**, **X026**, **X106**, **X114**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



SS09D239 1

Sheet 21

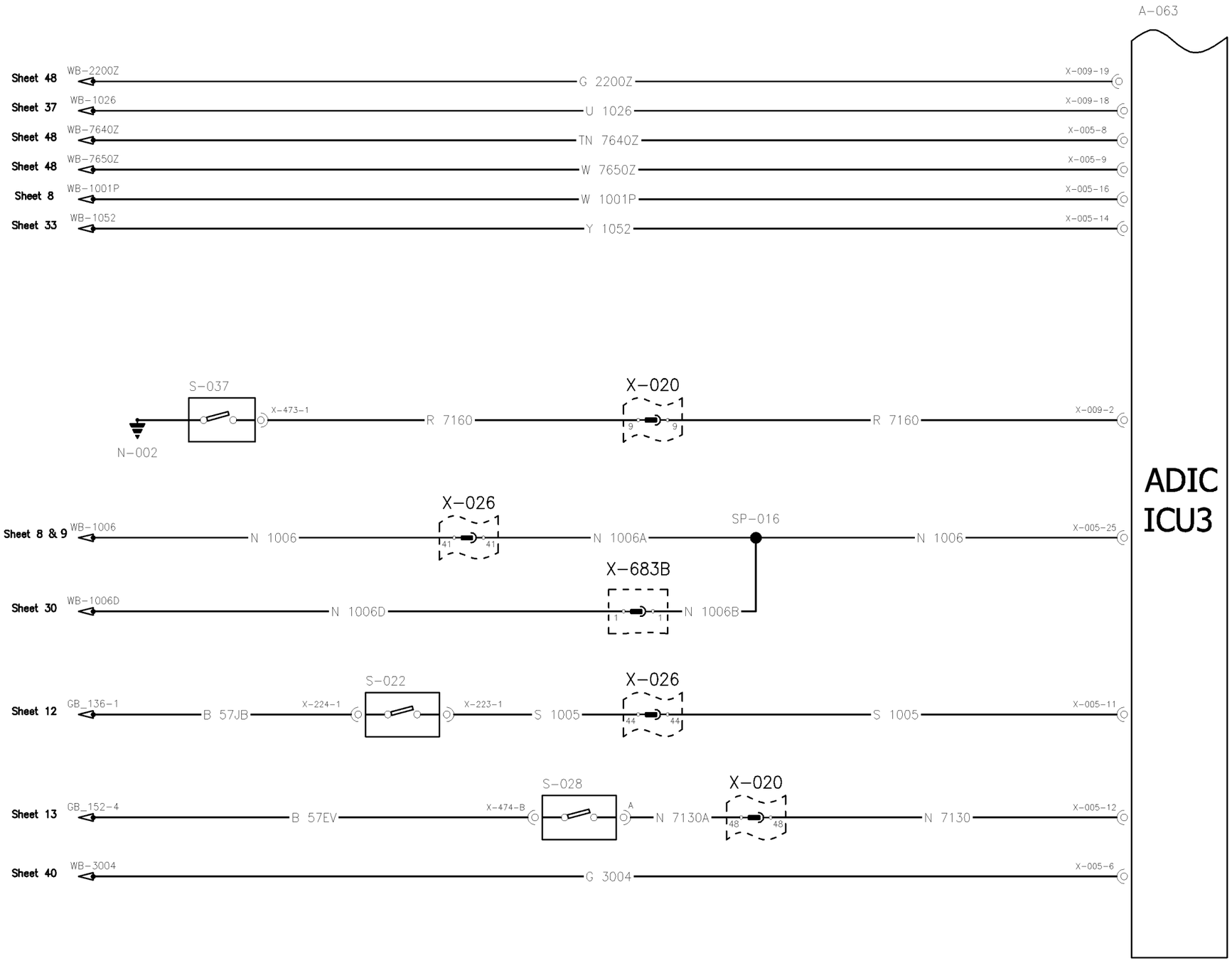
Wiring harness - Electrical schematic frame 22 Instrument Cluster (Switches)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A063	**X005**, **X009**	Instrument Cluster Unit
S022	**X223**, **X224**	Air Cleaner Switch
S028	**X474**	Hydraulic Filter Blocked (Vacuum Switch)
S037	**X473**	Low Hydraulic Charge Switch
Additional Connectors: **X020**, **X026**, **X683B**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



SS09D240 1

Sheet 22

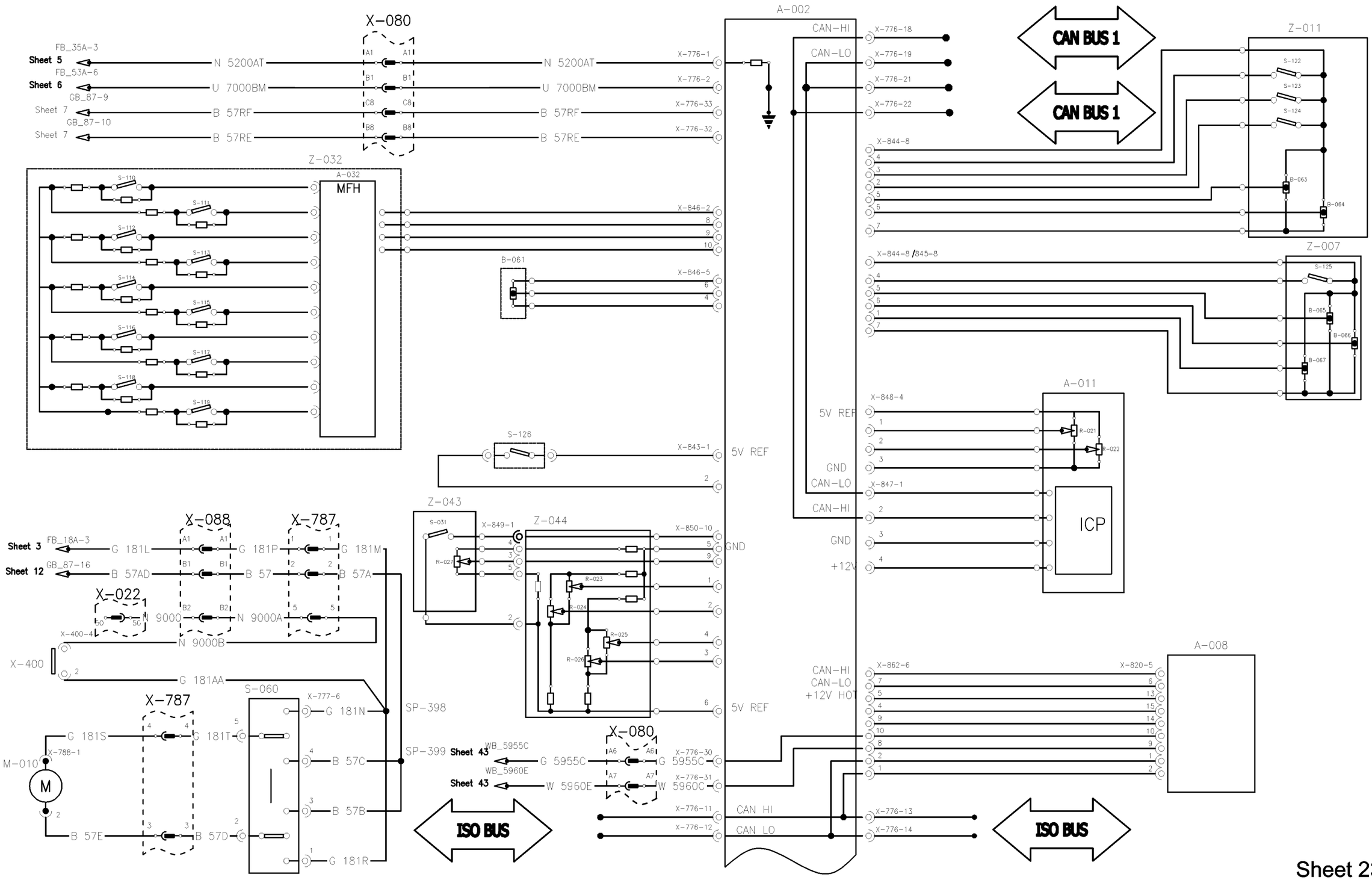
Wiring harness - Electrical schematic frame 23 Armrest Controller (MFH, Joystick, SWCD, EDC)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A002	**X776**	Armrest Control Unit (GARU)
A008	**X820**, **X862**	GARU SWCD
A011	**X847**, **X848**	Integrated Control Switch Panel
A032	**X846**	Multi Function Handle Electronic Modul
B061	**X846**	Hand Throttle-Sensor
B063	**X844**	Joystick Sensor Y
B064	**X844**	Joystick Sensor X
B065	**X845**	Joystick Sensor Y
B066	**X845**	Joystick Sensor X
B067	**X845**	Joystick Sensor Knob
M010	**X788**	Armrest Control Unit (GARU)
R021	**X848**	Rear Hitch Position Potentiometer
R022	**X848**	Rear Hitch Draft Potentiometer
R023	**X850**	EL.Draft Control Rear Sensitivity Poti.
R024	**X850**	EL.Draft Control Rear Drop Rate Poti.
R025	**X850**	EL.Draft Control Rear High Limit Poti.
R026	**X850**	EL.Draft Control Rear Slip Poti.
R027	**X849**	Front Height Setting
S031	**X849**	Front Height Enable
S060	**X777**	Switch Adjust Motor
S110	**X846**	Shuttle Forward Switch
S111	**X846**	Shuttle Reverse Switch
S112	**X846**	Range Increase Switch
S113	**X846**	Range Decrease Switch
S114	**X846**	EHR1/5 Extend Switch
S115	**X846**	EHR1/5 Retract Switch
S116	**X846**	Rear Hitch Fast Raise Switch
S117	**X846**	Rear Hitch Fast Lower Switch
S118	**X846**	HTS Step Switch
S119	**X846**	Shift Switch
S122	**X844**	Switch Loader Valve 1
S123	**X844**	Switch Loader Valve 2
S124	**X844**	MID-EHR 1&2 / 3&4
S125	**X845**	Switch
S126	**X843**	EHR Float / Joystick
Z007	**X844**, **X845**	Joystick 2
Z011	**X844**	Joystick 1
Z032	**X846**	Multi Function Handle
Z043	**X849**	Front Hitch Setting
Z044	**X850**	Rear Hitch Setting
-	**X400**	Diverter Switch
Additional Connectors: **X022**, **X080**, **X088**, **X787**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


X-080
FB_35A-3
Sheet 5
N 5200AT
FB_53A-6
Sheet 6
U 7000BM
GB_87-9
Sheet 7
B 57RF
GB_87-10
Sheet 7
B 57RE
A1
B1
C8
B8
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U 7000BM
B 57RF
B 57RE
X-776-1
X-776-2
X-776-33
X-776-32
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CAN-HI
CAN-LO
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X-776-19
X-776-21
X-776-22
CAN BUS 1
CAN BUS 1
Z-011
S-122
S-123
S-124
B-063
B-064
X-844-8
Z-032
A-032
MFH
S-110
S-111
S-112
S-113
S-114
S-115
S-116
S-117
S-118
S-119
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X-846-5
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Z-007
X-844-8 /845-8
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B-067
A-011
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R-021
R-022
ICP
5V REF
GND
CAN-LO
CAN-HI
GND
+12V
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S-126
X-843-1
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S-031
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Z-044
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R-025
R-026
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X-400-4
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GB_87-16
Sheet 12
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B 57
G 181M
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G 181AA
SP-398
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B 57B
G 181R
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G 181T
M-010
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M
B 57E
B 57D
X-080
WB_5955C
Sheet 43
G 5955C
WB_5960E
Sheet 43
W 5960E
X-776-30
X-776-31
X-776-11
X-776-12
CAN HI
CAN LO
ISO BUS
ISO BUS
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SS09D363 1

Sheet 23

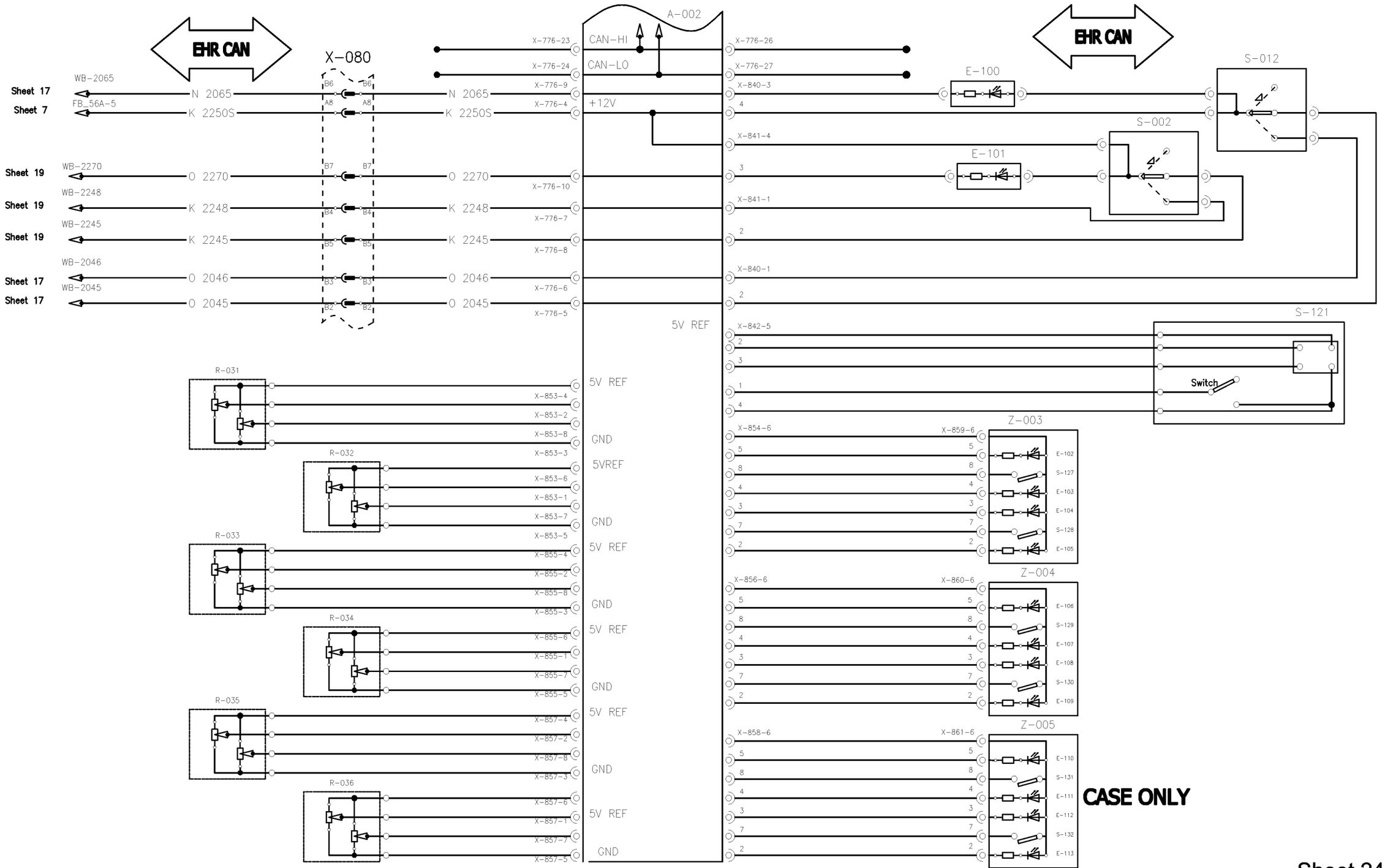
Wiring harness - Electrical schematic frame 24 Armrest Controller (Switch, Led's, Potentiometer)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A002	**X776**	Armrest Control Unit (GARU)
E100	**X840**	Rear PTO Lamp
E101	**X841**	Front PTO Lamp
E102	**X854**, **X859**	El.Hydraulic Remote 1 Timer LED
E103	**X854**, **X859**	El.Hydraulic Remote 1 Motor LED
E104	**X854**, **X859**	El.Hydraulic Remote 2 Timer LED
E105	**X854**, **X859**	El.Hydraulic Remote 2 Motor LED
E106	**X856**, **X860**	El.Hydraulic Remote 3 Timer LED
E107	**X856**, **X860**	El.Hydraulic Remote 3 Motor LED
E108	**X856**, **X860**	El.Hydraulic Remote 4 Timer LED
E109	**X856**, **X860**	El.Hydraulic Remote 4 Motor LED
E110	**X858**, **X861**	El.Hydraulic Remote 5 Timer LED
E111	**X858**, **X861**	El.Hydraulic Remote 5 Motor LED
E112	**X858**, **X861**	El.Hydraulic Remote 6 Timer LED
E113	**X858**, **X861**	El.Hydraulic Remote 6 Motor LED
R031	**X853**	El.Hydraulic Remote 1 Control
R032	**X853**	El.Hydraulic Remote 2 Control
R033	**X855**	El.Hydraulic Remote 3 Control
R034	**X855**	El.Hydraulic Remote 4 Control
R035	**X857**	El.Hydraulic Remote 5 Control
R036	**X857**	El.Hydraulic Remote 6 Control
S002	**X841**	Front PTO Switch
S012	**X840**	Rear PTO Switch
S121	**X842**	EHR Flow Control Encoder
S127	**X854**, **X859**	El.Hydraulic Remote 1 Timer / Motor Switch
S128	**X854**, **X859**	El.Hydraulic Remote 2 Timer / Motor Switch
S129	**X856**, **X860**	El.Hydraulic Remote 3 Timer / Motor Switch
S130	**X856**, **X860**	El.Hydraulic Remote 4 Timer / Motor Switch
S131	**X858**, **X861**	El.Hydraulic Remote 5 Timer / Motor Switch
S132	**X858**, **X861**	El.Hydraulic Remote 6 Timer / Motor Switch
Z003	**X854**, **X859**	El.Hydraulic Remote Lamps 1 & 2 & Swich
Z004	**X856**, **X860**	El.Hydraulic Remote Lamps 3 & 4 & Swich
Z005	**X858**, **X861**	El.Hydraulic Remote Lamps 5 & 6 & Swich
Additional Connectors: **X080**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


EHR CAN
X-080
WB-2065
Sheet 17
N 2065
FB_56A-5
Sheet 7
K 2250S
WB-2270
Sheet 19
O 2270
WB-2248
Sheet 19
K 2248
WB-2245
Sheet 19
K 2245
WB-2046
Sheet 17
O 2046
WB-2045
Sheet 17
O 2045
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B7
B4
B5
B3
B2
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X-776-6
X-776-5
A-002
CAN-HI
CAN-LO
+12V
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X-858-6
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E-101
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S-002
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Z-003
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Z-004
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CASE ONLY
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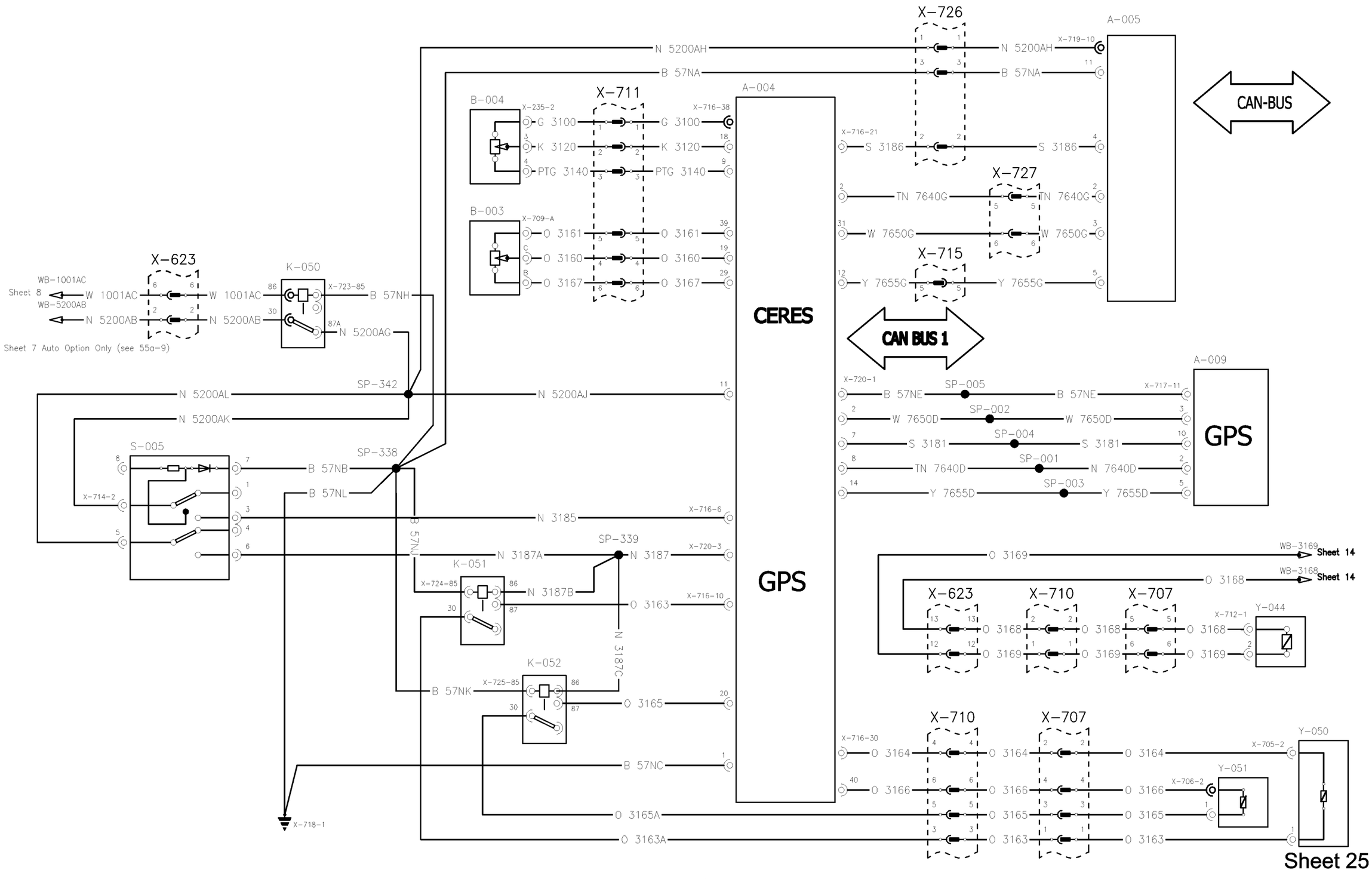
Wiring harness - Electrical schematic frame 25 Auto - Guidance (Steering Control, Switch, Supply, Solenoid)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A004	**X716**, **X720**	Navigation Controller
A005	**X719**	GPS Receiver
A009	**X717**	Auto Guidance Data Logger
B003	**X709**	Steering Pressure Sensor
B004	**X235**	Steering Angle Sensor
K050	**X723**	Relay Base Crank Isolate
K051	**X724**	Relay Base Solenoid B
K052	**X725**	Relay Base Solenoid A
S005	**X714**	Auto Guidance Control Switch
Y044	**X712**	Auto Guidance Dump Solenoid
Y050	**X705**	Steering Solenoid Right Hand
Y051	**X706**	Steering Solenoid Left Hand
-	**X718**	Earth to SP338
Additional Connectors: **X623**, **X707**, **X710**, **X711**, **X715**, **X726**, **X727**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


X-726
A-005
N 5200AH
B 57NA
X-719-10
CAN-BUS
A-004
X-711
B-004
X-235-2
G 3100
K 3120
PTG 3140
X-716-38
X-716-21
S 3186
X-727
TN 7640G
W 7650G
B-003
X-709-A
O 3161
O 3160
O 3167
X-715
Y 7655G
CERES
CAN BUS 1
A-009
X-720-1
B 57NE
SP-005
X-717-11
W 7650D
SP-002
S 3181
SP-004
TN 7640D
SP-001
Y 7655D
SP-003
GPS
X-623
K-050
WB-1001AC
Sheet 8
W 1001AC
WB-5200AB
N 5200AB
X-723-85
B 57NH
N 5200AG
Sheet 7 Auto Option Only (see 55a-9)
SP-342
N 5200AL
N 5200AK
N 5200AJ
S-005
X-714-2
SP-338
B 57NB
B 57NL
N 3185
X-716-6
B 57NJ
SP-339
N 3187A
N 3187
X-720-3
K-051
X-724-85
N 3187B
O 3163
X-716-10
N 3187C
K-052
X-725-85
B 57NK
O 3165
B 57NC
X-718-1
O 3165A
O 3163A
WB-3169
Sheet 14
O 3169
WB-3168
Sheet 14
O 3168
X-623
X-710
X-707
X-712-1
Y-044
X-716-30
O 3164
O 3166
Y-050
X-705-2
Y-051
X-706-2
Sheet 25

SS09D243 1

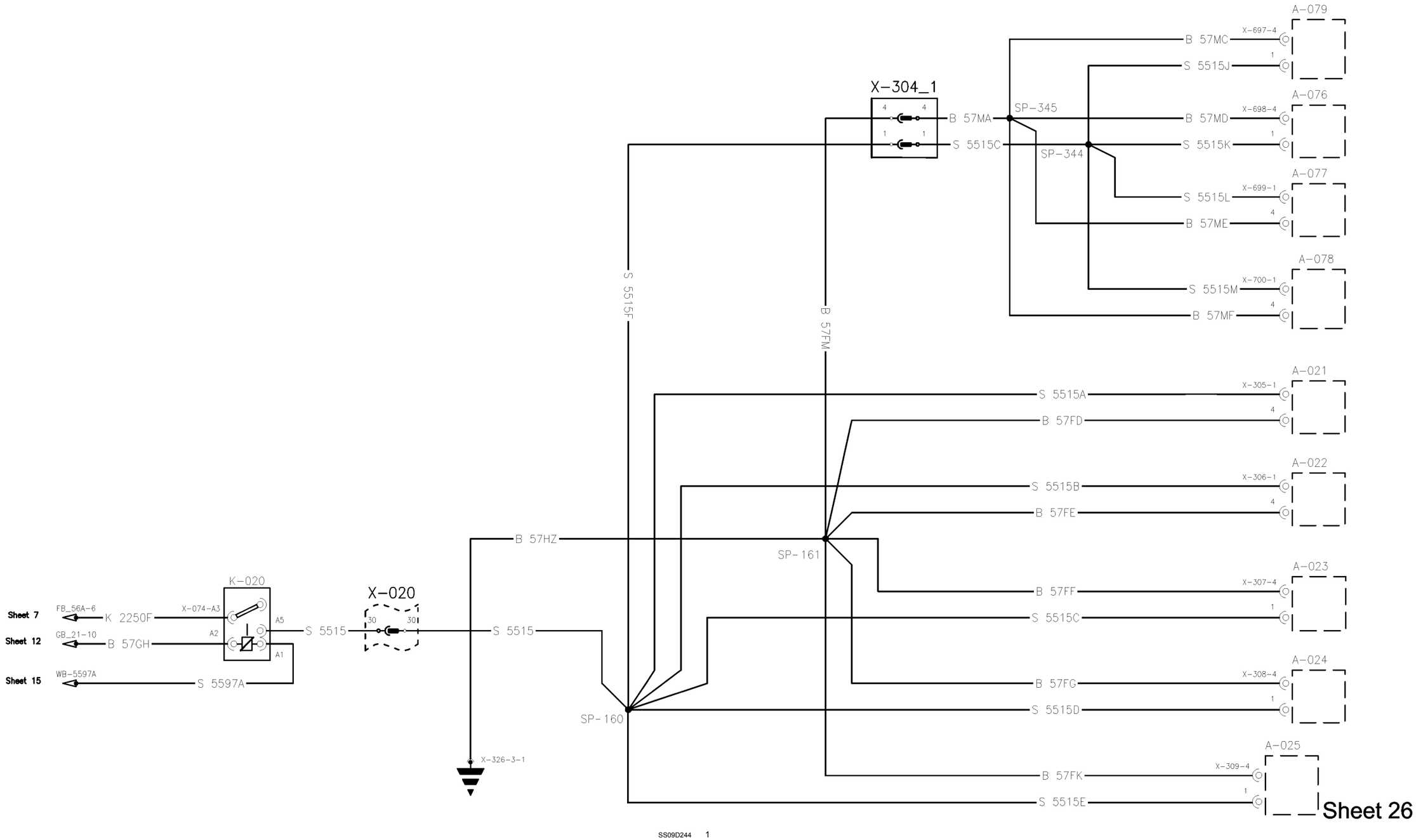
Wiring harness - Electrical schematic frame 26 Can Power (Can System)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A021	**X305**	El.Hydraulic Remote Valve 1
A022	**X306**	El.Hydraulic Remote Valve 2
A023	**X307**	El.Hydraulic Remote Valve 3
A024	**X308**	El.Hydraulic Remote Valve 4
A025	**X309**	El.Hydraulic Remote Valve 5
A076	**X698**	Mid Mount El.Hydraulic Remote Valve 2
A077	**X699**	Mid Mount El.Hydraulic Remote Valve 3
A078	**X700**	Mid Mount El.Hydraulic Remote Valve 4
A079	**X697**	Mid Mount El.Hydraulic Remote Valve 1
K020	**X074**	El.Hydraulic Remote Lock Relay
-	**X326**	Earth Transmission to SP161
Additional Connectors: **X020**, **X304**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


X-304_1
4
4
1
1
B 57MA
S 5515C
SP-345
SP-344
A-079
X-697-4
B 57MC
1
S 5515J
A-076
X-698-4
B 57MD
1
S 5515K
A-077
X-699-1
S 5515L
4
B 57ME
A-078
X-700-1
S 5515M
4
B 57MF
S 5515F
B 57FM
A-021
X-305-1
S 5515A
4
B 57FD
A-022
X-306-1
S 5515B
4
B 57FE
B 57HZ
SP-161
A-023
X-307-4
B 57FF
1
S 5515C
A-024
X-308-4
B 57FG
1
S 5515D
SP-160
A-025
X-309-4
B 57FK
1
S 5515E
K-020
X-020
FB_56A-6
K 2250F
X-074-A3
A5
A2
A1
GB_21-10
B 57GH
WB-5597A
S 5597A
S 5515
30
30
S 5515
X-326-3-1
Sheet 7
Sheet 12
Sheet 15
Sheet 26
SS09D244 1

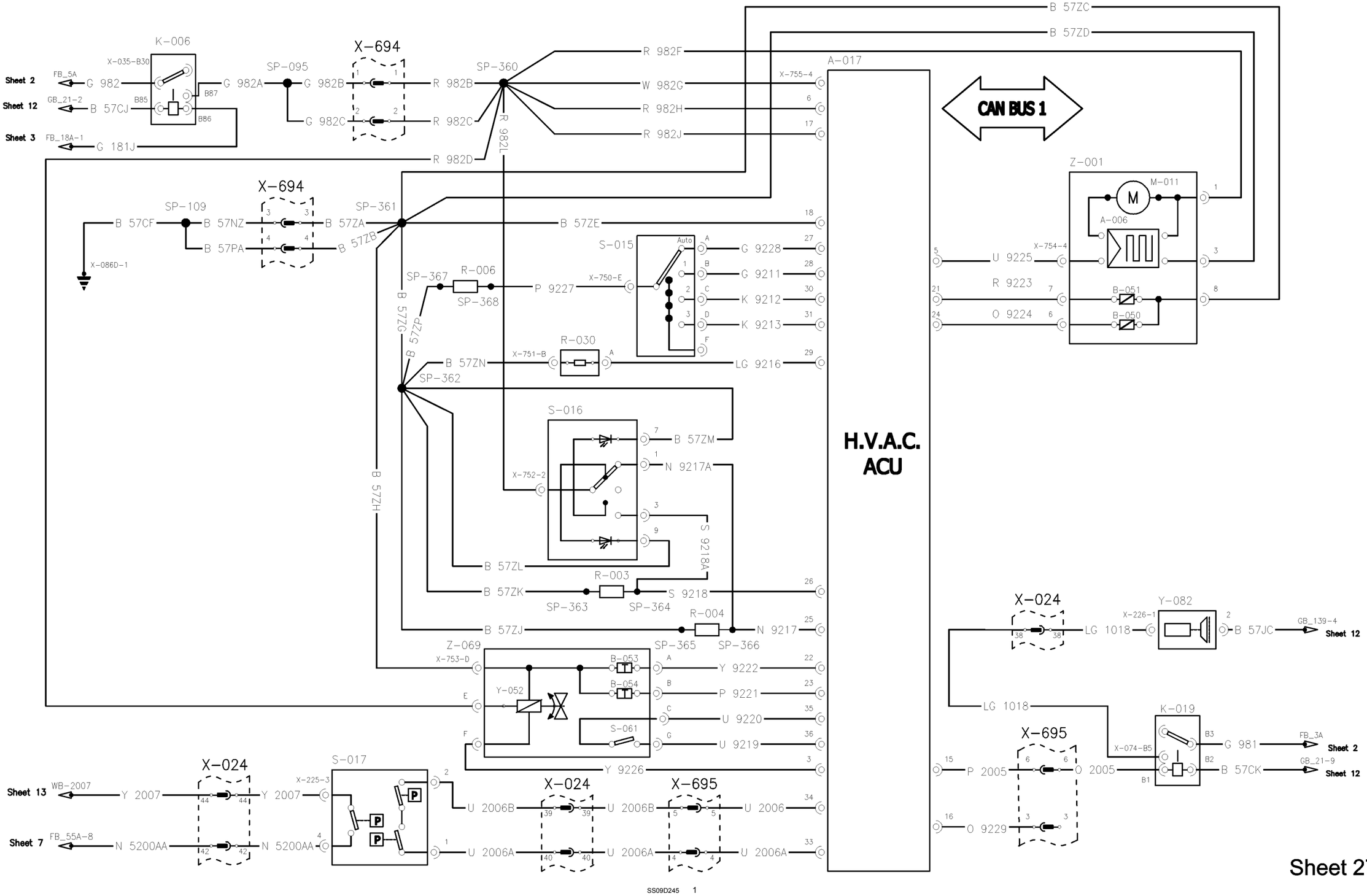
Wiring harness - Electrical schematic frame 27 Climate Control Auto (Heating Controller, Supply, Switch, Relay)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A006	**X754**	Blower Motor Treiber
A017	**X755**	Air Condition Control Unit
B050	**X754**	Temperature Outside
B051	**X754**	Temperature Cabin
B053	**X753**	Temperature Outlet Sensor
B054	**X753**	Temperature Evaporator Sensor
K006	**X035**	Blower Motor
K019	**X074**	Air Condition Clutch Relay
M011	**X754**	Blower Motor
R003	-	Resistor SJ5
R004	-	Resistor SJ4
R006	-	Resistor SJ6
R030	**X751**	Potentiometer Temperature Adjustment
S015	**X750**	Heater Blower Speed Switch ATC
S016	**X752**	Air Conditioning Mode Switch ATC
S017	**X225**	Air Condition Pressure Switch
S061	**X753**	Low Pressure Switch
Y052	**X753**	Heating Valve
Y082	**X226**	Air Condition Clutch
Z001	**X754**	Blower Assembly
Z069	**X753**	Air Condition Assembly
-	**X086D**	Earth Header 1 to SP109
Additional Connectors: **X024**, **X694**, **X695**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


K-006
X-035-B30
B87
B85
B86
FB_5A
G 982
G 982A
SP-095
G 982B
G 982C
X-694
SP-360
R 982B
R 982C
R 982F
W 982G
R 982H
R 982J
R 982D
R 982L
A-017
X-755-4
6
17
B 57ZC
B 57ZD
CAN BUS 1
Z-001
M-011
A-006
X-754-4
U 9225
R 9223
O 9224
B-051
B-050
Sheet 2
Sheet 12
GB_21-2
B 57CJ
Sheet 3
FB_18A-1
G 181J
X-694
SP-109
B 57CF
B 57NZ
B 57PA
SP-361
B 57ZA
B 57ZB
X-086D-1
B 57ZE
18
S-015
Auto
G 9228
G 9211
K 9212
K 9213
27
28
30
31
SP-367
R-006
SP-368
P 9227
X-750-E
B 57ZG
B 57ZP
R-030
X-751-B
B 57ZN
LG 9216
29
SP-362
S-016
B 57ZM
N 9217A
X-752-2
S 9218A
B 57ZH
B 57ZL
R-003
B 57ZK
S 9218
26
SP-363
SP-364
R-004
B 57ZJ
N 9217
25
Z-069
SP-365
SP-366
X-753-D
B-053
B-054
S-061
Y-052
Y 9222
P 9221
U 9220
U 9219
Y 9226
22
23
35
36
3
H.V.A.C.
ACU
X-024
S-017
X-225-3
WB-2007
Sheet 13
Y 2007
FB_55A-8
Sheet 7
N 5200AA
U 2006B
U 2006A
X-695
U 2006
34
33
X-024
Y-082
X-226-1
LG 1018
B 57JC
GB_139-4
Sheet 12
K-019
X-074-B5
G 981
FB_3A
Sheet 2
GB_21-9
Sheet 12
P 2005
O 2005
O 9229
Sheet 27
SS09D245 1

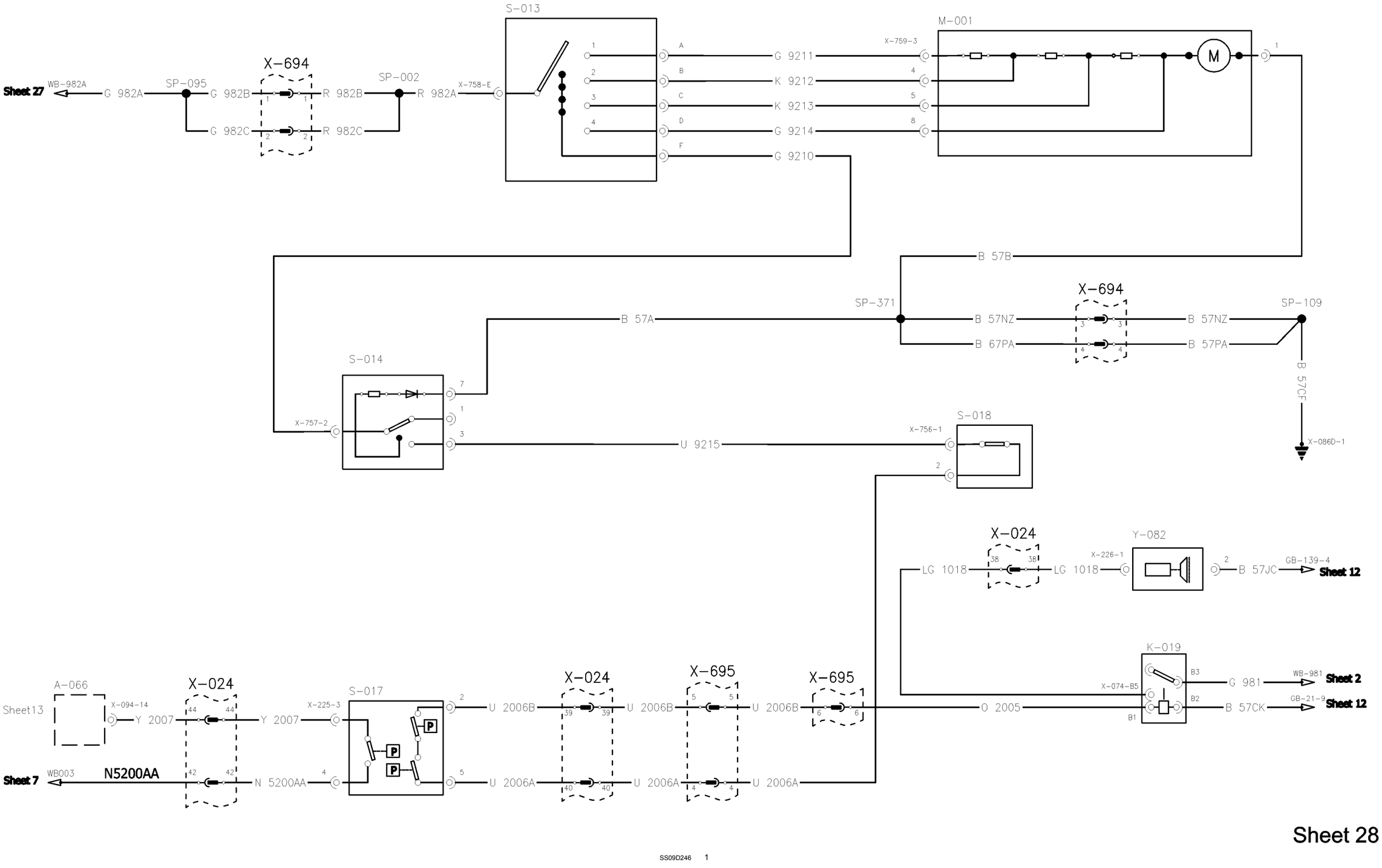
Wiring harness - Electrical schematic frame 28 Climate Control Manual (Heating, Supply, Switch, Relay)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A066	**X094**	Central Control Unit
K019	**X074**	Air Condition Clutch Relay
M001	**X759**	Blower Motor H.V.A.C System manual
S013	**X758**	Blower Speed Switch HVAC System manual
S014	**X757**	Operating Mode Switch H.V.A.C System manual
S017	**X225**	Air Condition Pressure Switch
S018	**X756**	Low Pressure Switch H.V.A.C System manual
Y082	**X226**	Air Condition Clutch
-	**X086D**	Earth Header 1 to SP109
Additional Connectors: **X024**, **X694**, **X695**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 28

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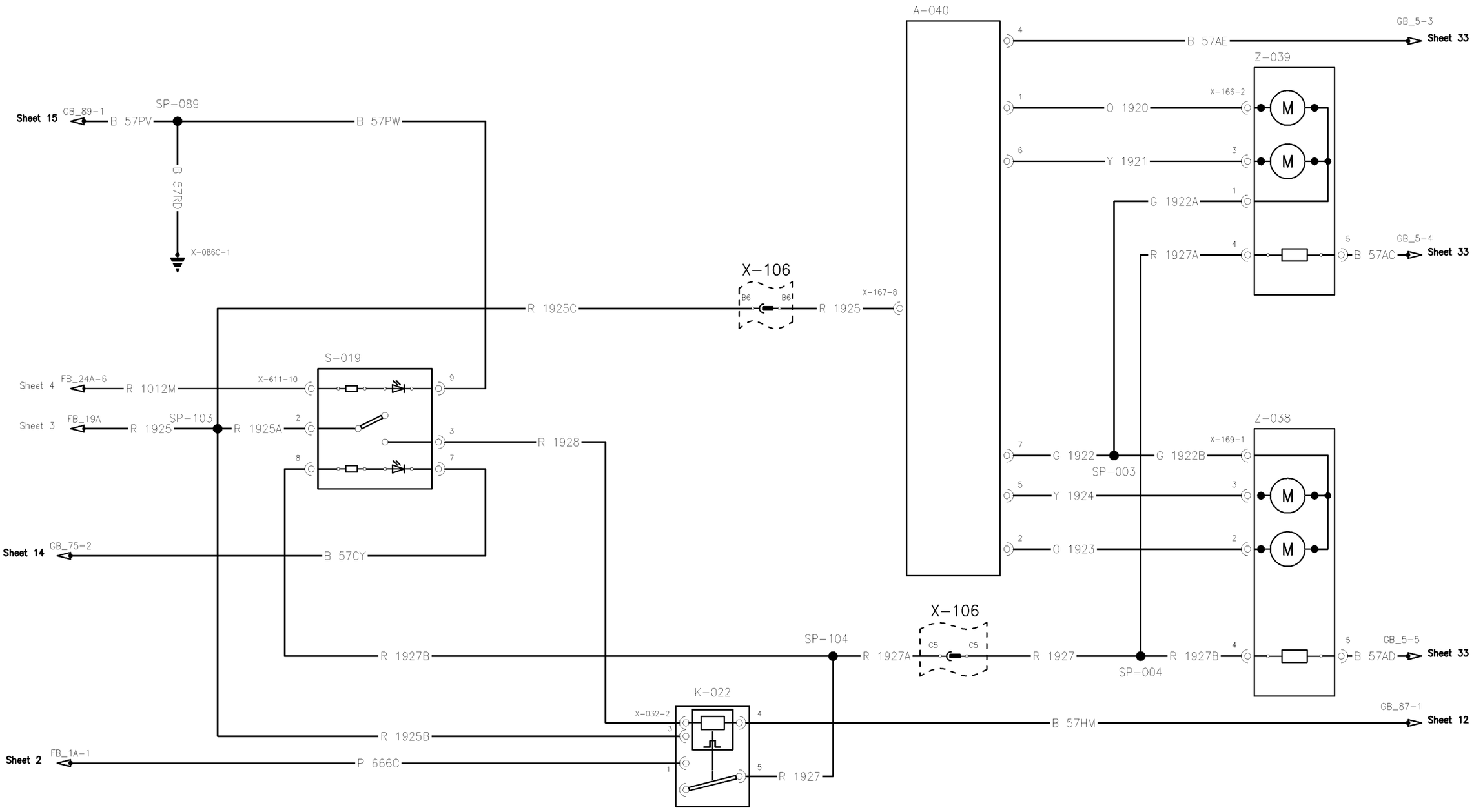
Wiring harness - Electrical schematic frame 29 Heated Mirrors (Switch & Relay)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A040	**X167**	Mirror Control
K022	**X032**	Heated Mirror Timer Relay
S019	**X611**	Heated Mirror Switch
Z038	**X169**	Electric Mirror Right Hand
Z039	**X166**	Electric Mirror Left Hand
-	**X086C**	Earth Header 1 to SP089
Additional Connectors: **X106**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 29

SS09D247 1

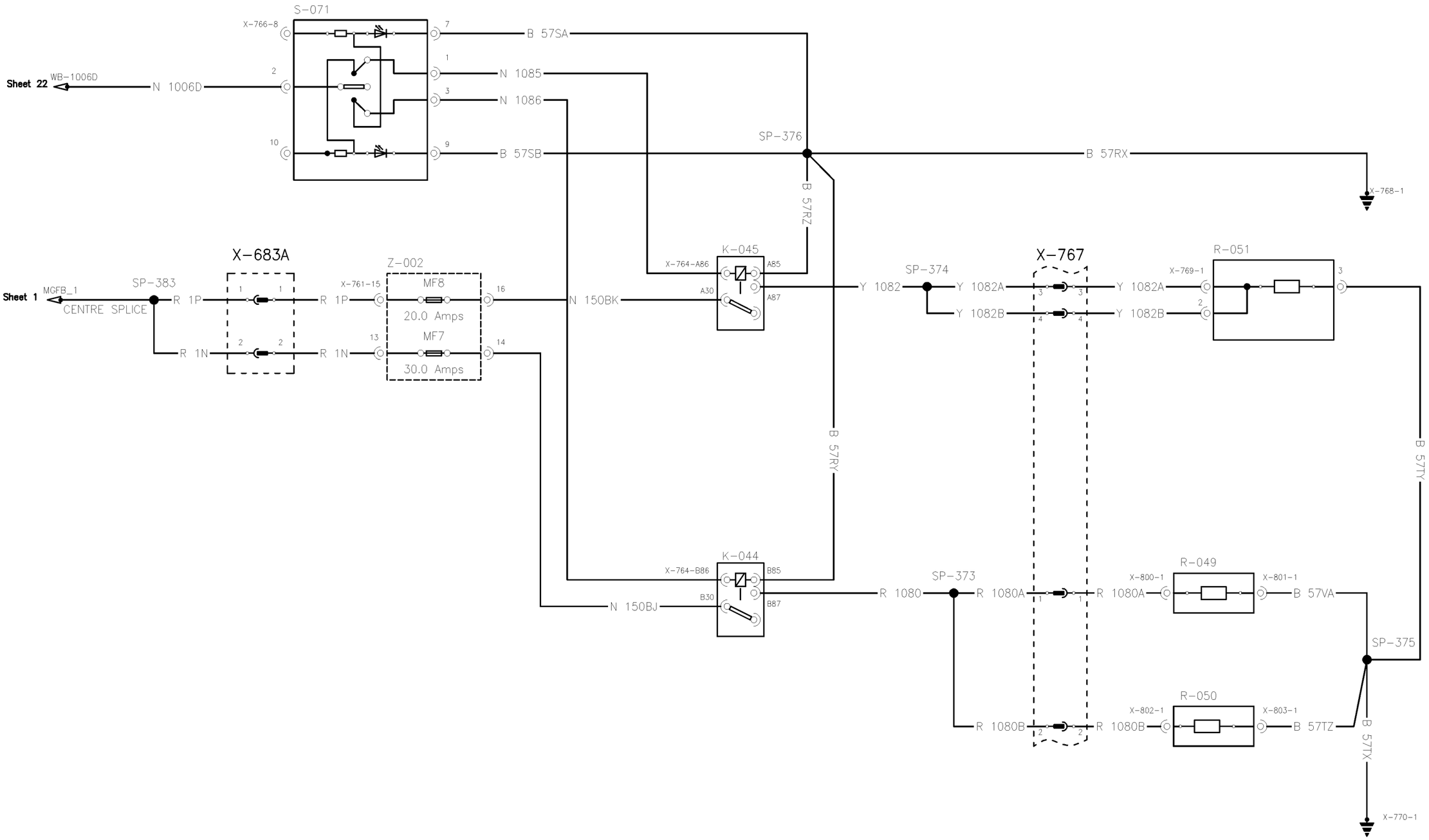
Wiring harness - Electrical schematic frame 30 Heated Screen (Supply, Switch & Relay)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
K044	**X764**	Front Screen Heater Relay
K045	**X764**	Rear Screen Heater Relay
MF7	**X761**	Supply heated windscreen front
MF8	**X761**	Supply heated screen rear
R049	**X800**, **X801**	Front Screen Heater A
R050	**X802**, **X803**	Front Screen Heater B
R051	**X769**	Rear Screen Heater
S071	**X766**	Screen Heater Switch
Z002	**X761**	Maxi Fuseholder
-	**X768**	Main Earth Point to SP376
-	**X770**	Earth Connector to SP375
Additional Connectors: **X683A**, **X767**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 30

SS09D248 1

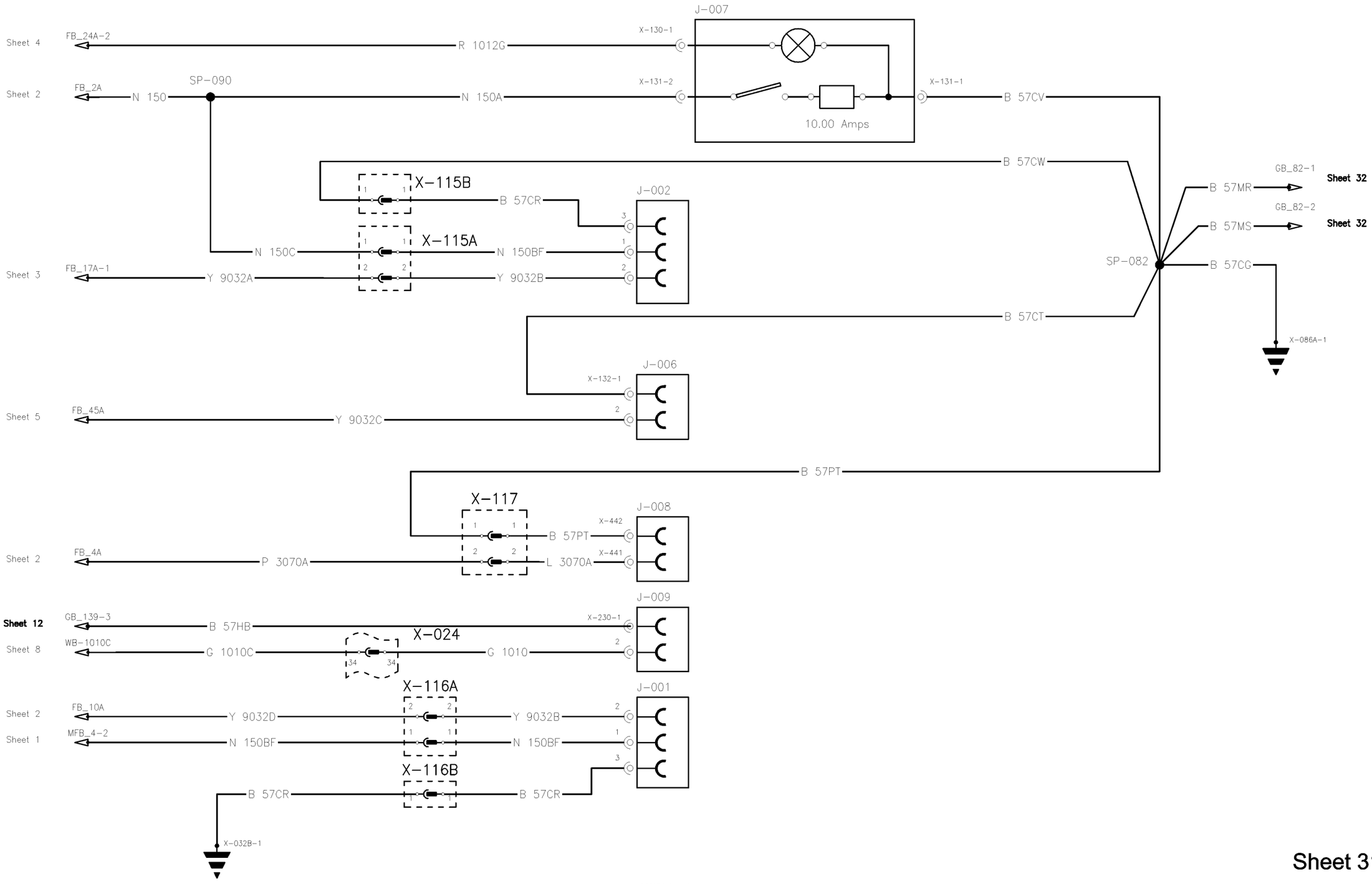
Wiring harness - Electrical schematic frame 31 Implement Sockets (Cigar Lighter, Power Sockets)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
J001	**X116A**, **X116B**	Rear Power Socket Implement
J002	**X115A**, **X115B**	30Amp Power Socket
J006	**X132**	8 Amp Socket
J007	**X130**, **X131**	Cigar Lighter
J008	**X441**, **X442**	Power Studs
J009	**X230**	DIA Engine Inline
-	**X032B**	Earth Header 2
-	**X086A**	Earth Header 1 to SP082
Additional Connectors: **X024**, **X115A**, **X115B**, **X116A**, **X116B**, **X117**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


J-007
Sheet 4
FB_24A-2
R 1012G
X-130-1
Sheet 2
FB_2A
N 150
SP-090
N 150A
X-131-2
X-131-1
B 57CV
10.00 Amps
B 57CW
GB_82-1
Sheet 32
B 57MR
GB_82-2
Sheet 32
B 57MS
B 57CG
X-115B
B 57CR
J-002
X-115A
N 150C
N 150BF
Sheet 3
FB_17A-1
Y 9032A
Y 9032B
SP-082
X-086A-1
B 57CT
J-006
X-132-1
Sheet 5
FB_45A
Y 9032C
B 57PT
X-117
J-008
X-442
B 57PT
Sheet 2
FB_4A
P 3070A
L 3070A
X-441
J-009
Sheet 12
GB_139-3
B 57HB
X-230-1
X-024
Sheet 8
WB-1010C
G 1010C
G 1010
X-116A
J-001
Sheet 2
FB_10A
Y 9032D
Y 9032B
Sheet 1
MFB_4-2
N 150BF
N 150BF
X-116B
B 57CR
B 57CR
X-032B-1
SS09D249 1

Sheet 31

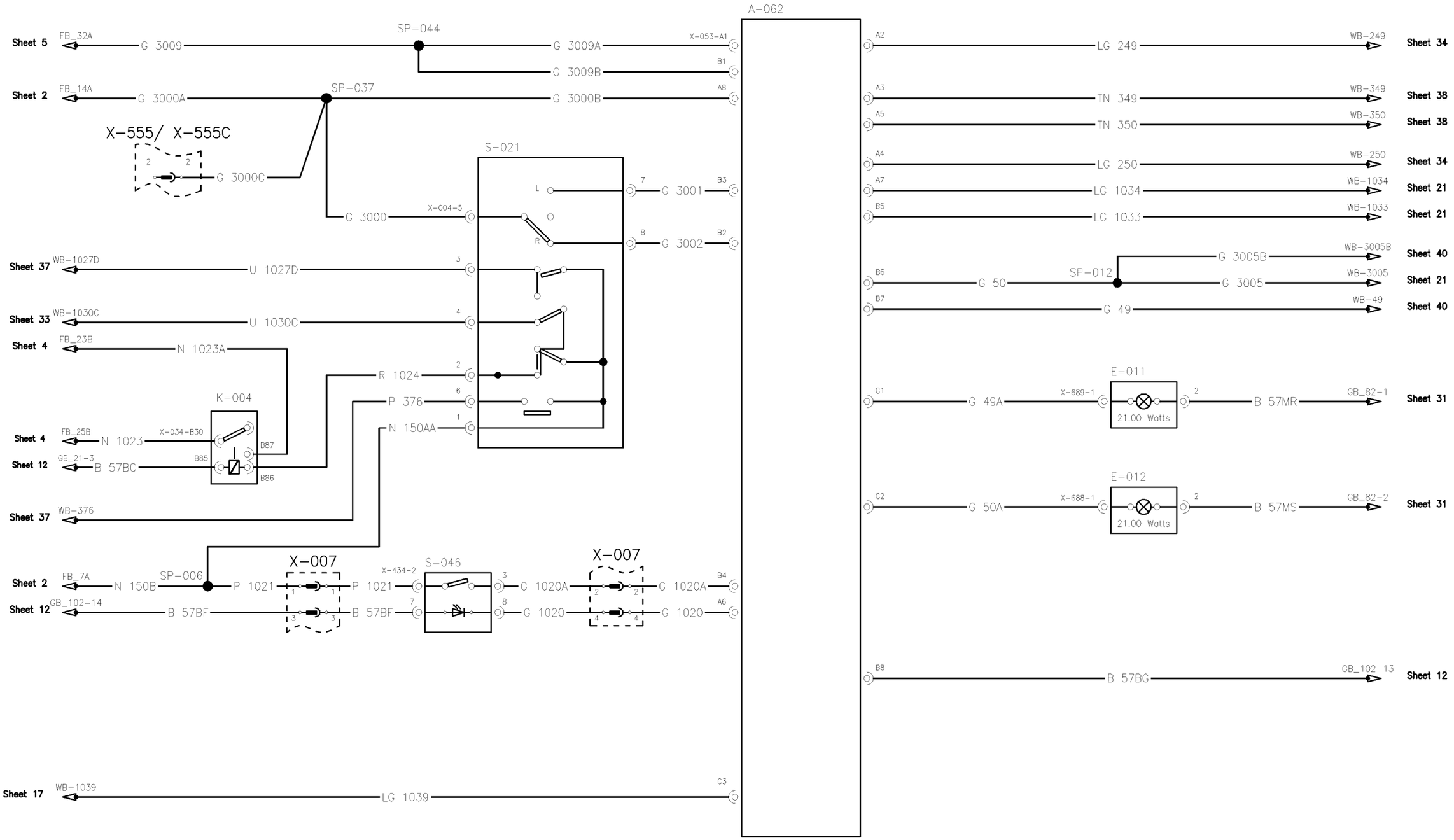
Wiring harness - Electrical schematic frame 32 Lighting (Switch & Flasher Unit)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A062	**X053**	Flasher Unit
E011	**X689**	Extremity Light Right Hand
E012	**X688**	Extremity Light Left Hand
K004	**X034**	Lights Relay
S021	**X004**	Main Light Switch
S046	**X434**	Hazard Switch
Additional Connectors: **X007**, **X555**, **X555C**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 32

SS09D250 1

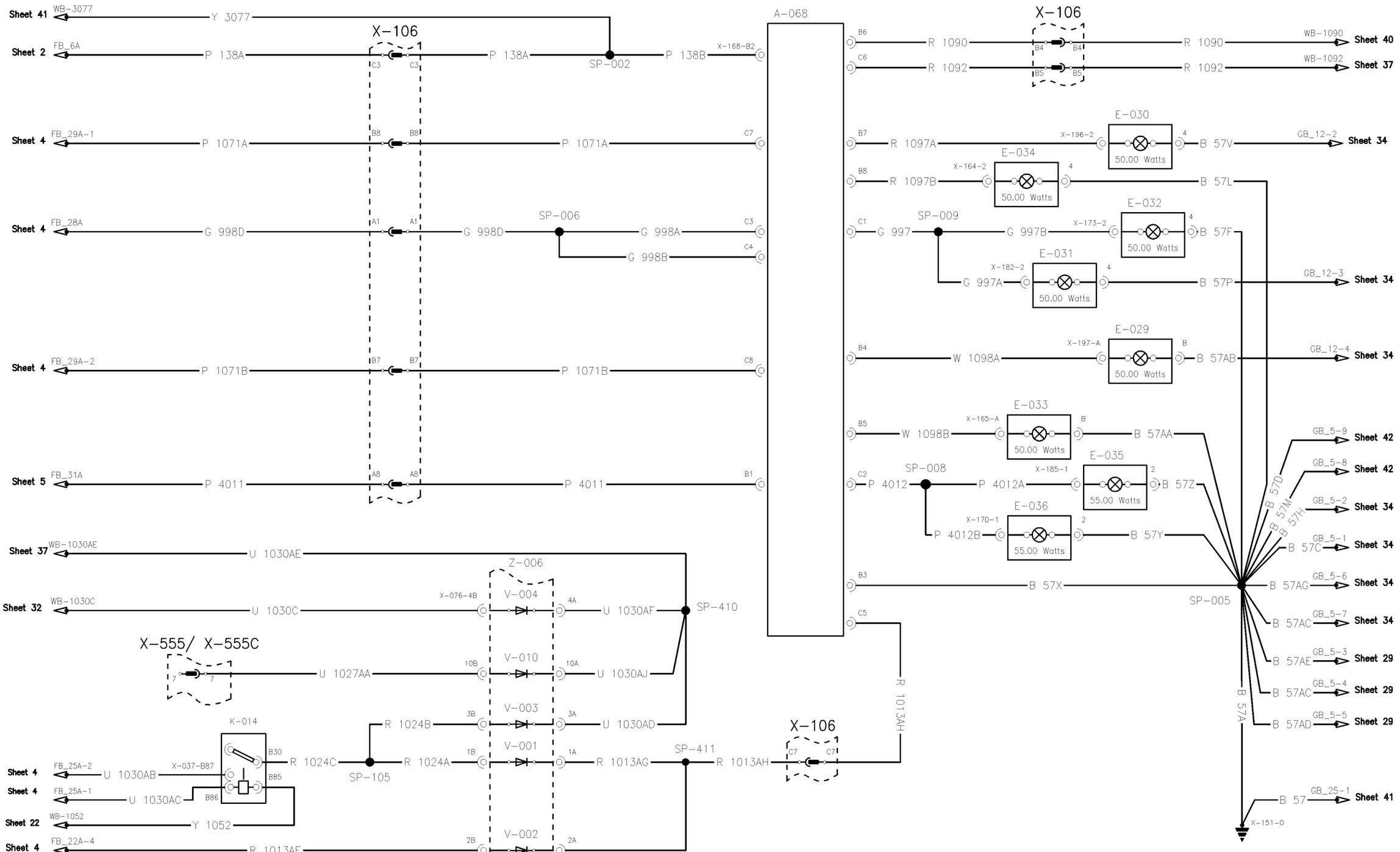
Wiring harness - Electrical schematic frame 33 Lighting Auxiliary (Worklamps & Beacons)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A068	**X168**	Worklamps Control Unit
E029	**X197**	Worklamp Roof Front Left Hand 2
E030	**X196**	Worklamp Grabrail Left Hand
E031	**X182**	Worklamp Left Hand Rear
E032	**X173**	Worklamp Rear Right Hand
E033	**X165**	Worklamp Roof Front Left Hand 2
E034	**X164**	Worklamp Grabrail Right Hand Front
E035	**X185**	Rotating Beacon Left Hand
E036	**X170**	Rotating Beacon Right Hand
K014	**X037**	Get U Home
V001	**X076**	Get U Home Diode
V002	**X076**	Get U Home Diode
V003	**X076**	Get U Home Diode
V004	**X076**	Dipped Beam Headlamps Diode
V010	**X076**	Main Beam Headlamps Diode
Z006	**X076**	Diode Block
-	**X151**	Roof Earth to SP005, Radio Earth
Additional Connectors: **X106**, **X555**, **X555C**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 33

SS09D251 1

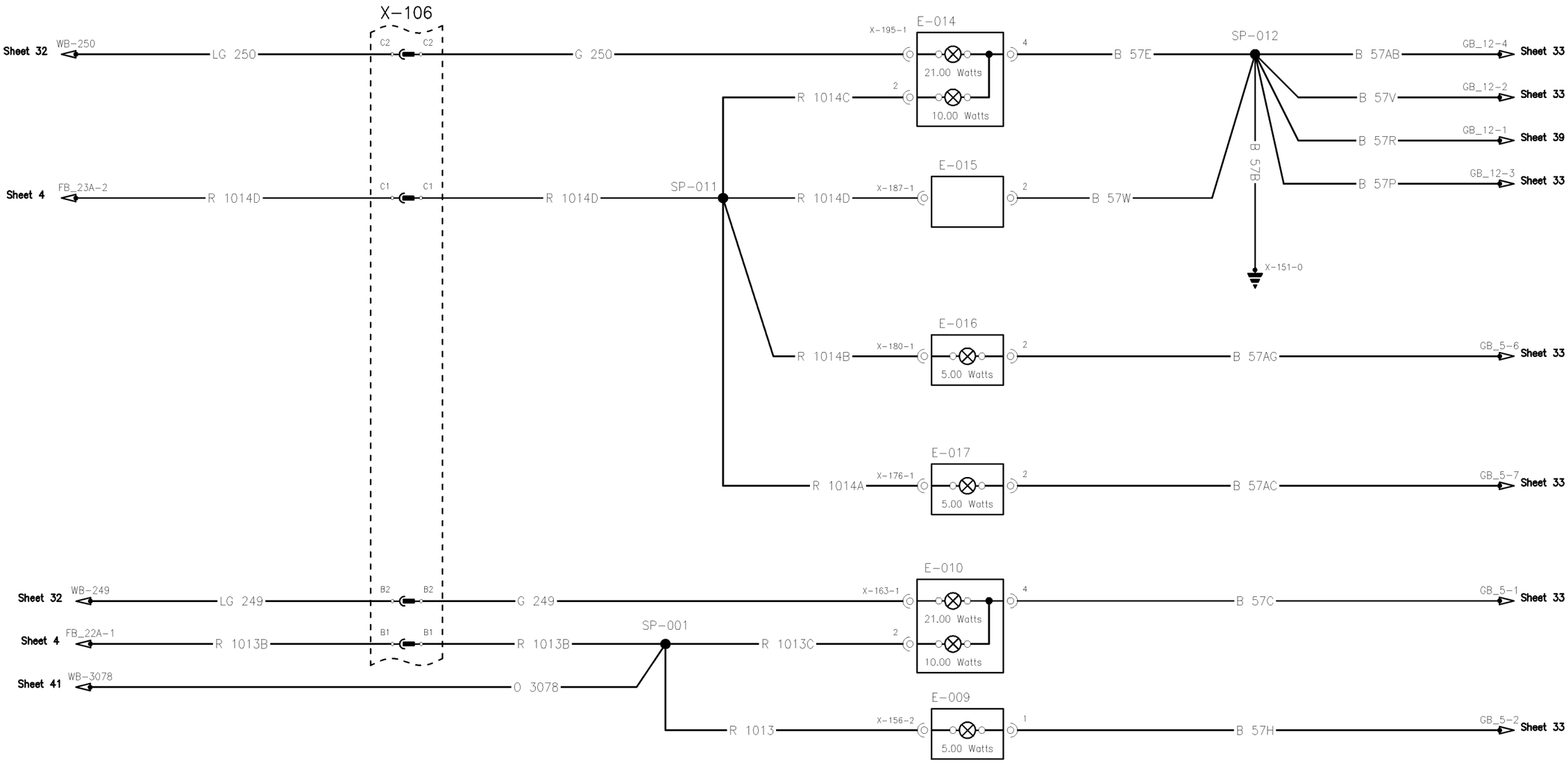
Wiring harness - Electrical schematic frame 34 Lighting (Side, Console & Licence Plate Lamps)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
E009	**X156**	Console Lamp Right Hand
E010	**X163**	Grabrail Side Lamp RH / SM Vehicle RF
E014	**X195**	Side Lamp Grabrail LH / SM Vehicle LF
E015	**X187**	Not used on this model
E016	**X180**	License Plate Left Hand
E017	**X176**	License Plate Right Hand
-	**X151**	Roof Earth to SP012
Additional Connectors: **X106**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 34

SS09D252 1

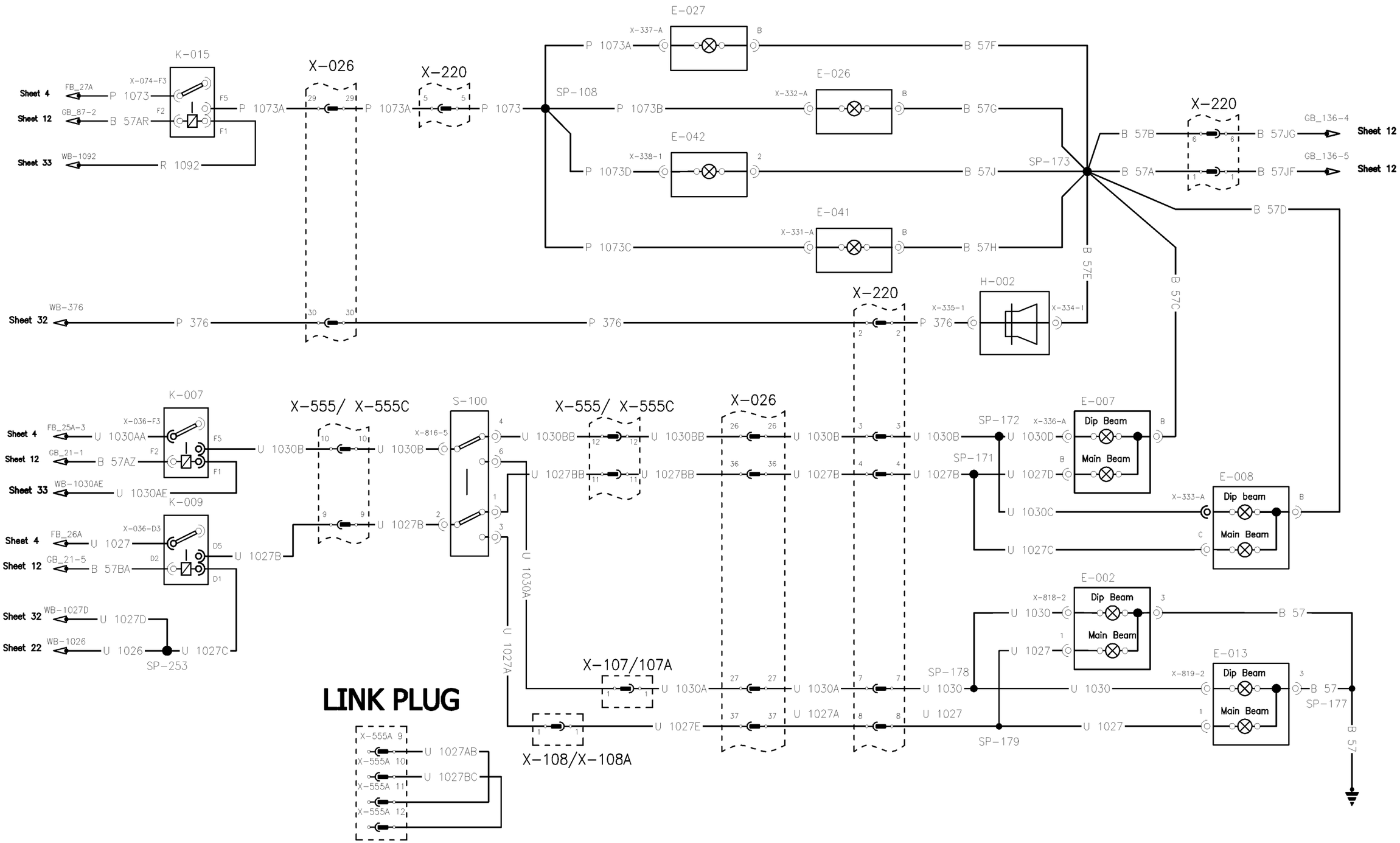
Wiring harness - Electrical schematic frame 37 Lighting (Headlamps / Worklamps Hood / Headlamps Grabrail)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
E002	**X818**	Headlamp 2 Left Hand Grabrail
E007	**X336**	Headlamp Left Hand
E008	**X333**	Headlamp Right Hand
E013	**X819**	Headlamp 1 Right Hand Grabrail
E026	**X332**	Corner Lamp Right Hand
E027	**X337**	Corner Lamp Left Hand
E041	**X331**	Worklamp Right Hand
E042	**X338**	Worklamp Left Hand
H002	**X334**, **X335**	Horn
K007	**X036**	Dipped Beam Headlamps
K009	**X036**	Main Beam Headlamps
K015	**X074**	Front Worklamps Hood
S100	**X816**	High Mount Headlamp Switch
Additional Connectors: **X026**, **X107**, **X107_A**, **X108**, **X108_A**, **X220**, **X555**, **X555C**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 37

SS09D253 1

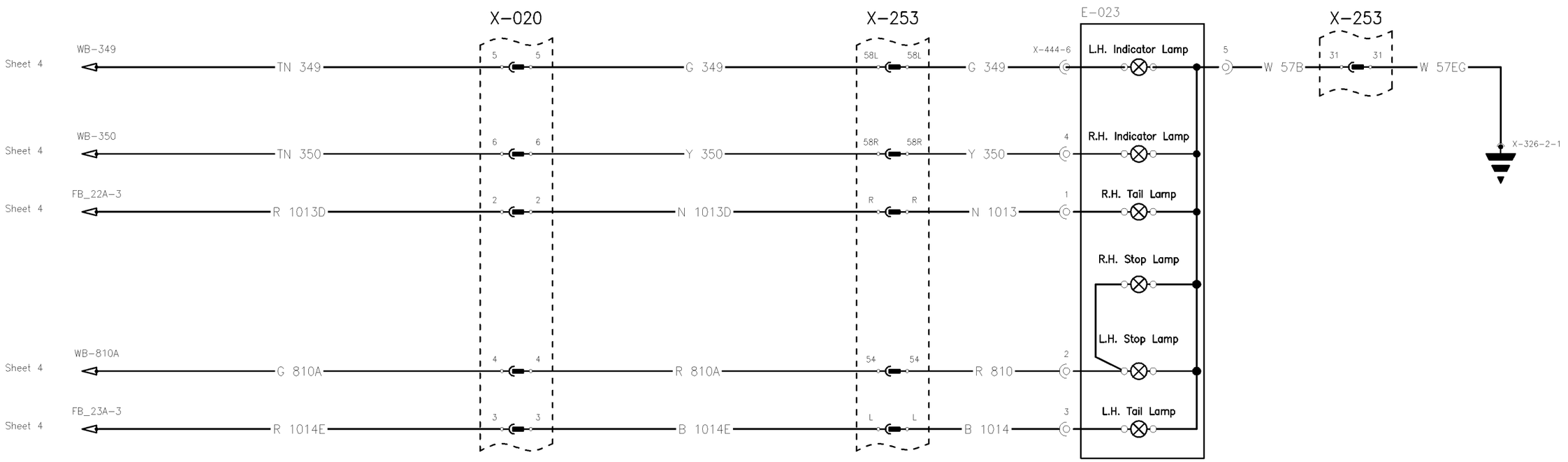
Wiring harness - Electrical schematic frame 38 Lighting (Trailer)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
E023	X444	Trailer Lamps
-	**X326**	Earth Transmission
Additional Connectors: **X020**, **X253**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 38

SS09D254 1

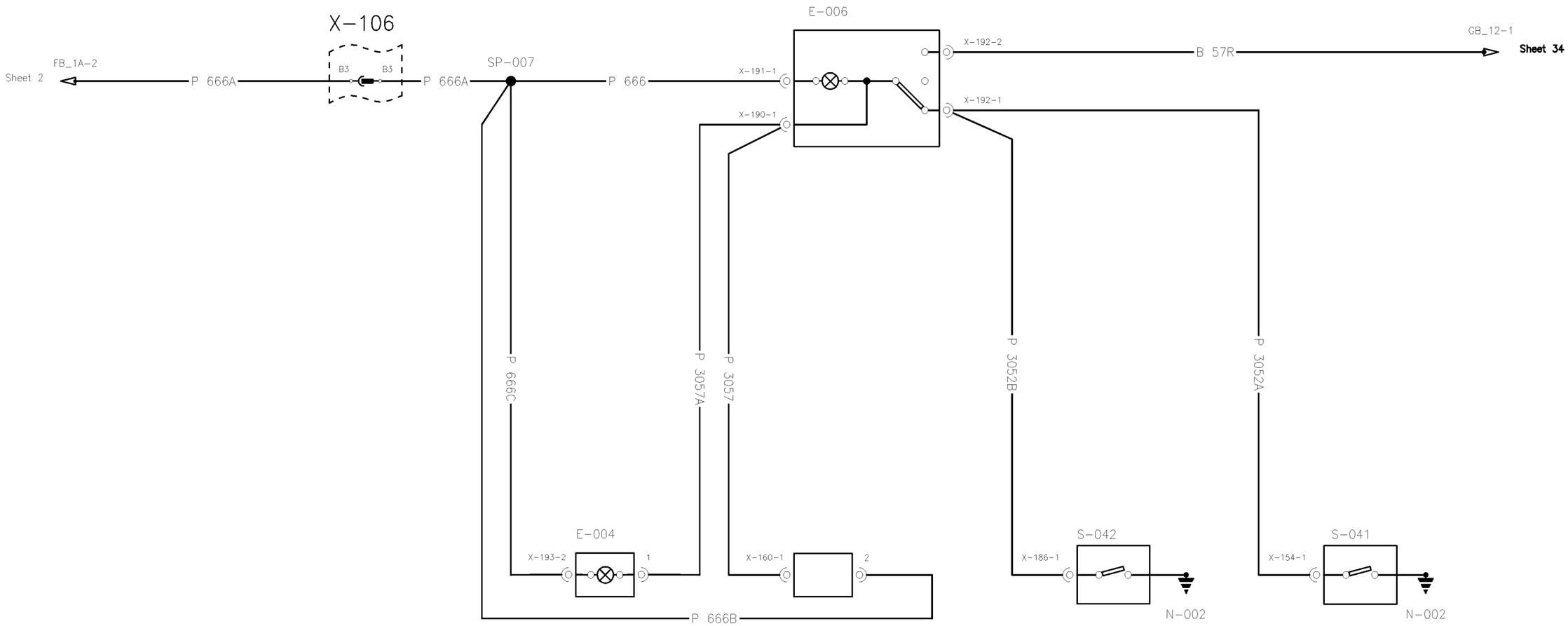
Wiring harness - Electrical schematic frame 39 Lighting (Interior Lights)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
-	X160	Puddle Lamp Right Hand (not used)
E004	**X193**	Puddle Lamp Left Hand
E006	**X190**, **X191**, **X192**	Interior Lamp
S041	X154	Door Switch Right Hand
S042	**X186**	Door Switch Left Hand
Additional Connectors: **X106**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 39

SS09D255 1

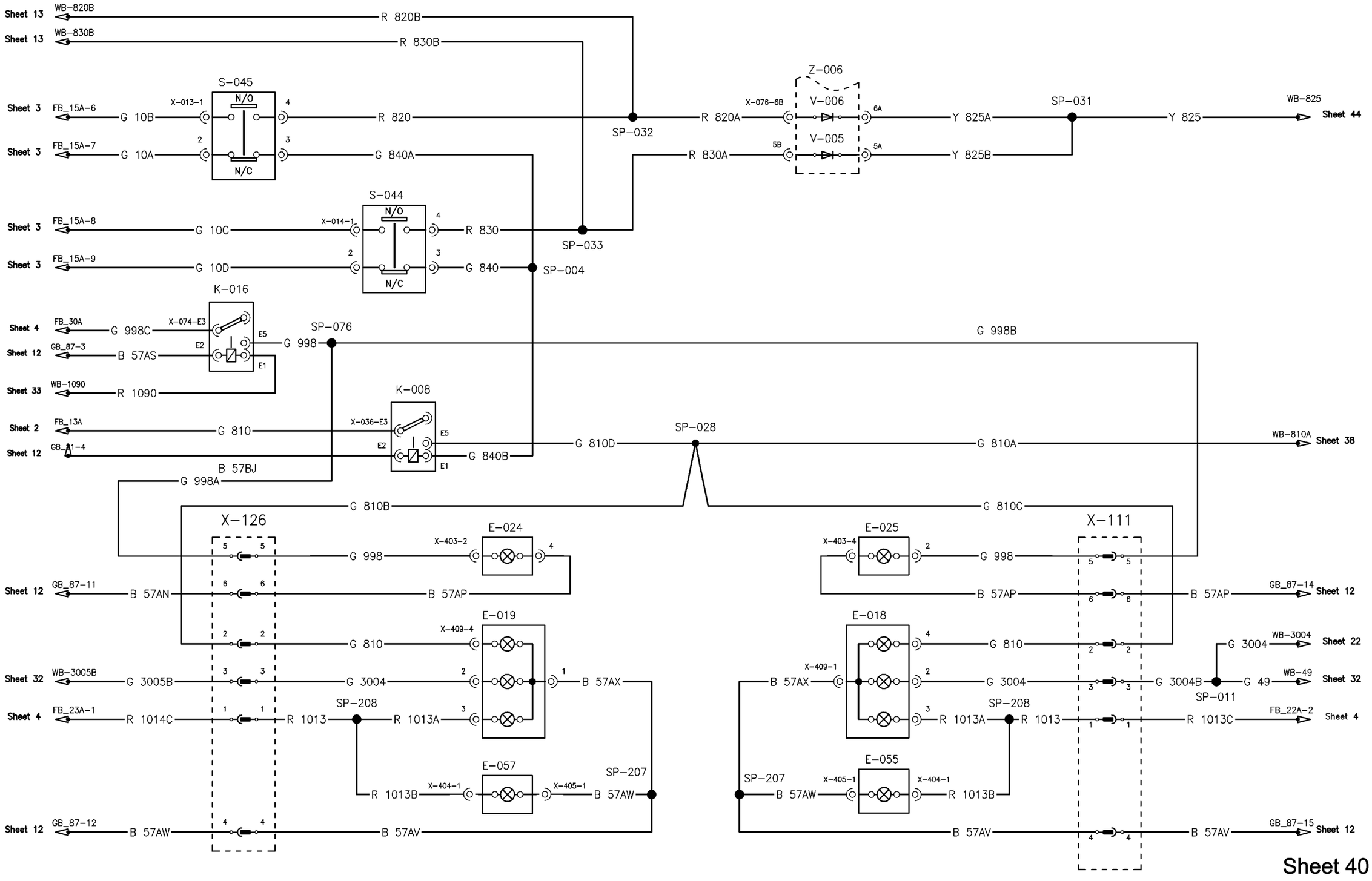
Wiring harness - Electrical schematic frame 40 Lighting (Stop / Tail Lamps & Worklamps)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
E018	**X409**	Stop & Tail Lamp Right Hand
E019	**X409**	Stop & Tail Lamp Left Hand
E024	**X403**	Worklamp C Pillar Left Hand
E025	**X403**	Worklamp C Pillar Right Hand
E055	**X404**, **X405**	License Lamp Right Hand
E057	**X404**, **X405**	License Lamp Left Hand
K008	**X036**	Stop Lamps Relay
K016	**X074**	Rear Worklamps C Pillar Relay
S044	**X014**	Stop Lamp Switch Right Hand
S045	**X013**	Stop Lamp Switch Left Hand
V005	**X076**	Brake Light Diode
V006	**X076**	Brake Light Diode
Z006	**X076**	Diode Block
Additional Connectors: **X111**, **X126**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 40

SS09D256 1

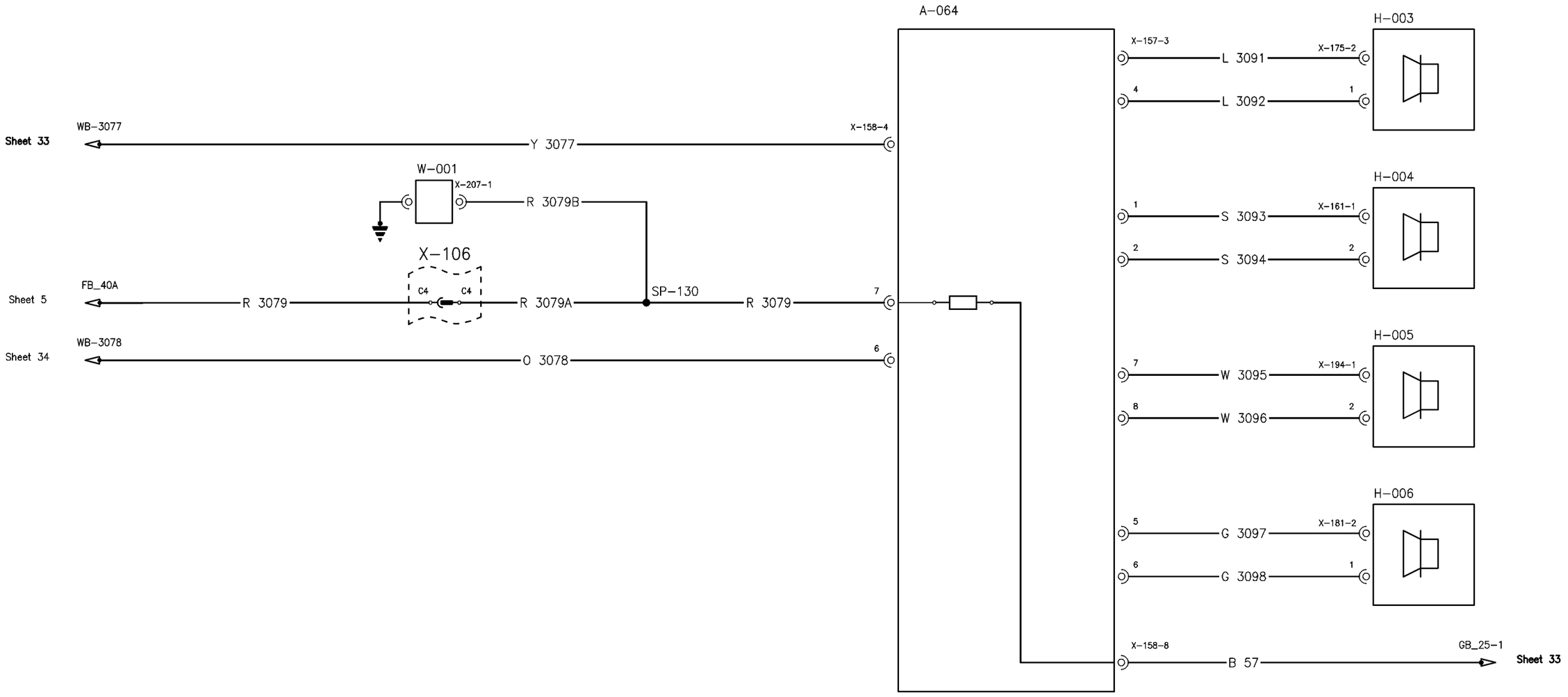
Wiring harness - Electrical schematic frame 41 I.C.E (Radio)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A064	**X157**, **X158**	Radio
H003	**X175**	Radio Speaker RHR
H004	X161	Radio Speaker RHF
H005	X194	Radio Speaker LHF
H006	**X181**	Radio Speaker LHR
W001	**X207**	Antenna Plus
Additional Connectors: **X106**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 41

SS09D257 1

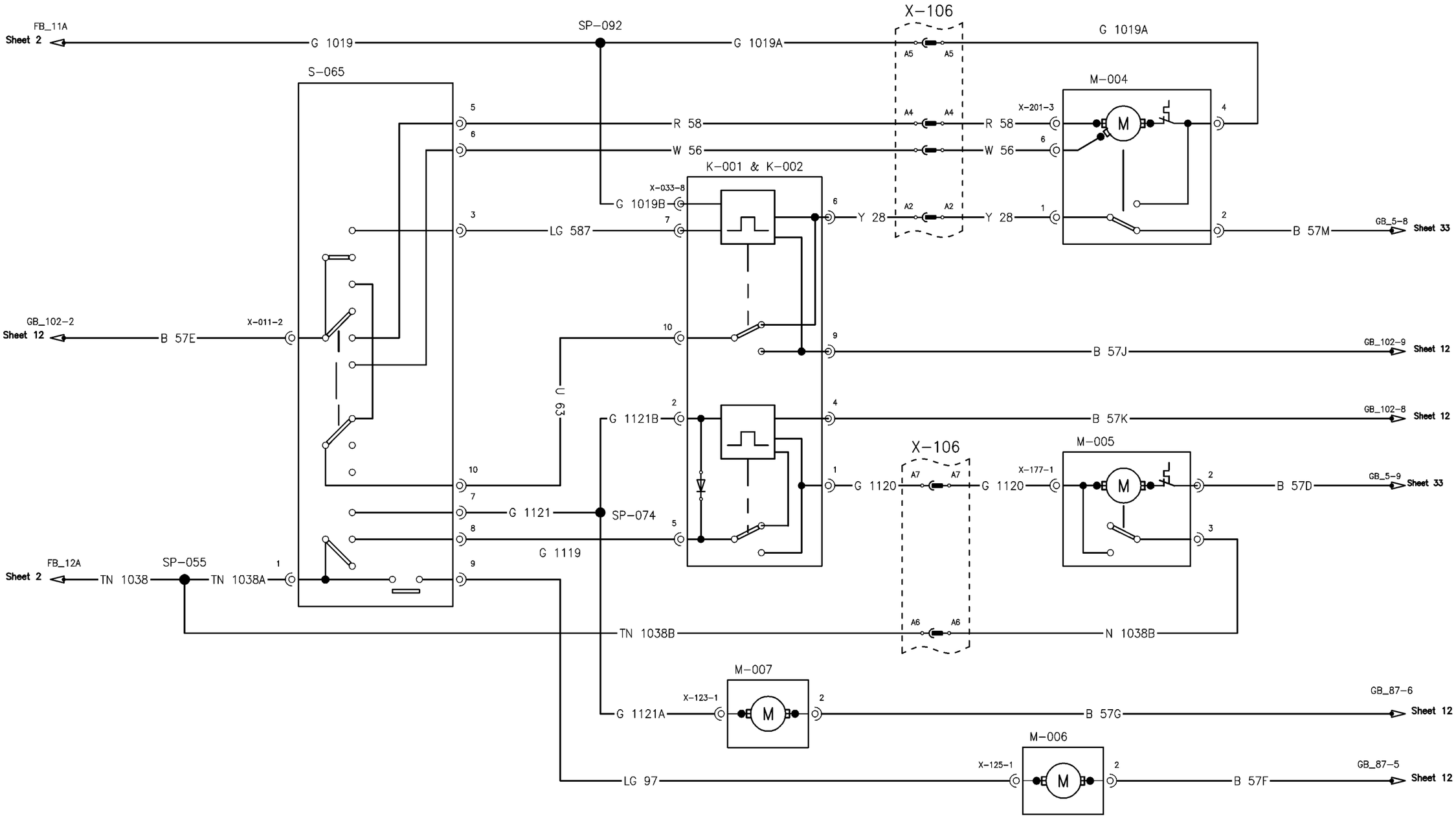
Wiring harness - Electrical schematic frame 42 Washers & Wipers (Switch & Relay)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
K001 & K002	**X033** (1-5)	Wiper Module Front & Rear
K001 & K002	**X033** (6-10)	Wiper Module Front & Rear
M004	**X201**	Wiper Motor Front
M005	**X177**	Wiper Motor Rear
M006	**X125**	Washer Motor Front
M007	**X123**	Washer Motor Rear
S065	**X011**	Front and Rear Wiper Switch
Additional Connectors: **X106**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 42

SS09D258 1

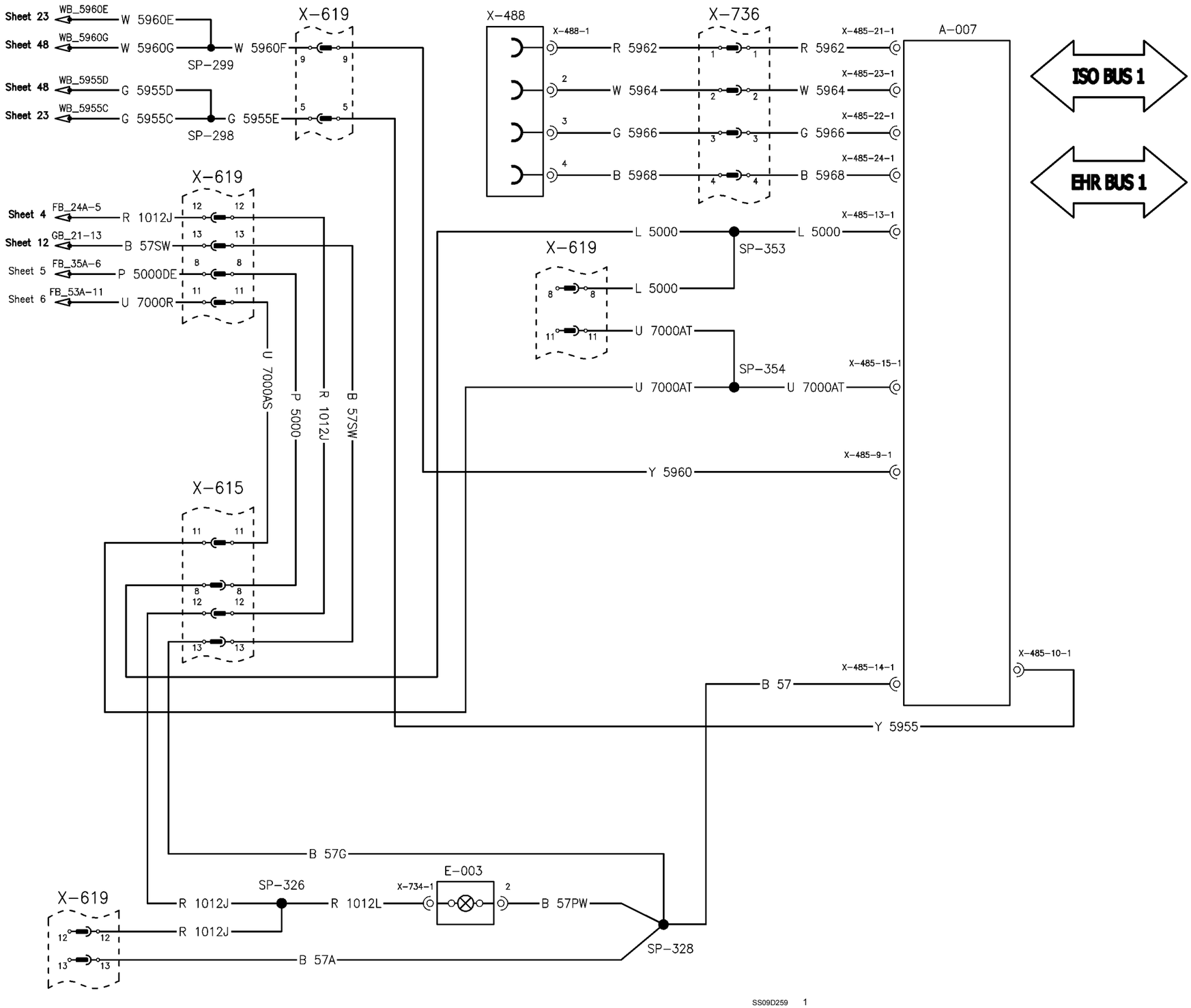
Wiring harness - Electrical schematic frame 43 Colour Display (Instruments)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A007	**X485**	Colour Display
E003	**X734**	Lamp Feed
-	**X488**	USB Connector
Additional Connectors: **X615**, **X619**, **X736**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


Sheet 23 WB_5960E W 5960E
Sheet 48 WB_5960G W 5960G
SP-299
W 5960F
X-619
Sheet 48 WB_5955D G 5955D
Sheet 23 WB_5955C G 5955C
SP-298
G 5955E
X-488
X-488-1
X-736
X-485-21-1
A-007
R 5962
X-485-23-1
W 5964
X-485-22-1
G 5966
X-485-24-1
B 5968
ISO BUS 1
EHR BUS 1
X-619
Sheet 4 FB_24A-5 R 1012J
Sheet 12 GB_21-13 B 57SW
Sheet 5 FB_35A-6 P 5000DE
Sheet 6 FB_53A-11 U 7000R
L 5000
SP-353
X-485-13-1
X-619
L 5000
U 7000AT
SP-354
X-485-15-1
U 7000AT
U 7000AS
P 5000
R 1012J
B 57SW
X-485-9-1
Y 5960
X-615
X-485-14-1
B 57
X-485-10-1
Y 5955
B 57G
E-003
X-734-1
SP-326
R 1012J
R 1012L
B 57PW
X-619
R 1012J
B 57A
SP-328
SS09D259 1

Sheet 43

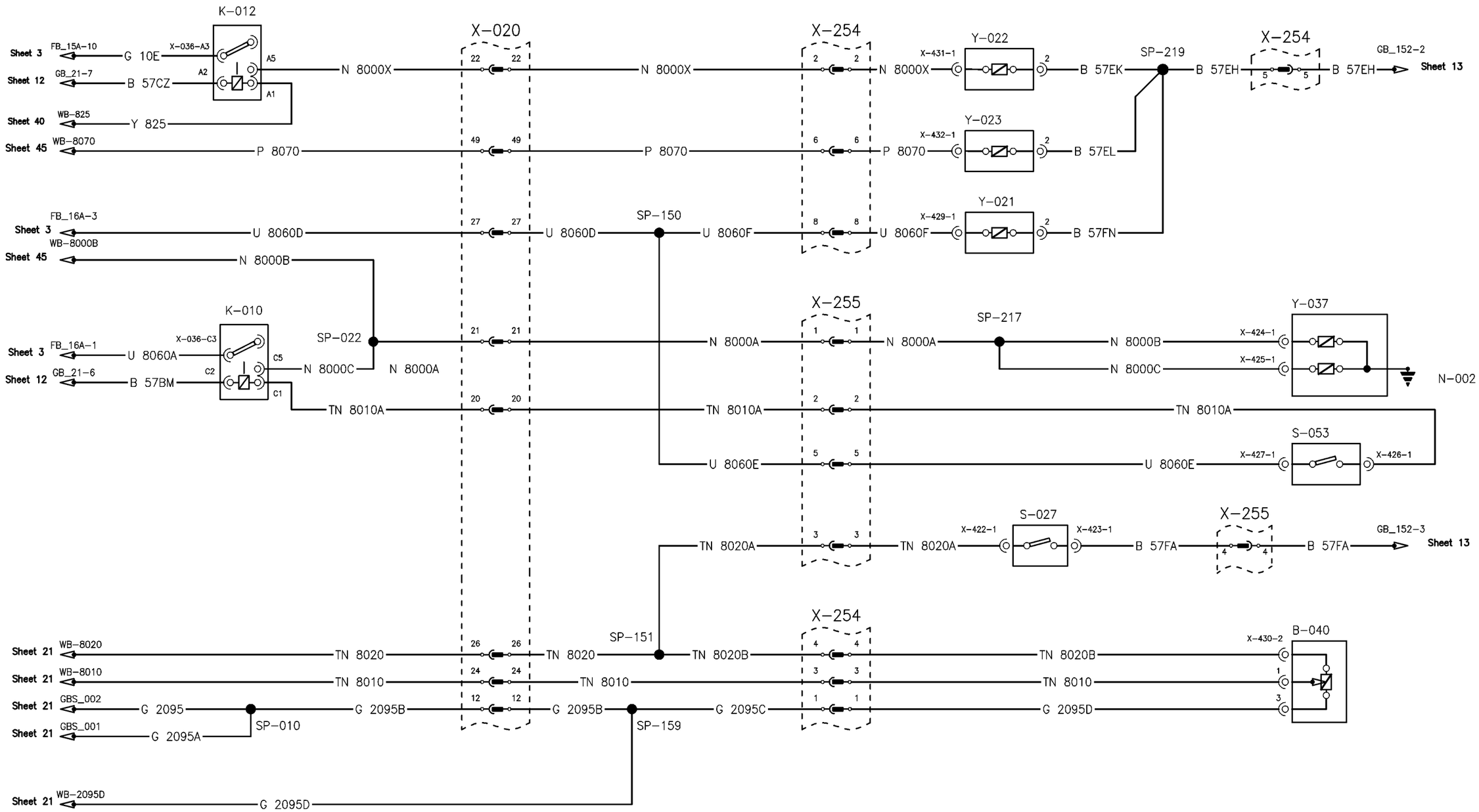
Wiring harness - Electrical schematic frame 44 Trailer Brakes (Hydraulic / Pneumatic Brake)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
B040	**X430**	Air Brake Pressure Sensor
K010	**X036**	Hydraulic Trailer Brake
K012	**X036**	Pneumatic Trailer Brake
S027	**X422**, **X423**	Low Brake Pressure Line Switch 1/ 2
S053	**X426**, **X427**	Low Pump Output Press Switch 1 / 2
Y021	**X429**	Brake De-Icer
Y022	**X431**	Pneumatic Trailer Brake Solenoid
Y023	**X432**	Park Brake Solenoid
Y037	**X424**, **X425**	Hydraulic Trailer Brake Solenoid 1 / 2
Additional Connectors: **X020**, **X254**, **X255**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 44

SS09D260 1

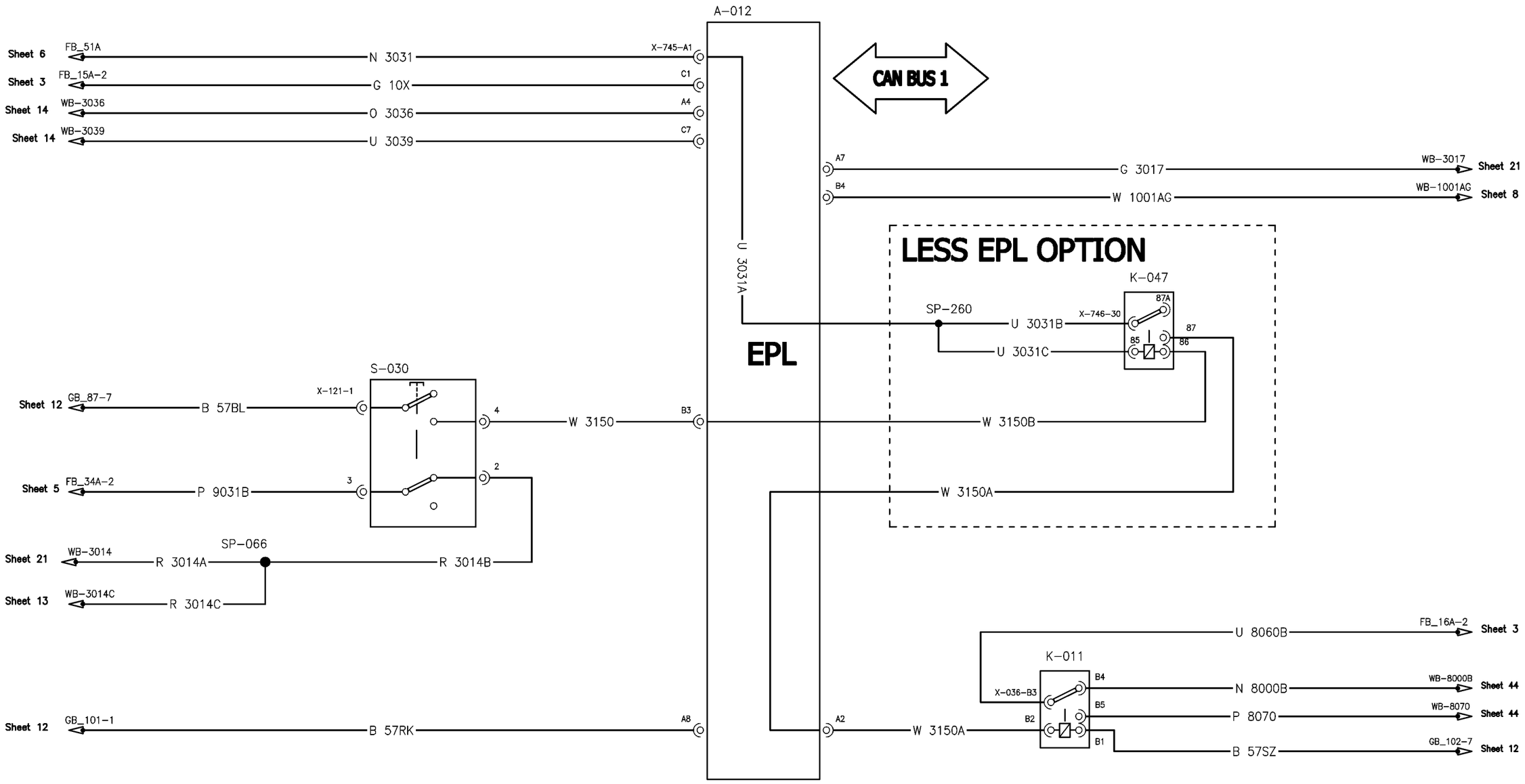
Wiring harness - Electrical schematic frame 45 Electronic Park Lock (Supply, Switch & Relay)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A012	**X745**	Electronic Park Brake Interface Conn
K011	**X036**	Electronic Park Brake
K047	**X746**	Less EPL
S030	**X121**	Hand Brake Switch
Additional Connectors: -		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 45

SS09D261 1

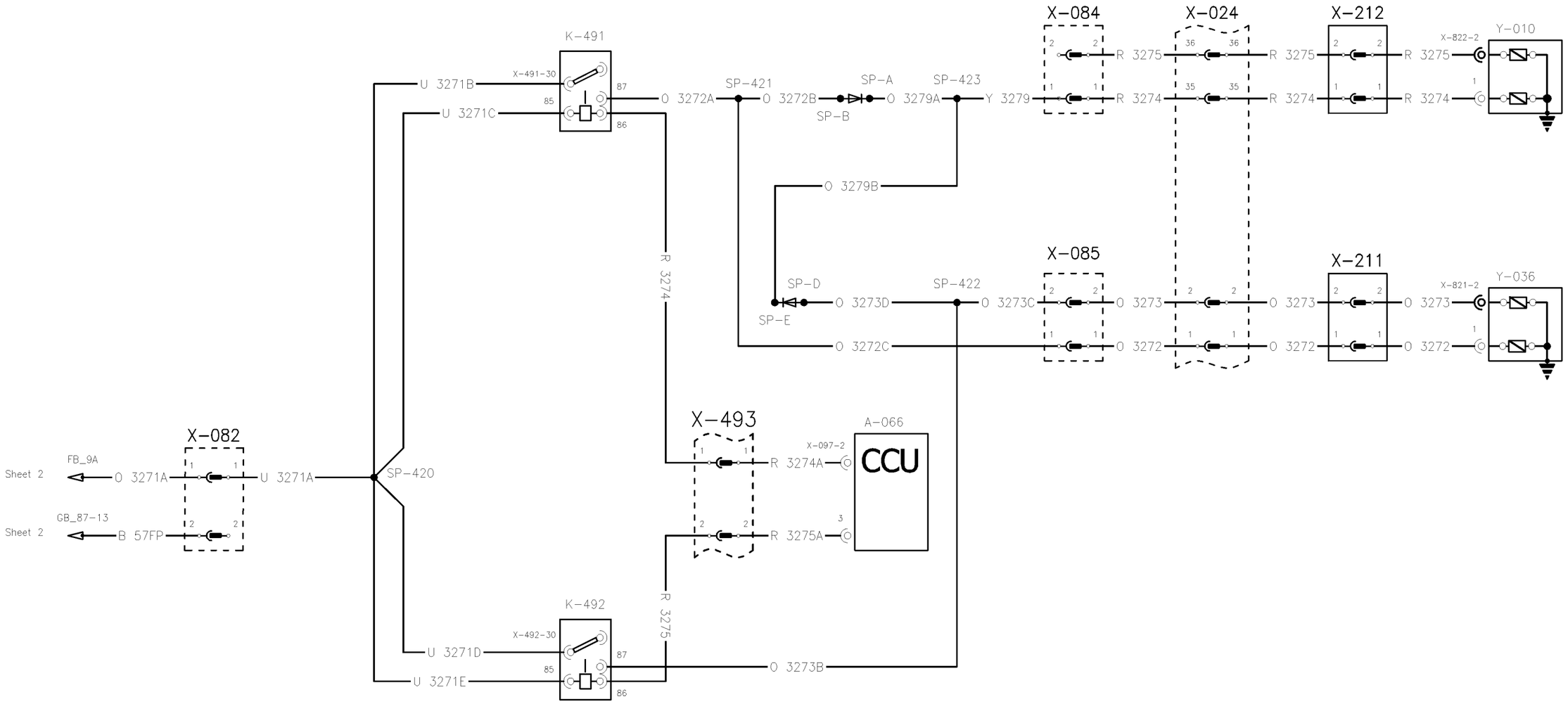
Wiring harness - Electrical schematic frame 46 Front Loader

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A066	**X097**	Central Control Unit
K491	**X491**	Front Loader Relay 1
K492	**X492**	Front Loader Relay 2
Y010	**X822**	Loader Valve Option B
Y036	**X821**	Loader Valve Option A
Additional Connectors: **X024**, **X082**, **X084**, **X085**, **X211**, **X212**, **X493**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 46

SS09D262 1

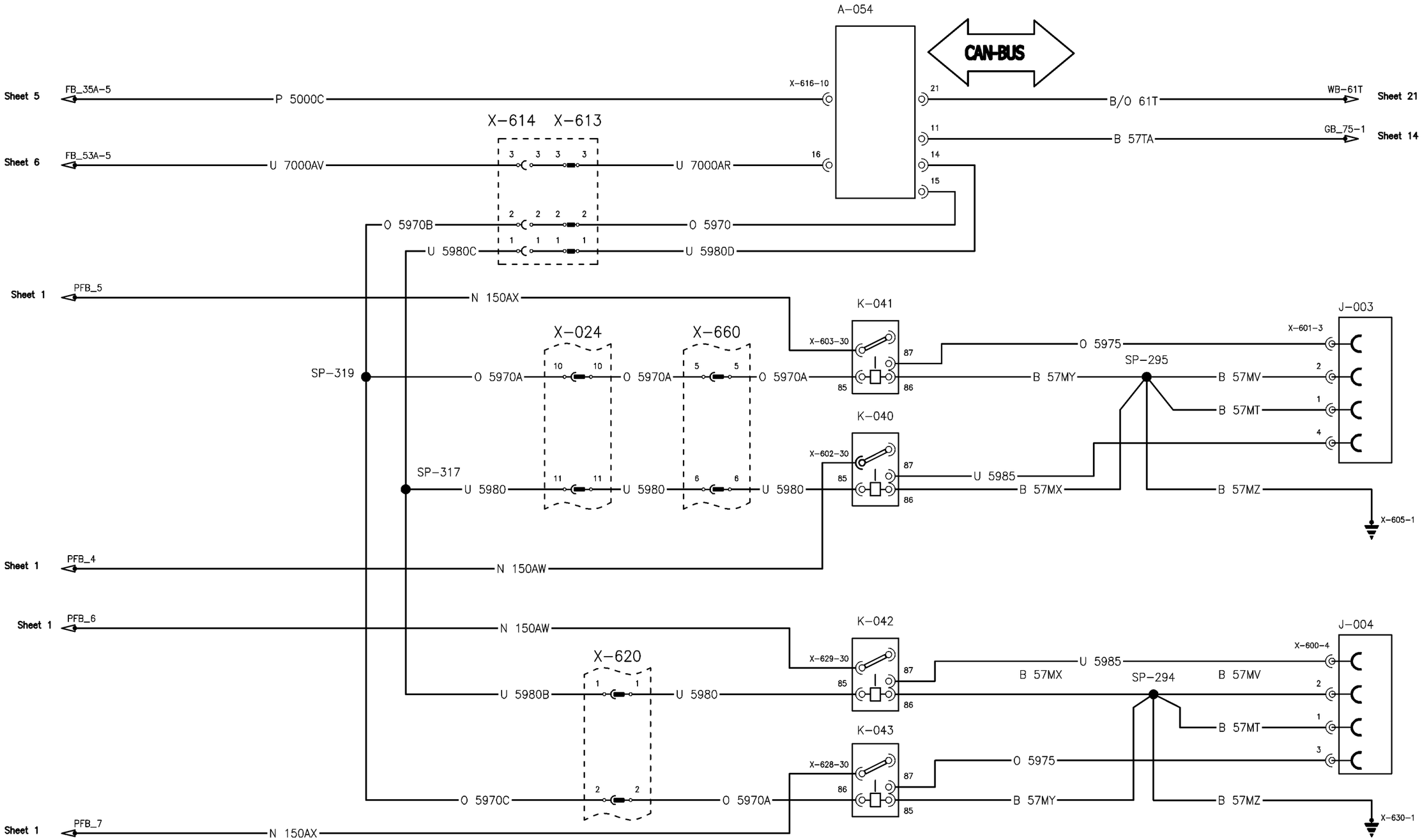
Wiring harness - Electrical schematic frame 47 Isobus (Isobus Power & Relay)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A054	**X616**	Iso Bus Control Unit
J003	**X601**	Iso Implement Socket (Rear)
J004	**X600**	Iso Implement Socket (Front)
K040	**X602**	ISO Relay 1 Rear
K041	**X603**	ISO Relay 2 Rear
K042	**X629**	ISO Relay 1 Front
K043	**X628**	ISO Relay 2 Front
-	**X605**	Earth to SP295
-	**X630**	Earth to SP294
Additional Connectors: **X024**, **X613**, **X614**, **X620**, **X660**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 47

SS09D263 1

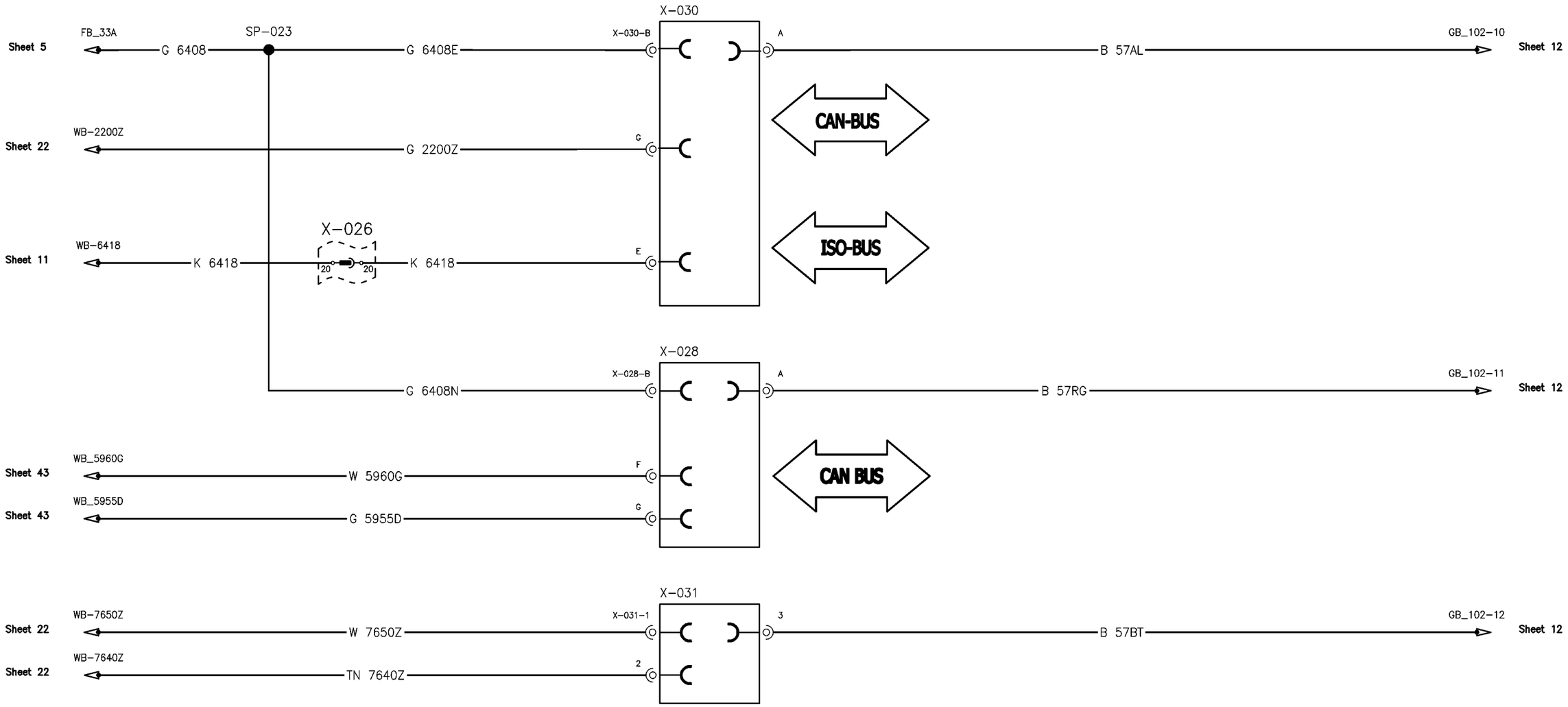
Wiring harness - Electrical schematic frame 48 Diagnostics

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
-	**X028**	Diagnostic Connector 2
-	**X030**	Diagnostic Connector 1
-	**X031**	ADIC Diagnostic Connector
Additional Connectors: **X026**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 48

SS09D264 1

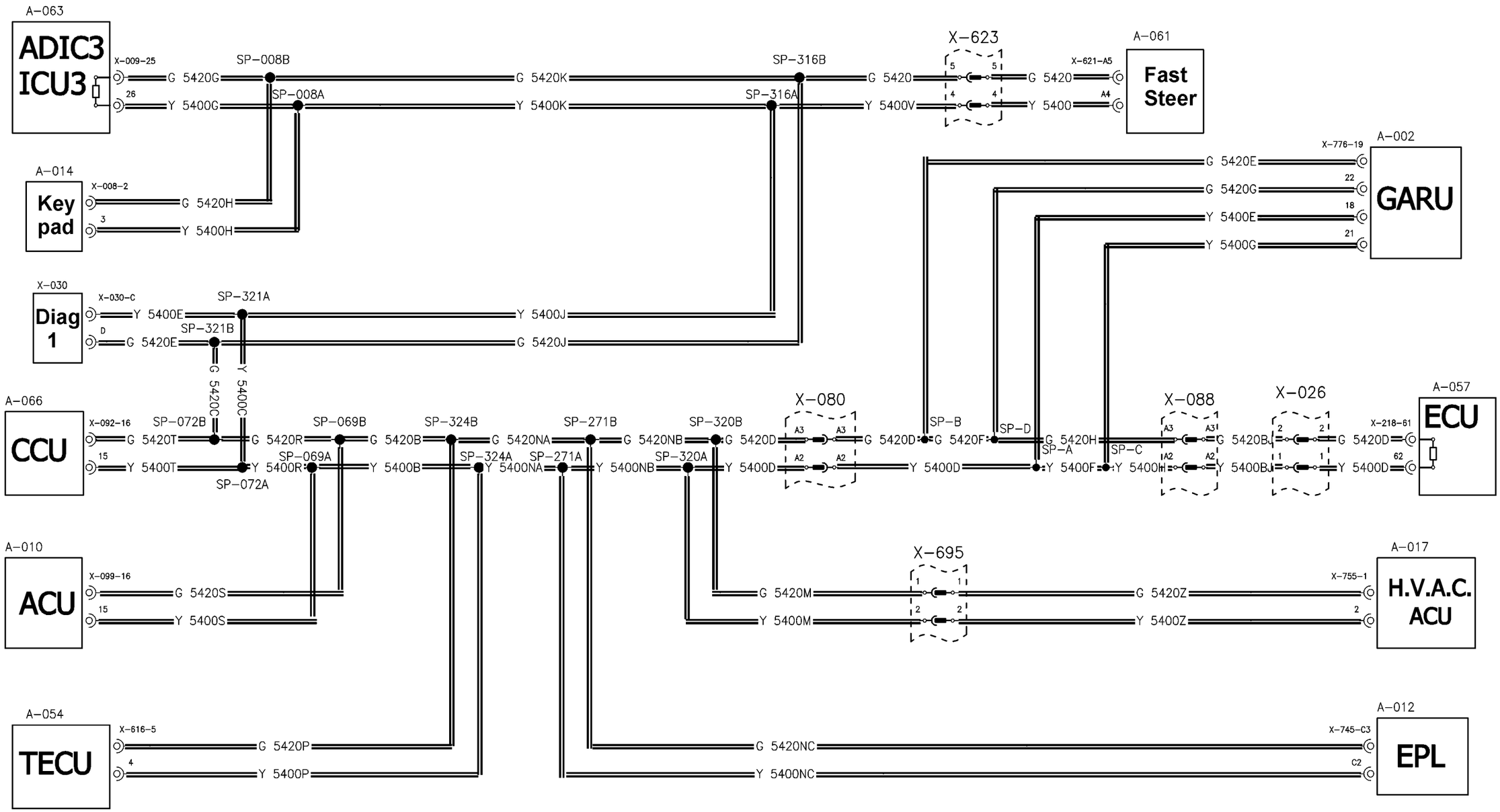
Wiring harness - Electrical schematic frame 49 Can System (Can Bus 1)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A002	**X776**	Armrest Control Unit (GARU)
A010	**X099**	Auxilary Control Unit
A012	**X745**	Electronic Park Brake Interface Conn
A014	**X008**	Keypad
A017	**X755**	Air Condition Control Unit
A054	**X616**	Iso Bus Control Unit
A057	**X218**	Engine Control Unit
A061	**X621**	Control Unit Fast Steer
A063	**X009**	Instrument Cluster Unit
A066	**X092**	Central Control Unit
-	**X030**	Diagnostic Connector 1
Additional Connectors: **X026**, **X080**, **X088**, **X623**, **X695**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 49

SS09D265 1

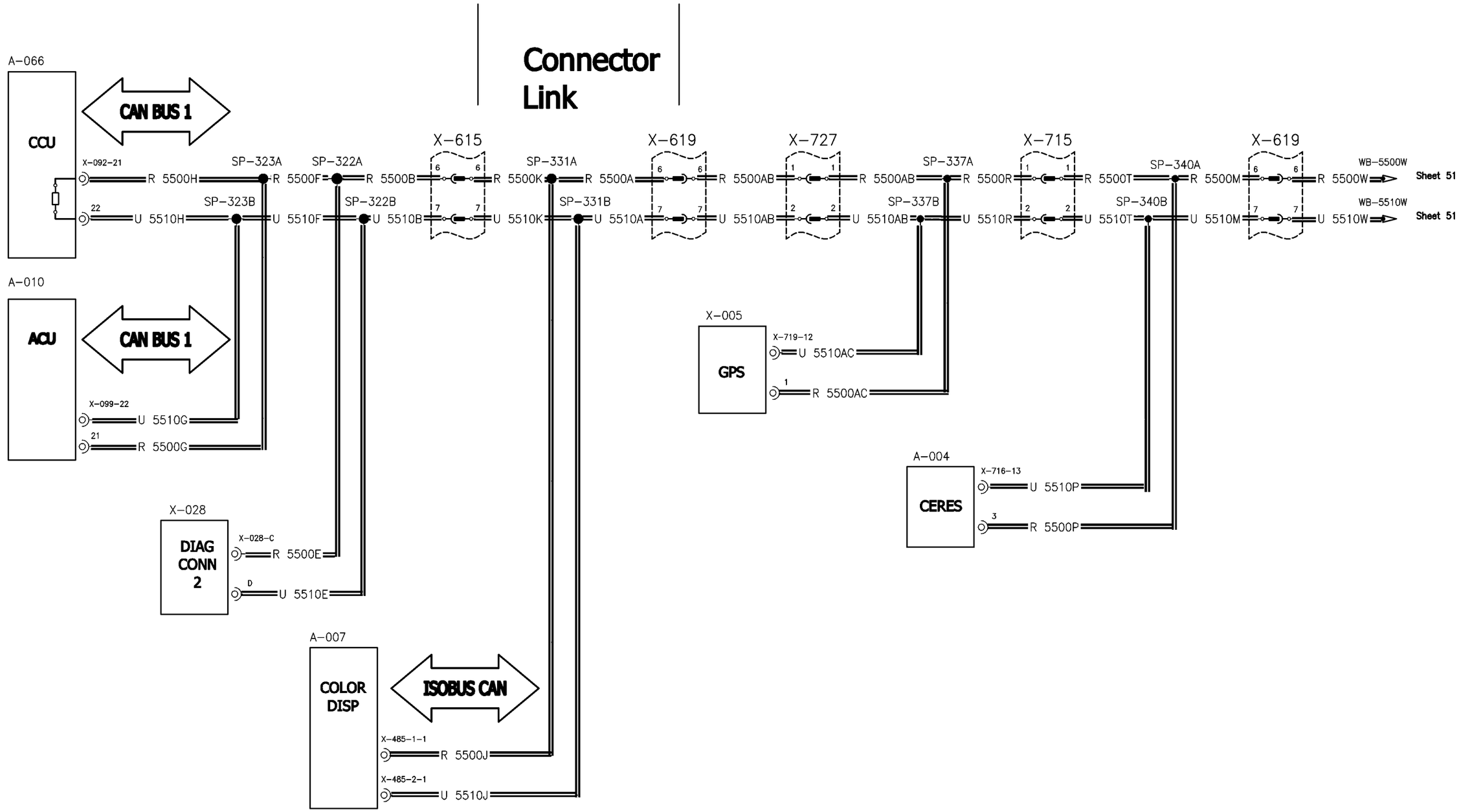
Wiring harness - Electrical schematic frame 50 Can System (Auto - Guidance)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A004	**X716**	Navigation Controller
A007	**X485**	Colour Display
A010	**X099**	Auxiliary Control Unit
A066	**X092**	Central Control Unit
X005	**X719**	GPS Receiver
-	**X028**	Diagnostic Connector 2
Additional Connectors: **X615**, **X619**, **X715**, **X727**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 50

SS09D266 1

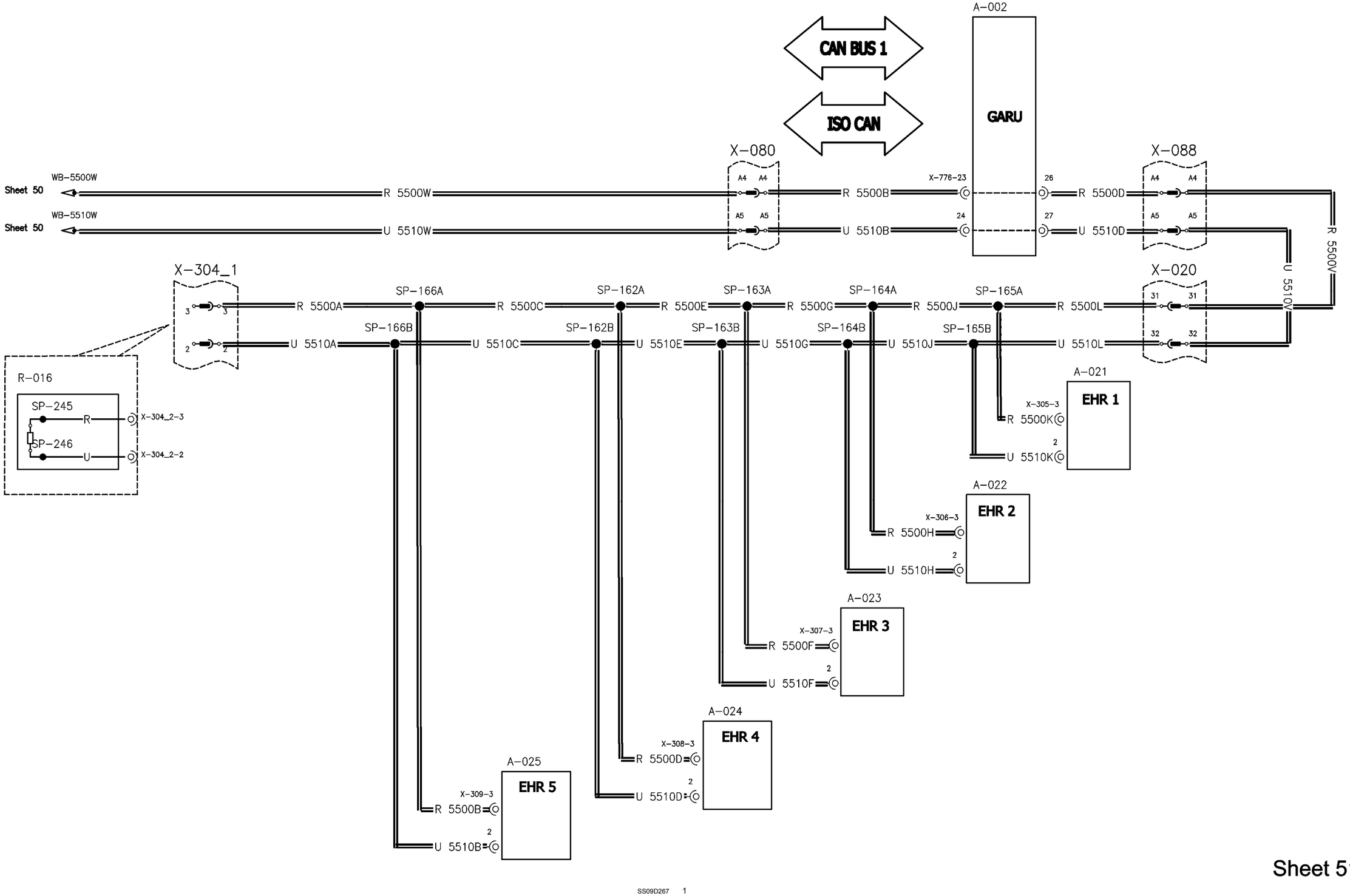
Wiring harness - Electrical schematic frame 51 CAN System (EHR CAN)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A002	**X776**	Armrest Control Unit (GARU)
A021	**X305**	El.Hydraulic Remote Valve 1
A022	**X306**	El.Hydraulic Remote Valve 2
A023	**X307**	El.Hydraulic Remote Valve 3
A024	**X308**	El.Hydraulic Remote Valve 4
A025	**X309**	El.Hydraulic Remote Valve 5
R016	**X304**	CAN Terminating Resistor
Additional Connectors: **X020**, **X080 X088**, **X304**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


CAN BUS 1
ISO CAN
A-002
GARU
X-080
X-088
WB-5500W
Sheet 50
R 5500W
R 5500B
X-776-23
26
R 5500D
WB-5510W
Sheet 50
U 5510W
U 5510B
24
27
U 5510D
R 5500V
U 5510V
X-304_1
X-020
SP-166A
SP-162A
SP-163A
SP-164A
SP-165A
R 5500A
R 5500C
R 5500E
R 5500G
R 5500J
R 5500L
SP-166B
SP-162B
SP-163B
SP-164B
SP-165B
U 5510A
U 5510C
U 5510E
U 5510G
U 5510J
U 5510L
R-016
SP-245
R
X-304_2-3
SP-246
U
X-304_2-2
A-021
EHR 1
X-305-3
R 5500K
2
U 5510K
A-022
EHR 2
X-306-3
R 5500H
2
U 5510H
A-023
EHR 3
X-307-3
R 5500F
2
U 5510F
A-024
EHR 4
X-308-3
R 5500D
2
U 5510D
A-025
EHR 5
X-309-3
R 5500B
2
U 5510B
SS09D267 1

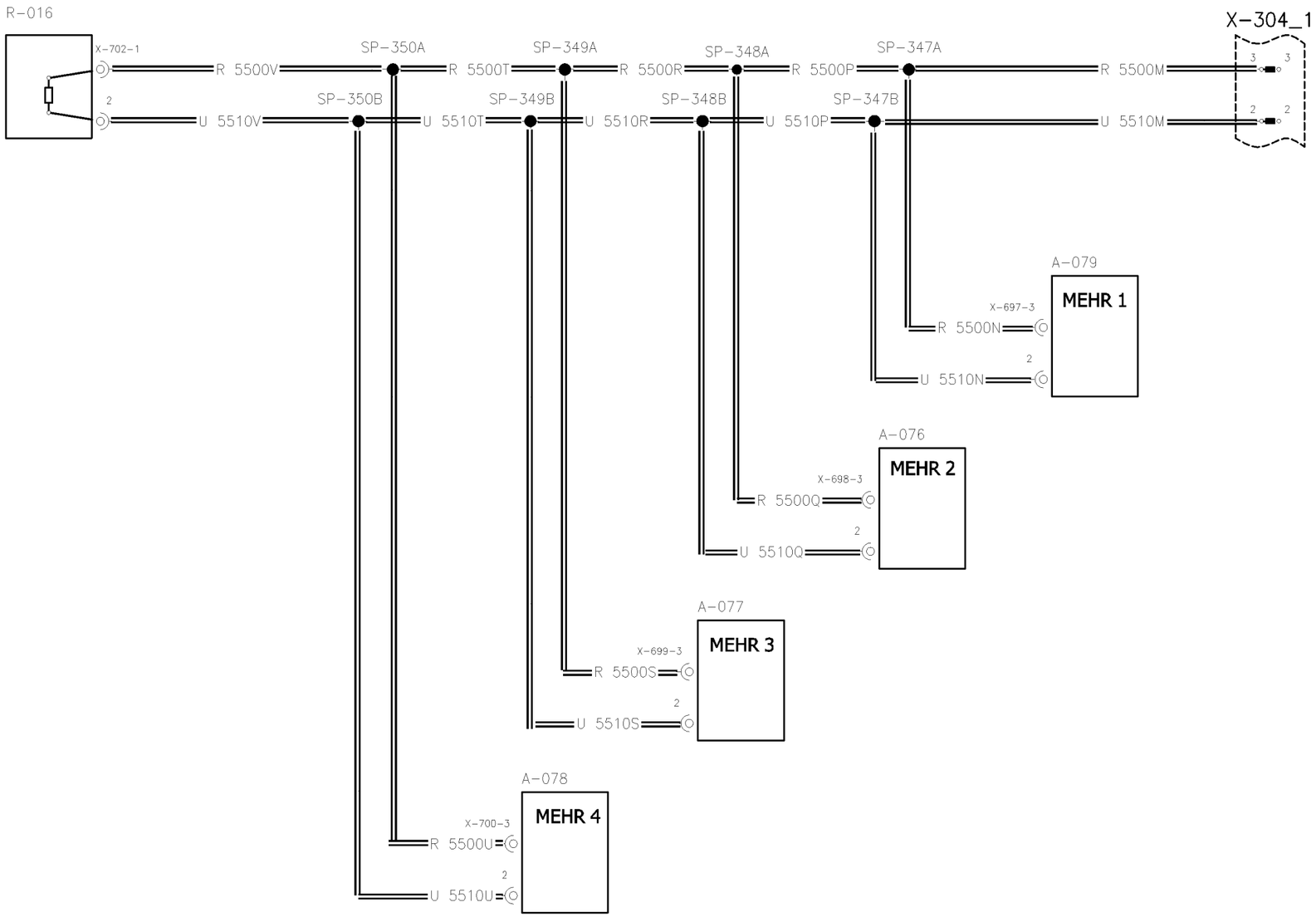
Sheet 51

Wiring harness - Electrical schematic frame 52 CAN System (EHR CAN)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A076	**X698**	Mid.Mount El.Hydraulic Remote Valve 2
A077	**X699**	Mid.Mount El.Hydraulic Remote Valve 3
A078	**X700**	Mid.Mount El.Hydraulic Remote Valve 4
A079	**X697**	Mid.Mount El.Hydraulic Remote Valve 1
R016	**X702**	CAN Terminating Resistor
Additional Connectors: **X304**		

Wire Colour Codes							
B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		



Sheet 52

SS09D268 1

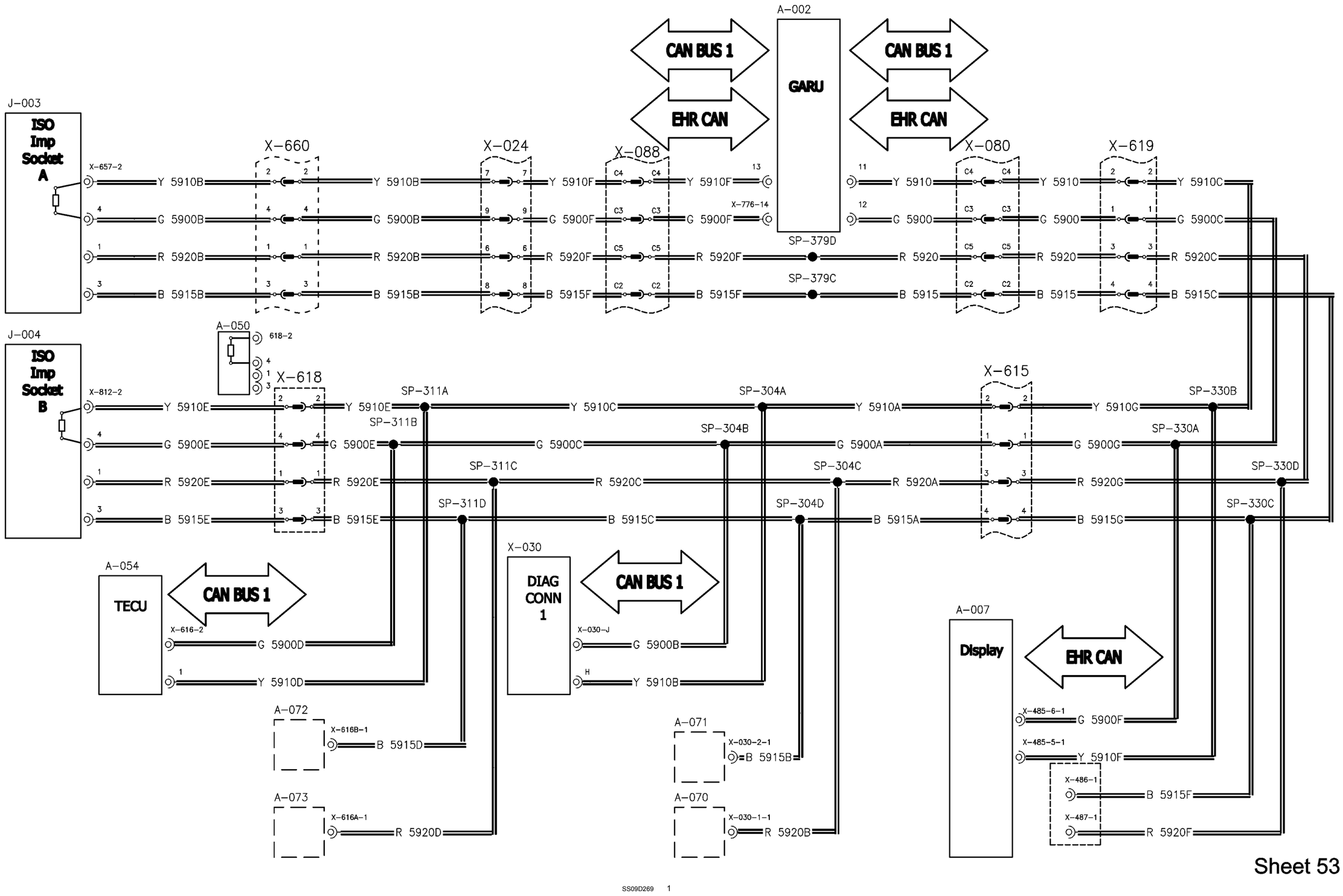
Wiring harness - Electrical schematic frame 53 CAN System (Isobus CAN)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component	Connector	Description
A002	**X776**	Armrest Control Unit (GARU)
A007	**X485**	Colour Display
A050	**X618**	Active CAN Terminator
A054	**X616**	Iso Bus Control Unit
A070	**X030**	Iso Bus Control Unit CAN Plus
A071	**X030**	Iso Bus Control Unit CAN Minus
A072	X616B	Iso Bus Control Unit CAN Minus
A073	X616A	Iso Bus Control Unit CAN Plus
J003	**X657**	Iso Bus Implement Socket Rear
J004	**X812**	Iso Bus Implement Socket Front
-	**X030**	Diagnostic Connector 1
Additional Connectors: **X024**, **X080**, **X088**, **X615**, **X618**, **X619**, **X660**		

Wire Colour Codes

B	Black	S	Slate	G	Green	P	Purple
N	Brown	R	Red	LG	Light Green	K	Pink
LN	Light Brown	O	Orange	U	Blue	W	White
L	Lilac	Y	Yellow	TQ	Turquoise		


J-003
ISO Imp Socket A
X-657-2
Y 5910B
G 5900B
R 5920B
B 5915B
X-660
X-024
X-088
CAN BUS 1
EHR CAN
A-002
GARU
X-080
X-619
Y 5910F
G 5900F
R 5920F
B 5915F
X-776-14
SP-379D
SP-379C
Y 5910
G 5900
R 5920
B 5915
Y 5910C
G 5900C
R 5920C
B 5915C
J-004
ISO Imp Socket B
X-812-2
A-050
618-2
X-618
Y 5910E
G 5900E
R 5920E
B 5915E
SP-311A
SP-311B
SP-311C
SP-311D
Y 5910C
G 5900C
R 5920C
B 5915C
SP-304A
SP-304B
SP-304C
SP-304D
Y 5910A
G 5900A
R 5920A
B 5915A
X-615
SP-330B
SP-330A
SP-330D
SP-330C
Y 5910G
G 5900G
R 5920G
B 5915G
A-054
TECU
X-616-2
Y 5910D
G 5900D
X-030
DIAG CONN 1
X-030-J
Y 5910B
G 5900B
A-072
X-616B-1
B 5915D
A-073
X-616A-1
R 5920D
A-071
X-030-2-1
B 5915B
A-070
X-030-1-1
R 5920B
A-007
Display
X-485-6-1
G 5900F
X-485-5-1
Y 5910F
X-486-1
B 5915F
X-487-1
R 5920F
Sheet 53
SS09D269 1

Alternator - Remove

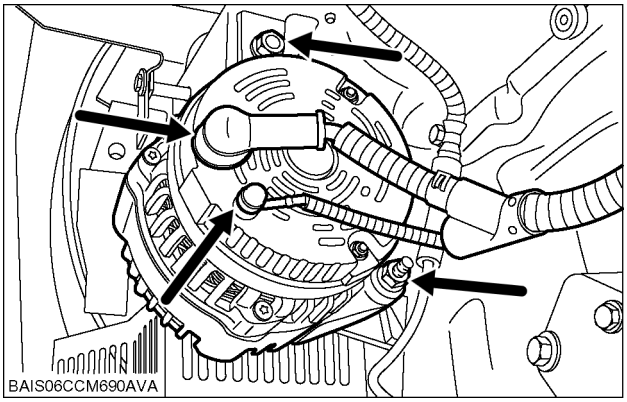
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Prior operation:
Ensure the battery is disconnected prior to removing the alternator, refer to, **Battery - Disconnect (A.30.A)**.

1. With reference to Figure **1**

   Disconnect the two cables from the rear of the alternator.

   Remove the alternator drive belt in the following manner. Place a bar with a 15mm socket attachment, onto the tensioner arm pulley retaining bolt and gently rotate the tensioner, refer to **Alternator - Static description (A.30.A)**. Remove the fan belt from the pulley, and allow the tensioner to return to its untensioned position once the belt has been removed.



BAIS06CCM690AVA 1

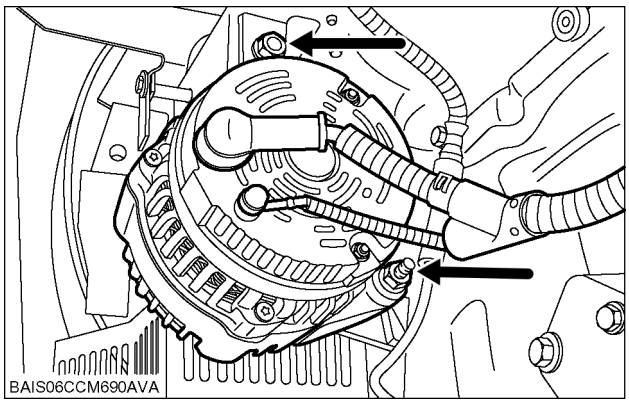
2. Remove the alternator upper and lower mounting bolts, and remove the alternator from the engine bracket .

Alternator - Install

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

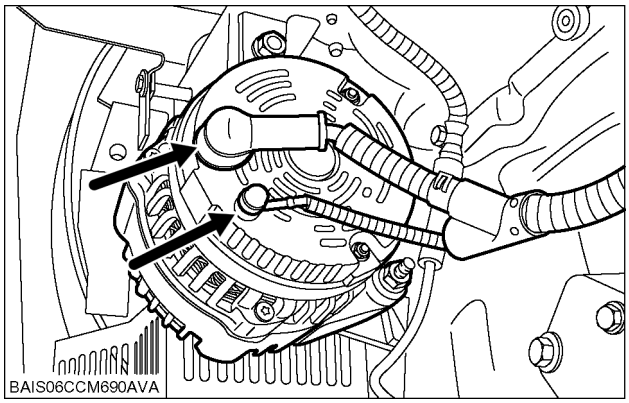
NOTE: *Ensure the battery ground (negative) cable is disconnected from the battery when installing the alternator.*

1. Install the alternator to the engine mounting bracket and tighten the bolts to the specified torque of, **25 Nm** (**18.4 lbft**).



BAIS06CCM690AVA 1

2. Rotate the tensioner arm and install the drive belt over the pulley, release the tensioner arm to allow the correct tension to be applied to the belt, refer to, **Alternator - Preliminary test (A.30.A)**.
3. Reconnect the two electrical cables to the alternator.



BAIS06CCM690AVA 2

Next operation:
Reconnect the battery, refer to, **Battery - Connect (A.30.A)**.

Alternator - Preliminary test

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

CAUTION - Service Precautions

1. To avoid damage to the components of the alternator charging system, service precautions must be observed as follows:
   - NEVER make or break any of the charging circuit connections, including the battery, when the engine is running.
   - NEVER short any of the charging components to ground.
   - ALWAYS disconnect the battery ground cable (negative) when charging the battery on the tractor using a battery charger.
   - ALWAYS observe correct polarity when installing the battery or using a slave battery to start the engine.

CONNECT POSITIVE TO POSITIVE AND NEGATIVE TO NEGATIVE

Preliminary Checks

2. Prior to electrical testing thoroughly inspect the charging and electrical system.
   Check all leads and connections for continuity and tightness.

   1. Check the battery
   Using a hydrometer check the individual battery cells. The battery should be at least **70 %**charged and in good condition.

   2. Check the drive belt
   Inspect the alternator drive belt and pulley, ensuring that both are clean, free from oil and grease and in good condition.
   The alternator drive belt is automatically tensioned by a spring tensioner mounted at the front of the engine, refer to **Alternator - Static description (A.30.A)**. If the belt tension is suspect, check the tensioner assembly as follows:

   Fan Belt Tensioner Removal
   The fan belt should be removed in the following manner. Place a bar with a **15 mm** socket attachment onto the bolt of the tensioner arm and rotate the lever clockwise. Remove the fan belt from the pulley and allow the tensioner to return to its untensioned position once the belt has been removed.
   Remove the tensioner from the pump by loosening and removing the centre attaching bolt.
   .

Inspection and Repair

3. Checking of the tensioner assembly operation should be carried out, with the tensioner assembly still attached to the front of the engine. To check the spring load, place a “breakback" torque bar preset to, **52 - 63 lbf.ft** (**70 - 85 Nm**) (**7.1 - 8.7 kgf.m**), onto the pulley arm **15 mm** socket. Raise the lever up through an arc of **20 °** maximum. If the torque bar does not “break" within the range a new tensioner assembly is required.
   Ensure the tensioner pulley rotates freely by hand. If not replace with new parts.

4. Re-Assembly
   Fit a new pulley to the assembly, if required, and torque the attaching bolt, refer to, **Fan and drive Belt tensioner - Torque (B.50.A)**.
   To reassemble the arm assembly, position the tensioner on to the front of the engine, fit the mounting bolt through the assembly, and torque the bolt, refer to, **Fan and drive Belt tensioner - Torque (B.50.A)**.
   Refitment of the fan belt is the reverse of the removal procedure, but ensure the “Poly V” belt, is positioned correctly onto all of the pulleys.

Check the Warning Lamp

5. Turn on the key start switch and check that the warning lamp is fully illuminated.
   If the warning lamp is not fully illuminated check the bulb. If the bulb is not the cause of the fault carry out the Alternator wiring connections test as detailed under ‘initial tests’ in this section.
   If the warning lamp is illuminated start the engine and run above idling speed. The lamp should go out.
   If the lamp does not go out, stop the engine and remove the wire from the D+ terminal. If the lamp now goes out a faulty alternator component is indicated.
   If the warning lamp remains illuminated, check for a short circuit to earth (ground) between the ‘D+’ cable end and the warning lamp.

INITIAL TESTS

6. The initial tests may be performed without removing any of the charging circuit components from the tractor and enable the following items to be checked:
   - Alternator wire connections
   - Alternator charging current and controlled voltage
   - Alternator charging circuit volt drops
   - Alternator maximum output performance

Test equipment required:

7. - Voltmeter (**0 - 30 volts** moving coil type
   - Millivoltmeter (**0 - 1 volt**)
   - Ammeter (**0 - 200 Amperes** moving coil type)
   - **1.5 Ohm 200 Amperes** variable load resistor

NOTE: *Most commercial test equipment incorporates several testing devices within a single unit . Use such equipment in accordance with the manufacturers instructions.*

8. Refer to **Alternator - Electrical test (A.30.A)** for testing procedures.

Alternator - Electrical test

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Alternator Wiring Connections Test

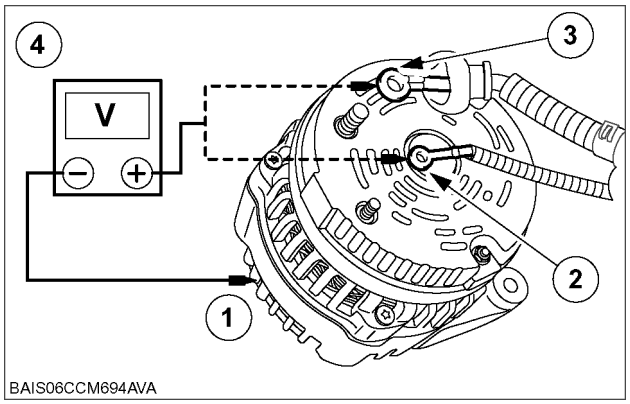
1. With reference to **1**

   1. Disconnect the battery
   2. Disconnect the D+ **(2)** and B+ **(3)** terminals from the alternator.
   3. Reconnect the battery and turn the key start on but do not start the engine. Connect a voltmeter **(4)** between each terminal and earth (ground), **(1)**. Battery voltage should be registered.

   If battery voltage is not registered a continuity fault in the external cable circuitry must be traced and remedied, refer to the circuit diagram (refer to **Wiring harness - Electrical schematic frame 01 Power Distribution (Power - Maxi Fuses) (A.30.A)**).

   4. Connect the D+ terminal, warning lamp (thin brown) wire, to earth (ground). The warning lamp should illuminate.
   5. Disconnect the battery and reconnect the removed alternator cable connections to the alternator.

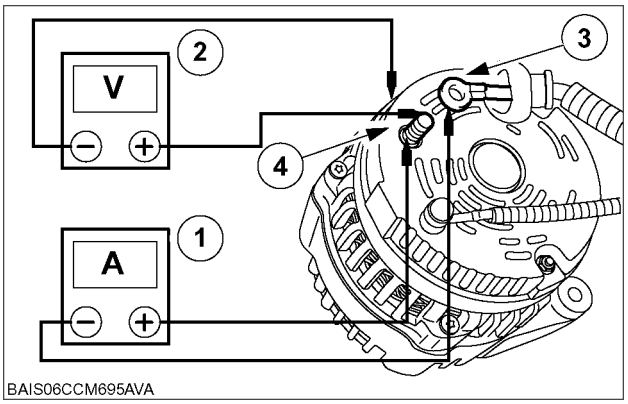
NOTE: *If the warning lamp fails to illuminate when the cable is reconnected to the alternator, a fault is indicated in the alternator regulator or rotor circuits. Ensure that the D+ terminal is clean.*



BAIS06CCM694AVA 1

Charging Current And Controlled Voltage Tests

2. With reference to Figure **2**
The following test should be performed at **20 °C**, a lower temperature will create a higher voltage and a higher temperature will create a lower voltage.
1. Ensure all tractor electrical components are switched off and the key start switch is in the 'off' position.
2. Disconnect the battery negative terminal and disconnect the B+ terminal **(4)** of the alternator.
3. Connect an ammeter **(1)**, between the removed (thick brown) cable **(3)** and the B+ alternator terminal.
4. Connect a voltmeter **(2)** between the alternator B+ terminal and earth (ground)
5. Reconnect the battery. Start and run the engine at **2000 rev/min**. and observe the ammeter and voltmeter readings.



BAIS06CCM695AVA 2

The voltmeter should register in excess of battery voltage and when the ammeter reading falls to **5 Amperes** the voltmeter reading should stabilise at **14.1 V +/- 0.15.**

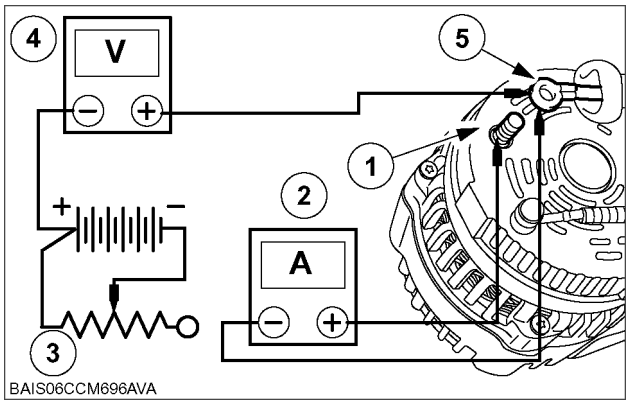
If the voltmeter reading exceeds the above value the alternator regulator is faulty.
If the voltmeter reading is below the specified value a faulty alternator component or a high resistance fault in the external connections of the charging system is indicated.

If the ammeter registers zero amperes a faulty alternator component is indicated.

Charging Circuit Volt Drop Tests

(a) Insulated-Side Volt Drop Tests

3. With reference to Figure **3**



BAIS06CCM696AVA 3

Ensure the key start switch is in the 'off' position.
1. Disconnect the battery negative cable and disconnect the B+ cable **(1)** from the alternator
2. Connect a millivoltmeter **(4)** between the battery positive terminal and the B+ cable **(5)**. (Positive side to cable).
3. Securely connect an ammeter **(2)** between the B+ terminal of the alternator and the B+ cable (negative side to cable)
4. Reconnect the battery negative cable and connect a variable load resistor **(3)**, with the slider in the minimum current draw position (maximum resistance), across the battery terminals.
5. Start the engine and increase the speed to **2000 rev/min**.
6. Slowly increase the current loading of the resistor (decrease resistance) until the ammeter registers **150 / 200 Amperes**.
7. Observe the millivoltmeter reading which should not exceed **400 millivolts**.

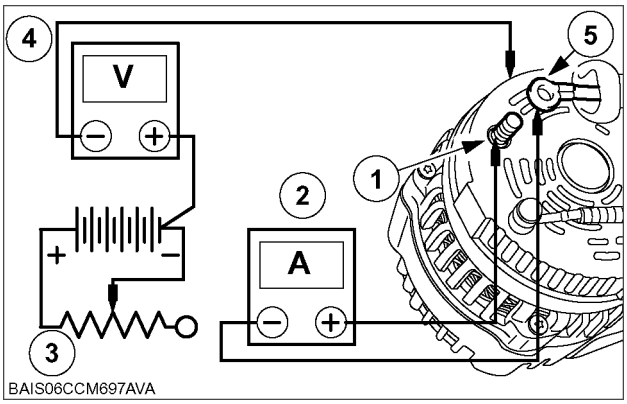
If the reading is in excess of **400 millivolts**, a high resistance fault is indicated in the external circuitry.

If the required alternator output cannot be achieved and the millivoltmeter reading is less than 400 millivolts, then a faulty alternator component is indicated.
.

8. Stop the engine.

(b) Ground-Side Volt Drop Test

4. With reference to **4**



BAIS06CCM697AVA 4

1. Ensure the key start switch is in the 'off' position.
2. The circuit is the same as that used in the previous test except for the millivoltmeter **(4)** which is now connected between the battery negative terminal and the alternator frame (negative side to frame).
3. Start the engine and increase the speed to **2000 rev/min**.
4. Slowly increase the current loading of the resistor (decrease resistance) until the ammeter **(2)** registers **150 / 200 Amperes**
5. Observe the voltmeter reading which should not exceed 200 millivolts.

If the reading is in excess of **200 millivolts** a high resistance fault is indicated in the external circuitry.

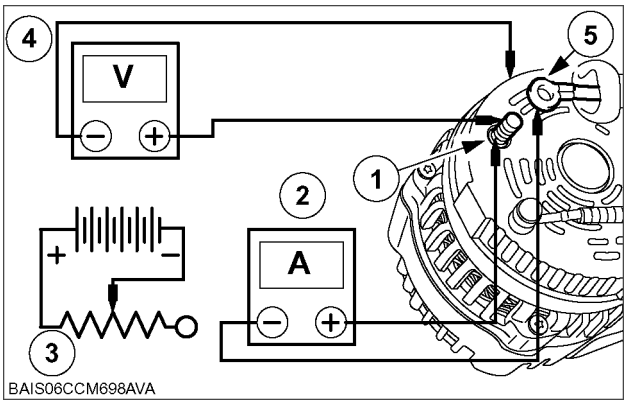
If the required alternator output cannot be achieved and the millivoltmeter reading is less than **200 millivolts** then a faulty alternator component is indicated.
.

6. Stop the engine.

NOTE: *Ensure the variable load resistor **(3)** is in the minimum current draw position (maximum resistance).*

Alternator Maximum Output Performance Test

5. With reference to **5**.



BAIS06CCM698AVA 5

1. Ensure the key start switch is in the 'off' position.
2. Disconnect the battery negative cable and disconnect the B+ cable **(5)** from the alternator.
3. Securely connect an ammeter **(2)** between the B+ terminal **(1)** of the alternator and the B+ cable (negative side to cable).
4. Connect a voltmeter **(4)** between the alternator B+ terminal and earth (ground).
5. Reconnect the battery, start and increase the engine speed to **2000 rev/min**.
6. Slowly increase the current loading of the resistor **(3)** (decrease resistance) until the ammeter registers **150 / 200 Amperes**.
7. Observe the voltmeter reading which should not fall below **13 volts**.

If the reading falls below **13 volts** a faulty alternator component is indicated..

Regulator and rotor field circuit test

6. Test equipment required:
   - **12 volt** battery
   - Multimeter
   - **2.2 Watt** Test Lamp

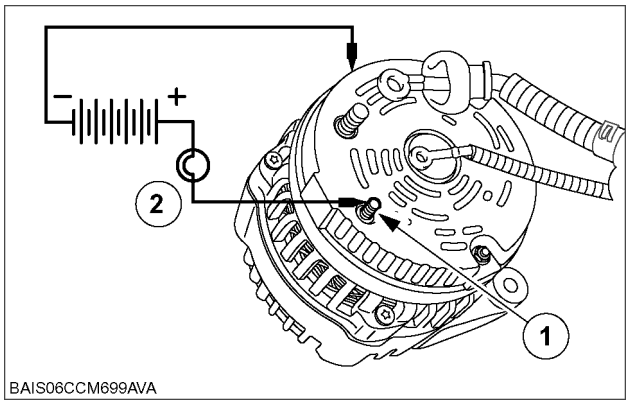
IMPORTANT: *Prior to removal of the alternator cables from the alternator ensure that the key start switch is in the 'off' position and the battery negative cable is disconnected.*

7. With reference to **6**

1. Disconnect all of the alternator cables.
2. Connect a **12 volt** battery and a 2.2 Watt test lamp **(2)** in series between the D+ **(1)** and the alternator frame (negative side to frame).
3. The test lamp should illuminate.

If the test lamp is not illuminated a fault is indicated in the rotor circuit. Check brushes, slip rings and continuity of rotor field windings.

If examination indicates these parts to be satisfactory the regulator may be suspect.

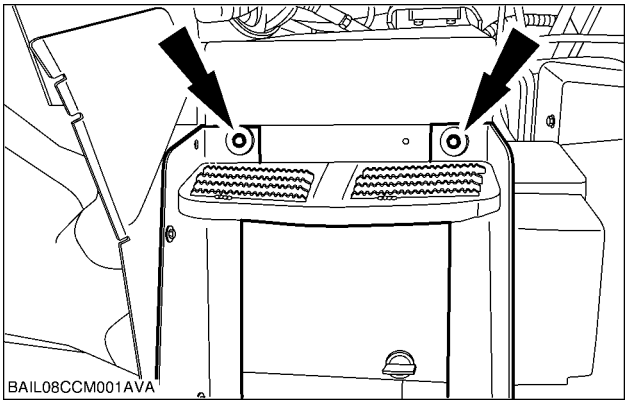


BAIS06CCM699AVA 6

Battery - Disconnect

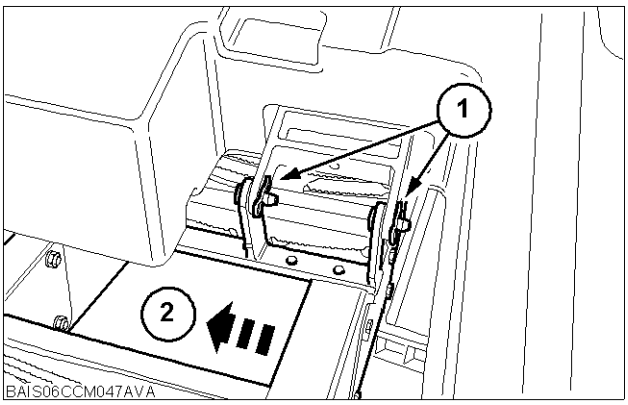
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

1. Remove retaining bolts and lower the right-hand steps.



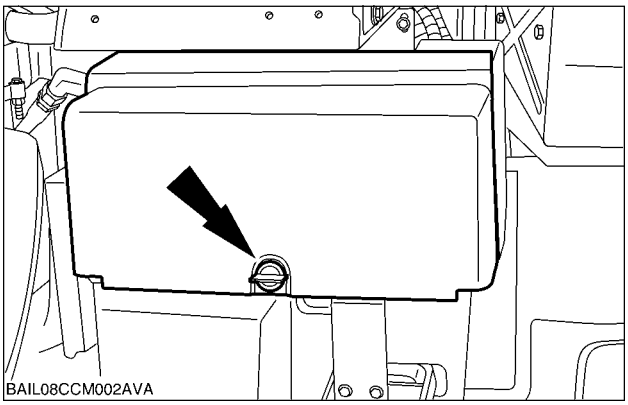
BAIL08CCM001AVA 1

2. Remove the R-clips **(1)** and remove the right-hand steps **(2)**.



BAIS06CCM047AVA 2

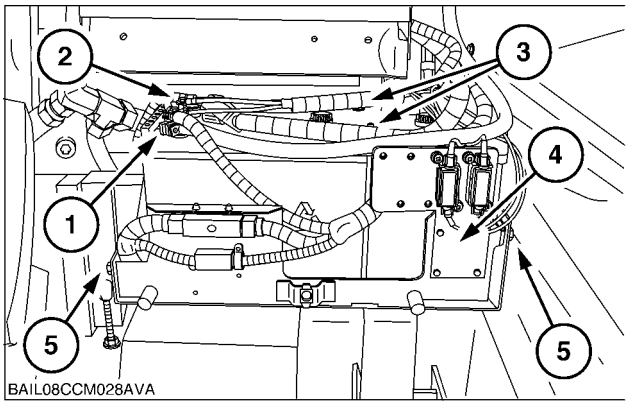
3. Remove the battery cover.



BAIL08CCM002AVA 3

4. Disconnect the negative lead **(1)** from the battery terminal and position to one side.
   Disconnect the positive lead **(2)** from the battery terminal and position to one side.
   .

NOTE: *Always disconnect the lead from the negative terminal first.*



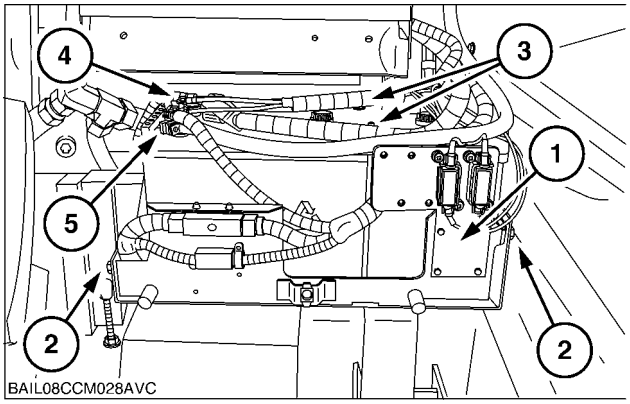
BAIL08CCM028AVA 4

Battery - Connect

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

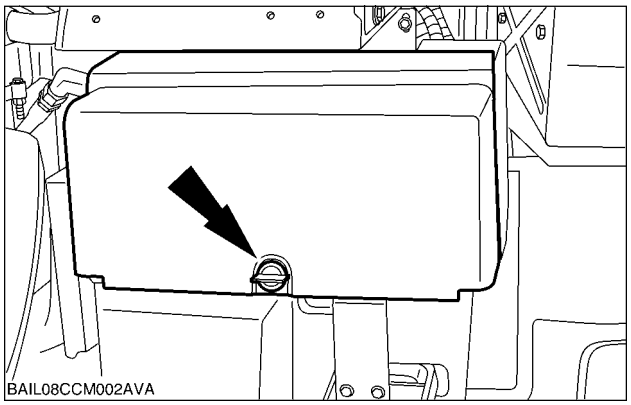
1. Connect the positive battery lead **(4)**.
   Connect the battery negative lead **(5)**.

NOTE: *Always connect the lead to the negative terminal last.*



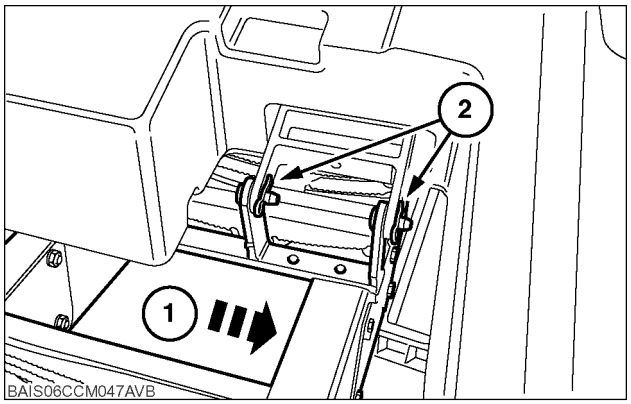
BAIL08CCM028AVC 1

2. Install the battery cover.



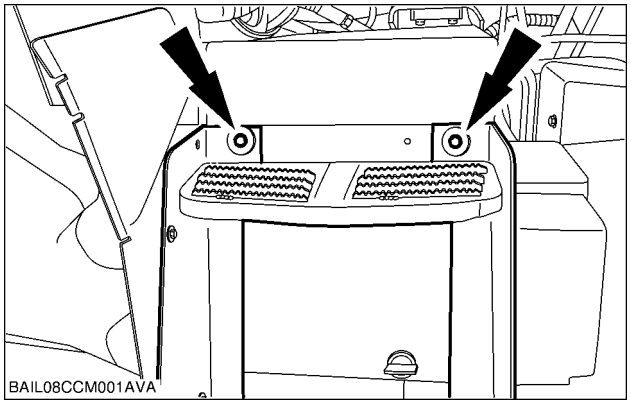
BAIL08CCM002AVA 2

3. Install the right-hand steps **(1)** and install the R-clips **(2)**.



BAIS06CCM047AVB 3

4. Raise the steps and install the retaining bolts.



BAIL08CCM001AVA 4

5. The radio, if fitted, will lose its stored information and will require reprogramming. It should be noted that on models with electronic instrument panel and microprocessors, that these components will not lose their memories, i.e, electronic height control and transmission calibrations will not be affected.

Battery - Electrical test

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Specific Gravity

1. The specific gravity of the battery electrolyte indicates the state of charge. Fully charged the specific gravity of the electrolyte is 1.280 minimum at **25 °C**.

   Alternatively the approximate state of charge can be measured by using an accurate digital volt meter (+/- 0.01V) as follows:-
   Less than **10.5 V** Battery un-serviceable*
   Less than **11.8 V** Battery discharged
   Less than **12.3 V** Battery 1/2 charged
   Better than **12.6 V** Battery fully charged
   * See note under tests for possible recovery of a mildly sulphated battery.

   Battery voltage to be taken with the battery unloaded and:-
   A. After the battery has rested unloaded for at least **4 hours**.
   B. If the vehicle has recently run or battery has recently been charged, switch on headlamps for **2 minutes**.

   When a battery discharges, sulphuric acid in the electrolyte combines chemically with the plates and this action lowers the specific gravity of the solution.

   A battery hydrometer will determine the specific gravity of the electrolyte in a cell and the amount of unused sulphuric acid in the solution is a measure of the degree of charge of that cell.

   The lower the temperature at which a battery is required to operate, the more necessary it is that the battery is maintained in a fully charged condition. For example a battery with a low specific gravity of 1.225 at **27 °C** (**80 °F**) will operate the starting motor at warm ambient temperatures but may not, due to lower battery efficiency at a low temperature.

   Table 1 shows the effect of temperature on the efficiency of a typical battery.
   Maximum battery life will be obtained if the correct care and periodic inspection is given. It is important that output capacity should not be exceeded by constant and excessive overloading and that charging requirements are maintained.

   Table 1: refer to **Battery - General specification (A.30.A)**.

Servicing The Battery

2. When servicing a battery the following steps should be observed:
   1. Maintain the electrolyte to the recommended level of **17 mm** (**0.67 in.**) above the plates. If this is not observed the acid will reach a high concentration that will damage the separators and impair the performance of the plates.
   2. Use only distilled or de-mineralised water, do not overfill and never use tap water or water from a rain barrel or other source
   3. Always keep the battery at least **75 %** charged otherwise the plates will become sulphated and loss of efficiency will result with possible damage from freezing at low temperatures.
   4. Avoid overcharging the battery as excessive charging will create high internal heat that will cause plate grid deterioration and produce water loss.
   5. When fast charging ensure the battery temperature does not exceed **50 °C**.
   6. Do not add sulphuric acid to a cell unless the electrolyte has been lost through spilling. Before replenishing ensure the solution is at the correct specific gravity. A slow charge is the only method to be employed to fully charge a battery. A high rate charger can be used to quickly boost the battery capacity but this must be followed by a slow charge rate to bring the battery to full capacity.

⚠ WARNING ⚠

Batteries contain sulphuric acid and during charging generate a highly explosive mixture of hydrogen and oxygen gases.- Never use equipment that generates flames or sparks in order to control electrolyte level- Do not remove the battery cover plugs without protection for eyes and hands.

B039

Dry Charged Batteries

3. Dry charged batteries must be prepared for service as follows:
   1. Remove the battery cell vent plugs.
   2. Fill each cell to the recommended level with electrolyte of 1.260 specific gravity.
   3. After filling, allow the battery to stand for **15 minutes** then re-check the electrolyte level and top up if necessary.
   4. Charge the battery for **4 hours** at a rate of **5 - 8 amperes** and check that all cells are gassing freely.
   5. Install the battery cell vent plugs.

NOTE: *The electrolyte must be diluted sulphuric acid preferably at a temperature of* ***21 °- 32 °C*** *(* ***70 °- 90 °F****).*

Charging The Battery

4. Before charging a battery:
   1. Thoroughly clean the battery casing and cell covers with dilute ammonia or hot water and clean the terminals.
   2. Check the level of the electrolyte in each cell and, if below plates, add distilled water to bring above plate level.

Normal (Top-up) Charging

5. 1. With a slow charger use a rate of **3 - 6 amperes** for the time necessary to bring the battery to full charge. This may take **36 hours** or more if the battery is heavily discharged. A severely sulphated battery might not accept a charge. When the battery is fully charged the cells will gas freely and the specific gravity will remain constant. Remove the charger after three consecutive hydrometer readings taken at hourly intervals indicate that the specific gravity has stopped rising.
   2. When using a fast or high rate of charge carefully follow the manufacturers instructions. High rate charging raises the temperature of the electrolyte and unless the charger is equipped with an automatic time or temperature device, the electrolyte temperature could exceed **50 °C** , which may cause violent battery gassing and damage to internal components.
   3. Re-check the level of electrolyte in each cell and add distilled water as necessary.

⚠ WARNING ⚠

When a battery is being charged an explosive gas is produced. Do not smoke or use an exposed flame when checking the electrolyte level and ensure the charger is switched off before connecting or disconnecting to avoid sparks which could ignite the gas.

B038

Recharging Deeply Discharged Batteries

6. The recommended method to recharge a low maintenance battery is to use a constant voltage charger. For deeply discharged batteries a 48 hours charging period at **16 volts** is recommended, with current limitation, (**88 A** for **176 Ah** batteries).

   This system is self regulating: high current is delivered at the beginning (when battery voltage is low), lower and lower current is then absorbed when battery reaches full charge (and its voltage is high).

   If only constant current chargers are available it is recommended to use the current levels and times shown Table 2 below. The figures are intended for deeply discharged batteries. If the battery is only 50% discharged use one half of the time listed (slow charge programs). For other states of discharge reduce proportionally the time of charge. Whenever possible use the slowest charge program to increase the battery's life.

   If when charging the battery, violent gassing or spewing of electrolyte occurs, or the battery case feels hot (**50 °C** or greater), reduce or temporarily halt charging to avoid damaging the battery.

   Table 2: refer to **Battery - General specification (A.30.A)**.

Tests

7. Before commencing battery tests check the battery for clogged vents, corrosion, raised vent plugs or a cracked case.

   Test equipment required:
   - Hydrometer
   - Battery starter tester (High rate discharge tester)
   - Thermometer
   - Battery Charger

Specific Gravity:

8. This test will determine the state of battery charge.
   1. With the float in the vertical position take the reading.
   2. Adjust the hydrometer reading for electrolyte temperature variations by subtracting 4 points (0.004 specific gravity) for every **5.5 °C** (**10 °F**) below the temperature at which the hydrometer is calibrated and by adding 4 points (0.004 specific gravity) for every **5.5 °C** (**10 °F**) above this temperature.

   The following examples are calculated using a hydrometer calibrated at **30 °C** (**86 °F**).

   Example 1:
   Temperature below **30 °C** (**86 °F**)
   Electrolyte temperature **19 °C** (**66 °F**)
   Hydrometer reading 1.270
   Subtract 11.0/5.5 x 0.004 0.008
   Corrected specific gravity = 1.262

   Example 2:
   Temperature above **30 °C** (**86 °F**)
   Electrolyte temperature **40 °C** (**104 °F**)
   Hydrometer reading 1.220
   Subtract 10.0/5.5 x 0.004 0.007
   Corrected specific gravity = 1.227

   3. If the specific gravity is 1.280 or more the battery is fully charged and in good operating condition.
   4. Should the corrected specific gravity be below 1.280, charge the battery and inspect the charging system to determine the cause of the low battery charge.

   If the battery has been charged under static conditions, denser electrolyte will accumulate at the bottom of the cells. The battery should be shaken periodically to mix the electrolyte, this will improve the charge rate and provide a more accurate hydrometer reading when tested.
   Refer to **Battery - General specification (A.30.A)**.

NOTE: *Specific gravity should not vary more than 0.025 points between cells.*

NOTE: *If distilled water has recently been added the battery should be recharged for a short period otherwise accurate hydrometer readings will not be obtained.*

Performance Test:

9. The performance test is to determine if the battery has adequate capacity to turn the engine. The voltage reading obtained is used to determine the battery condition. Prior to testing, ensure the electrolyte level is correct and the open circuit voltage is **12.5 V** or more. The battery may be tested on or off the tractor.

   1. Set the current control switch of the battery starter tester (high rate discharge tester) to the 'off' position and the voltage selector switch equal to, or slightly higher than, the rated battery voltage. Connect the tester positive leads to the battery positive terminal and the negative leads to the negative battery terminal.

   2. Turn the current control knob until the ammeter reading is half the CCA rating of the battery and take the voltage reading.

   - If the reading is **9.6 volts** or more after **15 seconds**, the battery has an acceptable output capacity and will readily accept a normal charge.

   - If however the reading is below **9.6 volts**, the battery is considered unsatisfactory for service and should be test charged as described below.

⚠ CAUTION ⚠

Do not leave the high discharge load on the battery for periods longer than 15 seconds.

B003

Test Charging:

10. This test is designed only for batteries that have failed the previous capacity test.
    1. Attach the battery starter (high rate discharge tester) positive leads to the battery positive terminal and the negative leads to the battery negative terminal.
    2. Connect the battery charger positive lead to the battery positive terminal and the negative lead to the battery negative terminal.
    3. Turn the charger timer past a ' **3 minutes**' charge indication and then back to the ' **3 minutes**' mark.
    4. Set the charging rate as close as possible to **40 amperes**
    5. After **3 minutes** at this fast charge take the voltmeter reading.
    - If the total voltage is over **15.5 volts** the battery is unsatisfactory and is probably sulphated or worn out and should be replaced.
    - If the total voltage is under **15.5 volts**, test the specific gravity of each cell and re-charge the battery to the following scale:
    Refer to **Battery - General specification (A.30.A)**.

NOTE: *A mildly sulphated battery can be recovered by using a multiple battery type charger, with an open circuit upper voltage limit of* ***50 volts****. Owing to the high resistance of a sulphated battery, it will primarily require a high voltage setting to overcome the resistance of the sulphation. initially there may be no visible acceptance of the charge. After a few minutes of inactivity a small charge will be apparent, followed by a rapid increase in the charge rate. The charge rate must not exceed* ***14.0 amperes*** *or the electrolyte temperature* ***50 °C****. When the ampere rate has stabilised, reset the volts until the charge rate is a steady 5 amperes. Continue at this rate until the electrolyte specific gravity stops rising at approximately 1.275-1.280 at* ***20 °C*** *(* ***68 °F****), this can take up to* ***48 hours*** *of charging. Stand the battery for* ***24 hours*** *and then conduct the capacity test detailed previously.*

NOTE: *When battery problems are experienced the alternator drive belt tension and the complete charging system should be checked.*

Common Causes of Battery Failures

11. 1. Internal open circuit.
2. Internal short circuit.
3. Loss of electrolyte.
4. Separation of active materials from grids.
5. Accumulation of sulphate crystals too large to disperse.

These failures are normally caused by the following:
1. Failure of inter cell components.
2. Excessive crystal growth may puncture the separators and cause short circuits.
3. Excessive over charging (charging system malfunction, boost/recovery techniques with high voltage, operation in very high temperatures.
4. Freezing of electrolyte.
A fully charged battery does not freeze until **-65 °C**. A **50 %** charged battery freezes between **-17 - -27 °C**. Fully discharged electrolyte freezes at - **3 - -11 °C**.
Excessively high boost charging and gassing will also cause separation of active materials from the grids. Separation destroys the chemical function of the battery.
5. Crystal growth occurs whenever batteries are left discharged. High temperatures and extended discharged periods increase this condition. At room temperature after one week the battery is unlikely to recover on the vehicle. Recharge will require a higher constant voltage. After 3 weeks the battery will have suffered permanent degradation and the procedure detailed previously for charging a 'Deeply Discharged' battery should be followed.

When fully charged, batteries have a long shelf life. The lead calcium type battery self discharges at **3 %** per month. This means that it will take 16 months to drop to **50 %** charged. On the tractor the quiescent load is about **50 mA**. To predict run-down on a static vehicle this should be added as approximately **8 Ah** per week.

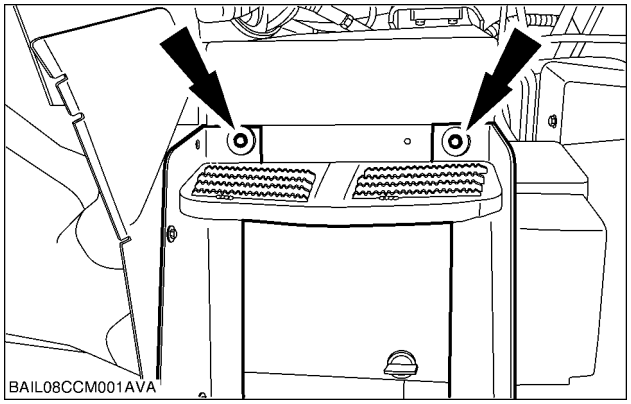
It is worth stressing that when cranking, if a battery starts to fade, it is beneficial to stop and allow two minutes for the battery to recover. The recovery time should be increased as the temperature decreases.

With a dual battery set up, an old battery should not be used with a new one. One battery will always fail first. If the battery has given the service life expected, change both batteries. If one has failed early, i.e, through manufacturing defect, then it is acceptable to replace just one battery.

Battery - Remove

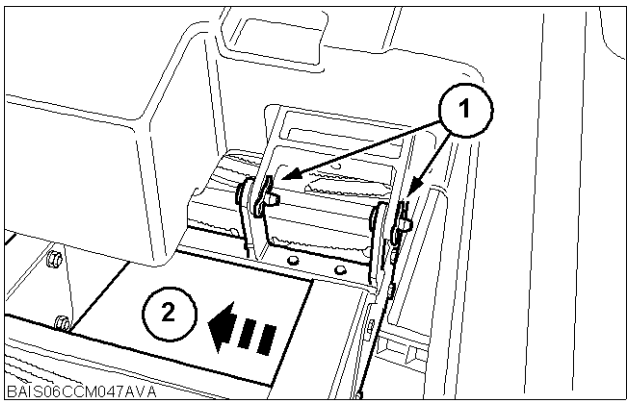
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1. Remove retaining bolts and lower the right-hand steps.



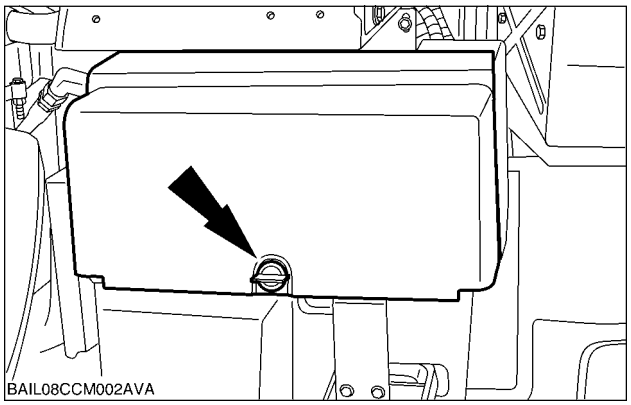
BAIL08CCM001AVA 1

2. Remove the R-clips **(1)** and remove the right-hand steps **(2)**.



BAIS06CCM047AVA 2

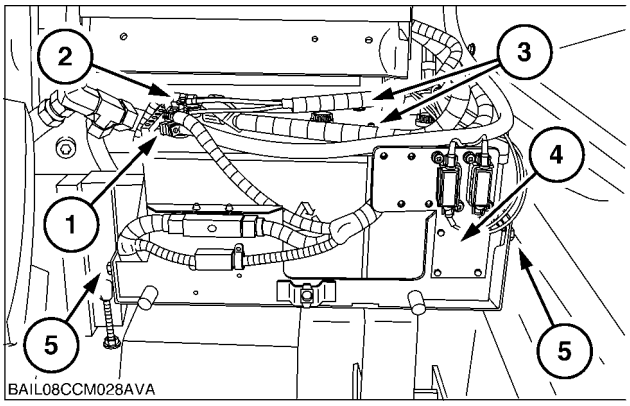
3. Remove the battery cover.



BAIL08CCM002AVA 3

4. Disconnect the negative lead **(1)** from the battery terminal and position to one side.
   Disconnect the positive lead **(2)** from the battery terminal and position to one side.
   Loosen the retaining nuts **(3)** and remove the battery clamp.
   Remove the retaining bolts **(5)** from the side plate **(4)** and position to one side taking care not to damage the wiring on the maxi fuse block.

NOTE: *Always disconnect the lead from the negative terminal first.*



BAIL08CCM028AVA 4

5. Carefully slide the battery out of the carrier.

⚠ CAUTION ⚠

The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944

Battery - Install

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

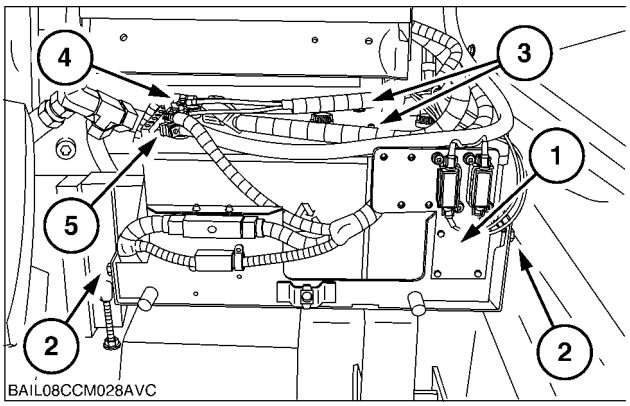
⚠ CAUTION ⚠

The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944

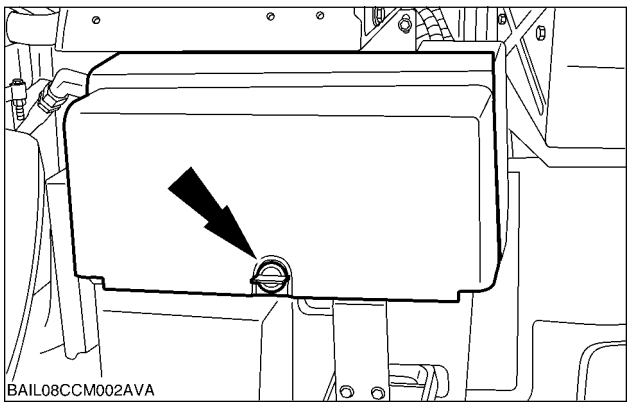
1. Before installing the battery check the following:
   - Make sure the battery is clean and dry and the vent caps are properly installed.
   - Smear the terminals with petroleum jelly, do not use conventional lubricating greases as these can promote electrolytic corrosion.
   - Make sure the battery tray and clamps are clean and free from stones or small objects which may puncture the battery casing.
   - Make sure the battery terminal polarity is correct and that the terminal connections are sufficiently tight, but not overtightened.
2. Carefully slide the battery into the carrier.
3. Reposition the side plate **(1)** and install the retaining bolts **(2)**.
   Install the battery clamp and tighten the retaining nuts **(3)**.
   Connect the positive battery lead **(4)**.
   Connect the battery negative lead **(5)**.

NOTE: *Always connect the lead to the negative terminal last.*



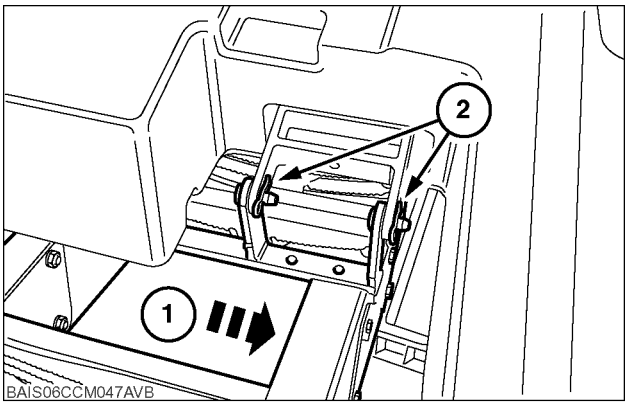
BAIL08CCM028AVC 1

4. Install the battery cover.



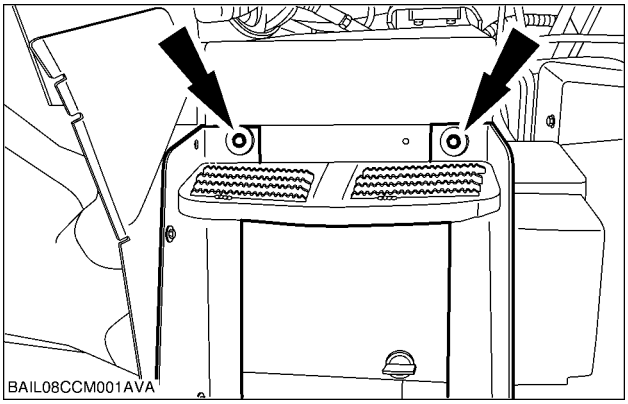
BAIL08CCM002AVA 2

5. Install the right-hand steps **(1)** and install the R-clips **(2)**.



BAIS06CCM047AVB 3

6. Raise the steps and install the retaining bolts.



BAIL08CCM001AVA 4

7. The radio, if fitted, will lose its stored information and will require reprogramming. It should be noted that on models with electronic instrument panel and microprocessors, that these components will not lose their memories, i.e, electronic height control and transmission calibrations will not be affected.

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Alternator - Torque 15
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Battery - Connect 430
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DISTRIBUTION SYSTEMS - A

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PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electronic schema Electronic Park Lock (EPL) - Module XA 518
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electronic schema Auxiliary Control Unit (RM module) 520
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electronic schema Arm Rest Control Unit (LC module) 522
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electronic schema Small Wide Colour Display 524
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electronic schema Radio and Hands Free module 526
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electronic schema Tractor Electronic Control Unit (TECU) 528
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electronic schema Automatic Temperature Control 530
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electronic schema Fast Steer (KA Module) 532
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electronic schema Engine control Module (EDC 16) 534
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electronic schema Auto Guidance Module 536
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electronic schema Electro-Hydraulic Remotes 538
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Electronic schema Full powershift central control unit (RT Module) 540
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

ELECTRONIC SYSTEM - Calibration

Calibration Set Up Procedures

Prior to any installation of programme download or any Calibration Set Up Procedure, ensure that the H8, memory reset, of the selected system has been performed.

Required When :

- A calibration Fault code is Present.

  NOTE: *The Fault code will not be displayed on the screen, but can be viewed in H-menu mode HB*

- The non volatile memory has been reset (H8) in the controller.

  NOTE: *After a full memory reset, in H8, it will be necessary to perform the tractor configuration procedure. Refer to H3 in the H-Menu Chapter of the Electrical Systems Section* ***Control module - Static description (A.50.A)****.*

- The microprocessor has been replaced.
- A PWM solenoid valve has been replaced.
- A potentiometer has been replaced.
- A mechanical repair has been effected.
- TRANSMISSION ONLY - The shift quality or clutch featherability has noticeably deteriorated.
- EDC ONLY - A new lift arm potentiometer is fitted, in which case error code 1024 will have to be induced by disconnecting the potentiometer with the key switch in the "ON" position and then re-connecting it. **Electronic control - Bad calibration (H.10.D)**.

Set Up Procedure:

Prior to conducting a clutch and synchroniser calibration, the following points should be checked:

- The transmission oil is at the correct temperature - this can be checked in mode H1. All transmissions should be calibrated between **60 - 105 °C**
- The parking brake is applied.
- The air conditioning (if fitted) is switched off.
- All electrical and hydraulic services are deselected.
- Electronic Lift only - A weight of approximately **200 Kg** is placed on the lift arms (to overcome any resistance of the lift linkage).
- Electronic lift only - All EDC controls are turned fully clockwise.
- Electronic lift only - The raise / work switch is positioned in the WORK position.

NOTE: *If the set up procedure has not been followed correctly a “U" Fault Code will be displayed.*
Refer to ***ELECTRONIC SYSTEM - Static description (A.50.A)****.*

ELECTRONIC SYSTEM - Calibration

Calibration fault codes

U Code	Calibration - U fault codes
Err	An error has occurred during calibration. Turn the starter switch to OFF and repeat process
U01	Front axle potentiometer open circuit - Automatic calibration is not working
U02	Front axle potentiometer's threshold value higher than set limit
U03	Short circuit of the front axle potentiometer - Automatic calibration is not working
U04	Front axle potentiometer's threshold value lower than set limit
U05	With automatic calibration, the suspension does not reach its lower/upper limit
U07	Suspension stands still at the Raise command during the automatic calibration
U08	Suspension cannot reach the upper limit within 20 seconds
U09	Suspension stands still at the Lower command during the automatic calibration
U10	Suspension cannot reach the lower limit within 25 seconds
U11	Suspension calibration not possible
U12	Automatic calibration stopped, vehicle not stationary
U13	Front suspension option not activated
U13	Valve 30 (upper lockout) Solenoid open circuit
U14	Insufficient potentiometer range for optimal suspension performance
U14	Valve 31 (lower lockout) Solenoid open circuit
U15	Valve 30 (upper lockout) and Valve 31 (lower lockout) solenoid connectors transposed
U16	Valve 30 (upper lockout) and Valve 31 (lower lockout) curent sense inputs transposed
U16	Engine speed fell too quickly during clutch calibration. (Transmission)
U17	Seat switch not activated (Transmission)
U17	Front Suspension pressure switch open circuit
U18	Front Suspension pressure switch short circuit
U19	Oil temperature below **10 °C**
U20	Handbrake not applied
U21	Engine speed below 1100, increase speed
U22	Engine speed above 1300, reduce speed
U23	Shuttle lever is in neutral, shift it to forward
U26	Clutch pedal is not up, release clutch pedal
U31	Wheel speed sensed
U36	Maximum permitted calibration value for the clutch exceeded
U51	Engine speed fault
U52	Constant speed switch recorded
U55	PTO started
U58	PTO speed sensor circuit interrupted
U59	PTO speed sensor short circuit
U61	Lever 1 not in Neutral position (not valid for PUMA Multicontroller)
U62	Lever 2 not in Neutral position (not valid for PUMA Multicontroller)
U63	Lever 3 not in Neutral position (not valid for PUMA Multicontroller)
U64	Lever 4 not in Neutral position (not valid for PUMA Multicontroller)
U64	Reverse and high synchroniser solenoid connectors swapped
U65	Engine is running during the “H8” procedure
U68	Creeper not engaged
U69	Creeper stuck
U70	PTO twist sensor not calibrated
U71	Calibration attempted while enable switch is off
U72	Proximity switch input signal not in permitted range - open
U73	Proximity switch input signal not in permitted range - closed
U74	Calibration of the LVDT recorder not successful (not in the permitted range after the 4th attempt).
U75	Quick fill calibration value too high.
U76	Quick fill calibration value too low.
U77	Calibration value of the damper is too high.

U78	Calibration value of the damper is too low.
U110	Value of the position sensor potentiometer too high or front hitch not lowered
U111	Value of the position sensor potentiometer too low or front hitch not raised.

Control module - Configure

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

RC / RH Front axle suspension, rear electro-hydraulic remote (EHR) valves, front PTO, front hitch
RC - Puma Standard
RH - Puma Multicontroller

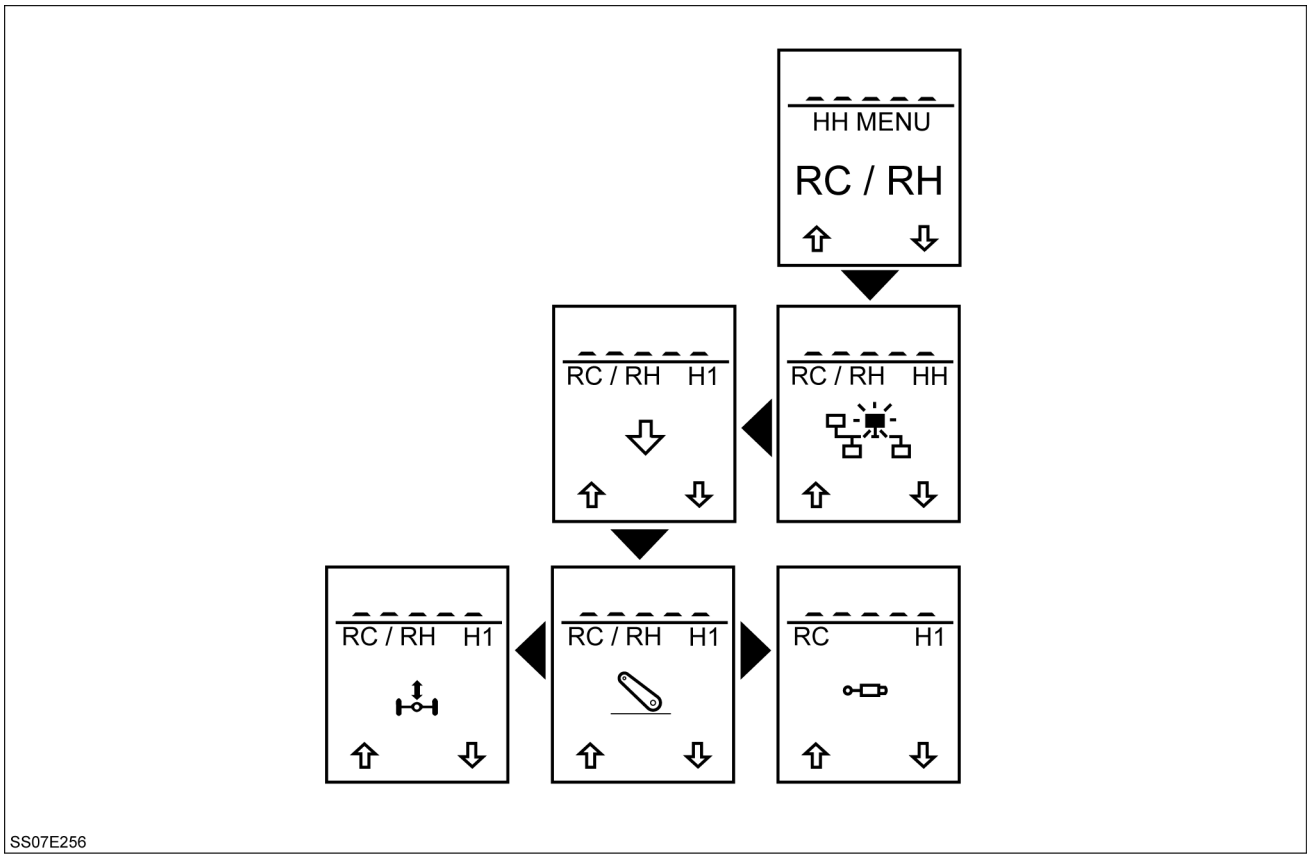
HH	Service menu	Figure
H1	Calibration procedures	**1**
H2	Display stored calibration values	**2**
H3	Configurations and options	**9**
H4	Display software version number	**26**
H5	Switch operation test	**29**
H6	Not used	-
H7	Not used	-
H8	Clearing the EEPROM memory	**33**
H9	Voltmeter	**37**
HA	Demonstration mode	**41**
HB	Display stored fault codes	**45**
HC	Clear all stored fault codes	**49**
HD	Not used	-
HE	Display frequency inputs	**53**
HF	Display controller hardware information	**56**
HJ	Rear EHR valve number programming	**59**

H1 - CALIBRATION PROCEDURES

This menu is used to calibrate the following units:

1. Electro-hydraulic Remote (EHR) Valves. See **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)**.
2. Front axle suspension system. See **Control valve - Calibrate (D.40.C)**.
3. Front hitch. See **HITCH Front hitch - Calibrate (H.10.B)**.

H1 Menu page selection diagram



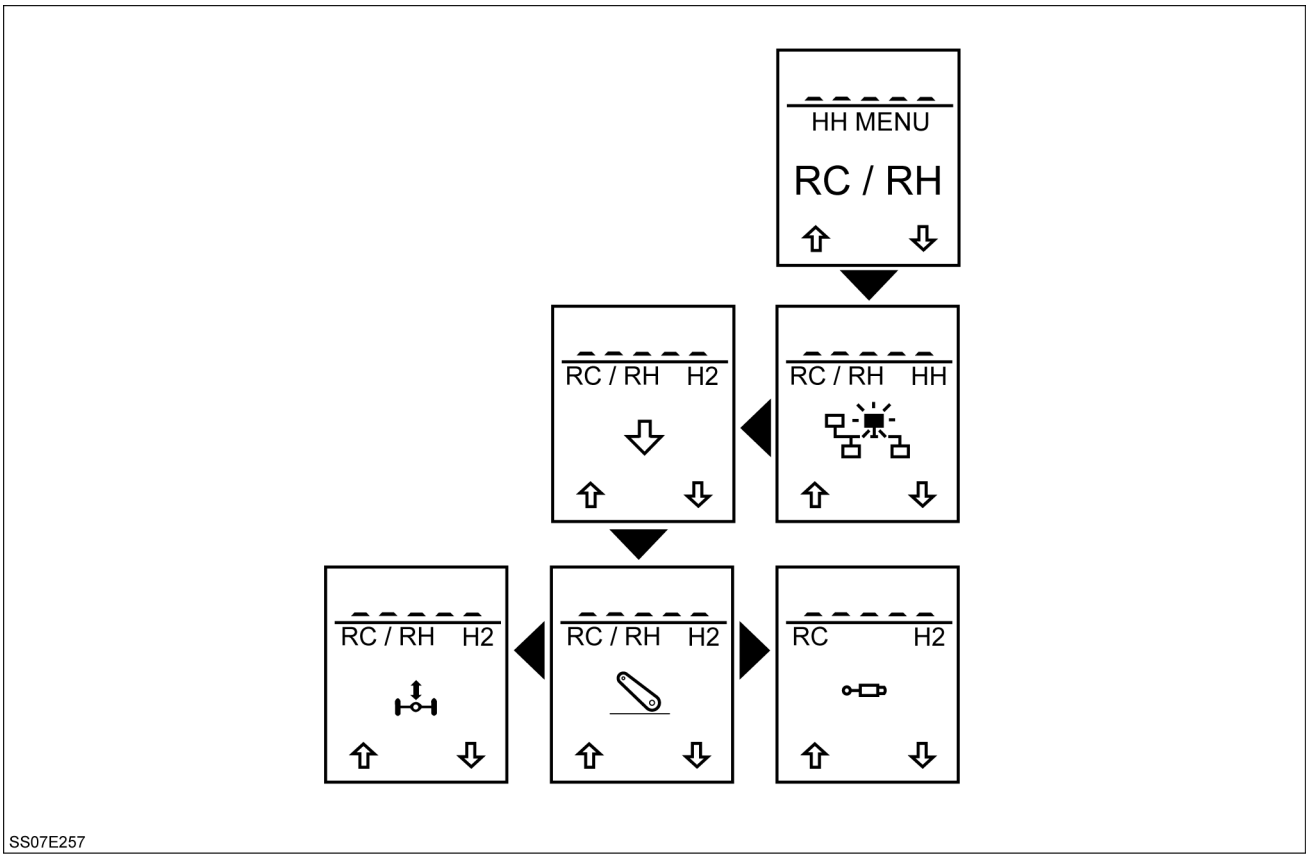
SS07E256 1

H2 - DISPLAY STORED CALIBRATION VALUES

This menu is used to display the calibration values of the following units, which are stored in the control units:

1. Electro-hydraulic remote valves (not used in PUMA Multicontroller)
2. Front axle suspension system
3. Front hitch

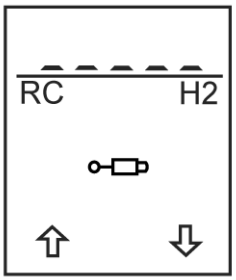
H2 Menu page selection diagram



SS07E257 2

VALUES FOR THE EHR VALVES (not used in PUMA Multicontroller)

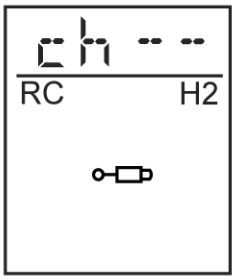
Press the Menu button to call up the EHR valves sub-system.



BAIL06CCM359AVB

BAIL06CCM359AVB 3

"ch - - " is displayed in the upper section of the display.
The relevant channel can be called up using the "Up" and "Down" navigation buttons.



BAIL06CCM362AVB

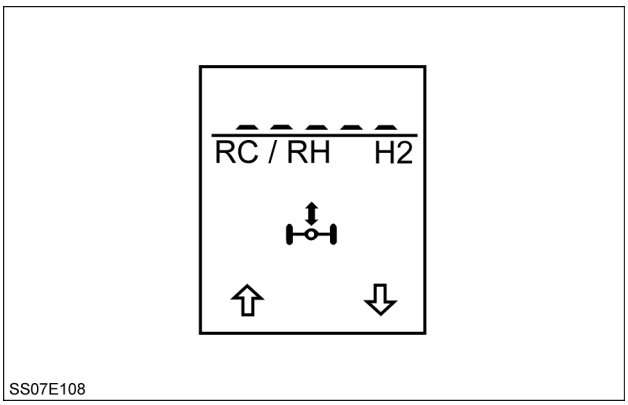
BAIL06CCM362AVB 4

After a delay, the code and then the calibration value are displayed. (The individual channels are described in the following table.)
To use the "HH" menu further, press the Menu button.

Channel	Description	Code	Value range
Channel 1	Control lever 1 - Neutral position	n	250 - 350
	Control lever 1 - Floating position	F	450 - 555
	Control lever 1 - Lower position (Retract)	L	350 - 450
	Control lever 1 - Raise position (Extend)	R	150 - 250
Channel 2	Control lever 2 - Neutral position	n	250 - 350
	Control lever 2 - Floating position	F	450 - 550
	Control lever 2 - Lower position (Retract)	L	350 - 450
	Control lever 2 - Raise position (Extend)	R	150 - 250
Channel 3	Control lever 3 - Neutral position	n	250 - 350
	Control lever 3 - Floating position	F	450 - 550
	Control lever 3 - Lower position (Retract)	L	350 - 450
	Control lever 3 - Raise position (Extend)	R	150 - 250
Channel 4	Control lever 4 - Neutral position	n	250 - 350
	Control lever 4 - Floating position	F	450 - 550
	Control lever 4 - Lower position (Retract)	L	350 - 450
	Control lever 4 - Raise position (Extend)	R	150 - 250

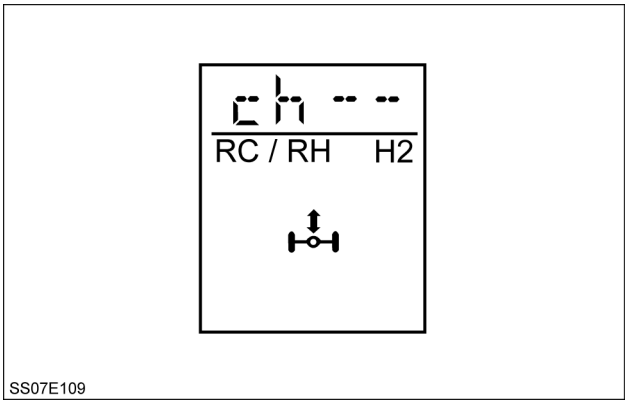
FRONT AXLE SUSPENSION VALUES

Press the Menu button to call up the 'Front axle suspension' sub-system.



SS07E108 5

"ch - - " is displayed in the upper section of the display.
The relevant channel can be called up using the "Up" and "Down" navigation buttons.



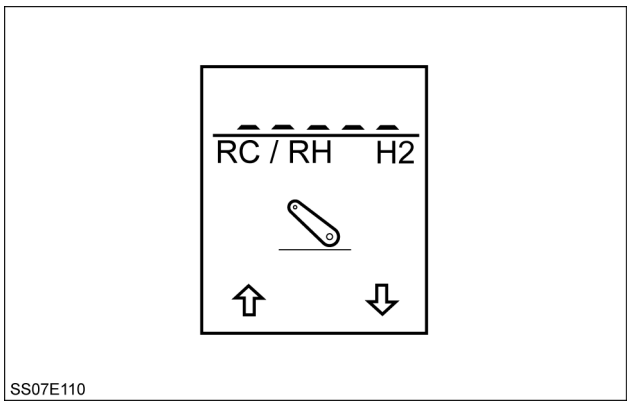
SS07E109 6

After a delay, the code and then the calibration value are displayed. (The individual channels are described in the following table.)
To use the "HH" menu further, press the Menu button.

Channel	Description	Code	Value range
Channel 1	Front axle - upper limit	u	512 - 972
	Front axle - lower limit	d	150 - 512

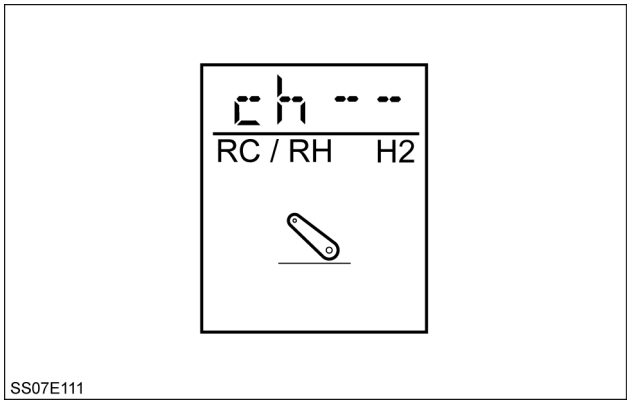
FRONT HITCH VALUES

Press the Menu button to call up the 'Front hitch' sub-system.



SS07E110 7

"ch - - " is displayed in the upper section of the display.
The relevant channel can be called up using the "Up" and "Down" navigation buttons.



SS07E111 8

After a delay, the code and then the calibration value are displayed. (The individual channels are described in the following table.)
To use the "HH" menu further, press the Menu button.

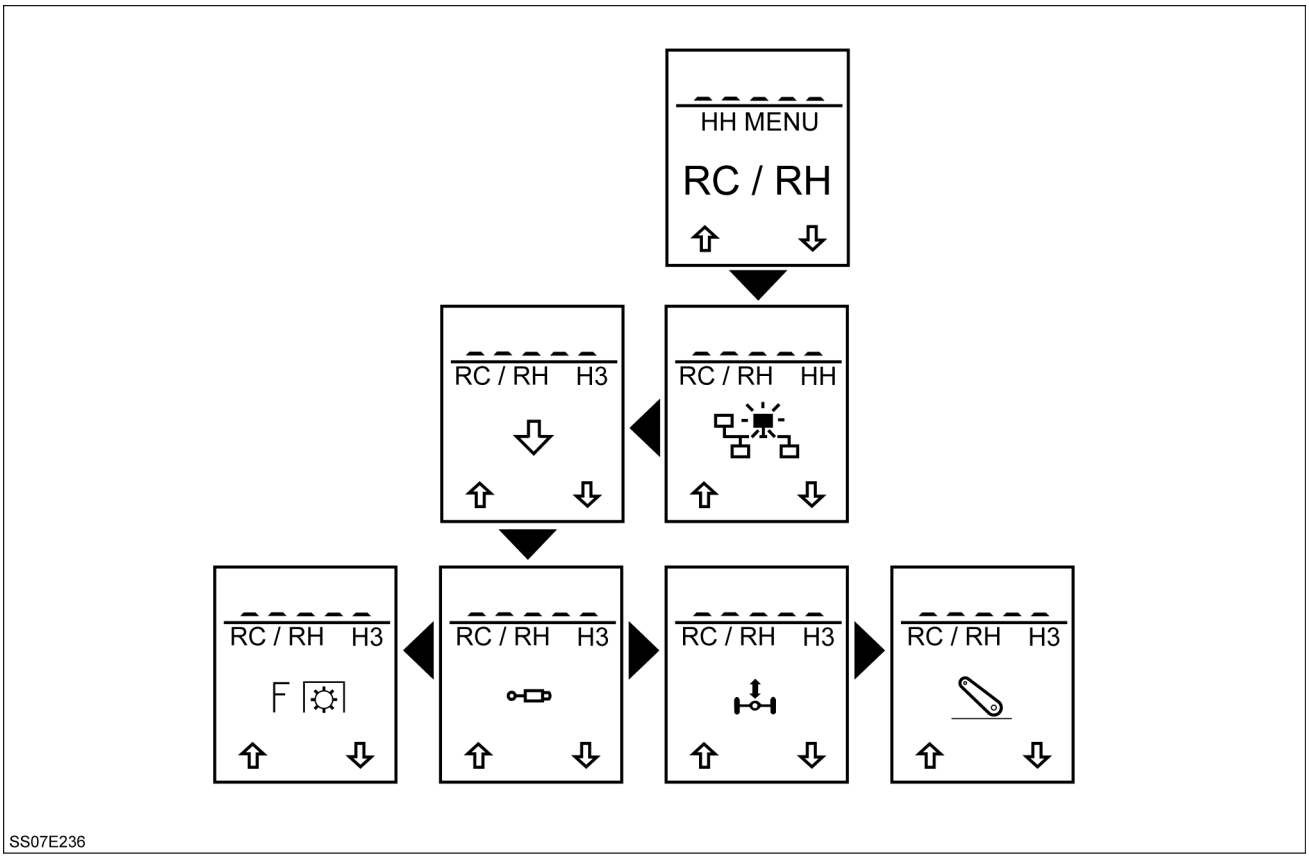
Channel	Description	Code	Value range
Channel 1	Front hitch - upper limit	u	700 - 963
	Front hitch - lower limit	d	41 - 400

H3 - CONFIGURATIONS AND OPTIONS

This page shows the available configurations for the following systems:

1. Electro-hydraulic Remote (EHR) Valves
   - Channel 1 - Activate/deactivate EHRs
   - Channel 2 - EHR front hitch selection
   - Channel 4 - Number of EHRs - Setup
   - Channel 5 - Activate/deactivate top/side link
2. Front axle suspension system
   - Channel 1 - Front axle suspension activate/deactivate
3. Front hitch
   - Channel 1 - Front hitch activate/deactivate
   - Channel 2 - Front hitch fender switches activate/deactivate
4. Front PTO
   - Channel 1 - Front PTO activate/deactivate
   - Channel 2 - Front PTO management activate/deactivate

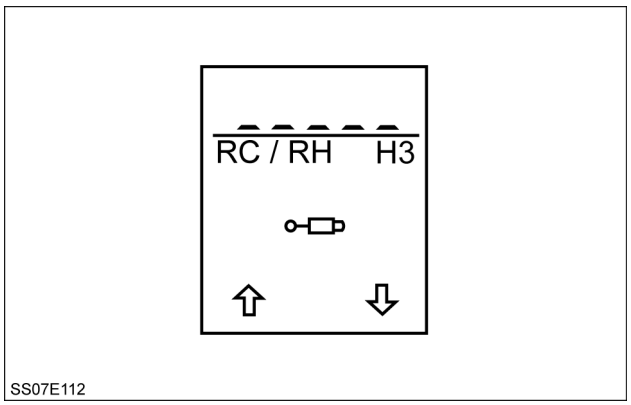
H3 Menu page selection diagram



SS07E236 9

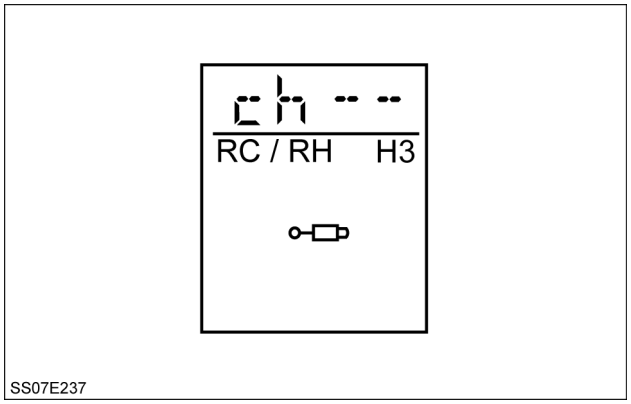
ELECTRO-HYDRAULIC REMOTE (EHR) VALVES OPTIONS

Press the Menu button to call up the EHR valves' sub-system.



SS07E112 10

"ch _ _" is displayed on the lower central display.
The relevant channel can be called up using the "Up" and "Down" navigation buttons.



SS07E237 11

After a delay, the current setting is displayed. (The individual channels are described in the following table).

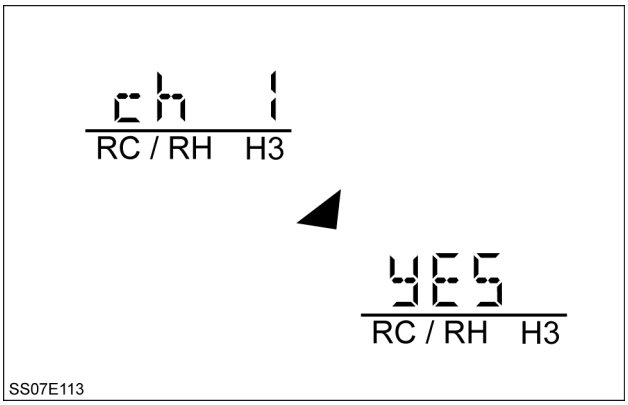
Channel	Description
Channel 1	Activate/deactivate rear EHRs
Channel 2	EHR front hitch selection
Channel 3	Not used
Channel 4	Number of EHRs - Setup
Channel 5	Activate/deactivate top/side link

Channel 1 - Activate/deactivate rear EHRs

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - Activate rear EHRs
- NO - Deactivate rear EHRs



SS07E113 12

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

Channel 2 - EHR Front hitch selection

This channel is used to select the EHR valve used to control the Front Hitch height limit.

NOTE: *This channel is only available if the Front Hitch has been configured for operation using the Rear EHRs. To configure the front hitch for operation with the rear EHRs, the midmount EHR Front Loader/Front Hitch selection (H3, channel 2) must be set to either “Load” or “None” in the transmission control module and the Front Hitch option must be set to ON in the auxilliary control module.*

NOTE: *The default EHR valve is number one.*

Scroll through the available options using the "Up" or "Down" navigation buttons.
The available options are 1, 2, 3, or 4 indicating which EHR will be used for the front hitch height limit.
To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

Channel 3 - Not used

This channel is not used.

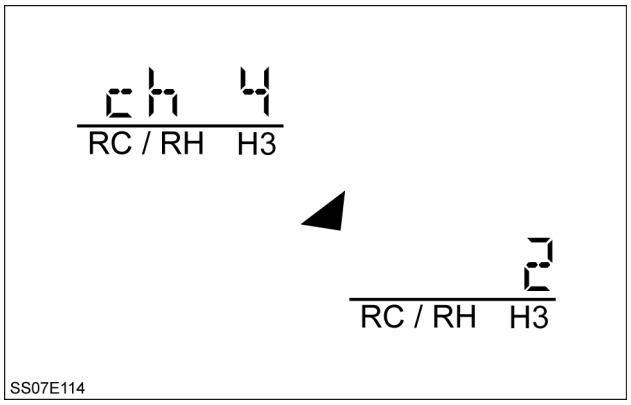
Channel 4 - Number of EHRs - Setup

When a new module is installed or the H8 procedure is completed, you use the automatic recording of the number of remote valves. If the number of the remote valves installed must be altered at another time, you use this set-up channel.

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- 2
- 3
- 4



SS07E114 13

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

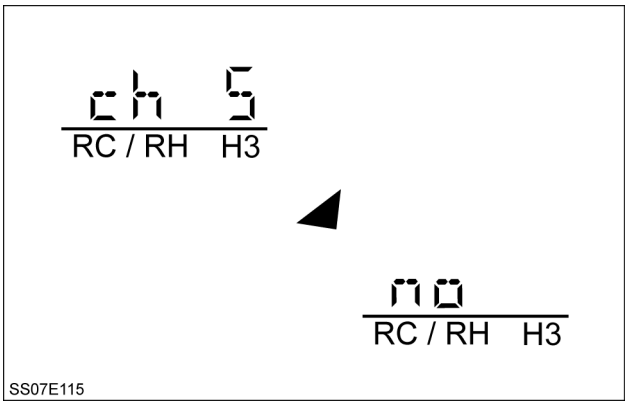
To use the "HH" menu further, press the Menu button.

Channel 5 - Activate/deactivate top/side link

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - Top/side link activated
- NO - Top/side link deactivated



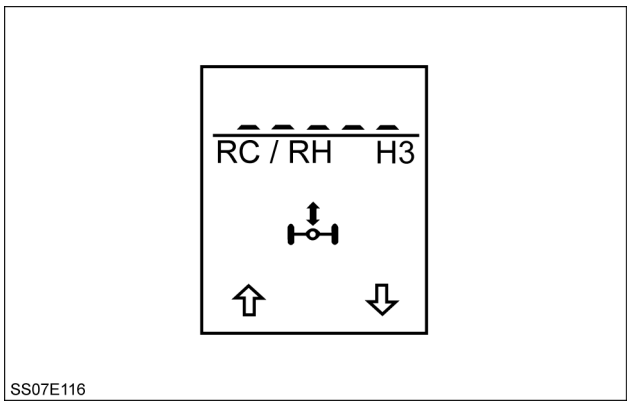
SS07E115 14

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

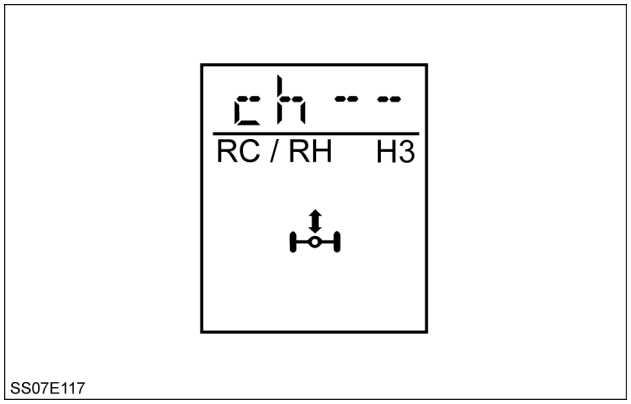
FRONT AXLE SUSPENSION OPTIONS

Press the Menu button to call up the 'Front axle suspension' sub-system.



SS07E116 15

"ch - - " is displayed in the upper section of the display.
The relevant channel can be called up using the "Up" and "Down" navigation buttons.



SS07E117 16

After a delay, the current setting is displayed. (The individual channel is described in the following table).

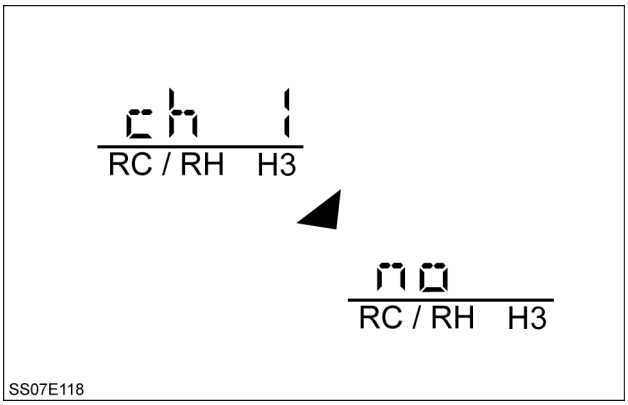
Channel	Description
Channel 1	Activate/deactivate front axle suspension

Channel 1 - Activate/deactivate front axle suspension

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - Front axle suspension activated
- NO - Front axle suspension deactivated



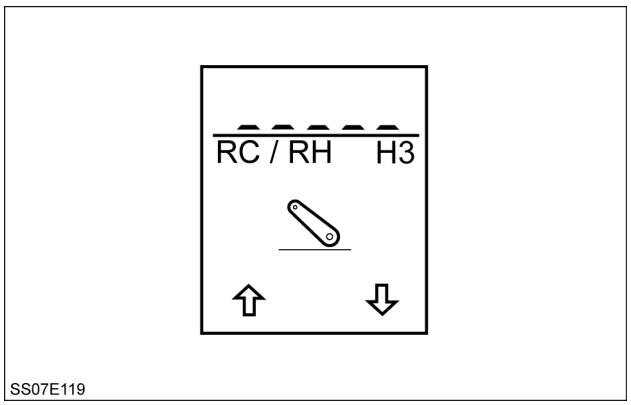
SS07E118 17

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

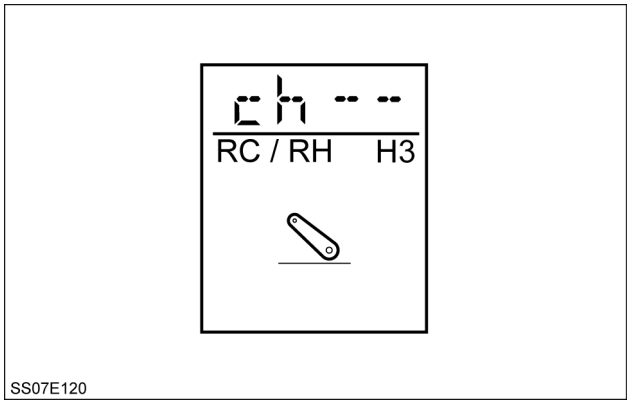
FRONT HITCH OPTIONS

Press the Menu button to call up the 'Front hitch' sub-system.



SS07E119 18

"ch - - " is displayed in the upper section of the display.
The relevant channel can be called up using the "Up" and "Down" navigation buttons.



SS07E120 19

After a delay, the current setting is displayed. (The individual channel is described in the following table).

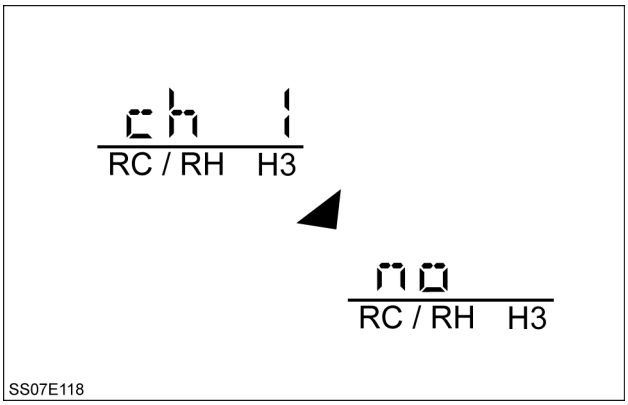
Channel	Description
Channel 1	Activate/deactivate front hitch
Channel 2	Activate/deactivate front hitch fender switches

Channel 1 - Activate/deactivate front hitch

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - Front hitch activated
- NO - Front hitch deactivated



SS07E118 20

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

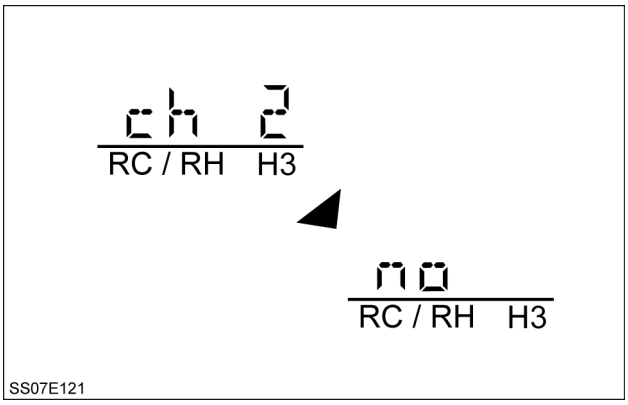
To use the "HH" menu further, press the Menu button.

Channel 2 - Activate/deactivate front hitch fender switches

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - Front hitch fender switches activated
- NO - Front hitch fender switches deactivated



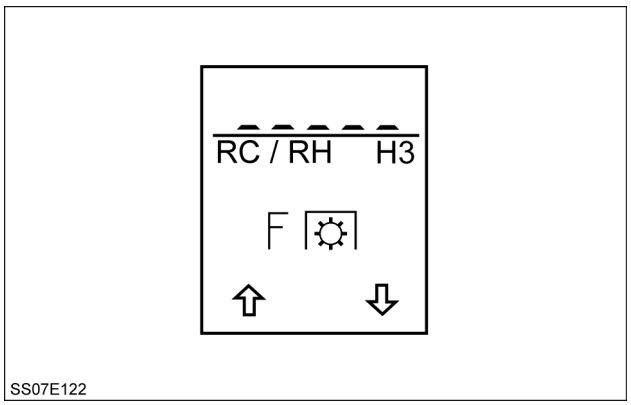
SS07E121 21

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

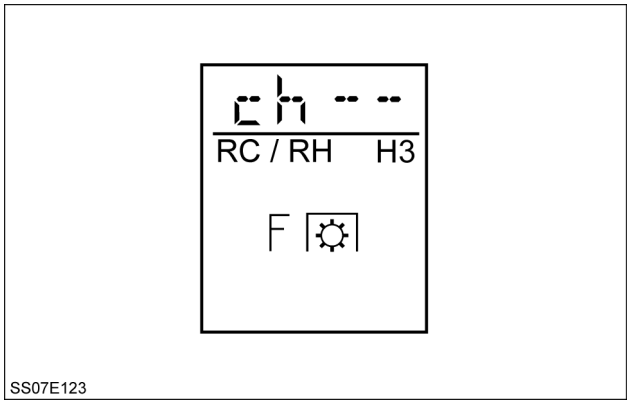
FRONT PTO OPTIONS

Press the Menu button to call up the 'Front PTO' sub-system.



SS07E122 22

"ch - - " is displayed in the upper section of the display.
The relevant channel can be called up using the "Up" and "Down" navigation buttons.



SS07E123 23

After a delay, the current setting is displayed. (The individual channels are described in the following table).

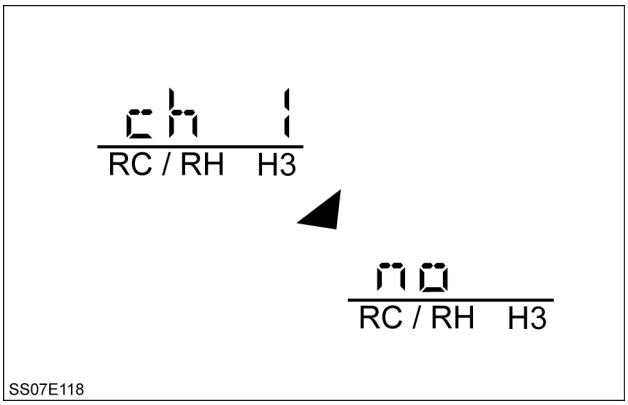
Channel	Description
Channel 1	Activate/deactivate front PTO
Channel 2	Activate/deactivate front PTO management

Channel 1 - Activate/deactivate front PTO

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - Front PTO activated
- NO - Front PTO deactivated



SS07E118 24

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

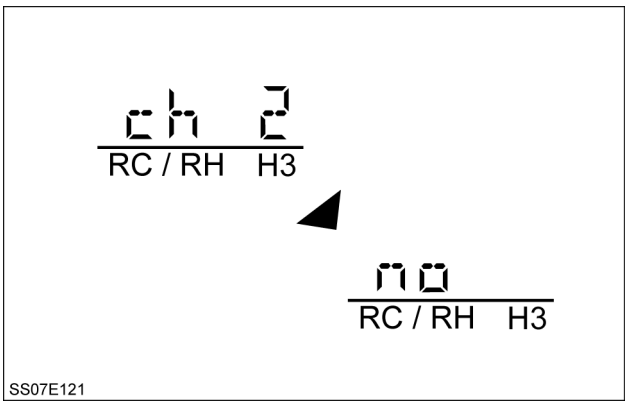
To use the "HH" menu further, press the Menu button.

Channel 2 - Activate/deactivate front PTO management

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - Front PTO management activated
- NO - Front PTO management deactivated



SS07E121 25

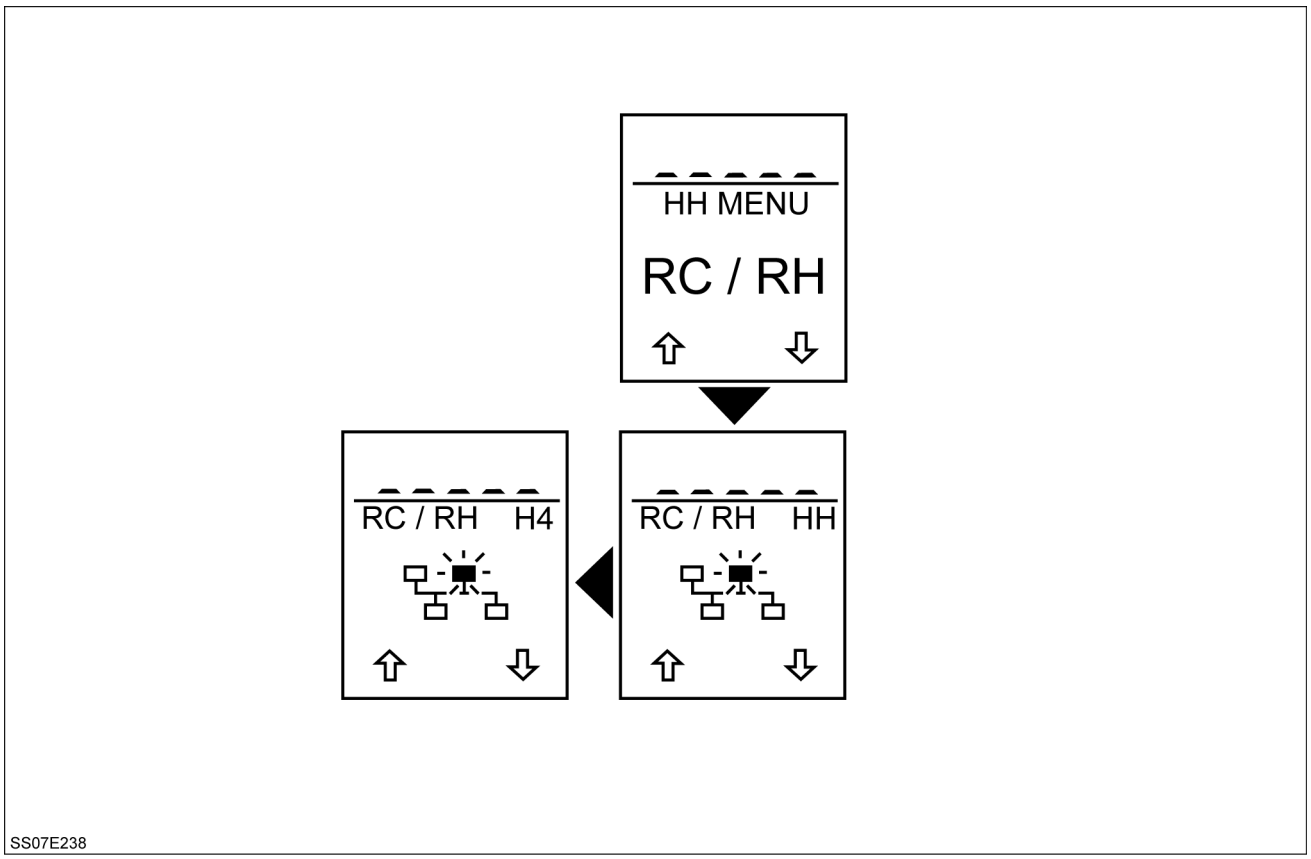
To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

H4 - DISPLAY SOFTWARE VERSION NUMBER

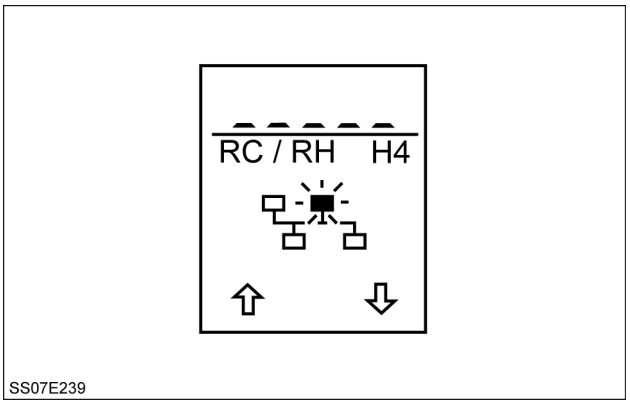
This function is available in all sub-systems.

H4 Menu page selection diagram



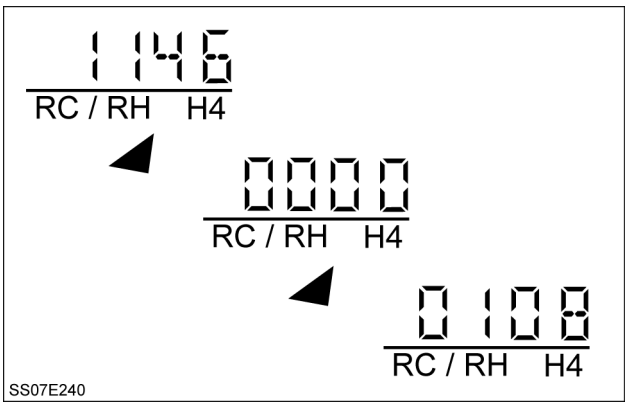
SS07E238 26

Press the Menu button to call up the H4 Menu.



SS07E239 27

The software version is automatically displayed in the upper section of the display (as in the illustrated example). After that the "HH" menu can be used again.



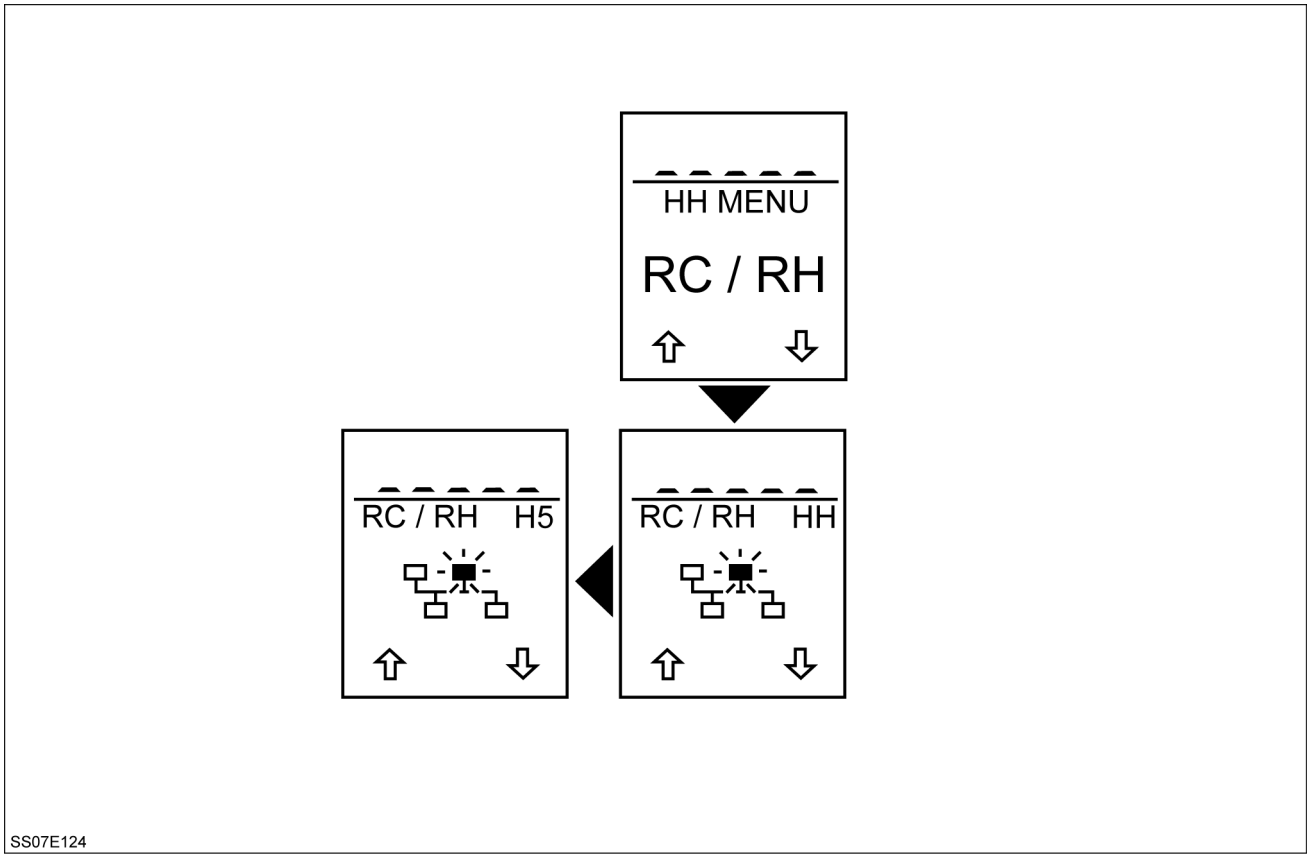
SS07E240 28

The first set of four digits indicates the Software identifier, which uniquely defines the application software present in the module.
The second and third set of four digits indicates the release version of the application software.

H5 - SWITCH OPERATION TEST

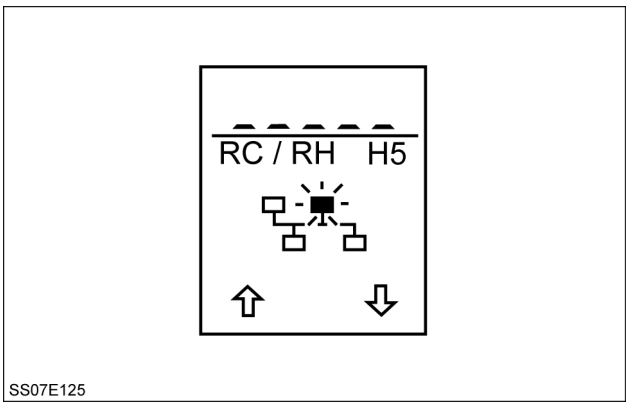
This menu shows a pre-defined code, if a switch's signal exchange is recorded.
This function is available in all sub-systems.

H5 Menu page selection diagram



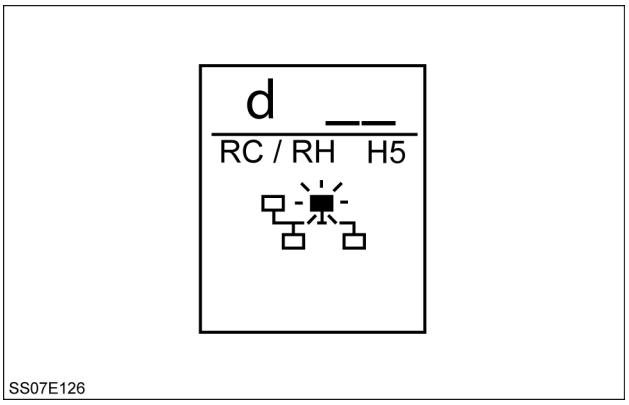
SS07E124 29

Press the Menu button to call up the H Menu.



SS07E125 30

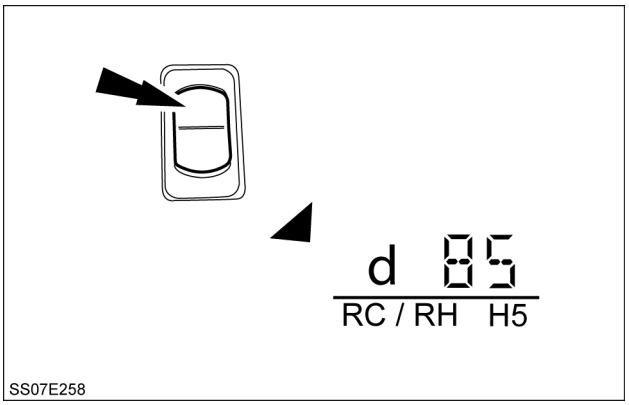
"d _ _" is displayed in the upper section of the display.



SS07E126 31

When a switch is actuated, a code is displayed and a beep reports that the switch is operating correctly.
If no switch code is displayed and no beep sounds, the relevant cabling can be tested with a 'loose connection' test.
To isolate the error, look at the display or listen to the beep.

NOTE: *If the starter switch is turned to the Engine Start position, while the shuttle lever is in the Neutral position and the clutch pedal is depressed, a switch consistency error may be displayed.*



SS07E258 32

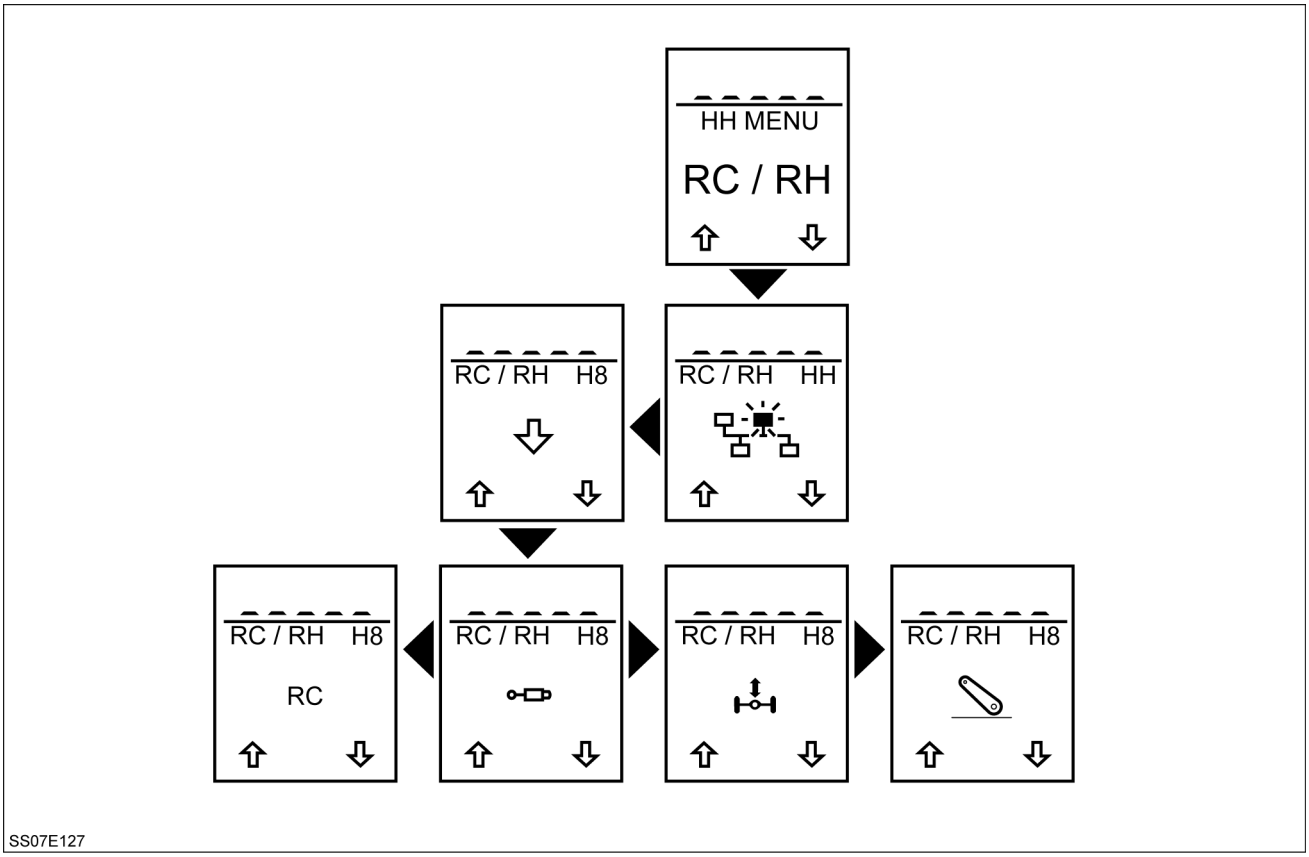
Identifier	Controller connector	Pin number	Use	Switch / Input	Special requirements
d0	No switch or two switches actuated at the same time				-
d8	CN1B	21	RC/RH	Crank detect switch	-
d69	CN1B	23	RC/RH	Signal pressure for front axle suspension	-
d75	CN3B	7	RC/RH	Extend switch for right-hand lift link	-
d76	CN3B	15	RC/RH	Retract switch for right-hand lift link	-
d77	CN1B	22	RC/RH	External common switch for front hitch	-
d78	CN1B	26	RC/RH	External Raise switch for front hitch	-
d79	CN1B	19	RC/RH	External Lower switch for front hitch	-
d82	CN3A	20	RC	EHR number 5 retract switch	-
d83	CN3A	14	RC	EHR number 5 extend switch	-
d84	CN3A	8	RC/RH	Front PTO management switch	-
d85	CN1A	30	RC	EHR number 1 timer/oil flow switch	-
d86	CN3B	30	RC	EHR number 2 timer/oil flow switch	-
d87	CN3B	32	RC	EHR number 3 timer/oil flow switch	-
d88	CN3B	15	RC	EHR number 4 timer/oil flow switch	-
d89	CN1B	29	RC/RH	Front suspension lock switch	-
d90	CN1B	11	RC/RH	Front PTO switch (normally open)	-
d91	CN1B	12	RC/RH	Front PTO switch (normally closed)	-
d92	CN1B	18	RC/RH	Front HPL enable switch	-

Identifier	Con-troller connec-tor	Pin num-ber	Use	Switch / Input	Special requirements
d95	CN3A	16	RC	EHR number 1 motor mode switch	-
d96	CN3A	17	RC	EHR number 2 motor mode switch	-
d97	CN3A	18	RC/RH	EHR number 3 motor mode switch	-
d98	CN3A	19	RC	EHR number 4 motor mode switch	-
d99	via CAN		RH	ARU EHR retract switch	-
d100	via CAN		RH	ARU EHR extend switch	-
d106	CN3B via CAN	11	RC/RH	Front joystick selection switch	-
d108	CN3B	14	RC/RH	Top link extend switch	-
d109	CN3B	8	RC/RH	Top link retract switch	-
d115	CN3B via CAN	31	RC/RH	Rear joystick selection switch	-
116	via CAN		RH	ARU shift button	-
140	via CAN		RH	ARU rear EHR timer 1 switch	-
141	via CAN		RH	ARU rear EHR timer 2 switch	
142	via CAN		RH	ARU rear EHR timer 3 switch	-
143	via CAN		RH	ARU rear EHR timer 4 switch	-
144	via CAN		RH	ARU rear EHR flow 1 switch	-
145	via CAN		RH	ARU rear EHR flow 2 switch	-
146	via CAN		RH	ARU rear EHR flow 3 switch	-
147	via CAN		RH	ARU rear EHR flow 4 switch	-
148	via CAN		RH	ARU rear EHR flow 5 switch	-

H8 - CLEARING THE EEPROM MEMORY

This menu is used to clear the calibration values and stored fault codes, with all EEPROM values being reset to the default.
All calibration values and fault codes are stored in the EEPROM memory. This memory is also not cleared by a break in the voltage supply to the electronic control unit, i. e. when the battery is disconnected.

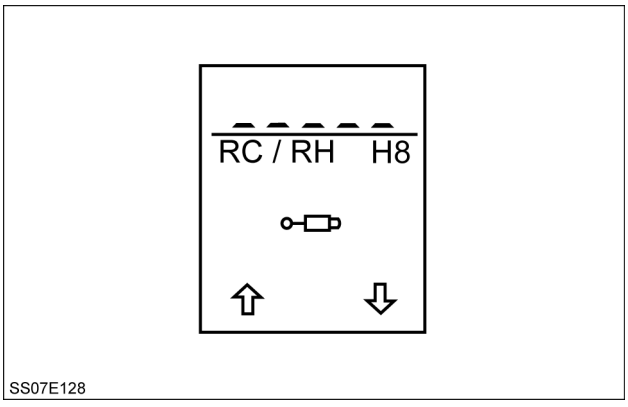
H8 Menu page selection diagram



SS07E127 33

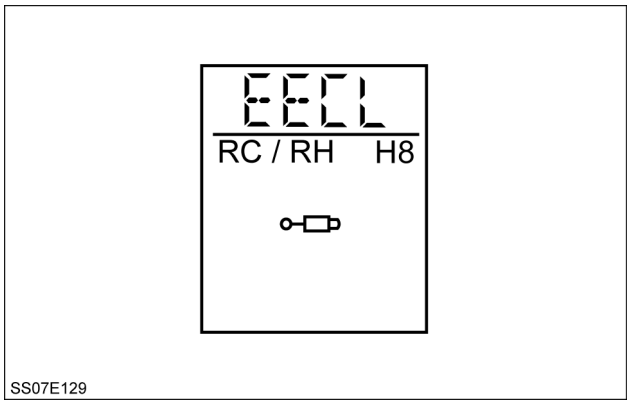
IMPORTANT: *After the menu page with the control unit code letters "RC" is selected, the EEPROM memories of all sub-systems are reset.*

If only the EEPROM of a special sub-system must be reset, you select the affected sub-system by pressing the Menu button as in the illustrated example.



SS07E128 34

"EECL" is displayed in the upper section of the display.



SS07E129 35

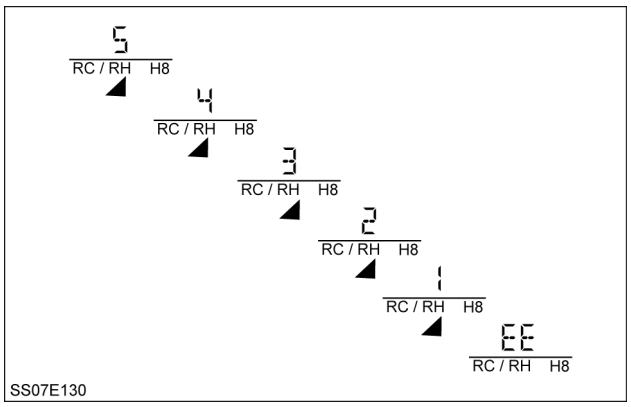
⚠ CAUTION ⚠

H8 will clear all calibrations values and stored error codes.

B006

NOTE: *If the "Down" button is released before the end of the countdown, the process is aborted.*

To confirm the EEPROM reset, press and hold the "Down" navigation button.
The numbers 5 to 1 run backwards in the upper section of the display, then "EE" appears to inform you that the EEPROM has been cleared.
Turn the starter switch to OFF.



SS07E130 36

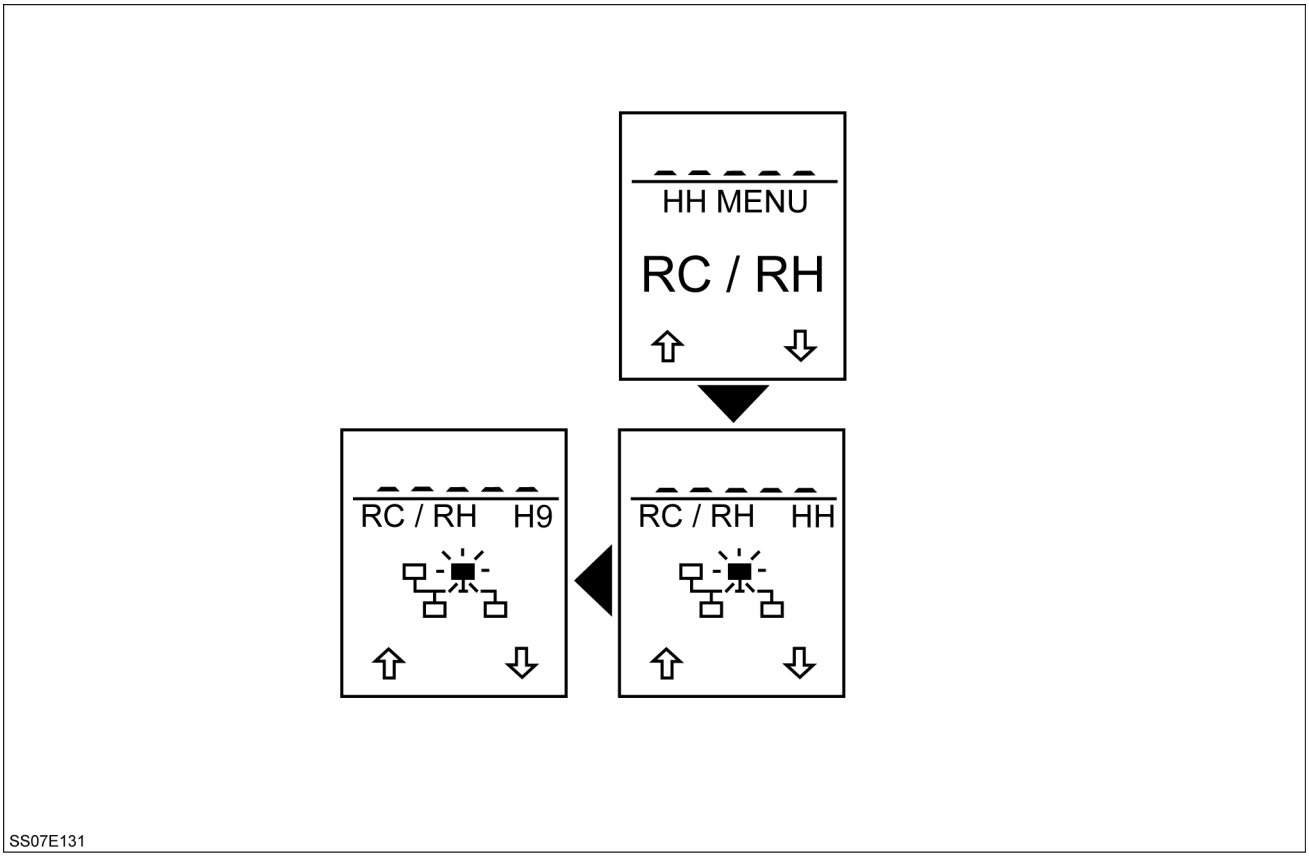
H9 - VOLTMETER

This menu is used to check the setting of the individual potentiometers, voltage sources and solenoid valve circuits. If a temporary error is recorded in a circuit, the relevant cabling can be tested for a loose connection. When doing this, check whether the values in the display change erratically to isolate the error range.

NOTE: *The vehicle may be driven in this mode.*

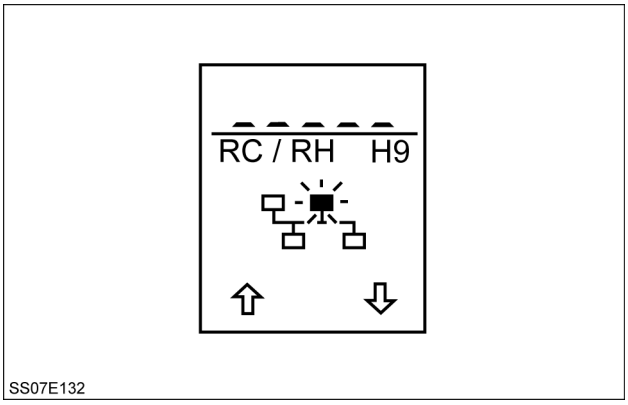
This function is available in all sub-systems.

H9 Menu page selection diagram



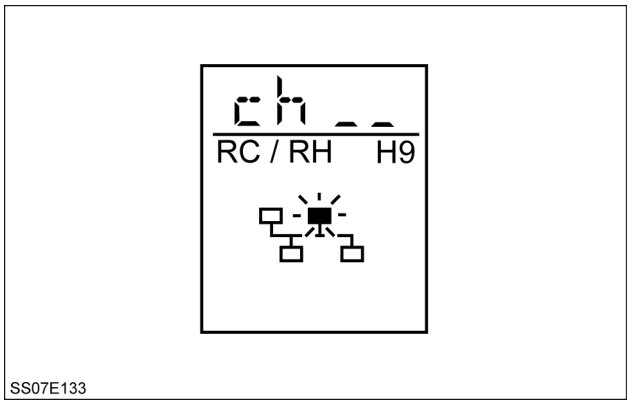
SS07E131 37

Press the Menu button to call up the H9 Menu.



SS07E132 38

"ch - - " is displayed in the upper section of the display.



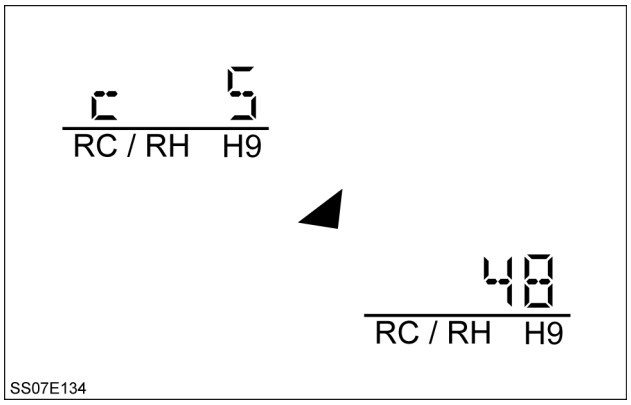
SS07E133 39

The relevant channel can be called up using the "Up" and "Down" navigation buttons.
After a delay, the value is displayed. Compare the displayed value with the standard value from the following table.

NOTE: *The value is the input voltage or the input signal of the electronic control unit. This value cannot be directly converted to a voltage value because of the internal processes in the control unit. A zero corresponds to* ***0 volts****.*

If the displayed value deviates from the desired value in the following table by more than **10 %**, there is a fault either in the component or in the cabling of the affected channel.

NOTE: *Before replacing any components, test the plug connections of the relevant circuit including the plug connection of the electronic control unit.*



SS07E134 40

Channel	Description	Controller connector	Pin number	Standard value	Comments
5	**+5 Volts** voltage supply to the sensors	CN1B	16	49	
7	**+12 Volt** VF input signal (see explanation)	CN1A	1	45	
8	**+12 Volt** VD input signal (see explanation	CN1A	8	45	The tractor moves, when the engine is running
9	**+12 Volt** VH input signal (see explanation)	CN1A	20	45	
10	**+12 Volt** VT input signal (see explanation)	CN3B	24	45	
14	Amperage of the front PTO solenoid valve	CN2	7	-	
15	Amperage of the upper lock solenoid suspended front axle	CN2	6	-	
16	Amperage of the lower lock solenoid suspended front axle	CN2	13	-	
17	Accelerometer suspended front axle	CN1B	5	40 when vehicle stationary	

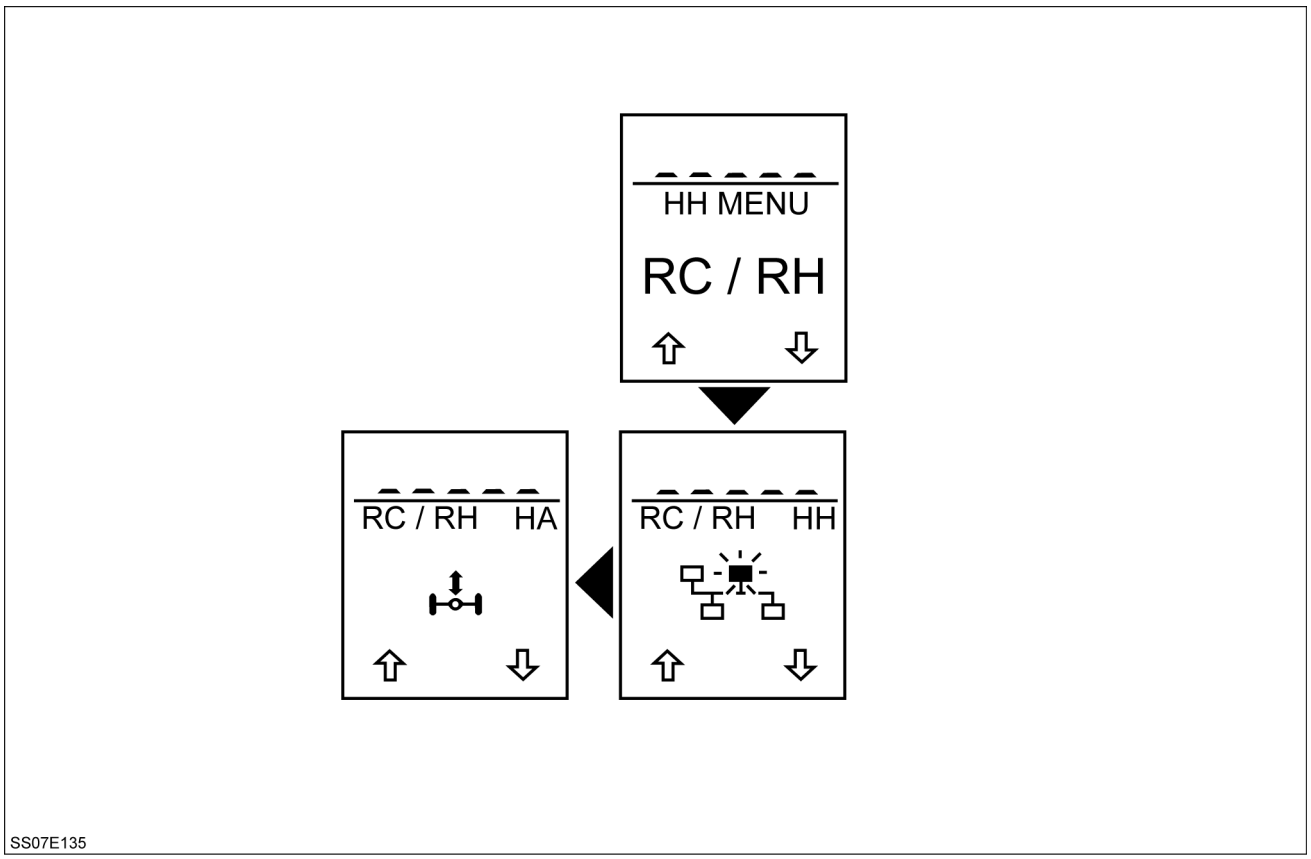
Chan-nel	Description	Con-troller con-nector	Pin number	Standard value	Comments
26	Front axle position	CN1B	6	120 lower limit 950 upper limit	
27	Lift height control of the front hitch	CN1B	3	0 lower limit 99 upper limit	
28	Front hitch position	CN1B	2	10 lower limit 90 upper limit	
97	EHR joystick (X)	via CAN	-		
98	EHR joystick (Y)	via CAN	-		
99	EHR 3 lever position (RH only)	via CAN	-		
101	EHR valve number 1 lever (RC only)	CN3A	1	10 Raise 25 Neutral position 40 Lower 50 Floating position	
102	EHR valve number 2 lever (RC only)	CN3A	3	10 Raise 25 Neutral position 40 Lower 50 Floating position	
103	EHR valve number 3 lever (RC only)	CN3A	5	10 Raise 25 Neutral position 40 Lower 50 Floating position	
104	EHR valve number 4 lever (RC only)	CN3A	7	10 Raise 25 Neutral position 40 Lower 50 Floating position	
104	EHR thumbwheel (RH only)	via CAN	-		

Explanations:
VF input signal: The value is the input voltage on the electronic control unit for the components of the front axle suspension, e. g. Lower and Lock solenoid valves of the front axle.
VD input signal: The value is the input voltage on the electronic control unit for the Raise solenoid valve of the front axle suspension.
VH input signal: The value is the input voltage on the electronic control unit for the components of the Front PTO and Front hitch, e. g. the solenoid valves of front PTO and front hitch
VT input signal: Second input voltage to the electronic control unit.

HA - DEMONSTRATION MODE

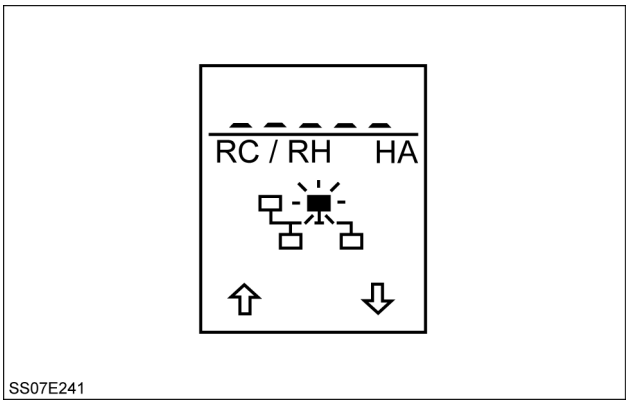
Used to demonstrate front axle suspension.

HA Menu page selection diagram



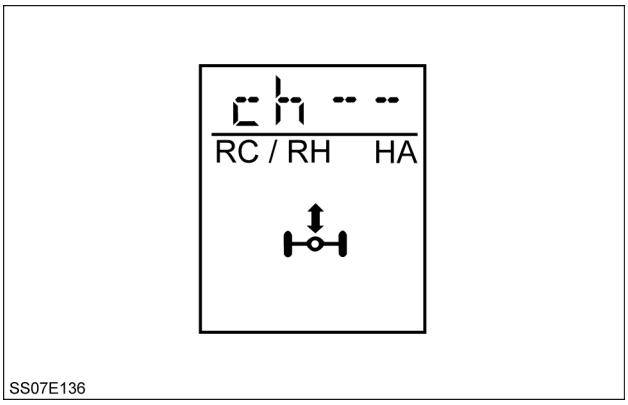
SS07E135 41

Press the Menu button to call up the HA Menu.



SS07E241 42

"ch - - " is displayed in the upper section of the display.



SS07E136 43

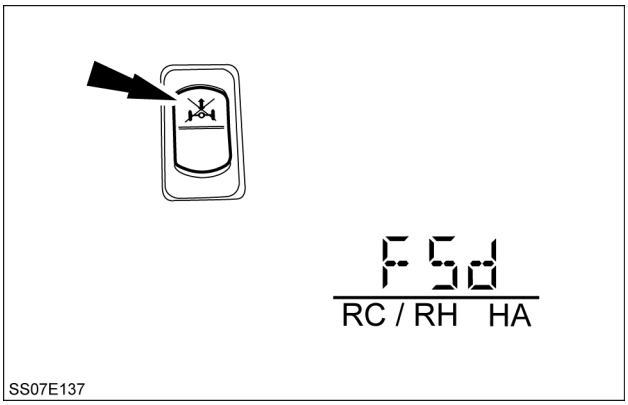
The relevant channel can be called up using the "Up" and "Down" navigation buttons.
After a delay, the current setting is displayed. (The individual channel is described in the following table).

Channel	Description
Channel 1	Front axle suspension demonstration

Channel 1 - Front Axle Suspension Demonstration

This demonstration mode makes it possible to lock the suspension at speeds above the designated **12 Km/h** parameter in automatic mode.
"FSd" (Front Suspension demonstration) is displayed in the upper section of the display.
To demonstrate the front axle suspension, start the engine and drive the tractor.
Actuate the lock switch to lock the suspension as normal. The light in switch illuminates indicating the front axle suspension has been locked.

NOTE: *The demonstration mode of the front axle suspension is deactivated by switching off the starter switch.*

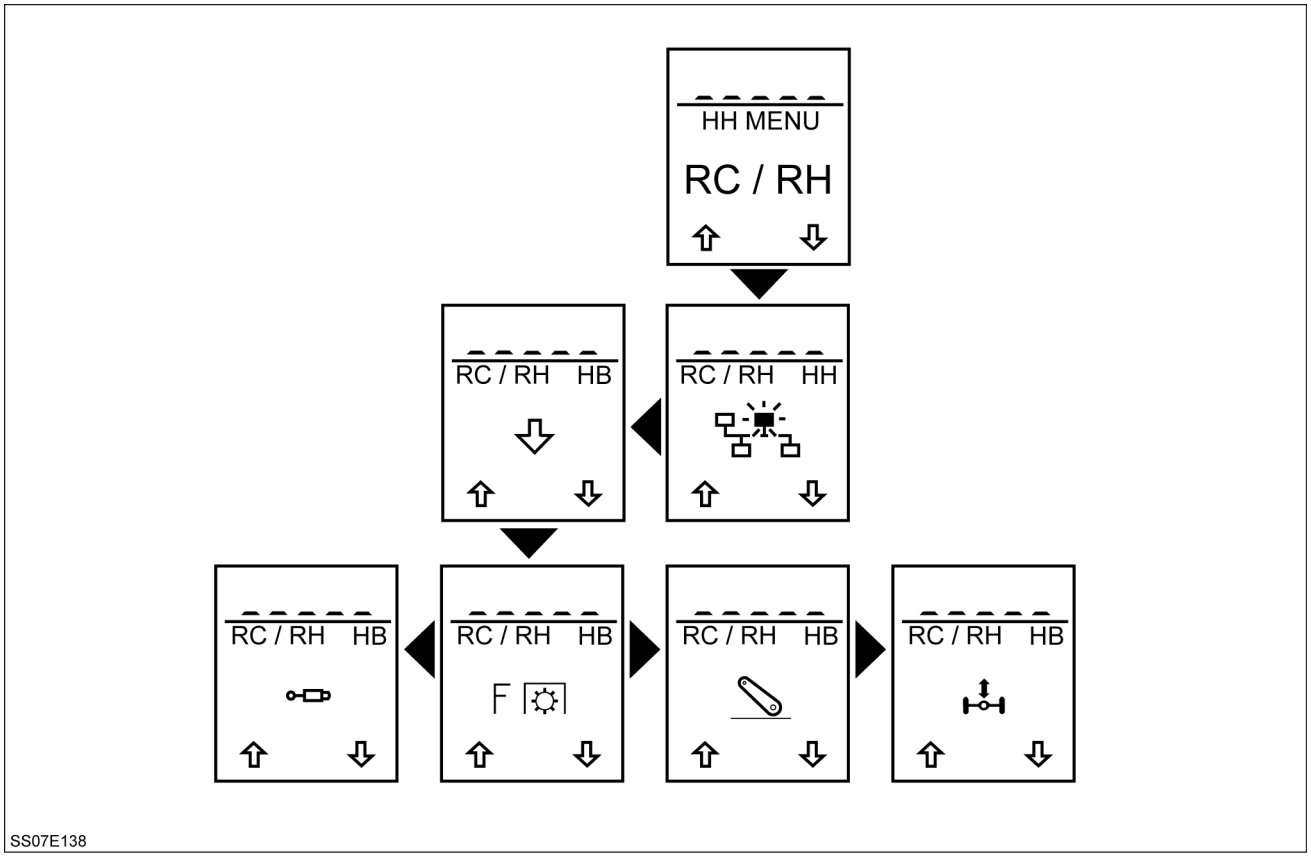


SS07E137 44

HB - DISPLAY STORED FAULT CODES

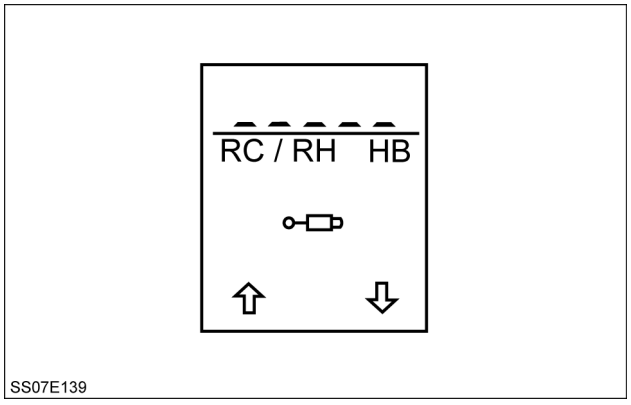
This menu is used to display the fault codes, which are stored in the EEPROM of the electronic control unit. This function is available in all sub-systems.
Each control unit is capable of storing up to ten fault codes for each sub system.

HB Menu page selection diagram



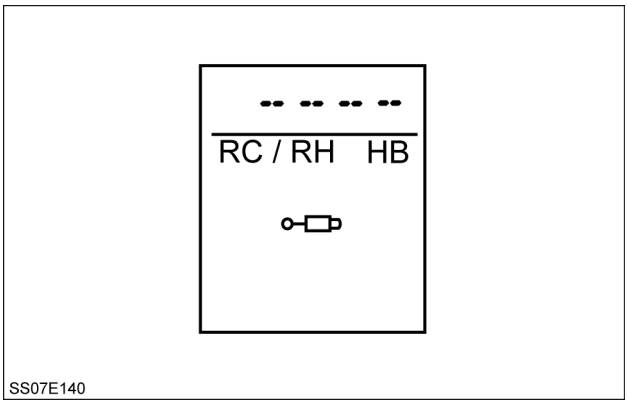
SS07E138 45

Press the Menu button to call up the HB Menu.



SS07E139 46

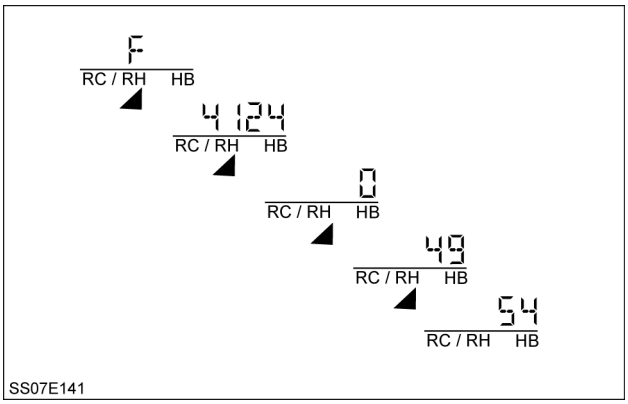
"_ _ _ _" is displayed in the upper section of the display, when no fault code is stored in the selected sub-system.



SS07E140 47

"F" is displayed in the upper section of the display, if a fault code is stored in the selected sub-system.
The sequence of the data display runs through in the upper section of the display, for example, as follows:

4124 fault code
00 Operating hours at the time of the first occurrence
49 Operating hours at the time of the last occurrence
54 Number of occurrences

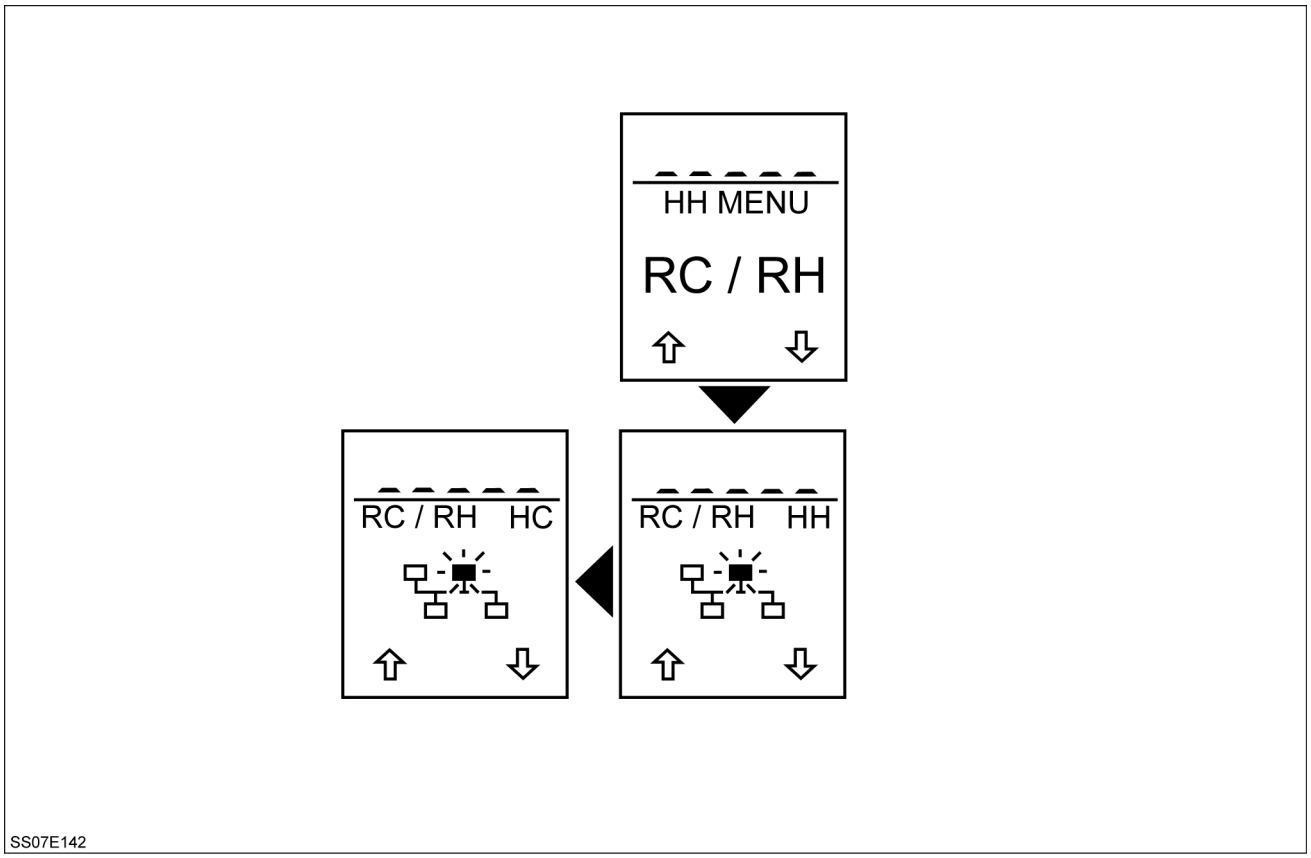


SS07E141 48

Press the "Up" or "Down" navigation button to change to the next fault code in the list.
As soon as the end of the list is reached, "_ _ _" is displayed in the upper section of the display.
To use the "HH" menu further, press the Menu button.

HC - CLEAR ALL STORED FAULT CODES

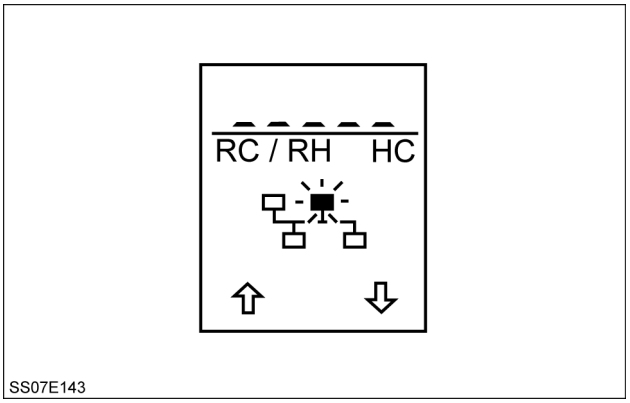
HC Menu page selection diagram



SS07E142 49

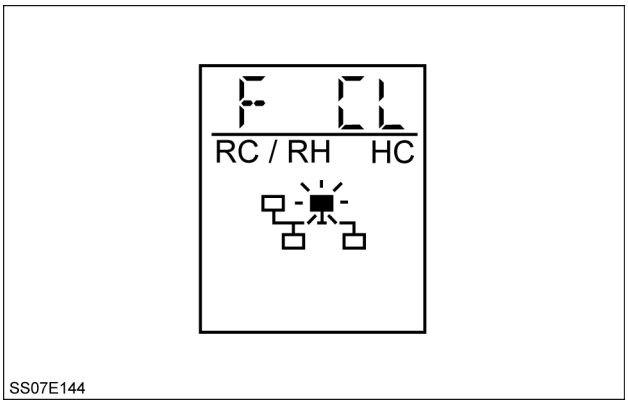
NOTE: *Always write the stored fault codes down before clearing.*

Press the Menu button to call up the HC Menu.



SS07E143 50

"F CL" is displayed in the upper section of the display.



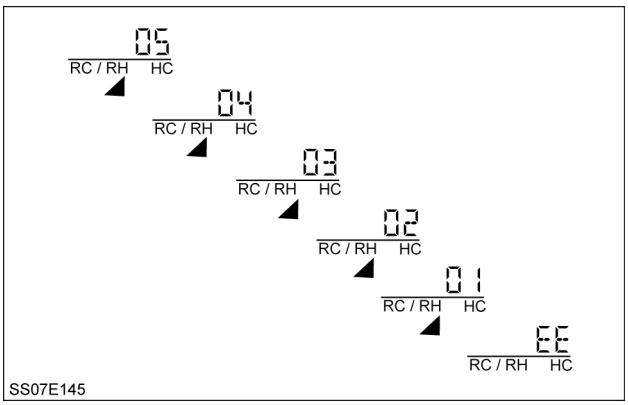
SS07E144 51

NOTE: *If the "Down" navigation button is released before the end of the countdown, the process is aborted.*

To confirm clearing the memory, press and hold the "Down" navigation button.

NOTE: *The numbers 05 to 01 run backwards in the upper section of the display, then "EE" appears to inform you that the fault codes have been cleared.*

To use the "HH" menu further, press the Menu button.

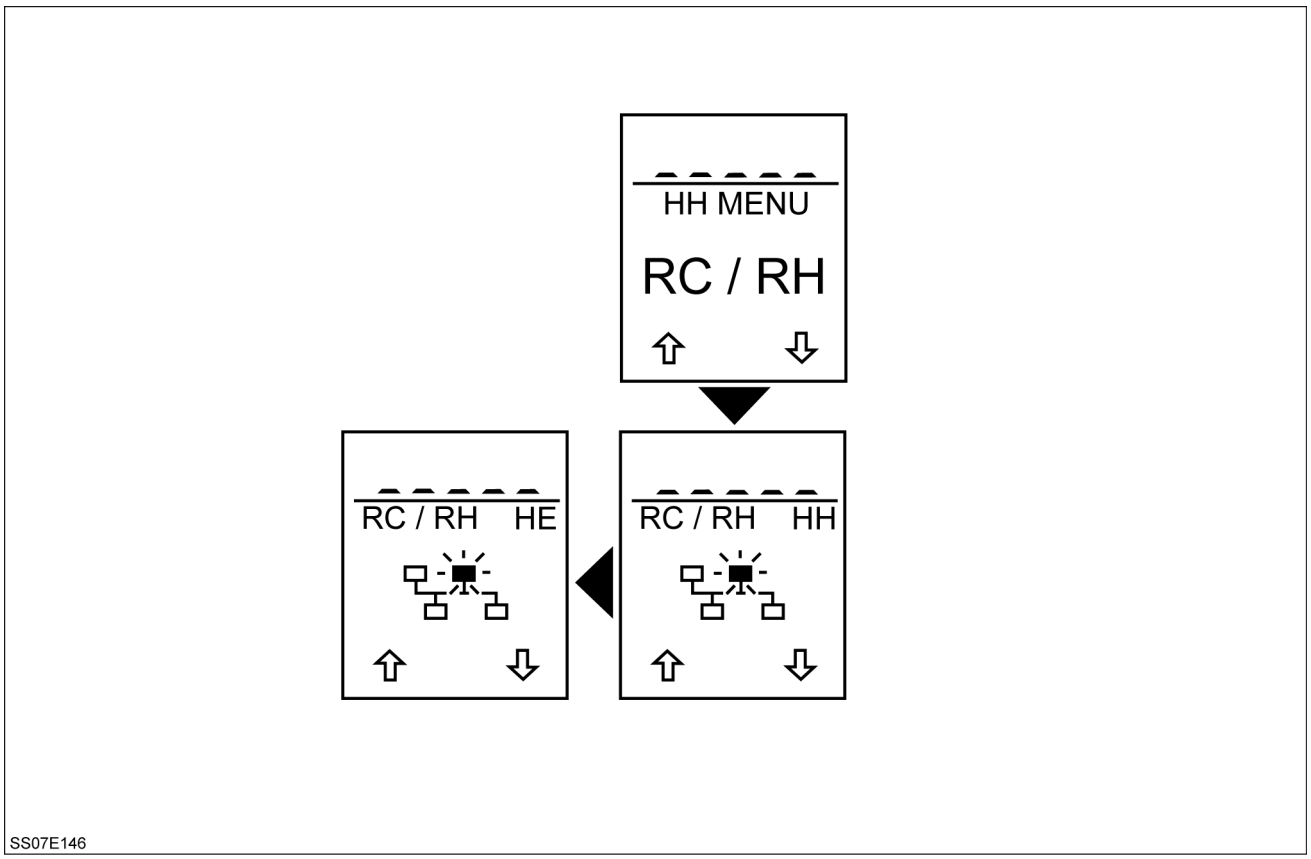


SS07E145 52

HE - DISPLAY ALL SPEED INPUT SIGNALS

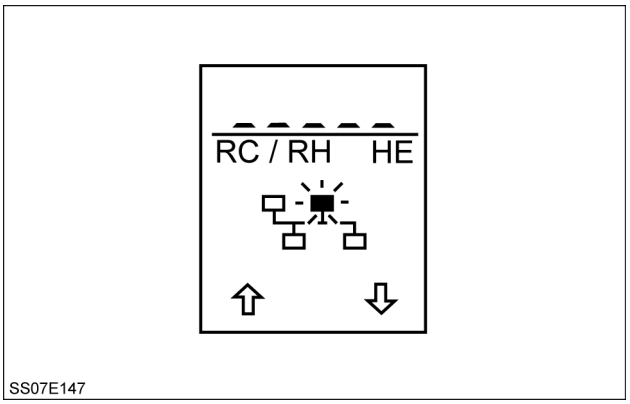
This function is available in all sub-systems.

HE Menu page selection diagram



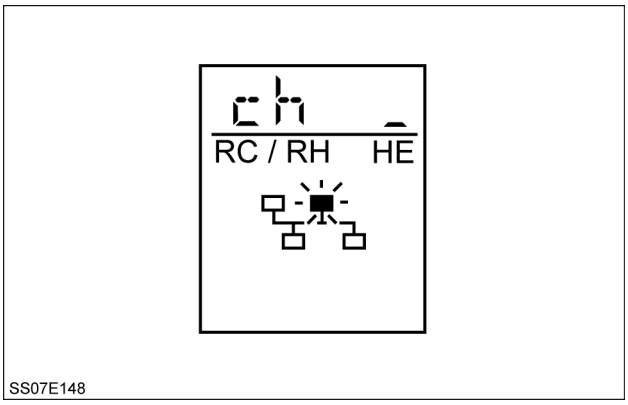
SS07E146 53

Press the Menu button to call up the HE Menu.



SS07E147 54

"ch _" is displayed in the upper section of the display.



SS07E148 55

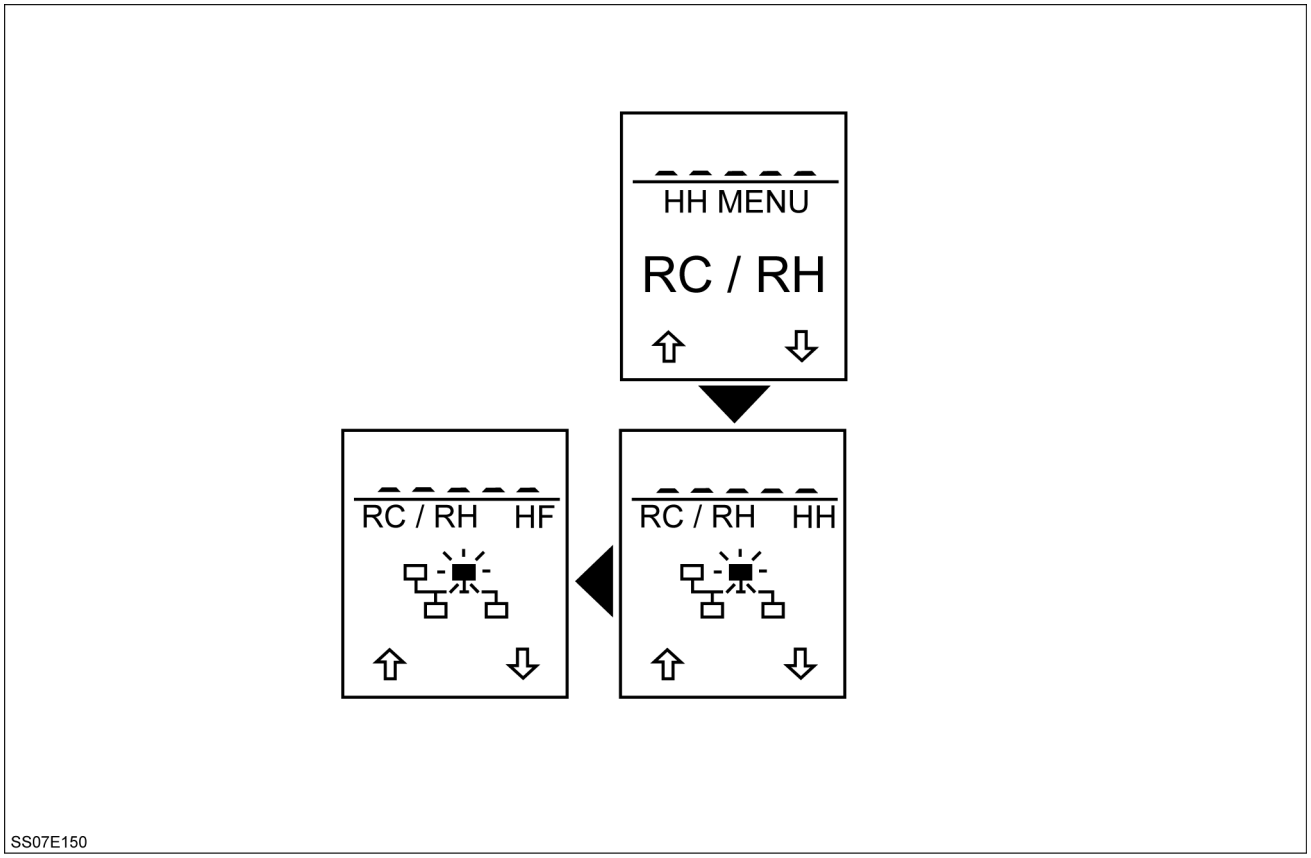
The relevant channel can be called up using the "Up" and "Down" navigation buttons.
The available channels are listed in the following table.
After a delay, the value is displayed.
To use the "HH" menu further, press the Menu button.

Channel	Description	Standard value	Comments
0	Not used		
1	Not used		
2	Not used		
3	Not used		
4	Not used		
5	Not used		
6	Not used		
7	Not used		
8	Not used		

HF - DISPLAY CONTROLLER HARDWARE INFORMATION

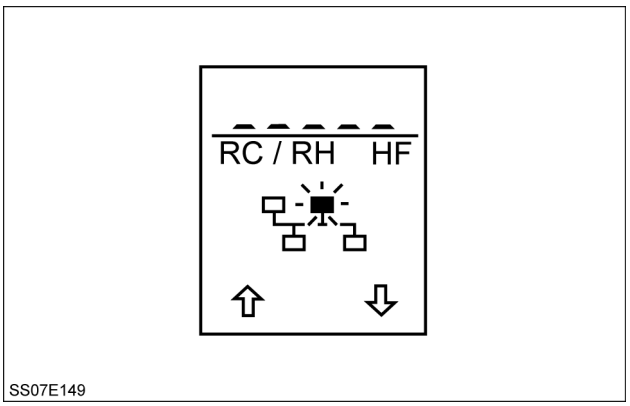
This menu makes possible hardware identification; the hardware version and serial number are displayed. This function is available in all sub-systems.

HF Menu page selection diagram



SS07E150 56

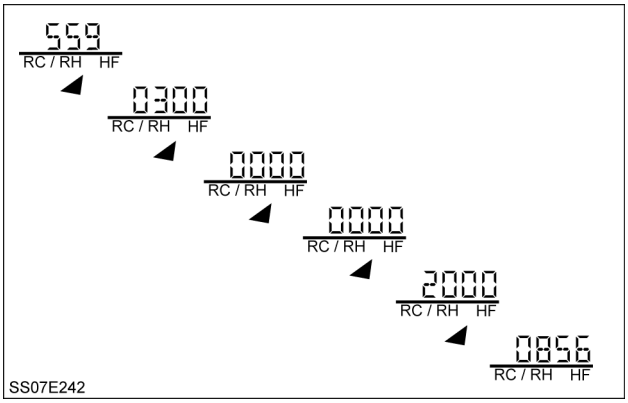
Press the Menu button to call up the HF Menu.



SS07E149 57

The sequence of the data display runs through automatically in the upper section of the display, for example, as follows:

559 Hardware identification
0300 Hardware version
0000 Hardware version
0000 Hardware version
2000 Serial number
0856 Serial number
After that the "HH" menu can be used again.

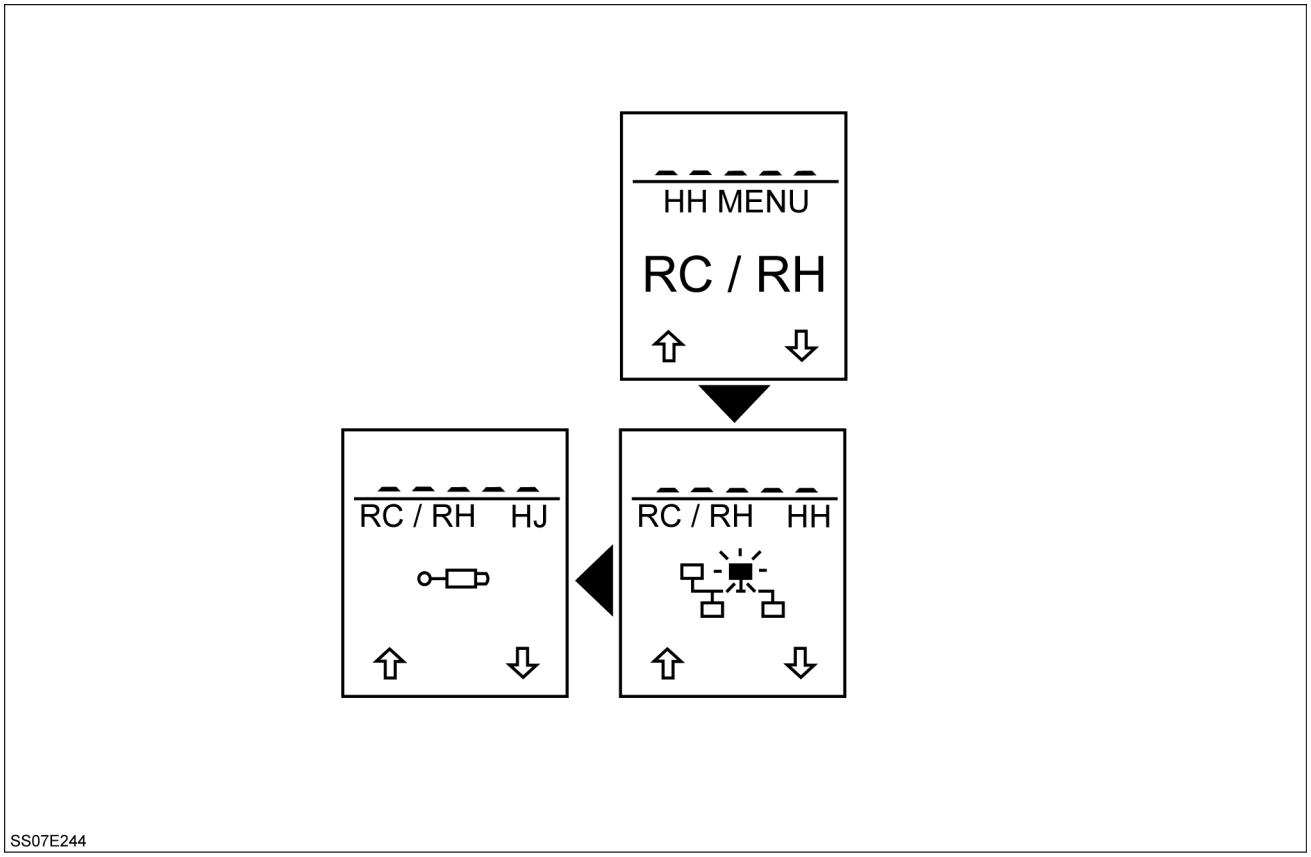


SS07E242 58

HJ - REAR EHR VALVE NUMBER PROGRAMMING

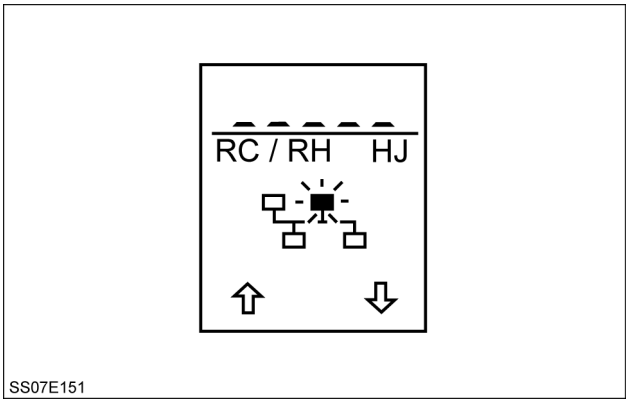
This menu makes it possible to reset the numbering of the EHR valves.
A number is stored in each of the EHR valves, which gives their position in the valve block, i.e. valve number 1, 2, 3, 4 or 5.

HJ Menu page selection diagram



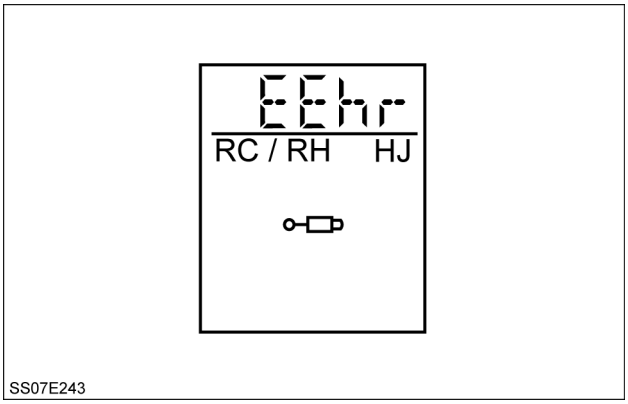
SS07E244 59

Press the Menu button to call up the HJ Menu.



SS07E151 60

"EEhr" is displayed in the upper section of the display.

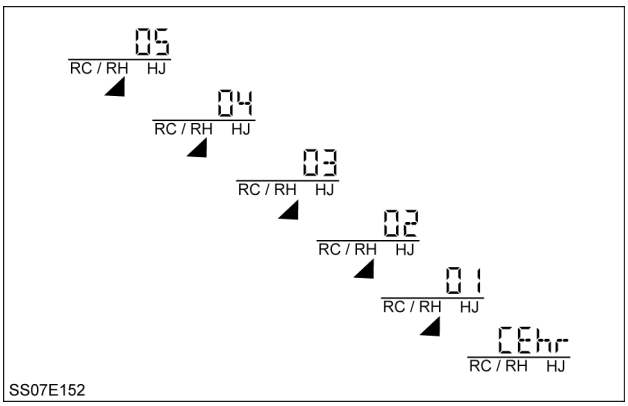


SS07E243 61

NOTE: *Use HJ to clear all numbers for the EHR valves.*

NOTE: *If the "Down" navigation button is released before the end of the countdown, the process is aborted.*

To confirm the reset of the valve numbering, press and hold the "Down" navigation button.
The numbers 05 to 01 run backwards in the upper section of the display, then "CEhr" is displayed to inform you that the valve numbering has been reset.



SS07E152 62

Turn the starter switch to OFF.

Disconnect the connectors from each valve.

Switch the starter switch to ON and call up the HJ Menu again. 'Ehr_' flashes on the display of the instrument cluster.

Connect the valve in the correct sequence. As each individual valve is connected, an acoustic signal confirms it is detected.

The display changes to 'Ehr_1'. Then 'Ehr_2' flashes to report that the control unit is ready for the next valve to be connected. As soon as the valve is connected, the display changes and indicates the number of the next valve that must be connected until finally 'Ehr_5' is displayed.

Press and hold the 'Down' button. The display changes to 'End' to report that the programming is completed.

Switch the starter switch to OFF to store the new control unit numbers.

Calibrate the remote valves. See **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)**.

Control module - Configure

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

IA - Enhanced ICU2
IB - Basic ICU2

NOTE: *IA - The Enhanced ICU2 is shown in the screen displays*

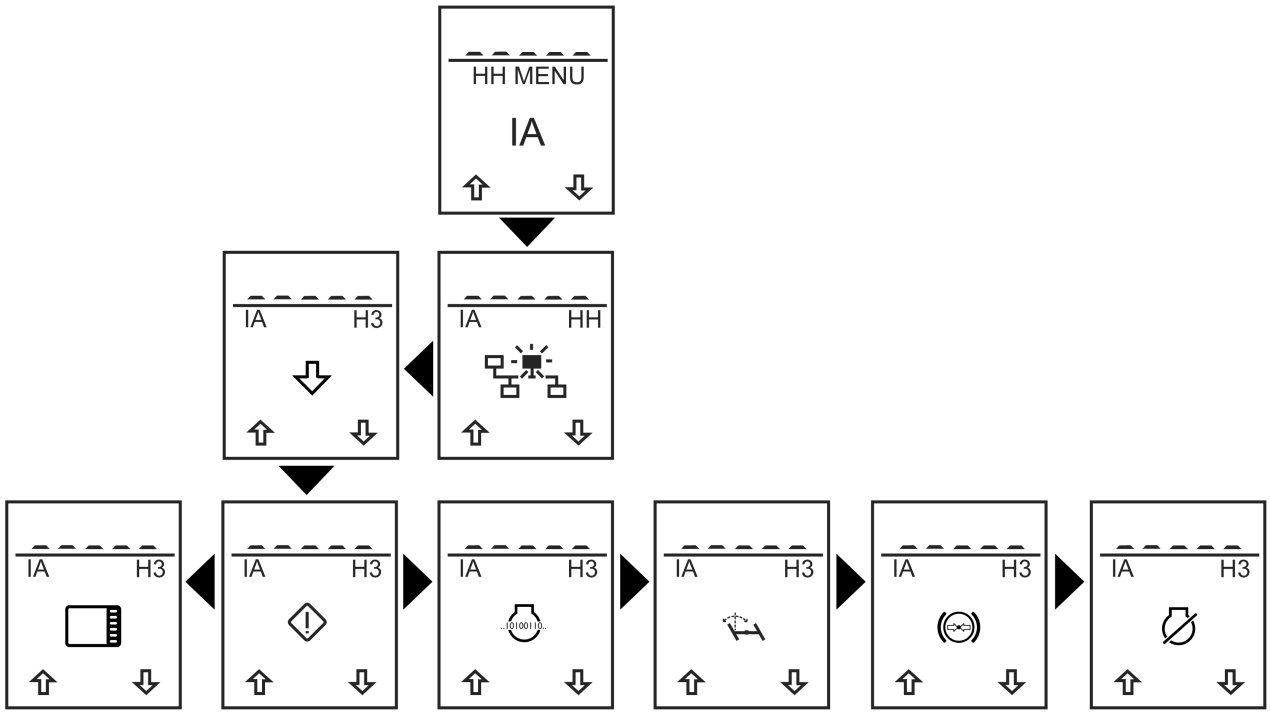
HH	Service menu	Figure
H1	Not used	-
H2	Not used	-
H3	Configurations and options	**1**
H4	Display software version number	**14**
H5	Switch operation test	**17**
H6	Not used	-
H7	Not used	-
H8	Clearing the EEPROM memory	**21**
H9	Voltmeter	**25**
HA	Not used	-
HB	Display stored fault codes	**28**
HC	Clear all stored fault codes	**31**
HD	Not used	-
HE	Display frequency inputs	-
HF	Display controller hardware information	**34**
HH	Back to the main menu	-

H3 - CONFIGURATIONS

This menu contains the configurations of the following functions:

- Automatic engine shutdown
- Error code reduction
- Electronic engine selection
- AFS 200
- Steering angle sensor
- Air brake selection

H3 Menu page selection diagram

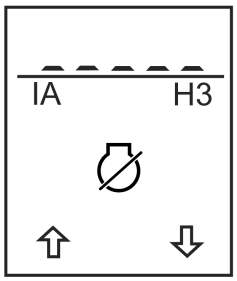


BAIL06CCM167AVB

BAIL06CCM167AVB 1

ENGINE SHUTDOWN OPTIONS

Press the Menu button to call up the 'Engine shutdown' sub-system.

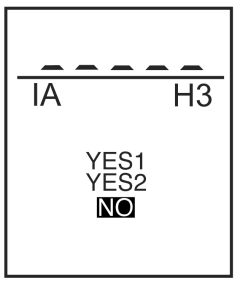


BAIL06CCM175AVB

BAIL06CCM175AVB 2

NOTE: *The standard setting is NO.*

Scroll through the available options using the "Up" or "Down" navigation buttons.
See the electronic engine shutdown option options in the following table.



BAIL06CCM176AVB

BAIL06CCM176AVB 3

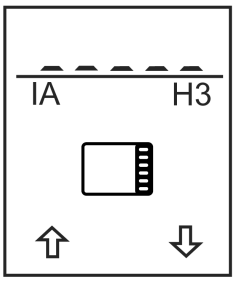
Press and hold the "Up" or "Down" navigation button to store the selection. A beep sounds to confirm the selection.
To use the "HH" menu further, press the Menu button.

Electronic engine shutdown options

Options		NECESSARY CONDITIONS FOR ENGINE SHUTDOWN	CONDITIONS, WHICH ENFORCE ENGINE SHUTDOWN (All conditions must be met)			
		Operating status	Driver present	Driver not present	Vehicle station-ary	Vehicle moving
NO	**No shutting down of the engine**	**The engine only shuts down when a critical engine fault is determined, which overrides this option and shuts the engine down.**	**-**	**-**	**-**	**-**
YES1	Always shut down engine	Engine oil pressure - Low	*	*	*	*
		Engine coolant temperature - High	*	*	*	*
		Transmission oil temperature - High		*	*	
		Transmission oil - Low		*	*	
YES2	Switching the engine off in stationary mode	Engine oil pressure - Low		*	*	
		Engine coolant temperature - High		*	*	
		Transmission oil temperature - High		*	*	
		Transmission oil - Low		*	*	

AFS 200 OPTIONS

Press the Menu button to call up the 'AFS 200' sub-system.

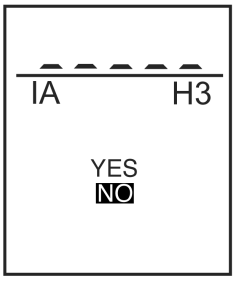


BAIL06CCM168AVB

BAIL06CCM168AVB 4

NOTE: *The default setting is "No", without AFS 200.*

Scroll through the available options using the "Up" or "Down" navigation buttons.



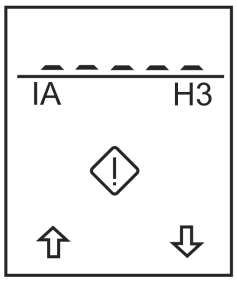
BAIL06CCM169AVB

BAIL06CCM169AVB 5

Press and hold the "Up" or "Down" navigation button to store the selection. A beep sounds to confirm the selection. To use the "HH" menu further, press the Menu button.

ERROR CODE REDUCTION OPTIONS

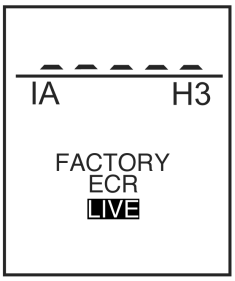
Press the Menu button to select the 'Reduced error code display' sub-system.



BAIL06CCM170AVB

BAIL06CCM170AVB 6

Scroll through the available options using the "Up" or "Down" navigation buttons.
"Factory" (F) - Workshop display mode for the fault codes, shows all fault codes for 6 minutes and then switches back to Error Code Reduction (ECR).
"ECR" (E) - Reduced display mode for the fault codes, only displays critical errors.
"Live" (L) - Live fault code display mode, displays all fault codes.



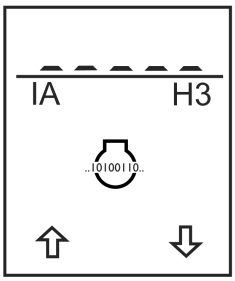
BAIL06CCM171AVB

BAIL06CCM171AVB 7

Press and hold the "Up" or "Down" navigation button to store the selection. A beep sounds to confirm the selection.
To use the "HH" menu further, press the Menu button.

ELECTRONIC ENGINE OPTIONS

Press the Menu button to select the electronic engine sub-system.

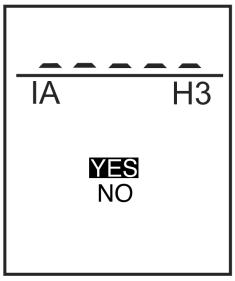


BAIL06CCM172AVB

BAIL06CCM172AVB 8

NOTE: *The default setting is "Yes" with electronic engine.*

Scroll through the available options using the "Up" or "Down" navigation buttons.



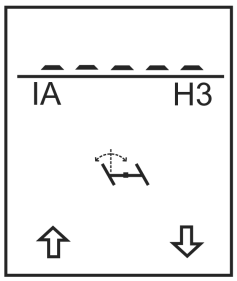
BAIL06CCM177AVB

BAIL06CCM177AVB 9

Press and hold the "Up" or "Down" navigation button to store the selection. A beep sounds to confirm the selection. To use the "HH" menu further, press the Menu button.

STEERING SENSOR SELECTION OPTIONS

Press the Menu button to select the steering sensor sub-system.

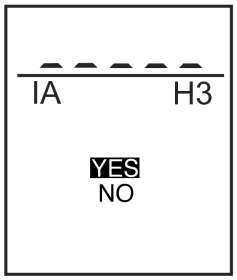


BAIL06CCM173AVB

BAIL06CCM173AVB 10

NOTE: *The default setting is "No", without steering angle sensor.*

Scroll through the available options using the "Up" or "Down" navigation buttons.



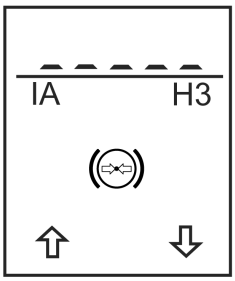
BAIL06CCM177AVB

BAIL06CCM177AVB 11

Press and hold the "Up" or "Down" navigation button to store the selection. A beep sounds to confirm the selection. To use the "HH" menu further, press the Menu button.

AIR BRAKE OPTIONS

Press the Menu button to select the air brake sub-system.

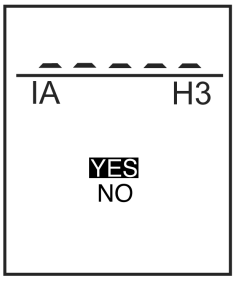


BAIL06CCM174AVB

BAIL06CCM174AVB 12

NOTE: *The default setting is "No", without air brakes.*

Scroll through the available options using the "Up" or "Down" navigation buttons.



BAIL06CCM177AVB

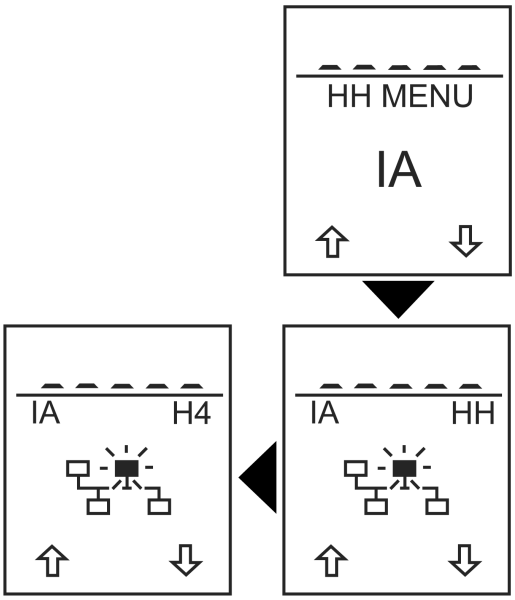
BAIL06CCM177AVB 13

Press and hold the "Up" or "Down" navigation button to store the selection. A beep sounds to confirm the selection. To use the "HH" menu further, press the Menu button.

H4 - DISPLAY SOFTWARE VERSION NUMBER

This menu shows the software version of the unit.

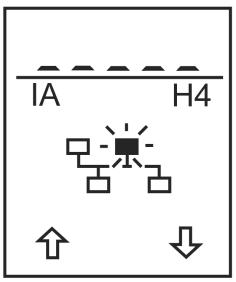
H4 Menu page selection diagram



BAIL06CCM179AVB

BAIL06CCM179AVB 14

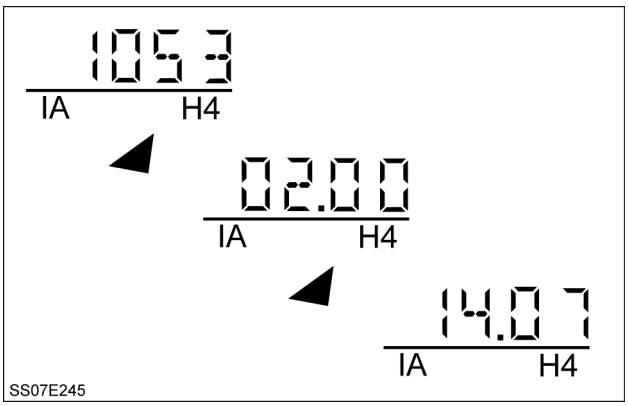
Press the Menu button to call up the H4 Menu.



BAIL06CCM180AVA

BAIL06CCM180AVA 15

The software version is automatically displayed on the upper section of the display (as in the illustrated example). After that the "HH" menu can be used again.



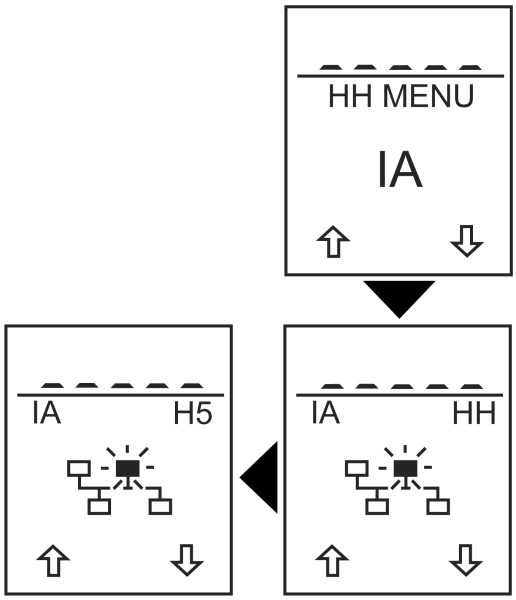
SS07E245 16

The first set of four digits indicates the Software identifier, which uniquely defines the application software present in the module.
The second and third set of four digits indicates the release version of the application software.

H5 - SWITCH OPERATION TEST

This menu displays a designated code when a switch transition is detected.

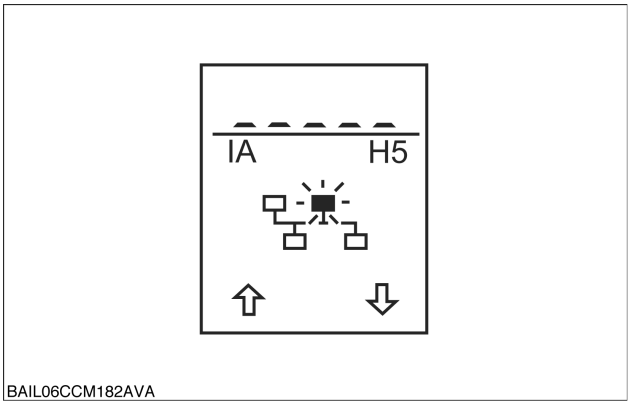
H5 Menu page selection diagram



BAIL06CCM185AVB

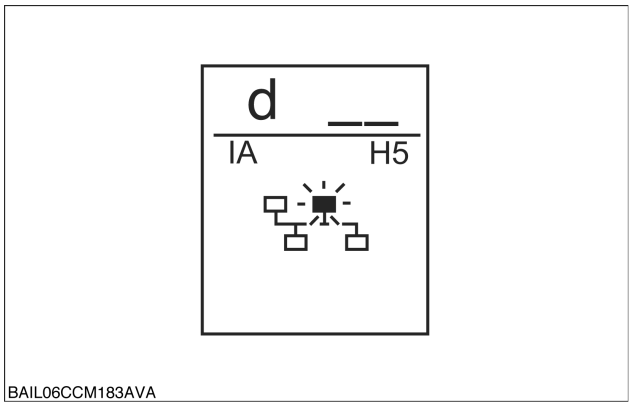
BAIL06CCM185AVB 17

Press the Menu button to call up the H5 Menu.



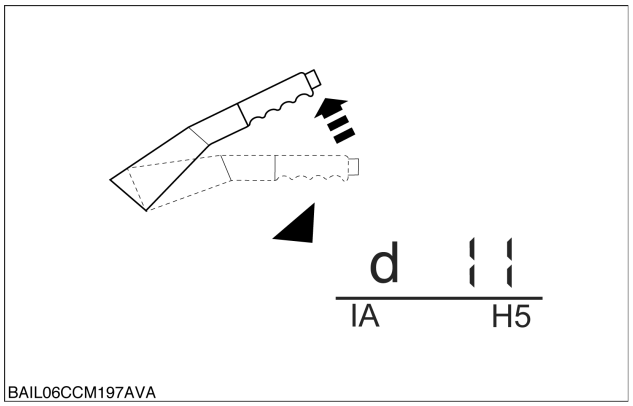
BAIL06CCM182AVA 18

"d _ _" is displayed in the upper section of the display.



BAIL06CCM183AVA 19

When a switch is actuated, a code is displayed and a beep reports that the switch is operating correctly.
If no switch code is displayed and no beep sounds, the affected cabling can be tested with a 'loose connection' test.
To isolate the error, look at the display or listen to the beep.



BAIL06CCM197AVA 20

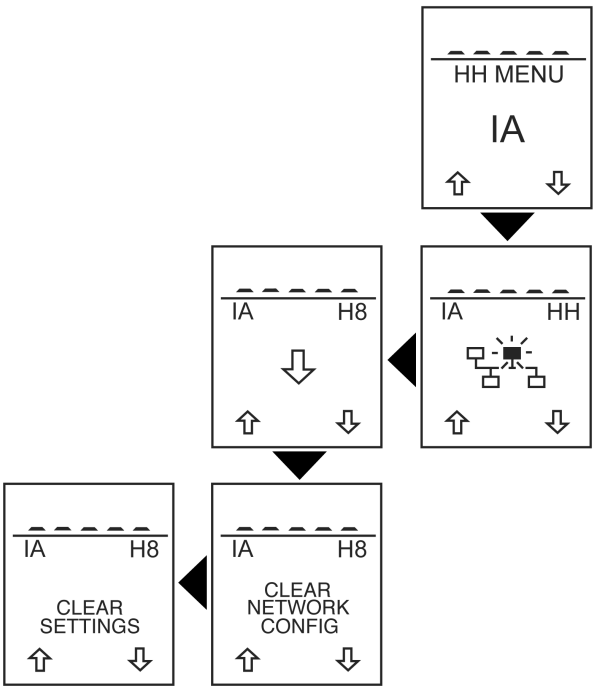
NOTE: *If the starter switch is turned to the Engine Start position, while the shuttle lever is in the Neutral position and the clutch pedal is depressed, a switch consistency error may be displayed.*

Identifier	Controller connector	PIN	Use	Switch / Input	Special requirements
d0	No switch or two switches actuated at the same time				
d11	CN3	7	IA/IB	Handbrake switch	-
d66	CN3	18	IA/IB	Main beam switch	-
d67	CN1	15	IA/IB	Side lights	-
d68	CN3	17	IA/IB	Brake pedals not locked (Japan ONLY)	-
d70	CN1	5	IA/IB	Left indicator	-
d71	CN1	6	IA/IB	Right indicator	-
d72	CN3	1	IA/IB	Device status (mechanical draft control only)	-
d74	CN3	9	IA/IB	Engine exhaust brake switch	-
d110	CN1	7	IB	CAL/SEL switch	-

H8 - CLEARING THE EEPROM MEMORY

This menu is used to clear the calibration values and stored fault codes, with all EEPROM values being reset to the default.
All calibration values and fault codes are stored in the EEPROM memory. This memory is retained even if there is no power to the controller, i. e. when the battery is disconnected.

H8 Menu page selection diagram

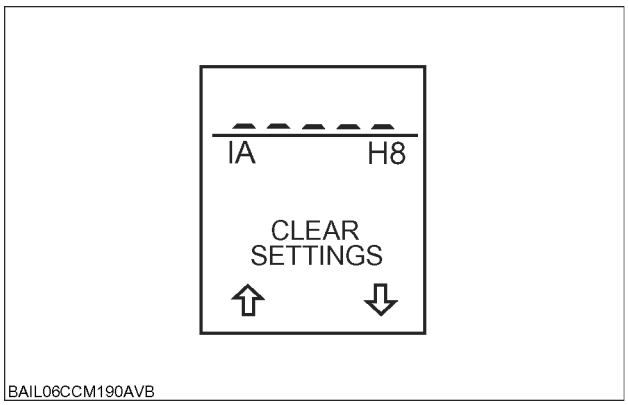


BAIL06CCM186AVB

BAIL06CCM186AVB 21

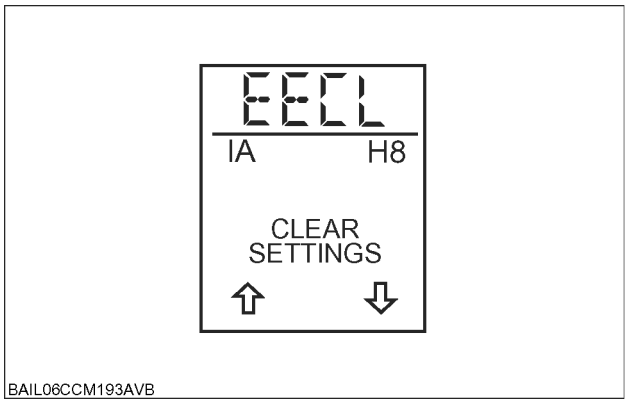
Press the Menu button to call up the H8 Menu.
Scroll through the available options using the "Up" or "Down" navigation buttons.

Press the Menu button to select the 'Clear settings' sub-system.



BAIL06CCM190AVB 22

"EECL" is displayed in the upper section of the display.



BAIL06CCM193AVB 23

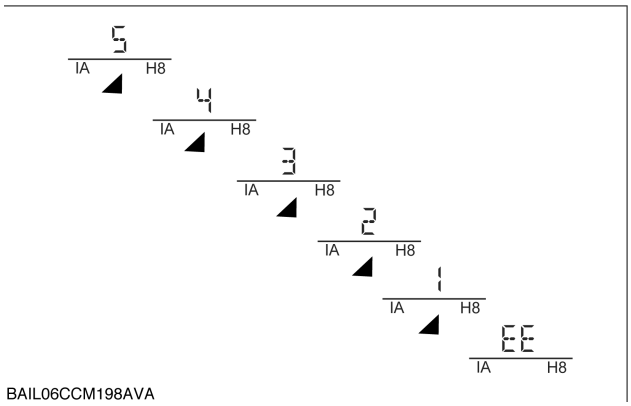
⚠ CAUTION ⚠

H8 will clear all calibrations values and stored error codes.

B006

NOTE: *If the "Down" navigation button is released before the end of the countdown, the process is aborted.*

To confirm the EEPROM reset, press and hold the "Down" navigation button.
The numbers 05 to 01 run backwards in the upper section of the display, then "EE" appears to inform you that the EEPROM has been cleared.



BAIL06CCM198AVA 24

Switch the starter switch to OFF to end H8.

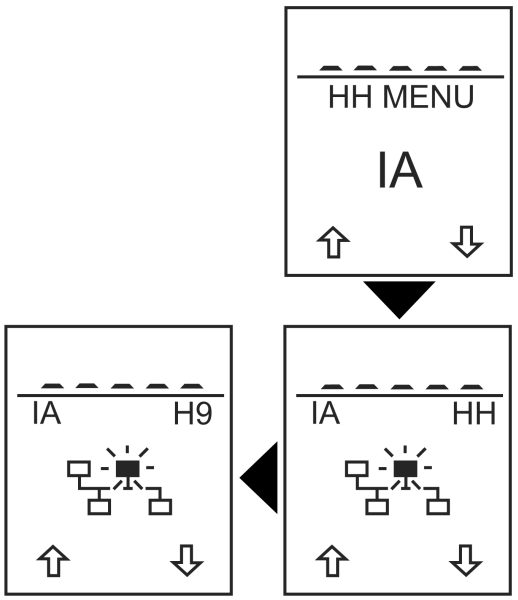
NOTE: *There is another instrument cluster option in H8 with the name 'Clear network config.'. This is performed in the same way as the 'Clear settings' option, but it clears the configuration currently stored in the instrument cluster and redefines the configuration when the starter switch is next switched on. This option should be used if the instrument cluster has been retrofitted or if the HH Menus show modules that are not installed on the tractor.*

H9 - VOLTMETER

This menu is used to check the setting of the various potentiometers, voltage sources and solenoid valve circuits. If a temporary error is recorded in a circuit, the relevant cabling can be tested for a loose connection. When doing this, check whether the values in the display change erratically to isolate the error range.

NOTE: *The vehicle may be driven while in this menu.*

H9 Menu page selection diagram

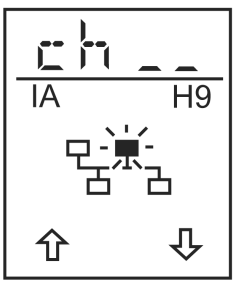


BAIL06CCM199AVA

BAIL06CCM199AVA 25

Press the Menu button to call up the H9 Menu.

" _ _" is displayed in the upper section of the display.



BAIL06CCM200AVA

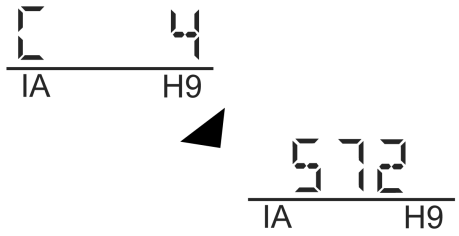
BAIL06CCM200AVA 26

The relevant channel can be called up using the "Up" and "Down" navigation buttons.
After a delay, the value is displayed. Compare the displayed value with the standard value from the following table.

NOTE: *The value is the input voltage or the input signal of the electronic control unit. This value cannot be directly converted to a voltage value because of the internal processes in the control unit. A zero corresponds to* ***0 volts****.*

If the displayed value deviates from the desired value in the following table by more than **10 %**, there is a fault either in the component or in the cabling of the affected channel.

NOTE: *Before replacing any components, test the plug connections of the relevant circuit including the plug connection of the electronic control unit.*



BAIL06CCM201AVA

BAIL06CCM201AVA 27

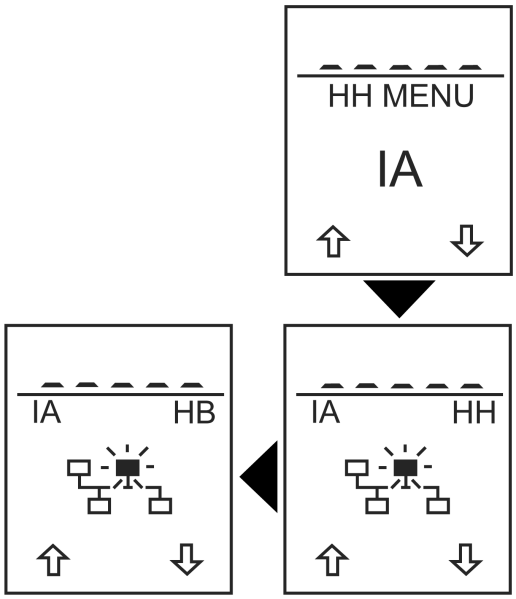
Channel	Description	Use	Standard value	Comments
4	Programming voltage Vpp	IB/IA	600	See explanations below
5	+5 Volt voltage supply for the sensors	IB/IA	500	
10	+12 Volt VT input	IB/IA	600	See explanations below
21	Steering angle sensor	IB/IA	Over 80	
24	Air brake system pressure	IB/IA	40 - 500	
25	Fuel gauge sensor	IB/IA	50 - 400	60 = Full 340 = Empty

Explanations:
Vpp input signal: Input voltage on the control unit to hold the temporary storage.
VT input signal: Second input voltage of the electronic control unit.

HB - DISPLAY OF THE STORED FAULT CODES

This menu is used to display the fault codes, which are stored in the EEPROM of the electronic control unit. Each control unit is capable of storing up to ten error codes for each sub system.

HB Menu page selection diagram

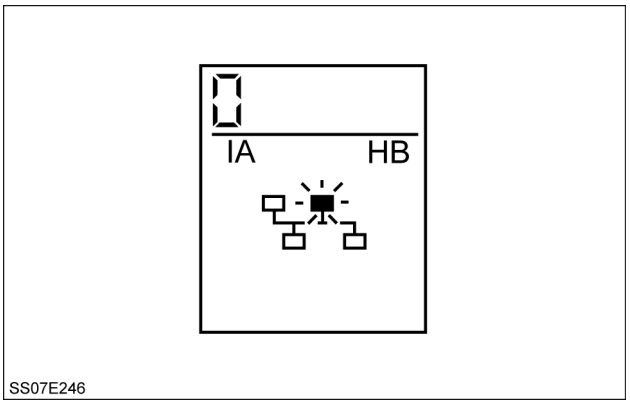


BAIL06CCM202AVA

BAIL06CCM202AVA 28

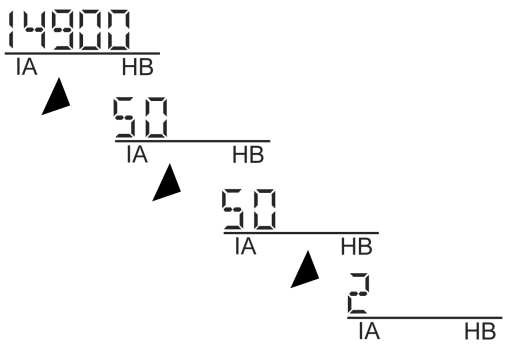
Press the Menu button to call up the HB Menu.

The number "0" flashes in the upper section of the display, when no fault code is stored.



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By typing through the fault codes, these are displayed in the upper section of the display, if these are stored.
The following shows an example of a fault code:
14900 Error code
50 Operating hours at the time of the first occurrence
50 Operating hours at the time of the last occurrence
2 Number of occurrenes



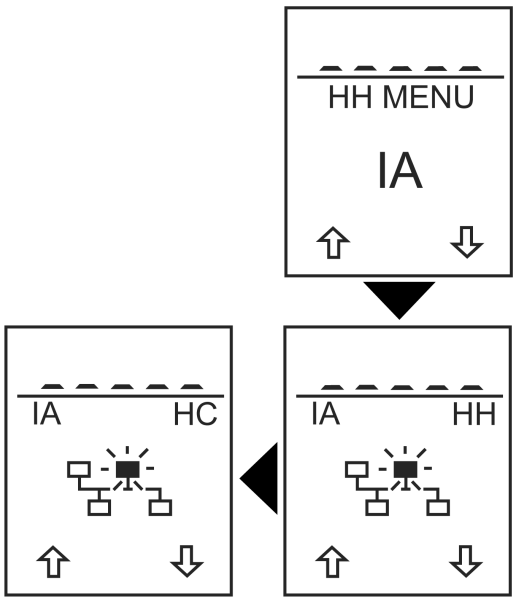
BAIL06CCM204AVA

BAIL06CCM204AVA 30

Press the "Up" or "Down" navigation button to change to the next fault code in the list.
As soon as the end of the list is reached, "_ _ _" is displayed in the upper section of the display.
To use the "HH" menu further, press the Menu button.

HC - CLEAR ALL STORED FAULT CODES

HC Menu page selection diagram

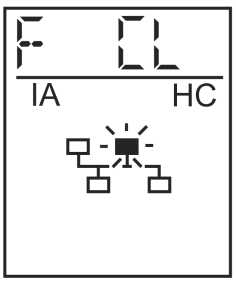


BAIL06CCM205AVA

BAIL06CCM205AVA 31

NOTE: *Always write the stored fault codes down on a piece of paper before clearing the memory.*

Press the Menu button to call up the HC Menu.
"F CL" is displayed in the upper section of the display.

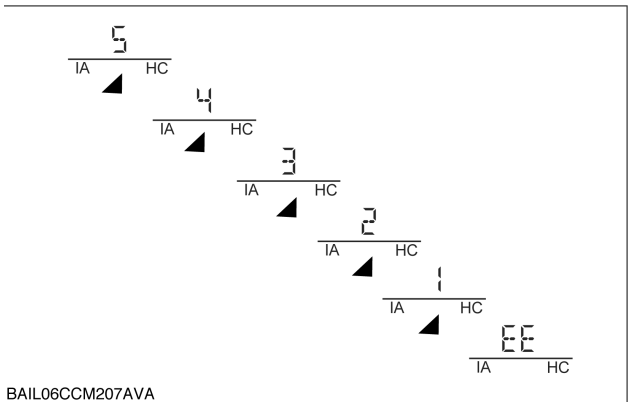


BAIL06CCM206AVA

BAIL06CCM206AVA 32

NOTE: *If the "Down" navigation button is released before the end of the countdown, the process is aborted.*

To confirm clearing the memory, press and hold the "Down" navigation button.
The numbers 05 to 01 run backwards in the upper section of the display, then "EE" appears to inform you that the fault codes have been cleared.
To use the "HH" menu further, press the Menu button.



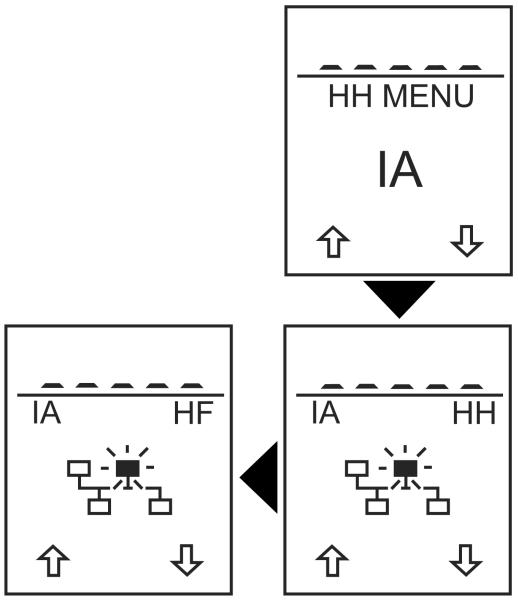
BAIL06CCM207AVA

BAIL06CCM207AVA 33

HF - VIEW CONTROLLER HARDWARE INFORMATION

This menu allows hardware identification; version and serial number to be displayed.

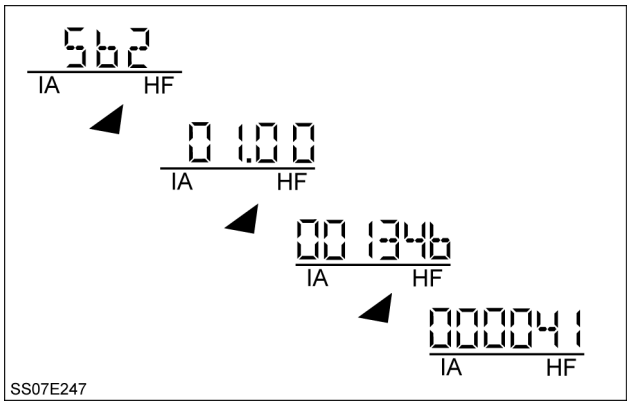
HF Menu page selection diagram



BAIL06CCM211AVA

BAIL06CCM211AVA 34

562 Hardware identification
01.00 Hardware version
001346 Serial number
000041 Serial number
After that the "HH" menu can be used again.



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Control module - Configure

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

RD / RG Full powershift transmission, EDC, rear PTO, four wheel drive, differential lock, front EHRs, engine.
RD - Puma Standard
RG - Puma Multicontroller

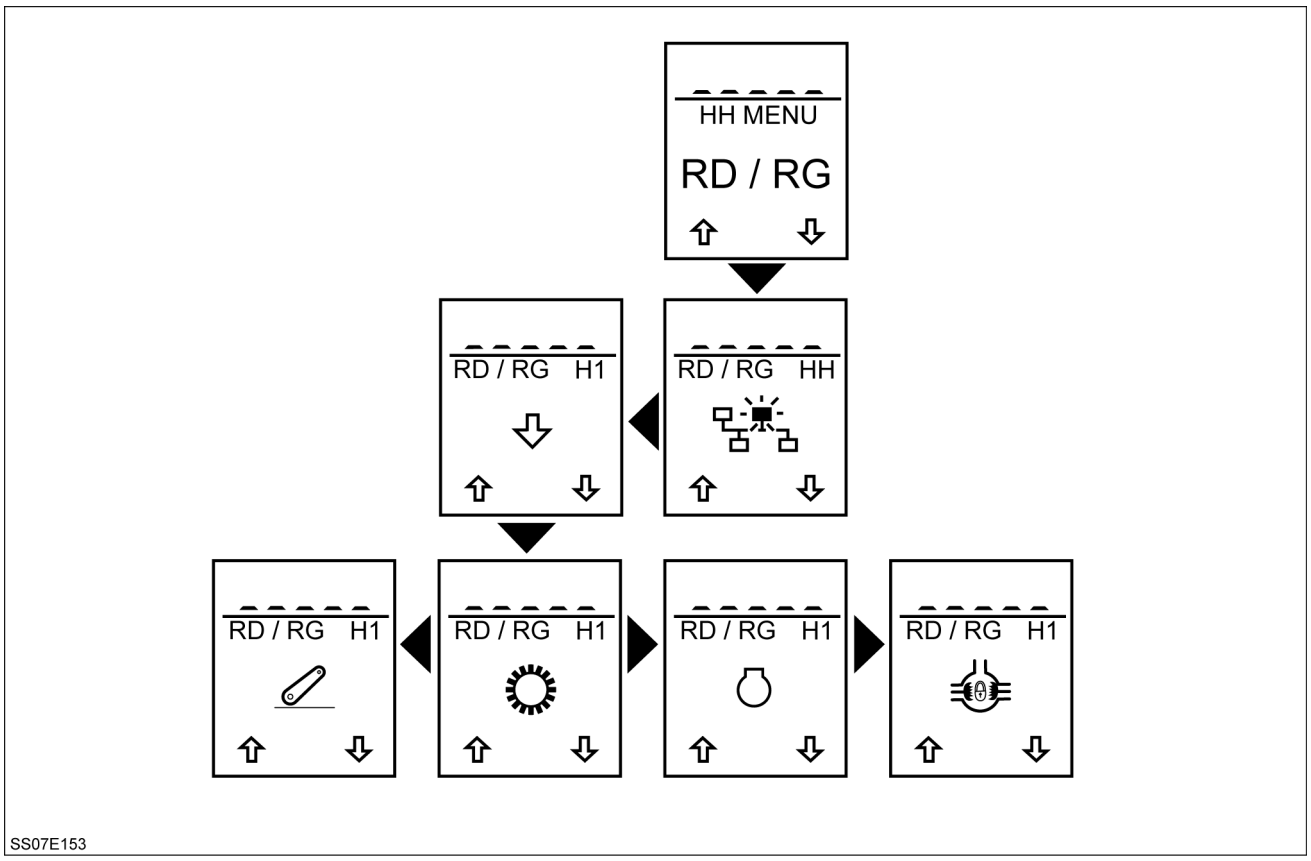
HH	Service menu	Figure
H1	Calibration procedures	**1**
H2	Display stored calibration values	**2**
H3	Configurations and options	**9**
H4	Display software version number	**38**
H5	Switch operation test	**41**
H6	Display vehicle information	**45**
H7	Vehicle test modes	**48**
H8	Clearing the EEPROM memory	**61**
H9	Voltmeter	**65**
HA	Demonstration mode	**67**
HB	Display stored fault codes	**70**
HC	Clear all stored fault codes	**74**
HD	Direct access to transmission set-ups (not available during use of the diagnostics switch)	-
HE	Display frequency inputs	**78**
HF	Display controller hardware information	**82**
HJ	Front EHR valve number programming	**85**

H1 - CALIBRATION PROCEDURES

This menu is used to calibrate the following units:

1. Electronic Draft Control (EDC) control unit. Refer to **HITCH Electronic draft control - Calibrate (H.10.D)**.
2. Transmission clutches, determine the amperages required for rotation of the input/output shaft at the relevant speed. Refer to **TRANSMISSION Powershift - Calibrate (C.20.E)**.
3. Engine (for PTO torque). Refer to **REAR PTO Hydraulic - Calibrate (C.40.C)**.
4. Differential lock (for steering angle sensor). Refer to **FRONT AXLE - Calibrate (D.10.A)**.

H1 Menu page selection diagram



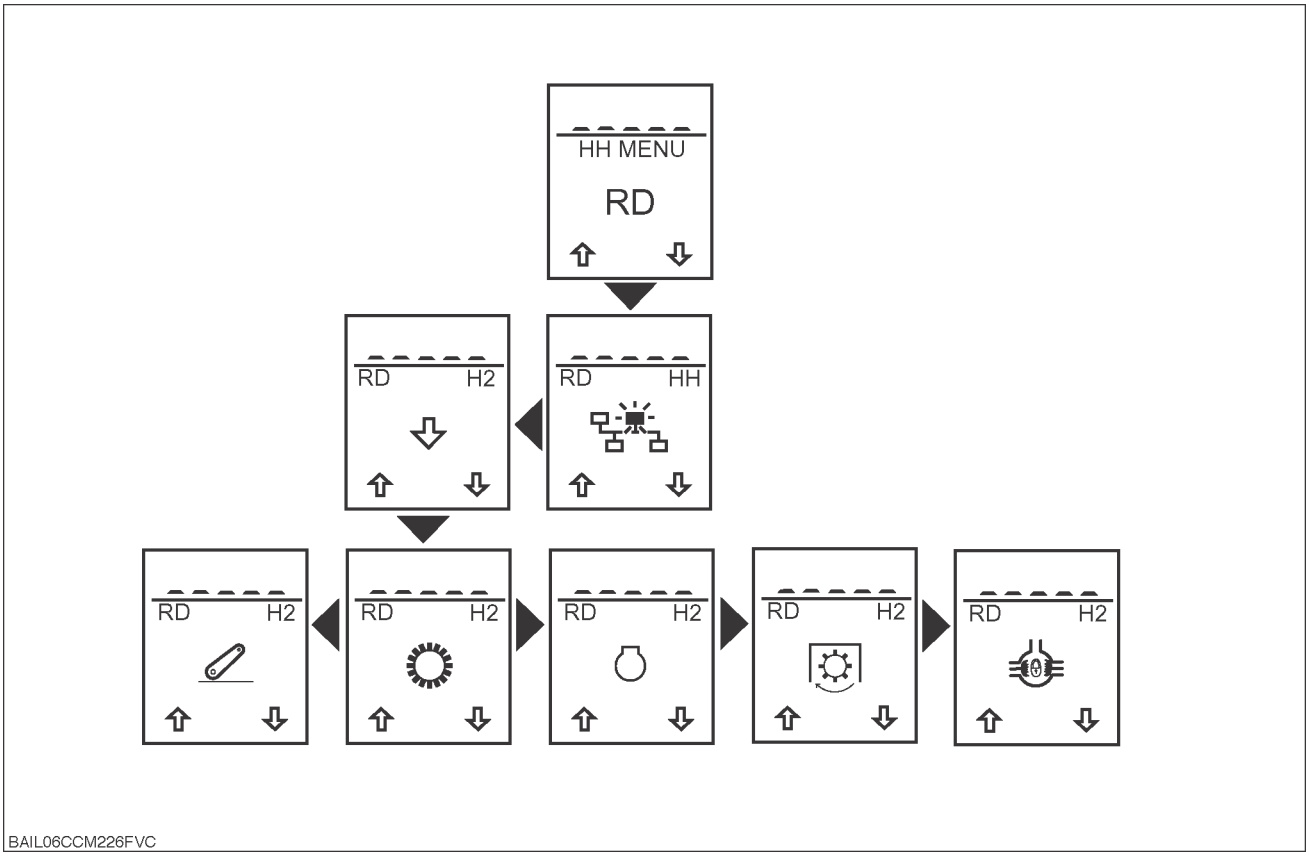
SS07E153 1

H2 - DISPLAY STORED CALIBRATION VALUES

This menu is used to display the calibration values of the following units, which are stored in the control units:

1. Transmission clutches and synchronisers
2. Differential lock (for steering angle sensor)
3. Engine (for PTO torque)
4. EDC valve
5. Rear PTO clutch

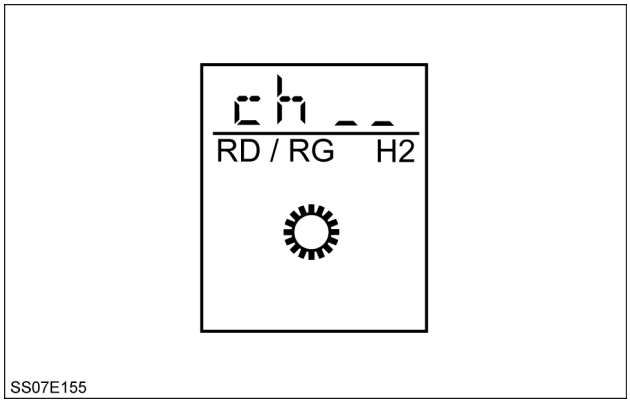
H2 Menu page selection diagram



BAIL06CCM226FVC 2

TRANSMISSION VALUES

Press the Menu button to select the 'Transmission' sub-system.
"ch _ _" is displayed in the upper section of the display.
The relevant channel can be called up using the "Up" and "Down" navigation buttons.



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After a delay, the channel number and then the clutch letter, the calibration value and the transmission oil temperature at the time of the calibration are displayed (the individual channels are described in the following table).
To use the "HH" menu further, press the Menu button.

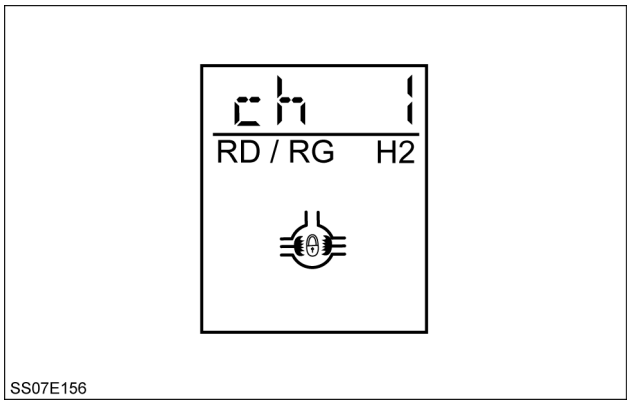
Channel	Description	Code	Value range
Channel 1	Clutch A - Amperage and temperature of the calibration	A	-
Channel 2	Clutch B - Amperage and temperature of the calibration	B	-
Channel 3	Clutch C - Amperage and temperature of the calibration	C	-
Channel 4	Clutch D - Amperage and temperature of the calibration	D	-
Channel 5	Clutch E - Amperage and temperature of the calibration	E	-
Channel 6	Clutch F1 - Amperage and temperature of the calibration	F1	-
Channel 7	Clutch F2 - Amperage and temperature of the calibration	F2	-
Channel 8	Clutch F3 - Amperage and temperature of the calibration	F3	-
Channel 9	Clutch F4 - Amperage and temperature of the calibration (only **50 km/h** transmission)	F4	-
Channel 9	Clutch R - Amperage and temperature of the calibration (all except **50 km/h** transmission)	R	-
Channel 10	Clutch R - Amperage and temperature of the calibration (only **50 km/h** transmission)	R	-
Channel 10	Flywheel damper calibration value (all except **50 km/h** transmission)	-	-
Channel 11	Flywheel damper calibration value (only **50 km/h** transmission)	-	-
Channel 11	PTO twist calibration value (all except **50 km/h** transmission)	-	-
Channel 12	PTO twist calibration value (only **50 km/h** transmission)	-	-
Channel 12	Radar adjustment value (all except **50 km/h** transmission)	-	-

Channel	Description	Code	Value range
Channel 13	Radar adjustment value (only **50 km/h** transmission)	-	-

DIFFERENTIAL LOCK VALUES (FOR STEERING ANGLE SENSOR)

NOTE: *The standard calibration value for the steering angle sensor is 12287.*

Press the Menu button to select the 'Differential lock' sub-system.
"ch 1" is displayed on the upper section of the display.



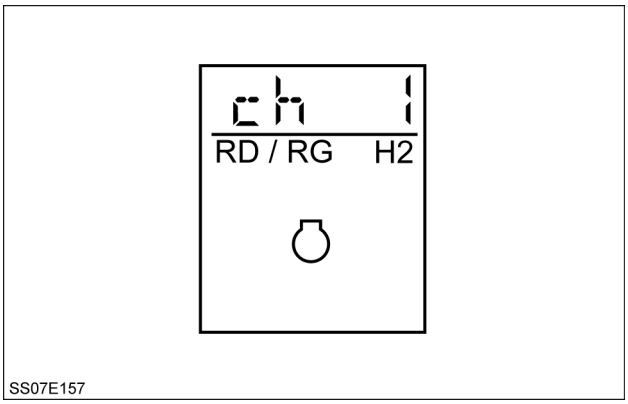
SS07E156 4

After a delay, the calibration value is displayed. (The individual channel is described in the following table).
To use the "HH" menu further, press the Menu button.

Channel	Description	Value range
Channel 1	Steering angle sensor	1000 - 8000

ENGINE VALUES (FOR PTO TORQUE SENSOR)

Press the Menu button to select the 'Engine' sub-system.
"ch 1" is displayed on the upper section of the display.



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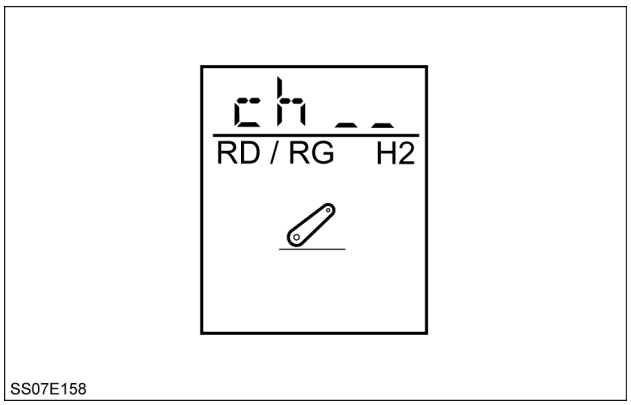
After a delay, the calibration value is displayed. (The individual channel is described in the following table).
To use the "HH" menu further, press the Menu button.

Channel	Description	Value range
Channel 1	PTO torque sensor	4400 - 13600 (corresponding to a twist angle of between **44 - 136 °**)

VALUES FOR THE EDC CONTROL VALVE

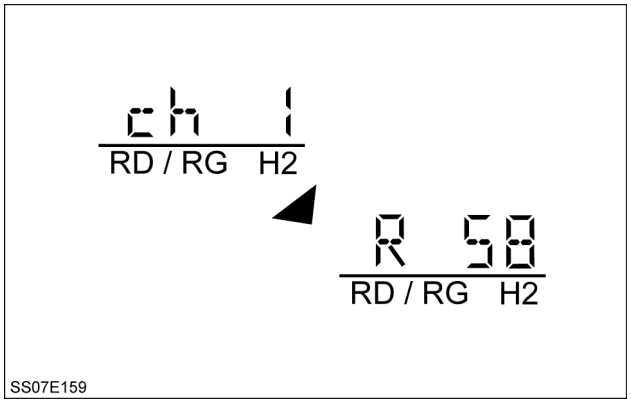
NOTE: *The standard calibration value for the Raise and Lower solenoid valve is 50.*

Press the Menu button to select the 'EDC' sub-system.
"ch _ _" is displayed in the upper section of the display.
The relevant channel can be called up using the "Up" and "Down" navigation buttons.



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After a delay, the code and then the calibration value are displayed. (The individual channels are described in the following table).
To use the "HH" menu further, press the Menu button.



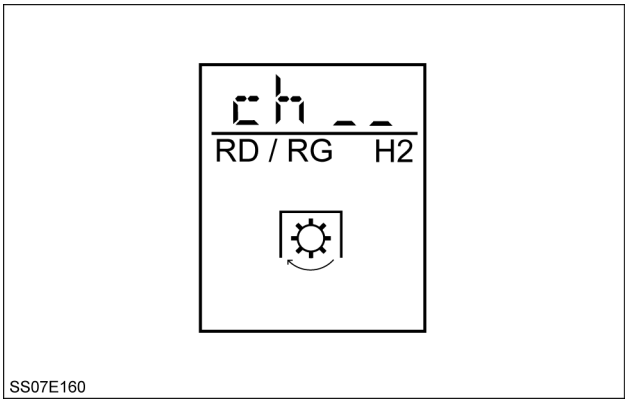
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Channel	Description	Code	Value range
Channel 1	Raise solenoid	R	20 - 80
Channel 2	Lower solenoid	L	20 - 80

VALUES FOR THE REAR PTO

NOTE: *The standard calibration value for the PTO solenoid valve is 212.*

Press the Menu button to call up the 'Front PTO' sub-system.
"ch _ _" is displayed in the upper section of the display.
The relevant channel can be called up using the "Up" and "Down" navigation buttons.



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After a delay, the calibration value is displayed. (The individual channels are described in the following table).
To use the "HH" menu further, press the Menu button.

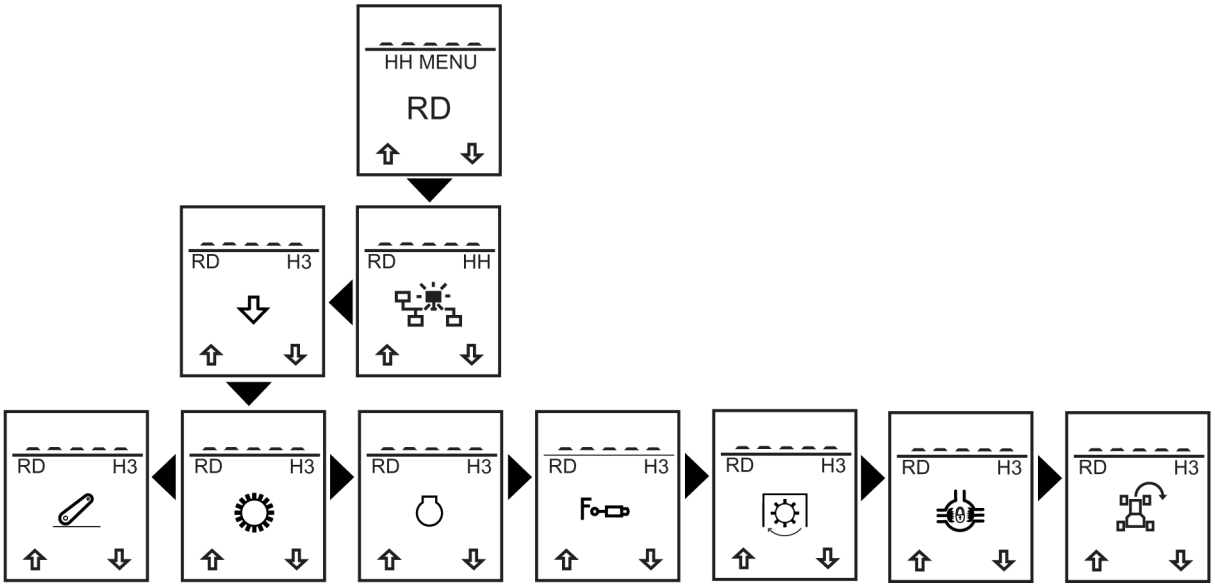
Channel	Description	Value range
Channel 1	PTO oil temperature	10 - 120
Channel 2	PTO solenoid valve	100 - 350

H3 - CONFIGURATIONS AND OPTIONS

This menu contains the configuration options of the following functions:

1. Electronic draft (EDC) control
   - Channel 1 - Diameter of the external lifting cylinder
   - Channel 2 - Activate/deactivate EDC
   - Channel 3 - Activate/deactivate slip control
2. Transmission
   - Channel 1 - Activate/deactivate creeper (Yes = activated)
   - Channel 2 - Activate/deactivate parking lock (Yes = activated)
   - Channel 3 - **40 Km/h** maximum speed restriction (Yes = limited)
   - Channel 4 - Clutch A solenoid quick fill adjustment
   - Channel 5 - Clutch B solenoid quick fill adjustment
   - Channel 6 - Clutch C solenoid quick fill adjustment
   - Channel 7 - Clutch D solenoid quick fill adjustment
   - Channel 8 - Clutch E solenoid quick fill adjustment
   - Channel 9 - Clutch F1 solenoid quick fill adjustment
   - Channel 10 - Clutch F2 solenoid quick fill adjustment
   - Channel 11 - Clutch F3 solenoid quick fill adjustment
   - Channel 12 - Clutch F4 solenoid quick fill adjustment(**50 km/h** Transmission)
   - Channel 12 - Clutch R solenoid quick fill adjustment(all except **50 km/h** transmission)
   - Channel 13 - Clutch R solenoid quick fill adjustment (only **50 km/h** transmission)
3. Electronic engine
   - Channel 1 - PTO dynamometer (Yes = activated)
   - Channel 2 - Not used
   - Channel 3 - Grid heater selection (Yes = installed)
   - Channel 4 - Fuel filter heater selection (Yes = installed)
4. Front EHR
   - Channel 1 - Front EHR option selection (Yes = activated)
   - Channel 2 - Front Loader / Front Hitch selection
   - Channel 3 - Not used
   - Channel 4 - Number of the EHR set-up
   - Channel 5 - High Flow pump selection (Yes = activated)
5. Rear PTO
   - Channel 1 - PTO management selection
   - Channel 2 - PTO fender switches selection
   - Channel 3 - PTO drop out speed selection
6. Differential Lock and Four Wheel Drive
   - Channel 1 - Axle type
   - Channel 2 - Four wheel drive selection (Yes = activated)
   - Channel 3 - Steering angle of the front axle (Terralock)
   - Channel 4 - Four wheel drive brake engagement speed selection
7. Headland turn sequence
   - Channel 1 - Activate/deactivate HTS

H3 Menu page selection diagram

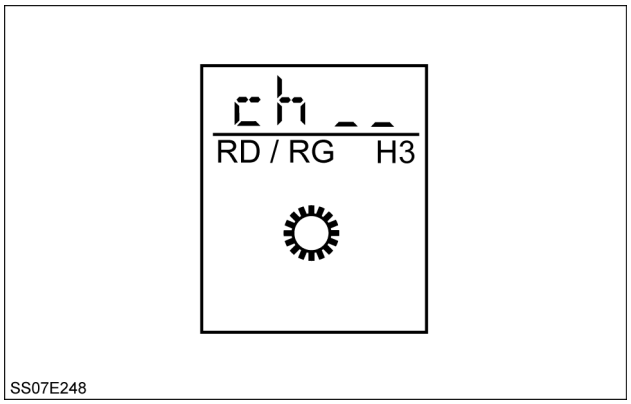


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TRANSMISSION OPTIONS

Press the Menu button to select the 'Transmission' sub-system.
"ch _ _" is displayed in the upper section of the display.



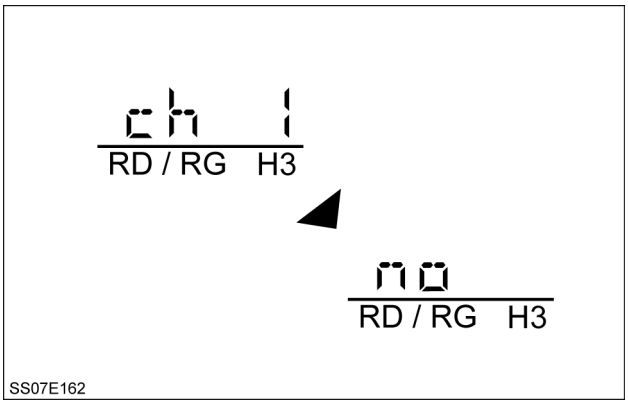
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The relevant channel can be called up using the "Up" and "Down" navigation buttons. (The individual channels are described in the following table).

Channel	Description
Channel 1	Creeper activate/deactivate
Channel 2	Park lock activate/deactivate
Channel 3	**40 Km/h** maximum speed restriction
Channel 4	A clutch solenoid quick fill adjustment
Channel 5	B clutch solenoid quick fill adjustment
Channel 6	C clutch solenoid quick fill adjustment
Channel 7	D clutch solenoid quick fill adjustment
Channel 8	E clutch solenoid quick fill adjustment
Channel 9	F1 clutch solenoid quick fill adjustment
Channel 10	F2 clutch solenoid quick fill adjustment
Channel 11	F3 clutch solenoid quick fill adjustment
Channel 12	F4 clutch solenoid quick fill adjustment (**50 Km/h** transmission)
Channel 12	R clutch solenoid quick fill adjustment (all other transmission versions)
Channel 13	R clutch solenoid quick fill adjustment (**50 Km/h** transmission only)

Channel 1 - Creeper activate/deactivate

This channel is used to select whether the creeper drive option is activated or deactivated.
After a delay, the currently stored value is displayed.

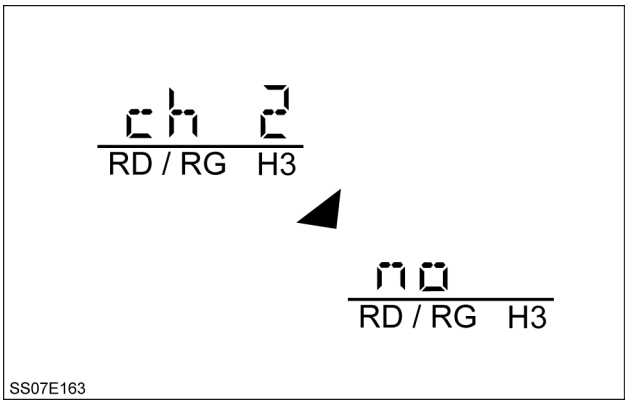


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Use the "Up" or "Down" navigation button to switch between "Yes" and "No" to input whether the creeper drive option is activated (Yes) or deactivated (No).
To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.
To use the "HH" menu further, press the Menu button.

Channel 2 - Park lock activate/deactivate

This channel is used to select whether the park lock option is activated or deactivated.
After a delay, the currently stored value is displayed.

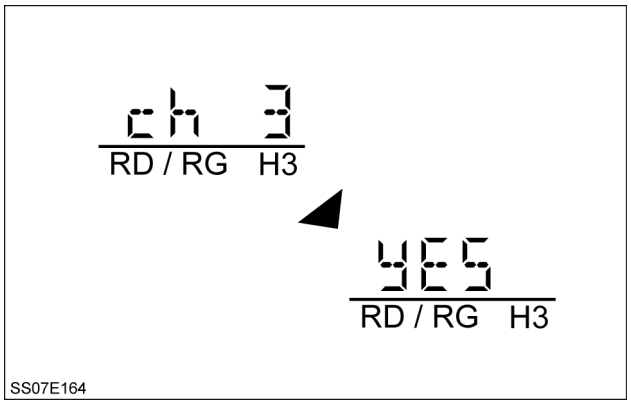


SS07E163 12

Use the "Up" or "Down" navigation button to switch between "Yes" and "No" to input whether the park lock option is activated (Yes) or deactivated (No).
To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.
To use the "HH" menu further, press the Menu button.

Channel 3 - 40 Km/h maximum speed restriction

This channel is used to select whether the **40 Km/h** maximum speed is activated or deactivated.
After a delay, the currently stored value is displayed.



SS07E164 13

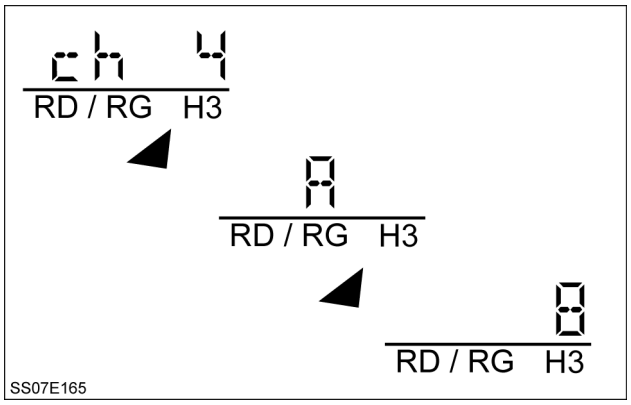
Use the "Up" or "Down" navigation button to switch between "Yes" and "No" to input whether the ' **40 Km/h** Limit the maximum speed' option is on **40 Km/h** limited (Yes) or not limited (No).
To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.
To use the "HH" menu further, press the Menu button.

Channels 4 to 13 - Clutch solenoid quick fill adjustment

These channels are used to set the pressure build-up time for the solenoid valves for transmission control.
Scroll through the available channel using the "Up" and "Down" navigation buttons. (The individual channels are described in the following table).

Channel	Description
Channel 4	A clutch solenoid quick fill adjustment
Channel 5	B clutch solenoid quick fill adjustment
Channel 6	C clutch solenoid quick fill adjustment
Channel 7	D clutch solenoid quick fill adjustment
Channel 8	E clutch solenoid quick fill adjustment
Channel 9	F1 clutch solenoid quick fill adjustment
Channel 10	F2 clutch solenoid quick fill adjustment
Channel 11	F3 clutch solenoid quick fill adjustment
Channel 12	F4 clutch solenoid quick fill adjustment (**50 Km/h** transmission only)
Channel 12	R clutch solenoid quick fill adjustment (all except **50 Km/h** transmissions)
Channel 13	R clutch solenoid quick fill adjustment (**50 Km/h** transmission only)

After a delay, the code for the clutch solenoid valve and then the currently stored value are displayed.



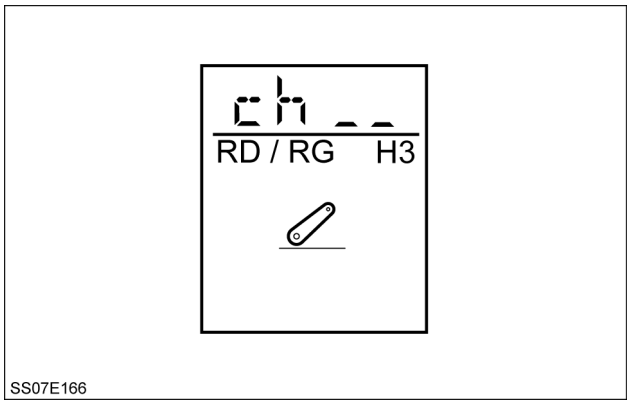
SS07E165 14

Use the "Up" or "Down" navigation button to set the quick fill to a value between "0" and "255".

To store the desired value, press and hold the "Up" or "Down" navigation button until the instrument cluster emits a beep to indicate that the selection has been stored.
To use the "HH" menu further, press the Menu button.

ELECTRONIC DRAFT CONTROL OPTIONS (EDC)

Press the Menu button to select the 'EDC' sub-system.
"ch _ _" is displayed in the upper section of the display.



SS07E166 15

The relevant channel can be called up using the "Up" and "Down" navigation buttons. (The individual channels are described in the following table).

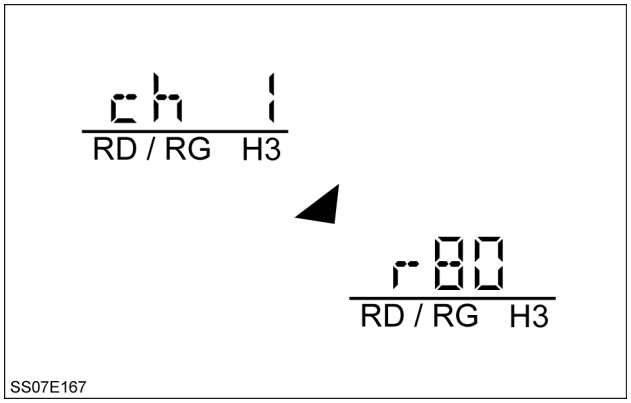
Channel	Description
Channel 1	Diameter of the external lift cylinder
Channel 2	Activate/deactivate EDC
Channel 3	Activate/deactivate slip control

Channel 1 - Diameter of the external lift cylinder

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are in **(mm)**:

- 80
- 90
- 100



SS07E167 16

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

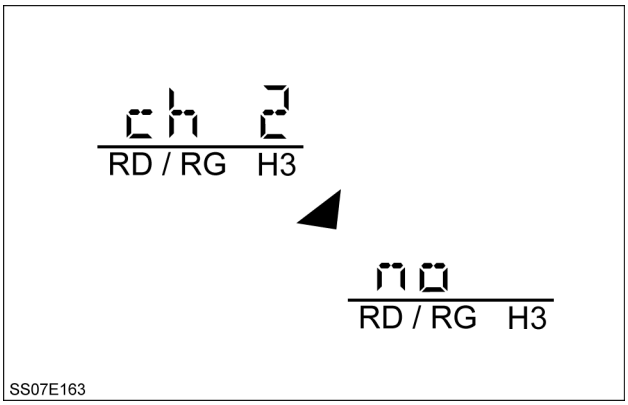
To use the "HH" menu further, press the Menu button.

Channel 2 - Activate/deactivate EDC

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - EDC activated
- NO - EDC deactivated



SS07E163 17

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

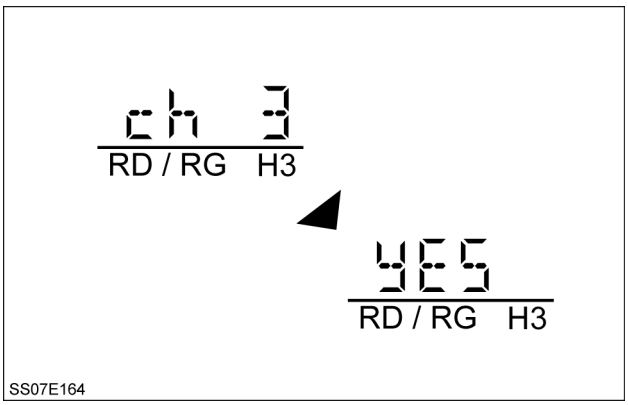
To use the "HH" menu further, press the Menu button.

Channel 3 - Activate/deactivate slip control

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - Slip control activated
- NO - Slip control deactivated



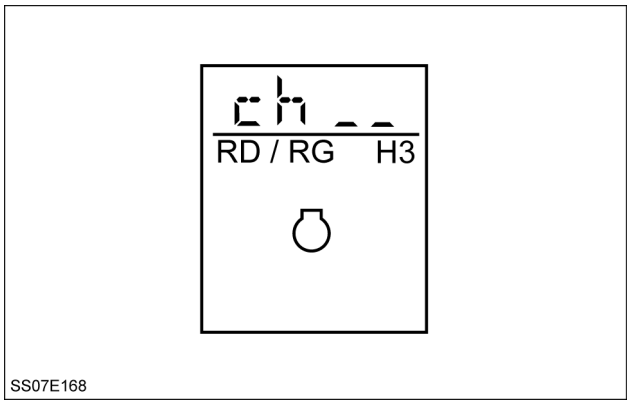
SS07E164 18

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

ELECTRONIC ENGINE OPTIONS

Press the Menu button to select the 'Electronic engine' sub-system.
"ch _ _" is displayed in the upper section of the display.



SS07E168 19

The relevant channel can be called up using the "Up" and "Down" navigation buttons. (The individual channels are described in the following table).

Channel	Description
Channel 1	Dynamometer power boost test
Channel 2	Not used
Channel 3	Grid heater selection
Channel 4	Fuel filter heater selection

Channel 1 - Dynamometer power boost test

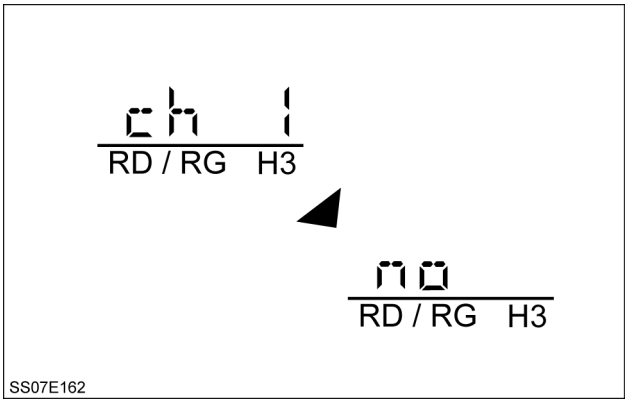
This channel makes it possible to test the tractor with a dynamometer with maximum boost.

NOTE: *The boost is only active for* ***45 minutes****.*

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - Power boost activated
- NO - Power boost deactivated



SS07E162 20

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

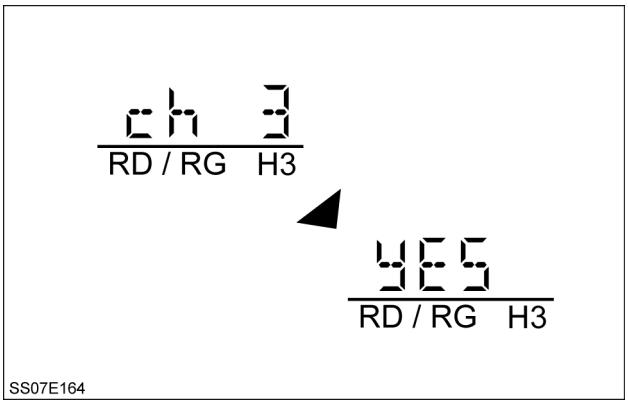
Channel 2 - Not used

Channel 3 - Grid heater selection

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - Grid heater installed
- NO - Grid heater not installed



SS07E164 21

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

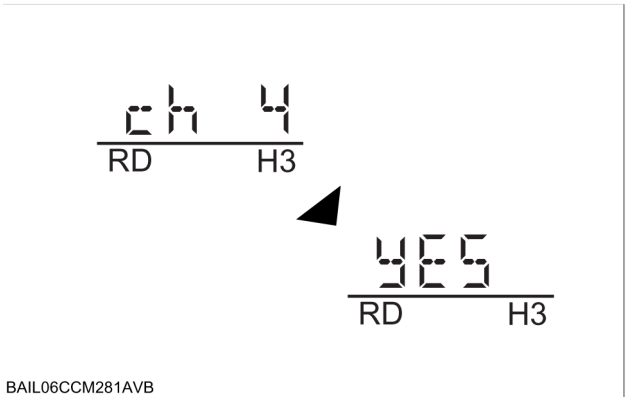
To use the "HH" menu further, press the Menu button.

Channel 4 - Fuel filter heater selection

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - Grid heater installed
- NO - Grid heater not installed



BAIL06CCM281AVB

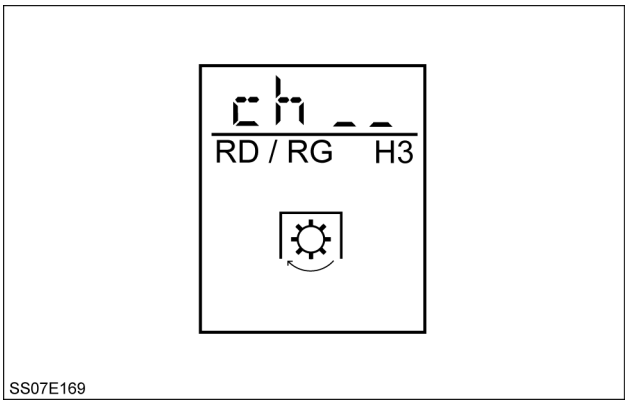
BAIL06CCM281AVB 22

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

REAR PTO OPTIONS

Press the Menu button to select the 'Front PTO' sub-system.
"ch _ _" is displayed in the upper section of the display.



SS07E169 23

The relevant channel can be called up using the "Up" and "Down" navigation buttons. (The individual channels are described in the following table).

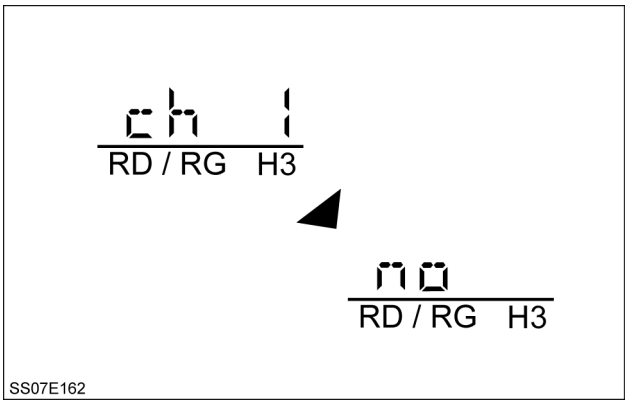
Channel	Description
Channel 1	PTO management selection
Channel 2	PTO fender switch selection
Channel 3	PTO drop out speed selection

Channel 1 - PTO management selection

This channel makes it possible to switch the auto PTO control function of the PTO control on/off.
Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - PTO management activated
- NO - PTO management deactivated



SS07E162 24

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

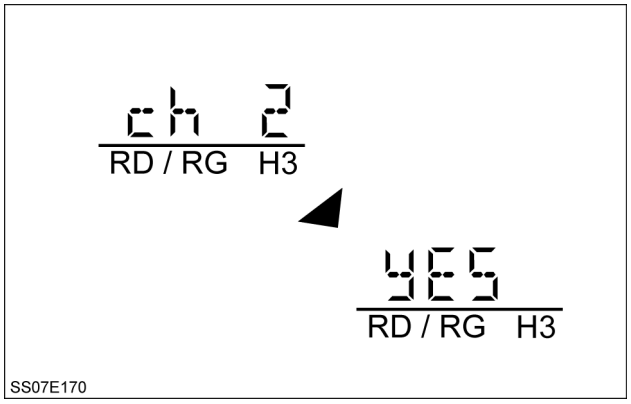
To use the "HH" menu further, press the Menu button.

Channel 2 - PTO Fender switches selection

This channel is used to deactivate or activate the rear control switch of the PTO.
Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - Rear PTO fender switches activated
- NO - Rear PTO fender switches deactivated



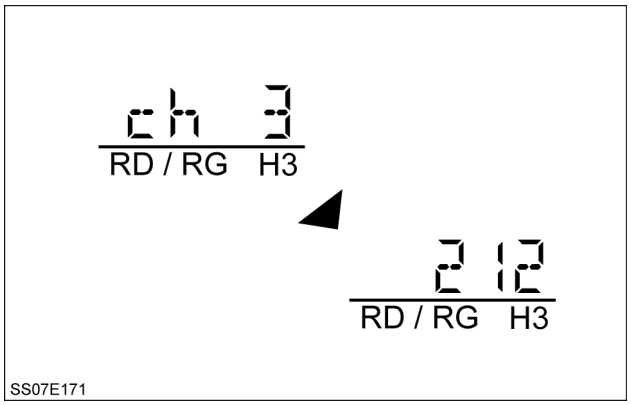
SS07E170 25

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

Channel 3 - PTO Drop out speed selection

This channel is used to enter the engine speed below which the PTO will drop out.
After a delay, the current setting is displayed.



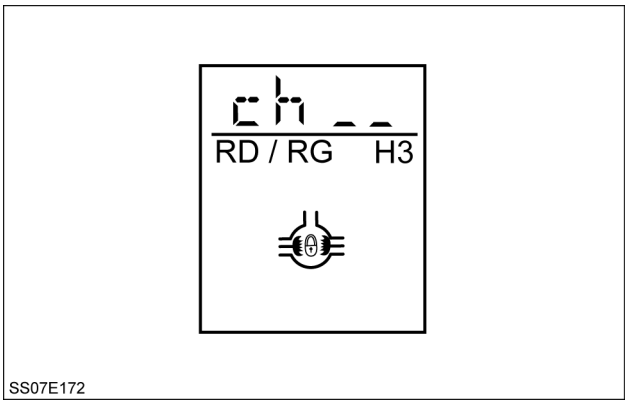
SS07E171 26

Use the "Up" and "Down" navigation button to increase or decrease the setting by **10 RPM** steps in the range **0 - 550 RPM** .
To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

DIFFERENTIAL LOCK AND FOUR-WHEEL DRIVE OPTIONS

Press the Menu button to select the 'Differential lock and all-wheel drive' sub-system.
"ch _ _" is displayed in the upper section of the display.



SS07E172 27

The relevant channel can be called up using the "Up" and "Down" navigation buttons. (The individual channels are described in the following table).

Channel	Description
Channel 1	Not used
Channel 2	Four wheel drive selection
Channel 3	Front axle angles (Terralock system)
Channel 4	Four wheel drive brake engagement speed selection

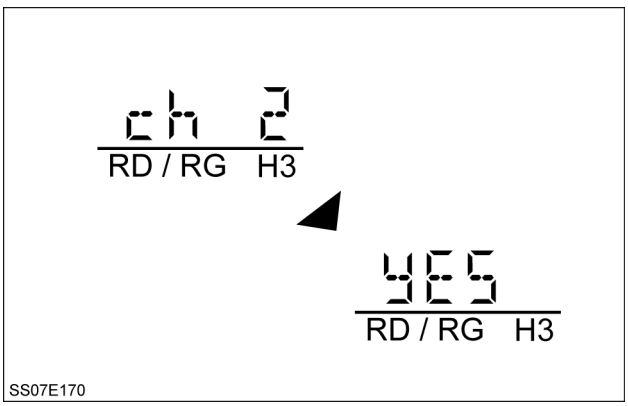
Channel 1 - not used

Channel 2 - Four wheel drive selection

This channel is used to activate or deactivate the all-wheel drive.
Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - Four wheel drive activated
- No - Four wheel drive deactivated



SS07E170 28

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

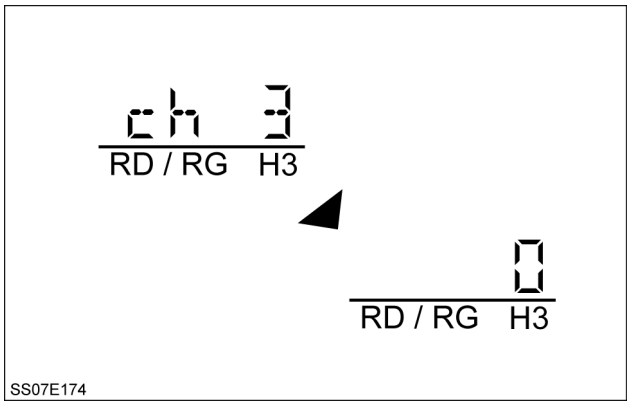
Channel 3 - Front axle angles (Terralock)

This channel is used to select the steering angle at which the automatic functions of differential lock and four wheel drive switch on and switch off.

Scroll through the available options using the "Up" or "Down" navigation buttons.
The available options (0, 1, 2 and 3) are listed in the following table and are each individually described.

Standard axle

	Auto four wheel drive 0 - 10 km/h		Auto Difflock 0 - 10 km/h		Auto Difflock 10 - 15 km/h		Auto four wheel drive 10 - 20 km/h	
	Degrees right	Degrees left	Degrees right	Degrees left	Degrees right	Degrees left	Degrees right	Degrees left
Option 0	20º	18.5º	15º	14.25º	10º	9.5º	15º	14.2º
Option 1	45º	37.5º	20º	18.5º	10º	9.5º	40º	34º
Option 2	15º	14.2º	10º	9.5º	10º	9.5º	15º	14.2º
Option 3	11.7º	10.9º	5º	4.5º	10º	9.5º	15º	14.2º



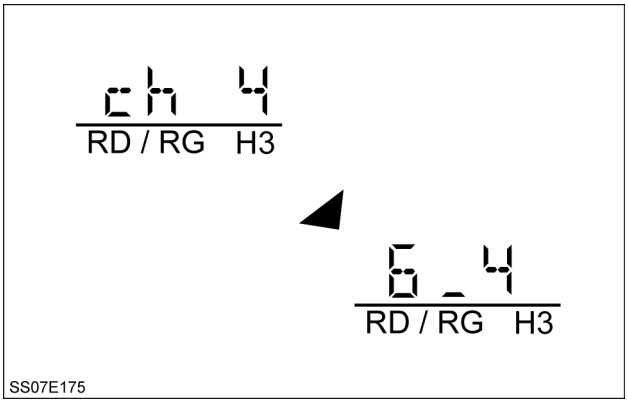
SS07E174 29

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.
To use the "HH" menu further, press the Menu button.

Channel 4 - Four wheel drive brake engagement speed selection

This channel is used to select the vehicle speed below which there is no four-wheel braking.
Scroll through the available options using the "Up" or "Down" navigation buttons.
The available options (0, 1, 2, 3 and 4) are listed in the following table and are each individually described.

	Option 4	Option 3	Option 2	Option 1	Option 0
Four-wheel braking, if wheel speed greater than or equal to:	Default value **6.4 Km/h**.	**4.8 Km/h**.	**3.2 Km/h**.	**1.6 Km/h**.	**0 Km/h**.

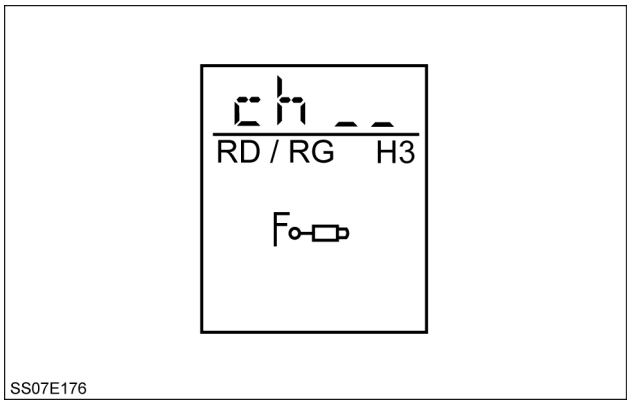


SS07E175 30

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.
To use the "HH" menu further, press the Menu button.

FRONT EHR OPTIONS

Press the Menu button to call up the 'Front EHR' sub-system.
"ch _ _" is displayed in the upper section of the display.



SS07E176 31

The relevant channel can be called up using the "Up" and "Down" navigation buttons. (The individual channels are described in the following table).

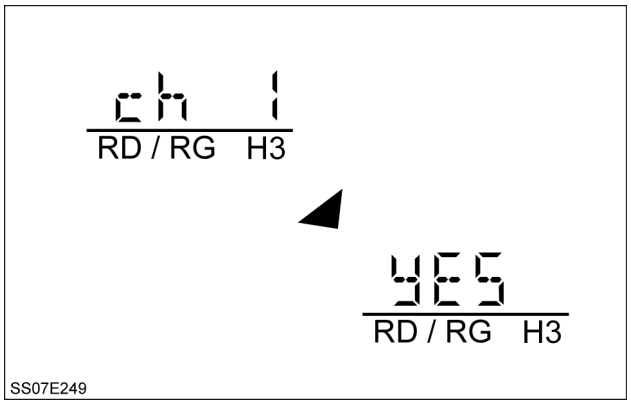
Channel	Description
Channel 1	Front EHR option selection
Channel 2	Front loader / front hitch selection
Channel 3	Not used
Channel 4	Number of EHR setup
Channel 5	High flow pump selection

Channel 1 - Front EHR option selection

This channel is used to activate or deactivate the front EHR.
Scroll through the available options using the "Up" or "Down" navigation button.

The available options are:

- YES - Front EHR activate
- NO - Front EHR deactivate



SS07E249 32

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

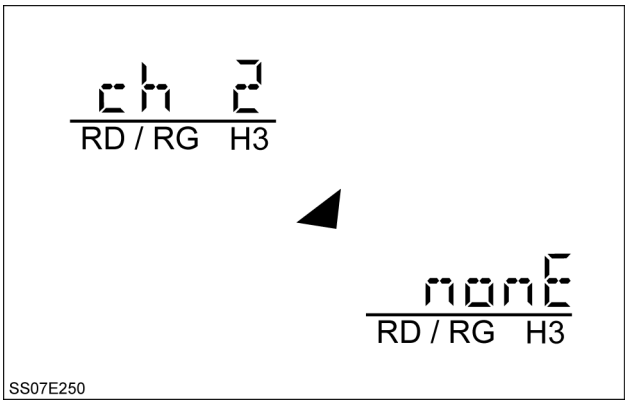
Channel 2 - Front loader / front hitch selection

This channel is used to select whether the EHRs are used in conjunction with the front hitch or front loader. Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- None - No option selected
- Hitch - Front hitch selected
- Load - Front loader selected

NOTE: *If the front hitch is selected then the front EHR valve 1 will be reserved for front hitch operation. If the front loader is selected then the front EHR valves 1-3 will be reserved for front loader operation. If 'None' option is selected, all front EHR valves will be available for use.*



SS07E250 33

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.
To use the "HH" menu further, press the Menu button.

Channel 3 - Not used

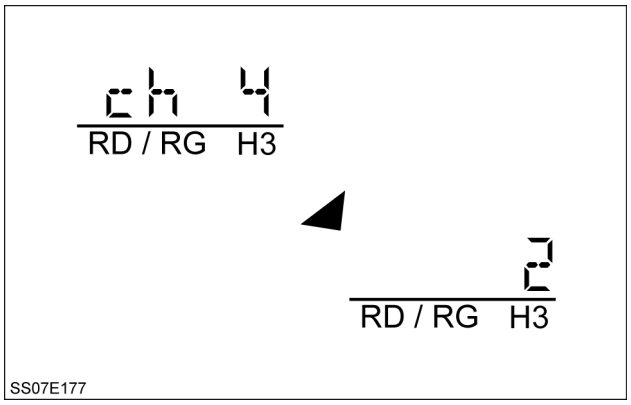
Channel 4 - Number of EHR setup

When a new module is installed or the H8 procedure is completed, you use the automatic recording of the number of remote valves. If the number of the remote valves installed must be altered at another time, you use this set-up channel.

Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- 2
- 3
- 4



SS07E177 34

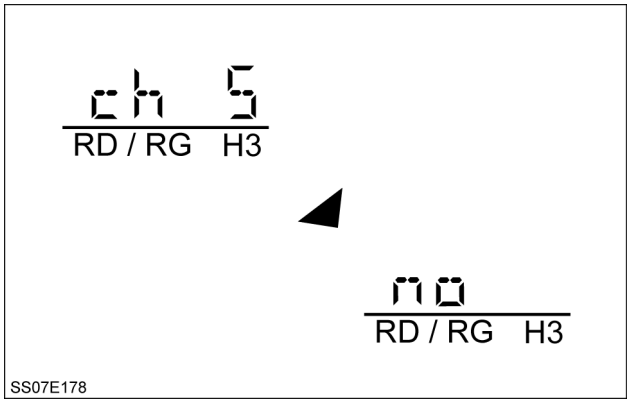
To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.
To use the "HH" menu further, press the Menu button.

Channel 5 - High flow pump selection

This channel is used to activate or deactivate the high flow pump.
Scroll through the available options using the "Up" or "Down" navigation buttons.

The available options are:

- YES - High flow pump activated
- NO - High flow pump deactivated



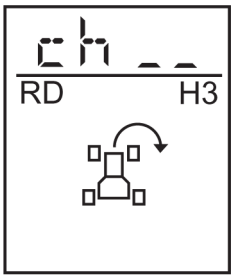
SS07E178 35

To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

HEADLAND TURN SEQUENCE (HTS) OPTIONS

Press the Menu button to call up the 'HTS' sub-system.
"ch _ _" is displayed in the upper section of the display.



BAIL06CCM234AVB

BAIL06CCM234AVB 36

The relevant channel can be called up using the "Up" and "Down" navigation buttons. (The individual channels are described in the following table).

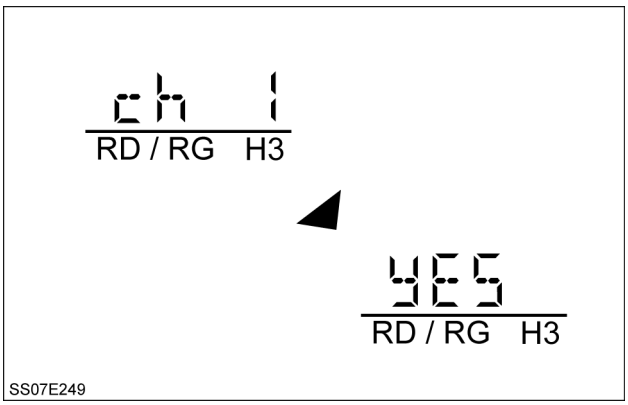
Channel	Description
Channel 1	HTS option selection

Channel 1 - HTS option selection

This channel is used to activate or deactivate the HTS.
Scroll through the available options using the "Up" or "Down" navigation button.

The available options are:

- YES - HTS activate
- NO - HTS deactivate



SS07E249 37

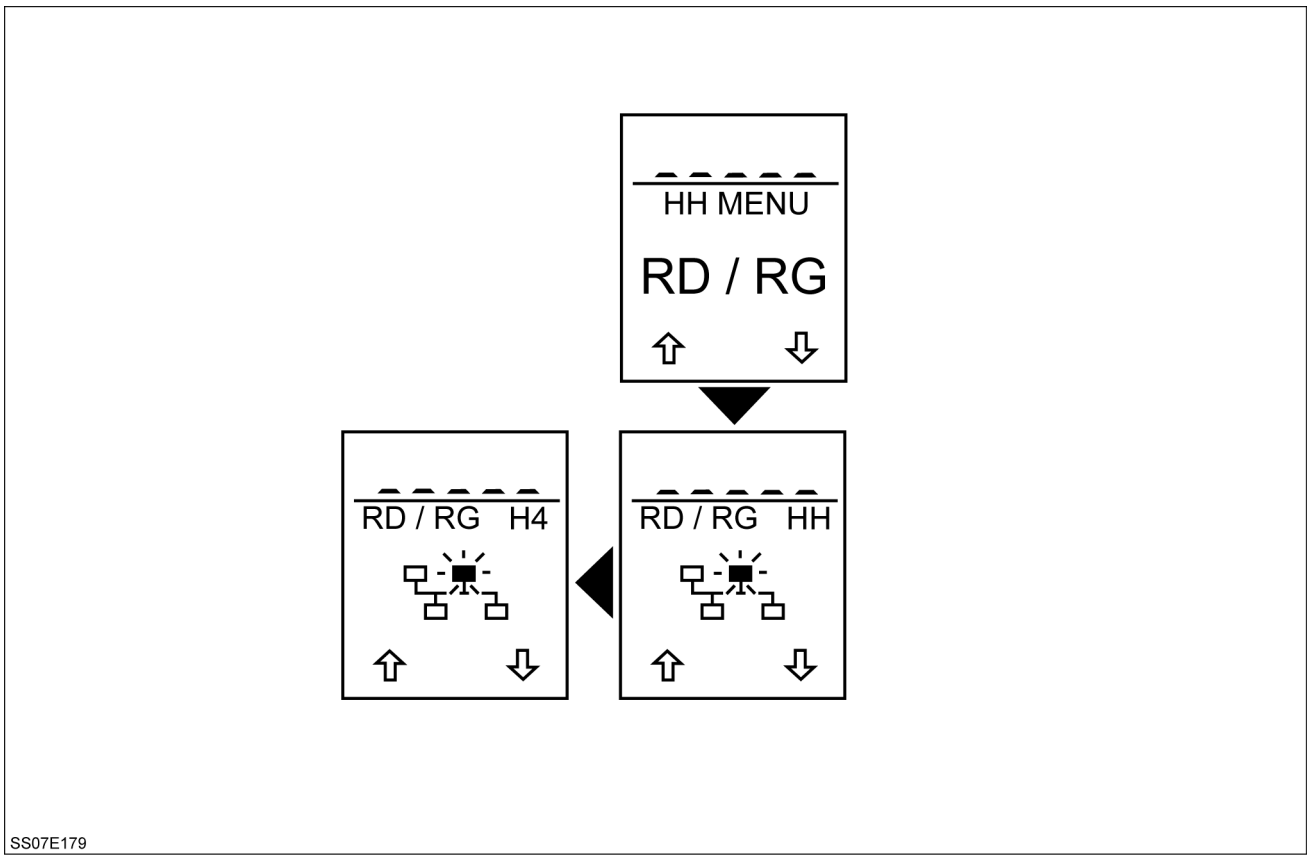
To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

H4 - DISPLAY SOFTWARE VERSION NUMBER

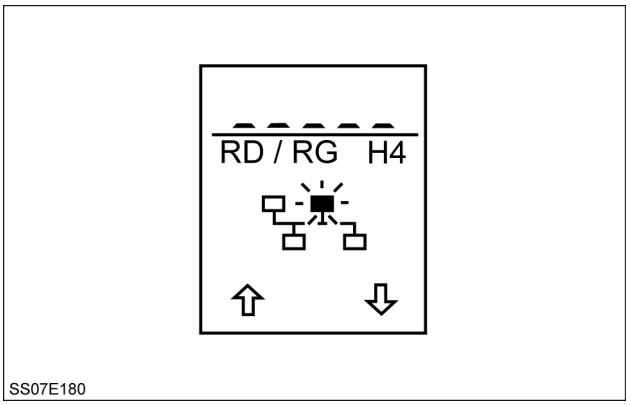
This function is available in all sub-systems.

H4 Menu page selection diagram



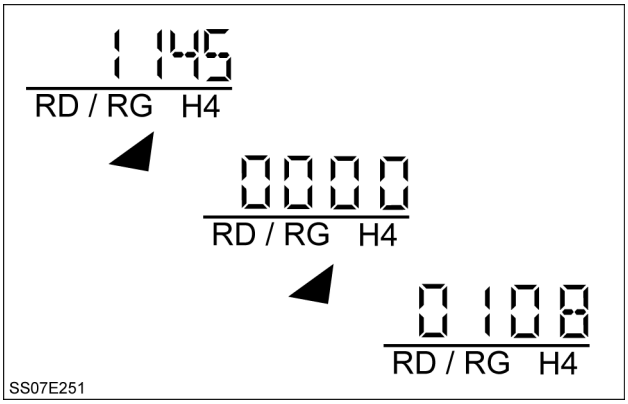
SS07E179 38

Press the Menu button to call up the H4 Menu.



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The software version is automatically displayed in the upper section of the display (as in the illustrated example). After that the "HH" menu can be used again.



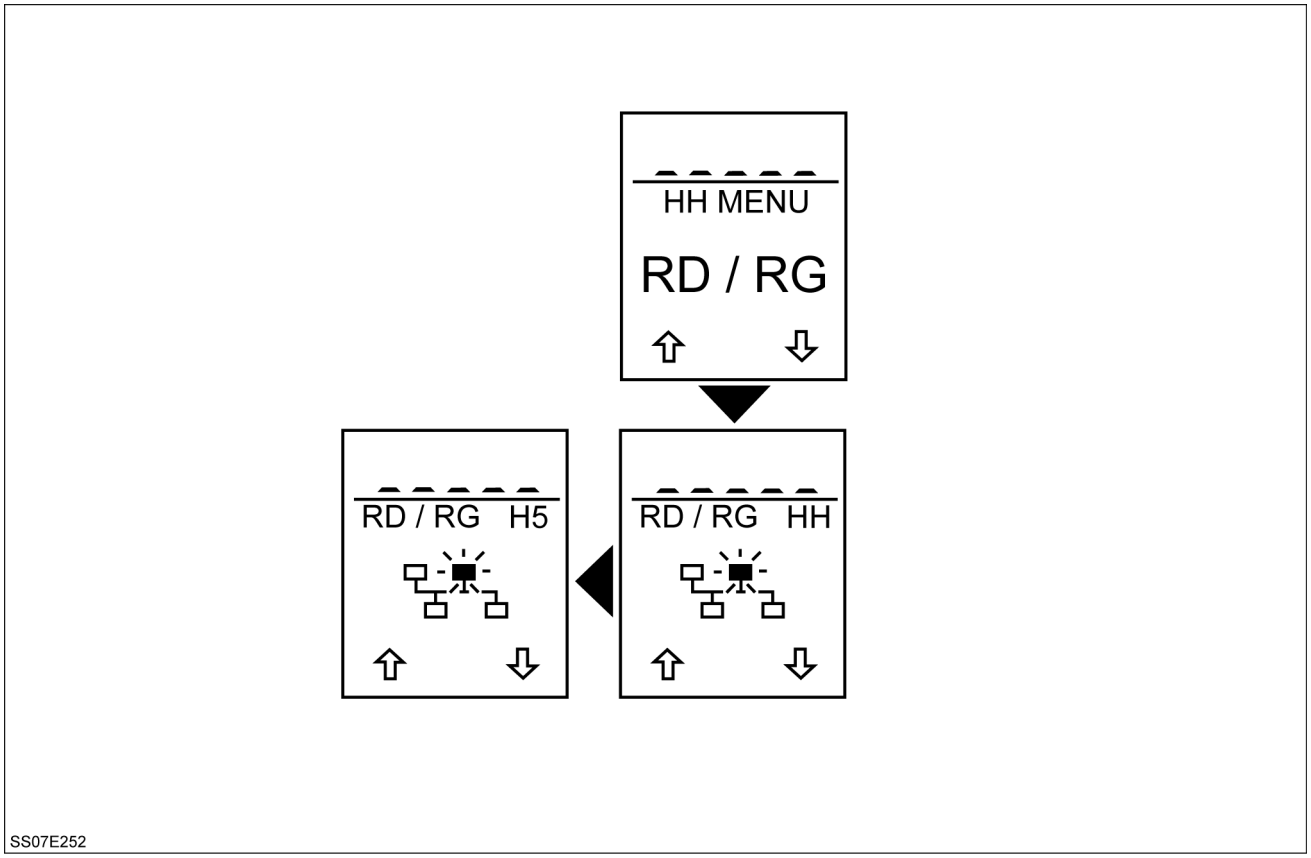
SS07E251 40

The first set of four digits indicates the Software identifier, which uniquely defines the application software present in the module.
The second and third set of four digits indicates the release version of the application software.

H5 - SWITCH OPERATION TEST

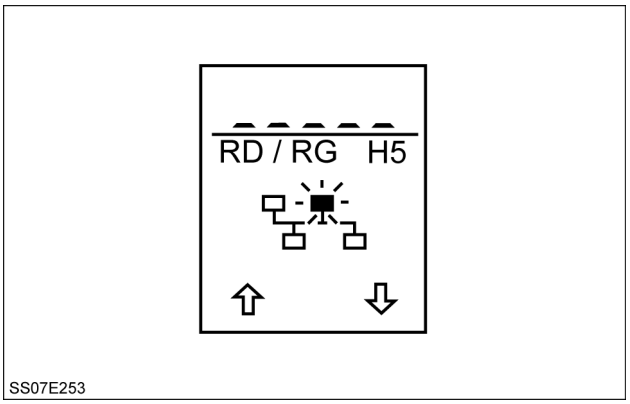
This menu shows a pre-defined code, if a switch's signal exchange is recorded.
This function is available in all sub-systems.

H5 Menu page selection diagram



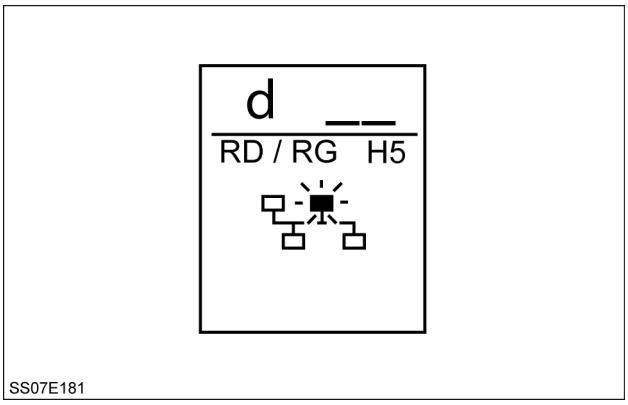
SS07E252 41

Press the Menu button to call up the H5 Menu.



SS07E253 42

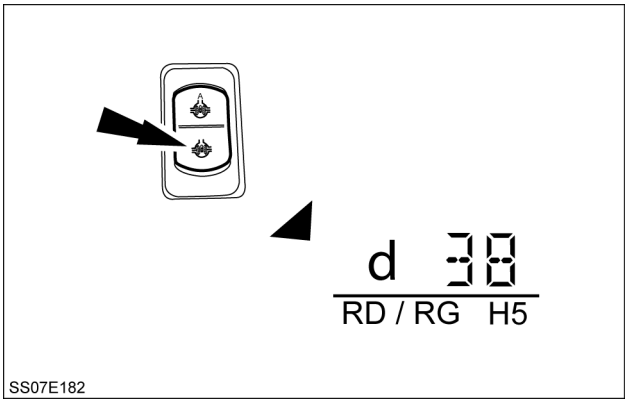
"d _ _" is displayed in the upper section of the display.



SS07E181 43

When a switch is actuated, a code is displayed and a beep reports that the switch is operating correctly.
If no switch code is displayed and no beep sounds, the affected cabling can be tested with a 'loose connection' test.
To isolate the error, look at the display or listen to the beep.

NOTE: *If the starter switch is turned to the Engine Start position, while the shuttle lever is in the Neutral position and the clutch pedal is depressed, a switch consistency error may be displayed.*



SS07E182 44

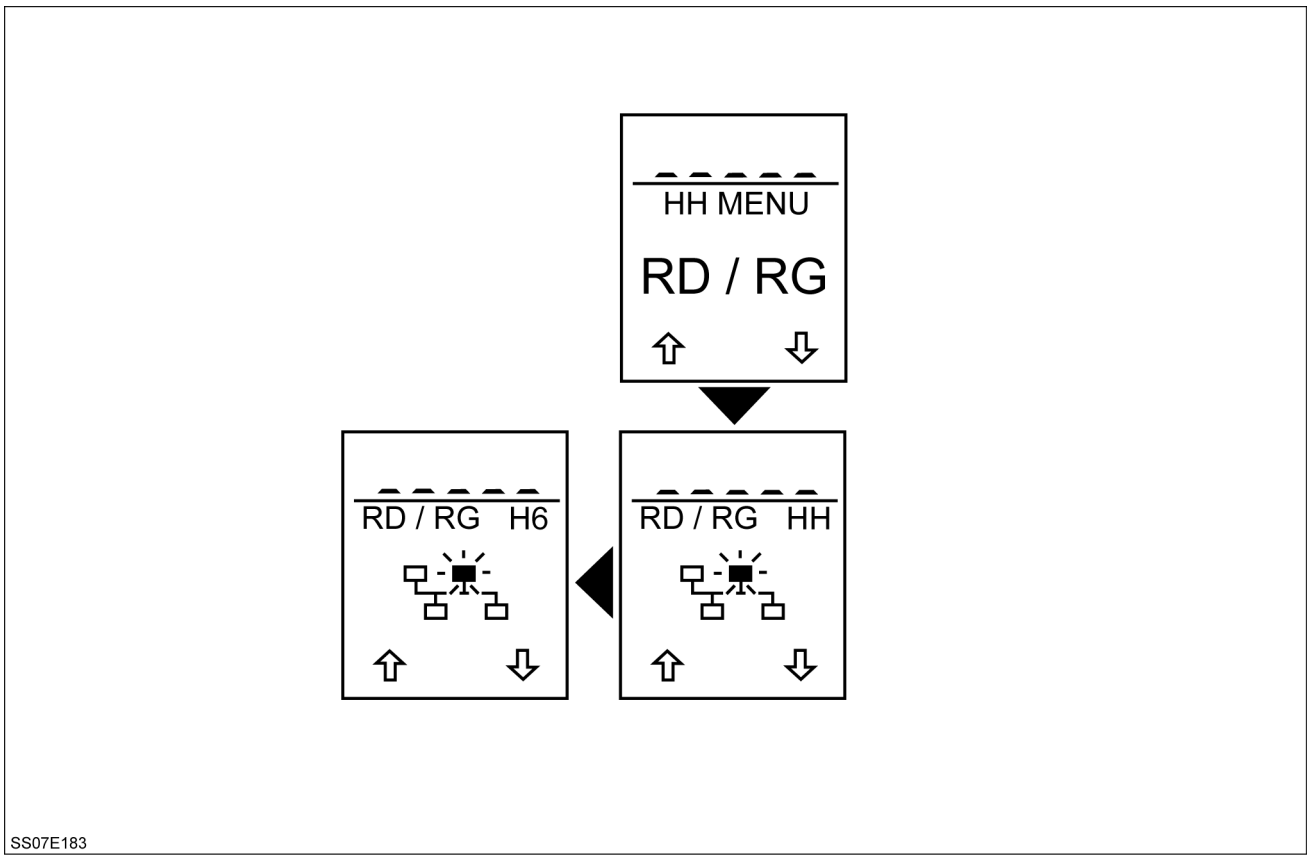
Channel	Control unit plug connection	Pin number	Use	Description
d1	CN1B	30	RD/RG	Fender EDC switch - Lower
d2	CN1B	29	RD/RG	Fender EDC switch - Raise
d3	CN1B	18	RD	Internal EDC work switch (mouse) - Work
d4	CN1B	20	RD	Internal EDC work switch (mouse) - Raise
d5	CN3A	26	RD/RG	Internal EDC work switch (bone) - Work
d6	CN3A	7	RD/RG	Internal EDC work switch (bone) - Raise
d7	CN3A	15	RD/RG	Connection of the NASO lighting
d8	CN1A	21	RD/RG	Crank detect switch
d9	CN1B	11	RD/RG	Fuse 38 sense
d10	CN4	9	RD/RG	Seat switch
d11	CN4	10	RD/RG	Handbrake switch
d12	CN1B	22	RD/RG	Left brake pedal switch
d13	CN1B	23	RD/RG	Right brake pedal switch
d14	CN1A	8	RD/RGRD/RG	Clutch pedal switch (with shuttle lever out of neutral)
d15	CN1B	12	RD/RG	Switch for the shuttle lever - Forwards (with clutch pedal depressed)
d16	CN1B	13	RD/RG	Switch for the shuttle lever - Reverse (with clutch pedal depressed)
d17	CN3A	11	RD	Transmission downshift button
d18	CN3A	10	RD	Transmission upshift button

Channel	Control unit plug connection	Pin number	Use	Description
d20	CN4	17	RD/RG	Reverse clutch pressure switch (bridge switch to test with engine off)
d21	CN4	11	RD/RG	Forward clutch pressure switch (bridge switch to test with engine off)
d23	CN1B	27	RG	Momentary shuttle forward / reverse switch
d24	CN4	16	RG	Momentary shuttle neutral switch
d25	CN1B	27	RD	Transmission neutral switch
d28	CN4	16	RD	Park lock switch
d29	CN3A	6	RD	EDC raise / work fault switch (mouse)
d30	CN4	23	RD	Transmission auto ON-OFF / increase switch
d31	CN3A	14	RD/RG	Air conditioning pressure switch (bridge switch to test with engine off)
d32	CN3A	17	RG	EDC activate switch
d34	CN3A	8	RD/RG	Transmission creeper switch
d37	CN3A	19	RD/RG	Differential lock pressure switch (bridge switch to test with engine off)
d38	CN3B	31	RD/RG	Differential lock switch - Manual
d39	CN3B	30	RD/RG	Differential lock switch - Automatic
d40	CN1B	26	RD/RG	Four wheel drive pressure switch (bridge switch to test with engine off)
d41	CN3A	25	RD/RG	Four wheel drive switch - Manual
d42	CN3A	24	RD/RG	Four wheel drive switch - Automatic
d43	CN4	21	RD/RG	High flow pump chassis link (disconnect and reconnect link on the high flow pump)
d44	CN3A	12	RD/RG	Rear PTO switch - normally open
d45	CN3A	13	RD/RG	Rear PTO switch - normally closed
d47	CN3B	24	RD/RG	Rear PTO brake switch
d48	CN3B	33	RD/RG	Rear PTO speed switch
d49	CN3B	23	RD/RG	Rear PTO switch - Automatic
d50	CN3A	21	RD/RG	HTS switch - record
d52	CN1A	23	RD	HTS / CRPM sequence switch
d53	CN1B	24	RD/RG	Transmission oil pressure switch (bridge switch to test with engine off)
d54	CN4	12	RD/RG	CRPM on/off switch
d55	CN3A	5	RD/RG	Engine speed switch - Reduce
d56	CN3A	4	RD/RG	Engine speed switch - Increase
d57	CN3B	11	RD/RG	CRPM selection switch
d59	CN3A	17	RD	Hand throttle not at idle switch
d60	CN3B	32	RD/RG	Foot throttle not at idle switch
d63	CN3A	18	RD/RG	Rear PTO fender switch - normally open
d64	CN3A	3	RD/RG	Rear PTO fender switch - normally closed
d80	CN4	5	RD/RG	HTS auto switch
d81	CN3A	22	RD/RG	HTS manual switch
d93	CN4	25	RD/RG	Front HPL present link (disconnect and reconnect the 13 pin connector)
d94	CN3A	16	RD	EHR stop switch
d102	CAN BUS		RG	Arm rest unit (ARU) upshift switch
d103	CAN BUS		RG	ARU downshift switch
d104	CAN BUS		RG	ARU HTS switch
d105	CAN BUS		RG	ARU autoshift switch
d116	CAN BUS		RG	ARU transmission range switch
d136	CAN BUS		RG	ARU forward switch
d137	CAN BUS		RG	ARU reverse switch
d139	CAN BUS		RD/RG	Joystick EHR selection switch

Channel	Control unit plug connection	Pin number	Use	Description
d149	CAN BUS		RG	ARU front EHR flow 1 switch
d150	CAN BUS		RG	ARU front EHR flow 2 switch
d151	CAN BUS		RG	ARU front EHR flow 3 switch
d152	CAN BUS		RG	ARU front EHR flow 4 switch

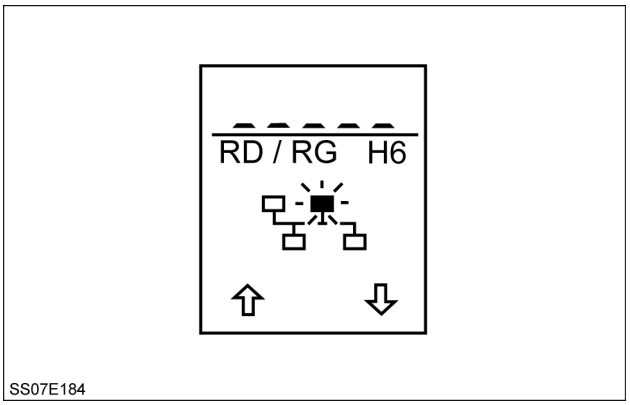
H6 - DISPLAY VEHICLE INFORMATION

H6 Menu page selection diagram



SS07E183 45

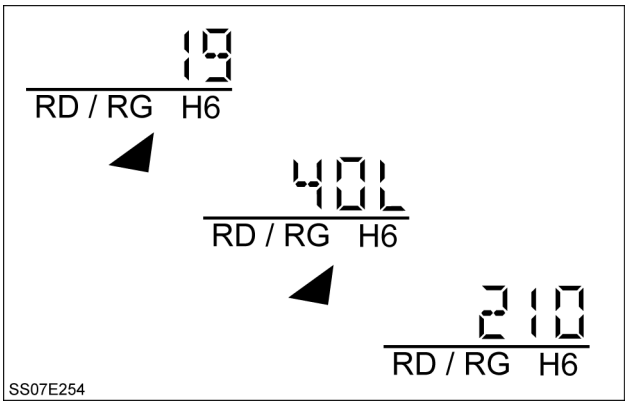
Press the Menu button to call up the H6 Menu.



SS07E184 46

The sequence of the data display runs through automatically in the upper section of the display, for example, as follows:

- 19 Number of gears
- 40L = Transmission speed
- 210PS = Engine horsepower



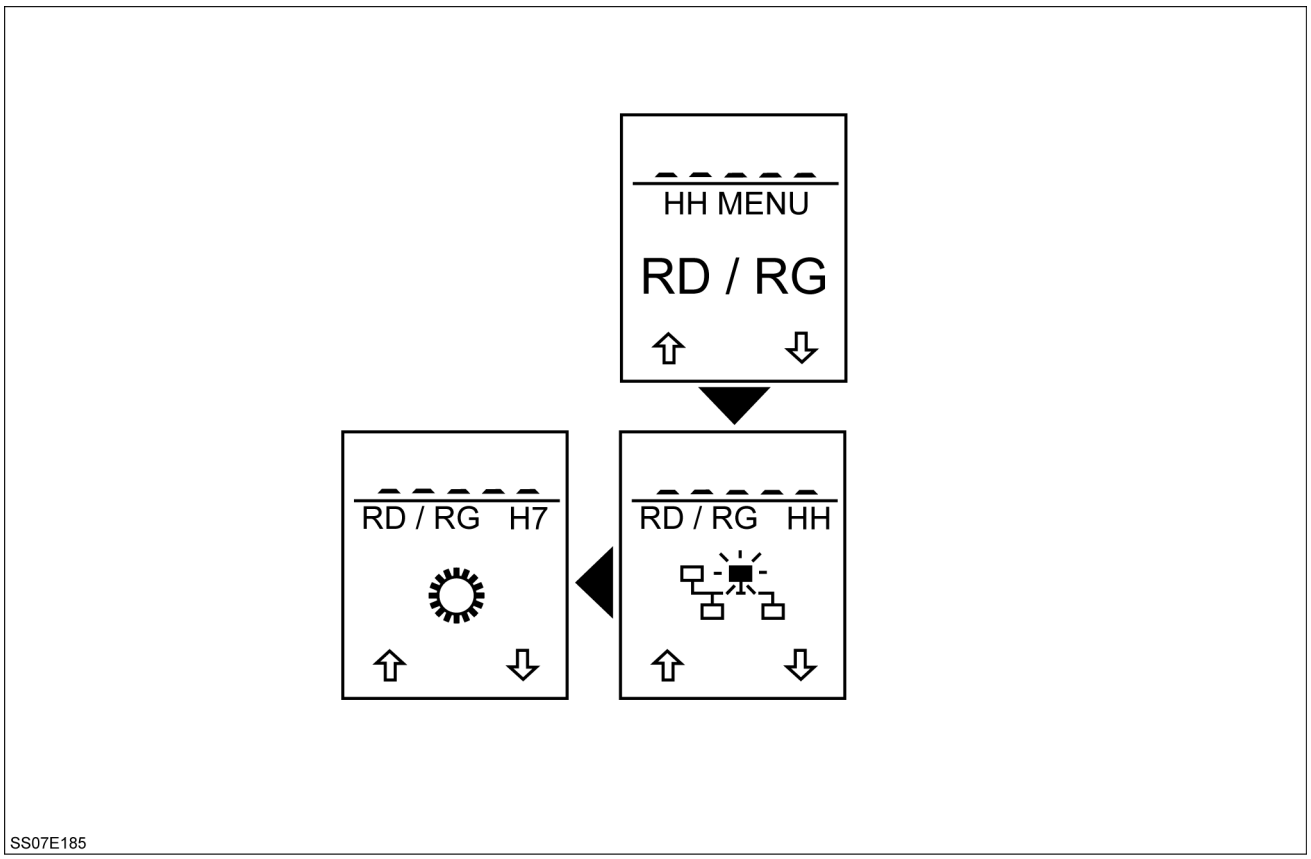
SS07E254 47

After the sequence, the display resets itself and the "HH" Menu can be used again.

H7 - VEHICLE TEST MODES

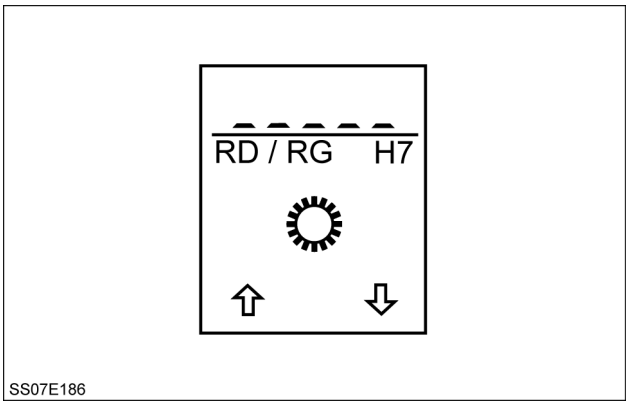
This menu is used to check the clutch disconnect switch adjustment and the transmission synchronisers.

H7 Menu page selection diagram



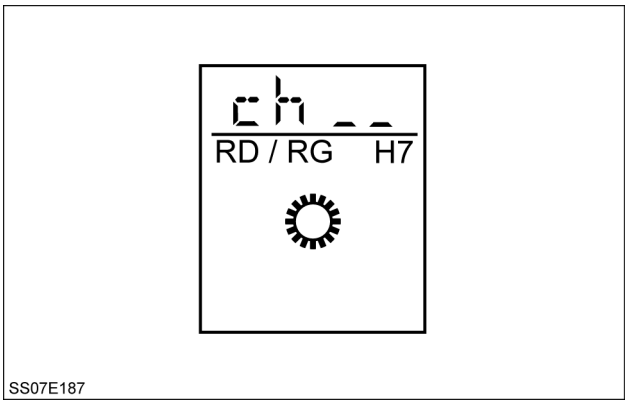
SS07E185 48

Press the Menu button to call up the H7 Menu.



SS07E186 49

"ch _ _" is displayed in the upper section of the display.



SS07E187 50

The relevant channel can be called up using the "Up" and "Down" navigation buttons. (The individual channels are described in the following table).

Channel	Description
Channel 1	Clutch switch adjustment
Channel 2	Manual clutch adjustment
Channel 3	Manual quick fill adjustment
Channel 4	Clutch pressure test
Channel 5	Clutch switch adjustment

Channel 1 - Clutch switch test

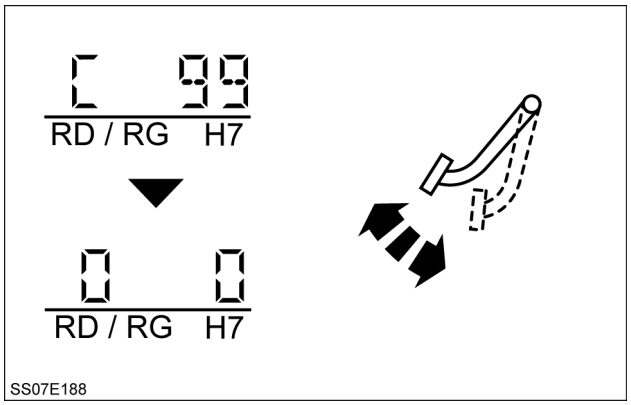
This channel is used to display the clutch pedal setting and status. In addition it also displays the oil temperature. The shuttle lever must be out of neutral for the clutch pedal switch status to change.

The position of the clutch is displayed as a percentage of the pedal travel (99 - 0):

- 99 = Clutch pedal in the upper limit
- 0 = Clutch pedal in the lower limit

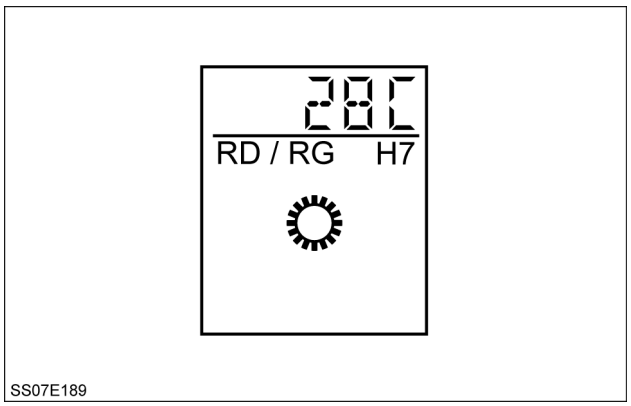
The current switch status is also shown:

- O = Clutch pedal switch open
- C = Clutch pedal switch closed



SS07E188 51

When the clutch pedal remains at the upper limit for longer than 5 seconds, the oil temperature is displayed on the upper section of the display.



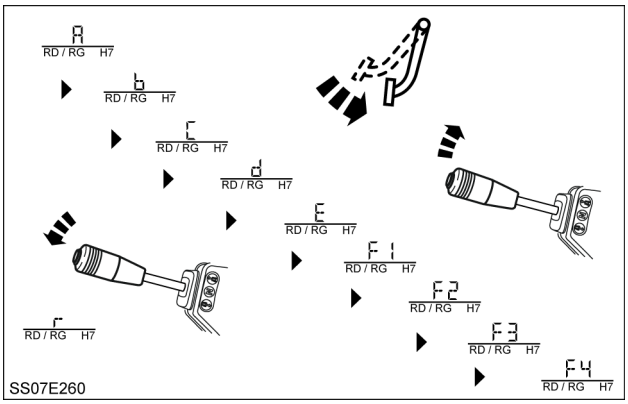
SS07E189 52

To use the "HH" menu further, press the Menu button.

Channel 2 - Manual clutch adjustment

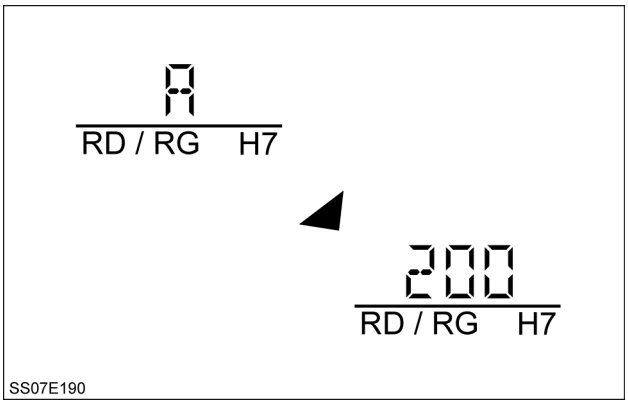
This channel is used to manually test and adjust the calibration values for each clutch.

Select the clutch to be set; to do that, depress the clutch pedal and engage the shuttle lever.
By engaging the shuttle lever in Forwards, the clutches A to F4 are engaged.
By engaging the shuttle lever in Reverse, the reverse clutch is selected.



SS07E260 53

After a delay, the currently stored value for the selected clutch is displayed on the upper section of the display.



SS07E190 54

The calibration values can be altered using the Upshift and Downshift buttons.
To check the calibration, move the shuttle lever out of the Neutral position and release the clutch pedal completely. Two clutches are subjected to low pressure to create torque through the transmission. Then the set clutch is pressurised up to the value at which it reaches the biting point and begins to engage.
To test the same clutch again, depress the clutch pedal a little and then release again.

Channel 3 - Manual quick fill adjustment

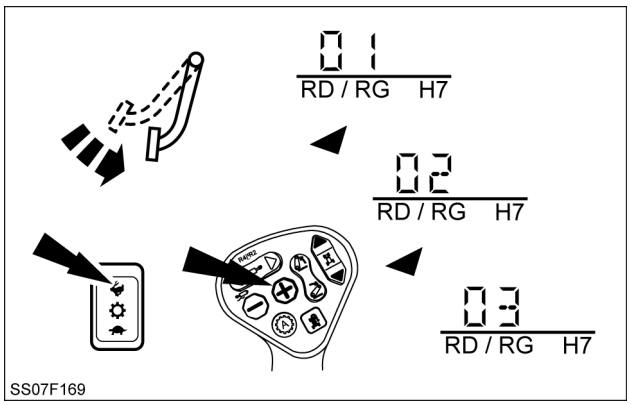
This channel is used to adjust and test the quick fill settings for each clutch.

The quick fill settings can be tested in one of three ways.

The quick fill test methods are:

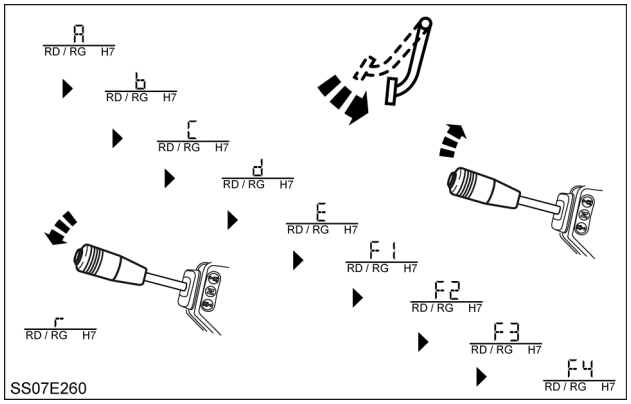
1. Two clutches are subjected to low pressure to create a torque through the transmission. The clutch being tested is subjected to its CAL_P_NOM pressure.
2. One clutch is subjected to low pressure, a second clutch is subjected to low pressure together with the clutch, which is to be set to its CAL_P_NOM pressure.
3. Two clutches are subjected to low pressure and at the same time, the CAL_P_NOM pressure is applied to the clutch being calibrated.

To select the test method, depress the clutch pedal and scroll through the options using the Upshift button.



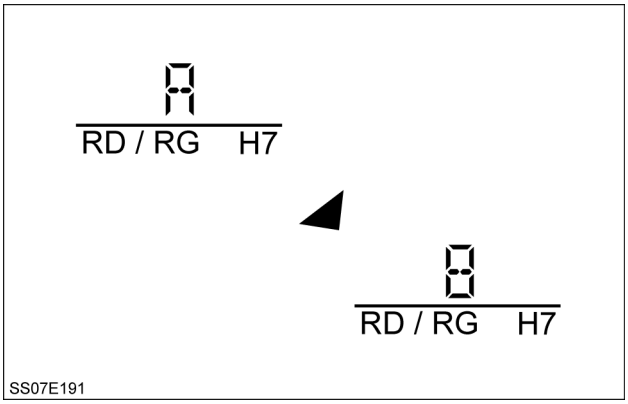
SS07F169 55

Select the clutch to be set; to do that, depress the clutch pedal and engage the shuttle lever.
By engaging the shuttle lever in Forwards, the clutches A to F4 are engaged.
By engaging the shuttle lever in Reverse, the R clutch is engaged.



SS07E260 56

After a delay, the code for the clutch solenoid valve and then the currently stored value are displayed.



SS07E191 57

To correct the setting, release the clutch pedal and press the Upshift or Downshift button, until the desired setting appears.
To use the "HH" menu further, press the Menu button.

Channel 4 - Clutch pressure test

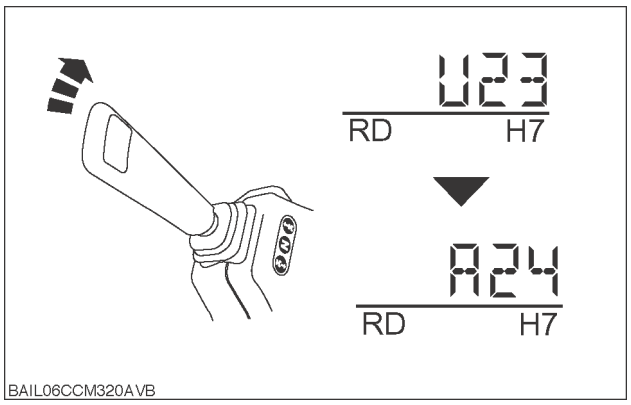
This channel is used to test the pressure of the individual clutches.

Place the shuttle lever in the Forwards position.

The following is displayed in the upper display:

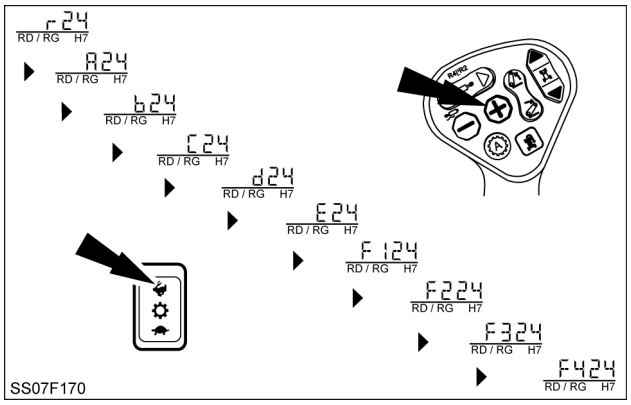
- U23 = Neutral position
- A24 = Forward

The handbrake must be ON, or the fault code 'U20' is shown on the display.



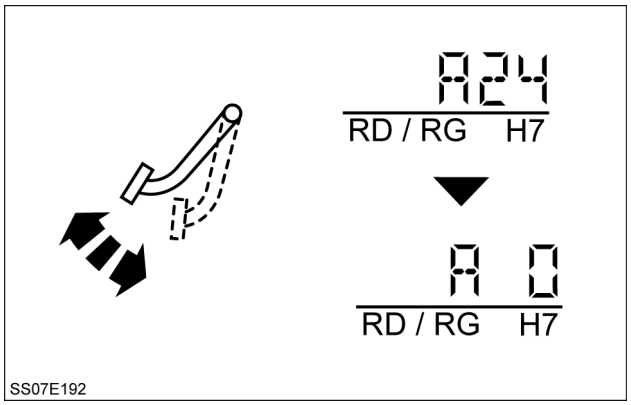
BAIL06CCM320AVB 58

Select the clutch to be tested by pressing the Upshift button.



SS07F170 59

If the clutch pedal is operated from the upper limit, the upper section of the display displays 'A24' and then 'A20' backwards to 'A0'.



SS07E192 60

If the clutch pedal position is lower than **30 %**, then the pressure value is set to zero.
With a pedal position of **30 %** the clutch pressure is set to **1 bar** and rises linearly to **20 bar** as soon as the clutch pedal is moved up to **75 %**.
Above **75 %** of the clutch pedal travel, the pressure is set to the maximum pressure of **24 bar**.

Press and hold the Downshift button to switch on the power supply to the clutch solenoid valve.

Channel 5- Clutch Switch Adjustment

This channel is an alternative to channel 1 for adjusting the clutch switch. The transmission is enabled in this state.

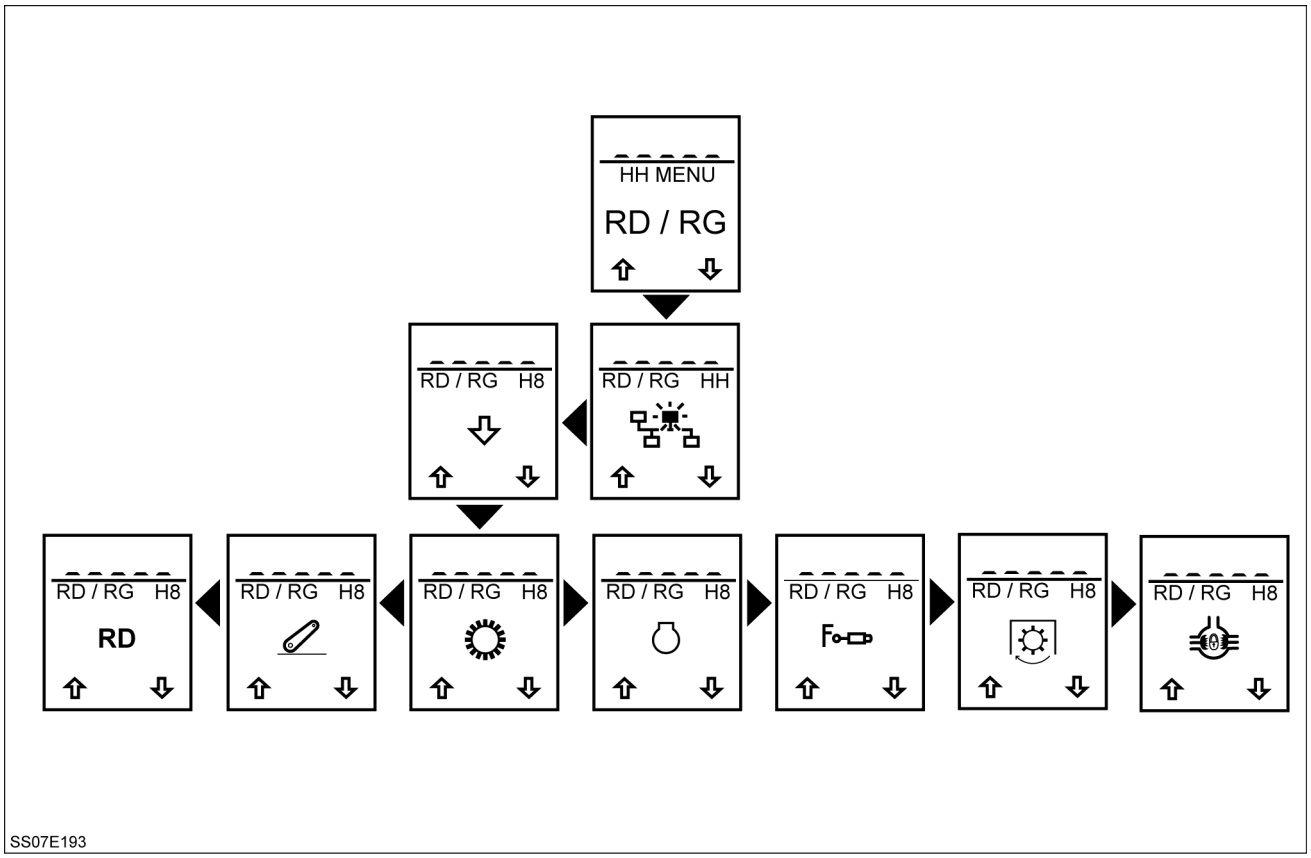
Place the shuttle lever into the forward position The display will show ’n’ if the lever is in neutral.

- When the display shows "CP", cycle the clutch pedal.
- When the clutch pedal is released the display will show a value in the range 8-14, if the switch is correctly adjusted.
- If the switch is incorrectly adjusted the display will show "CL" and the screw will need to be rotated clockwise, or the display will show "CCL" and the screw will need to be rotated in an anti-clockwise direction.

Adjust the screw in the direction indicated by the display and cycle the clutch pedal and repeat the procedure until the display shows the correct value.

H8 - CLEARING THE EEPROM MEMORY

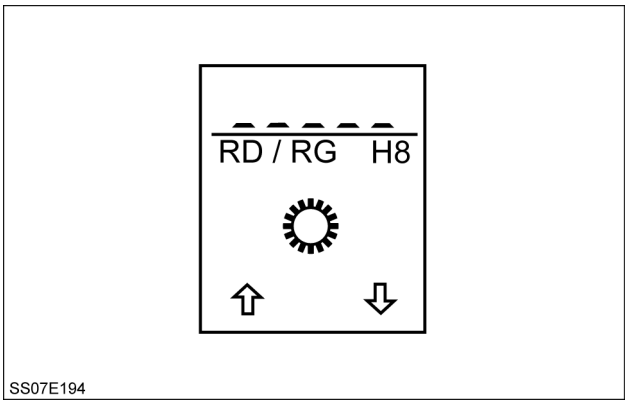
This menu is used to clear the calibration values and stored error codes, with all EEPROM values being reset to the default.
All calibration values and fault codes are stored in the EEPROM memory. This memory is not cleared by a break in the voltage supply to the electronic control unit, i. e. when the battery is disconnected.



SS07E193 61

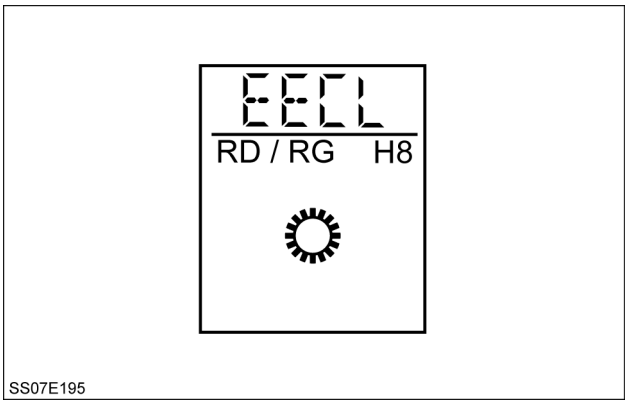
IMPORTANT: *After the menu page with the control unit code letters "RD" is selected, the EEPROM memories of all sub-systems are reset.*

Select the sub-system, whose EEPROM is to be reset, by pressing the Menu button, as in the illustrated example.



SS07E194 62

"EECL" is displayed in the upper section of the display.



SS07E195 63

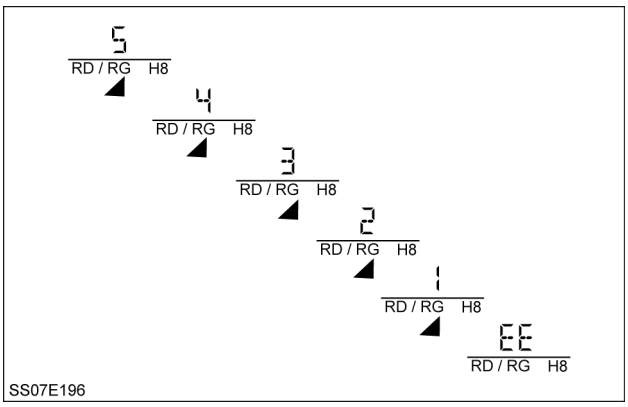
⚠ CAUTION ⚠

H8 will clear all calibrations values and stored error codes.

B006

NOTE: *If the "Down" navigation button is released before the end of the countdown, the process is aborted.*

To confirm the EEPROM reset, press and hold the "Down" navigation button.
The numbers 5 to 1 run backwards in the upper section of the display, then "EE" appears to inform you that the EEPROM has been cleared.
Turn the starter switch to OFF.



SS07E196 64

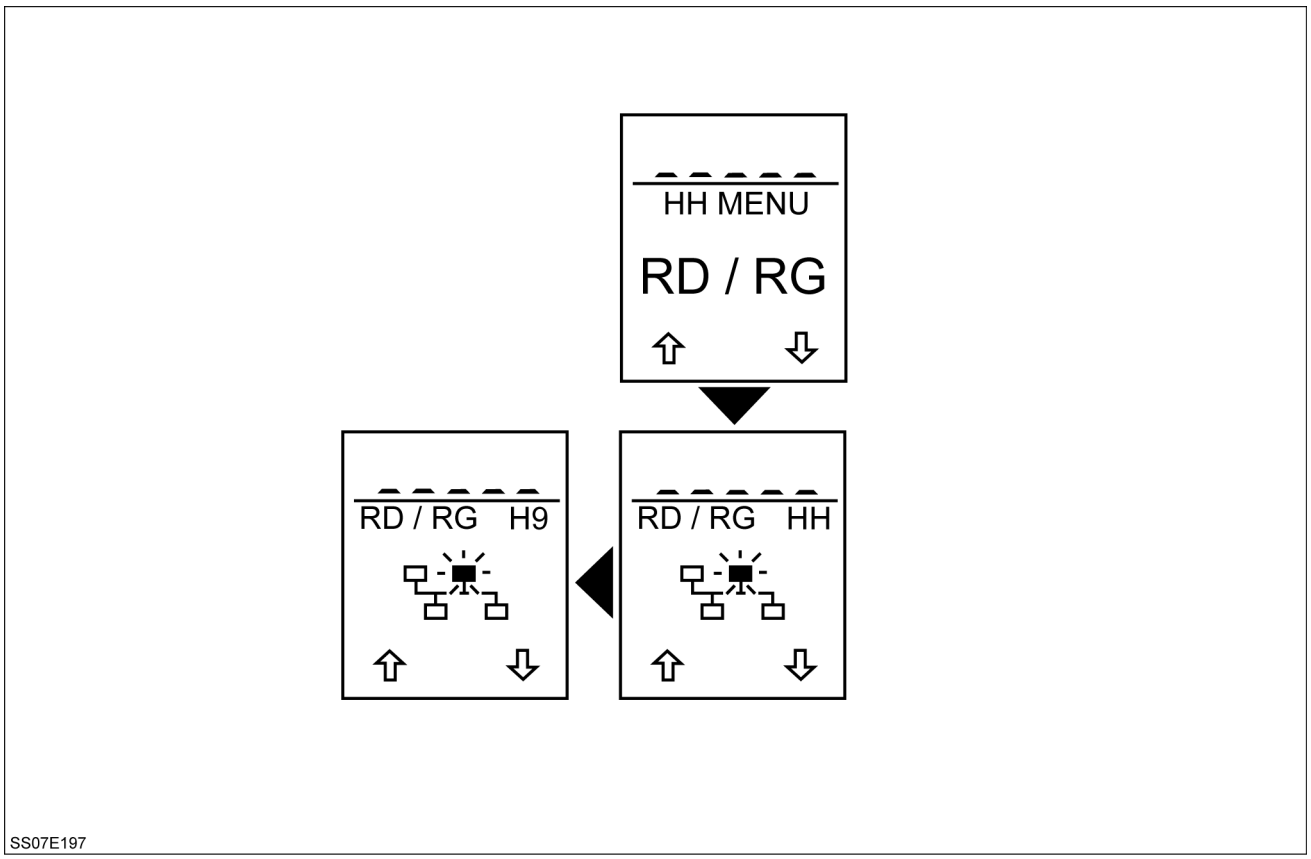
H9 - VOLTMETER

This menu is used to check the setting of the individual potentiometers, voltage sources and solenoid valve circuits. If a temporary error is recorded in a circuit, the relevant cabling can be tested for a loose connection. When doing this, check whether the values in the display change erratically to isolate the error range.

NOTE: *The vehicle may be driven while in this menu.*

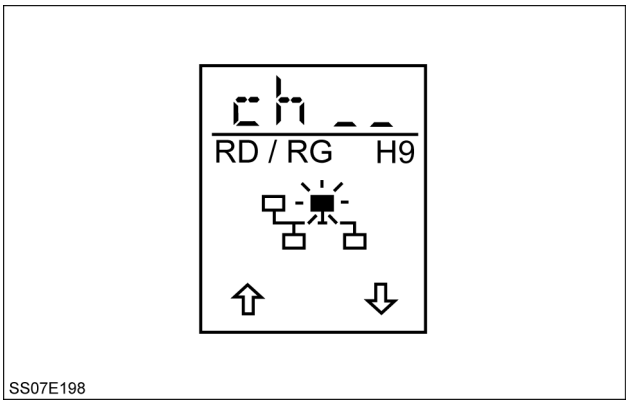
This function is available in all sub-systems.

H9 Menu page selection diagram



SS07E197 65

Press the Menu button to call up the H9 Menu.
"ch _ _" is displayed in the upper section of the display.



SS07E198 66

The relevant channel can be called up using the "Up" and "Down" navigation buttons.
After a delay, the value is displayed. Compare the displayed value with the standard value from the following table.

NOTE: *The value is the input voltage or the input signal of the electronic control unit. This value cannot be directly converted to a voltage value because of the internal processes in the control unit. A zero corresponds to* ***0 volts****.*

If the displayed value deviates from the desired value in the following table by more than **10 %**, there is a fault either in the component or in the cabling of the affected channel.

NOTE: *Before replacing any components, test the plug connections of the relevant circuit including the plug connection of the electronic control unit.*

Channel	Controller pin	Description	Use	Typical reading
1	CN4-20	Clutch pedal position	RD/RG	72 Not depressed 26 Depressed
2	CN1B - 14	Transmission temperature sensor	RD/RG	**75 %** at **40 °C**.
3	CN1B - 11	Fuse 38 sense	RD/RG	99
5	CN1B - 16	**+5 Volt** voltage supply to the sensors	RD/RG	48
6	CN1B - 25	**+8 Volt** voltage supply to the sensors	RD/RG	79
7	CN1A - 1	**+12 Volt** VF input signal (see explanation)	RD/RG	45
8	CN1A - 8	**+12 Volt** VD input signal (see explanation). Shuttle lever in forward	RD/RG	45
9	CN1A - 20	**+12 Volt** VH input signal (see explanation)	RD/RG	45
10	CN3B - 24	**+12 Volt** VT input signal (see explanation)	RD/RG	45
11	CN4 - 9	Seat switch	RD/RG	69 - operator in seat 36 - operator not in seat
29	CN3A - 9	Creeper position potentiometer	RD/RG	-
30	CN2 - 4	Raise solenoid for the EDC control valve	RD/RG	0 Off - 66 On
31	CN2 - 5	Lower solenoid for the EDC control valve	RD/RG	0 Off - 66 On
32	CN1B - 2	Lift arm position potentiometer	RD/RG	6 Lowered - 79 Raised
33	CN1B - 3	Lift control potentiometer	RD/RG	10 Lowered - 88 Raised
34	CN1B - 4	Drop rate control potentiometer	RD/RG	84 Clockwise - 14 Anti-clockwise
35	CN1B - 5	Control knob for height limit control	RD/RG	84 Clockwise - 14 Anti-clockwise
36	CN1B - 6	Sensitivity control potentiometer	RD/RG	84 Clockwise - 14 Anti-clockwise
37	CN1B - 7	Slip limit control potentiometer	RD/RG	84 Clockwise - 14 Anti-clockwise
38	CN1B - 9	Right hand load sensing pin (no mounted implement)	RD/RG	46
39	CN1B - 10	Left hand load sensing pin (no mounted implement)	RD/RG	46
40	CN1B - 8	Draft load control potentiometer	RD/RG	88 Clockwise - 10 Anti-clockwise
41	CN3A - 7	EDC raise switch (bone)	RD	30 Not actuated - 68 Actuated
42	CN3A - 26	EDC lower switch (bone)	RD	30 Not actuated - 68 Actuated
43	CN2 - 8	Current solenoid valve clutch A	RD/RG	70 Engaged - 0 Disengaged
44	CN2 - 1	Current solenoid valve clutch B	RD/RG	70 Engaged - 0 Disengaged
45	CN2 - 5	Current solenoid valve clutch C	RD/RG	70 Engaged - 0 Disengaged
46	CN2 - 3	Current solenoid valve clutch D	RD/RG	70 Engaged - 0 Disengaged

Chan-nel	Con-troller pin	Description	Use	Typical reading
47	CN3B - 1	Current solenoid valve clutch E	RD/RG	70 Engaged - 0 Disengaged
48	CN3A - 6	EDC raise / work fault line		0 Not actuated - 99 Actuated
49	CN3B - 18	Rear PTO solenoid current	RD/RG	0 Off - 99 On
52	CN3B - 2	Creeper solenoid current	RD/RG	0 Off - 99 On
58	CN3B - 3	Low range solenoid current	RD/RG	0 Off - 70 On
59	CN2 - 7	Mid range solenoid current	RD/RG	0 Off - 70 On
60	CN2 - 2	High range solenoid current	RD/RG	0 Off - 70 On
61	CN2 - 13	19th gear solenoid current	RD/RG	
62	CN3B - 10	19th gear dump solenoid current	RD/RG	
66	CN3B - 4	Reverse range solenoid current	RD/RG	0 Off - 70 On
76	CN1B - 12	Forwards position sensor of the shuttle lever		30 Not actuated - 68 Actuated
77	CN1B - 13	Reverse position sensor of the shuttle lever	RD/RG	30 Not actuated - 68 Actuated
80	CN4 - 16	Park lock switch (shuttle lever)	RD/RG	30 Park lock On - 68 Park lock Off
81	CN3A - 10	Upshift button	RD	30 Not actuated - 68 Actuated
82	CN3A - 11	Downshift button	RD	30 Not actuated 68 Actuated
83	CN3A - 17	Hand throttle low idle input		0 at low idle - 99 not at low idle
84	via CAN	Boost pressure engine intake	RD/RG	
85	via CAN	Engine intake boost pressure sensor	RD/RG	
86	via CAN	Oil temperature sensor	RD/RG	
87	via CAN	Rail pressure sensor	RD/RG	
88	via CAN	Fuel temperature sensor	RD/RG	
89	CN3A - 2	Hand throttle potentiometer 2	RD	4 at idle - 36 at maximum rpm
90	CN3A - 1	Hand throttle potentiometer 1	RD	6 at idle - 73 at maximum rpm
90	via CAN	Hand throttle potentiometer 1	RG	6 at idle - 73 at maximum rpm
91	CN1B - 1	Foot throttle potentiometer	RD/RG	10 at idle - 85 at maximum rpm
97	via CAN	EHR joystick (X)	RG	
98	via CAN	EHR joystick (Y)	RG	
132	via CAN	EHR thumbwheel	RG	

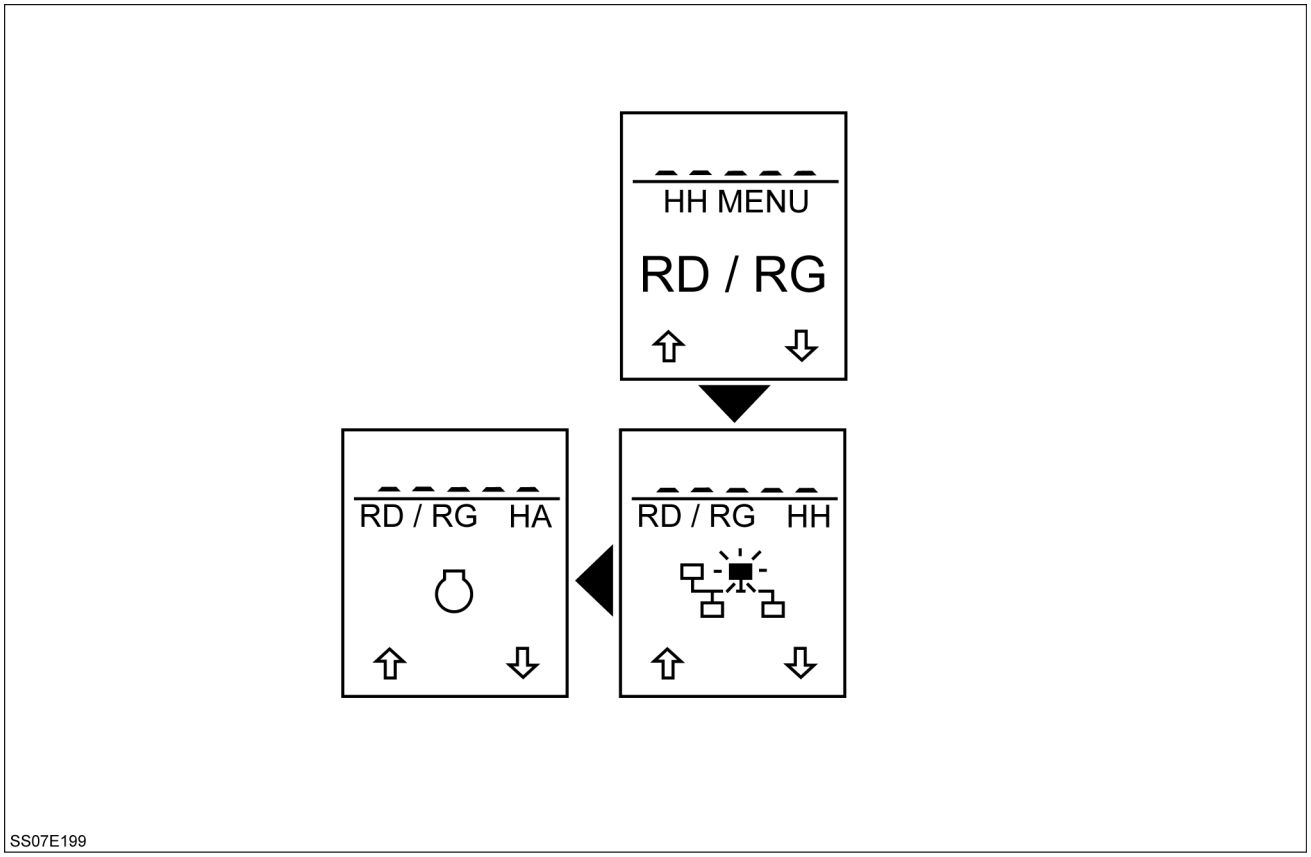
Explanations:

VF input signal: This is the input voltage into the controller to transmission components not directly affected by the clutch pedal switch, i.e. forward and reverse synchroniser solenoid, creeper solenoid and four wheel drive solenoids.
VD input signal: This is the input voltage into the controller to transmission components directly affected by the clutch pedal switch, i.e. PWM solenoids.
VH input signal: This is the input voltage into the controller to EDC components i.e. raise and lower solenoids.
VT input signal: This is the input voltage into the controller to rear PTO clutch, rear PTO brake and differential lock solenoids.

HA - DEMONSTRATION MODE MENU

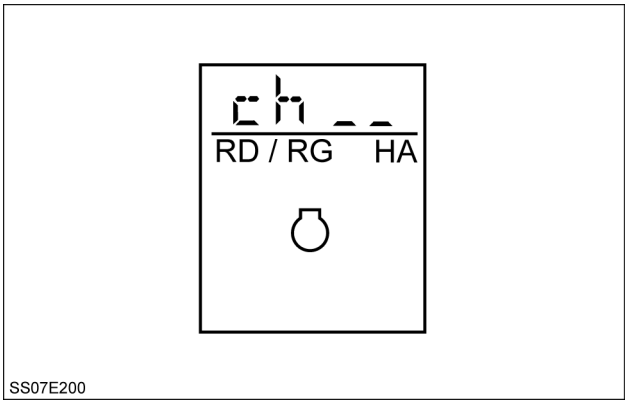
Used to demonstrate the engine power boost.

HA Menu page selection diagram



SS07E199 67

Press the Menu button to select the HA Menu.
"ch _ _" is displayed in the upper section of the display.



SS07E200 68

The relevant channel can be called up using the "Up" and "Down" navigation buttons. (The individual channels are described in the following table).

Channel	Description
Channel 1	Demo mode of engine power boost

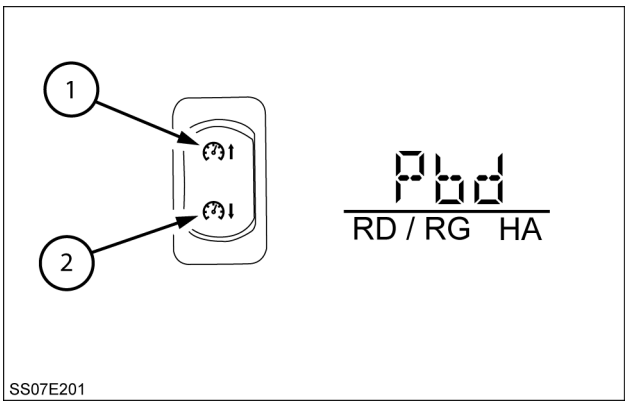
Channel 1 - Demo mode of engine power boost

The power boost is activated when the following conditions are met:

- No PTO torque sensor or calibration error codes.
- The PTO is completely engaged.
- The speed of the tractor is higher than **0.5 Km/h**.
- The engine speed is higher than **1300 rev/min**.
- The coolant temperature is below **105 °C**.
- The PTO transmits a torque of at least **250 Nm**.

"Pbd" (Power boost demonstration) is displayed on the lower central display.
Start the engine and operate the tractor to activate the engine power boost, the power boost lamp on the cluster will illuminate.
Engine power boost will operate as normal, but can be switched on and off using the CRPM switch.
Use the constant speed Increase button **(1)** to switch the power boost ON.
Use the constant speed Decrease button **(2)** to switch the power boost OFF.

NOTE: *The power boost demo mode is deactivated when the starter switch is switched off.*

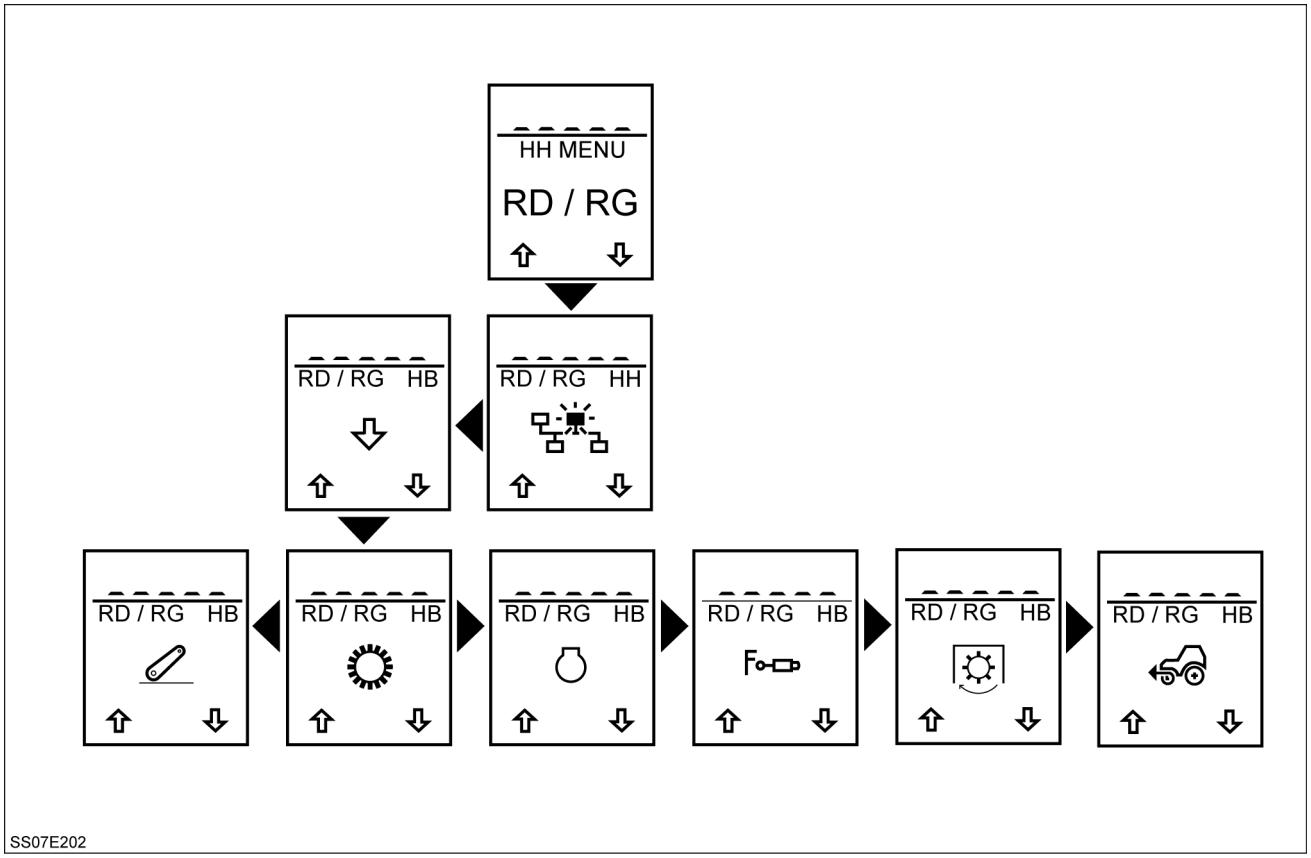


SS07E201 69

HB - DISPLAY STORED FAULT CODES

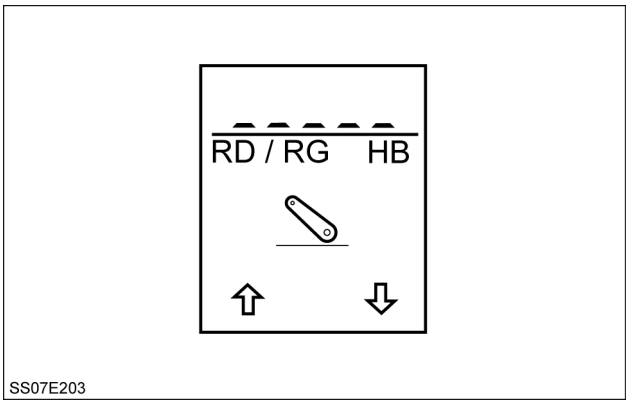
This menu is used to display the fault codes, which are stored in the EEPROM of the electronic control unit.
Each control unit is capable of storing up to ten fault codes for each sub system.
This function is available in all sub-systems.

HB Menu page selection diagram



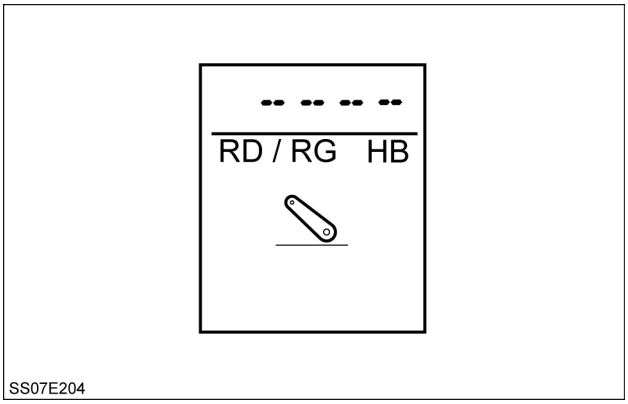
SS07E202 70

Select the desired sub-system by pressing the Menu button, as in the illustrated example.



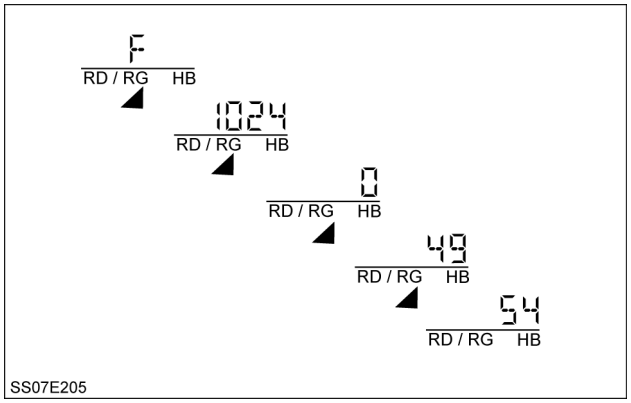
SS07E203 71

In the upper section of the display, "_ _ _ _" is displayed if no fault code is stored in the selected sub-system.



SS07E204 72

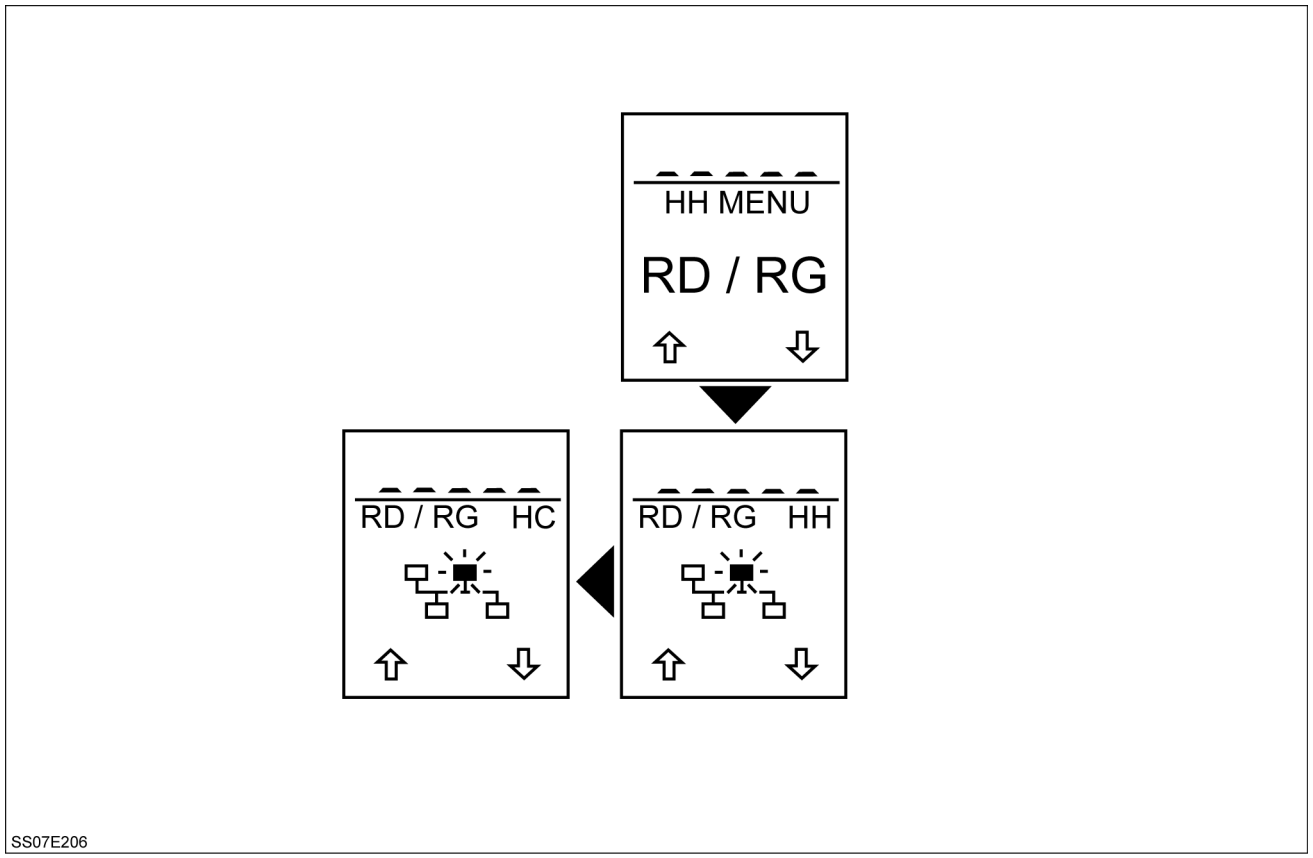
"F" is displayed in the upper section of the display, if a fault code is stored in the selected sub-system.
The fault code display then runs through automatically as in the following example:
1024 Error code
0 Operating hours at the time of the first occurrence
49 Operating hours at the time of the last occurrence
54 Number of occurrences
Press the "Up" or "Down" navigation button to change to the next fault code in the list.
As soon as the end of the list is reached, "- - -" is displayed on the upper section of the display.
To use the "HH" menu further, press the Menu button.



SS07E205 73

HC - CLEAR ALL STORED FAULT CODES

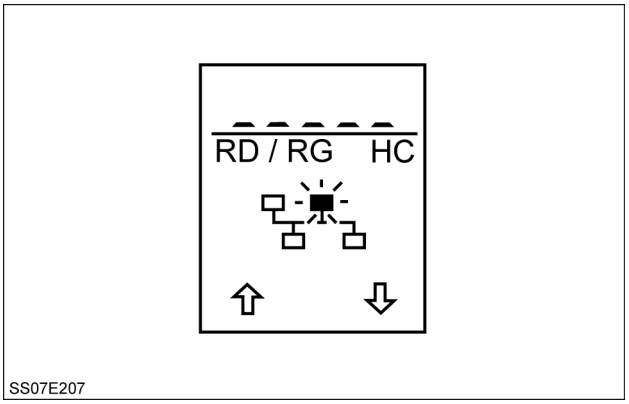
HC Menu page selection diagram



SS07E206 74

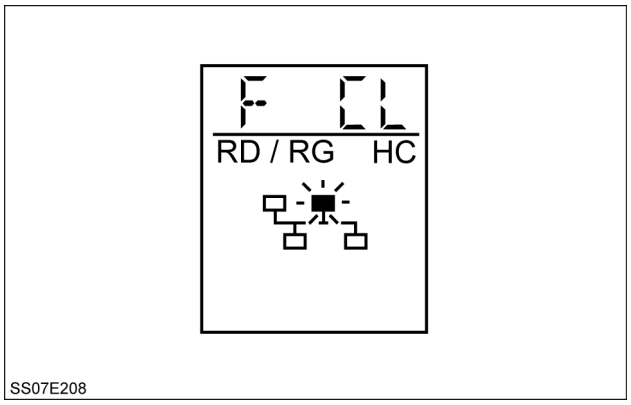
NOTE: *Always write the stored fault codes down before clearing.*

Press the Menu button to call up the HC Menu.



SS07E207 75

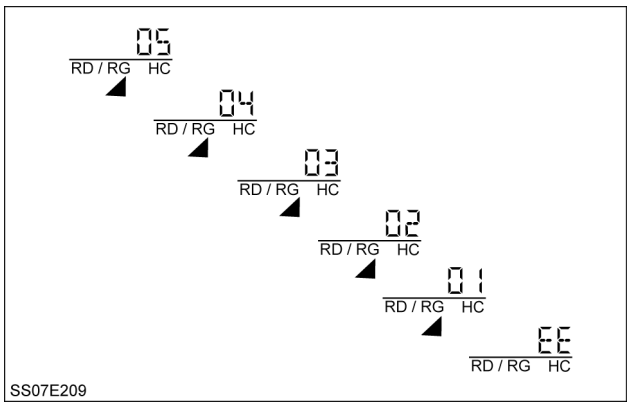
"F CL" is displayed in the upper section of the display.



SS07E208 76

NOTE: *If the "Down" navigation button is released before the end of the countdown, the process is aborted.*

To confirm the EEPROM reset, press and hold the "Down" navigation button.
The numbers 05 to 01 run backwards in the upper section of the display, then "EE" appears to inform you that the EEPROM has been cleared.



SS07E209 77

To use the "HH" menu further, press the Menu button.

HD - DIRECT ACCESS TO TRANSMISSION SETUPS

This menu makes possible direct access to various setting and options for the transmission.

NOTE: *This menu is not available while the diagnostics switch is in use.*

Vehicles without Multicontroller.
Enter the mode by placing the shuttle lever in the forward position, press the Auto Function switch at key on with the clutch pedal released. If the vehicle is not fitted with an Auto Function switch use the Downshift switch.
Vehicles with Multicontroller.
Enter the mode by placing the shuttle lever in the forward position, press the Neutral button at key on with the clutch pedal released.

'OPT_' is displayed on the central display of the instrument cluster. Scroll through the available options using the "Up" and "Down" navigation buttons.

When the desired option is displayed, the display changes after a few seconds and the procedure for the selected option can be carried out.

Option	Description
1	GAC (Adjustable gear difference)
2	LAG (Lowest Automatic Gear)

GAC (Adjustable gear difference)

This mode is used to adjust the adjustable gear difference of the shuttle lever.
Press the 'Upshift' or 'Downshift' switch to increase or reduce the setting between -3 and +3 .

LAG (Lowest Automatic Gear)

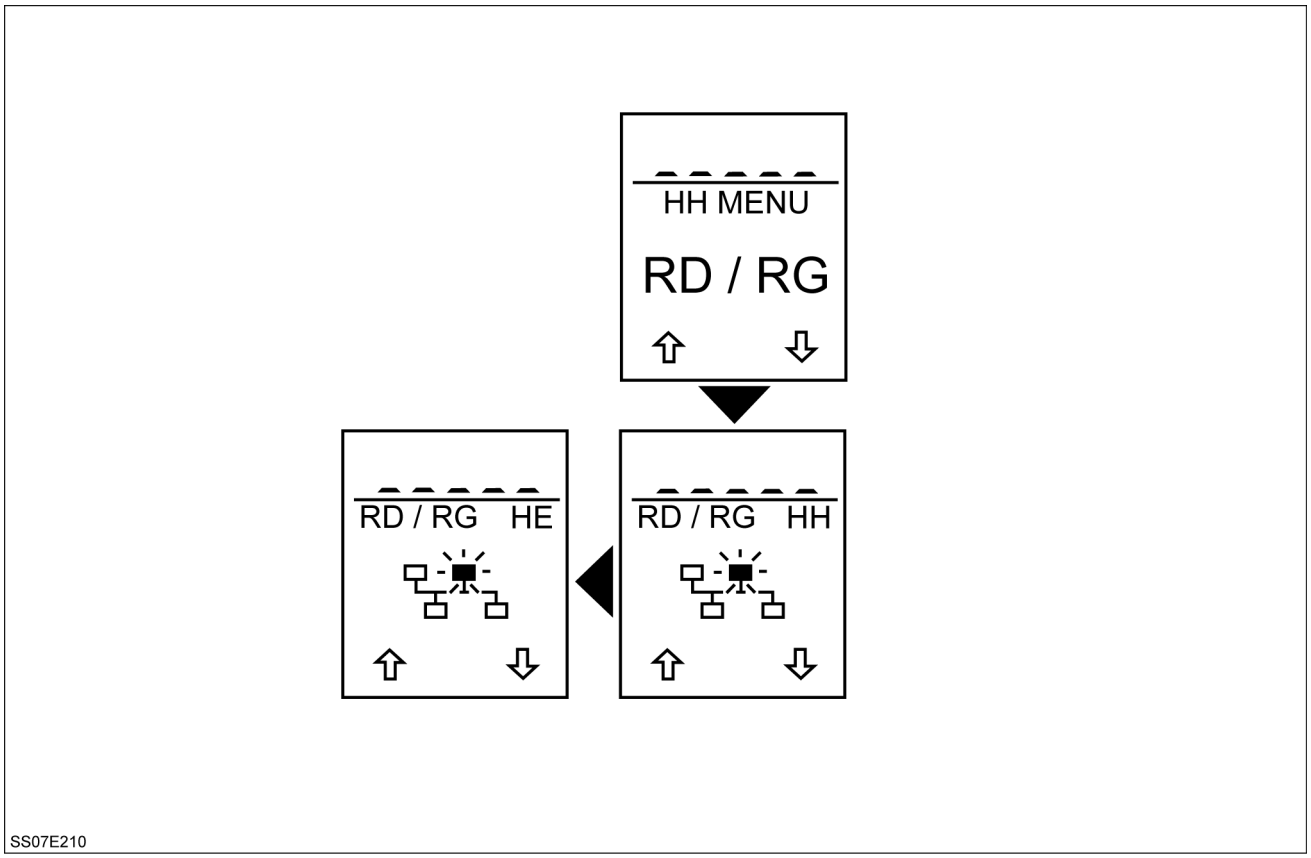
This mode is used to select the lowest standard gear available in the operating mode 'Auto Transport'.
Scroll through the available value ranges between 7 and 12 using the "Up" and "Down" navigation buttons.

HE - DISPLAY FREQUENCY INPUTS

This menu is used to function test the various frequency inputs.

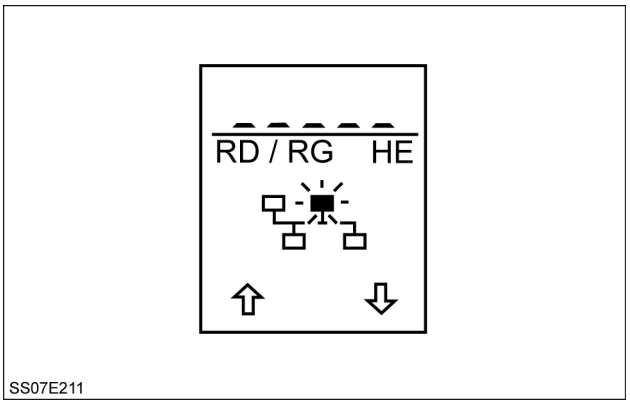
NOTE: *The vehicle may be driven while in this menu.*

This function is available in all sub-systems.
HE Menu page selection diagram



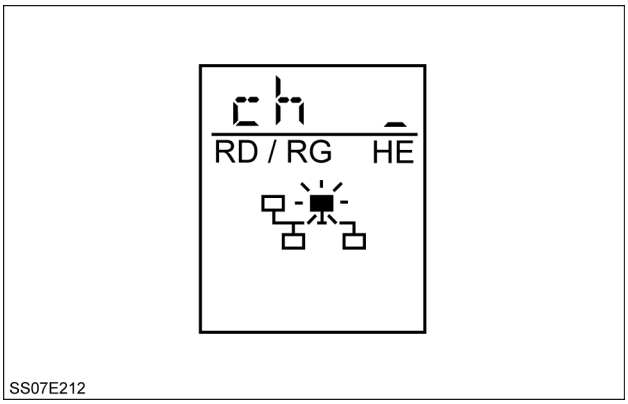
SS07E210 78

Press the Menu button to call up the HE Menu.



SS07E211 79

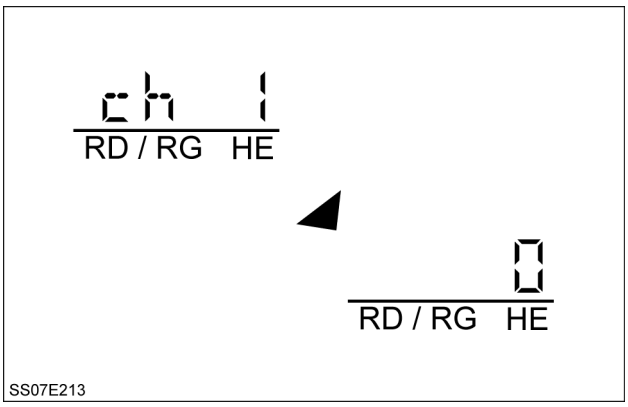
"ch _" is displayed in the upper section of the display.
The relevant channel can be called up using the "Up" and "Down" navigation buttons. (The individual channels are described in the following table).



SS07E212 80

Channel	Description	Standard value	Comments
1	Wheel speed		
2	Radar sensor		
3	Not used		
4	Rear PTO speed		
5	Not used		
6	Mid speed sensor		
7	PTO twist sensor		
8	Flywheel speed sensor		

After a delay, the value is displayed.
To use the "HH" menu further, press the Menu button.

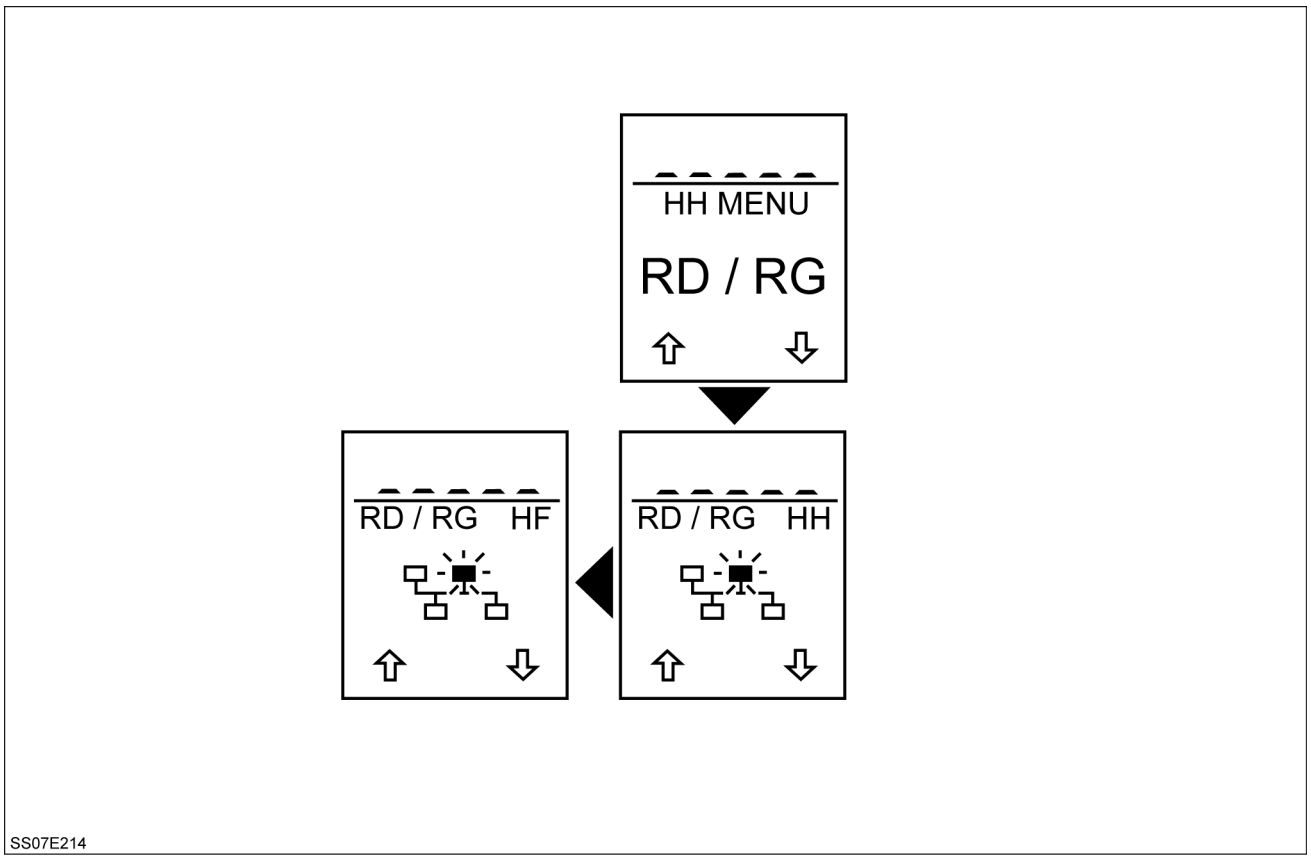


SS07E213 81

HF - DISPLAY CONTROLLER HARDWARE INFORMATION

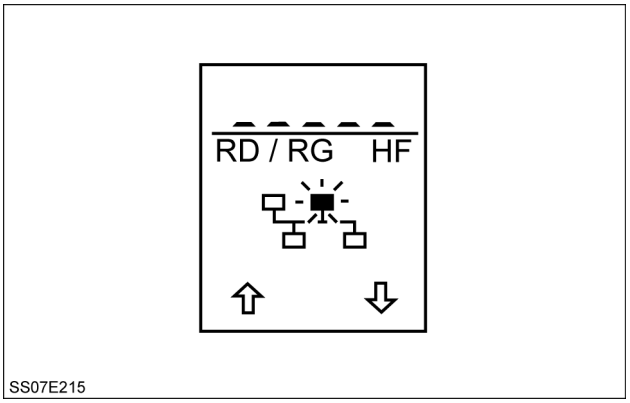
This menu allows hardware identification; version and serial number to be displayed. This function is available in all sub-systems.

HF Menu page selection diagram



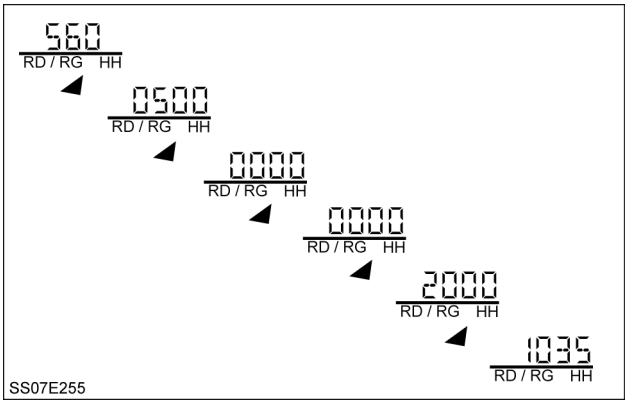
SS07E214 82

Press the Menu button to call up the HF Menu.



SS07E215 83

The sequence of the data display runs through automatically in the upper section of the display, for example, as follows:
560 Hardware identification
0500 Hardware version
0000 Hardware version
0000 Hardware version
2000 Serial number
1035 Serial number
After that the "HH" menu can be used again.

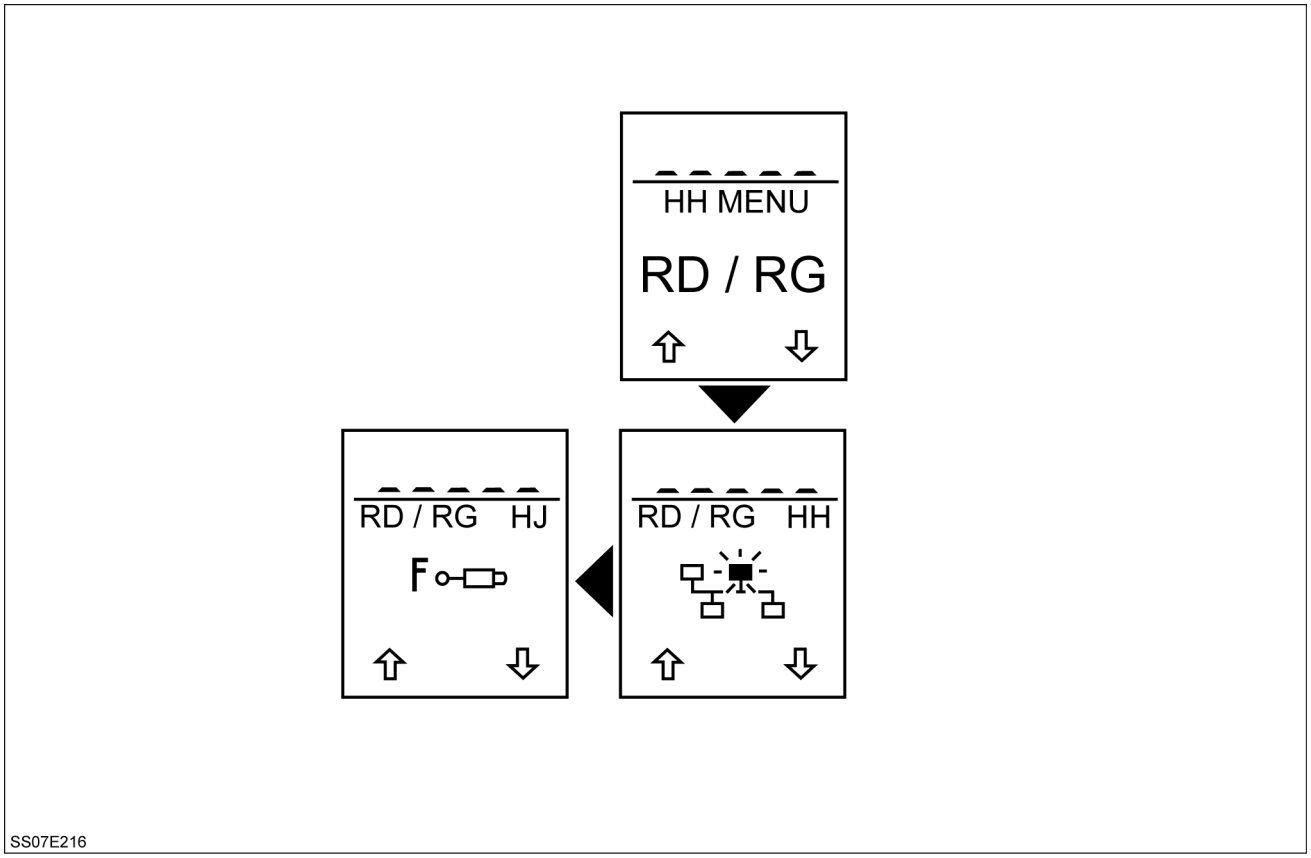


SS07E255 84

HJ - FRONT EHR VALVE NUMBER PROGRAMMING

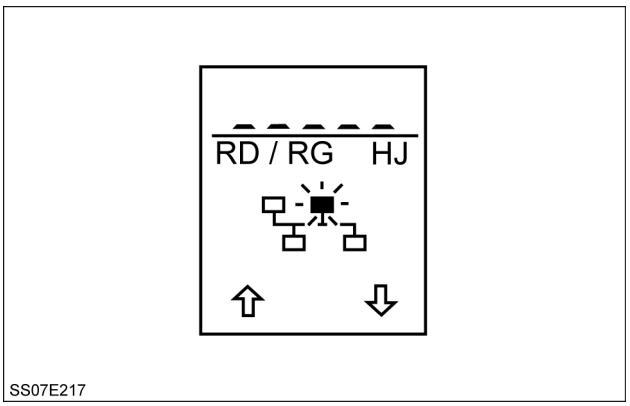
This menu allows the numbering of the EHR valves to be reset.
The EHR valve stores a number to indicate its position in the remote control valve stack, i.e. 1, 2, 3, 4 or 5.

HJ Menu page selection diagram



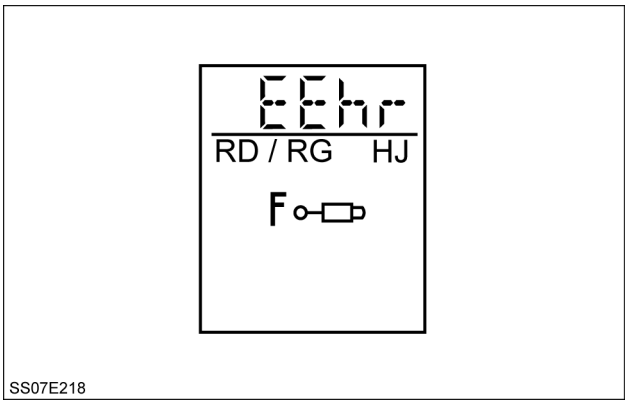
SS07E216 85

Press the Menu button to call up the HJ Menu.



SS07E217 86

"EEhr" is displayed in the upper section of the display.

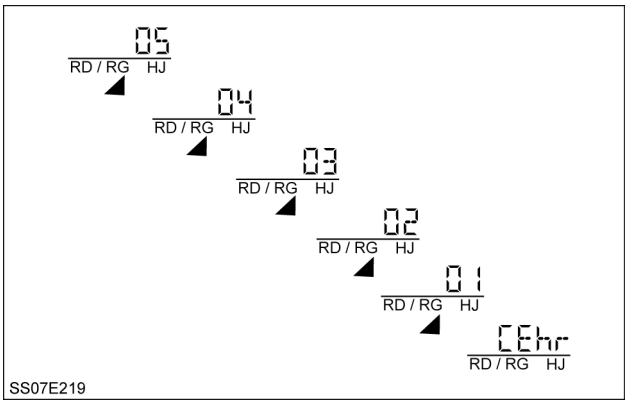


SS07E218 87

NOTE: *Use HJ to clear all numbers for the electrohydraulic control units.*

NOTE: *If the "Down" navigation button is released before the end of the countdown, the process is aborted.*

To confirm the reset of the control unit numbering, press and hold the "Down" navigation button.
The numbers 05 to 01 run backwards in the upper section of the display, then "CEhr" is displayed to inform you that the control unit numbering has been reset.



SS07E219 88

Turn the keystart OFF.

Disconnect the connectors from each EHR valve.

Switch the keystart ON and call up the HJ Menu again. The cluster display will flash 'Ehr_'.

Reconnect the first valve, an acoustic signal confirms it is detected.

The display changes to 'Ehr_1'. 'Ehr_2' then flashes to report that the control unit is ready for the next valve to be connected. As each valve is connected, the display changes and indicates the number of the next valve to connect until finally 'Ehr_5' is displayed.

Press and hold the 'Down' button. The display changes to 'End' to report that the programming is completed.

Switch the keystart OFF to store the new control unit numbers.

Calibrate the remote valves. See **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)**.

Control module - Configure

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

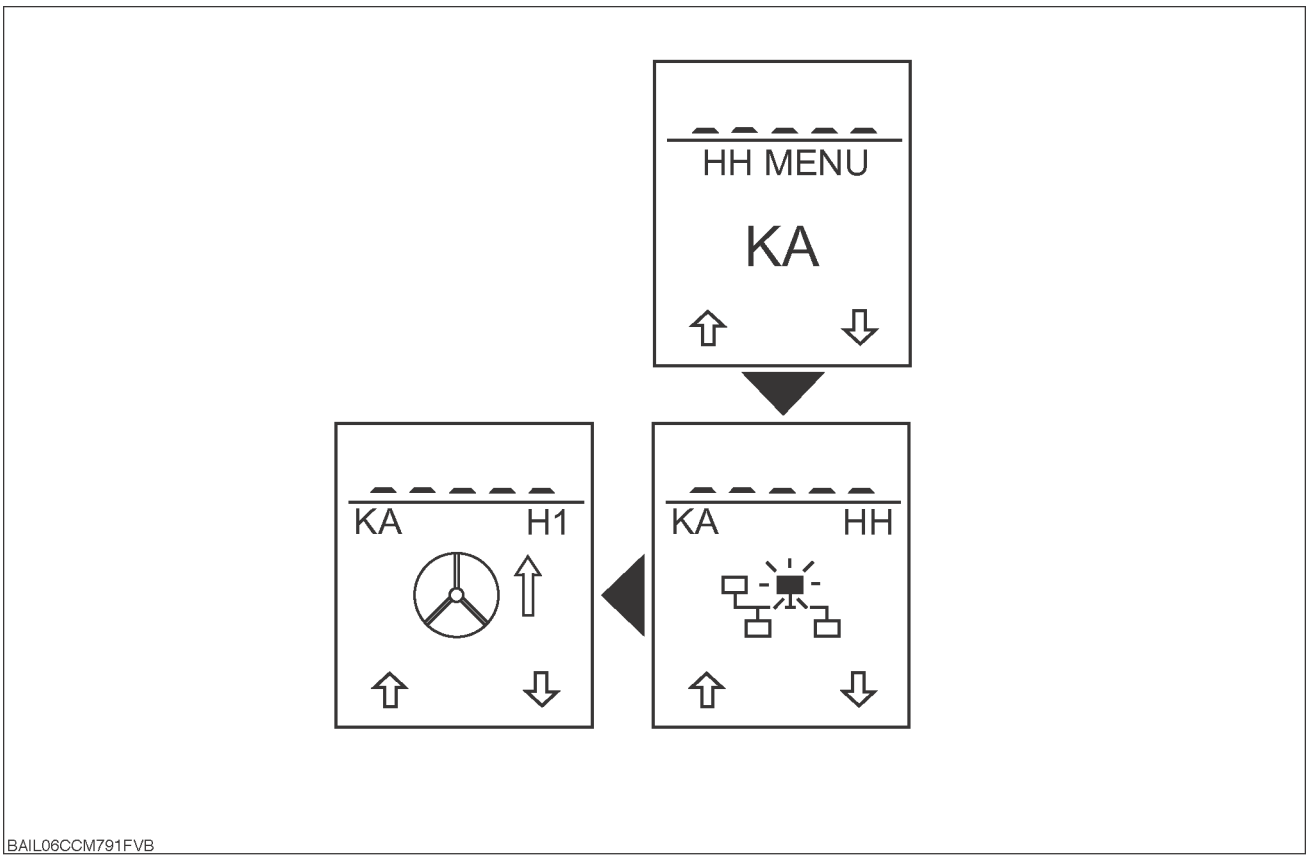
KA - Steering

HH	Service menu	Figure
H1	Calibration procedures	**1**
H2	Display stored calibration values	**2**
H3	Not used	-
H4	Display software version number	**5**
H5	Switch operation test	**8**
H6	Not used	-
H7	Not used	-
H8	Clearing the EEPROM memory	**12**
H9	Voltmeter	**15**
HA	Not used	-
HB	Display stored fault codes	**18**
HC	Clear all stored fault codes	**22**
HD	Not used	-
HE	Display frequency inputs	**26**
HF	View controller hardware information	**29**

H1 - CALIBRATION PROCEDURES

This menu is used to display the calibration of the steering control unit. See **Fast steer system - Calibrate (D.20.C)**.

H1 Menu page selection diagram

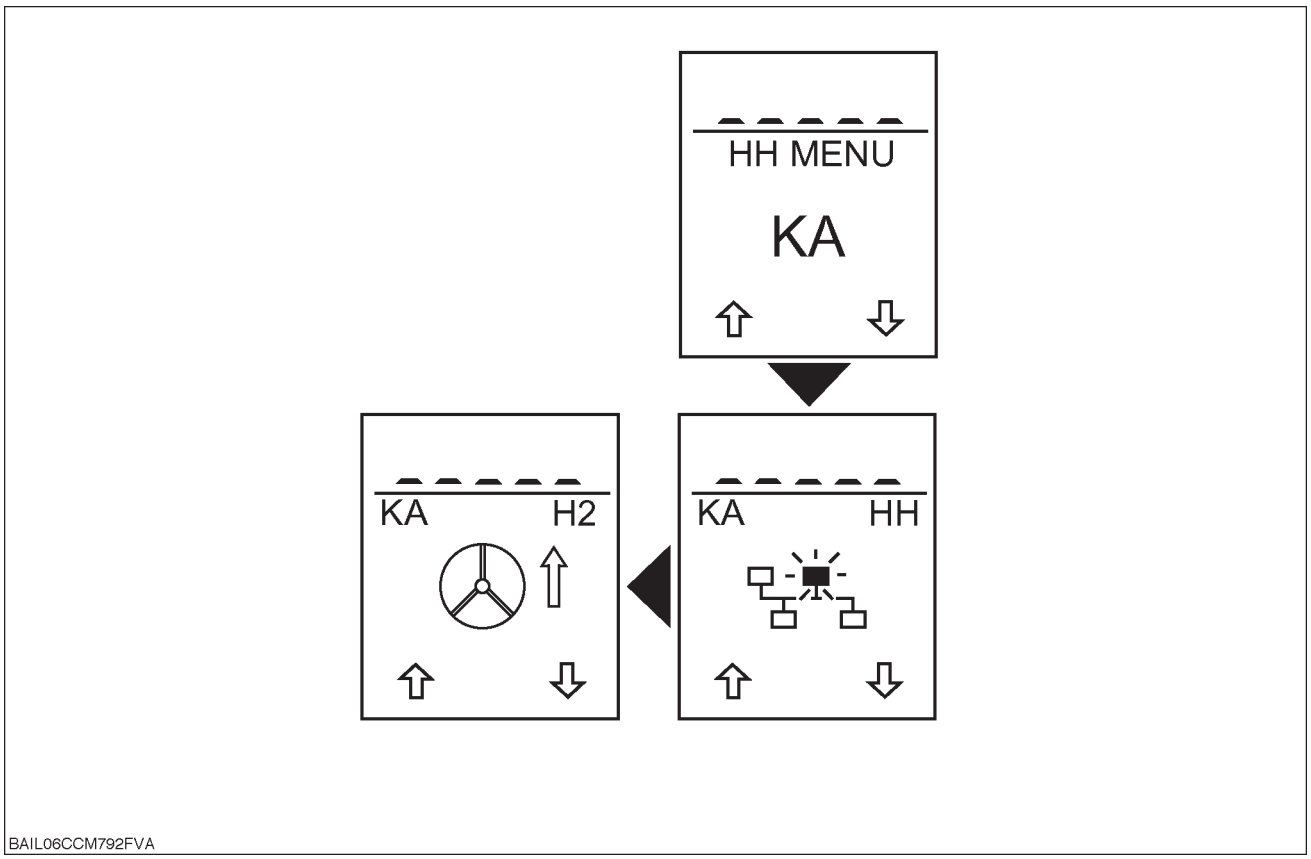


BAIL06CCM791FVB 1

H2 - DISPLAY STORED CALIBRATION VALUES

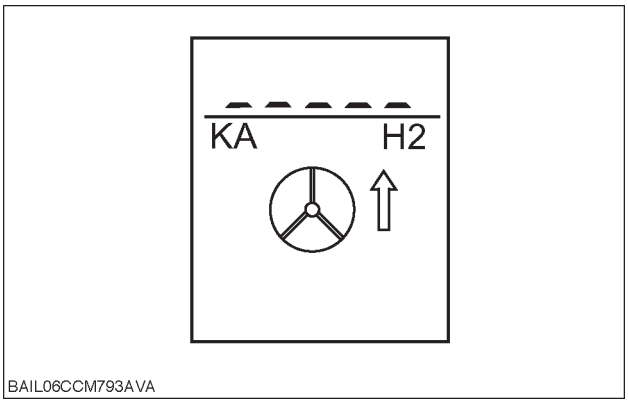
This menu is used to display the calibration values stored in the steering control unit.

H2 Menu page selection diagram



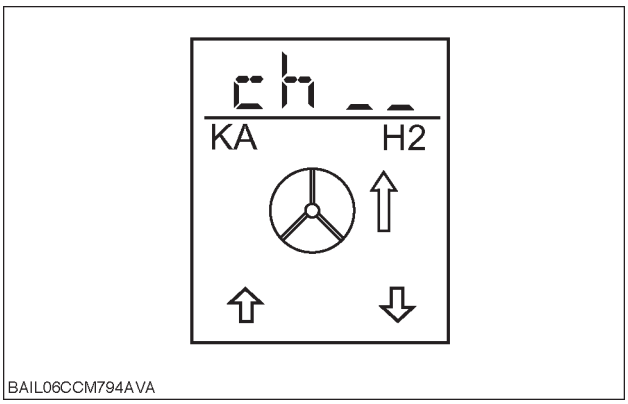
BAIL06CCM792FVA 2

Press the Menu button to call up the ’steering’ sub-system.



BAIL06CCM793AVA 3

"ch - - " is displayed in the upper section of the display.
The relevant channel can be called up using the "Up" and "Down" navigation buttons.



BAIL06CCM794AVA 4

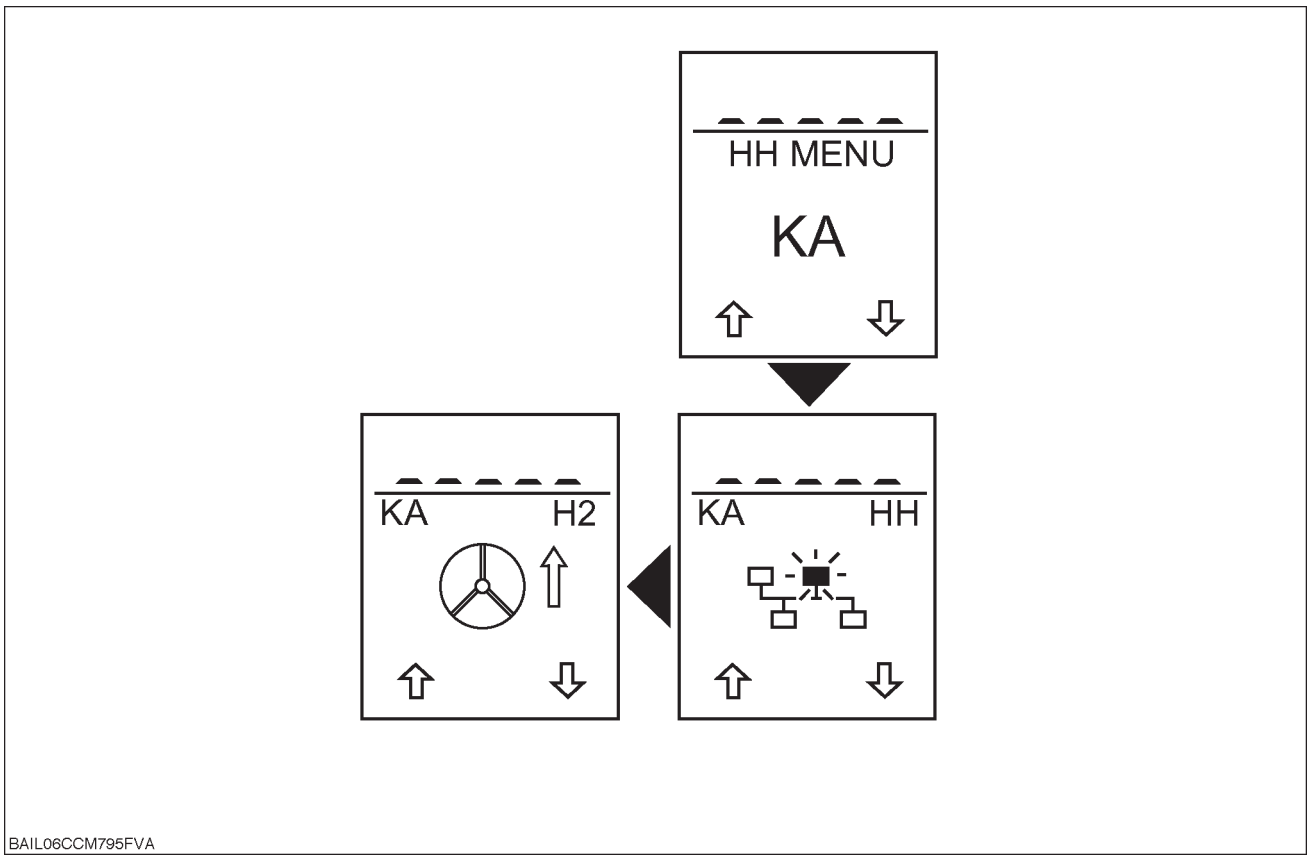
After a delay, the code and then the calibration value are displayed. (The individual channels are described in the following table.)
To use the "HH" menu further, press the Menu button.

Channel	Description	Default value	Value range
Channel 1	Proximity switch open	350	0 - 999
Channel 2	Proximity switch closed	295	0 - 999
Channel 3	LVDT recorder secondary signal 1 open	400	400 - 750
Channel 4	LVDT recorder secondary signal 2 open	500	400 - 750
Channel 5	LVDT recorder secondary signal 1 closed	500	400 - 750
Channel 6	LVDT recorder secondary signal 2 closed	400	400 - 750

H4 - DISPLAY SOFTWARE VERSION NUMBER

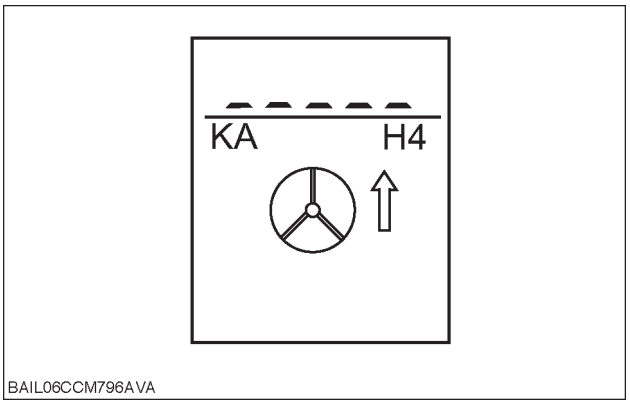
This function is available in all sub-systems.

H4 Menu page selection diagram



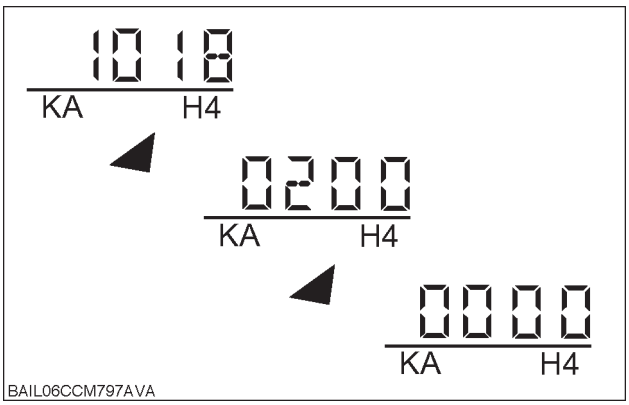
BAIL06CCM795FVA 5

Press the Menu button to call up the H4 Menu.



BAIL06CCM796AVA 6

The software version is automatically displayed in the upper section of the display (as in the illustrated example). After that the "HH" menu can be navigated again.



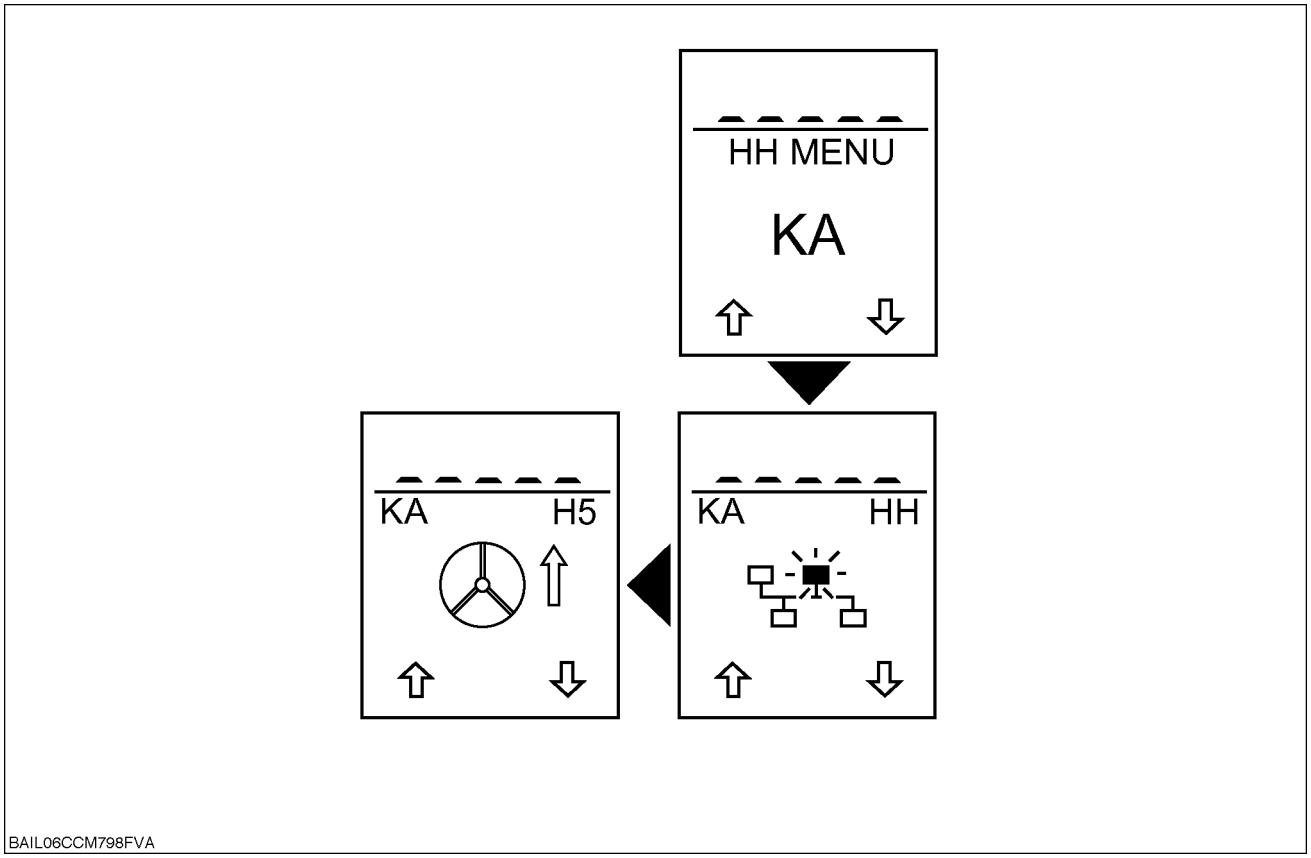
BAIL06CCM797AVA 7

The first set of four digits indicates the Software identifier, which uniquely defines the application software present in the module.
The second and third set of four digits indicate the release version of the application software.

H5 - SWITCH OPERATION TEST

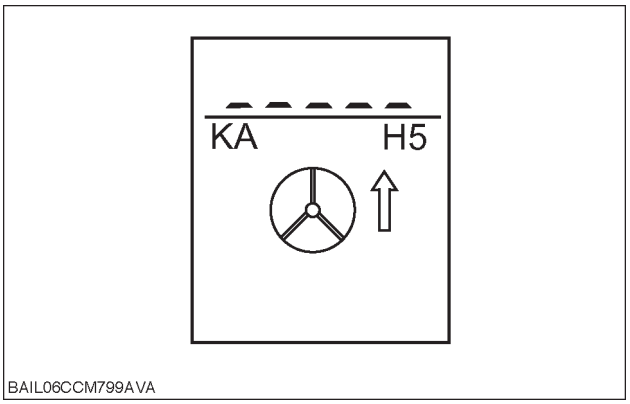
This menu shows a pre-defined code, if a switch's signal exchange is recorded.
This function is available in all sub-systems.

H5 Menu page selection diagram



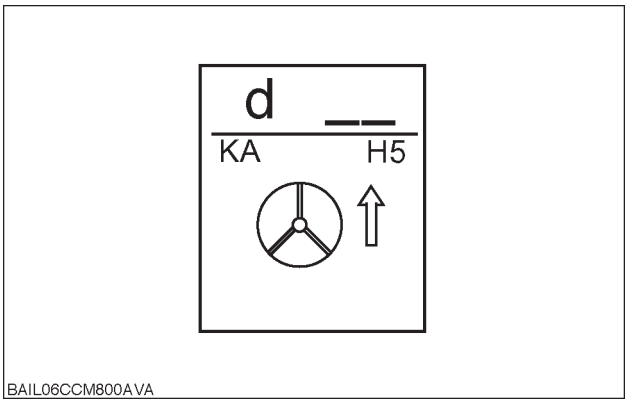
BAIL06CCM798FVA 8

Press the Menu button to call up the H5 Menu.



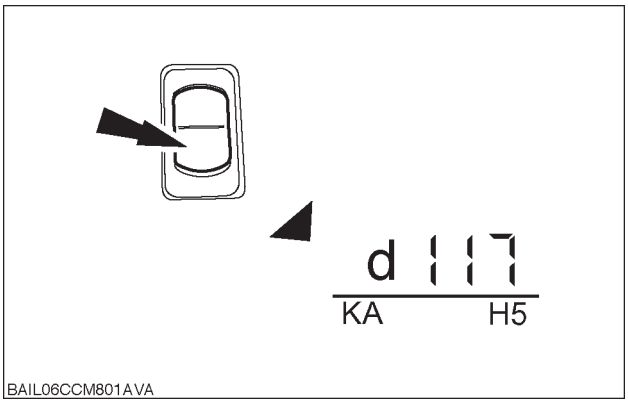
BAIL06CCM799AVA 9

"d _ _" is displayed on the upper section of the display.



BAIL06CCM800AVA 10

When a switch is actuated, a code is displayed and a beep reports that the switch is operating correctly.
If no switch code is displayed and no beep sounds, the affected cabling can be tested with a 'loose connection' test.
To isolate the error, look at the display or listen to the beep.



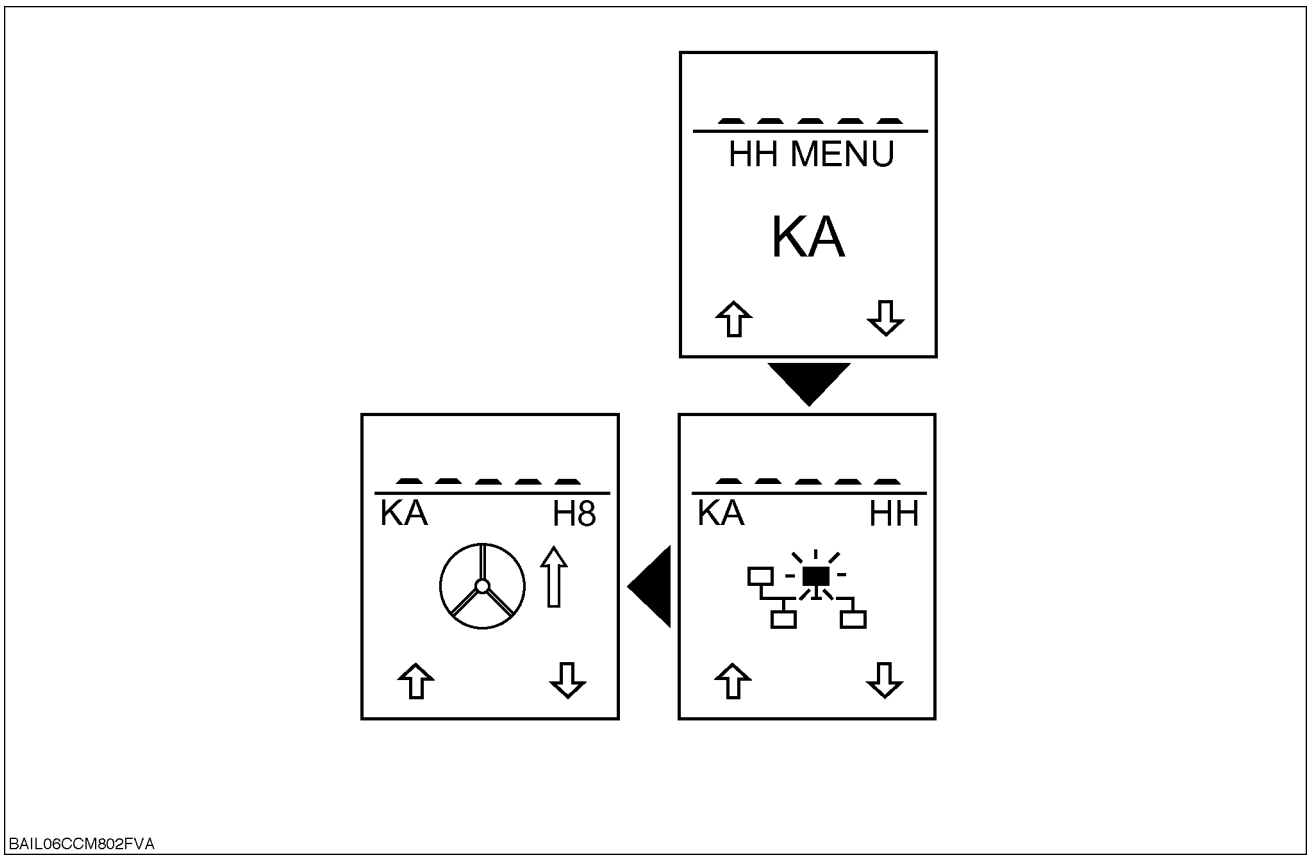
BAIL06CCM801AVA 11

Identifier	Controller connector	Switch / Input	Special requirements
d117	A1	On/Off switch	-
d118	C4	Safety switch	-
d119	B4	Proximity switch	-
d120	-	LVDT recorder	-

H8 - CLEARING THE EEPROM MEMORY

This menu is used to clear the calibration values and stored fault codes, with all EEPROM values being reset to the default.
All calibration values and fault codes are stored in the EEPROM memory. This memory is also not cleared by a break in the voltage supply to the electronic control unit, i. e. when the battery is disconnected.

H8 Menu page selection diagram



BAIL06CCM802FVA 12

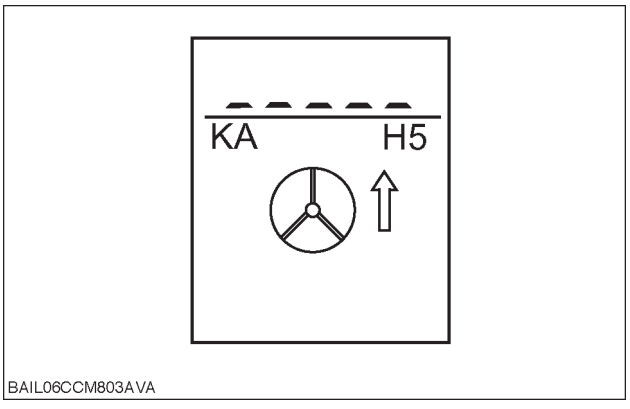
⚠ CAUTION ⚠

H8 will clear all calibrations values and stored error codes.

B006

NOTE: *If the "Down" navigation button is released before the end of the countdown, the process is aborted.*

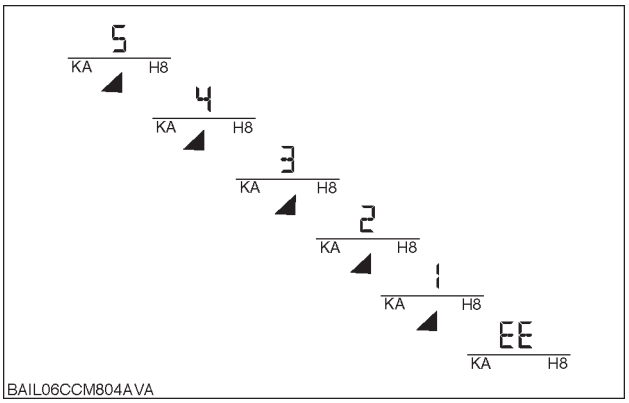
Press the Menu button to call up the H8 Menu.



BAIL06CCM803AVA 13

To confirm the resetting of the EEPROM, press and hold the Down button.

The numbers 05 to 01 run backwards on the lower central display, then "EE" is displayed to inform you that the EEPROM has been cleared.
Turn the starter switch to OFF.



BAIL06CCM804AVA 14

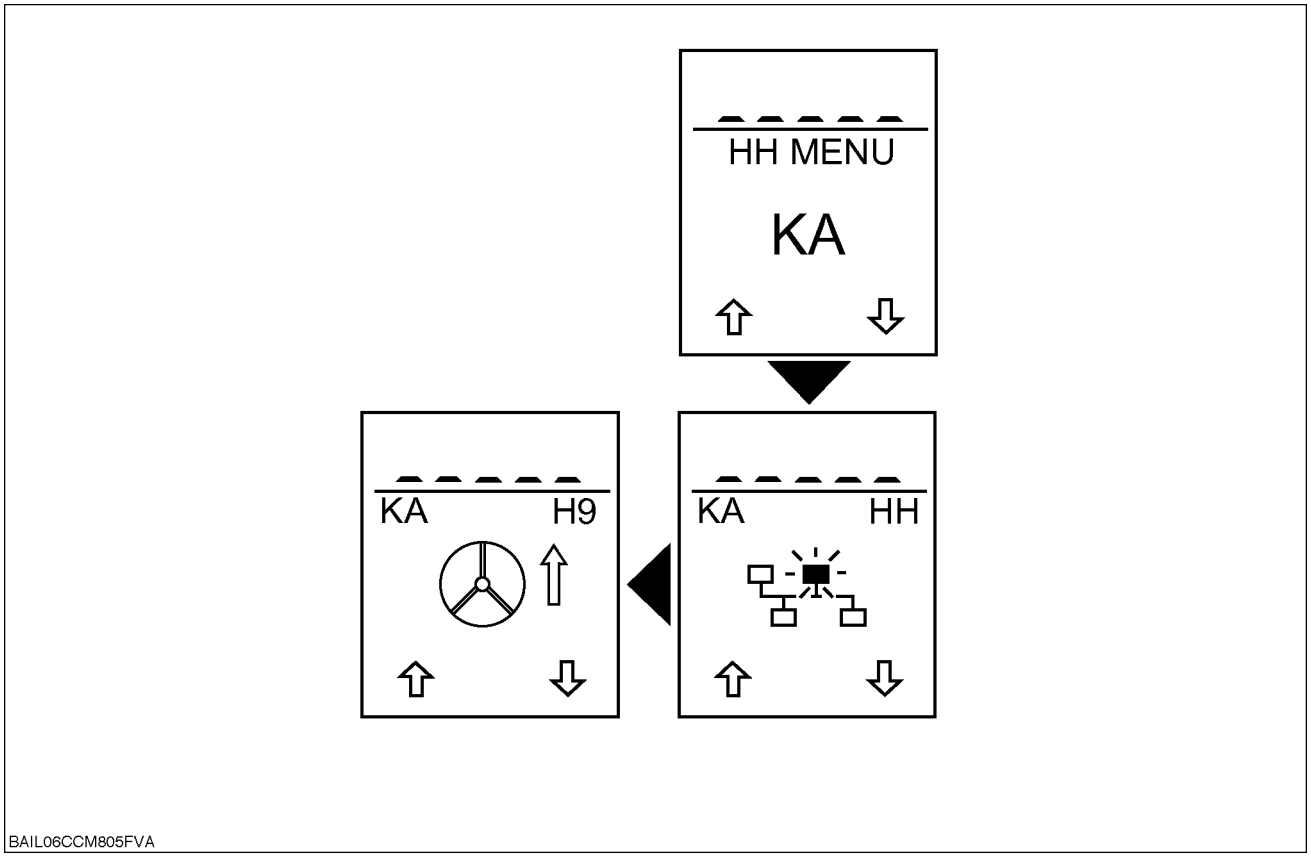
H9 - VOLTMETER

This menu is used to check the setting of the individual potentiometers, voltage sources and solenoid valve circuits. If a temporary error is recorded in a circuit, the relevant cabling can be tested for a loose connection. When doing this, check whether the values in the display change erratically to isolate the error range.

NOTE: *The tractor is ready to move in this menu.*

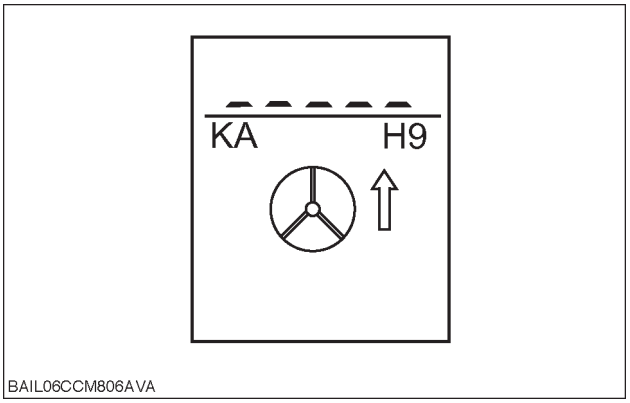
This function is available in all sub-systems.

H9 Menu page selection diagram



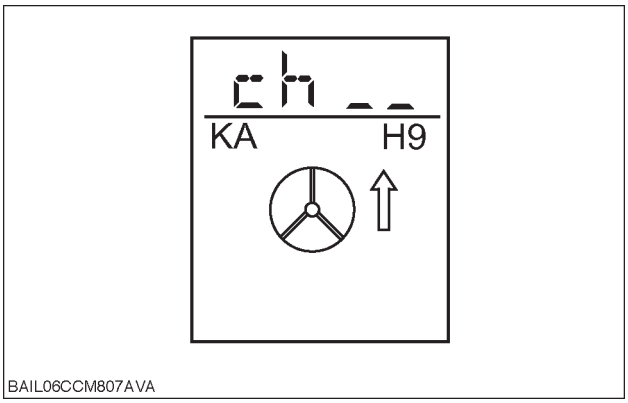
BAIL06CCM805FVA 15

Press the Menu button to call up the H9 Menu.



BAIL06CCM806AVA 16

"ch _ _" is displayed on the upper section of the display.



BAIL06CCM807AVA 17

The relevant channel can be called up using the "Up" and "Down" buttons.
After a delay, the value is displayed. Compare the displayed value with the standard value from the following table.

NOTE: *The value is the input voltage or the input signal of the electronic control unit. This value cannot be directly converted to a voltage value because of the internal processes in the control unit. A zero corresponds to* ***0 volts****.*

If the displayed value deviates from the desired value in the following table by more than **10 %**, there is a fault either in the component or in the cabling of the affected channel.

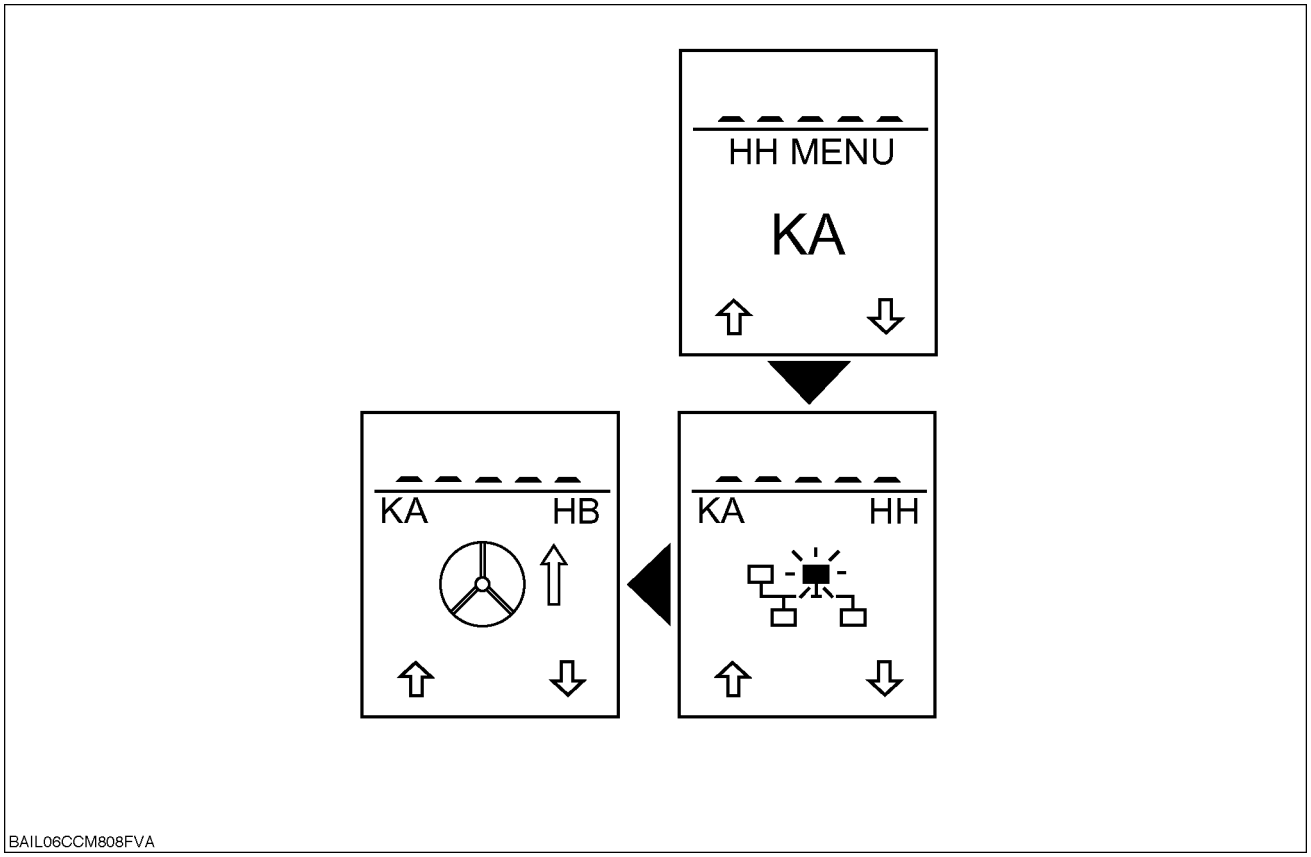
NOTE: *Before replacing any components, test the plug connections of the relevant circuit including the plug connection of the electronic control unit.*

Channel	Description	Standard value	Comments
1	LVDT recorder secondary coil 1	450 - 750	
2	LVDT recorder secondary coil 2	450 - 750	
3	Proximity switch	50 - 800	
4	Solenoid valve	350 to 500 mA	

HB - DISPLAY STORED FAULT CODES

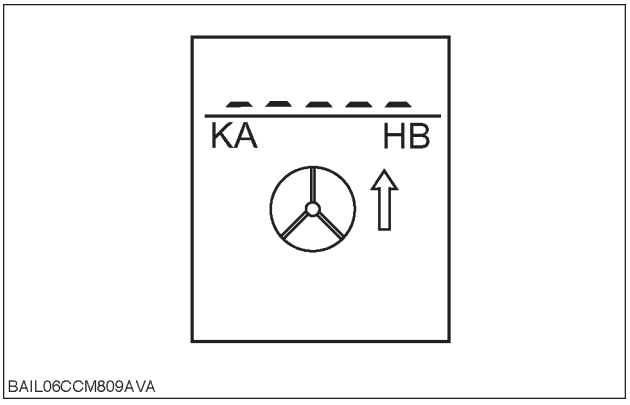
This menu is used to display the fault codes, which are stored in the EEPROM of the electronic control unit.
A maximum of ten error codes can be stored for each of the sub-systems.
This function is available in all sub-systems.

HB Menu page selection diagram



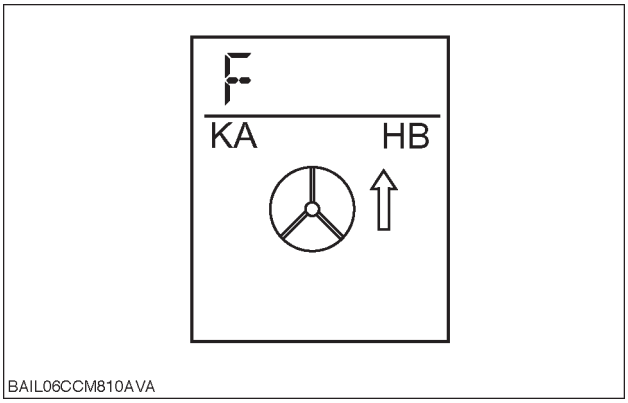
BAIL06CCM808FVA 18

Press the Menu button to call up the HB menu.



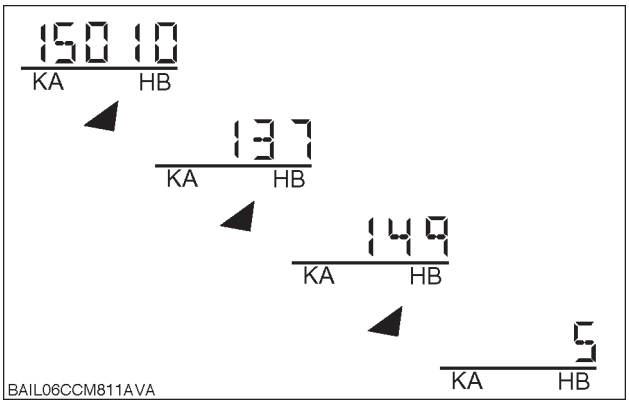
BAIL06CCM809AVA 19

"_ _ _ _" is displayed on the upper section of the display, if no fault codes are stored in the selected sub-system.
"F" is displayed on the upper section of the display, if a fault code is stored in the selected sub-system.



BAIL06CCM810AVA 20

Then, for example, the following displays then run through on the upper section of the central display:
15010 Fault code
137 Operating hours at the time of the first occurrence
149 Operating hours at the time of the last occurrence
5 Number of occurrences

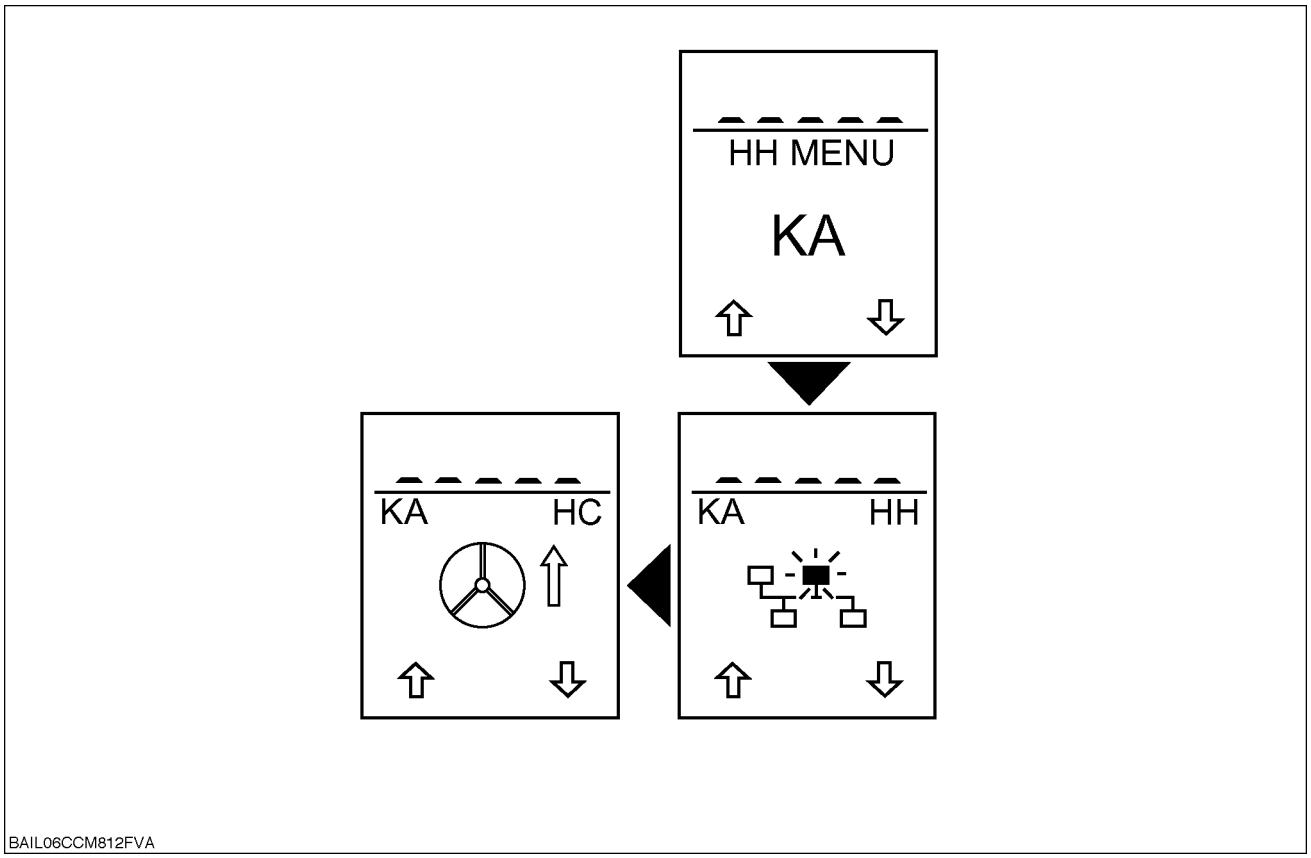


BAIL06CCM811AVA 21

Press the "Up" or "Down" button to move to the next fault code in the list.
"_ _ _" is displayed on the upper section of the display, if the end of the list is not reached.
To use the "HH" menu further, press the Menu button.

HC - CLEARING STORED FAULT CODES

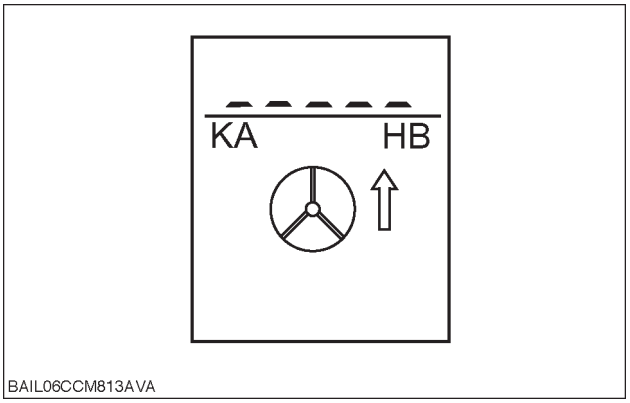
HC Menu page selection diagram



BAIL06CCM812FVA 22

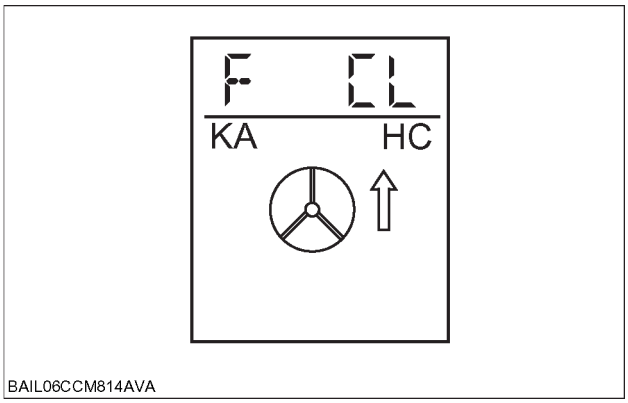
NOTE: *Always write the stored fault codes down before clearing.*

Press the Menu button to call up the HC Menu.



BAIL06CCM813AVA 23

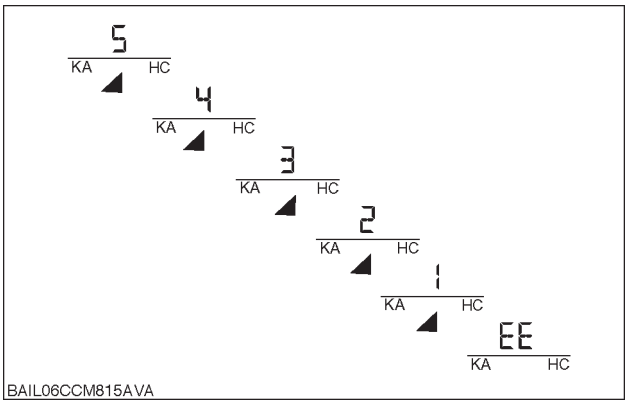
"F CL" is displayed on the upper section of the display.



BAIL06CCM814AVA 24

NOTE: *If the "Down" navigation button is released before the end of the countdown, the process is aborted.*

To confirm clearing the memory, press and hold the "Down" button.
The numbers 05 to 01 run backwards on the upper section of the display, then "EE" is displayed to inform you that the EEPROM has been cleared.
To use the "HH" menu further, press the Menu button.



BAIL06CCM815AVA 25

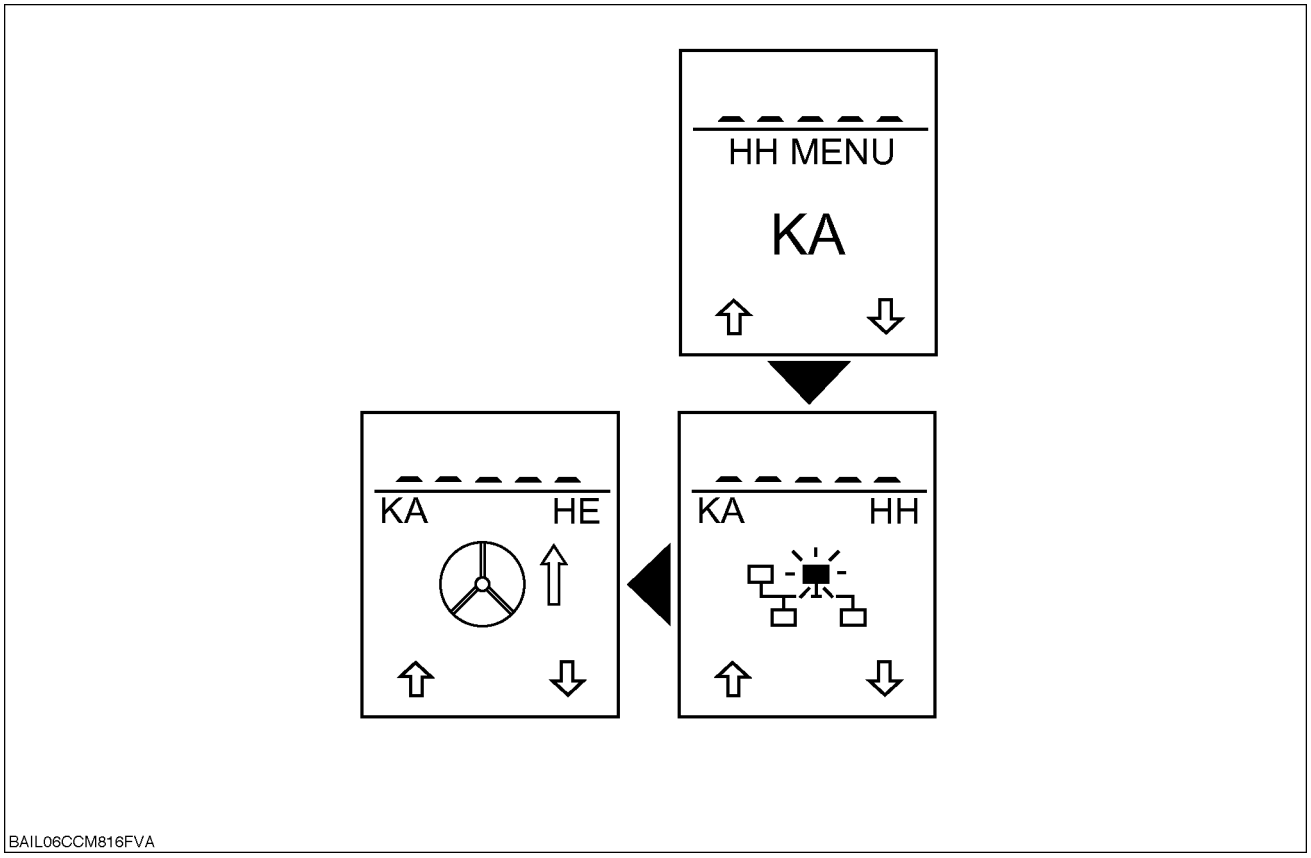
HE - DISPLAY FREQUENCY INPUTS

This menu is used to function test the various frequency inputs.

NOTE: *The vehicle may be driven while in this menu.*

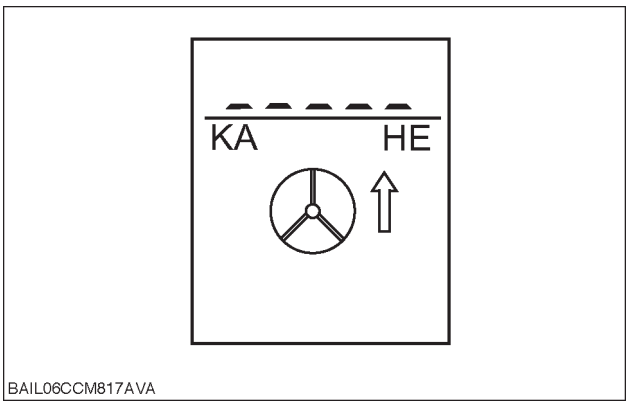
This function is available in all sub-systems.

HE Menu page selection diagram



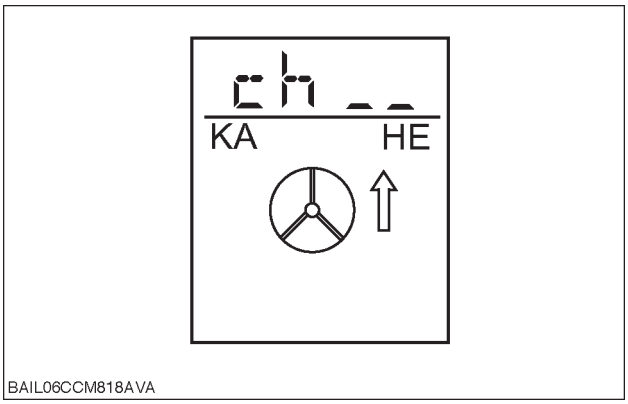
BAIL06CCM816FVA 26

Press the Menu button to call up the HE Menu.



BAIL06CCM817AVA 27

"ch _ _" is displayed on the upper section of the display.
The relevant channel can be called up using the "Up" and "Down" buttons.
The available channels are listed in the following table.



BAIL06CCM818AVA 28

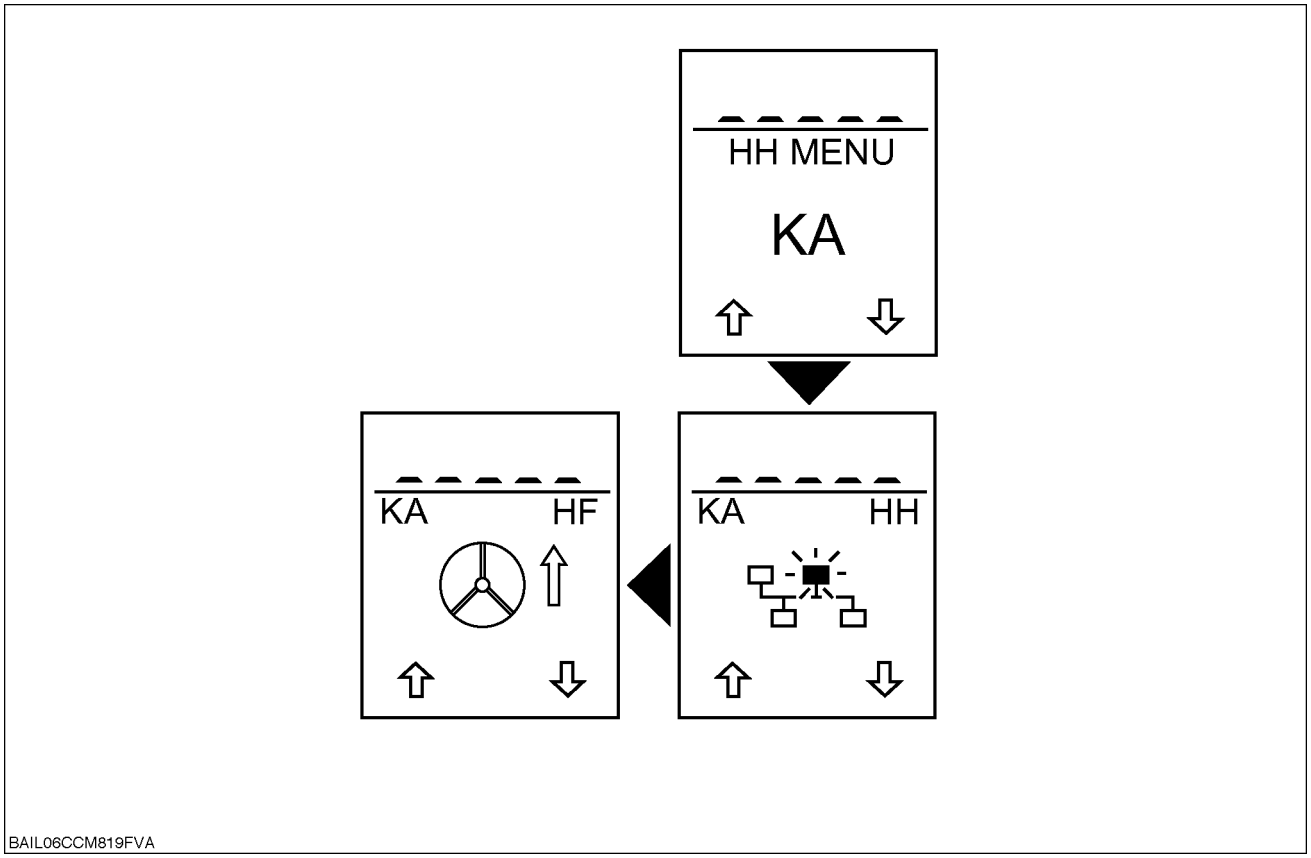
After a delay, the value is displayed.
To use the "HH" menu further, press the Menu button.

Channel	Description	Standard value	Comments
1			
2			

HF - VIEW CONTROLLER HARDWARE INFORMATION

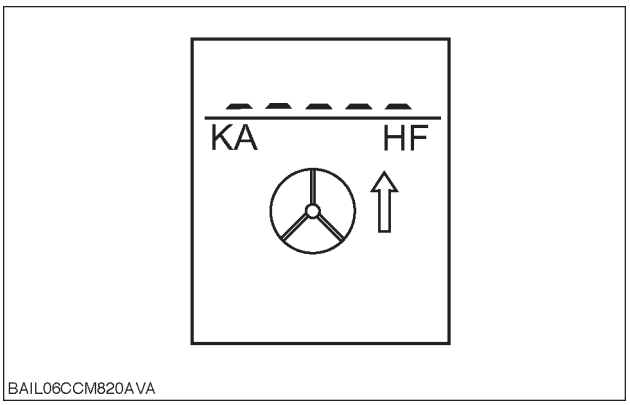
This menu makes possible hardware identification; the hardware version and serial number are displayed. This function is available in all sub-systems.

HF Menu page selection diagram



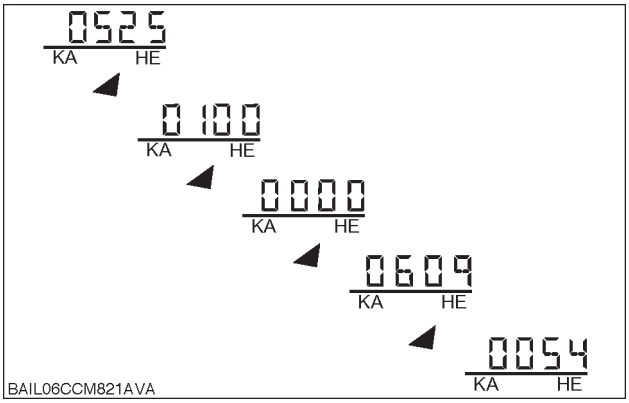
BAIL06CCM819FVA 29

Press the Menu button to call up the HF Menu.



BAIL06CCM820AVA 30

Then, for example, the following displays run through on the upper section of the display:
0525 Hardware identification
0100 Hardware version
0000 Hardware version
0609 Serial number
0054 Serial number
After that the "HH" menu can be used again.



BAIL06CCM821AVA 31

Control module - Configure Armrest

PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

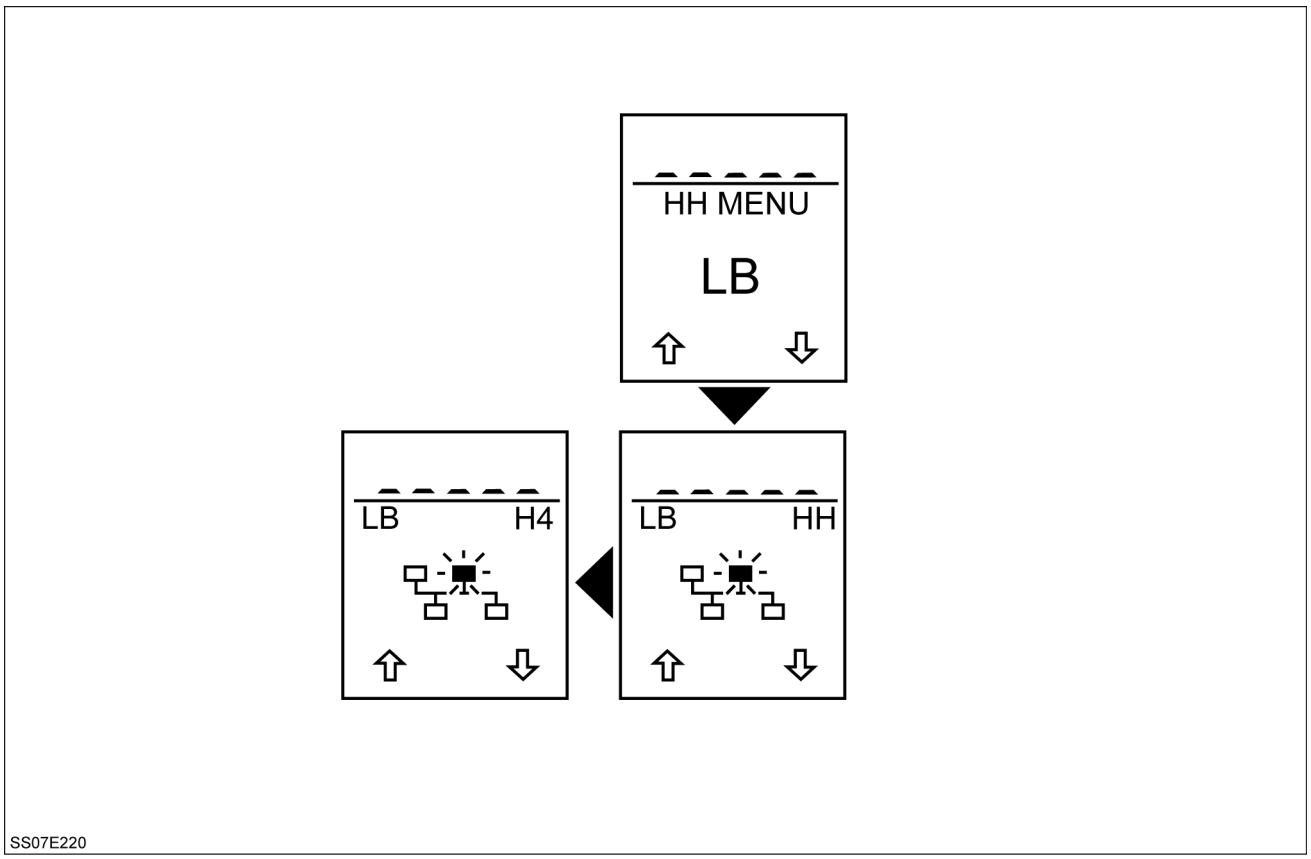
LB - Armrest (ARU)

HH	Service menu	Figure
H1	Not used	-
H2	Not used	-
H3	Not used	-
H4	Display software version number	**1**
H5	Not used	-
H6	Not used	-
H7	Not used	-
H8	Not used	-
H9	Not used	-
HA	Not used	-
HB	Display stored fault codes	**4**
HC	Clear all stored fault codes	**8**
HD	Not used	-
HE	Not used	-
HF	Display controller hardware information	**12**
HJ	Not used	-

H4 - DISPLAY SOFTWARE VERSION NUMBER

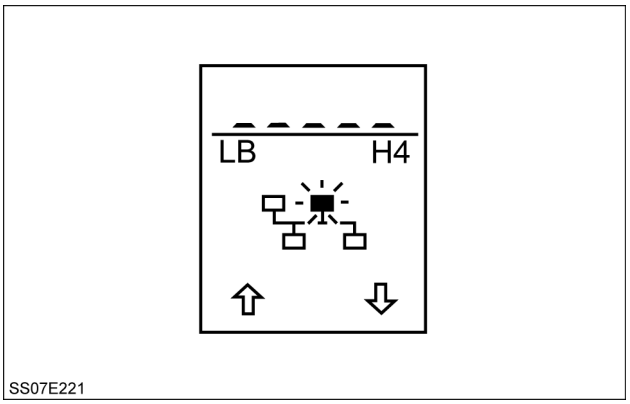
This function is available in all sub-systems.

H4 Menu page selection diagram



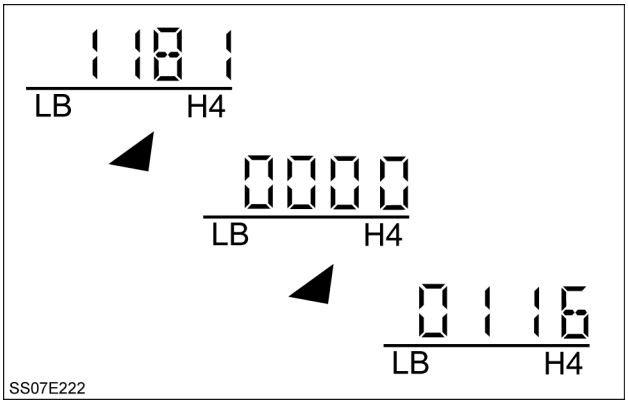
SS07E220 1

Press the Menu button to call up the H4 Menu.



SS07E221 2

The software version is automatically displayed in the upper section of the display (as in the illustrated example). After that the "HH" menu can be used again.

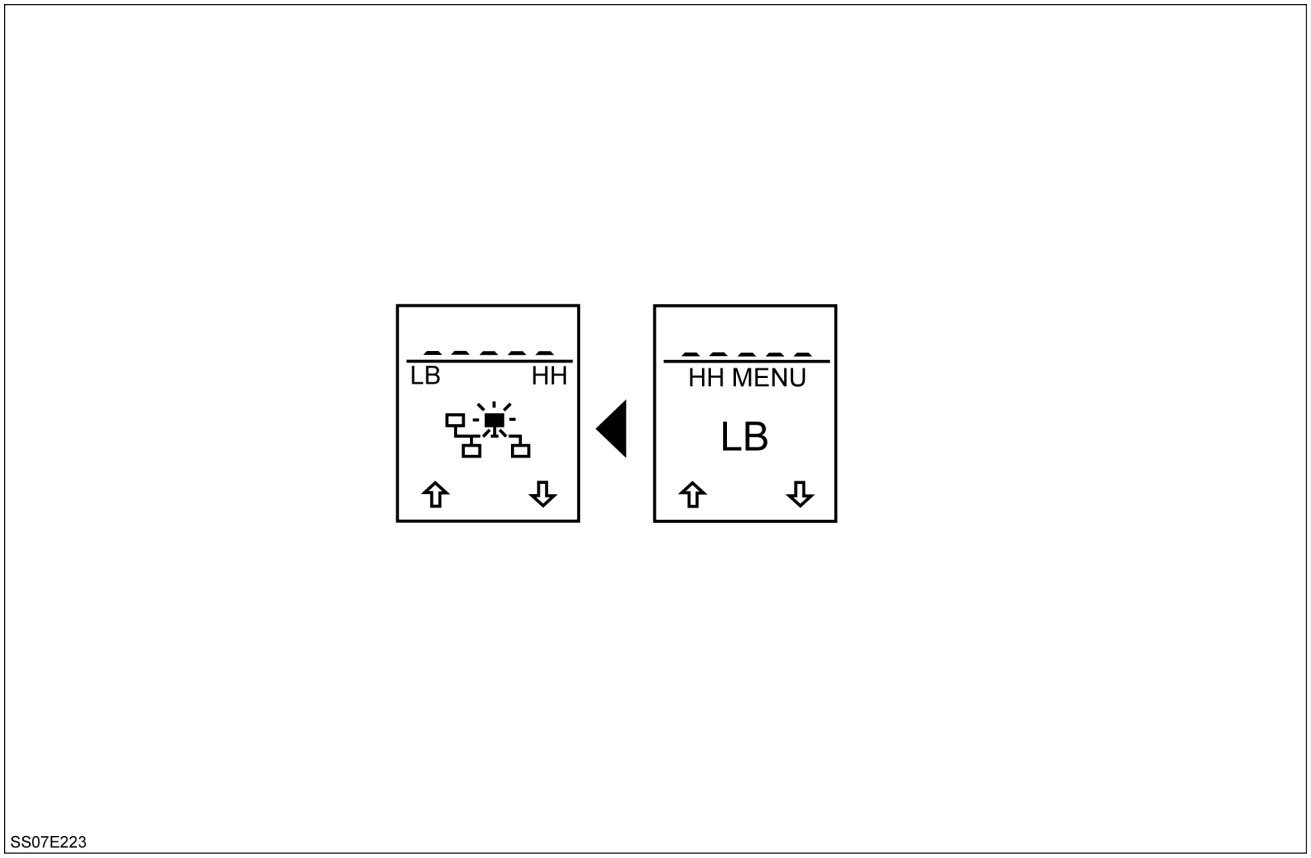


SS07E222 3

HB - DISPLAY STORED FAULT CODES

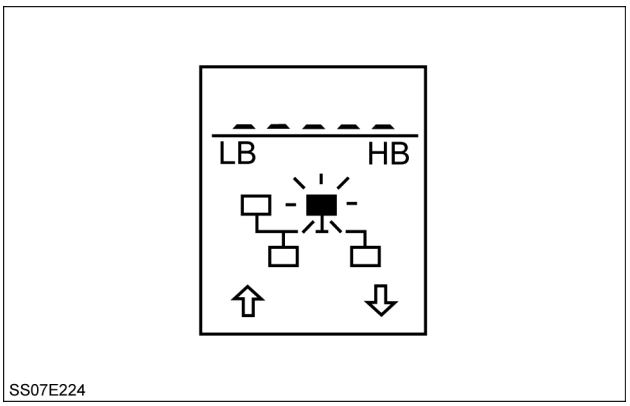
This menu is used to display the fault codes, which are stored in the EEPROM of the electronic control unit. This function is available in all sub-systems.

HB Menu page selection diagram



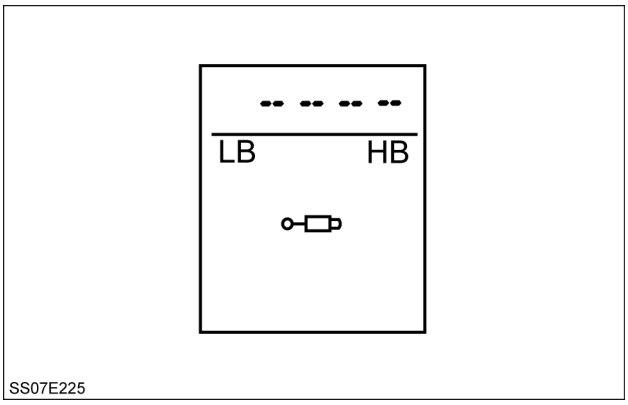
SS07E223 4

Press the Menu button to call up the HB Menu.



SS07E224 5

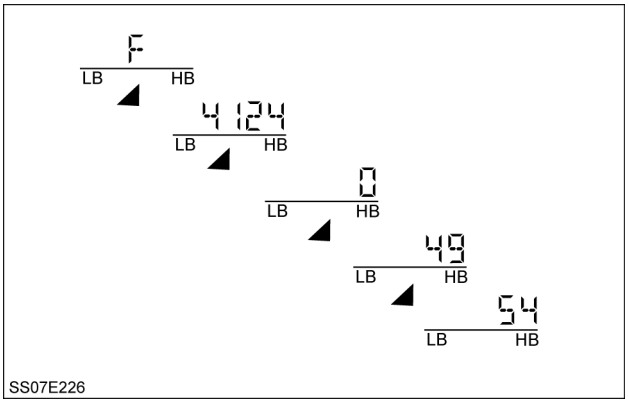
"_ _ _ _" is displayed in the upper section of the display, when no fault code is stored in the selected sub-system.



SS07E225 6

"F" is displayed in the upper section of the display, if a fault code is stored in the selected sub-system.
The sequence of the data display runs through in the upper section of the display, for example, as follows:

4124 Fault code
00 Operating hours at the time of the first occurrence
49 Operating hours at the time of the last occurrence
54 Frequency of occurrence



SS07E226 7

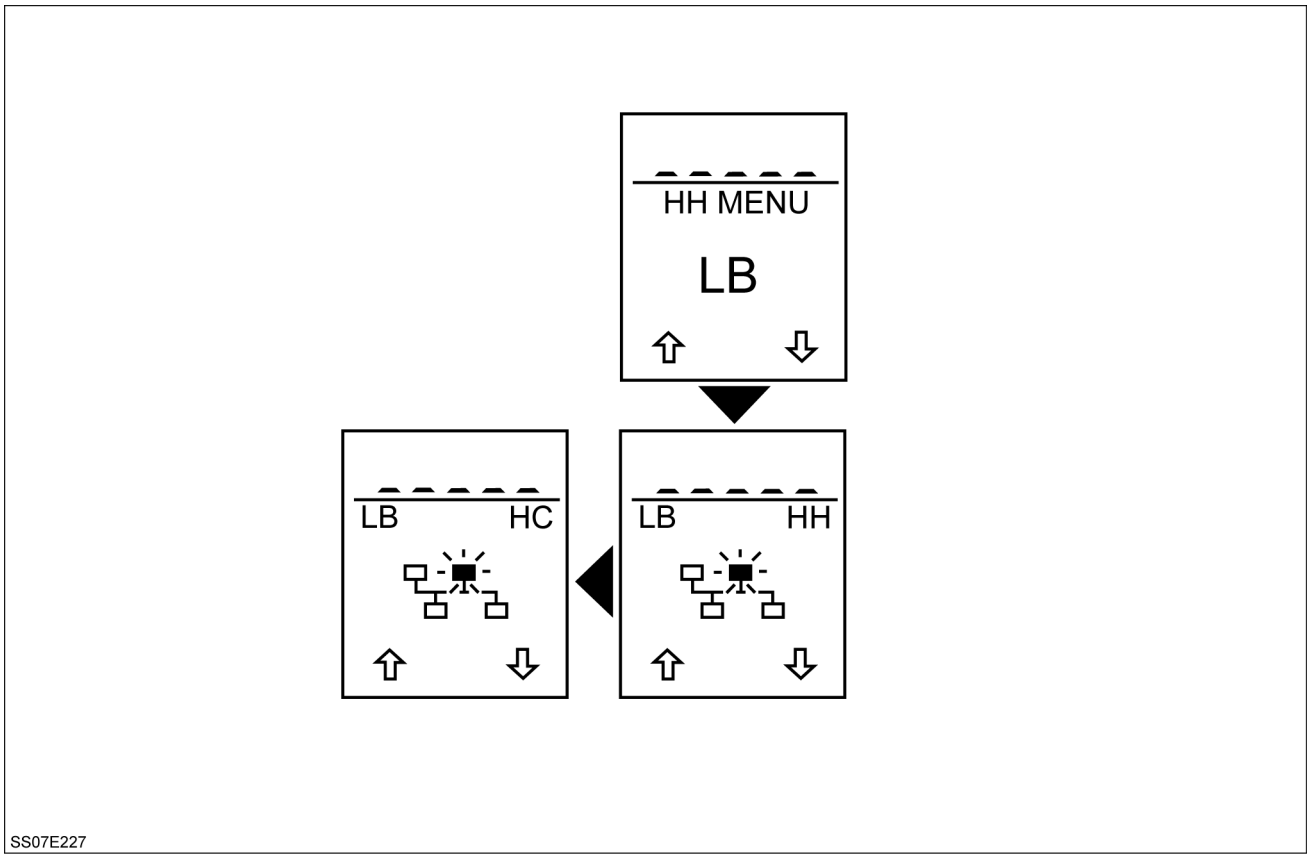
Press the "Up" or "Down" navigation button to change to the next fault code in the list.

As soon as the end of the list is reached, "_ _ _" is displayed in the upper section of the display.

To use the "HH" menu further, press the Menu button.

HC - CLEAR ALL STORED FAULT CODES

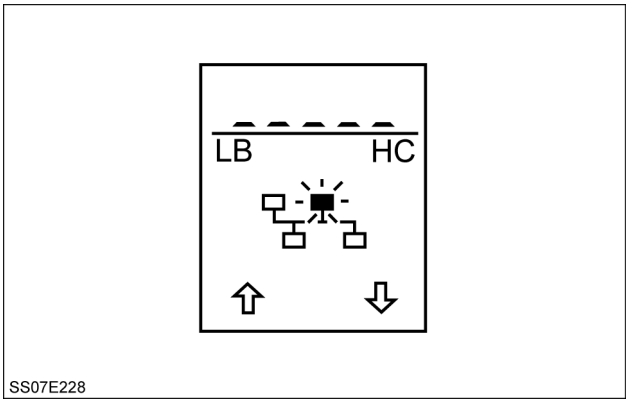
HC Menu page selection diagram



SS07E227 8

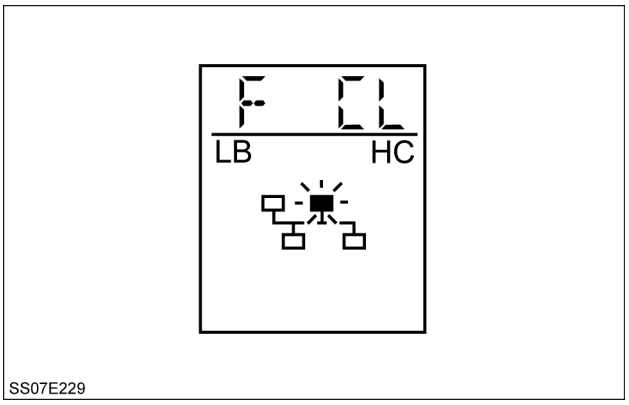
NOTE: *Always write the stored fault codes down before clearing.*

Press the Menu button to call up the HC Menu.



SS07E228 9

"F CL" is displayed in the upper section of the display.



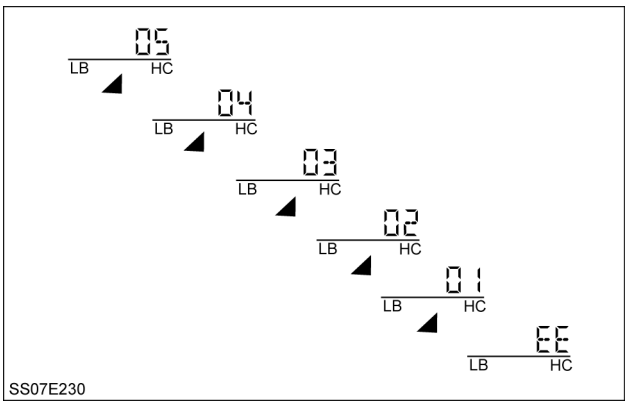
SS07E229 10

NOTE: *If the "Down" navigation button is released before the end of the countdown, the process is aborted.*

To confirm clearing the memory, press and hold the "Down" navigation button.

NOTE: *The numbers 05 to 01 run backwards in the upper section of the display, then "EE" appears to inform you that the fault codes have been cleared.*

To use the "HH" menu further, press the Menu button.

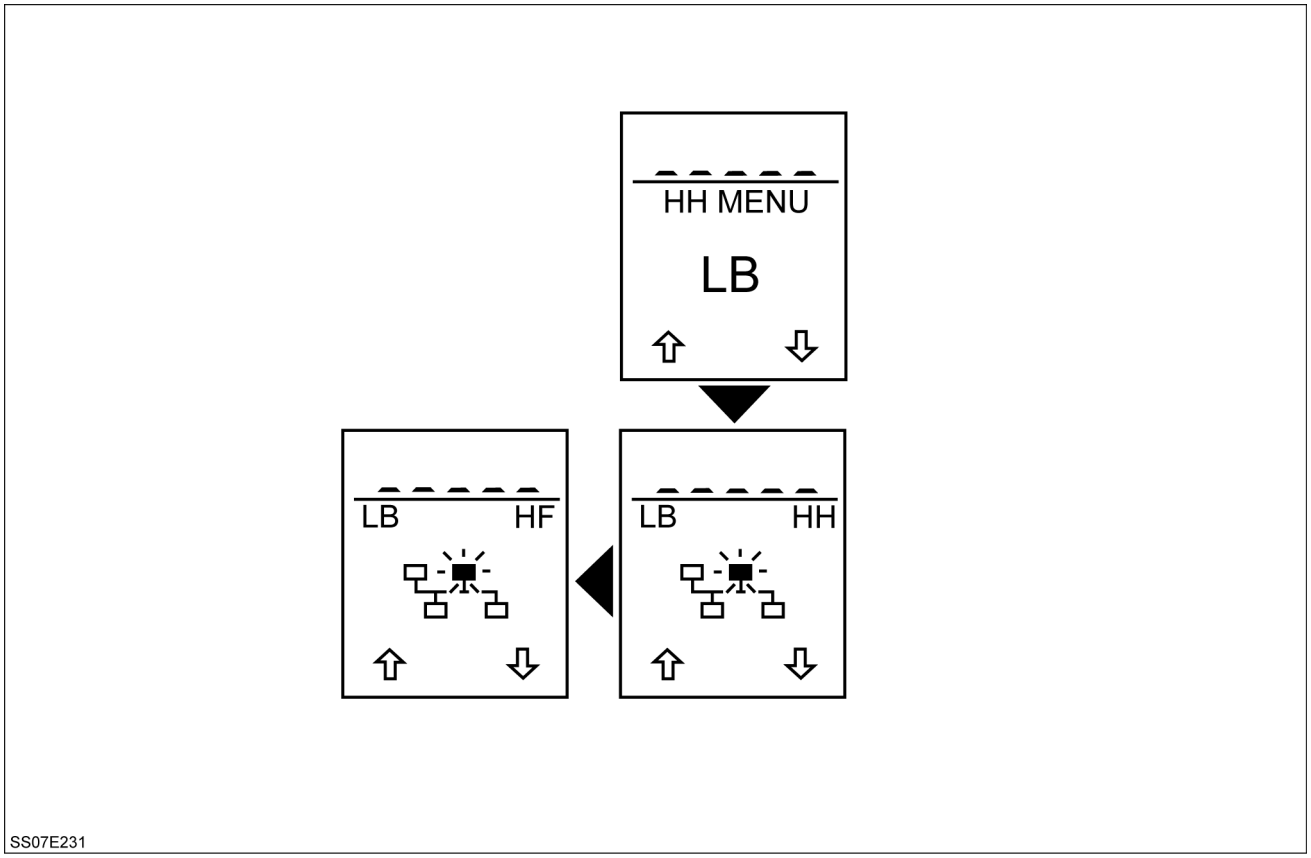


SS07E230 11

HF - DISPLAY CONTROLLER HARDWARE INFORMATION

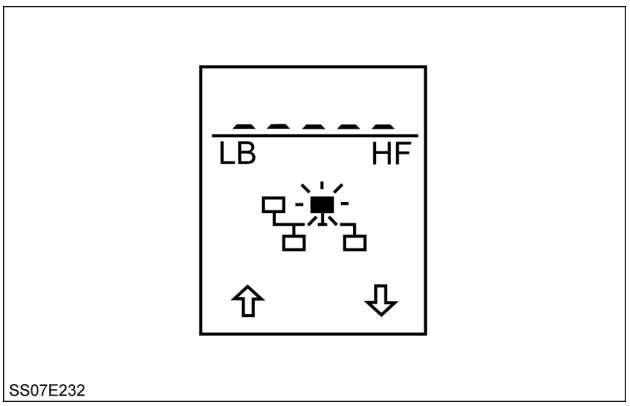
This menu makes possible hardware identification; the hardware version and serial number are displayed. This function is available in all sub-systems.

HF Menu page selection diagram



SS07E231 12

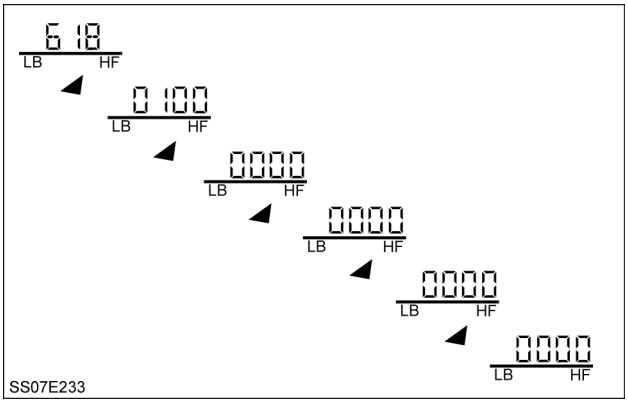
Press the Menu button to call up the HF Menu.



SS07E232 13

The sequence of the data display runs through automatically in the upper section of the display, for example, as follows:

618 Hardware identification
0100 Hardware version
0000 Hardware version
0000 Hardware version
0000 Serial number
0000 Serial number
After that the "HH" menu can be used again.



SS07E233 14

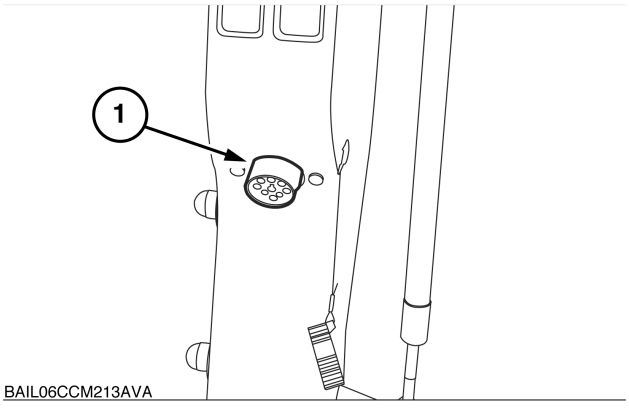
Control module - Configure H-Menu Overview

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Identifier	Controller Functions
IE	Enhanced ICU3 Instrument Cluster
RT	FPS Transmission, Electronic Draft Control, Rear PTO, Front Wheel Drive, Differential Lock, Midmount Electronic Hydraulic Remote Valves, Engine
RM	Front Axle Suspension, Rear Electronic Hydraulic Remote Valves, Front PTO, Front Hitch
KA	Fast Steer System
LC	Armrest Controller
XA	Electronic Park Lock

INTRODUCTION

The “H" menu mode is part of the on-board diagnostics, providing configuration and diagnostic support through the resources available on the system.



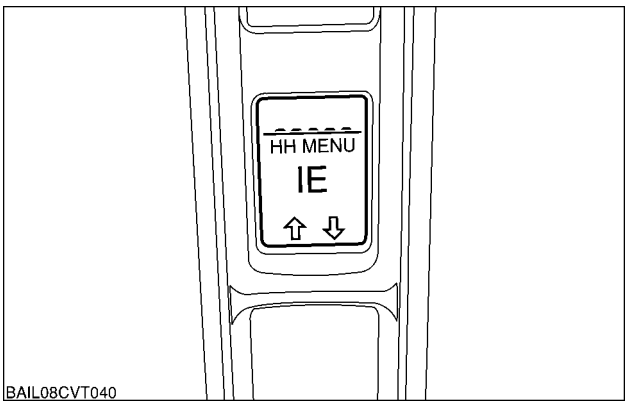
BAIL06CCM213AVA 1

To gain access to the diagnostic “H" menu mode routine, it is necessary to use the diagnostic test switch, special tool **380000843** in the tractor diagnostic connector **X030** located on the right-hand pillar behind the driver’s seat **(1)**. There

is a second diagnostic connector located in the lower trim behind the driver’s seat used by the EST for accessing the secondary CAN Bus system.

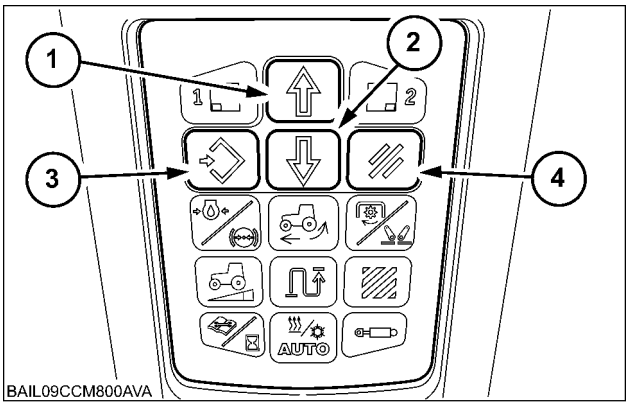
H Menu Navigation Procedure

Connect the special tool **380000843** to the diagnostic connector and turn the key start switch ON.
At key ON the ICU3 will automatically build a list of the controllers connected on the Controller Area Network (CAN), and will store it in the Electrically Erasable Programmable Read Only Memory (EEPROM).
The dot matrix display will show “HH MENU" to indicate that the “H" menu has been activated.



BAIL08CVT040 2

To navigate the “H" menus use the navigation “up" key and “down" key to scroll through the options, and the “menu" key to select the required controller or “H" menu.
(1) "up" key
(2) "down" key
(3) "menu" key
(4) "escape" key



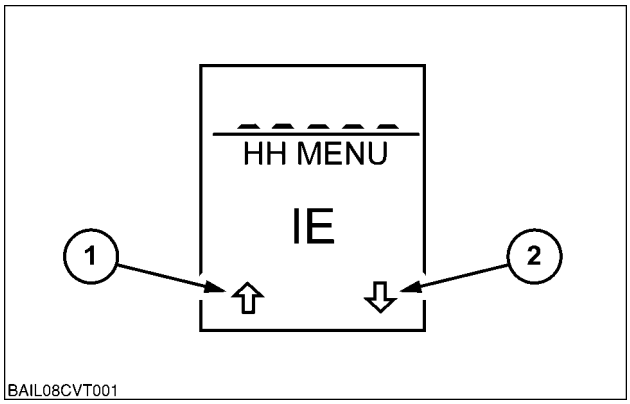
BAIL09CCM800AVA 3

Controller Identifier Code Table

The controller is identified with a two letter code, i.e. IE - Enhanced ICU3.

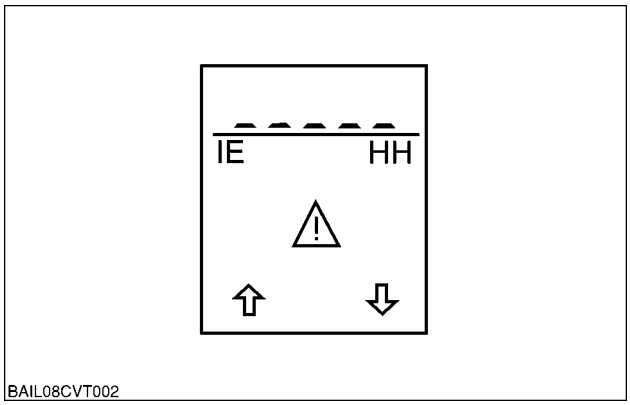
Identifier	Controller Functions
IE	Enhanced ICU3 Instrument Cluster
RT	FPS Transmission, Electronic Draft Control, Rear PTO, Front Wheel Drive, Differential Lock, Midmount Electronic Hydraulic Remote Valves, Engine
RM	Front Axle Suspension, Rear Electronic Hydraulic Remote Valves, Front PTO, Front Hitch
KA	Fast Steer System
LC	Armrest Controller
XA	Electronic Park Lock

Select the controller that requires diagnostics or configuration.
Depress the “menu" key to show the first controller identifier code in the list.
The up arrow **(1)** and the down arrow **(2)** indicate there are other controllers available.
To navigate through the list of controllers use the “up" and "down" key.



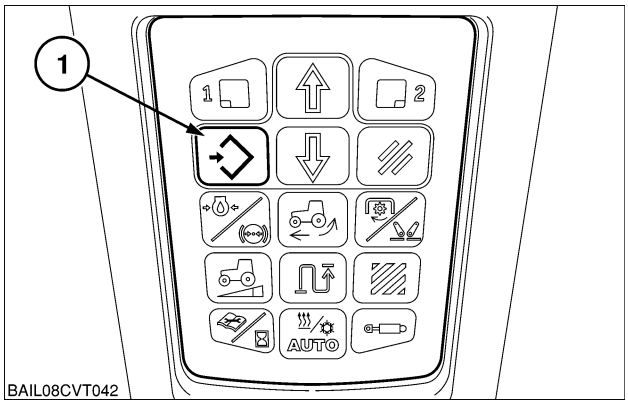
BAIL08CVT001 4

If a controller cannot be found on the CAN, a symbol will be displayed to indicate that there is no communication between the ICU3 and the selected controller.



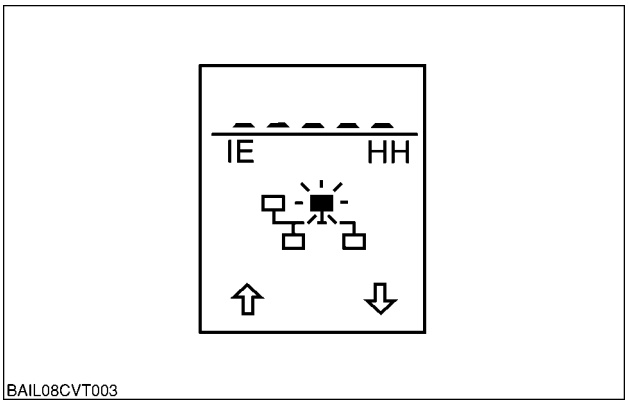
BAIL08CVT002 5

When the required controller is located in the list, depress the "menu" key **(1)** to select it.



BAIL08CVT042 6

The display will change to show the “HH menu" select screen.



BAIL08CVT003 7

H Menu Common Features

The “H“ menus consist of the following menu codes.

NOTE: *Not all the following “H" menus are available for all controllers.*

HH	Service Menu
H1	Calibration procedures
H2	View stored calibration values
H3	Configurations and options
H4	View software revision level
H5	Switch operation test
H6	Vehicle information view
H7	Vehicle test modes
H8	Clear stored calibration information
H9	Voltmeter diagnostics
HA	Demonstration mode
HB	Display stored fault codes
HC	Clear all stored fault codes
HE	Display frequency inputs
HF	View controller hardware information
HJ	Electronic hydraulic remote control valve number programming
HK	Rear electronic hydraulic remote control valve diagnostics

Dot Matrix Display Symbols

1. Engine 

2. Transmission 

3. Differential lock 

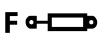
4. Electronic draft control 

5. Front hitch 

6. Rear P.T.O. system 

6a. Front P.T.O. system 

7. Rear Electronic remote valves 

7a Front EHRs 

8. Front suspension 

9. Four wheel drive 

10. Fast steer system 

11. HTS 

12. Engine shutdown 

13. Air brake 

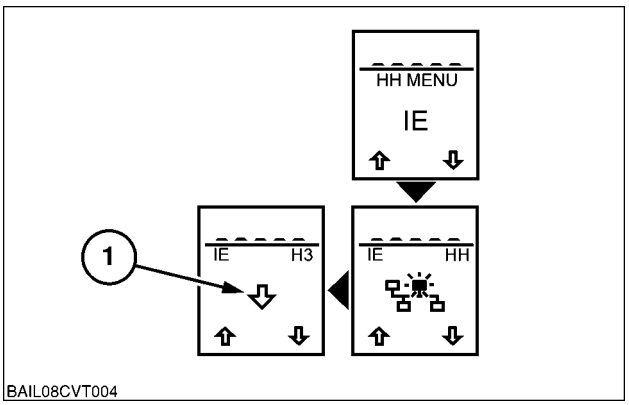
14. Steering sensor 

16. Error code management 

17. SWCD 

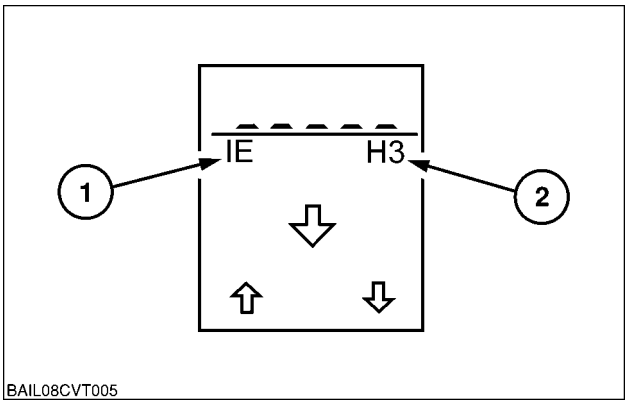
18. Front electronic remote valves

The up and down arrows indicate there are other “H" menus available.
To navigate through the list of "H" menus use the “up" and "down" key.
The downward arrow **(1)** indicates there is more than one sub-system that uses the same menu (multi-functional “H" menu).
Depress the “menu" key to select the “H" menu required.



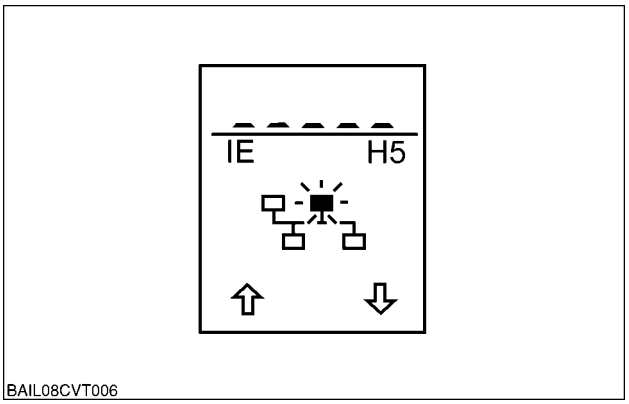
BAIL08CVT004 8

The controller selected will be displayed in the top left hand corner of the dot matrix display **(1)**.
The “H" menu will be displayed in the top right hand corner of the dot matrix display **(2)**.



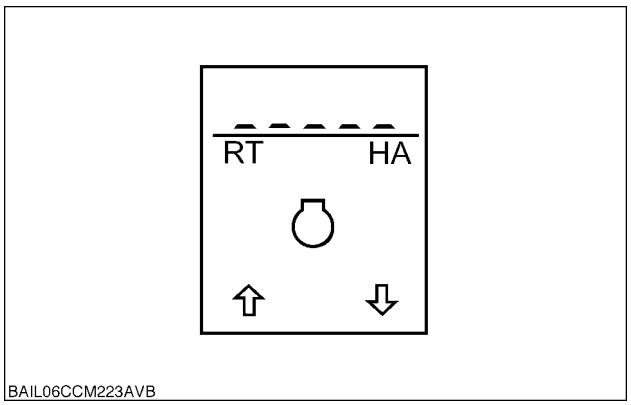
BAIL08CVT005 9

The “H" menu select screen will be displayed if the menu is common to all sub-systems, i.e. H5 - Switch test and H9 - Voltmeter.



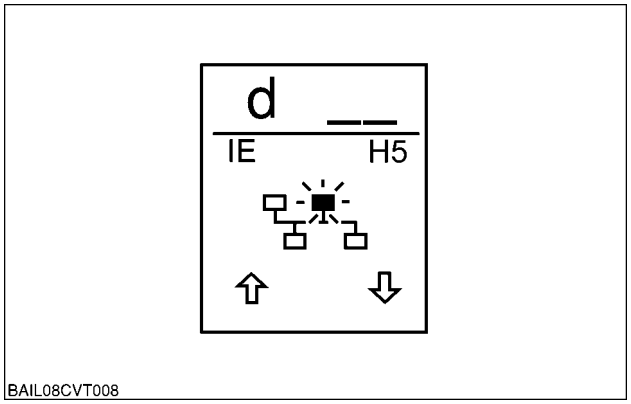
BAIL08CVT006 10

If the menu is specific to only one sub-system, the relevant icon will be displayed in the centre of the dot matrix display, i.e. engine icon for HA - Demonstration mode.



BAIL06CCM223AVB 11

When the sub-system has been selected, the navigation arrows will no longer be displayed.
The top section of the dot matrix display will be used to display the set-ups or values for the selected sub-system.



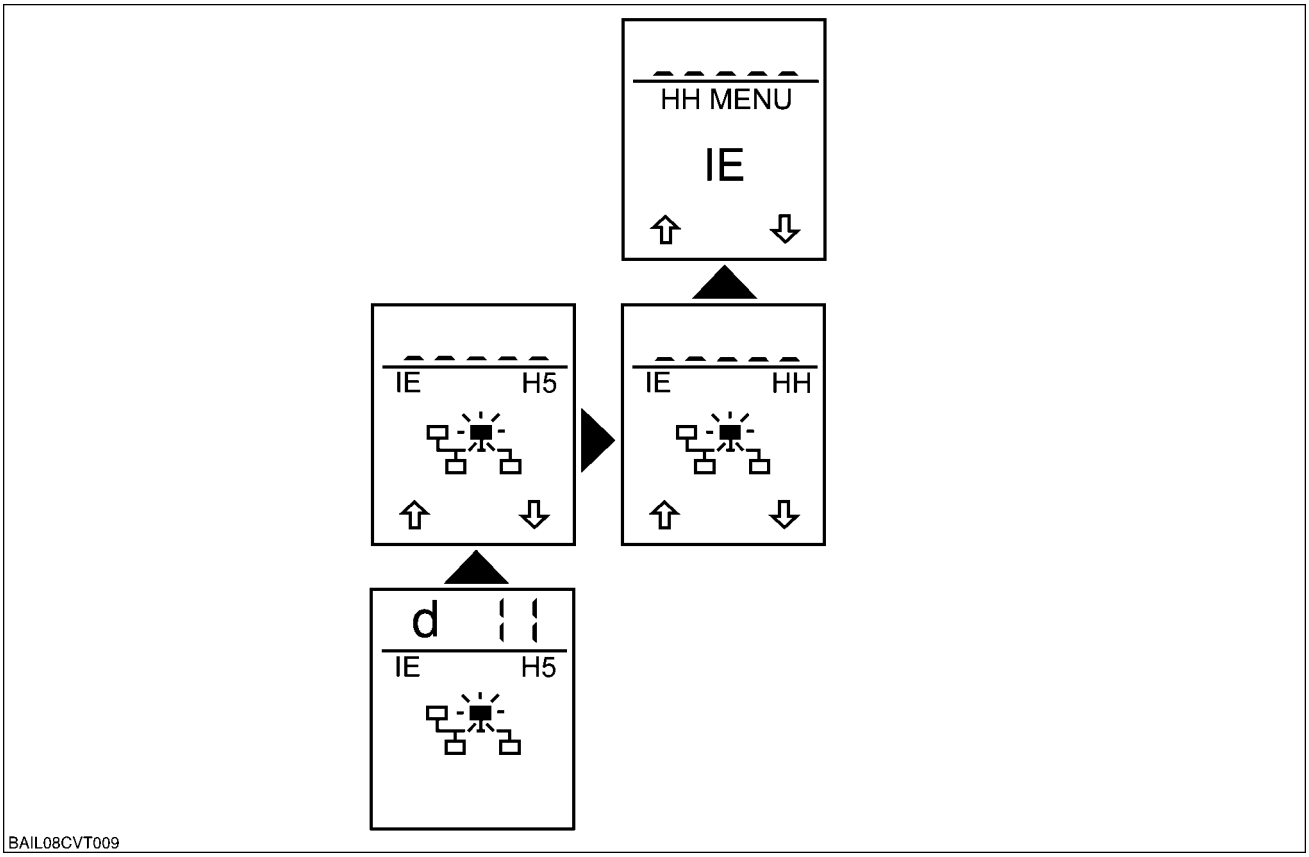
BAIL08CVT008 12

NOTE: *To return to the “H" menu select screen from H1 - Calibrations the keystart needs to be turned OFF. This will store the completed calibrations.*

To return back to the “H" menu select screen, depress the "escape" key.

NOTE: *To return to the controller select screen, “HH" must be indicated in the top right hand corner of the dot matrix display.*

To return back to the controller select screen, depress the “escape" key again.



BAIL08CVT009 13

Control module - Configure Instrument Cluster

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Instrument Cluster Unit (ICU3)

IE - Enhanced ICU3

HH	Service Menu	Figure Number
H1	Not used	-
H2	Not used	-
H3	Configurations	**1**
H4	View software revision level	**14**
H5	Switch operation test	**17**
H6	Not used	-
H7	Not used	-
H8	Clear Electrically Erasable Programmable Read Only Memory (EEPROM)	**21**
H9	Voltmeter	**25**
HA	Not used	-
HB	Display stored fault codes	**28**

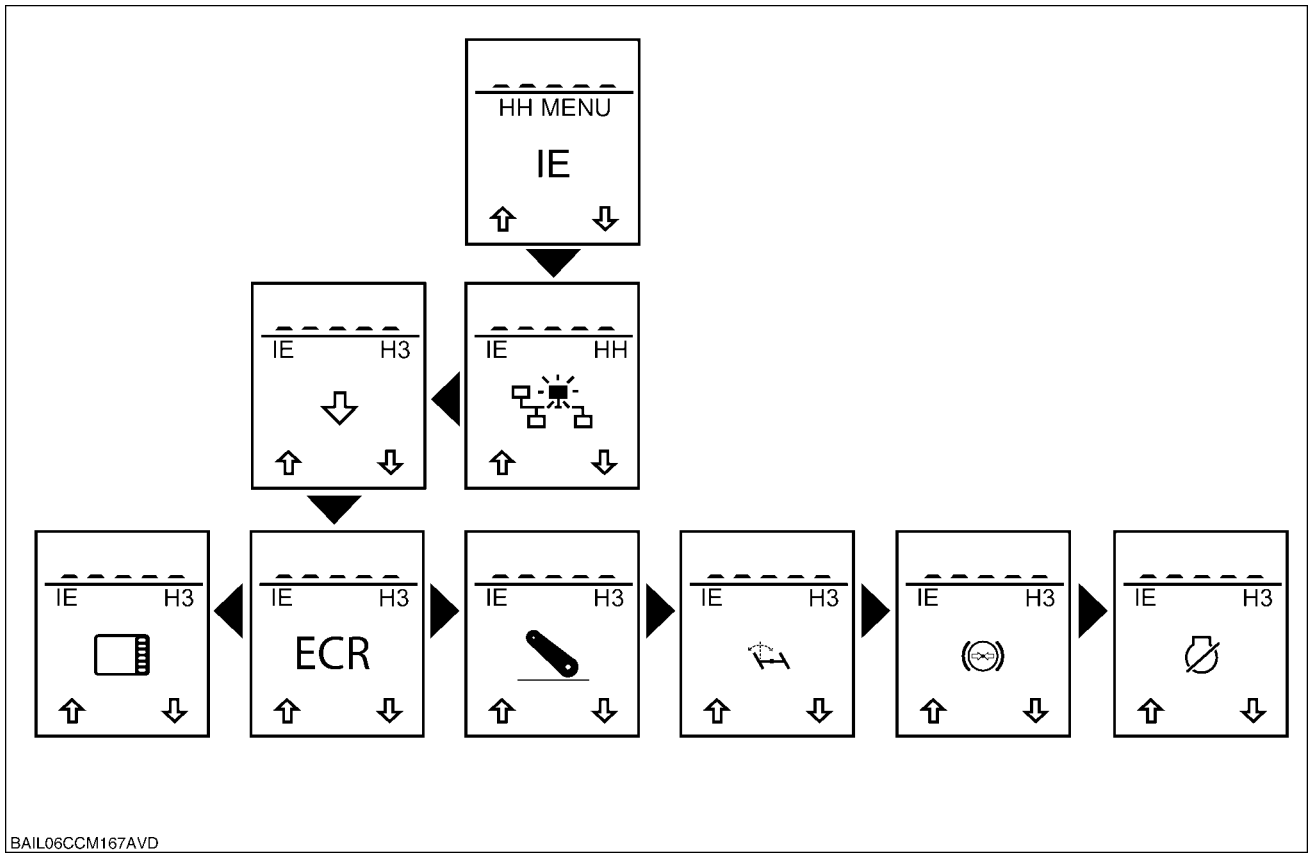
HH	Service Menu	Figure Number
HC	Clear all stored fault codes	**31**
HD	Not used	-
HE	Display frequency inputs	**34**
HF	View controller hardware information	**36**
HH	Return to main menu	-

H3 - CONFIGURATIONS

This menu displays the configurations available for:

Engine shutdown
Error code reduction
Electronic front hitch option
AFS 200
Steering sensor selection
Air brake selection

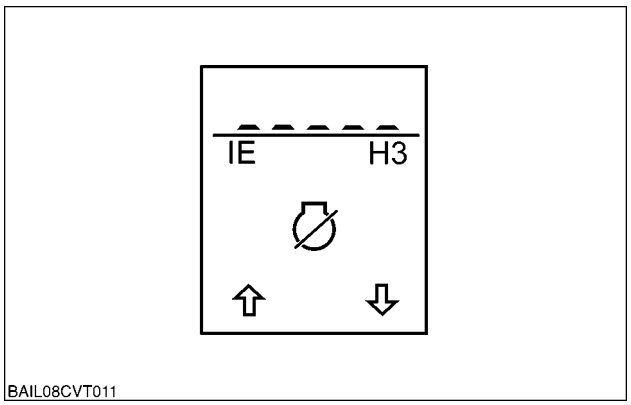
H3 Menu Screen Select Diagram



BAIL06CCM167AVD 1

ENGINE SHUTDOWN OPTIONS

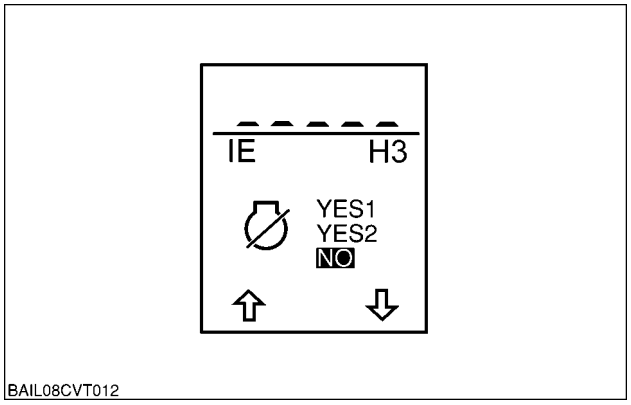
Select the engine shutdown sub-system by depressing the “menu" key.



BAIL08CVT011 2

NOTE: *The default setting is NO.*

Scroll through the available options using the navigation “up" or “down" key.
Refer to the engine shutdown options table below.



BAIL08CVT012 3

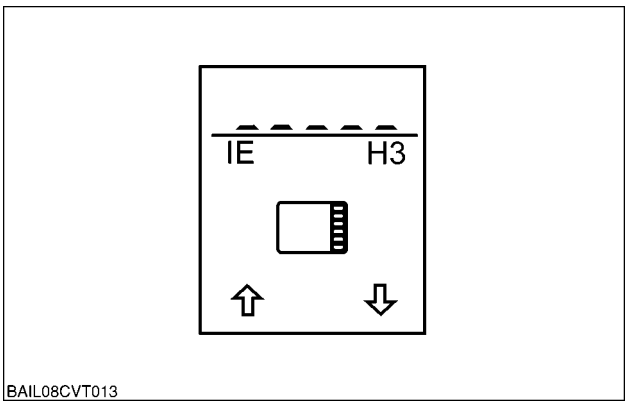
Depress and hold the navigation “up" or “down" key to store the selection, an audible tone will be heard to confirm the selection.
Depress the “menu" key to continue navigating through the “HH" menus.

Engine Shutdown Options

Options		CONDITIONS REQUIRED FOR ENGINE SHUTDOWN	CONDITIONS WHICH OVERRIDE ENGINE SHUTDOWN OPTIONS (All conditions must be met)			
		Operating Condition	Operator Present	Operator Not Present	Vehicle Station-ary	Vehicle Moving
NO	**No engine shutdown**	**The engine will not shut down**	**-**	**-**	**-**	**-**
YES1	Always shutdown engine	Engine oil pressure - Low	*	*	*	*
		Engine coolant temperature - High	*	*	*	*
		Driveline oil temperature - High		*	*	
		Driveline oil pressure - Low		*	*	
YES2	Stationary engine shutdown	Engine oil pressure - Low		*	*	
		Engine coolant temperature - High		*	*	
		An external device is requesting the engine to shutdown		*	*	
		Driveline oil temperature - High		*	*	
		Driveline oil pressure - Low		*	*	

AFS 200 OPTIONS

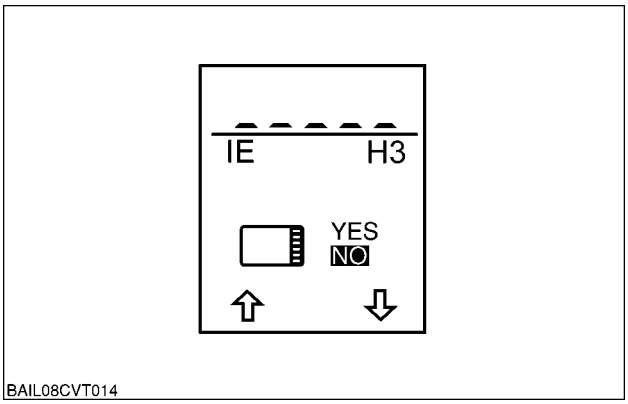
Select the AFS 200 sub-system by depressing the “menu" key.



BAIL08CVT013 4

NOTE: *The default setting is “No" without AFS 200.*

Scroll through the available options using the navigation “up" or “down" key.

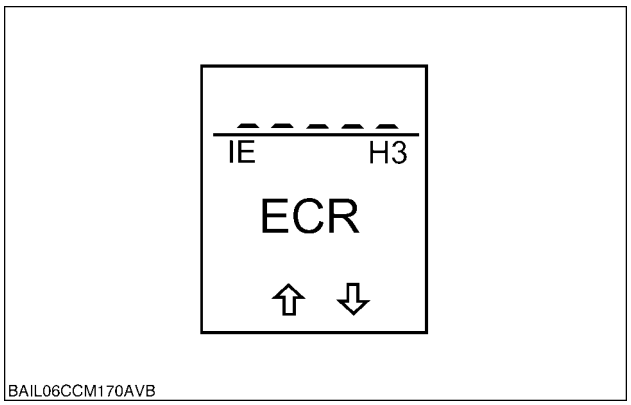


BAIL08CVT014 5

Depress and hold the navigation “up" or “down" key to store the selection, an audible tone will be heard to confirm the selection.
Depress the “menu" key to continue navigating through the “HH" menus.

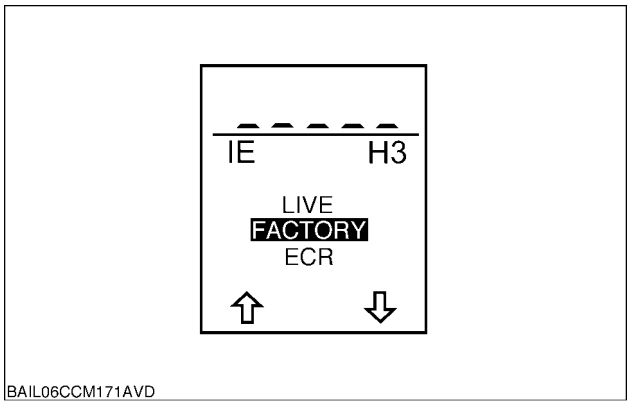
ERROR CODE REDUCTION OPTIONS

Select the error code reduction sub-system by depressing the “menu" key.



BAIL06CCM170AVB 6

Scroll through the available options using the navigation “up" or “down" key.
"Factory" - factory error mode, displays all error codes for a period of 6 minutes then reverts to error code reduction (ECR).
"ECR" - error code reduction mode, only displays critical errors.
"Live" - live error code mode, displays all error codes.

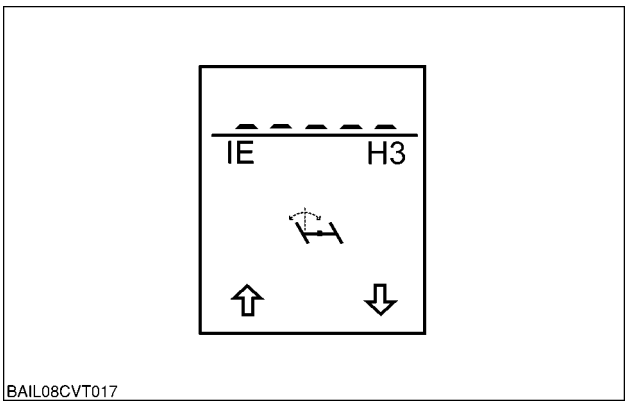


BAIL06CCM171AVD 7

Depress and hold the navigation “up" or “down" key to store the selection, an audible tone will be heard to confirm the selection.
Depress the “menu" key to continue navigating through the “HH" menus.

STEERING SENSOR SELECTION OPTIONS

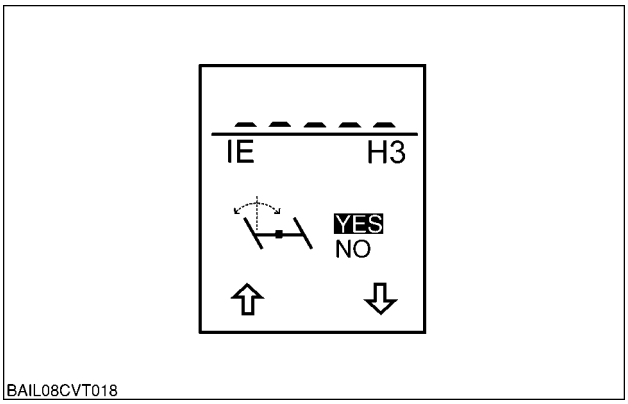
Select the steering sensor sub-system by depressing the “menu" key.



BAIL08CVT017 8

NOTE: *The default setting is “No" without steering sensor.*

Scroll through the available options using the navigation “up" or “down" key.

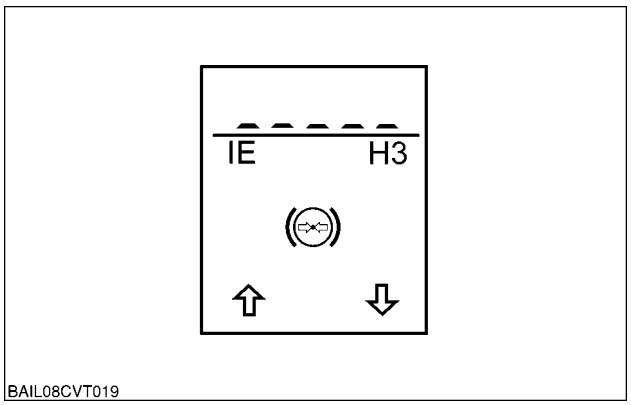


BAIL08CVT018 9

Depress and hold the navigation “up" or “down" key to store the selection, an audible tone will be heard to confirm the selection.
Depress the “menu" key to continue navigating through the “HH" menus.

AIR BRAKE OPTIONS

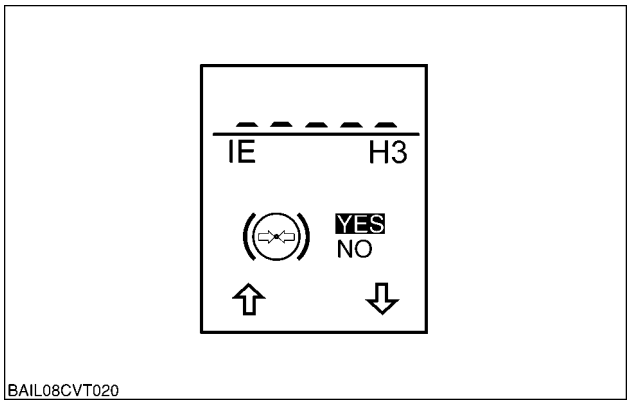
Select the air brake sub-system by depressing the “menu" key.



BAIL08CVT019 10

NOTE: *The default setting is “No" without air brakes.*

Scroll through the available options using the navigation “up" or “down" key.



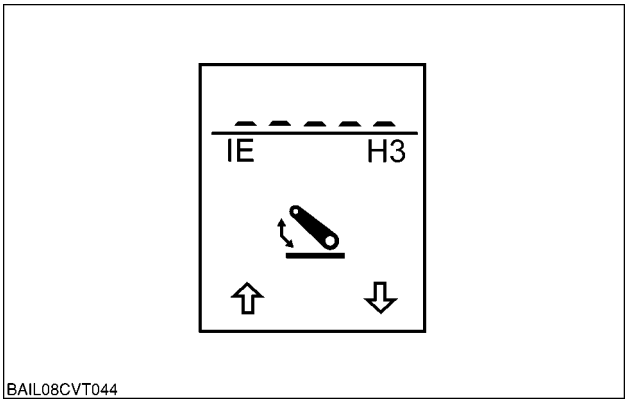
BAIL08CVT020 11

Depress and hold the navigation “up" or “down" key to store the selection, an audible tone will be heard to confirm the selection.
Depress the “menu" key to continue navigating through the “HH" menus.

Electronic Front Hitch Option

This section is used to configure the Electronic front hitch option.

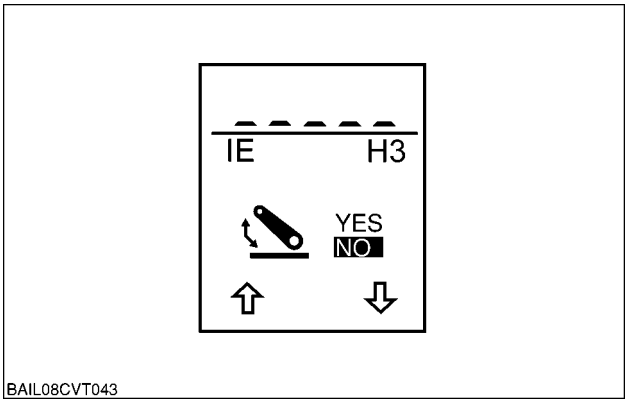
Select the Electronic front hitch sub-system by depressing the “menu" key.



BAIL08CVT044 12

NOTE: *The default setting is “No". Electronic front hitch not present.*

Scroll through the available options using the navigation “up" or “down" key.



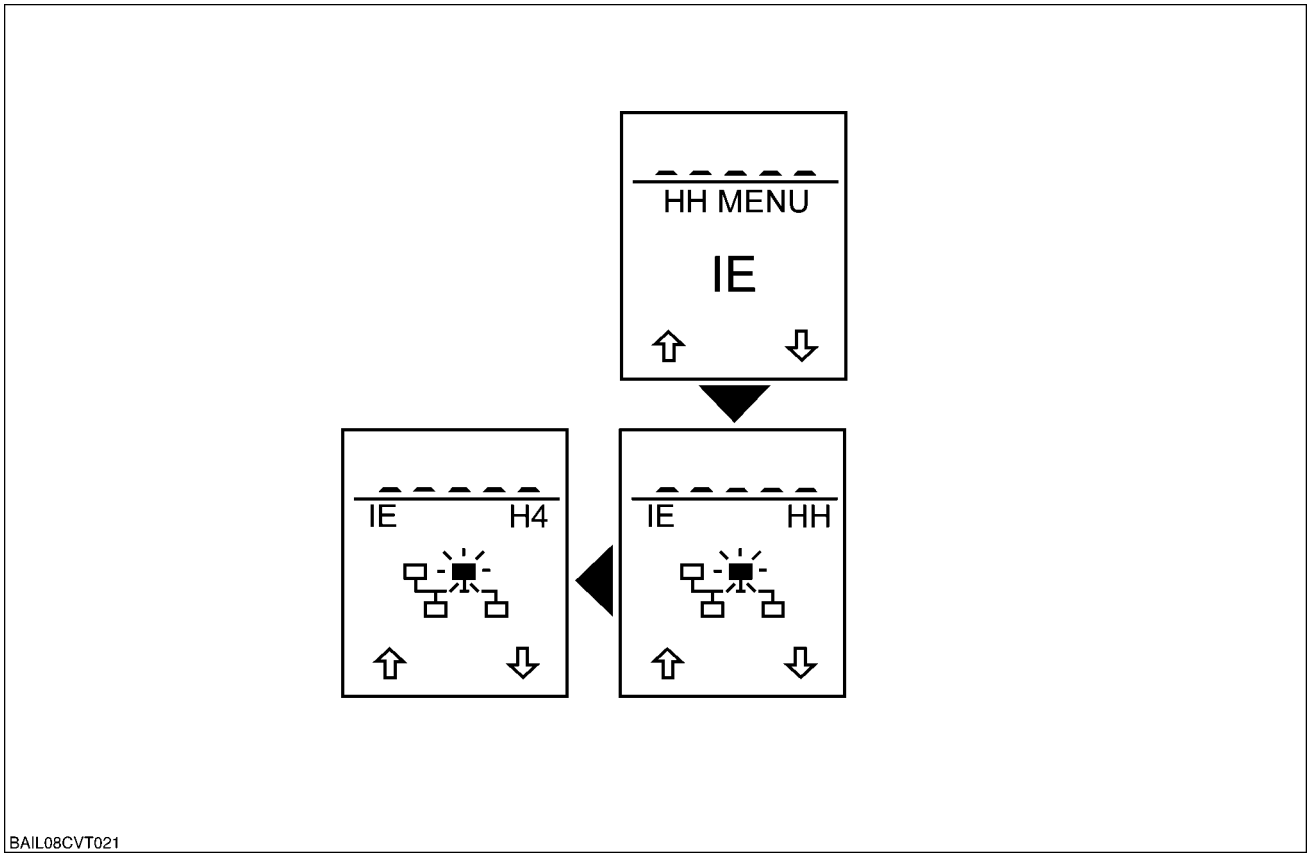
BAIL08CVT043 13

Depress and hold the navigation “up" or “down" key to store the selection, an audible tone will be heard to confirm the selection.
Depress the “menu" key to continue navigating through the “HH" menus.

H4 - VIEW SOFTWARE REVISION LEVEL

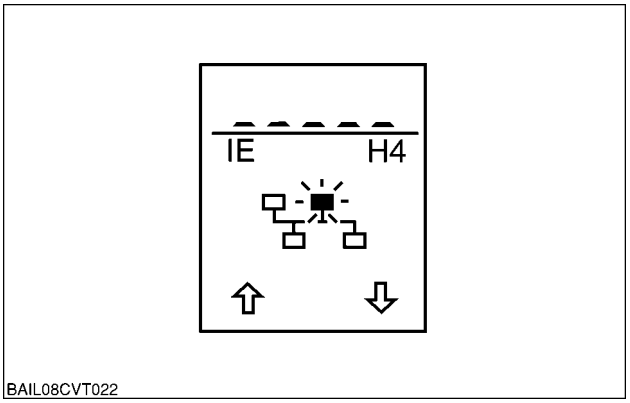
This menu displays the software release of the unit.

H4 Menu Screen Select Diagram



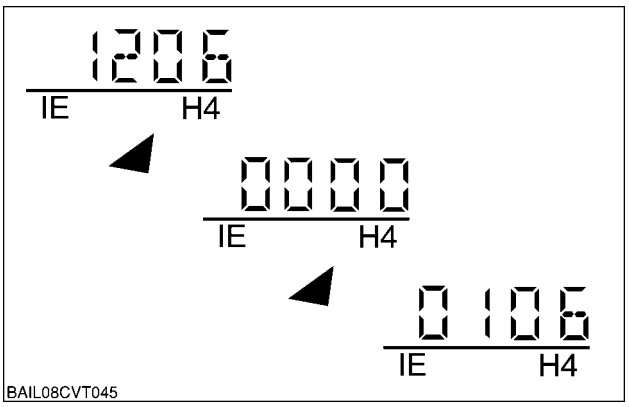
BAIL08CVT021 14

Select the H4 menu by depressing the “menu" key.



BAIL08CVT022 15

The display will automatically cycle through the software release as the example shown below, and will then return to allow navigation of the “HH" menus.

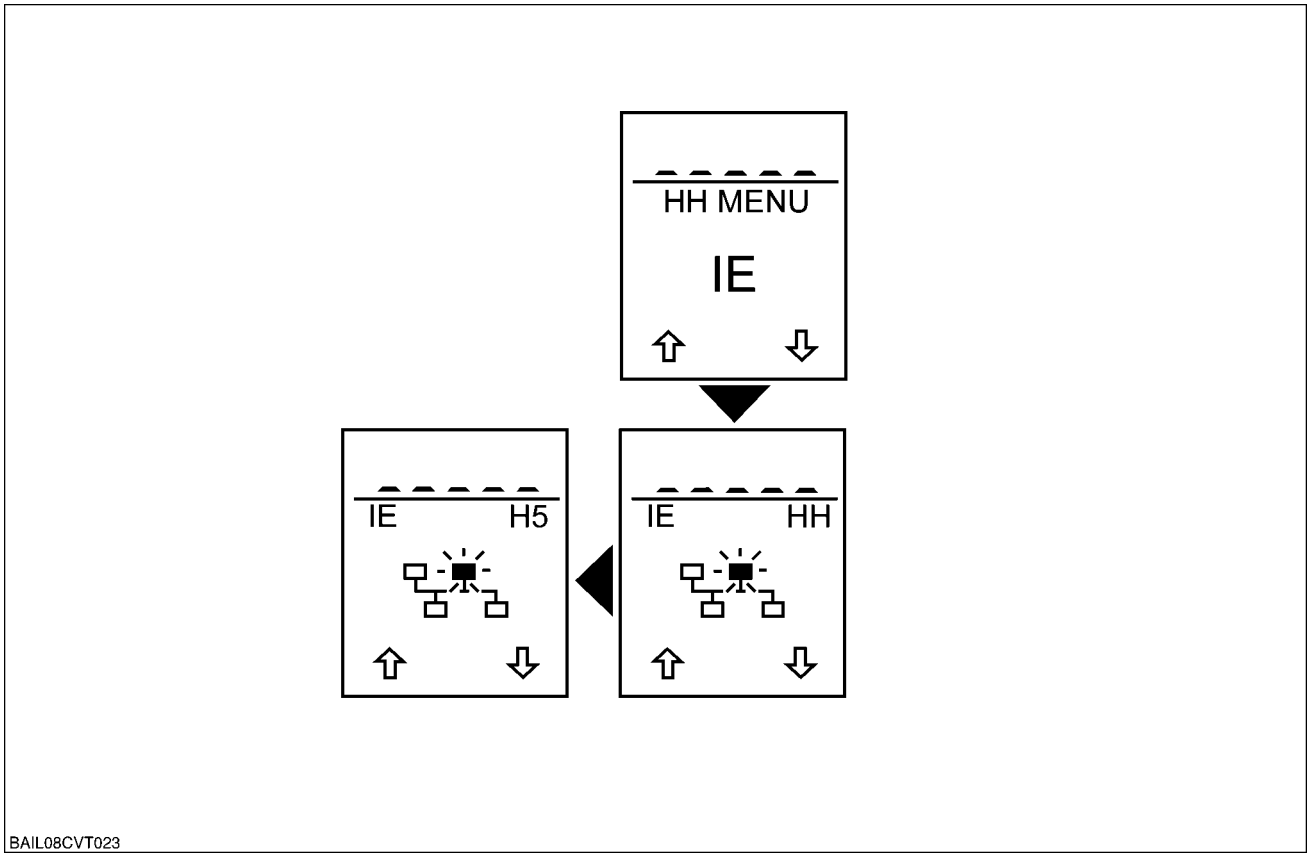


BAIL08CVT045 16

H5 - SWITCH OPERATION TEST

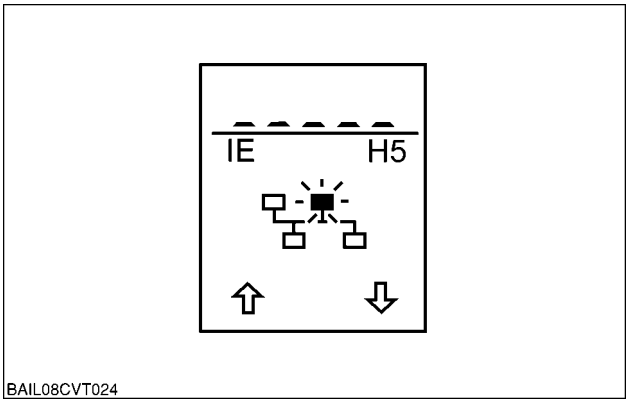
This menu displays a designated code when a switch transition is detected.

H5 Menu Screen Select Diagram



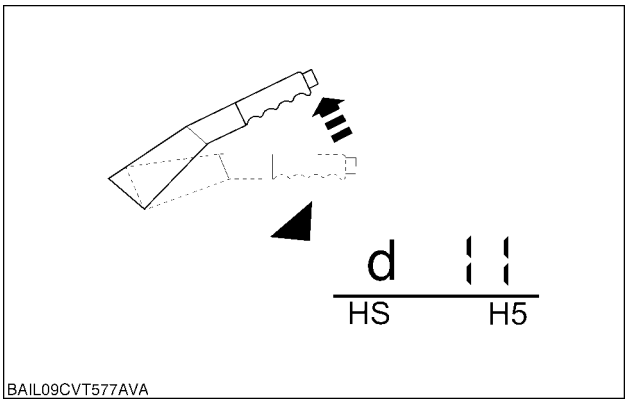
BAIL08CVT023 17

Select the H5 menu by depressing the “menu" key.



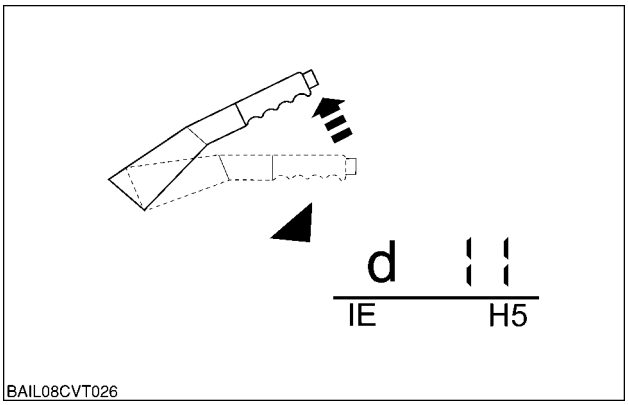
BAIL08CVT024 18

The top section of the display will display “d _ _".



BAIL09CVT577AVA 19

When a switch is operated, a code will be displayed and an audible tone should be heard to indicate the correct function.
If a switch code is not displayed and the audible tone not heard, a ’wiggle’ test can be performed on the related wiring while watching the display or listening for the audible tone, to help locate the fault.



BAIL08CVT026 20

NOTE: *If the keystart switch is turned to the “crank" position, with the shuttle lever in neutral and the clutch pedal down, a switch disagreement error may occur.*

Identifier	Controller Connector	Pin Number	Switch / Input	Special Requirements
d0	No switch or two switches activated at the same time			-
d11	CN3	7	Handbrake switch	-
d66	CN3	18	Main high beam switch	-
d67	CN1	15	Side lights	-
d68	CN3	17	Brakes not latched (Japan ONLY)	-
d70	CN1	5	Left turn signal indicator	-
d71	CN1	6	Right turn signal indicator	-
d74	CN3	9	Exhaust brake switch	-

H8 - CLEAR ELECTRICAL ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM)

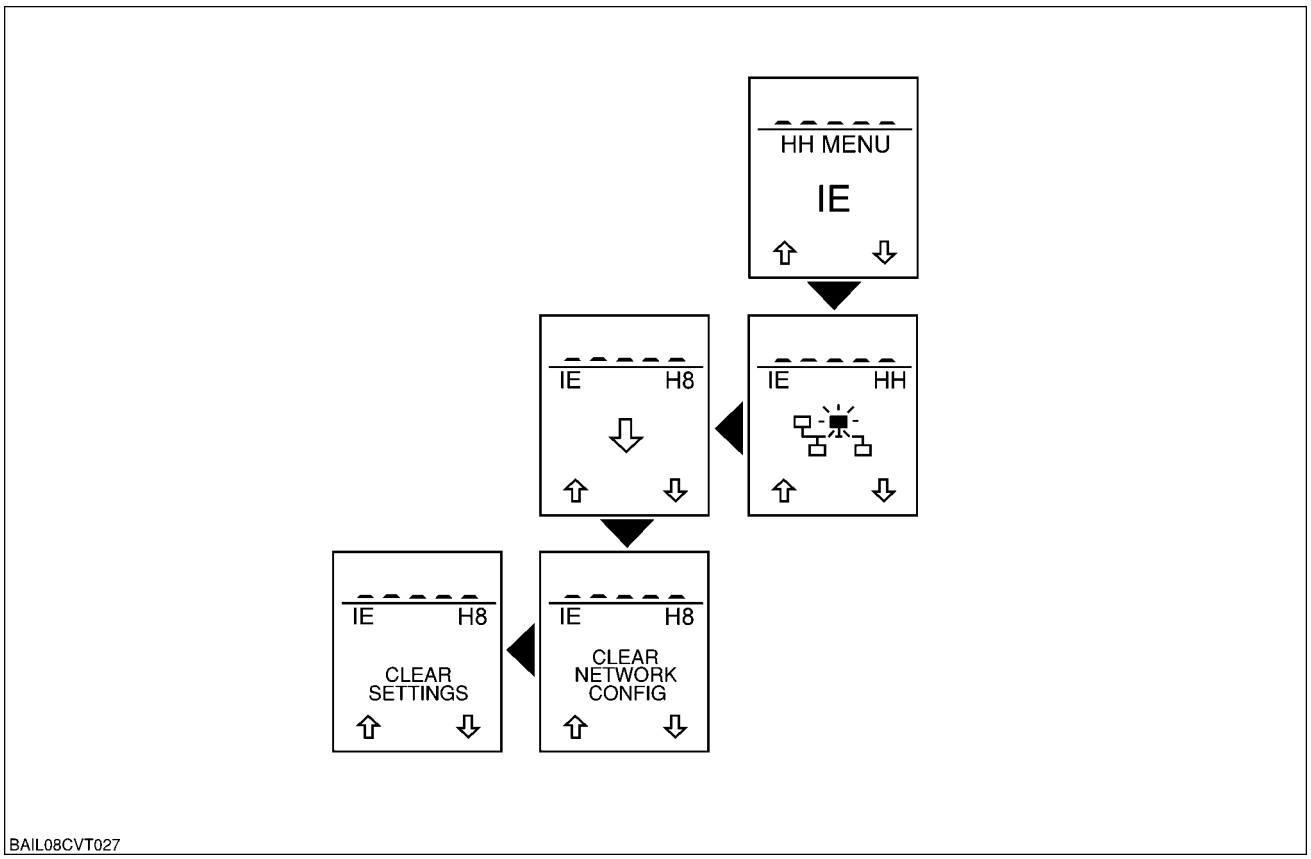
This menu clears calibration values and stored error codes by resetting all EEPROM values back to default. EEPROM is where all calibration values and error codes are stored. This memory is retained even if there is no power to the controller, i.e. if the battery is disconnected. There are two options available. "Clear net config" and "clear settings". "Clear net config" is used to erase the stored network configuration, this will clear the current configuration stored in the instrument cluster and rebuild the configuration at the next key ON. This should be used if the cluster has been changed or if the HH menus are showing modules which are not fitted to the machine.
"Clear settings" will return all instrument cluster settings back to their default setting.

NOTE: *To change any configuration settings H3 menu mode must be used. H8 will not affect these settings.*

NOTE: *To remove all stored error codes without erasing the calibration values use the HC menu.*

The "CLEAR SETTINGS" option will clear all of the following information stored in the instrument cluster's non-volatile memory, and set the parameters to their default values (indicated in brackets).

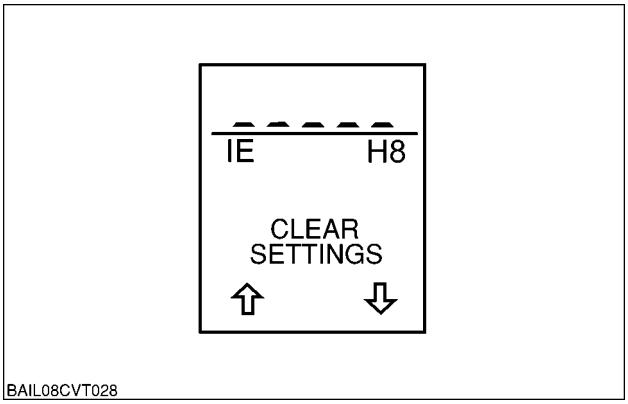
H8 Menu Screen Select Diagram



BAIL08CVT027 21

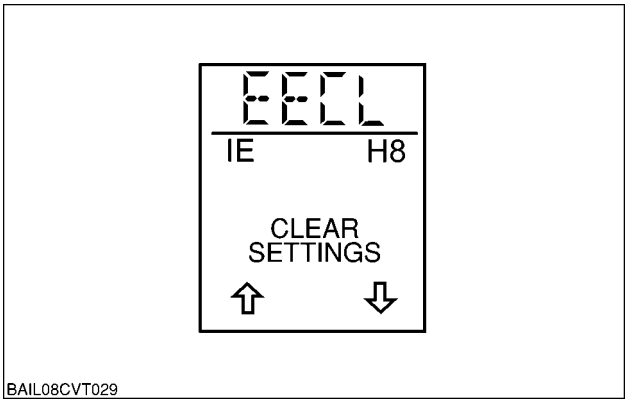
Turn the key switch on without starting the vehicle.
Select the H8 menu by depressing the "menu" key.
Scroll through the available options using the navigation "up" or "down" key.

Select "Clear Settings" by depressing the "down" key



BAIL08CVT028 22

The top section of the display will display “EECL"



BAIL08CVT029 23

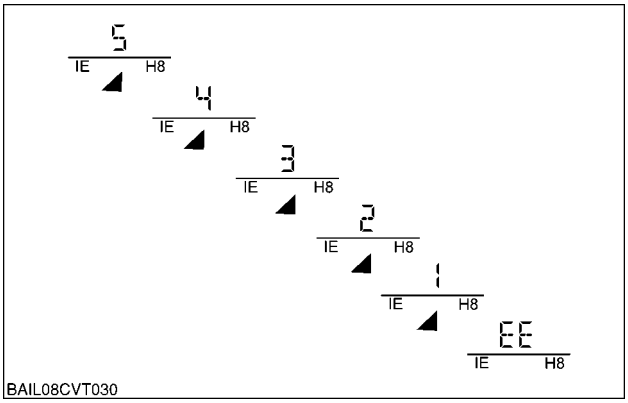
⚠ CAUTION ⚠

H8 will clear all calibrations values and stored error codes.

B006

NOTE: *If the navigation “down" key is released before the countdown finishes, the procedure will be aborted.*

Depress and hold the navigation “down" key to confirm the resetting of the EEPROM.



BAIL08CVT030 24

It is not possible to continuing through the "H" menus after an H8 procedure. The only possible action is to turn the ignition key switch off to allow the reset values to be stored.

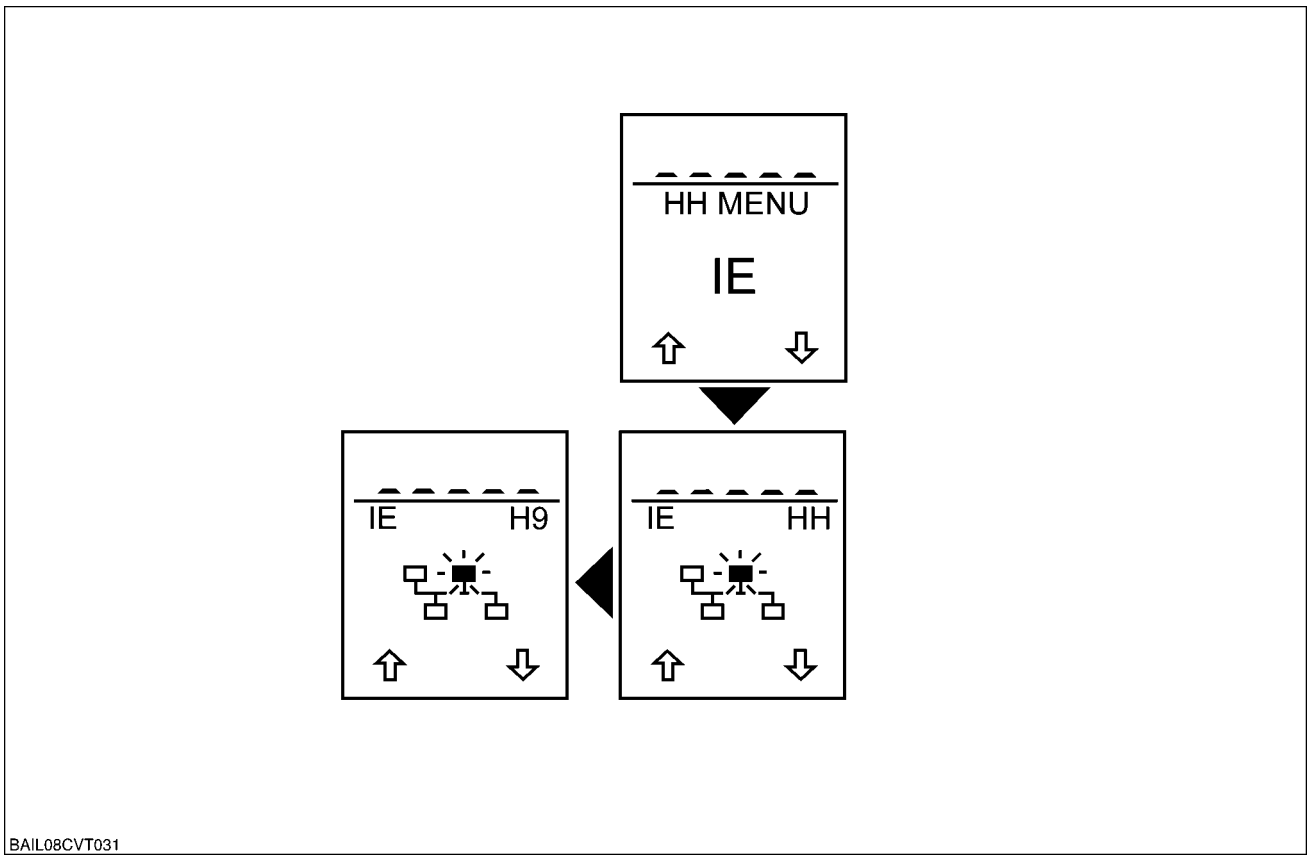
NOTE: *The ’Clear Network Config’ procedure is carried out in the same way as ’Clear Settings’*

H9 - VOLTMETER

This menu is used to verify the operation of various potentiometers, voltage supplies, and solenoid current circuits. If an intermittent fault is detected within a circuit, a 'wiggle' test can be performed on the related wiring while watching the display for sudden changes in values, to help locate the area where the fault exists.

NOTE: *The vehicle may be driven while in this menu.*

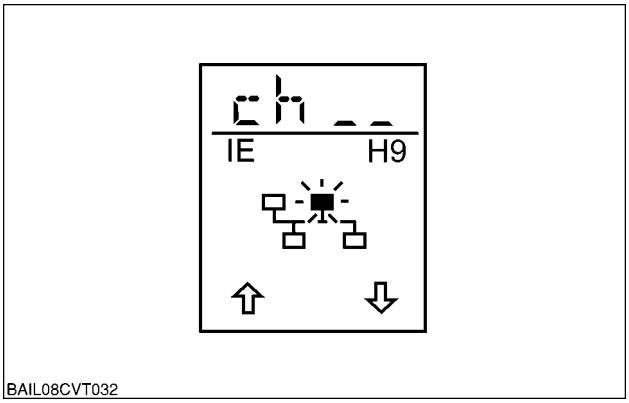
H9 Menu Screen Select Diagram



BAIL08CVT031 25

Select the H9 menu by depressing the "menu" key.

The top section of the display will display "ch _ _".



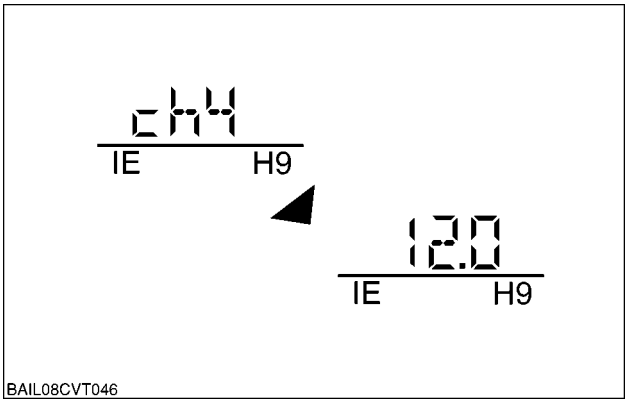
BAIL08CVT032 26

The required channel can be selected by using the navigation "up" and "down" keys.
After a delay the value will be displayed. Compare the value displayed with the typical reading shown in the table below.

NOTE: *The value is the input voltage or signal into the controller. This cannot be directly translated into a voltage due to the internal processes of the controller. A zero equates to* ***0 volts****.*

If the value displayed varies by more than **10 %** to that shown in the table below, a fault is indicated in either the component or the wiring harness relevant to that channel.

NOTE: *Check the connectors of the effected circuit, including the controller connectors, prior to replacing any components.*



BAIL08CVT046 27

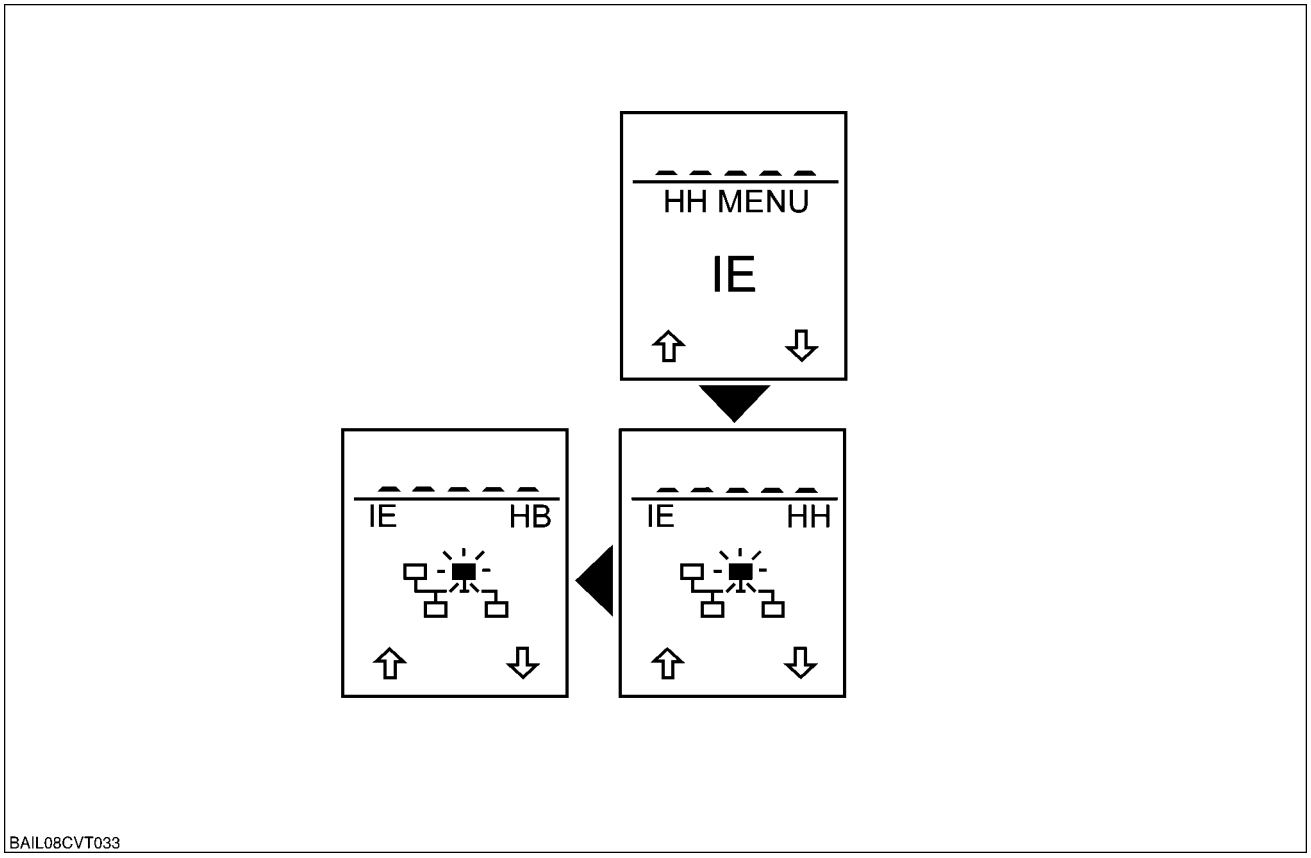
Channel	Description	Typical Reading	Notes
4	Programming voltage Vpp	**12 V**	See explanations below
5	+5 Volt sensor supply	**5 V**	
10	+12 Volt VT input	12.0 (voltage in Volts)	See explanations below
21	Steering angle sensor	23.0 full right lock 128.0 full left lock	
24	Air brake pressure	**9.0 bar**	Low pressure warning at **5.4 bar**
25	Fuel level sensor	30 - 270	30 = Full 270 = Empty
108	Air brake pressure (new sensor)	**9.0 bar**	Low pressure warning at **5.4 bar**

Explanations:
Vpp Input: This is the input voltage into the controller to retain the volatile memory.
VT Input: This is a second input voltage into the controller.

HB - DISPLAY STORED FAULT CODES

This menu is used to display fault codes which are stored in the EEPROM of the controller.

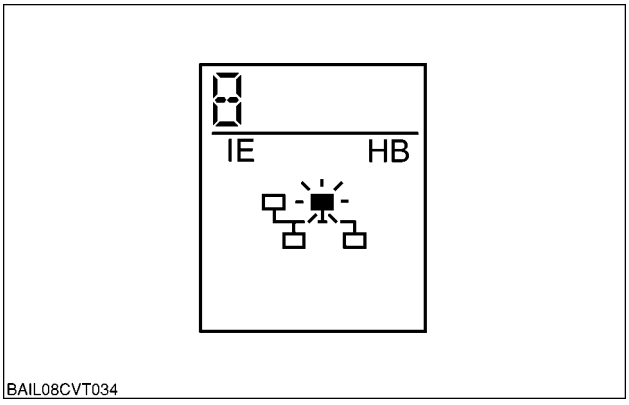
HB Menu Screen Select Diagram



BAIL08CVT033 28

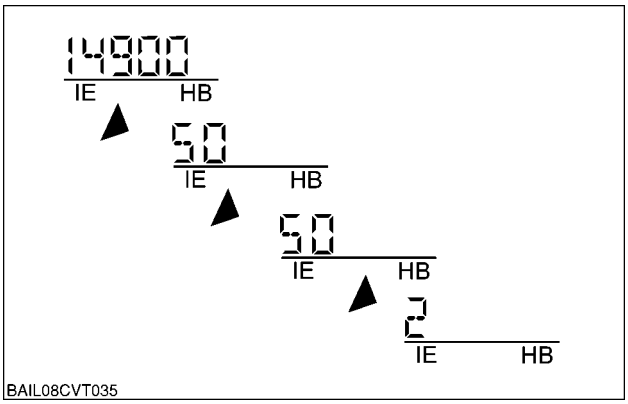
Select the HB menu by depressing the “menu" key.

"0" will flash in the top section of the display if no fault code is stored.



BAIL08CVT034 29

14900 Fault code
50 Hour of first occurrence
50 Hour of last occurrence
2 Number of occurrences of the fault

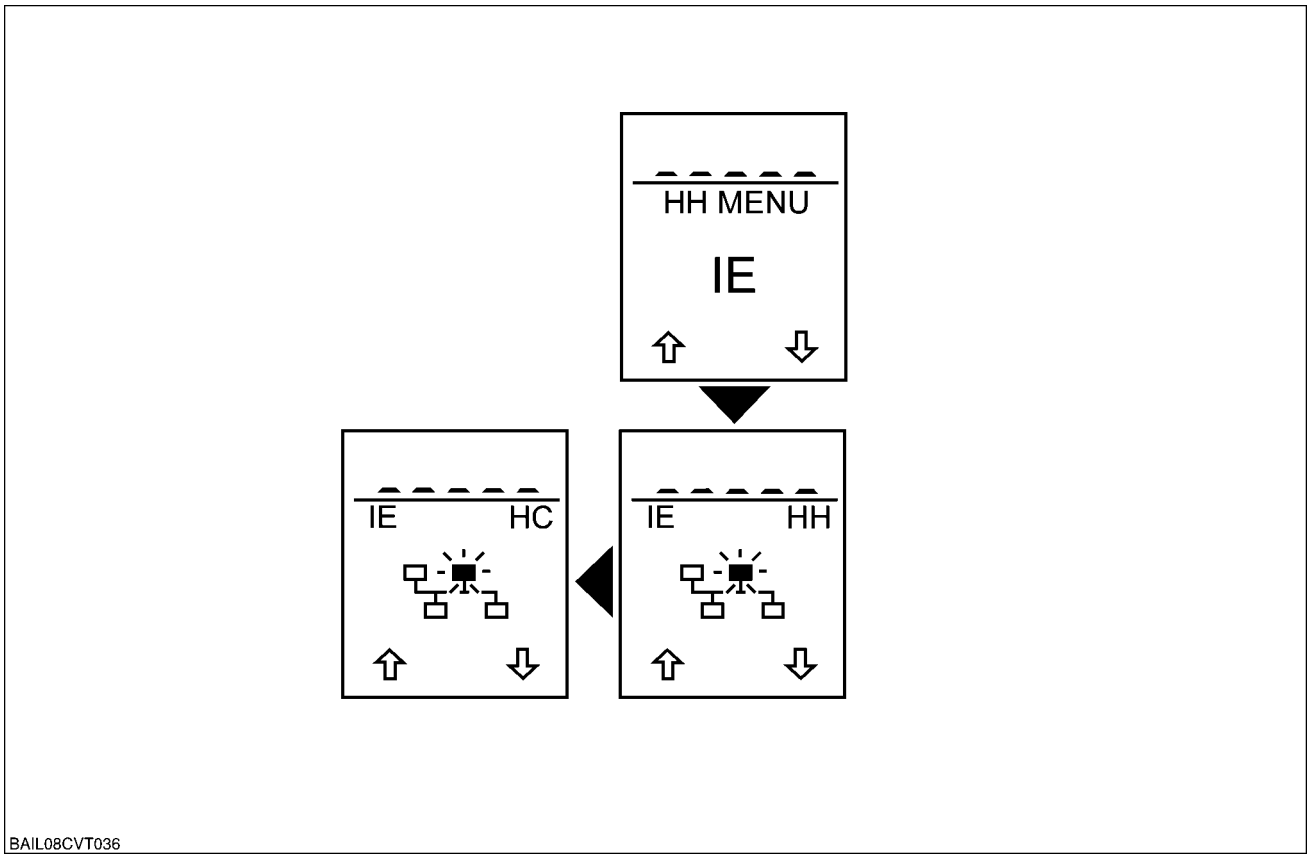


BAIL08CVT035 30

Depress the navigation “up" or “down" key to change to the next fault code in the list.
The top section of the display will display “_ _ _" at the end of the list.
Depress the “menu" key to continue navigating through the “HH" menus.

HC - CLEAR STORED FAULT CODES

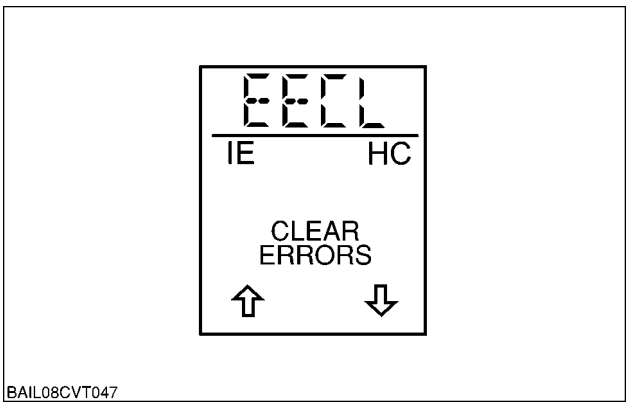
HC Menu Screen Select Diagram



BAIL08CVT036 31

NOTE: *Always make a note of the fault codes stored, before clearing the memory.*

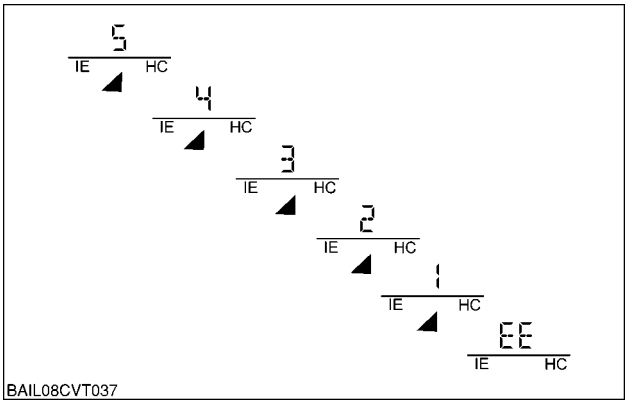
Select the HC menu by depressing the “menu" key.
The top section of the display will display “EE CL".



BAIL08CVT047 32

NOTE: *If the navigation “down" key is released before the countdown finishes, the procedure will be aborted.*

Depress and hold the navigation “down" key to confirm the clearing of the memory.
The top section of the display will countdown from 05 to 01, then “EE" will be displayed to indicate the fault codes have been cleared.
Depress the “menu" key to continue navigating through the “HH" menus.



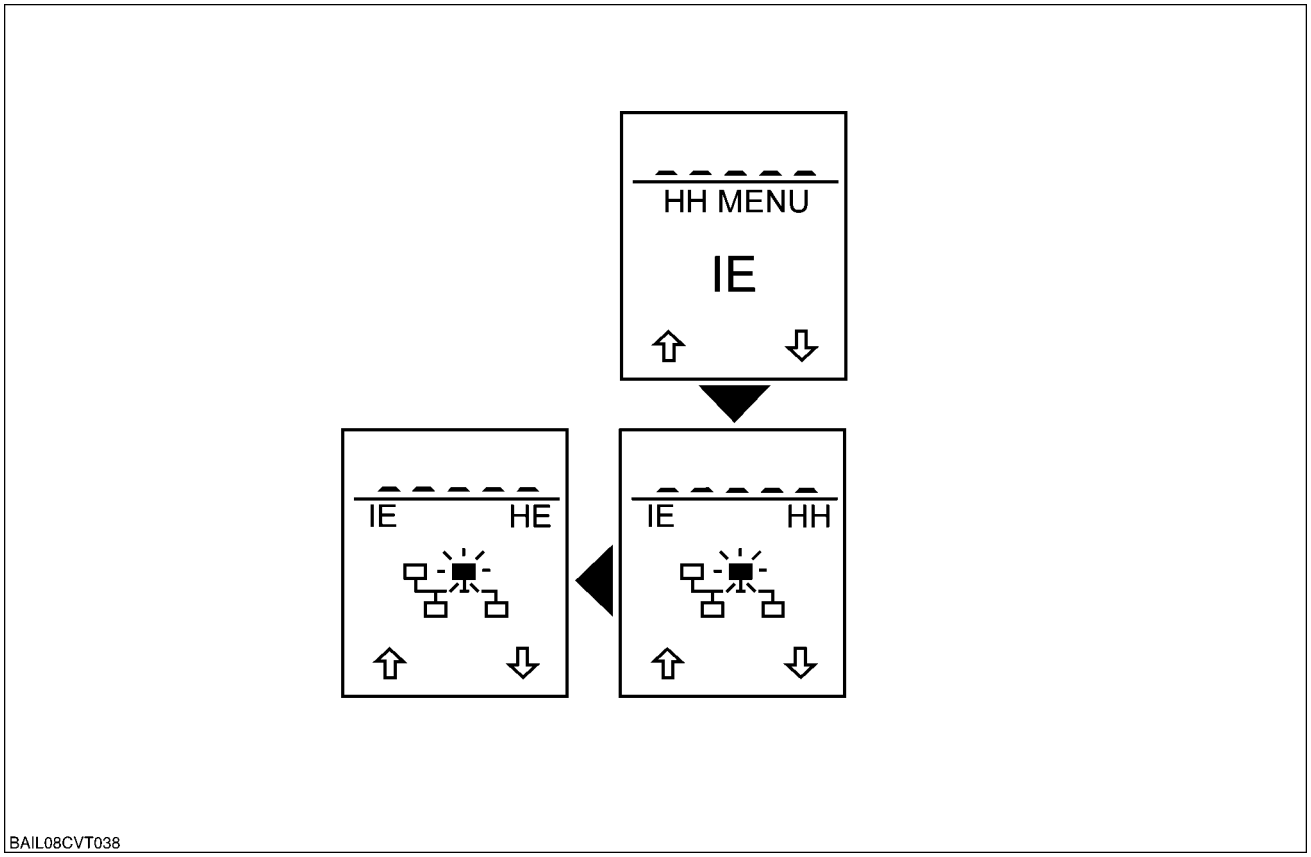
BAIL08CVT037 33

HE - DISPLAY ALL SPEED INPUTS

This menu is used to verify the operation of various frequency inputs.

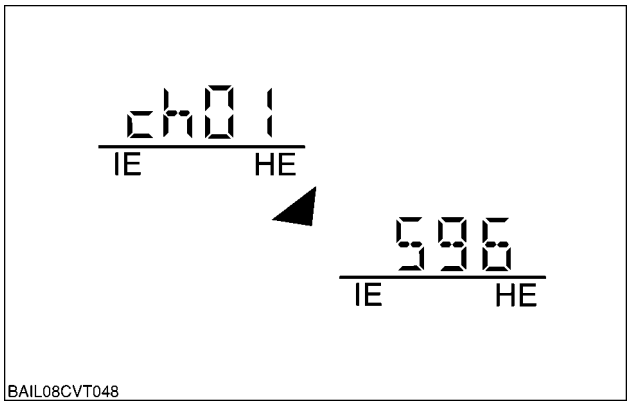
NOTE: *The vehicle may be driven while in this menu.*

HE Menu Screen Select Diagram



BAIL08CVT038 34

Select the HE menu by depressing the “menu" key.
The required channel can be selected by using the navigation “up" and “down" keys.
Refer to the table below for the available channels.
After a delay the value will be displayed.



BAIL08CVT048 35

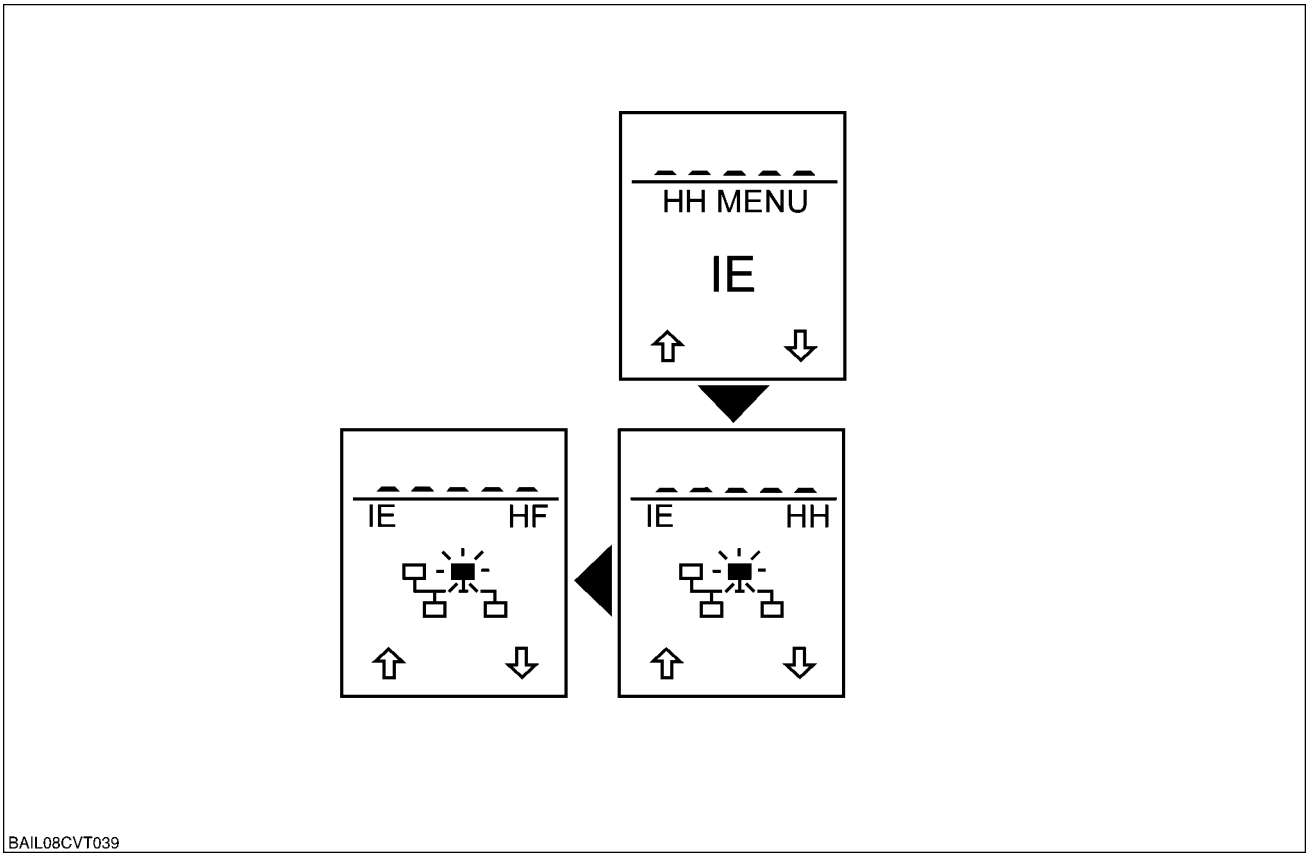
Depress the “menu" key to continue navigating through the “HH" menus.

Channel	Description	Typical Reading	Notes
1	H_Rec_status from EPL	**0 - 4000 Hz**.	

HF - VIEW CONTROLLER HARDWARE INFORMATION

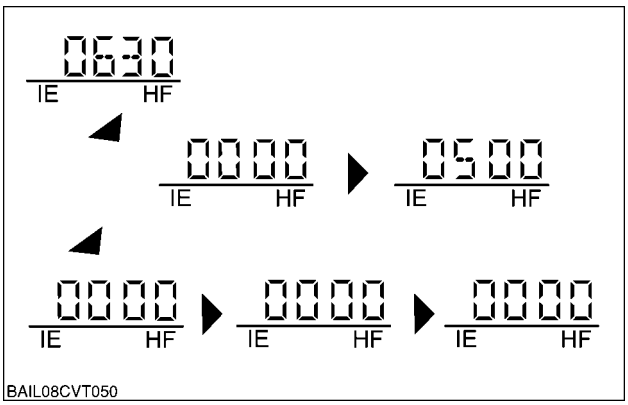
This menu allows the hardware identification, hardware version and serial number to be displayed.

HF Menu Screen Select Diagram



BAIL08CVT039 36

There is a sequence of six numbers. The first set indicates the hardware identification.
The second and third sets indicate the hardware version
The fourth, fifth and sixth sets indicate the 12 digit module serial number
0630 Hardware identification
0000 0500 Hardware version
0000 0000 0000 Serial number
and return to allow navigation of the “HH" menus.



BAIL08CVT050 37

Control module - Configure - Front Axle Suspension, Rear Electronic Hydraulic Remote Valves, Front PTO, Front Hitch

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

RM Control Module

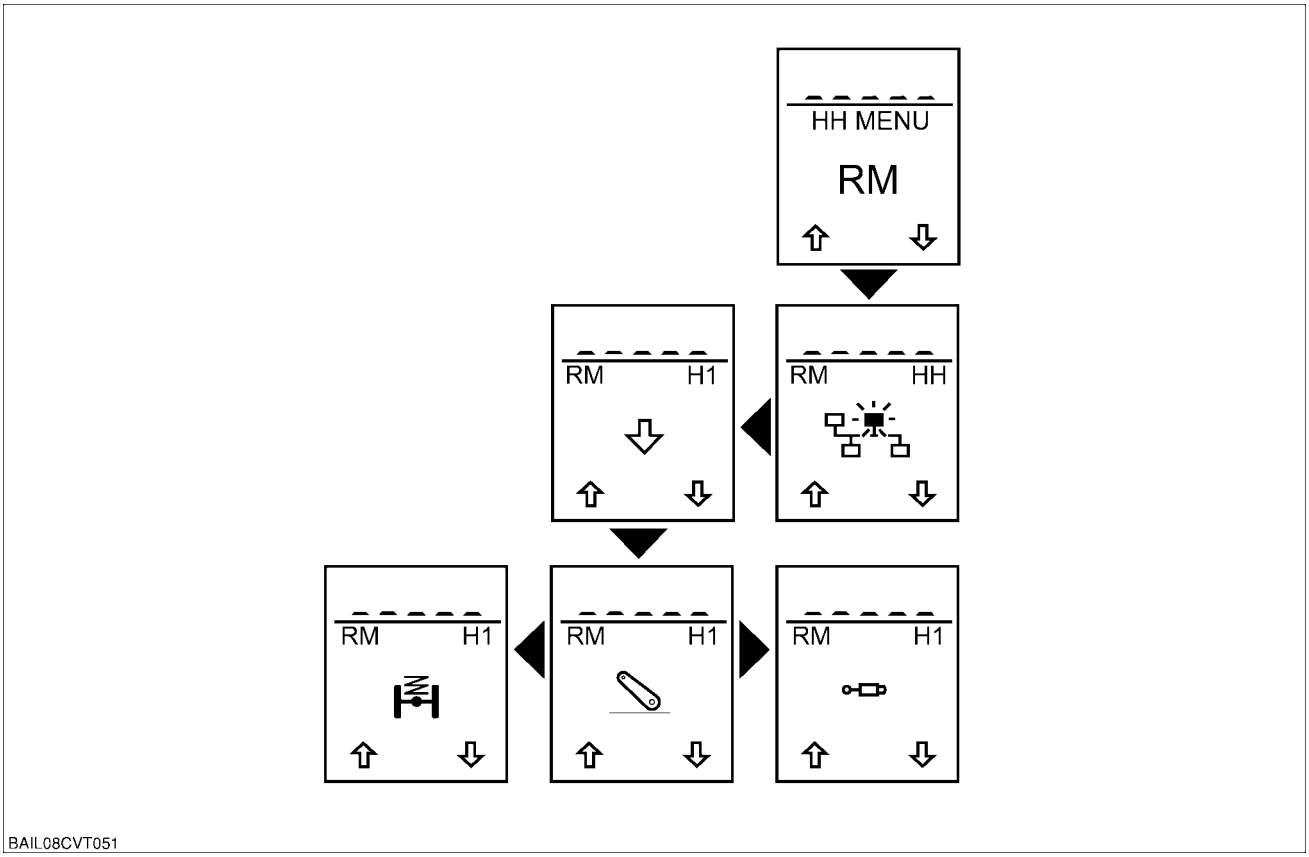
HH	Service Menu	Figure Number
H1	Calibration procedures	**1**
H2	View stored calibration values	**2**
H3	Configurations	**9**
H4	View software revision level	**25**
H5	Switch operation test	**28**
H6	Not used	-
H7	Not used	-
H8	Clear Electrically Erasable Programmable Read Only Memory (EEPROM)	**32**
H9	Voltmeter	**36**
HA	Demonstration mode	**40**
HB	Display stored fault codes	**44**
HC	Clear all stored fault codes	**48**
HD	Not used	-
HE	Display frequency inputs	**52**
HF	View controller hardware information	**55**
HJ	Electronic hydraulic remote control valve set-up	**58**
HK	CNH Electronic hydraulic remote control valve diagnostic functions	**62**

H1 - CALIBRATION PROCEDURES

This menu is used to calibrate:

1. Electronic Hydraulic Remote levers. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)**.
2. Front axle suspension. Refer to **Control valve - Calibrate (D.40.C)**.
3. Front hitch. Refer to **HITCH Front hitch - Calibrate (H.10.B)**.

H1 Menu Screen Select Diagram



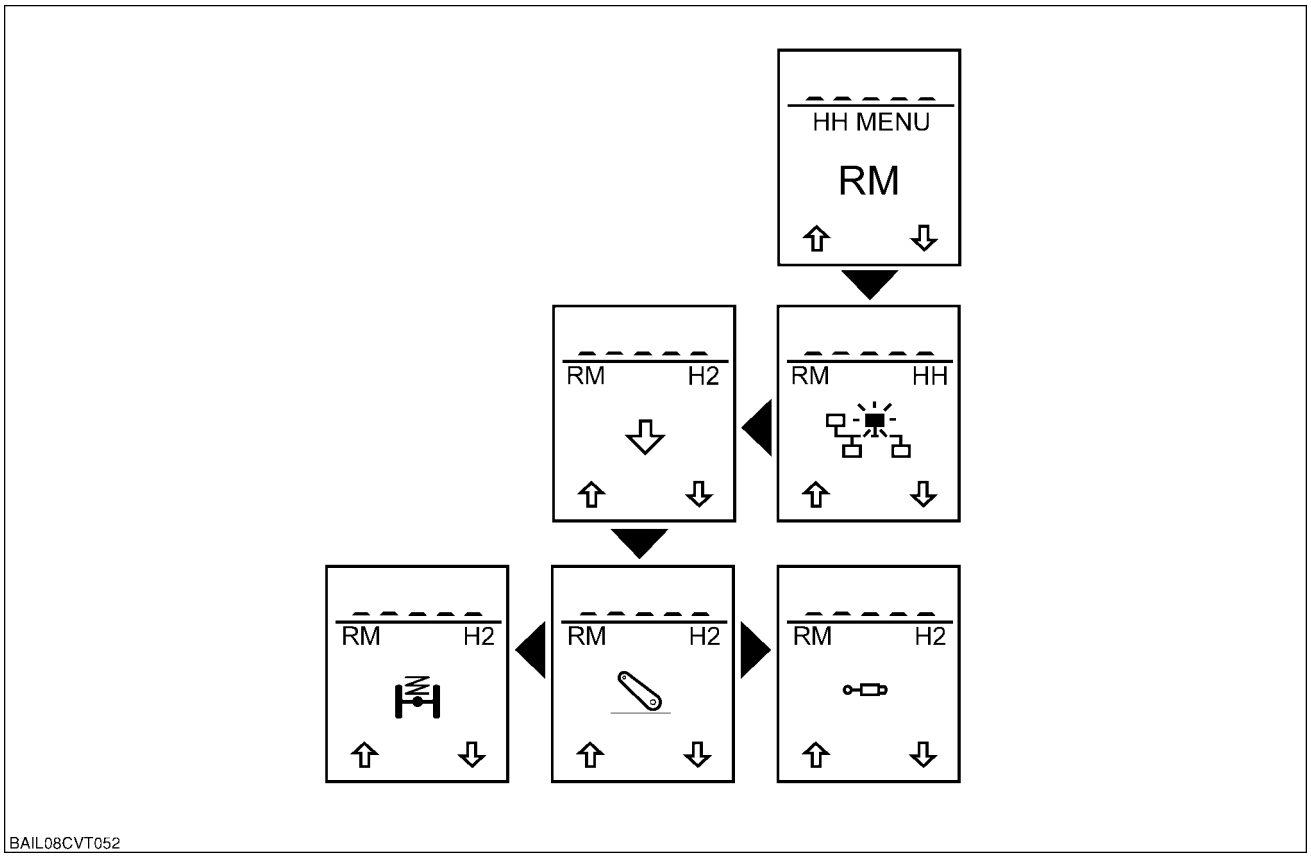
BAIL08CVT051 1

H2 - VIEW STORED CALIBRATION VALUES

This menu is used to display the calibration values stored in the controllers for:

1. Electronic Hydraulic Remote levers
2. Front axle suspension
3. Front hitch

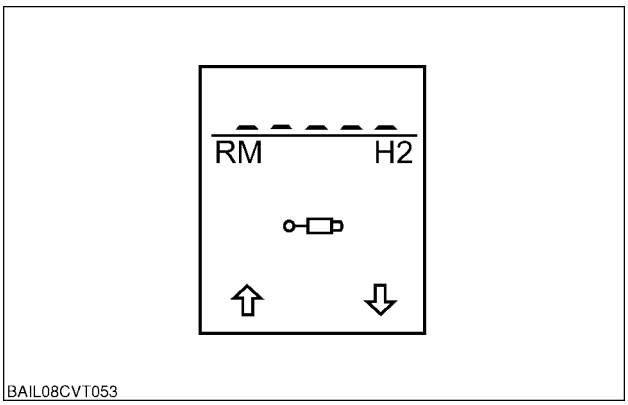
H2 Menu Screen Select Diagram



BAIL08CVT052 2

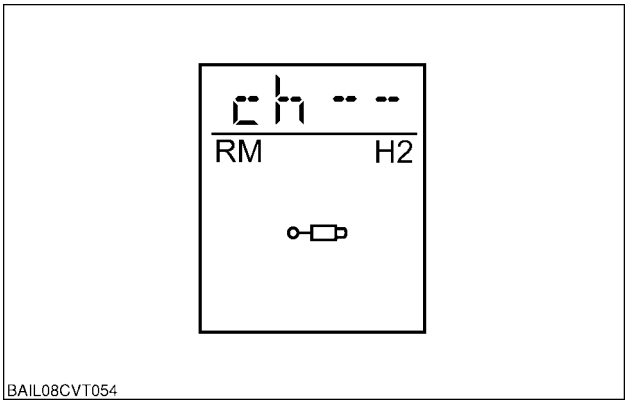
ELECTRONIC HYDRAULIC REMOTE LEVER VALUES

Select the electronic hydraulic remote sub-system by depressing the "menu" key.



BAIL08CVT053 3

The upper section of the display will display "ch - -".
The required channel can be selected by using the navigation "up" and "down" keys.



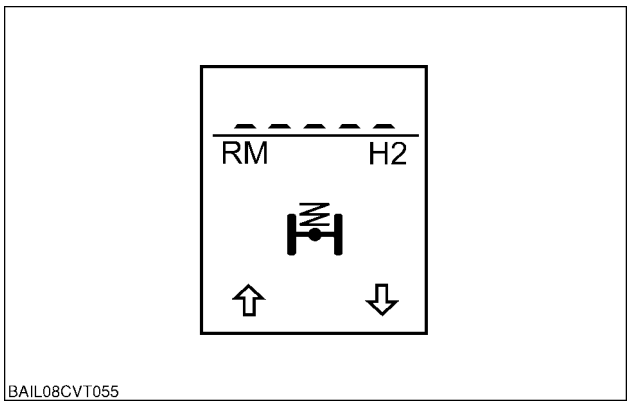
BAIL08CVT054 4

After a delay the code followed by the calibration value will be displayed, (refer to the table below for the description of each channel).
Depress the "menu" key to continue navigating through the "HH" menus.

Channel	Description	Code	Value Range
Ch 1	Lever 1 - Neutral position	n	520 - 560
	Lever 1 - Float position	F	0 - 20
	Lever 1 - Lower (retract) position	L	890 - 930
	Lever 1 - Raise (extend) position	R	160 - 220
Ch 2	Lever 2 - Neutral position	n	520 - 560
	Lever 2 - Float position	F	0 - 20
	Lever 2 - Lower (retract) position	L	890 - 930
	Lever 2 - Raise (extend) position	R	160 - 220
Ch 3	Lever 3 - Neutral position	n	520 - 560
	Lever 3 - Float position	F	0 - 20
	Lever 3 - Lower (retract) position	L	890 - 930
	Lever 3 - Raise (extend) position	R	160 - 220
Ch 4	Lever 4 - Neutral position	n	520 - 560
	Lever 4 - Float position	F	0 - 20
	Lever 4 - Lower (retract) position	L	890 - 930
	Lever 4 - Raise (extend) position	R	160 - 220

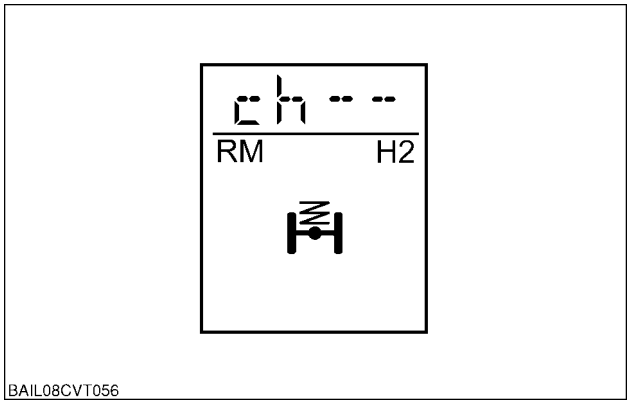
FRONT AXLE SUSPENSION VALUES

Select the front axle suspension sub-system by depressing the "menu" key.



BAIL08CVT055 5

The upper section of the display will display "ch - -".
The required channel can be selected by using the navigation "up" and "down" keys.



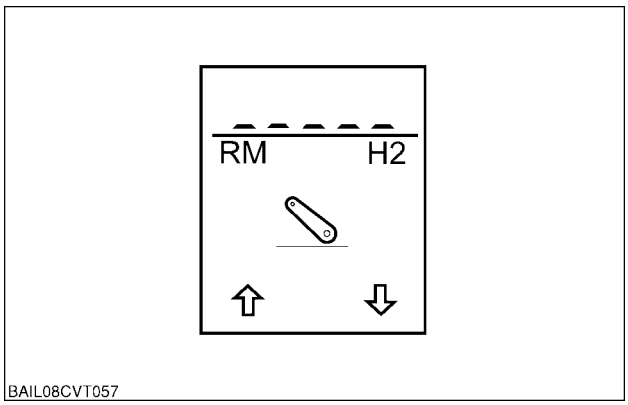
BAIL08CVT056 6

After a delay the code followed by the calibration value will be displayed, (refer to the table below for the description of each channel).
Depress the "menu" key to continue navigating through the "HH" menus.

Channel	Description	Code	Value Range
Ch 1	Front axle upper limit	u	512 - 972
	Front axle lower limit	d	150 - 512

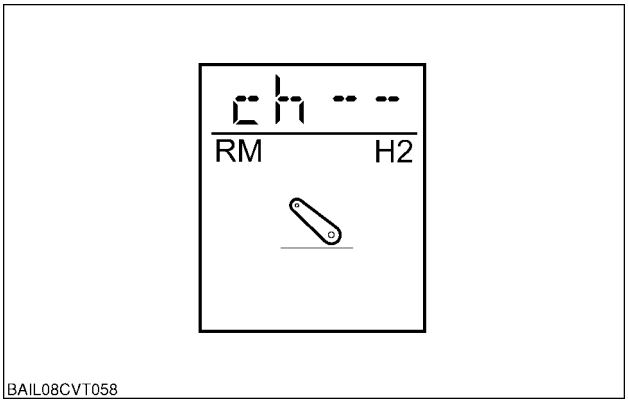
FRONT HITCH VALUES

Select the front hitch sub-system by depressing the "menu" key.



BAIL08CVT057 7

The upper section of the display will display "ch - - ".
The required channel can be selected by using the navigation "up" and "down" keys.



BAIL08CVT058 8

After a delay the code followed by the calibration value will be displayed, (refer to the table below for the description of each channel).
Depress the "menu" key to continue navigating through the "HH" menus.

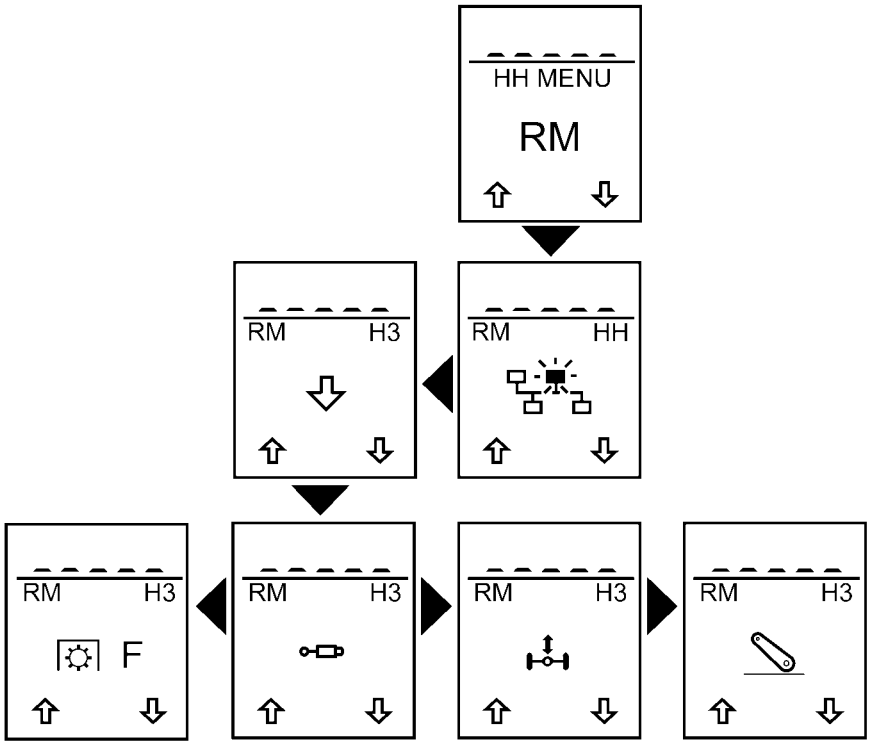
Channel	Description	Code	Value Range
Ch 1	Front hitch upper limit	u	700 - 963
	Front hitch lower limit	d	41 - 400

H3 - CONFIGURATIONS

Used to display the configurations available for:

1. Electronic Hydraulic Remotes (EHR)
   - Ch.1 Enable / Disable EHR
   - Front Loader / Front Hitch Selection
   - Ch.3 Not used
   - Ch.4 Number of EHR's present - setup
   - Ch.5 Top and side link control option selection
2. Front Axle Suspension
   - Ch.1 Enable / Disable front axle suspension
3. Front Hitch
   - Ch.1 Enable / Disable front hitch
   - Ch.2 Enable / Disable front hitch fender switches
4. Front PTO
   - Ch.1 Enable / Disable front PTO

H3 Menu Screen Select Diagram

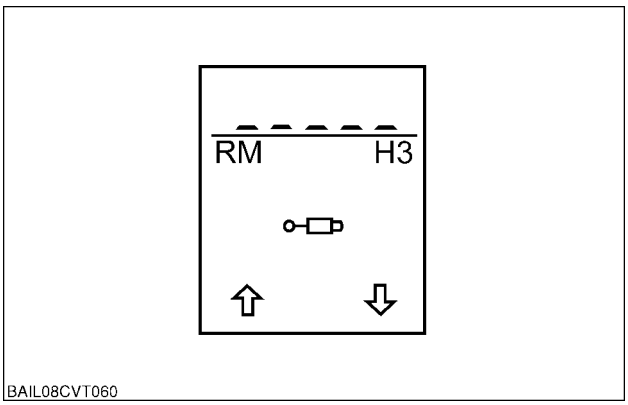


BAIL06CCM254FVC

BAIL06CCM254FVC 9

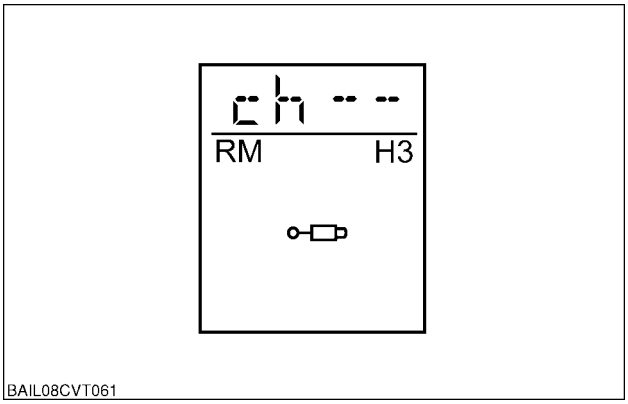
ELECTRONIC HYDRAULIC REMOTES (EHR) OPTIONS

Select the EHR sub-system by depressing the "menu" key.



BAIL08CVT060 10

The lower central display will display "ch - -".
The required channel can be selected by using the "h" and "m" keys.



BAIL08CVT061 11

After a delay the current setting will be displayed. (see the table below for the description of each channel).

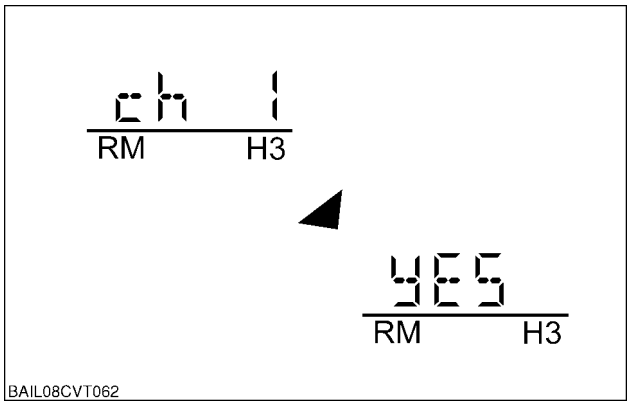
Channel	Description
Ch 1	Enable / Disable rear EHR
Ch 2	Not Used
Ch 3	Not Used
Ch 4	Number of EHR’s present - setup
Ch 5	Enable / Disable top and side link control

Channel 1 - Enable / Disable Rear EHR

Scroll through the available options using the navigation "up" or "down" key.

The options available are:

- YES - Enable Rear EHR
- NO - Disable Rear EHR



BAIL08CVT062 12

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the "menu" key to continue navigating through the "HH" menus.

Channel 2 - Not Used

This channel is not used

Channel 3 - Not Used

This channel is not used.

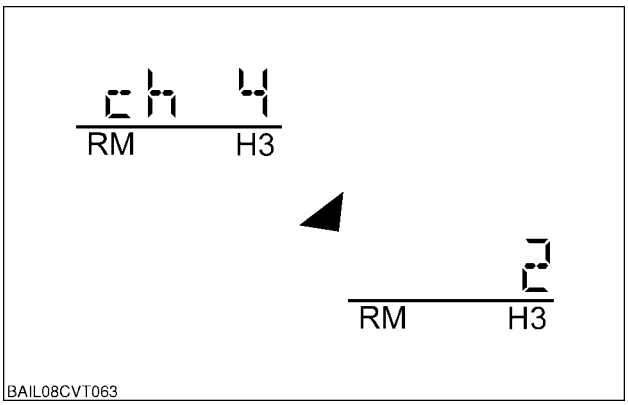
Channel 4- Number of EHR’s Present - Setup

When a new module is installed or the H8 procedure is completed, automatic detection for the number of remotes is used. If at any time the number of fitted remotes needs to be changed then this setup channel is used.

Scroll through the available options using the navigation "up" or "down" key.

The options available are:

- 2
- 3
- 4
- 5



BAIL08CVT063 13

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

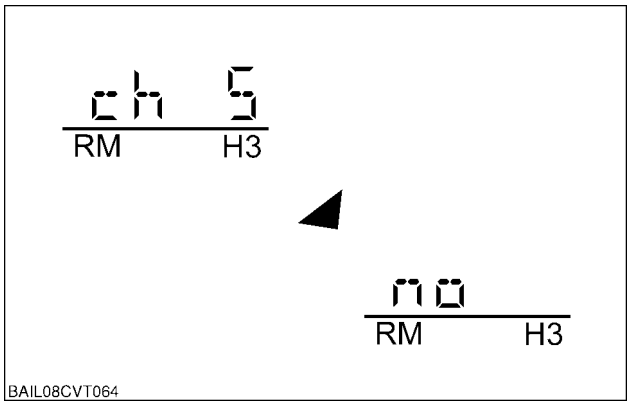
Depress the "menu" key to continue navigating through the "HH" menus.

Channel 5- Enable / Disable Top and Side Link Control

Scroll through the available options using the navigation "up" or "down" key.

The options available are:

- YES - Enable top/side link control
- NO - Disable top/side link control



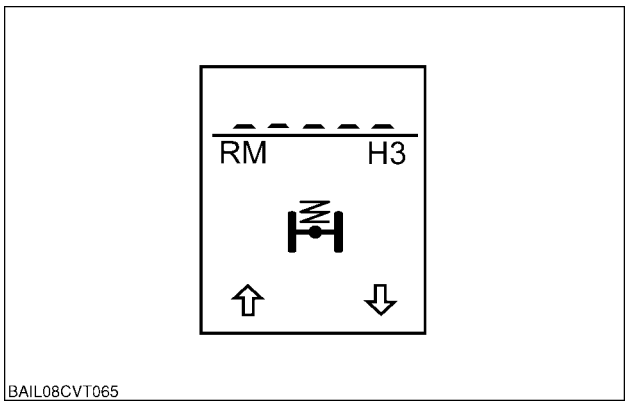
BAIL08CVT064 14

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the "menu" key to continue navigating through the "HH" menus.

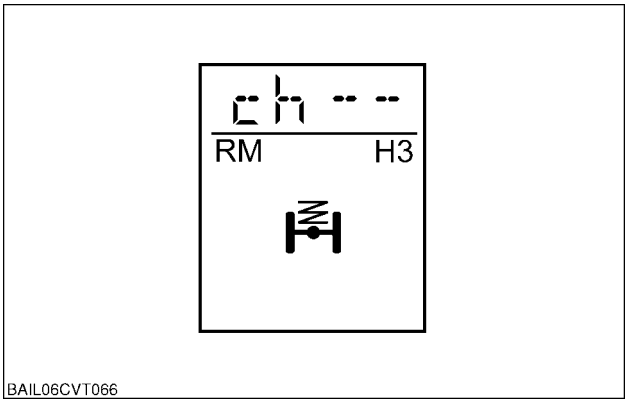
FRONT AXLE SUSPENSION OPTIONS

Select the front axle suspension sub-system by depressing the "menu" key.



BAIL08CVT065 15

The upper section of the display will display "ch - -".
The required channel can be selected by using the navigation "up" and "down" keys.



BAIL08CVT066 16

After a delay the current setting will be displayed. (see the table below for the description of the channel).

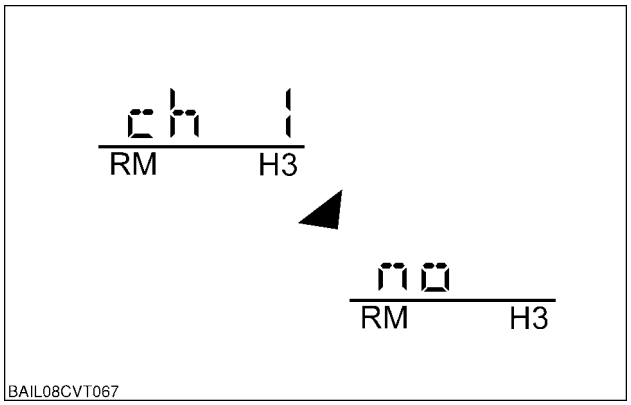
Channel	Description
Ch 1	Enable / Disable front axle suspension

Channel 1 - Enable / Disable Front Axle Suspension

Scroll through the available options using the navigation "up" or "down" key.

The options available are:

- YES - Enable front axle suspension
- NO - Disable front axle suspension



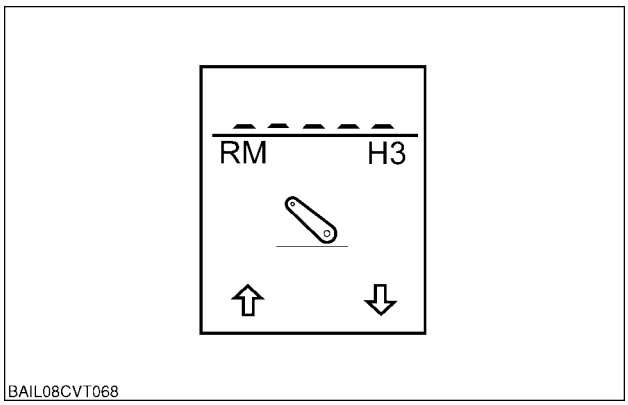
BAIL08CVT067 17

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the "menu" key to continue navigating through the "HH" menus.

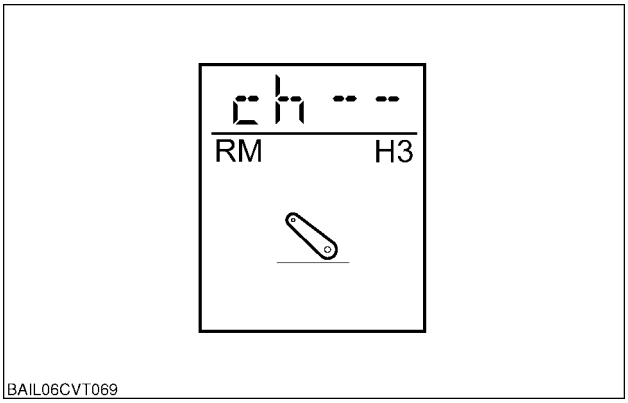
FRONT HITCH OPTIONS

Select the front hitch sub-system by depressing the "menu" key.



BAIL08CVT068 18

The upper section of the display will display "ch - -".
The required channel can be selected by using the navigation "up" and "down" keys.



BAIL08CVT069 19

After a delay the current setting will be displayed. (see the table below for the description of the channel).

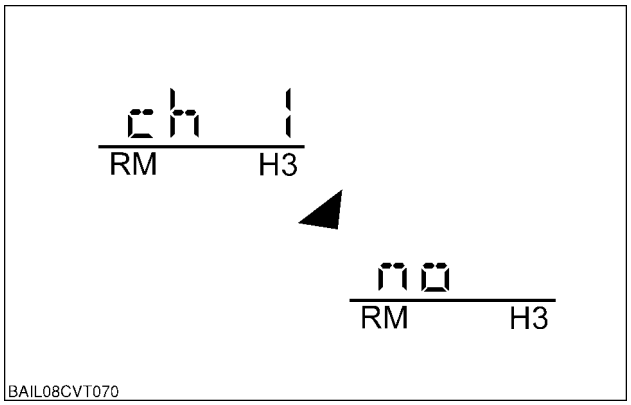
Channel	Description
Ch 1	Enable / Disable front hitch
Ch 2	Enable / Disable front hitch fender switches

Channel 1 - Enable / Disable Front Hitch

Scroll through the available options using the navigation "up" or "down" key.

The options available are:

- YES - Enable front hitch
- NO - Disable front hitch



BAIL08CVT070 20

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

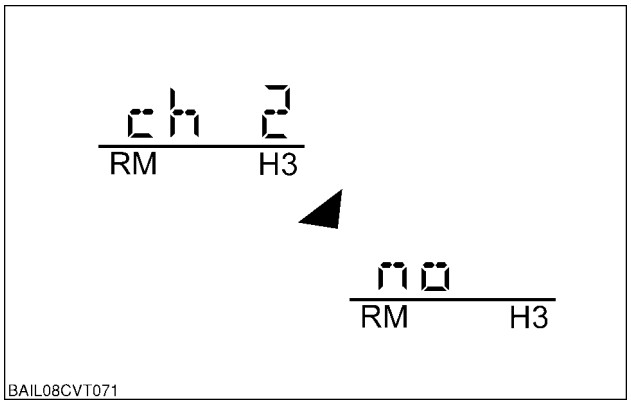
Depress the "menu" key to continue navigating through the "HH" menus.

Channel 2 - Enable / Disable Front Hitch Fender Switches

Scroll through the available options using the navigation "up" or "down" key.

The options available are:

- YES - Enable front hitch fender switches
- NO - Disable front hitch fender switches



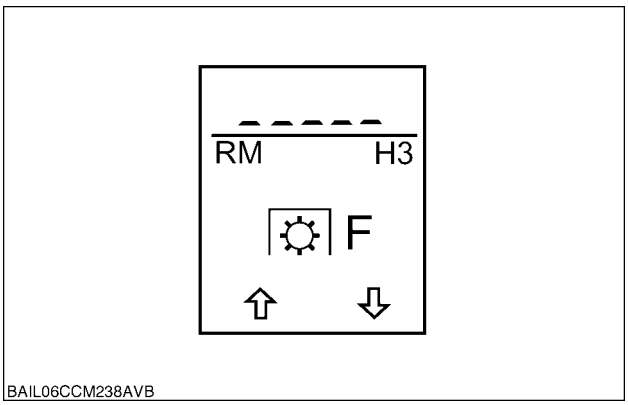
BAIL08CVT071 21

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the "menu" key to continue navigating through the "HH" menus.

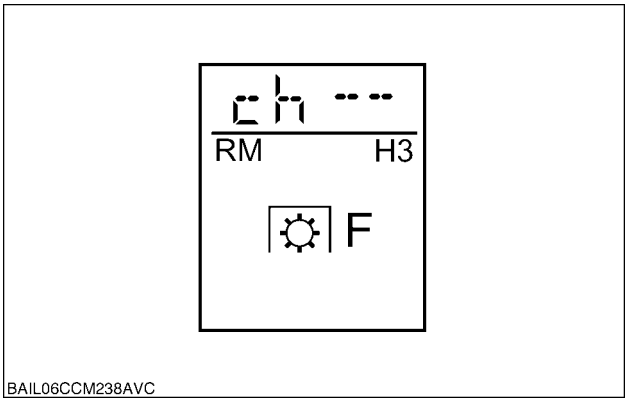
FRONT PTO OPTIONS

Select the front PTO sub-system by depressing the "menu" key.



BAIL06CCM238AVB 22

The upper section of the display will display "ch - -".
The required channel can be selected by using the navigation "up" and "down" keys.



BAIL06CCM238AVC 23

After a delay the current setting will be displayed. (see the table below for the description of each channel).

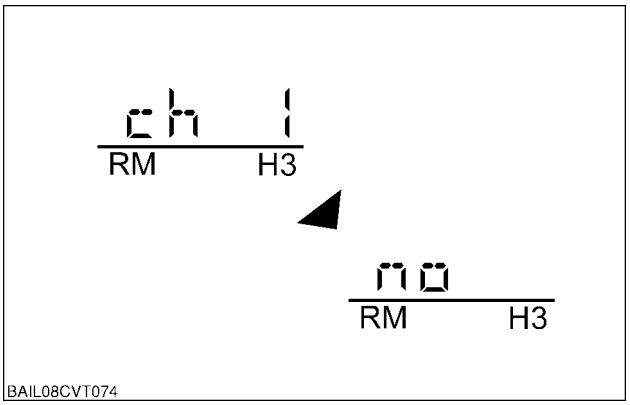
Channel	Description
Ch 1	Enable / Disable front PTO

Channel 1- Enable / Disable Front PTO

Scroll through the available options using the navigation "up" or "down" key.

The options available are:

- YES - Enable front PTO
- NO - Disable front PTO



BAIL08CVT074 24

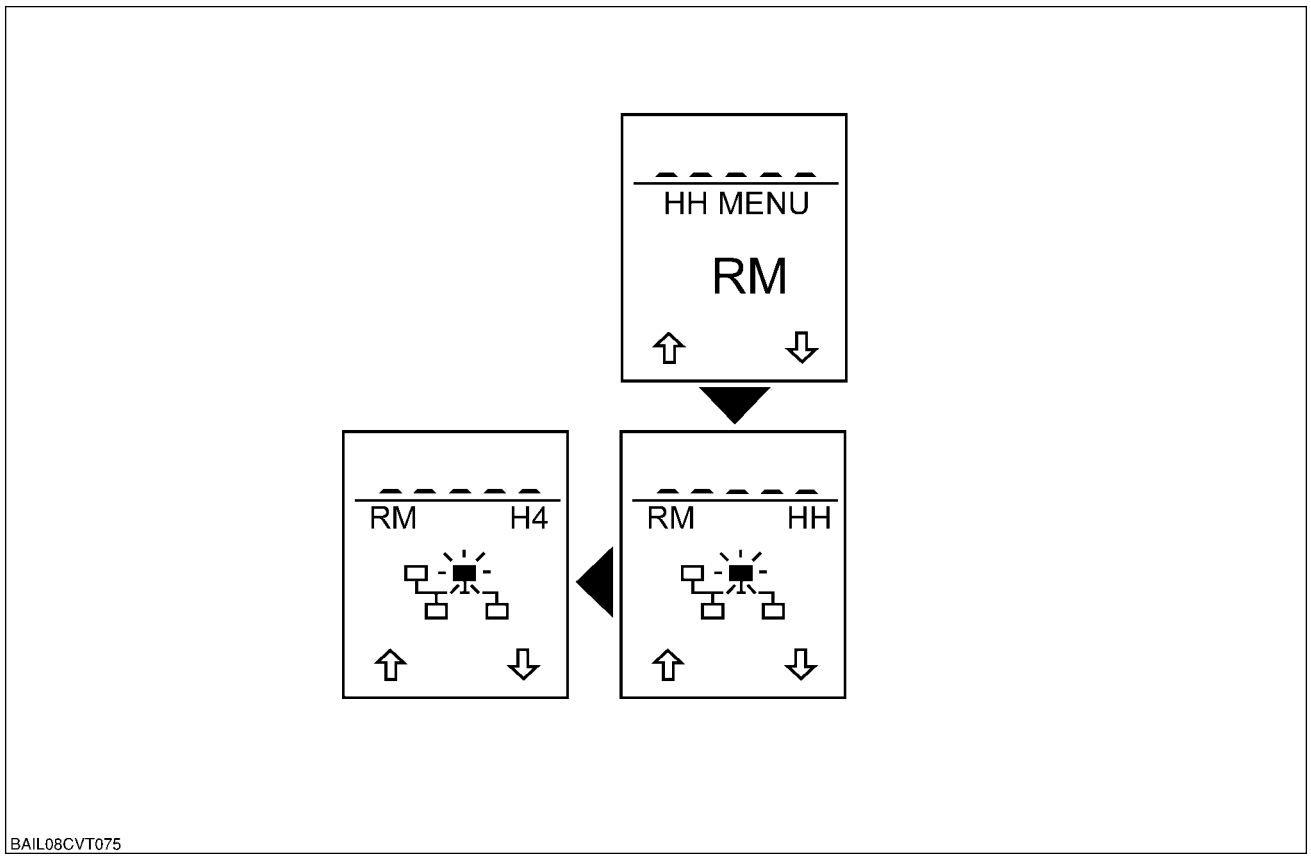
To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the "menu" key to continue navigating through the "HH" menus.

H4 - VIEW SOFTWARE REVISION LEVEL

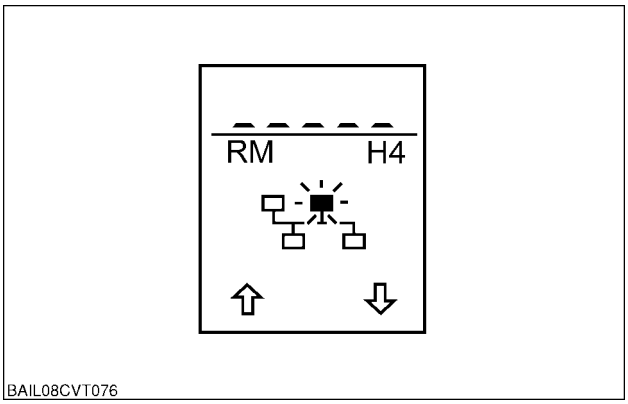
Common to all sub-systems.

H4 Menu Screen Select Diagram



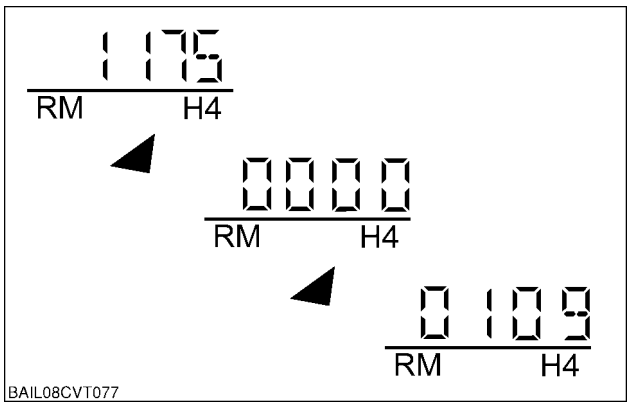
BAIL08CVT075 25

Select the H4 menu by depressing the "menu" key.



BAIL08CVT076 26

The upper section of the display will automatically cycle through the software release, as the example shown and return to allow navigation of the "HH" menus.

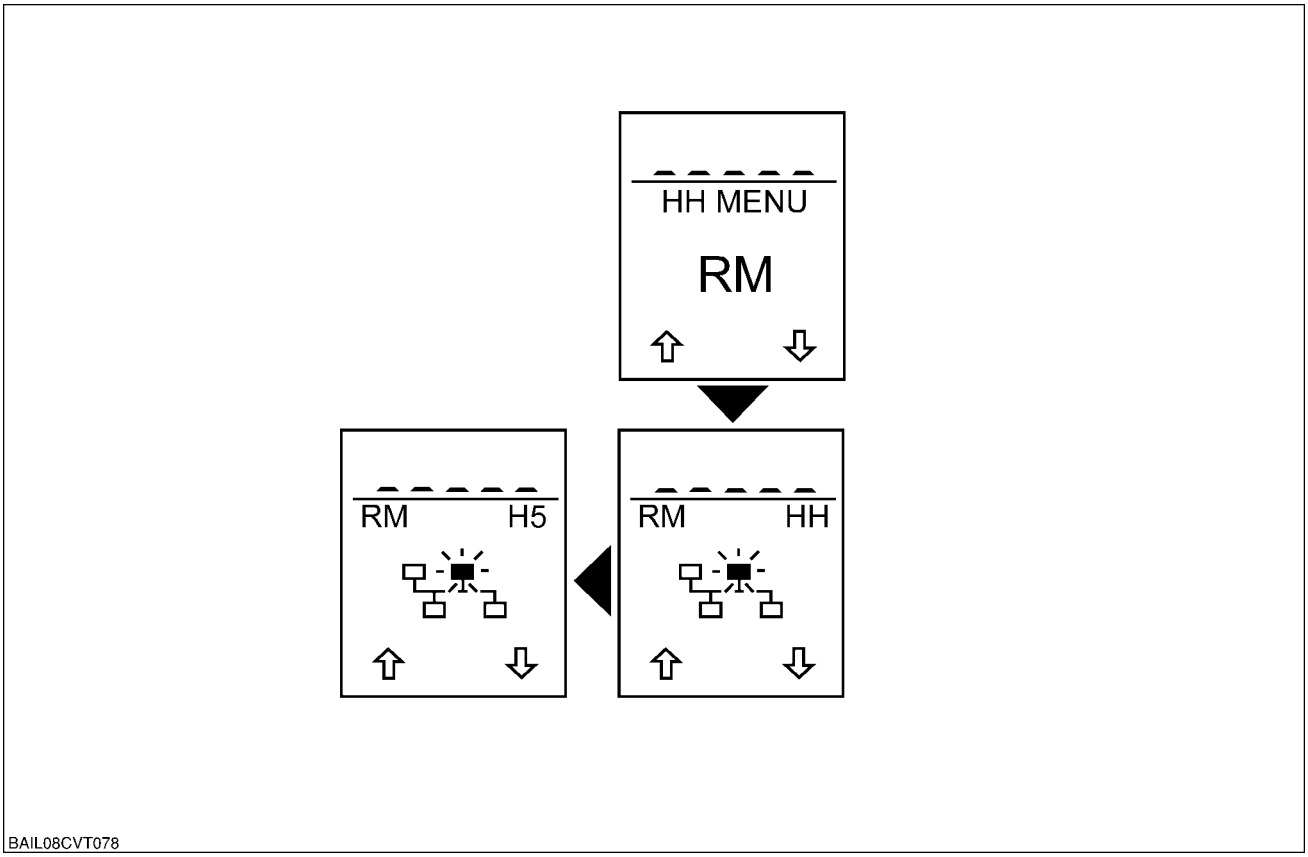


BAIL08CVT077 27

H5 - SWITCH OPERATION TEST

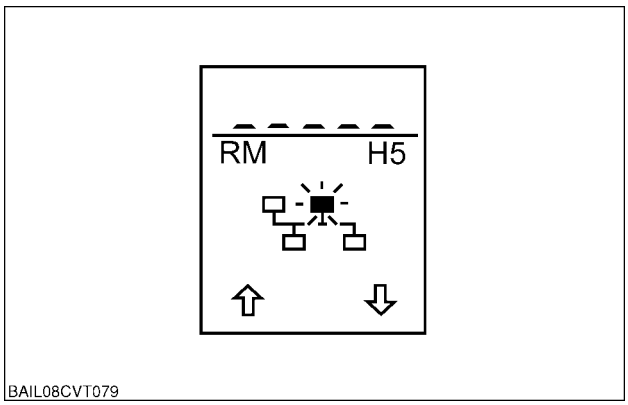
This menu displays a designated code when a switch transition is detected.
Common to all sub-systems.

H5 Menu Screen Select Diagram



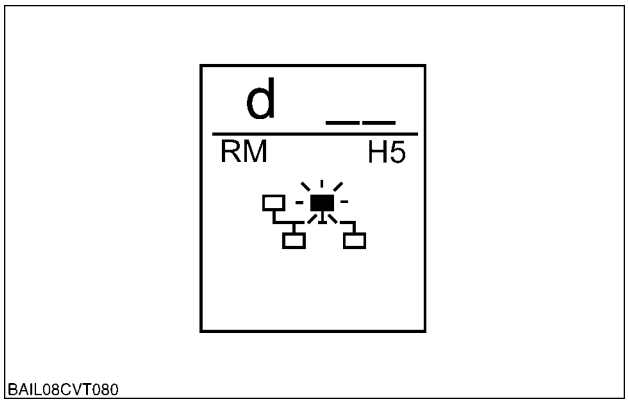
BAIL08CVT078 28

Select the H menu by depressing the "menu" key.



BAIL08CVT079 29

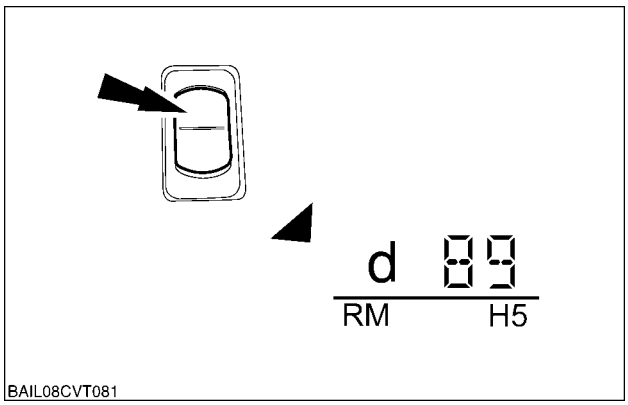
The upper section of the display will display "d_ _"



BAIL08CVT080 30

When a switch is operated, a code will be displayed and an audible tone should be heard to indicate the correct function.
If a switch code is not displayed and the audible tone not heard, a 'wiggle' test can be performed on the related wiring, while watching the display or listening for the audible tone, to help locate the fault.

NOTE: *If the keystart switch is turned to the "crank" position, with the shuttle lever in neutral and the clutch pedal down, a switch disagreement error may occur.*



BAIL08CVT081 31

Identifier	Controller Connector	Pin Number	Switch / Input	Special Requirements
d0	No switch or two switches activated at the same time			-
d8	CN1B	21	Crank detect switch	-
d69	CN1B	23	Front suspension pressure switch	-
d75	via CAN		Right hand link extend switch	-
d76	via CAN		Right hand link retract switch	-
d77	CN1B	22	Front hitch external common switch	-
d78	CN1B	26	Front hitch external raise switch	-
d79	CN1B	19	Front hitch external lower switch	-
d89	via CAN		Front suspension lock switch	-
d90	CN1B	11	Front PTO switch (normally open)	-
d91	CN1B	12	Front PTO switch (normally closed)	-
d92	via CAN		Front hitch height limit switch	-
d95	via CAN		EHR No. 1 program/motor mode switch	-
d96	via CAN		EHR No. 2 program/motor mode switch	-
d97	via CAN		EHR No. 3 program/motor mode switch	-
d98	via CAN		EHR No. 4 program/motor mode switch	-
d108	via CAN		Top link extend switch	-
d109	via CAN		Top link retract switch	-

Identifier	Con-troller Connec-tor	Pin Number	Switch / Input	Special Requirements
d159	via CAN		EHR flow encoder switch	-
d165	via CAN		EHR float switch	-
d178	via CAN		EHR 1 extend switch (on hand controller)	-
d179	via CAN		EHR 1 retract switch (on hand controller)	-
d180	via CAN		EHR 2 extend switch on hand controller)	-
d181	via CAN		EHR 2 retract switch (on hand controller)	-
d183	CN3A	16	EHR 3 extend switch (on rear fender)	-
d184	CN3A	17	EHR 3 retract switch (on rear fender)	-

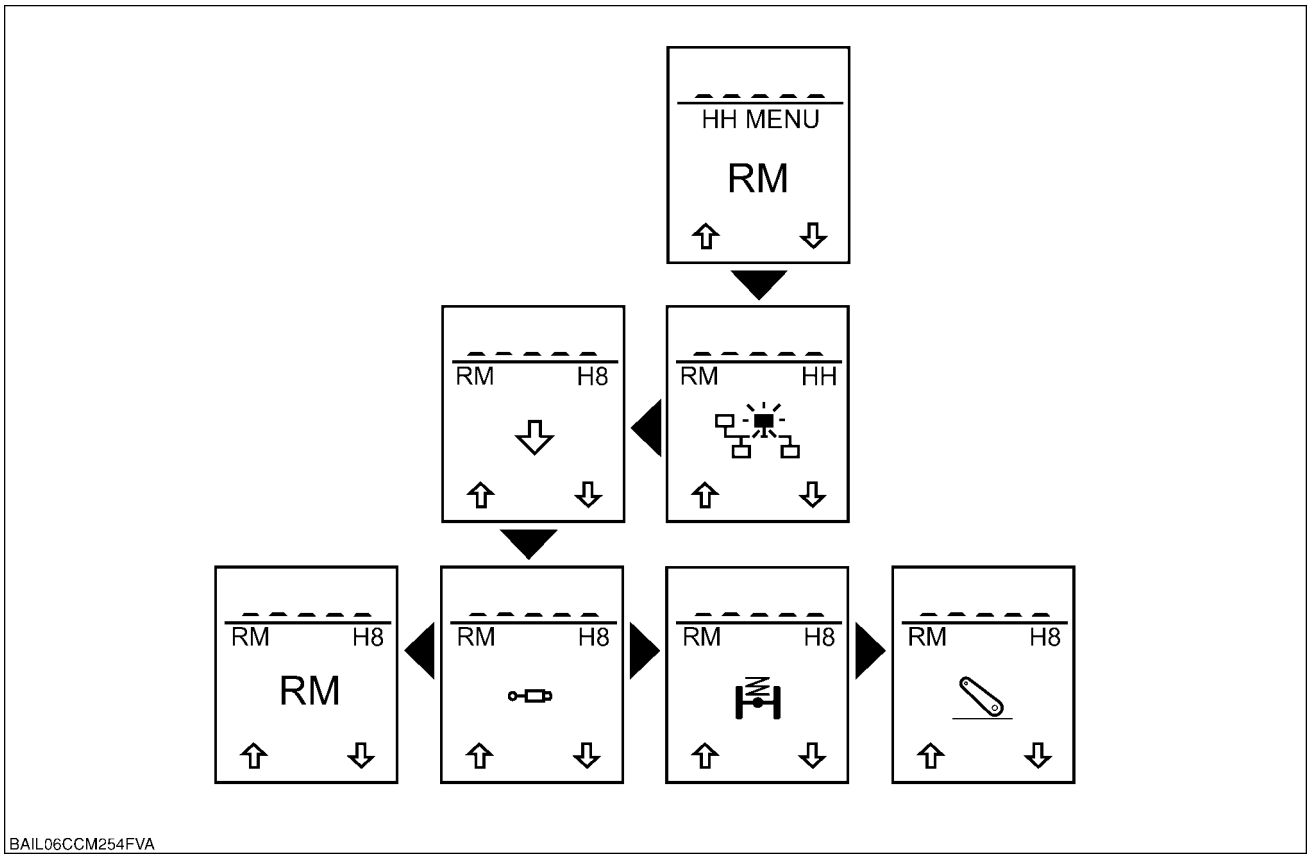
H8 - CLEAR ELECTRICAL ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM)

This menu clears calibration values and stored error codes by resetting all EEPROM values back to default. EEPROM is where all calibration values and error codes are stored. This memory is retained even if there is no power to the controller, i.e. if the battery is disconnected.

NOTE: *H8 will not change the configuration settings. The H3 menu mode must be used for this.*

NOTE: *To erase only the stored error codes and not affect the calibration data use the HC menu mode.*

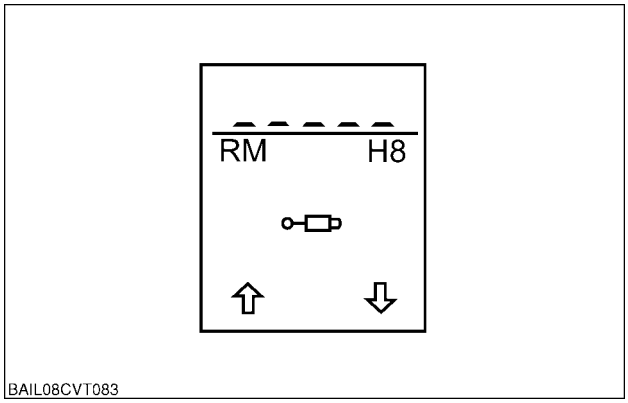
H8 Menu Screen Select Diagram



BAIL08CVT082 32

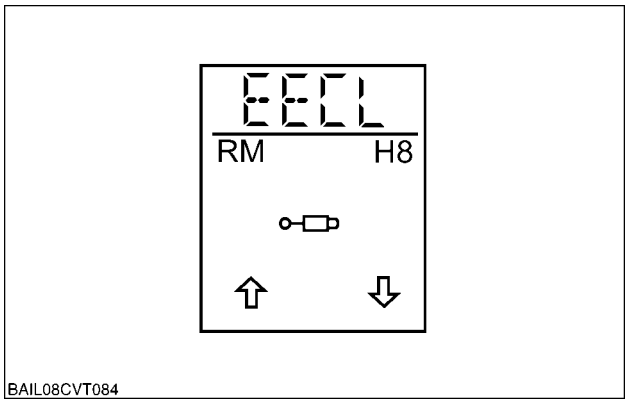
IMPORTANT: *By selecting the screen display with the controller identifier "RM" displayed this will reset the EEPROM in all the sub-systems.*

If only a specific sub-system EEPROM requires to be reset, select the sub-system that requires the EEPROM to be reset by depressing the "menu" key, as the example shown.



BAIL08CVT083 33

The upper section of the display will display "EECL".



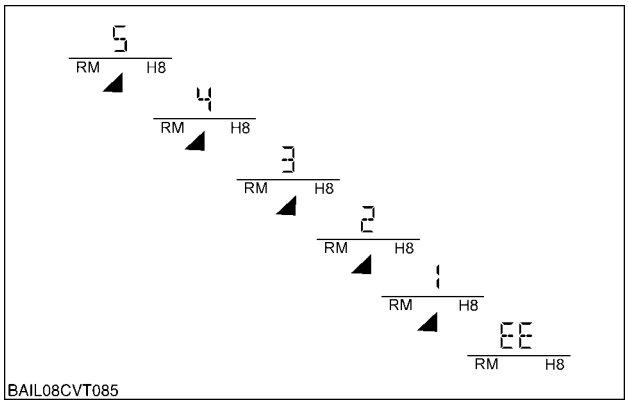
BAIL08CVT084 34

⚠ CAUTION ⚠

H8 will clear all calibrations values and stored error codes.

B006

Depress and hold the navigation "down" key to confirm the resetting of the EEPROM.
The upper section of the display will countdown from 5 to 1, then "EE" will be displayed to indicate the EEPROM has been cleared.



BAIL08CVT085 35

NOTE: *If the "down" key is released before the countdown finishes, the procedure will be aborted.*

Turn the keystart OFF.

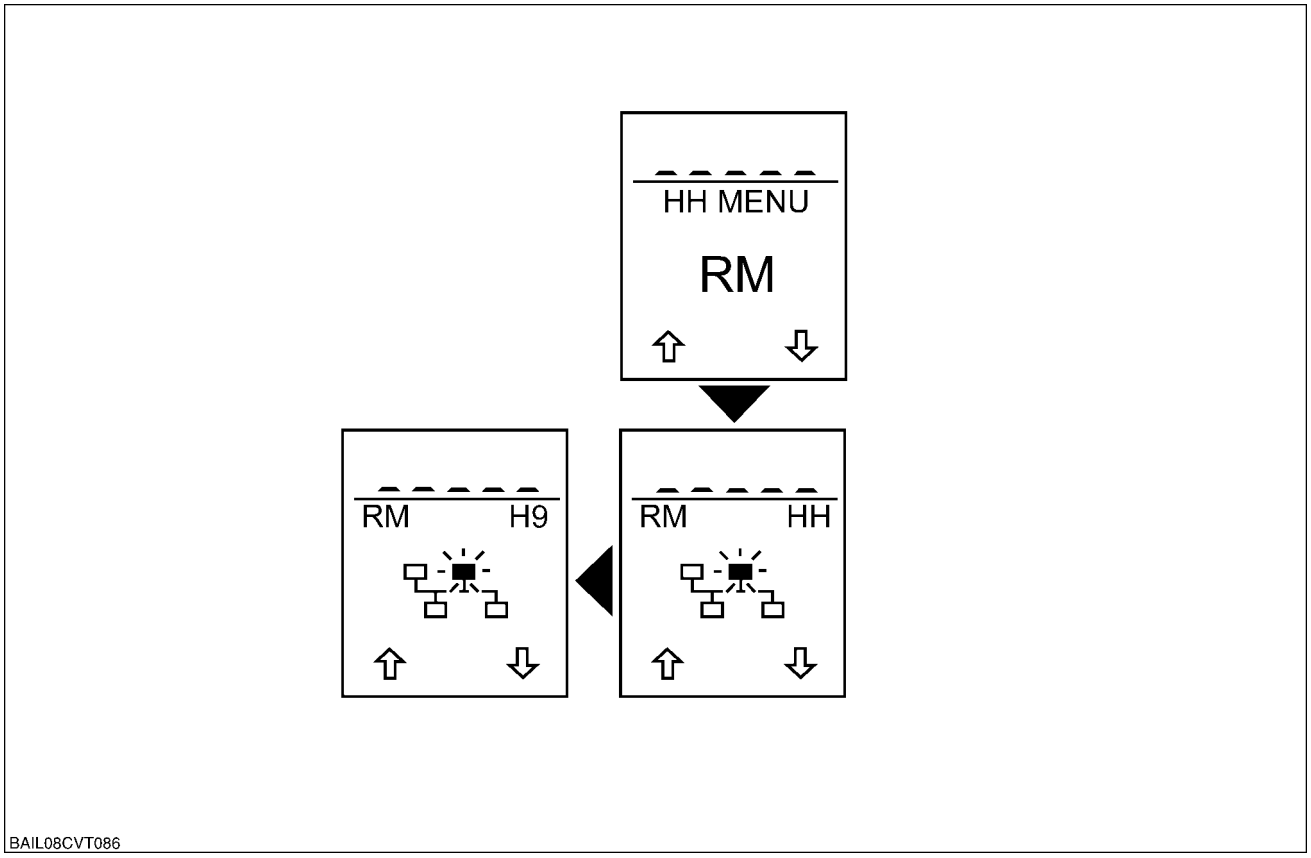
H9 - VOLTMETER

This menu is used to verify the operation of various potentiometers, voltage supplies, and solenoid current circuits. If an intermittent fault is detected within a circuit, a 'wiggle' test can be performed on the related wiring while watching the display for sudden changes in values, to help locate the area where the fault exists.

NOTE: *The vehicle may be driven while in this menu.*

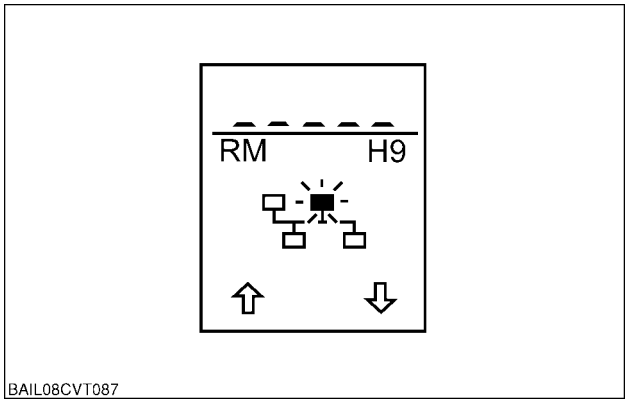
Common to all sub-systems.

H9 Menu Screen Select Diagram



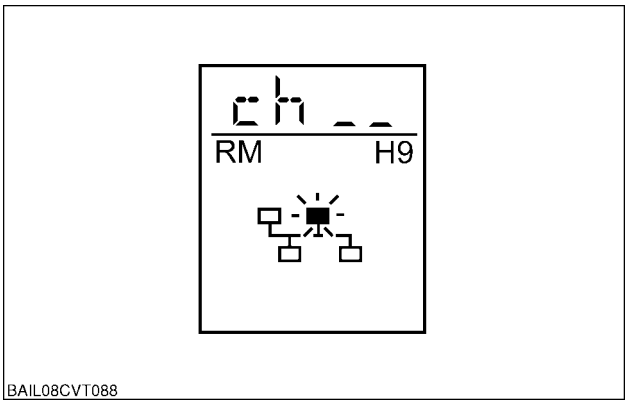
BAIL08CVT086 36

Select the H9 menu by depressing the "menu" key.



BAIL08CVT087 37

The upper section of the display will display "ch - -"



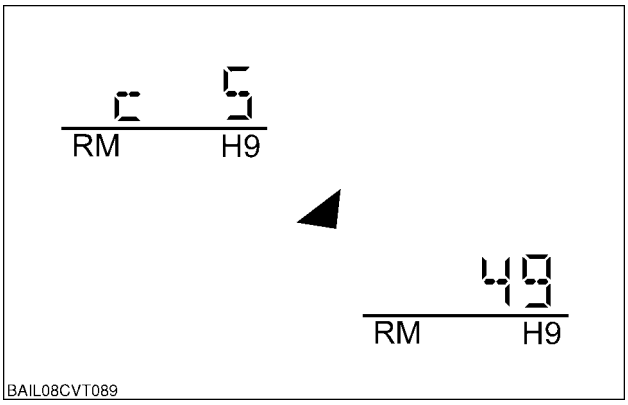
BAIL08CVT088 38

The required channel can be selected by using the navigation "up" and "down" keys.
After a delay the value will be displayed. Compare the value displayed with the typical reading shown in the table below.

NOTE: *The value is the input voltage or signal into the controller. This cannot be directly translated into a voltage due to the internal processes of the controller. A zero equates to* ***0 volts****.*

If the value displayed varies by more than **10 %** to that shown in the table below, a fault is indicated in either the component or the wiring harness relevant to that channel.

NOTE: *Check the connectors of the effected circuit, including the controller connectors, prior to replacing any components.*



BAIL08CVT089 39

Channel	Description	Connector	Pin	Typical Reading	Comments
5	**+5 Volts** voltage supply to the sensors	CN1B	16	49	
7	**+12 Volt** VF input signal (see explanation)	CN1A	1	45	
8	**+12 Volt** VD input signal (see explanation	CN1A	8	45	The tractor moves, when the engine is running
9	**+12 Volt** VH input signal (see explanation)	CN1A	20	45	
10	**+12 Volt** VT input signal (see explanation)	CN3B	24	45	
14	Amperage of the front PTO solenoid valve	CN2	7	0 when FPTO is Off 99 when FPTO is On	
15	Amperage of the upper lock solenoid suspended front axle	CN2	6	0 when locked out 30 to 55 when active	

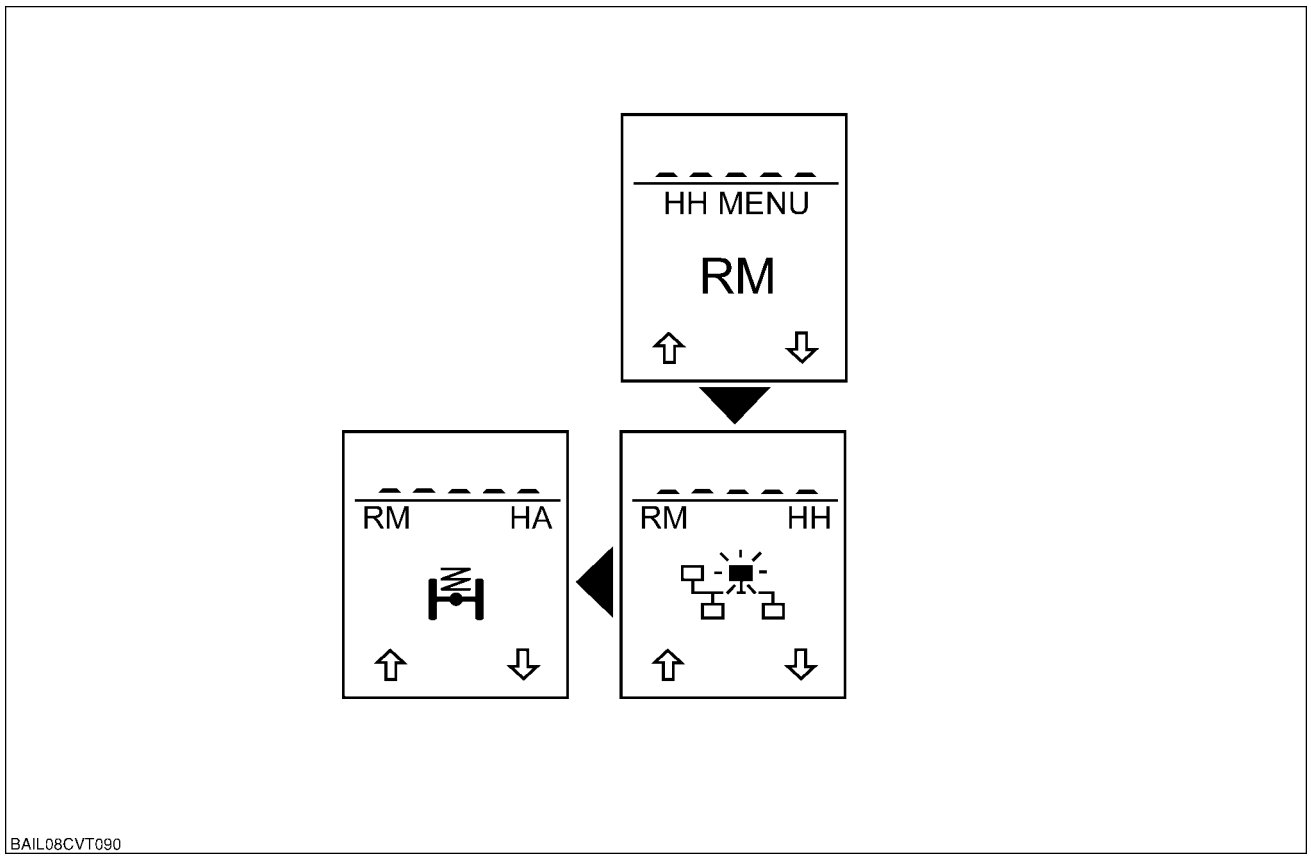
Chan-nel	Description	Connec-tor	Pin	Typical Reading	Comments
16	Amperage of the lower lock solenoid suspended front axle	CN2	13	0 when locked out 30 to 46when active	
17	Accelerometer suspended front axle	CN1B	5	40 when vehicle stationary	
26	Front axle position	CN1B	6	120 lower limit 950 upper limit	
28	Front powerlift position	CN1B	2	10 lower limit 90 upper limit	
97	EHR 1 Joystick (X) green	via CAN		100 < 0 > 100	
98	EHR 2 Joystick (Y) blue	via CAN		100 < 0 > 100	

Explanations:
VF Input: This is the input voltage into the controller to suspended front axle components, i.e. Front axle lower and lockout solenoids.
VD Input: This is the input voltage into the controller to suspended front axle raise solenoid.
VH Input: This is the input voltage into the controller to front PTO and front hitch components, i.e. Front PTO solenoid and front hitch height solenoid.
VT Input: This is a second input voltage into the controller.

HA - DEMONSTRATION MENU

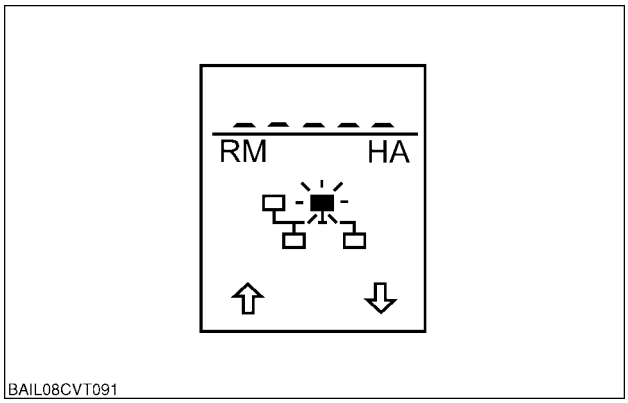
Used to demonstrate front axle suspension.

HA Menu Screen Select Diagram



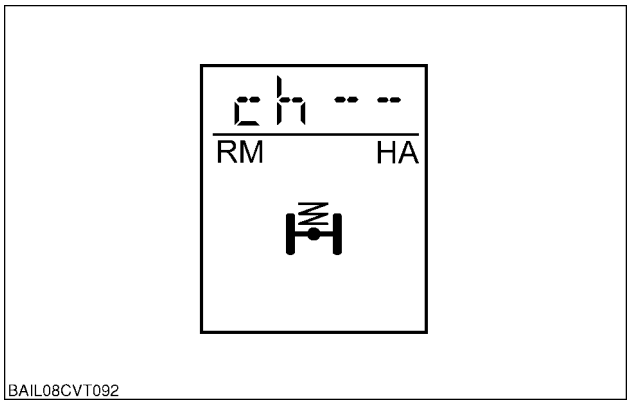
BAIL08CVT090 40

Select the HA menu by depressing the "menu" key.



BAIL08CVT091 41

The upper section of the display will display "ch - -"



BAIL08CVT092 42

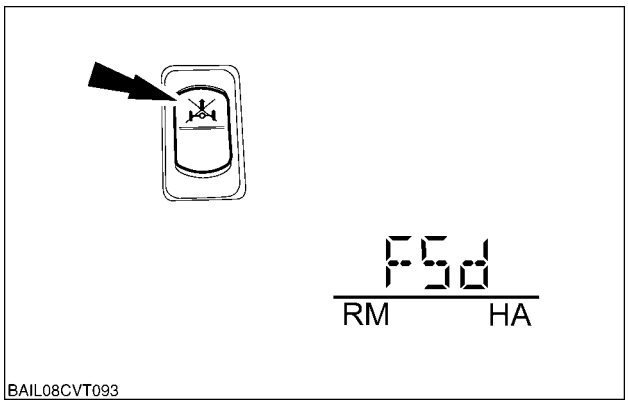
The required channel can be selected by using the navigation "up" and "down" keys.
After a delay the current setting will be displayed. (see the table below for the description of the channel).

Channel	Description
Ch 1	Front Axle Suspension demonstration

Channel 1 - Front Axle Suspension Demonstration

This demonstration mode allows the suspension to be locked at speeds above the normal **12 Km/h** automatic engagement parameter.
The lower central display will display "FSd" (Front Axle Suspension demonstration).
Start the engine and operate the vehicle to demonstrate front axle suspension.
Use the lockout switch to lock the suspension as normal. The light in the switch will be illuminated to indicate the front axle suspension had been locked.

NOTE: *Front axle suspension demonstration will be disabled after turning the keystart OFF.*

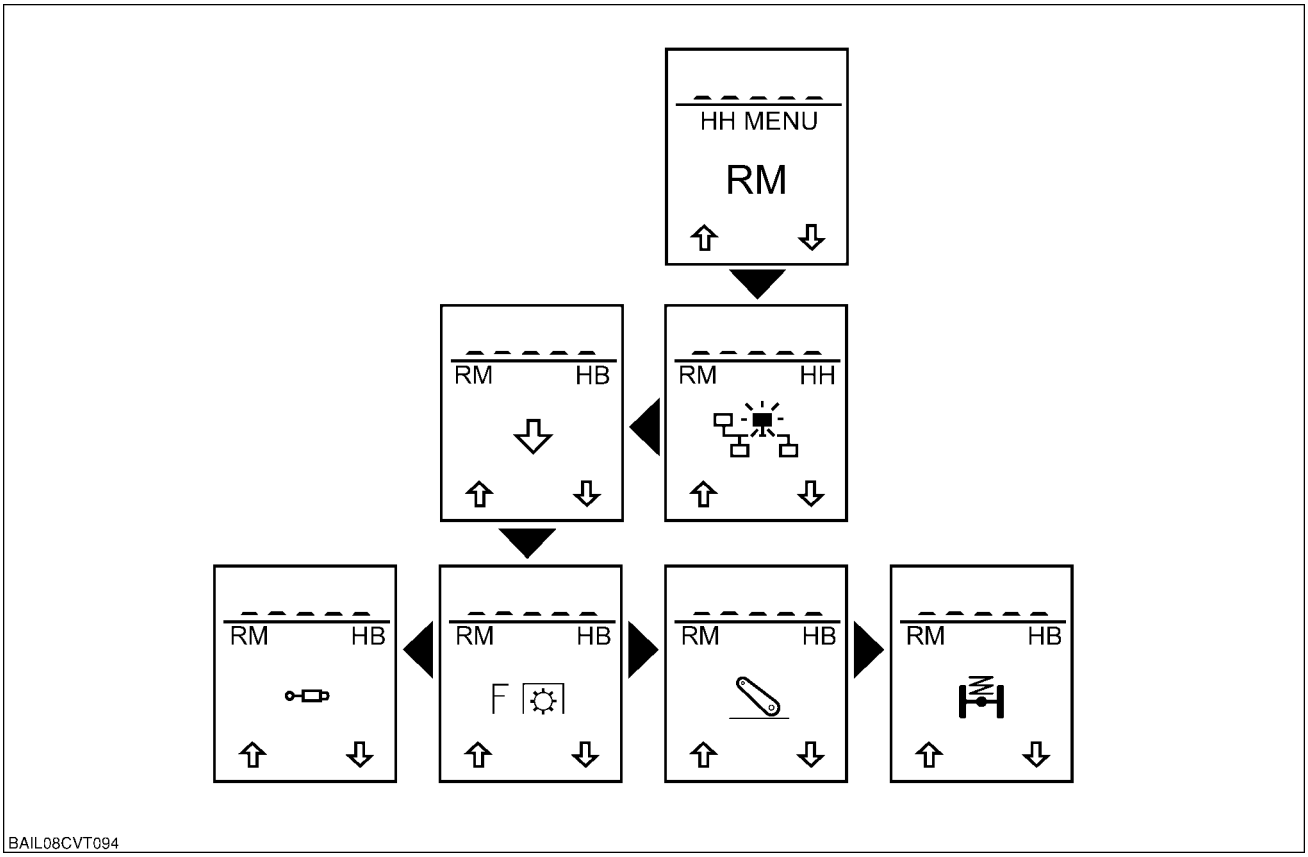


BAIL08CVT093 43

HB - DISPLAY STORED FAULT CODES

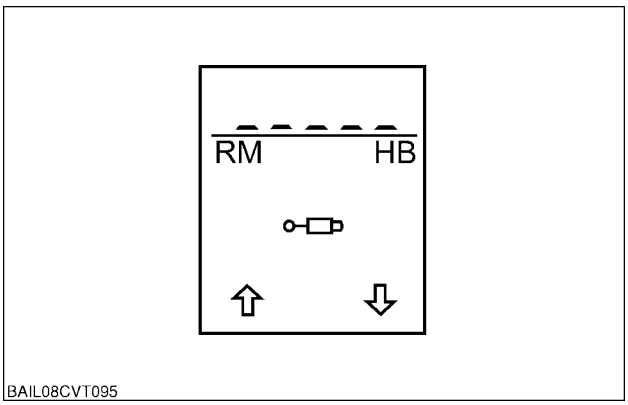
This menu is used to display fault codes which are stored in the EEPROM of the controller. Common to all sub-systems.

HB Menu Screen Select Diagram



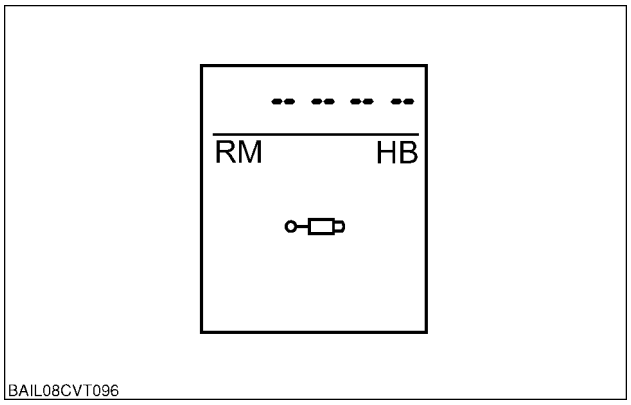
BAIL08CVT094 44

Select the HB menu by depressing the "menu" key.



BAIL08CVT095 45

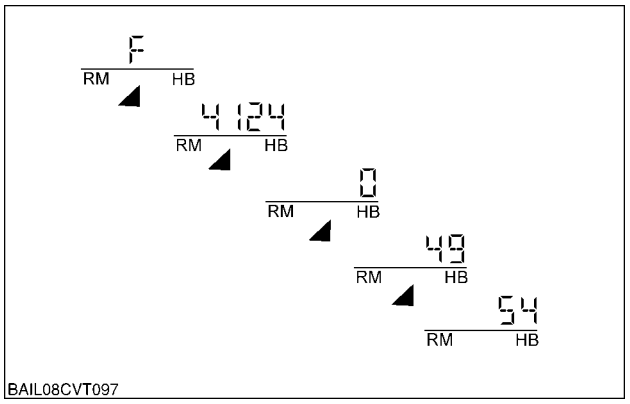
The upper section of the display will display "- - - -", if no fault is stored in the selected sub-system.



BAIL08CVT096 46

The upper section of the display will display "F", if a fault code is stored in the selected sub-system.
The upper section of the display will then automatically cycle through as the example:

4124Fault code
00 Hour of first occurrence
49 Hour of last occurrence
54 Number of occurrences of the fault

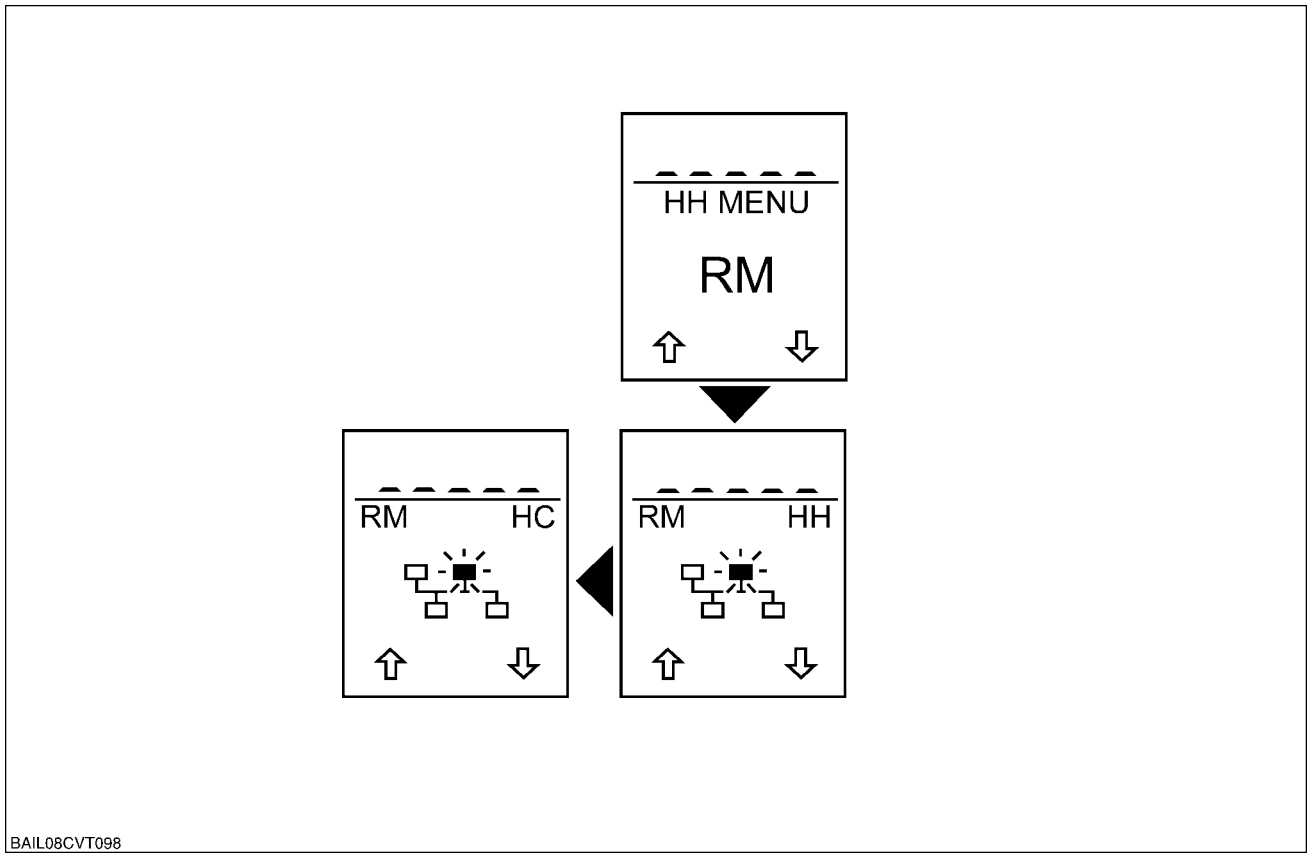


BAIL08CVT097 47

Depress the navigation "up" or "down" key to change to the next fault code in the list.
The upper section of the display will display "_ _ _" at the end of the list.
Depress the "menu" key to continue navigating through the "HH" menus.

HC - CLEAR STORED FAULT CODES

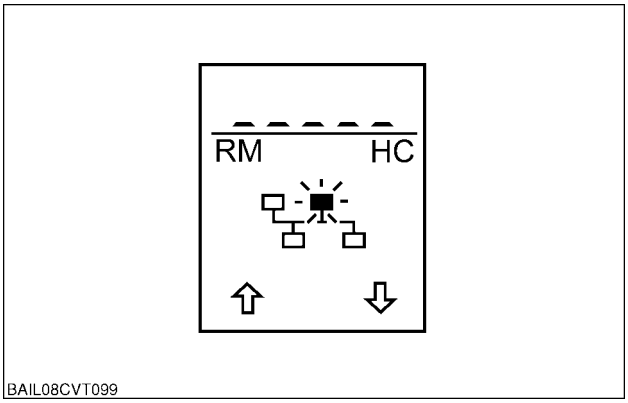
HC Menu Screen Select Diagram



BAIL08CVT098 48

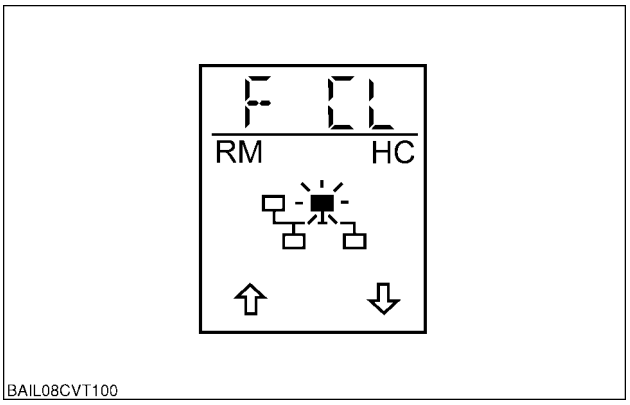
NOTE: *Always make a note of the fault codes stored, before clearing.*

Select the HC menu by depressing the "menu" key.



BAIL08CVT099 49

The upper section of the display will display "F CL".



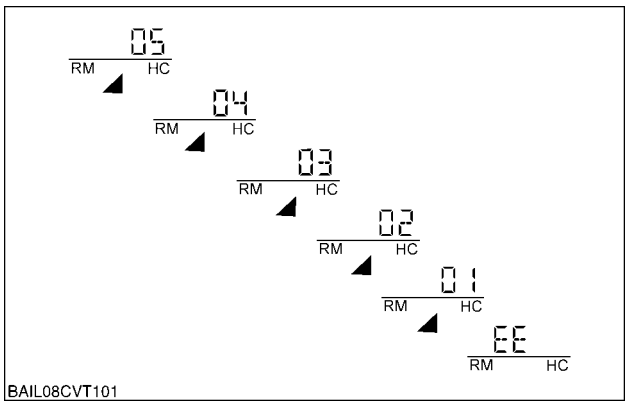
BAIL08CVT100 50

NOTE: *If the navigation "down" key is released before the countdown finishes, the procedure will be aborted.*

Depress and hold the navigation "down" key to confirm the clearing of the memory.

NOTE: *The upper section of the display will countdown from 05 to 01, then "EE" will be displayed to indicate the fault codes have been cleared.*

Depress the "menu" key to continue navigating through the "HH" menus.

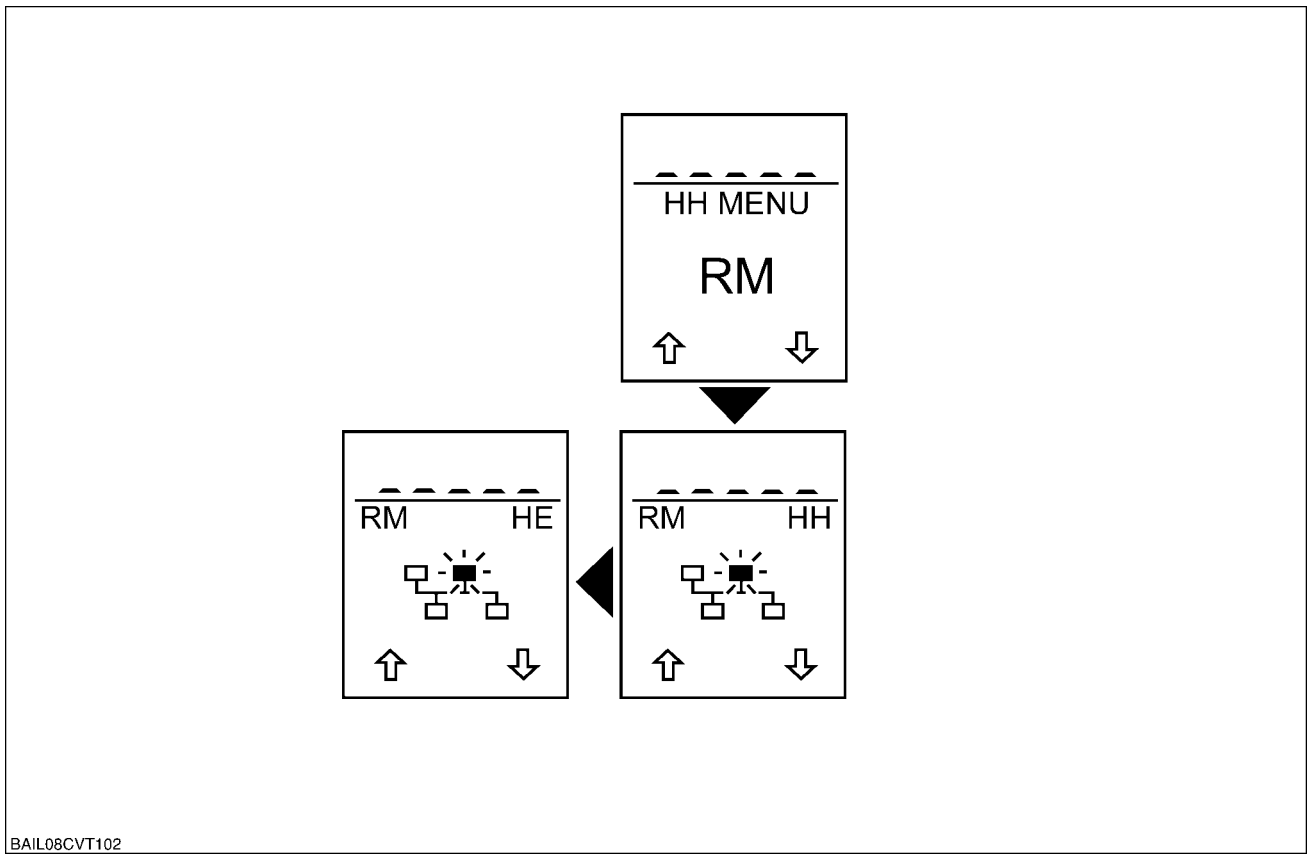


BAIL08CVT101 51

HE - DISPLAY ALL SPEED INPUTS

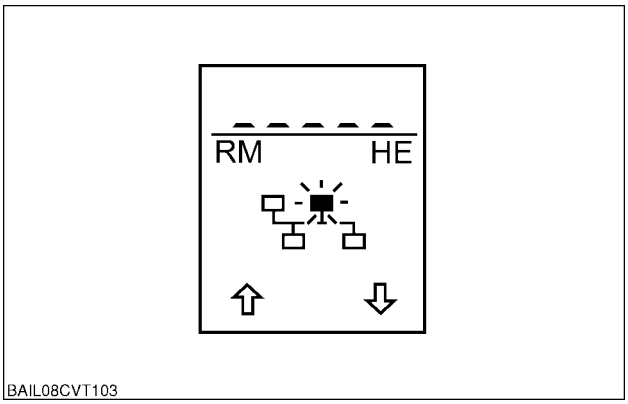
Common to all sub-systems.

HE Menu Screen Select Diagram



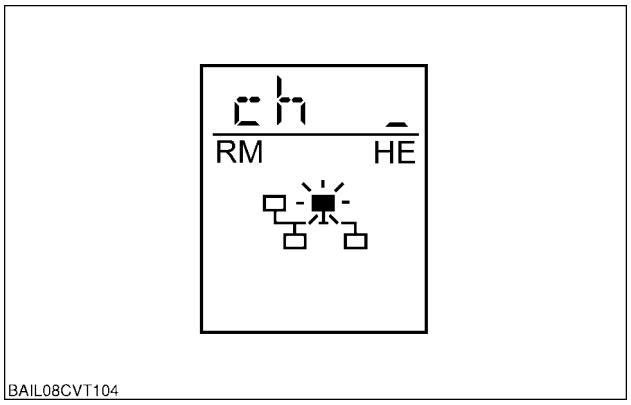
BAIL08CVT102 52

Select the HE menu by depressing the "menu" key.



BAIL08CVT103 53

The upper section of the display will display "ch _".



BAIL08CVT104 54

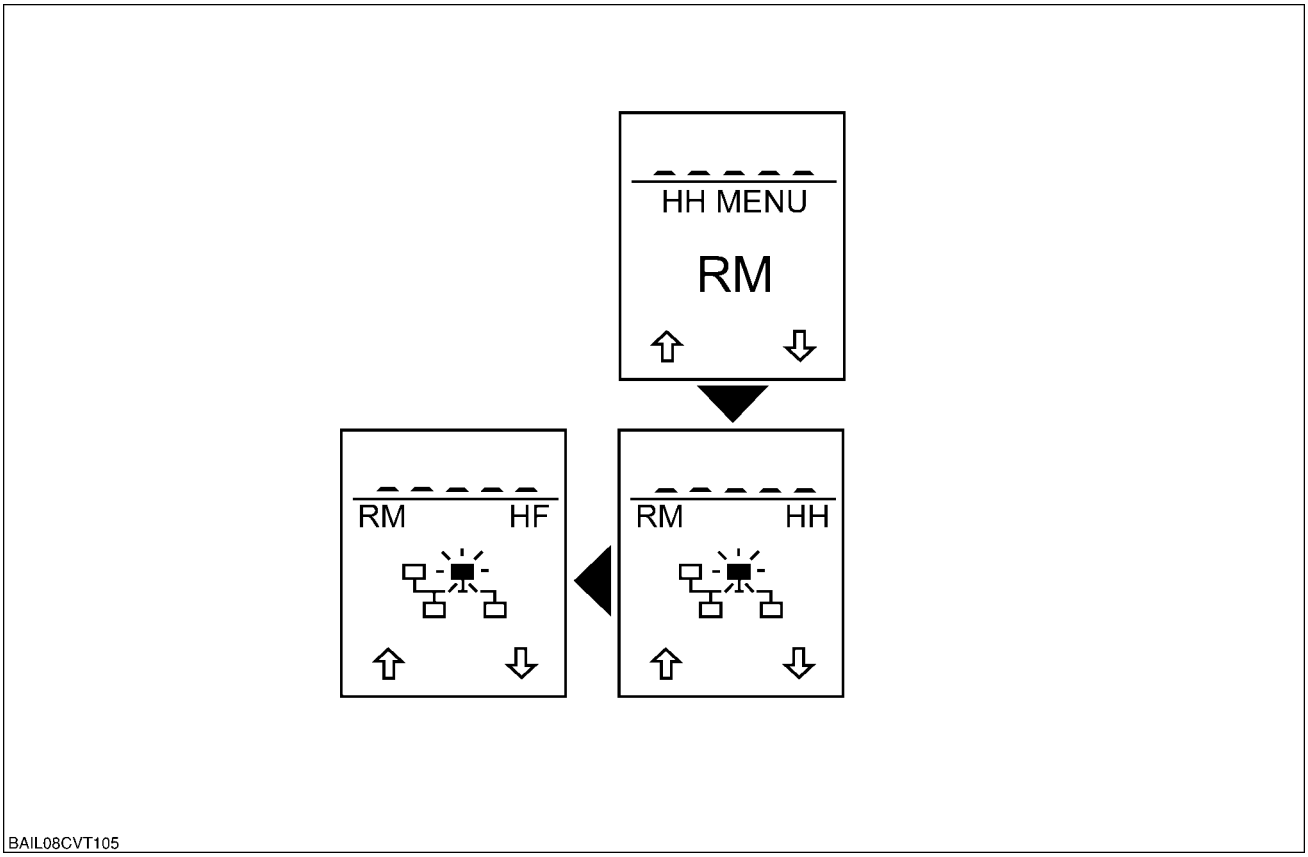
The required channel can be selected by using the navigation "up" and "down" keys.
Refer to the table below for the available channels.
After a delay the value will be displayed.
Depress the "menu" key to continue navigating through the "HH" menus.

Channel	Description	Typical Reading	Notes
0	Not used		
1	Not used		
2	Not used		
3	Not used		
4	Not used		
5	Not used		
6	Not used		
7	Not used		
8	Not used		

HF - VIEW CONTROLLER HARDWARE INFORMATION

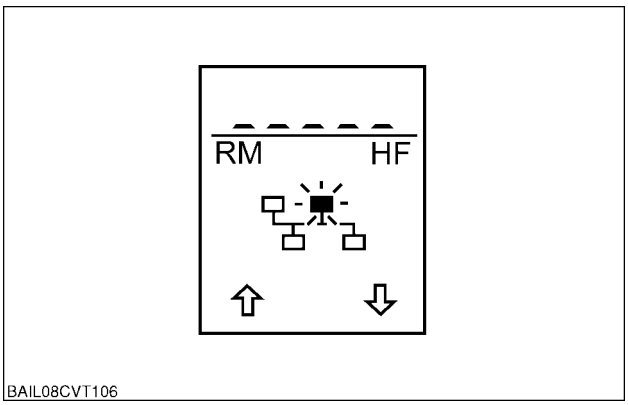
This menu allows the hardware identification, hardware version and serial number to be displayed. Common to all sub-systems.

HF Menu Screen Select Diagram



BAIL08CVT105 55

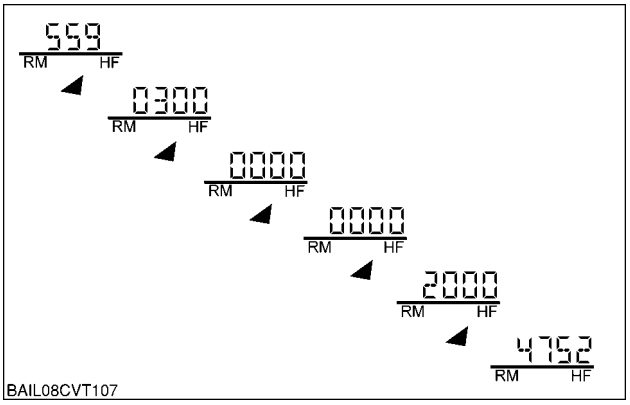
Select the HF menu by depressing the "menu" key.



BAIL08CVT106 56

The upper section of the display will automatically cycle through as the example:

559 Hardware identification
0300 Hardware version
0000 Hardware version
0000 Serial number
2000 Serial number
4752 Serial number
and return to allow navigation of the "HH" menus.



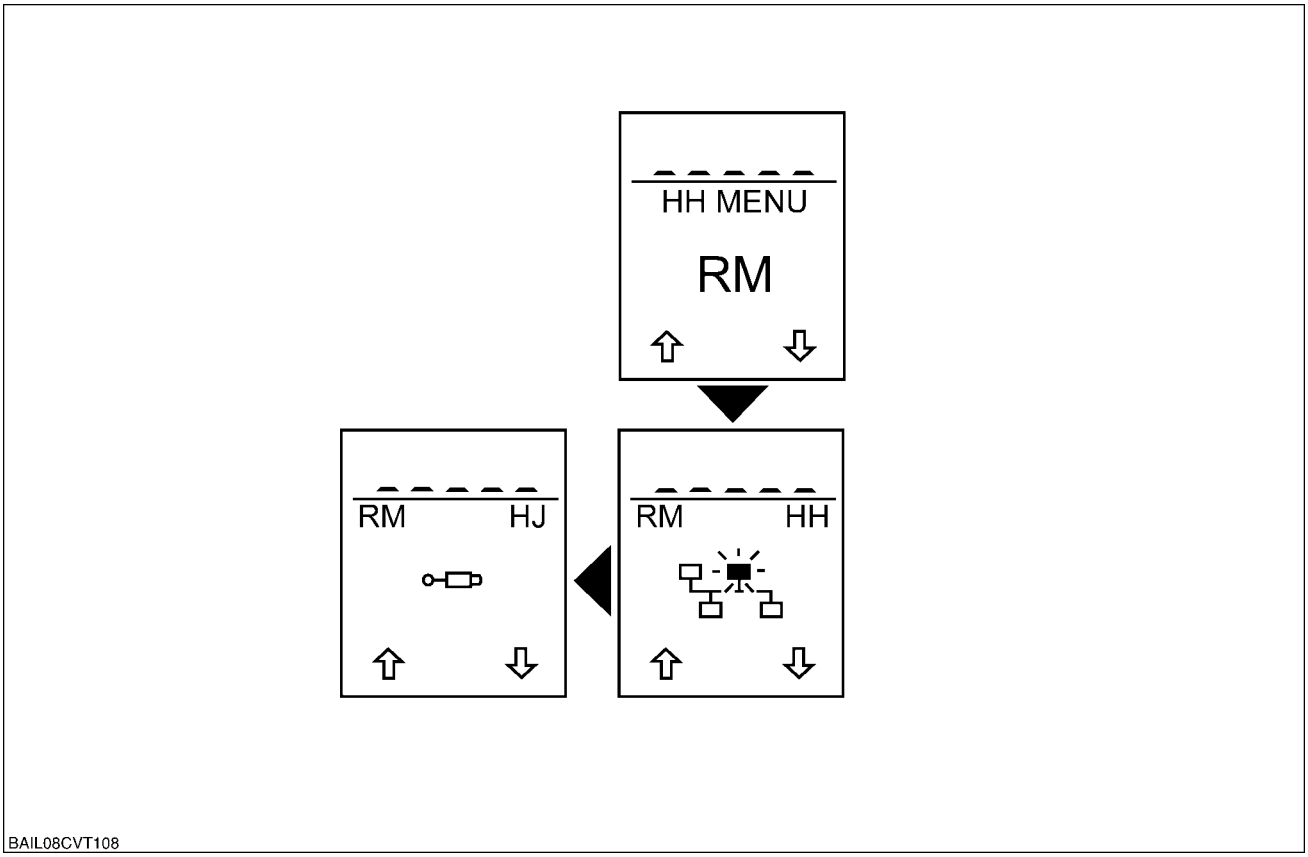
BAIL08CVT107 57

HJ - ELECTRONIC HYDRAULIC REMOTE CONTROL VALVE SET-UP

This menu allows the Electronic Hydraulic Remote (EHR) control valve numbers to be reset.
The EHR valve stores a number to indicate its position in the remote control valve stack, i.e. valve number 1,2, 3, 4 or 5. If a valve assembly has been replaced it will be necessary to reprogram the number of each valve within the complete assembly. New valves are supplied without an assigned number.

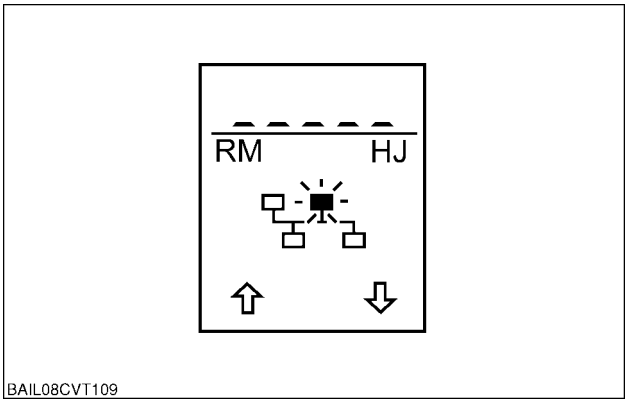
NOTE: *The renumbering procedure for all of the valves, either rear or mid mount valves, must be completed before commencing the procedure for the other set of valves.*

HJ Menu Screen Select Diagram



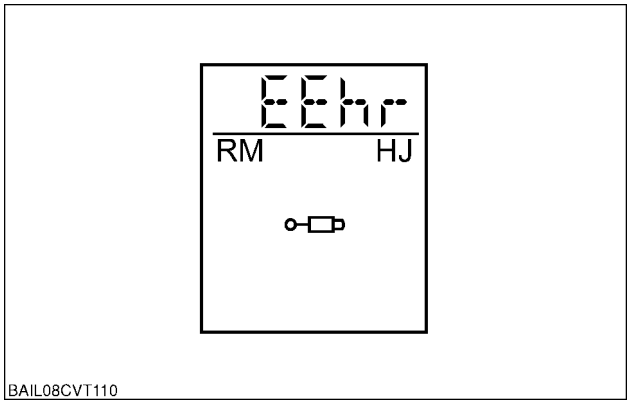
BAIL08CVT108 58

With all of the rear remotes connected, navigate the H-menus and select the HJ menu by depressing the "menu" key.



BAIL08CVT109 59

The upper section of the display will display "EEhr".

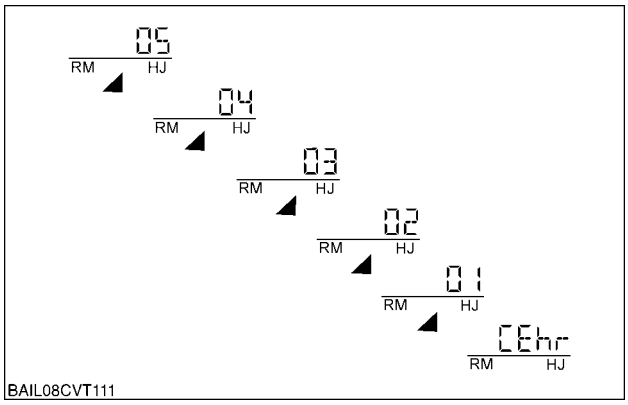


BAIL08CVT110 60

NOTE: *HJ will clear all the EHR valve numbers.*

NOTE: *If the navigation "down" key is released before the countdown finishes, the procedure will be aborted.*

Depress and hold the navigation "down" key to confirm the resetting of the valve numbers.
The upper section of the display will countdown from 05 to 01, then "CEhr" will be displayed to indicate the valve numbers have been reset.



BAIL08CVT111 61

Turn the keystart OFF.

Disconnect the connectors from each of the remote valves, except for valve number 1.

Turn the keystart ON and enter HJ menu again. The cluster display will momentarily flash 'Ehr_' followed by 'Ehr1', an audible beep will be heard, indicating that number 1 valve has been recognised and renumbered. The display will then change to flash 'Ehr2' to signify that the controller is ready for the next valve to be connected..

Connect each remote valve in the correct order. As each valve is connected an audible beep will signify the valve is recognised.

As each valve is connected the display will change to show the next valve number to be connected until 'Ehr_5' is displayed.

If there are less than 5 rear remotes then the procedure can be exited by depressing and holding the navigation 'down' key , the display will change to 'End' to indicate programming is complete. If the maximum number of valves are fitted then the procedure will end automatically and display 'End'.

Turn the keystart OFF to store the new valve numbers.

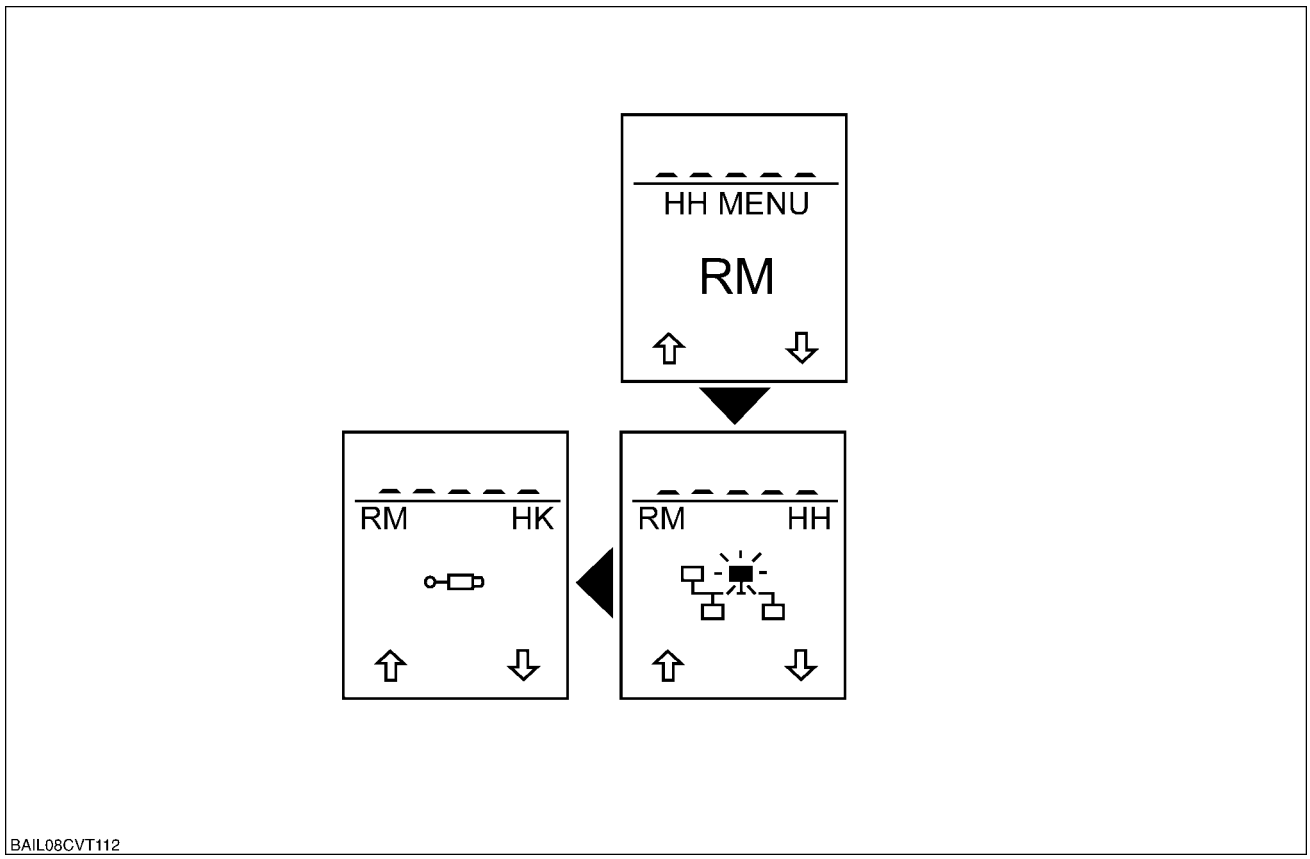
Calibrate the remote valves. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)**.

HK - Rear Electro Hydraulic Remote Valve Diagnostic Functions

This menu is used to provide a number of diagnostic functions for the Rear EHR valves.

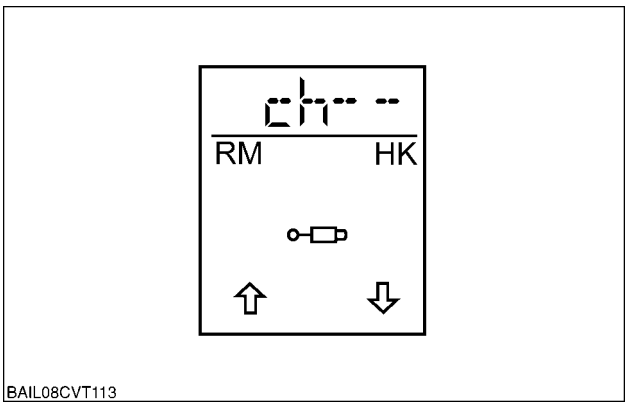
NOTE: *If this procedure is to be carried out following the change of a pilot head, then the HJ procedure should first be carried out in order to renumber the valves.*

HK Menu Screen Select Diagram



BAIL08CVT112 62

Select the HK menu by depressing the "menu" key. Depressing the Menu Key again will display "ch--". Use the "up" or "down" key to navigate to the required channel.



BAIL08CVT113 63

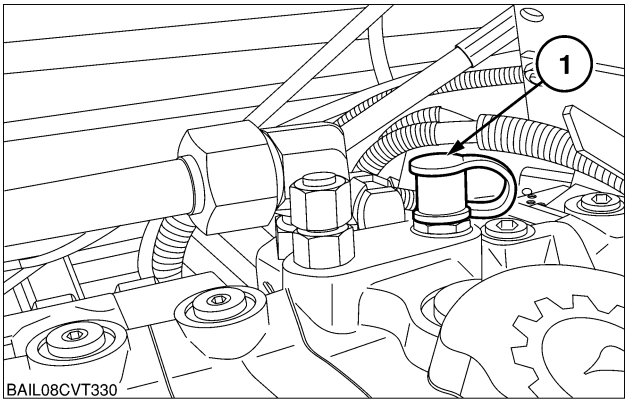
Channel	Description	Comments
Ch 1	Valve Calibration	Required when installing a new valve pilot head. Requires the use of special tools **380001903** pressure transducer and **84148258** jumper harness.

Channel	Description	Comments
Ch 2	Read Calibration Data	For information only. Reads the valve calibration data

Channel 1 - Valve Calibration

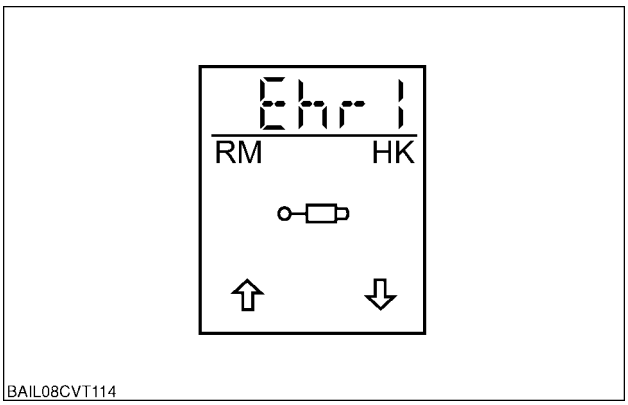
This channel is used to perform the on-board calibration of the rear EHR valves

1. Connect the pressure transducer, special tool **380001903**, with jumper harness, special tool **84148258**. Connect the pressure transducer to the quick release coupler located on the top of the valve block **(1)**, and using the jumper harness, connected to the transducer harness, connect to the "front hitch and PTO" connector, **X227**, located on the left side of the vehicle under the hood on top of the engine.



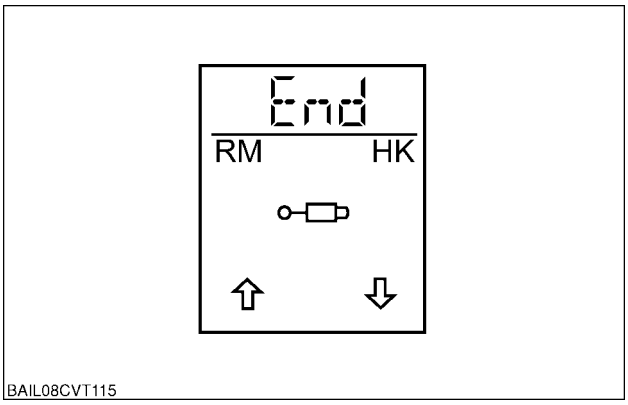
BAIL08CVT330 64

2. Select the EHR to be calibrated by using the "up" or "down" keys.



BAIL08CVT114 65

3. Start the engine. Depress and hold the "down" key for 2 seconds, calibration will start automatically. During calibration the valve position data will be displayed. The display will show "End" if the procedure was successful.



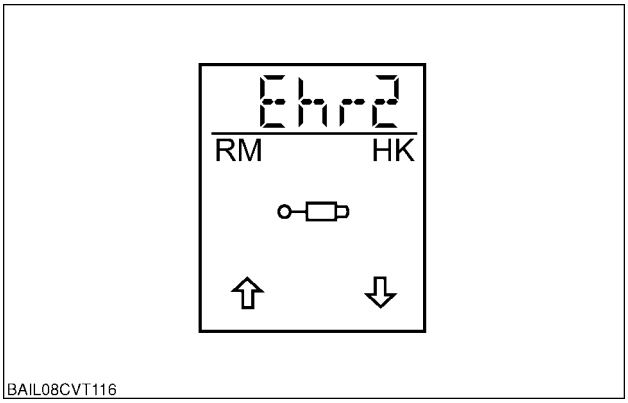
BAIL08CVT115 66

4. To calibrate another valve use the "up" or "down" key to select the required valve and repeat step 3.

Channel 2 - Read Calibration Data

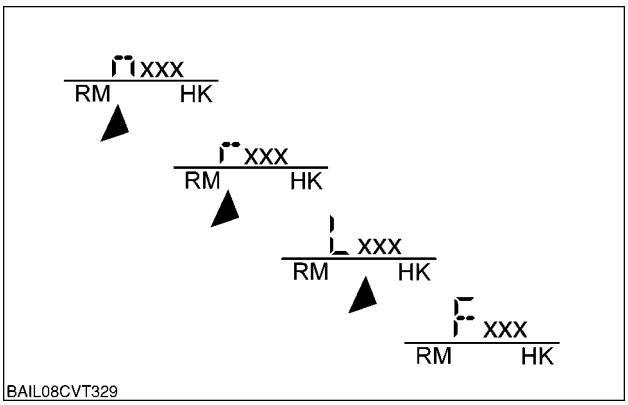
This channel is for information purposes only to read the calibration data of each valve

1. Select the EHR valve number which is to be read by depressing the "up" or "down"" keys.



BAIL08CVT116 67

2. Depress and hold the "down" key for 2 seconds. The display will show the calibration data for each position prefixed by ’n’ (neutral), ’R’ (raise), ’L’ (lower), ’F’ (float).



BAIL08CVT329 68

3. To read the calibration values from another valve use the "up" or "down" keys to select the required valve number and repeat step 2.

Control module - Configure - FPS Transmission, Electronic Draft Control, Rear PTO, Front Wheel Drive, Differential Lock, Front Electronic Hydraulic Remote Valves, Engine.

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Control Module RT

HH	Service Menu	Figure Number
H1	Calibration procedures	**1**
H2	View stored calibration values	**2**
H3	Configurations	**8**
H4	View software revision level	**38**
H5	Switch operation test	**41**
H6	Vehicle information view	**45**
H7	Vehicle test modes	**48**
H8	Clear Electrically Erasable Programmable Read Only Memory (EEPROM)	**61**
H9	Voltmeter	**65**
HA	Demonstration mode	**67**

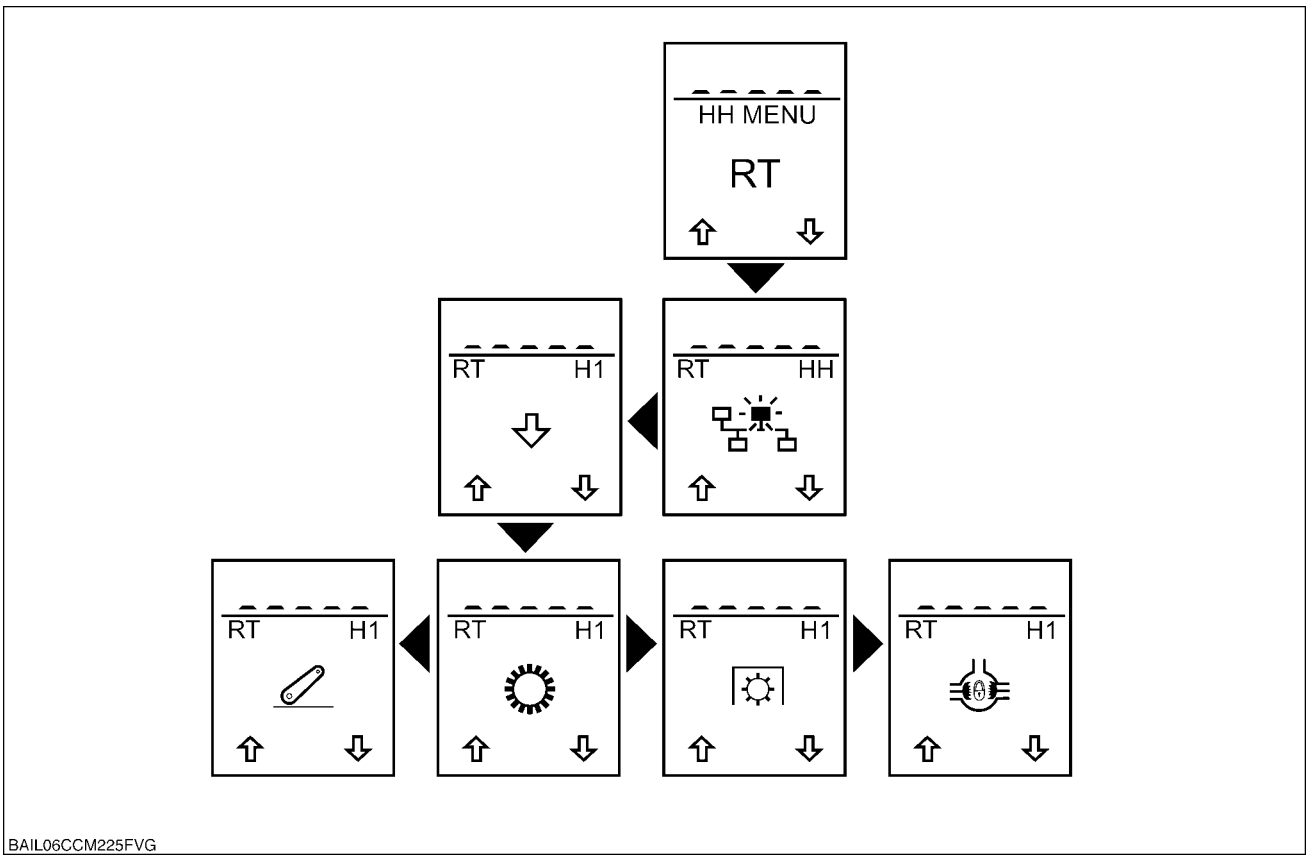
HH	Service Menu	Figure Number
HB	Display stored fault codes	**70**
HC	Clear all stored fault codes	**73**
HE	Display frequency inputs	**77**
HF	View controller hardware information	**81**
HJ	Electronic hydraulic remote control valve set-up	**84**

H1 - CALIBRATION PROCEDURES

This menu is used to calibrate:

1. Electronic Draft Control Valve. Refer to **HITCH Electronic draft control - Calibrate (H.10.D)**.
2. Transmission Clutches, determining the current required to turn the input/output shaft at the required speed. Flywheel speed sensor and PTO torque sensor. Refer to **TRANSMISSION Powershift - Calibrate (C.20.E)**.
3. Engine (for PTO torque sensor). Refer to **REAR PTO Hydraulic - Calibrate (C.40.C)**.
4. Differential lock (for steering angle sensor). Refer to **FRONT AXLE - Calibrate (D.10.A)**.

H1 Menu Screen Select Diagram



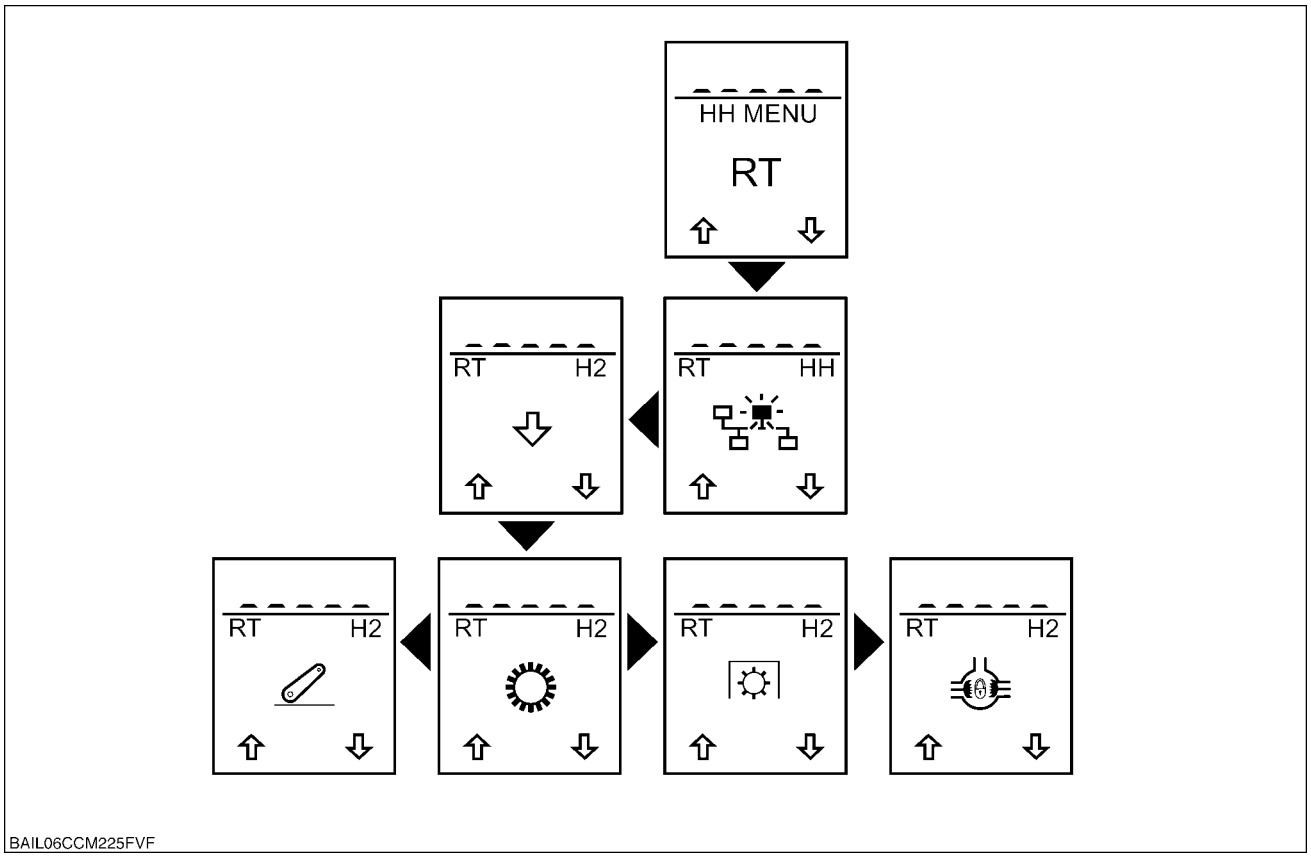
BAIL06CCM225FVG 1

H2 - VIEW STORED CALIBRATION VALUES

This menu is used to display the calibration values stored in the controllers for:

1. Transmission clutches and synchronisers
2. Differential lock (for steering angle sensor)
3. Electronic draft control valve
4. Rear PTO clutch

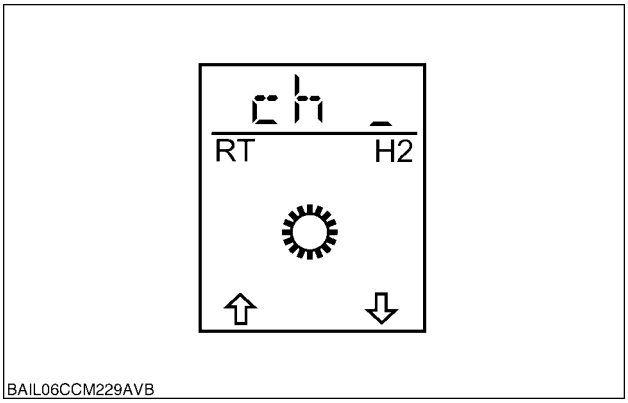
H2 Menu Screen Select Diagram



BAIL06CCM225FVF 2

TRANSMISSION VALUES

Select the transmission sub-system by depressing the “menu" key.
The upper section of the display will display “ch _ _".
The required channel can be selected by using the navigation “up" and “down" keys.



BAIL06CCM229AVB 3

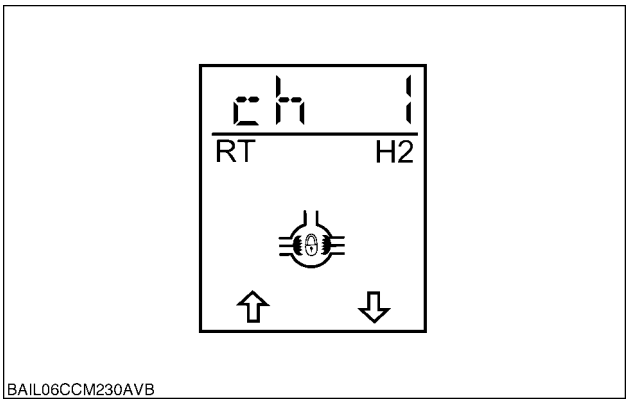
After a delay the channel number followed by the clutch letter, calibration value and the temperature the calibration took place will be displayed (refer to the table below for a description of each channel).
The solenoid current values are displayed in units of milliampere and temperature values are displayed in units of degrees centigrade.
Depress the “menu" key to continue navigating through the “HH" menus.

Channel	Description	Code
Ch 1	Clutch A - Amperage and temperature of the calibration	A
Ch 2	Clutch B - Amperage and temperature of the calibration	B
Ch 3	Clutch C - Amperage and temperature of the calibration	C
Ch 4	Clutch D - Amperage and temperature of the calibration	D
Ch 5	Clutch E - Amperage and temperature of the calibration	E
Ch 6	Clutch F1 - Amperage and temperature of the calibration	F1
Ch 7	Clutch F2 - Amperage and temperature of the calibration	F2
Ch 8	Clutch F3 - Amperage and temperature of the calibration	F3
Ch 9	Clutch F4 - Amperage and temperature of the calibration (only **50 km/h** transmission)	F4
Ch 9	Clutch R - Amperage and temperature of the calibration (all except **50 km/h** transmission)	R
Ch 10	Clutch R - Amperage and temperature of the calibration (only **50 km/h** transmission)	R
Ch 10	Flywheel damper calibration value (all except **50 km/h** transmission)	
Ch 11	Flywheel damper calibration value (only **50 km/h** transmission)	
Ch 11	PTO twist calibration value (all except **50 km/h** transmission)	
Ch 12	PTO twist calibration value (only **50 km/h** transmission)	
Ch 12	Radar adjustment value (all except **50 km/h** transmission)	
Ch 13	Radar adjustment value (only **50 km/h** transmission)	

DIFFERENTIAL LOCK (FOR STEERING ANGLE SENSOR) VALUES

NOTE: *The default calibration value is 12287 for the steering angle sensor.*

Select the differential lock sub-system by depressing the “menu" key.
The lower central display will display “ch 1".



BAIL06CCM230AVB 4

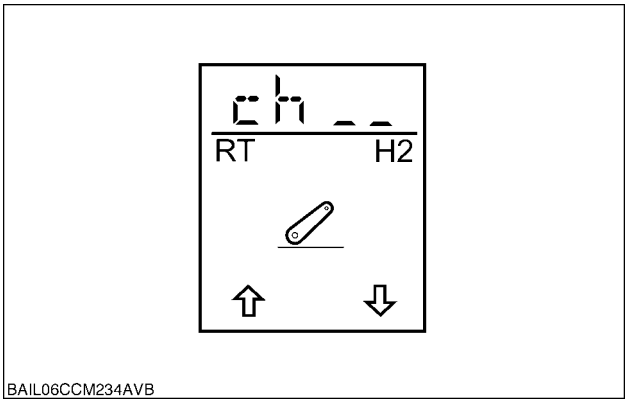
After a delay the calibration value will be displayed. (see the table below for the description of the channel).
Depress the “menu" key to continue navigating through the “HH" menus.

Channel	Description	Value Range
Ch 1	Steering angle sensor	7000 - 10000

ELECTRONIC DRAFT CONTROL VALVE VALUES

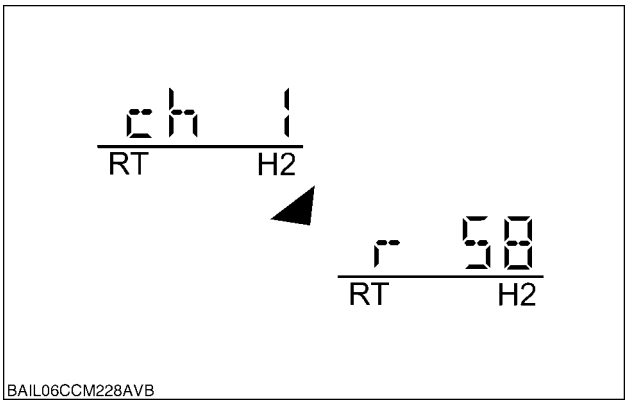
NOTE: *The default calibration value is 50 for both the raise and lower solenoids.*

Select the Electronic Draft Control sub-system by depressing the “menu" key.
The upper section of the display will display “ch _ _".
The required channel can be selected by using the navigation “up" and “down" keys.



BAIL06CCM234AVB 5

After a delay the code followed by the calibration value will be displayed. (see the table below for the description of each channel).
Depress the “menu" key to continue navigating through the “HH" menus.



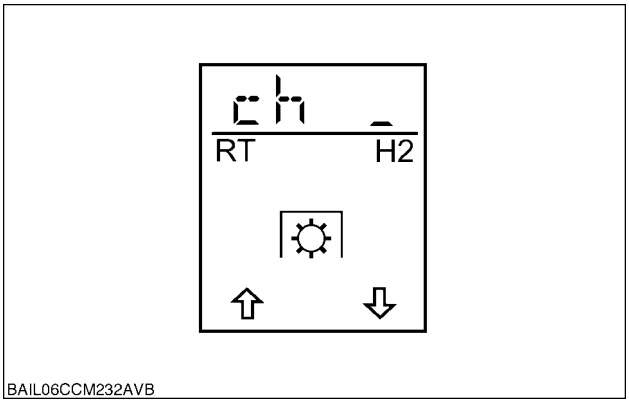
BAIL06CCM228AVB 6

Channel	Description	Code	Value Range
Ch 1	Raise solenoid	R	20 - 80
Ch 2	Lower solenoid	L	20 - 80

PTO VALUES

NOTE: *The default calibration value is 212 for the PTO solenoid.*

Select the PTO sub-system by depressing the “menu" key.
The upper section of the display will display “ch _ _".
The required channel can be selected by using the navigation “up" and “down" keys.



BAIL06CCM232AVB 7

After a delay the calibration value will be displayed. (see the table below for the description of each channel).
Depress the “menu" key to continue navigating through the “HH" menus.

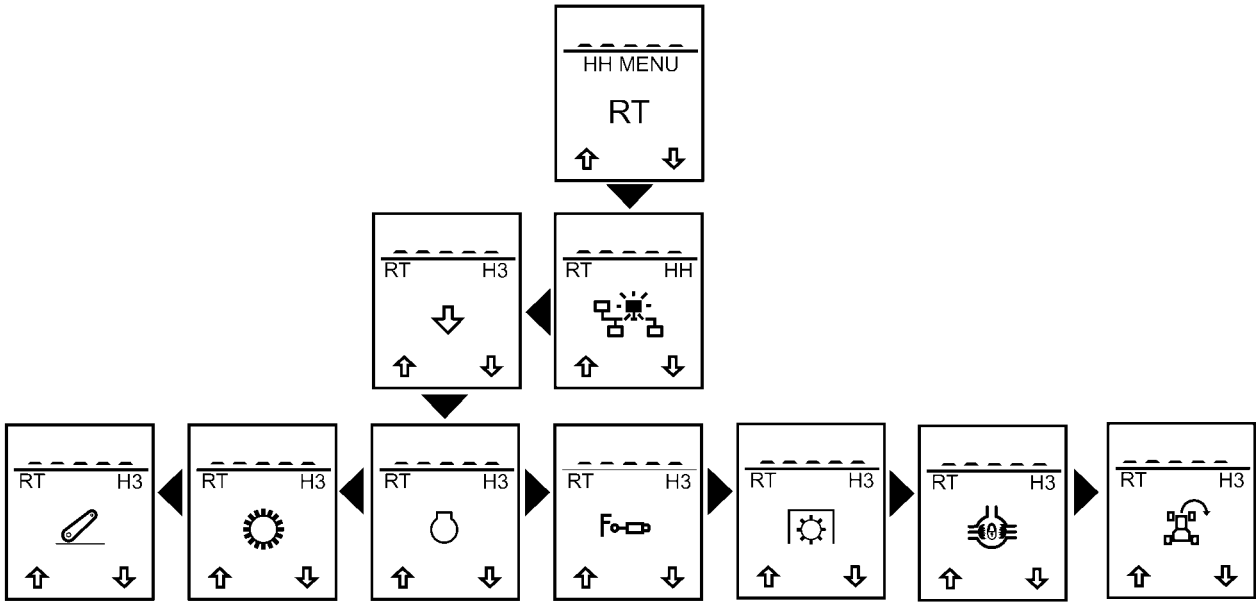
Channel	Description	Value Range
Ch 1	PTO oil temperature	Temperature dependant
Ch 2	PTO solenoid	100 to 420
Ch 3	Shiftable PTO extend position	700 to 900
Ch 4	Shiftable PTO retract position	100 to 300
Ch 5	Shiftable PTO neutral position	450 to 600
Ch 6	Shiftable PTO optional speed setting	1000, 540E, 540, 1000E

H3 - CONFIGURATIONS

This menu contains the configuration options of the following functions:

1. Electronic draft (EDC) control
   - Channel 1 - Diameter of the external lifting cylinder
   - Channel 2 - Enable/disable EDC
   - Channel 3 - Enable/disable slip control
2. Transmission
   - Channel 1 - Enable/disable creeper (Yes = activated)
   - Channel 2 - Enable/disable parking lock (Yes = activated)
   - Channel 3 - **40 Km/h** maximum speed restriction (Yes = limited)
   - Channel 4 - Clutch A solenoid quick fill adjustment
   - Channel 5 - Clutch B solenoid quick fill adjustment
   - Channel 6 - Clutch C solenoid quick fill adjustment
   - Channel 7 - Clutch D solenoid quick fill adjustment
   - Channel 8 - Clutch E solenoid quick fill adjustment
   - Channel 9 - Clutch F1 solenoid quick fill adjustment
   - Channel 10 - Clutch F2 solenoid quick fill adjustment
   - Channel 11 - Clutch F3 solenoid quick fill adjustment
   - Channel 12 - Clutch F4 solenoid quick fill adjustment (**50 km/h** transmission)
   - Channel 12 - Clutch R solenoid quick fill adjustment (all except **50 km/h** transmission)
   - Channel 13 - Clutch R solenoid quick fill adjustment (only **50 km/h** transmission)
3. Electronic engine
   - Channel 1 - Dynamometer power boost test (Std or bSt = activated)
   - Channel 2 - Not used
   - Channel 3 - Grid heater selection (Yes = installed)
   - Channel 4 - Fuel filter heater selection (Yes = installed)
   - Channel.5 Engine brake selection (Yes = fitted)
   - Channel.6 Engine fan selection (V = viscous type, r = reversible type)
4. Front EHR
   - Channel 1 - Front EHR option selection (Yes = activated)
   - Channel 2 - Front Loader/Front Hitch selection
   - Channel 3 - Not used
   - Channel 4 - Number of the EHR set-up
   - Channel 5 - High Flow pump selection (Yes = activated)
5. Rear PTO
   - Channel.1 Not used
   - Channel.2 PTO fender switches selection
   - Channel.3 PTO drop out speed option
   - Channel.4 Electronic shiftable PTO option
6. Differential Lock and Four Wheel Drive
   - Channel.1 Not used
   - Channel.2 Not used
   - Channel.3 Front axle angles (Terralock)
   - Channel.4 Four wheel drive brake engagement speed selection
7. Headland management control (HMC)
   - Channel.1 enable/disable/deactivate

H3 Menu Screen Select Diagram

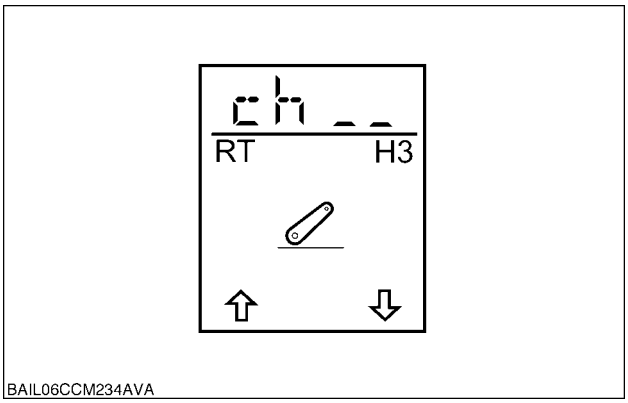


BAIL06CCM307FVC

BAIL06CCM307FVC 8

ELECTRONIC DRAFT CONTROL OPTIONS

Select the Electronic Draft Control sub-system by depressing the "menu" key.
The upper section of the display will display “ch _ _".



BAIL06CCM234AVC 9

The required channel can be selected by using the navigation “up" and “down" keys (see the table below for the description of each channel).

Channel	Description
Ch 1	Diameter of the external hydraulic lift rams
Ch 2	Enable/Disable Electronic Draft Control
Ch 3	Enable/Disable Slip Control

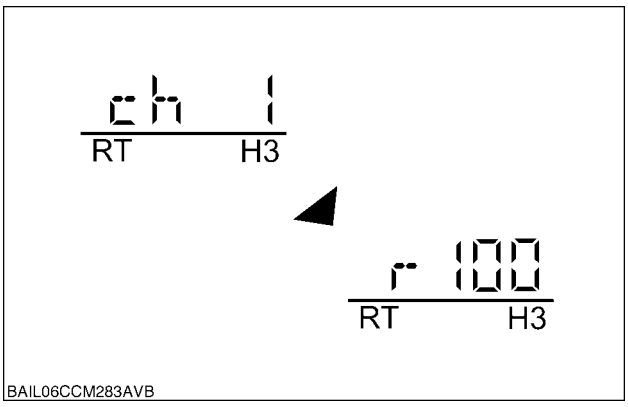
Channel 1 - Diameter Of The External Hydraulic Lift Rams

Scroll through the available options using the navigation “up" or “down" key

The options available are in **(mm)**:

- 90
- 100
- 110

The default setting for this option is "def", corresponding to 90mm. If "def" is displayed then this channel must be used to select the appropriate ram size, otherwise fault code 1070 (hydraulic ram configuration not set) will be generated.



BAIL06CCM283AVB 10

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the “menu" key to continue navigating through the “HH" menus.

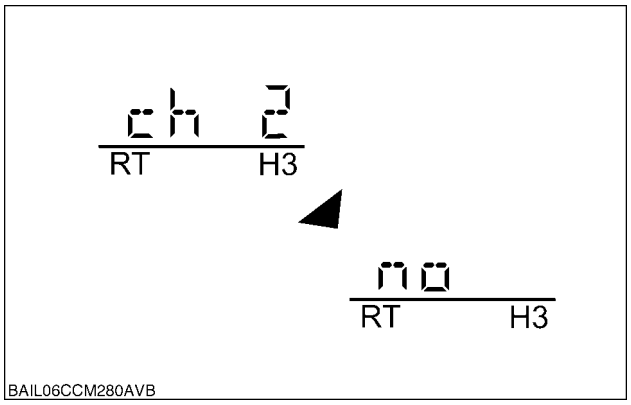
Channel 2 - Enable/Disable Electronic Draft Control

Scroll through the available options using the navigation “up" or “down" key

The options available are:

- YES - Enable Electronic Draft Control
- NO - Disable Electronic Draft Control

The default setting is NO but will be set to YES automatically if the EDC system is detected.



BAIL06CCM280AVB 11

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the “menu" key to continue navigating through the “HH" menus.

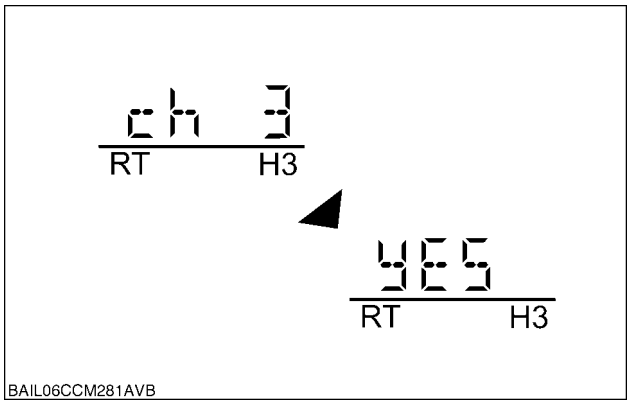
Channel 3 - Enable/Disable Slip Control

Scroll through the available options using the navigation “up" or “down" key.

The options available are:

- YES - Enable Slip Control
- NO - Disable Slip Control

The default setting is NO but will be set to YES automatically if the slip control system is detected.
If the EDC option is disabled in channel 2 then this channel will not be available.



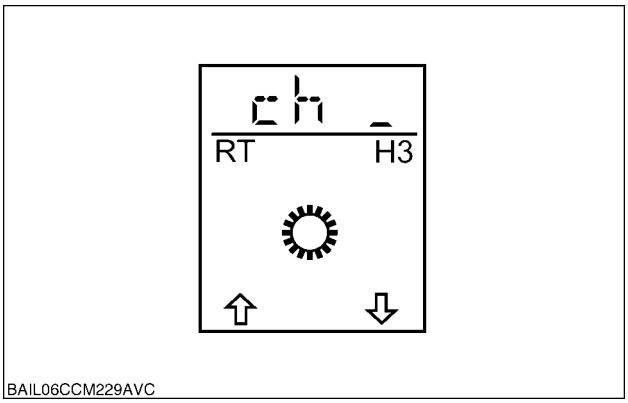
BAIL06CCM281AVB 12

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the “menu" key to continue navigating through the “HH" menus.

TRANSMISSION OPTIONS

Select the transmission sub-system by depressing the “menu" key.
The upper section of the display will display “ch _ _".



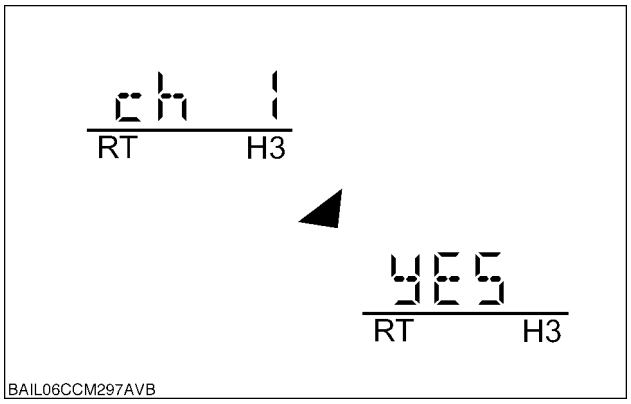
BAIL06CCM229AVC 13

The required channel can be selected by using the navigation “up" and “down" keys (see the table below for the description of each channel).

Channel	Description
Ch 1	Enable/Disable Creeper
Ch 2	Enable/Disable Park Lock
Ch 3	**40 Km/h** maximum speed restriction
Ch 4	A clutch solenoid quick fill adjustment
Ch 5	B clutch solenoid quick fill adjustment
Ch 6	C clutch solenoid quick fill adjustment
Ch 7	D clutch solenoid quick fill adjustment
Ch 8	E clutch solenoid quick fill adjustment
Ch 9	F1 clutch solenoid quick fill adjustment
Ch 10	F2 clutch solenoid quick fill adjustment
Ch 11	F3 clutch solenoid quick fill adjustment
Ch 12	F4 clutch solenoid quick fill adjustment (**50 Km/h** transmission)
Ch 12	R clutch solenoid quick fill adjustment (all other transmission speeds)
Ch 13	R clutch solenoid quick fill adjustment (**50 Km/h** transmission only)

Channel 1 - Creeper enable/disable

This channel is used to select whether the creeper drive option is activated or deactivated.
After a delay, the currently stored value is displayed.

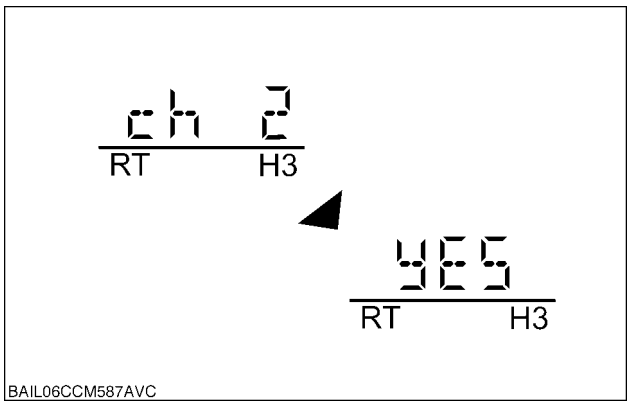


BAIL06CCM297AVB 14

Use the "Up" or "Down" navigation button to switch between "Yes" and "No" to input whether the creeper drive option is activated (Yes) or deactivated (No).
To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.
To use the "HH" menu further, press the Menu button.

Channel 2 - Park lock enable/disable

This channel is used to select whether the park lock option is activated or deactivated.
After a delay, the currently stored value is displayed.

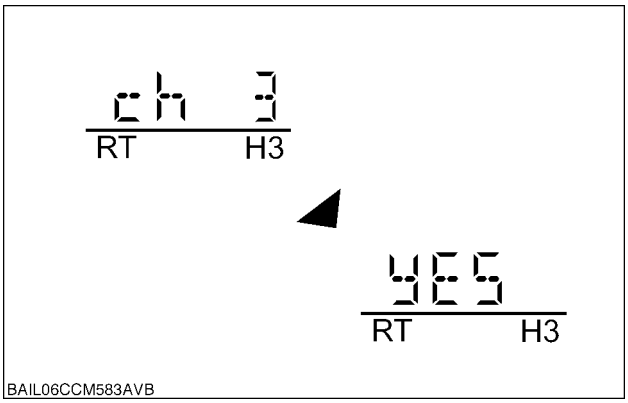


BAIL06CCM587AVC 15

Use the "Up" or "Down" navigation button to switch between "Yes" and "No" to input whether the park lock option is activated (Yes) or deactivated (No).
To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.
To use the "HH" menu further, press the Menu button.

Channel 3 - 40 Km/h maximum speed restriction

This channel is used to select whether the **40 Km/h** maximum speed restriction option is enabled or disabled.
After a delay the current stored value will be displayed.



BAIL06CCM583AVB 16

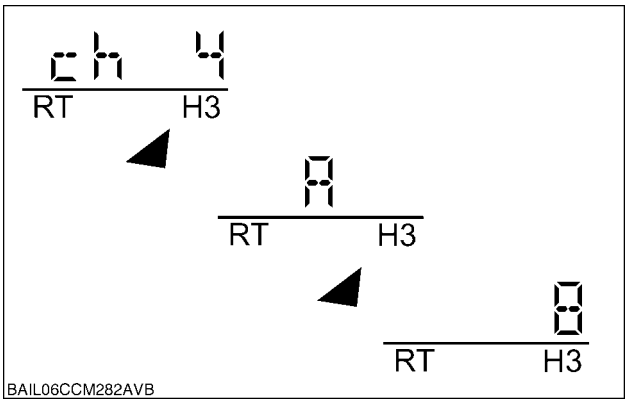
Use the navigation "up" and "down" keys to toggle between "Yes" and "No", indicating whether the **40 Km/h** maximum speed restriction option is restricted to **40 Km/h** (Yes) or unrestricted (No).
To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.
The default setting for this option is "YES".
Depress the “menu" key to continue navigating through the “HH" menus.

Channels 4 to 13 - Clutch quick fill adjustment

These channels are used to adjust the quick fill value for the transmission solenoids.
Scroll through the available channels using the navigation "up" and "down" keys. (see the table below for the description of each channel)

Channel	Description
Channel 4	A clutch solenoid quick fill adjustment
Channel 5	B clutch solenoid quick fill adjustment
Channel 6	C clutch solenoid quick fill adjustment
Channel 7	D clutch solenoid quick fill adjustment
Channel 8	E clutch solenoid quick fill adjustment
Channel 9	F1 clutch solenoid quick fill adjustment
Channel 10	F2 clutch solenoid quick fill adjustment
Channel 11	F3 clutch solenoid quick fill adjustment
Channel 12	F4 clutch solenoid quick fill adjustment (**50 Km/h** transmission only)
Channel 12	R clutch solenoid quick fill adjustment (all except **50 Km/h** transmissions)
Channel 13	R clutch solenoid quick fill adjustment (**50 Km/h** transmission only)

After a delay the clutch solenoid code then current stored value will be displayed.

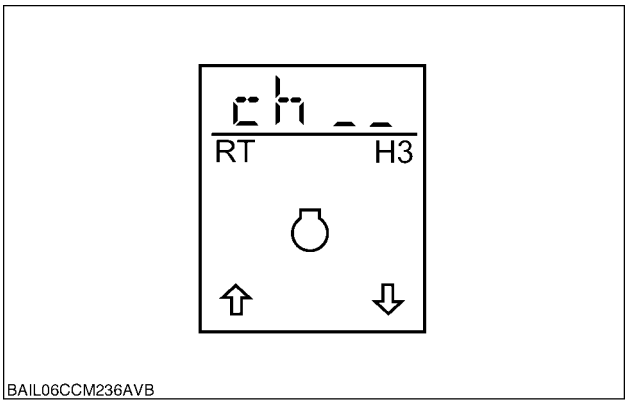


BAIL06CCM282AVB 17

Use the navigation "up" and "down" keys to change the quick fill value between "3" and "25", representing 30m/s 250m/s.
To save the desired value, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.
Depress the “menu" key to continue navigating through the “HH" menus.

ELECTRONIC ENGINE OPTIONS

Select the electronic engine sub-system by depressing the “menu" key.
The upper section of the display will display “ch _ _".



BAIL06CCM236AVB 18

The required channel can be selected by using the navigation “up" and “down" keys (see the table below for the description of each channel).

Channel	Description
Ch 1	Dynamometer power boost test
Ch 2	Not used
Ch 3	Grid heater selection
Ch 4	Fuel filter heater selection
Ch 5	Engine brake selection
Ch 6	Engine fan selection

Channel 1 - Dynamometer Power Boost Test

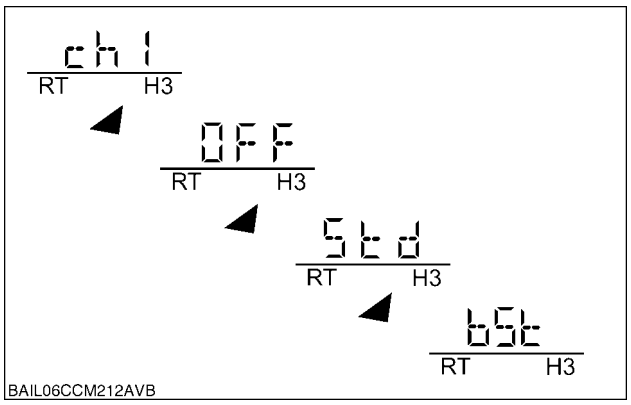
This channel is used to allow the tractor to be dynamometer tested with maximum powerboost.

NOTE: *The powerboost is only active for* ***45 minutes****.*

Scroll through the available options using the “up" or “down" key.

The options available are:

- "OFF" - dyno power boost test mode is off (normal vehicle operation)
- "Std" - dyno power boost test mode is on (straight unboosted curve without any limitations)
- "bSt" - dyno power boost test mode is on (straight boosted curve without any limitations)



BAIL06CCM212AVB 19

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the “menu" key to continue navigating through the “HH" menus.

Channel 2 - Not used

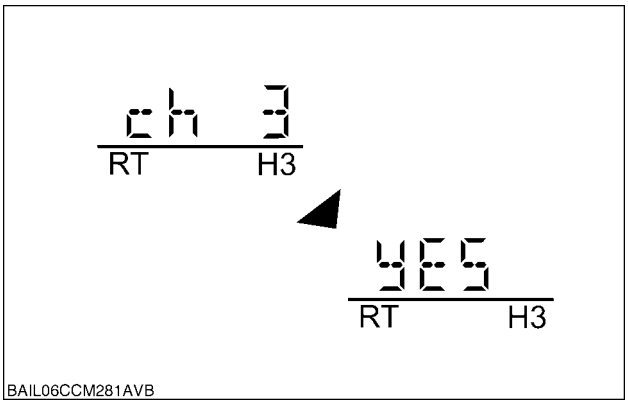
This channel is not used and "---" will be displayed.

Channel 3 - Grid heater selection

Scroll through the available options using the navigation “up" or “down" key.

The options available are:

- YES - Grid heater fitted
- NO - Grid heater not fitted



BAIL06CCM281AVB 20

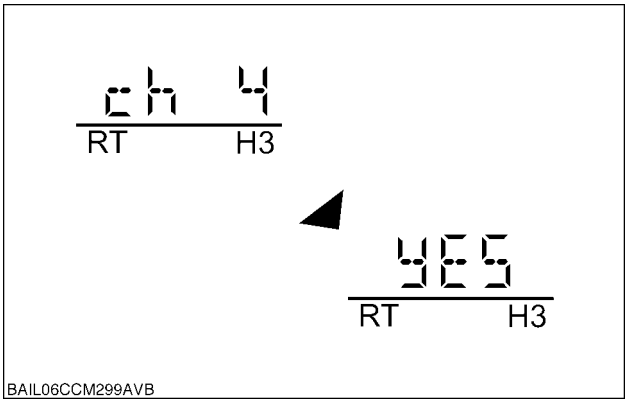
To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.
The default setting for this option is "YES".
Depress the “menu" key to continue navigating through the “HH" menus.

Channel 4- Fuel filter heater selection

Scroll through the available options using the navigation “up" or “down" key.

The options available are:

- YES - Fuel filter heater fitted
- NO - Fuel filter heater not fitted



BAIL06CCM299AVB 21

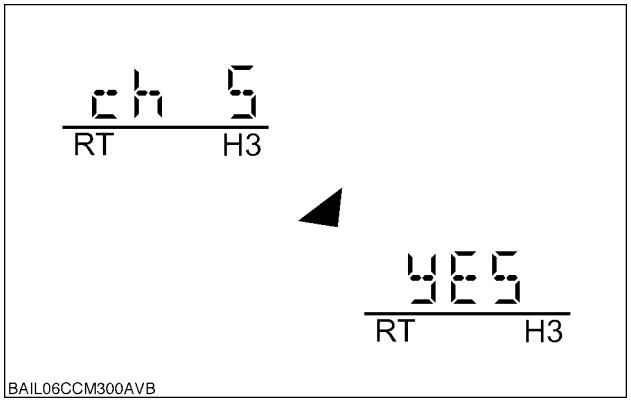
To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.
The default setting for this option is "NO".
Depress the “menu" key to continue navigating through the “HH" menus.

Channel 5- Engine brake selection

Scroll through the available options using the navigation “up" or “down" key.

The options available are:

- YES - Engine brake fitted
- NO - Engine brake not fitted



BAIL06CCM300AVB 22

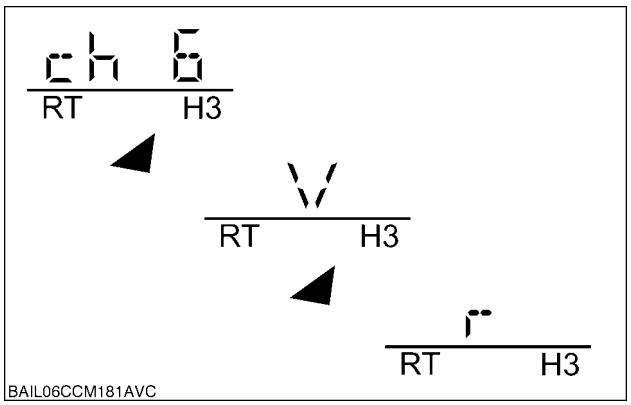
To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.
The default setting for this option is "NO".
Depress the “menu" key to continue navigating through the “HH" menus.

Channel 6- Engine fan selection

Scroll through the available options using the navigation “up" or “down" key.

The options available are:

- V- Vistronic type fan fitted
- r- Reversible type fan fitted

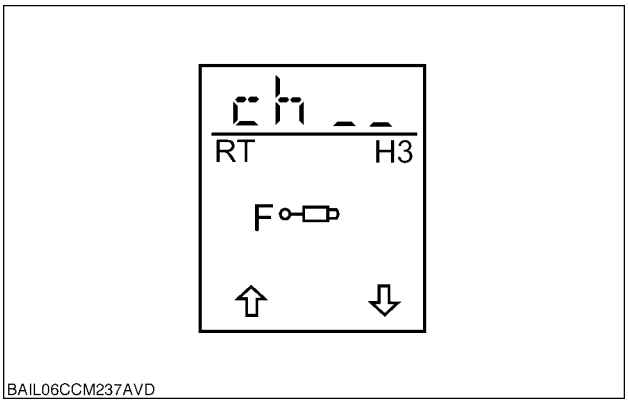


BAIL06CCM181AVC 23

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.
The default setting for this option is "V" (Vistronic fan type).
Depress the “menu" key to continue navigating through the “HH" menus.

FRONT EHR OPTIONS

Select the Front EHR sub-system by depressing the “menu" key.
The upper section of the display will display “ch _ _".



BAIL06CCM237AVD 24

The required channel can be selected by using the navigation “up" and “down" keys (see the table below for the description of each channel).

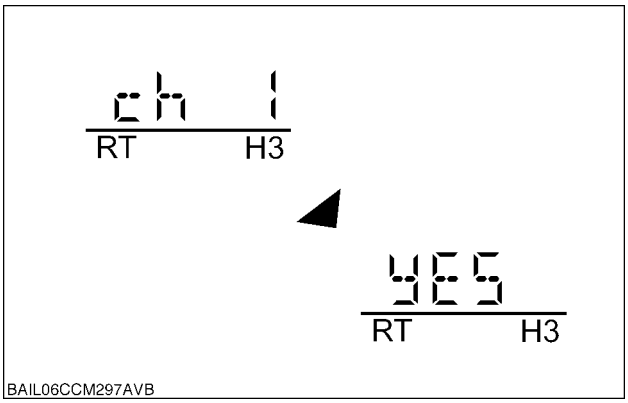
Channel	Description
Ch 1	Front EHR option selection
Ch 2	Front Loader/Front Hitch selection
Ch 3	not used
Ch 4	Number of EHR setup
Ch 5	High flow pump selection

Channel 1 - Front EHR Option Selection

This channel is used to disable/enable the front EHR.
Scroll through the available options using the navigation “up" or “down" key.

The options available are:

- Yes - Enable front EHR
- No - Disable front EHR



BAIL06CCM297AVB 25

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the “menu" key to continue navigating through the “HH" menus.

Channel 2 - Front Loader/Front Hitch Selection

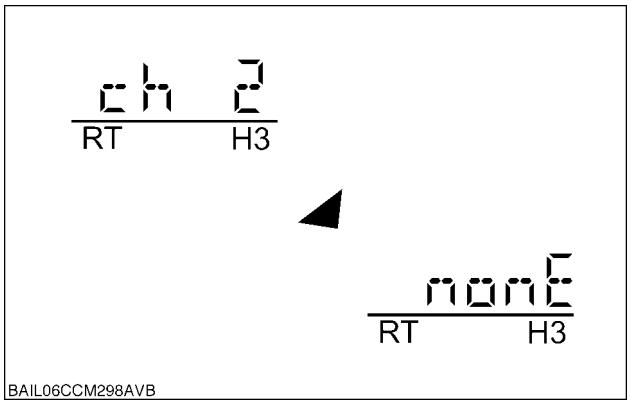
This channel is used to select if the front EHRs are used in conjunction with the front hitch or the front loader. Scroll through the available options using the navigation “up" or “down" key.

The options available are:

- nonE - Neither selected
- Htch - Front hitch selected
- LOAd - Front loader selected

NOTE: *If the front EHR’s are to be used to control the front hitch then the front hitch option must also be enabled in the "RM" module.*

NOTE: *If Front Hitch is selected then the Front EHR valve 1 will be reserved for front hitch operation.*
If Front Loader is selected then the front EHR valves 1-3 will be reserved for front loader operation.
If None is selected then all the front EHR valves will be available for use.



BAIL06CCM298AVB 26

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.
Depress the “menu" key to continue navigating through the “HH" menus.

Channel 3

This channel is not used and "---" will be displayed.

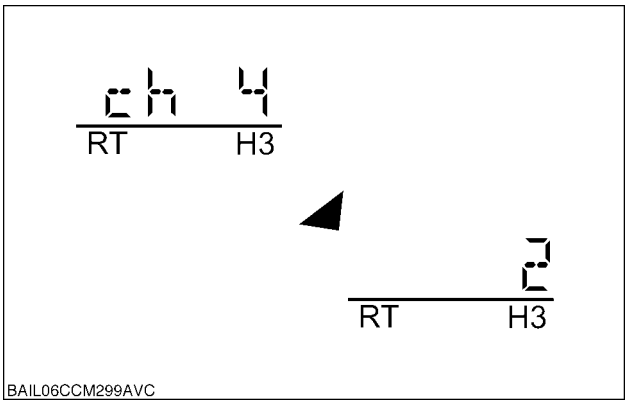
Channel 4 - Number of EHR Setup

When a new module is installed or the H8 procedure is completed, automatic detection for the number of remotes is used. If at any time the number of fitted remotes needs to be changed then this setup channel is used.

Scroll through the available options using the navigation “up" or “down" key.

The options available are:

- 2
- 3
- 4



BAIL06CCM299AVC 27

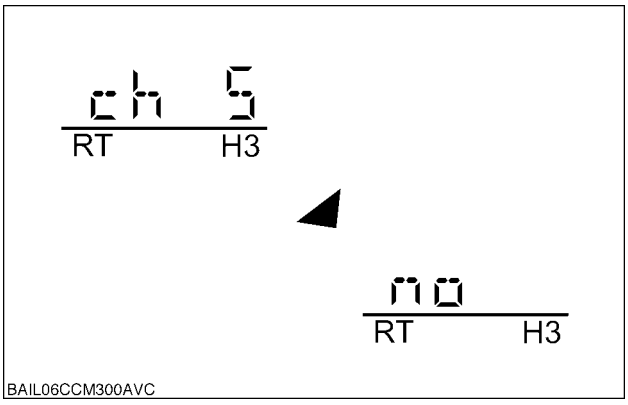
To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.
Depress the “menu" key to continue navigating through the “HH" menus.

Channel 5 - High Flow Pump Selection

This channel is used to disable/enable the high flow pump.
Scroll through the available options using the navigation “up" or “down" key.

The options available are:

- Yes - Enable high flow pump
- No - Disable high flow pump



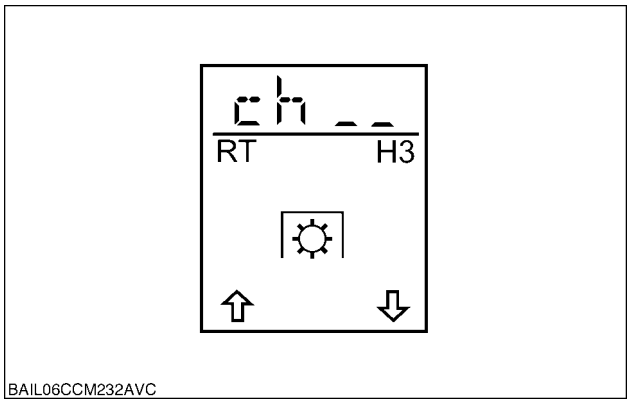
BAIL06CCM300AVC 28

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the “menu" key to continue navigating through the “HH" menus.

REAR PTO OPTIONS

Select the Rear PTO sub-system by depressing the “menu" key.
The upper section of the display will display “ch _ _".



BAIL06CCM232AVC 29

The required channel can be selected by using the navigation “up" and “down" keys (see the table below for the description of each channel).

Channel	Description
Ch 1	Not used
Ch 2	PTO fender switches selection
Ch 3	PTO drop out speed selection
Ch 4	Electronic shiftable PTO option

Channel 1 - Not used

This channel is not used and "---" will be displayed.

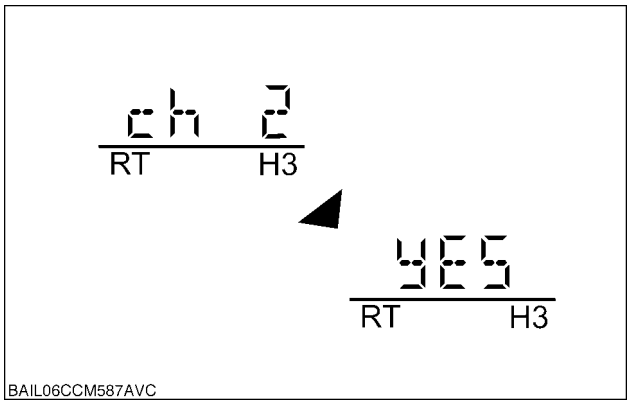
Channel 2 - PTO Fender Switches Selection

This channel is used to disable/enable the rear PTO fender switch.
Scroll through the available options using the navigation “up" or “down" key

The options available are:

- YES - Enable rear PTO fender switches
- NO - Disable rear PTO fender switches

If the vehicle is fitted with external rear fender PTO switches then this option must be setup before the PTO is calibrated.



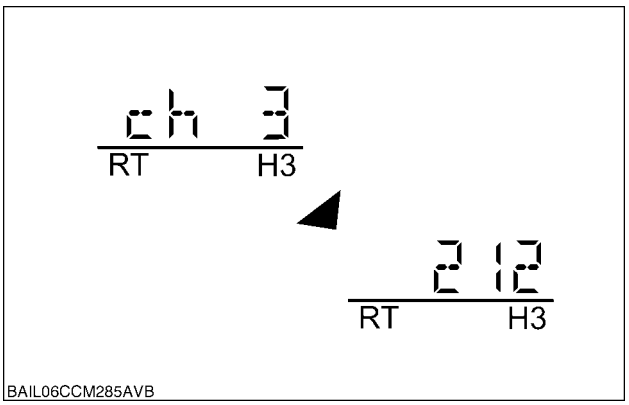
BAIL06CCM587AVC 30

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the “menu" key to continue navigating through the “HH" menus.

Channel 3 - PTO Drop Out Speed Selection

This channel is used to adjust the engine speed below which the PTO will drop out.
After a delay the current setting will be displayed.



BAIL06CCM285AVB 31

Use the navigation "up" and "down" keys to increase or decrease the setting in **10 RPM** increments between **0 - 550 RPM**.
To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.
The default value on a new module or after an H8 operation is **0 RPM**.
Depress the “menu" key to continue navigating through the “HH" menus.

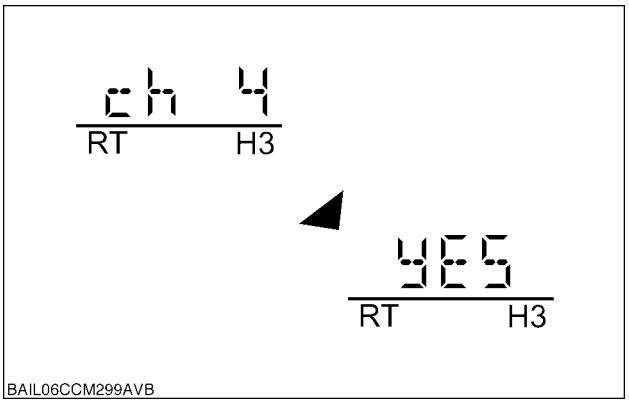
Channel 4- Electronic shiftable PTO option

This channel is used to select the electronic shiftable PTO if fitted to the vehicle.
Scroll through the available options using the navigation “up" or “down" key

The options available are:

- YES - Electronic shiftable PTO fitted
- NO - Electronic shiftable PTO not fitted

The default value is "YES".



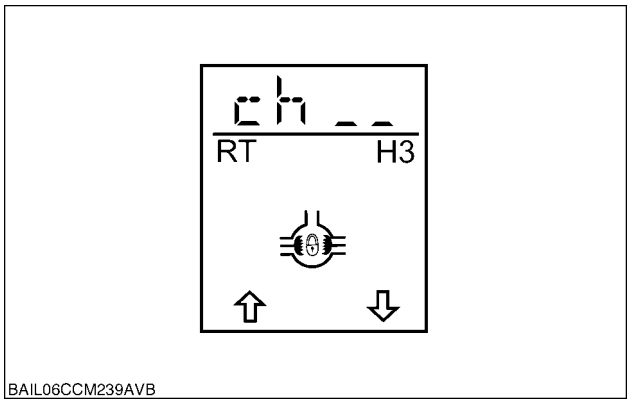
BAIL06CCM299AVB 32

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the “menu" key to continue navigating through the “HH" menus.

DIFFERENTIAL LOCK AND FOUR WHEEL DRIVE OPTIONS

Select the differential lock and four wheel drive sub-system by depressing the “menu" key.
The upper section of the display will display “ch _ _".



BAIL06CCM239AVB 33

The required channel can be selected by using the navigation “up" and “down" keys (see the table below for the description of each channel).

Channel	Description
Ch 1	Not used
Ch 2	Not used
Ch 3	Front axle angles
Ch 4	Four wheel drive brake engagement speed selection

Channel 1 - Not used

This channel is not used and "---" will be displayed.

Channel 2- Not used

This channel is not used and "---" will be displayed.

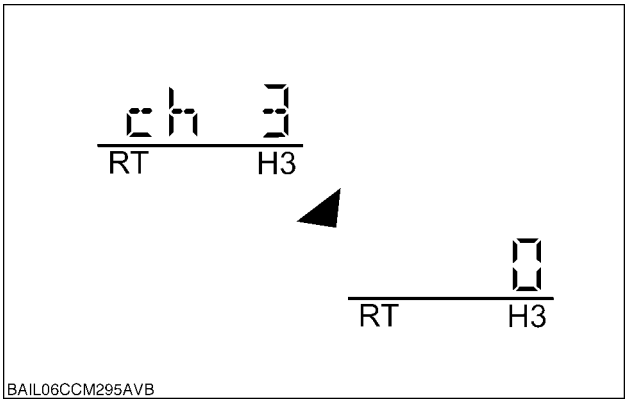
Channel 3 - Front Axle Angles

This channel is used to select the steering angle at which the Auto Difflock and Auto Four Wheel Drive functions engage and disengage.

Scroll through the available options using the navigation “up" or “down" key.
The available options (0, 1, 2 or 3) are shown in the table below with a description of each option.

Standard Axle

	0 - 10 km/h	**0 - 10 km/h**	**0 - 10 km/h**	**0 - 10 km/h**	**10 - 15 km/h**	**10 - 15 km/h**	**10 - 20 km/h**	**10 - 20 km/h**
	Auto Four Wheel Drive	**Auto Four Wheel Drive**	**Auto Difflock**	**Auto Difflock**	**Auto Difflock**	**Auto Difflock**	**Auto Four Wheel Drive**	**Auto Four Wheel Drive**
	Degrees Right	**Degrees Left**	**Degrees Right**	**Degrees Left**	**Degrees Right**	**Degrees Left**	**Degrees Right**	**Degrees Left**
Option 0	**20 °**	**18.5 °**	**15 °**	**14.25 °**	**10 °**	**9.5 °**	**15 °**	**14.2 °**
Option 1	**45 °**	**37.5 °**	**20 °**	**18.5 °**	**10 °**	**9.5 °**	**40 °**	**34 °**
Option 2	**15 °**	**14.2 °**	**10 °**	**9.5 °**	**10 °**	**9.5 °**	**15 °**	**14.2 °**
Option 3	**11.7 °**	**10.9 °**	**5 °**	**4.5 °**	**10 °**	**9.5 °**	**15 °**	**14.2 °**



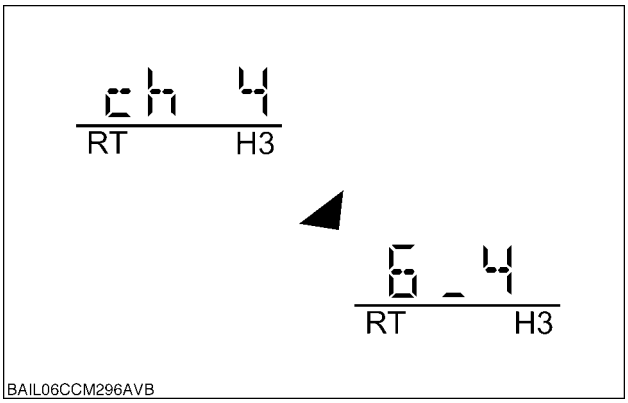
BAIL06CCM295AVB 34

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.
Depress the “menu" key to continue navigating through the “HH" menus.

Channel 4 - Four Wheel Drive Brake Engagement Speed Selection

This channel is used to select the ground speed below which four wheel drive braking will not occur.
Scroll through the available options using the navigation “up" or “down" key.
The available options (0, 1, 2, 3 or 4) are shown in the table below with a description of each option.

	Option 4	Option 3	Option 2	Option 1	Option 0
Four wheel braking engagement, if wheel speed is greater than or equal to:	Default **6.4 Km/h**.	**4.8 Km/h**.	**3.2 Km/h**.	**1.6 Km/h**.	**0 Km/h**.



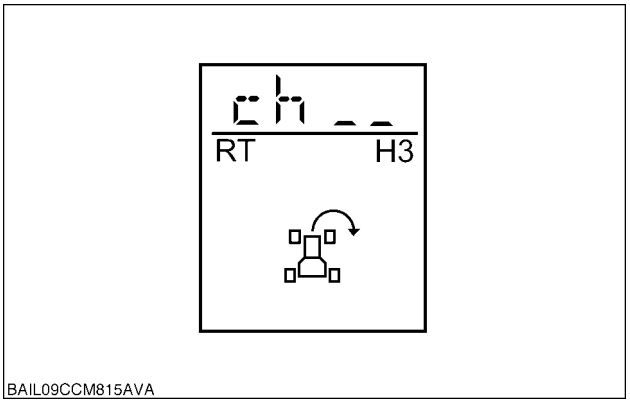
BAIL06CCM296AVB 35

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.
Depress the “menu" key to continue navigating through the “HH" menus.

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HEADLAND MANAGEMENT CONTROL (HMC) OPTIONS.

Press the Menu button to call up the 'HMC' sub-system.
"ch _ _" is displayed in the upper section of the display.



BAIL09CCM815AVA 36

The relevant channel can be called up using the "Up" and "Down" navigation buttons. (The individual channels are described in the following table).

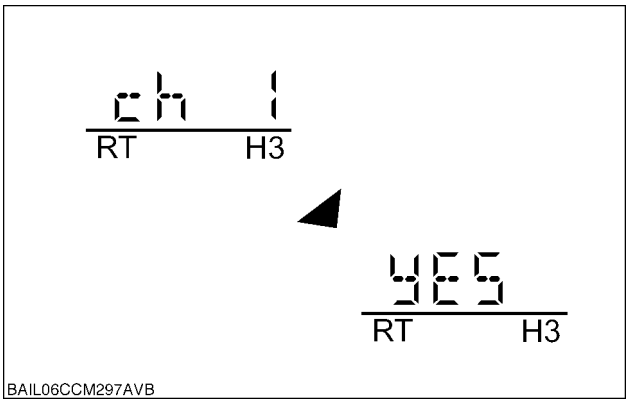
Channel	Description
Channel 1	HMC option selection

Channel 1 - HMC option selection.

This channel is used to activate or deactivate the HMC.
Scroll through the available options using the "Up" or "Down" navigation button.

The available options are:

- YES - HMC activate
- NO - HMC deactivate



BAIL06CCM297AVB 37

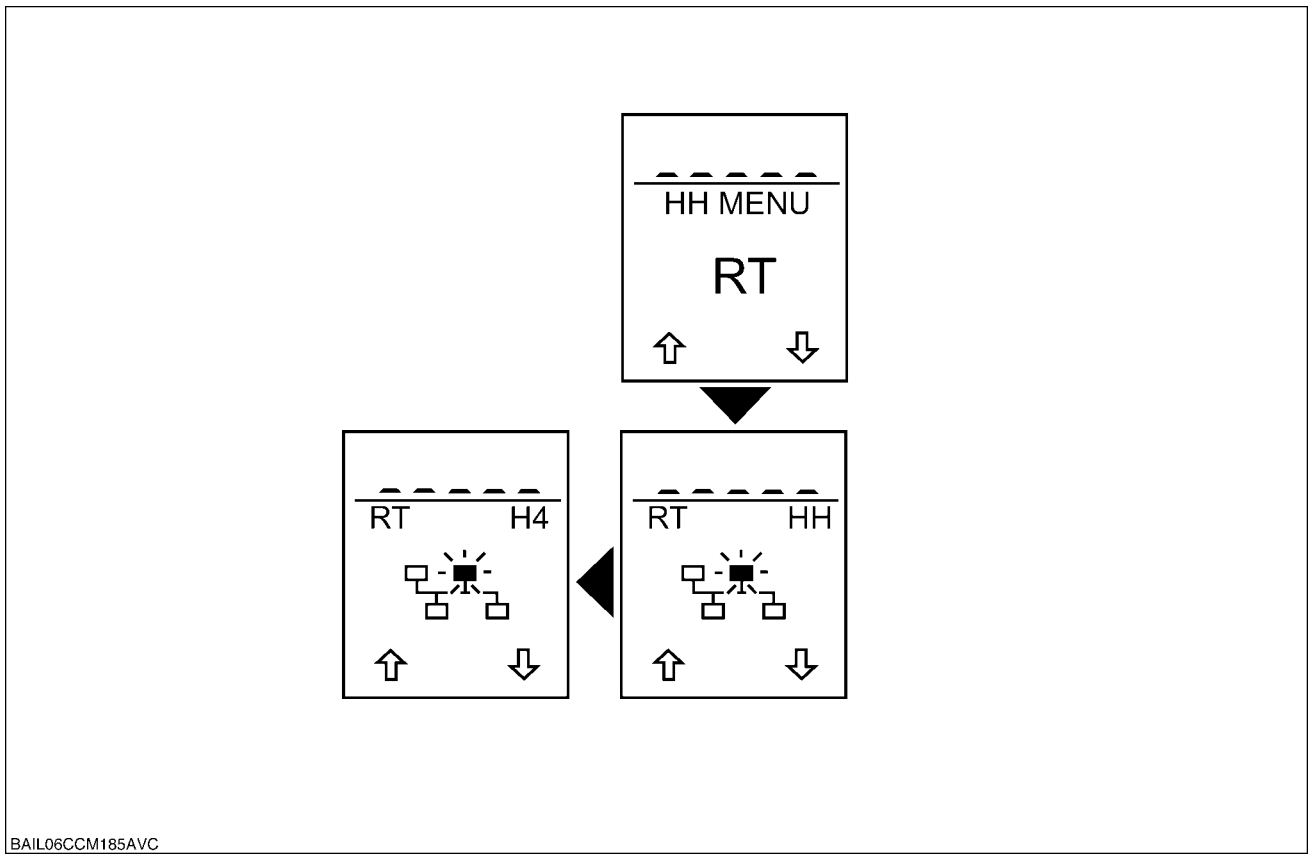
To store the desired option, press and hold the "Up" or "Down" navigation button until the instrument cluster indicates by a beep that the selection has been stored.

To use the "HH" menu further, press the Menu button.

H4 - VIEW SOFTWARE REVISION LEVEL

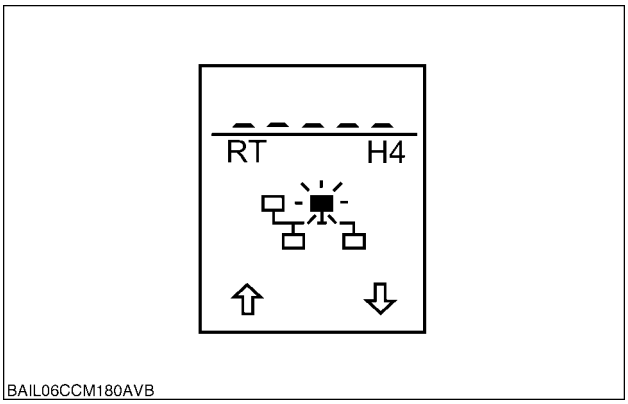
Common to all sub-systems.

H4 Menu Screen Select Diagram



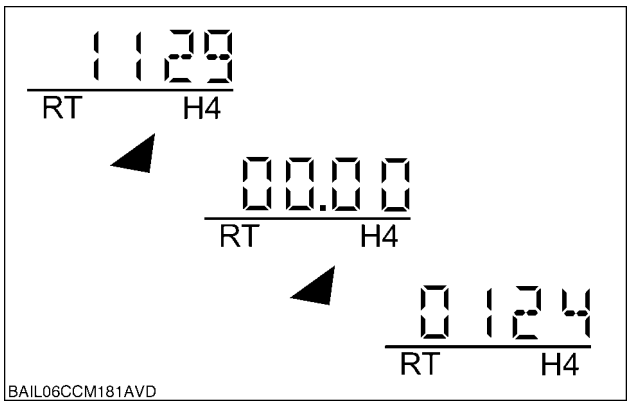
BAIL06CCM185AVC 38

Select the H4 menu by depressing the "menu" key.



BAIL06CCM180AVB 39

The upper section of the display will automatically cycle through the software release, as the example shown and return to allow navigation of the "HH" menus.

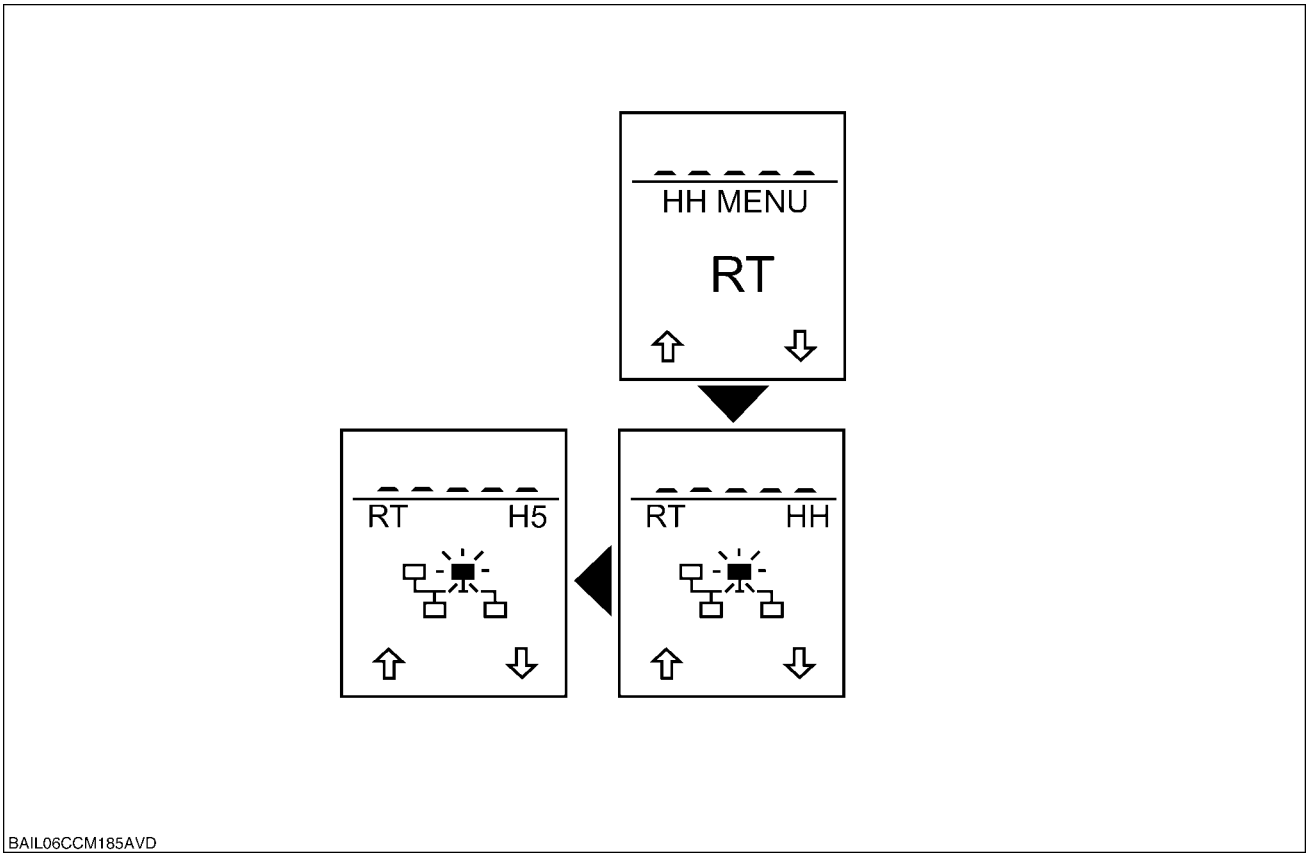


BAIL06CCM181AVD 40

H5 - SWITCH OPERATION TEST

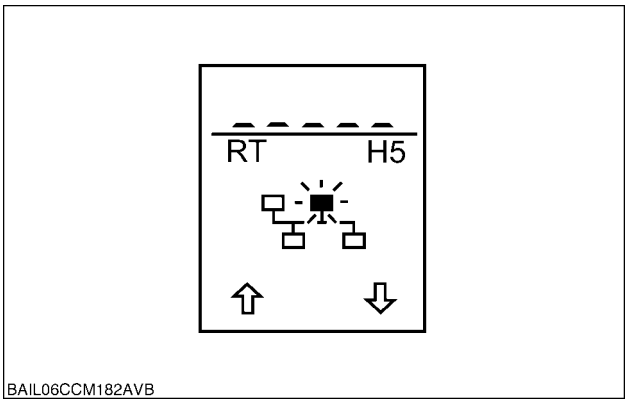
This menu displays a designated code when a switch transition is detected.
Common to all sub-systems.

H5 Menu Screen Select Diagram



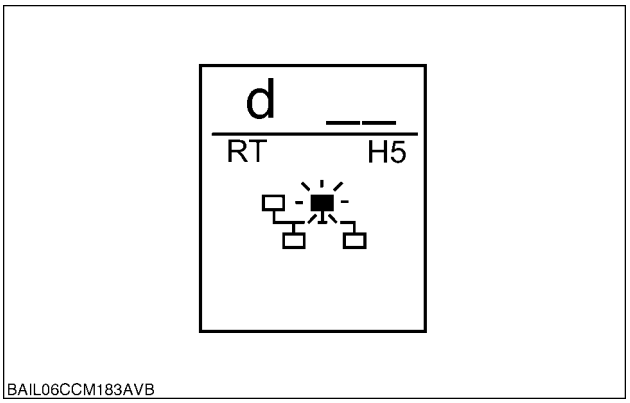
BAIL06CCM185AVD 41

Select the H5 menu by depressing the "menu" key.



BAIL06CCM182AVB 42

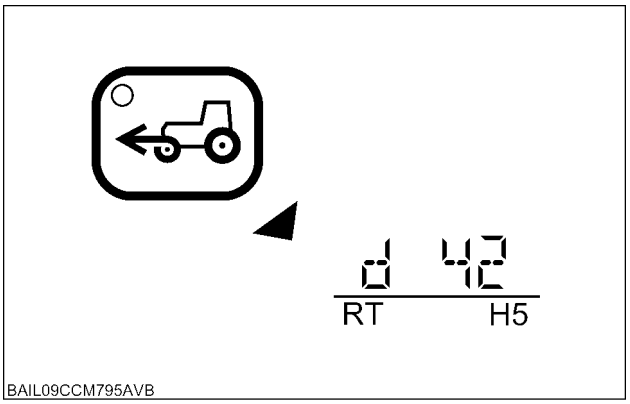
The upper section of the display will display "d _ _"



BAIL06CCM183AVB 43

When a switch is operated, a code will be displayed and an audible tone should be heard to indicate the correct function.
If a switch code is not displayed and the audible tone not heard, a 'wiggle' test can be performed on the related wiring, while watching the display or listening for the audible tone, to help locate the fault.

NOTE: *If the keystart switch is turned to the "crank" position, with the shuttle lever in neutral and the clutch pedal down, a switch disagreement error may occur.*



BAIL09CCM795AVB 44

Channel	Control unit plug connection	Pin number	Description
d0	**-**	**-**	**No switch activated or two switches activated at the same time**
d1	CN1B	30	Rear control switch for the EDC - Lower
d2	CN1B	29	Rear control switch for the EDC - Raise
d5	via CAN	-	EDC work switch (on hand controller)
d6	via CAN	-	EDC raise switch (on hand controller)
d7	CN3A	15	Connection of the NASO lighting (disconnect and reconnect the flasher unit)
d8	CN1B	21	Crank detect switch
d10	CN4	9	Seat switch
d11	CN4	10	Parking brake switch
d12	CN1B	22	Left brake pedal switch
d13	CN1B	23	Right brake pedal switch
d14	CN1A	8	Clutch pedal switch (engine running and transmission in forward or reverse)
d15	CN1B	12	Switch for the shuttle lever - Forwards
d16	CN1B	13	Switch for the shuttle lever - Reverse
d17	via CAN	-	Transmission downshift switch (on hand controller)
d18	via CAN	-	Transmission upshift switch (on hand controller)
d19	via CAN	-	Transmission range shift switch (on hand controller)

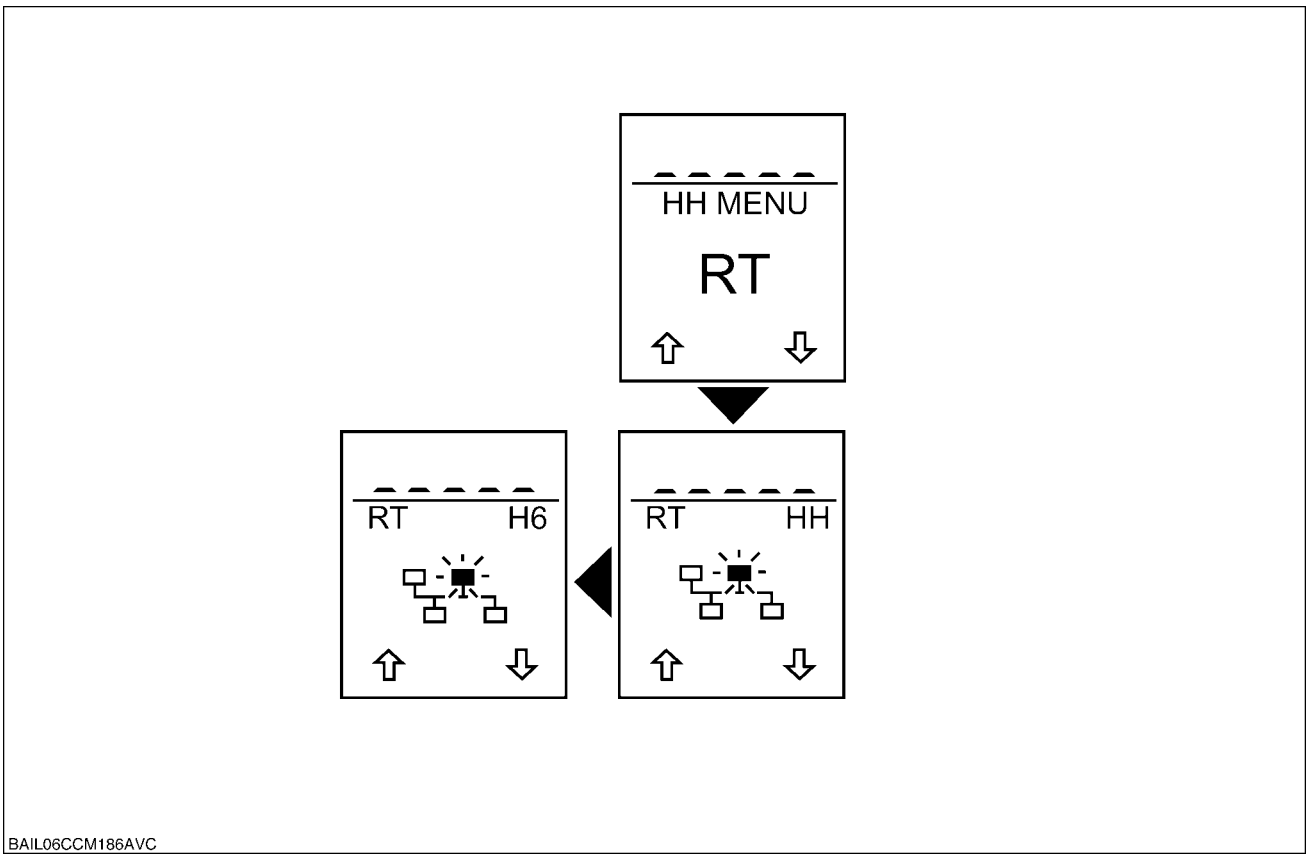
Channel	Control unit plug connection	Pin number	Description
d0	**-**	**-**	**No switch activated or two switches activated at the same time**
d20	CN4	17	Reverse clutch pressure switch
d21	CN4	11	Forward clutch pressure switch
d23	CN1B	27	Momentary shuttle lever forward/reverse switch
d24	CN4	16	Momentary shuttle lever neutral switch
d31	CN3A	14	Air conditioning pressure switch (bridge switch to test with engine off)
d32	CN3A	17	EDC lock switch
d33	CN1B	19	Radar present input (disconnect radar to test)
d38	via CAN	-	Differential lock switch - Manual
d39	via CAN	-	Differential lock switch - Automatic
d41	via CAN	-	All-wheel drive switch - Manual
d42	via CAN	-	All-wheel drive switch - Automatic
d44	CN3A	12	Rear PTO switch - normally open
d45	CN3A	13	Rear PTO switch - normally closed
d46	CN4	24	Hi flow pump not present input
d47	CN3B	24	Switch for rear PTO brake
d48	CN3B	33	Ground speed PTO switch
d49	via CAN	-	Rear PTO switch - management
d50	via CAN	-	HTS switch record mode
d53	CN1B	24	Transmission oil pressure switch (bridge switch to test with engine off)
d55	via CAN	-	Engine speed switch - decrease
d56	via CAN	-	Engine speed switch - Increase
d60	CN3B	32	Foot throttle not at idle switch
d63	CN3A	18	Fender switch of the rear PTO - normally open
d64	CN3A	3	Fender switch of the rear PTO - normally closed
d80	via CAN	-	HMC AUTO switch
d81	via CAN	-	HMC Manual switch
d93	CN4	25	Front HPL present link (disconnect and reconnect the 13-way connector)
d94	CN3A	16	EHR lock switch
d95	via CAN	-	EHR 1 program/motor mode switch
d96	via CAN	-	EHR 2 program/motor mode switch
d97	via CAN	-	EHR 3 program/motor mode switch
d98	via CAN	-	EHR 4 program/motor mode switch
d104	via CAN	-	HMC step switch on hand controller
d111	CN3A	20	PTO speed select switch - speed 1 (1000)
d112	CN4	18	PTO speed select switch - speed 2 (1000E)
d113	CN4	4	PTO speed select switch - neutral
d122	via CAN	-	CRPM speed 1 selection switch
d123	via CAN	-	CRPM speed 2 selection switch
d125	via CAN	-	Auto guidance engage on/off switch (on ICP)
d126	via CAN	-	Engine brake pedal switch
d127	via CAN	-	Reversible fan switch
d136	via CAN	-	Forward switch (on hand controller)
d137	via CAN	-	Reverse switch (on hand controller)
d139	via CAN	-	Joystick EHR select switch
d159	via CAN	-	EHR flow encoder switch
d165	via CAN	-	EHR float control switch
d180	via CAN	-	EHR 2 extend switch (on hand controller)
d181	via CAN	-	EHR 2 retract switch (on hand controller)
d185	via CAN	-	Rear slip switch

Channel	Control unit plug connection	Pin number	Description
d0	**-**	**-**	**No switch activated or two switches activated at the same time**
d186	via CAN	-	Ride control switch
d187	via CAN	-	Rear hitch inching raise switch
d188	via CAN	-	Rear hitch inching lower switch
d196	via CAN	-	Auto field switch (on ICP)
d197	via CAN	-	Auto transport switch (On ICP)

CN1a = **X092**
CN1b = **X093**
CN2 = **X091**
CN3a = **X094**
CN3b = **X095**
CN4 = **X097**

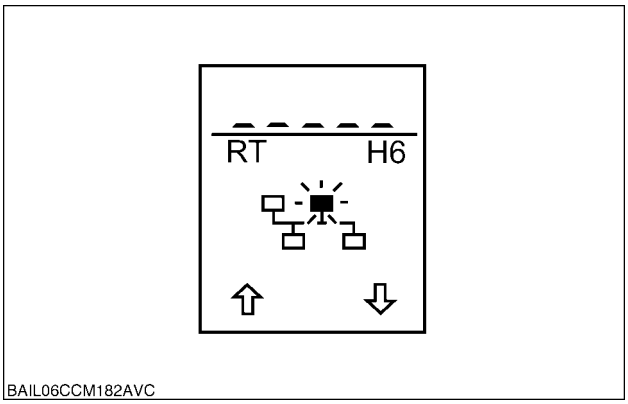
H6 - VEHICLE INFORMATION VIEW

H6 Menu Screen Select Diagram



BAIL06CCM186AVC 45

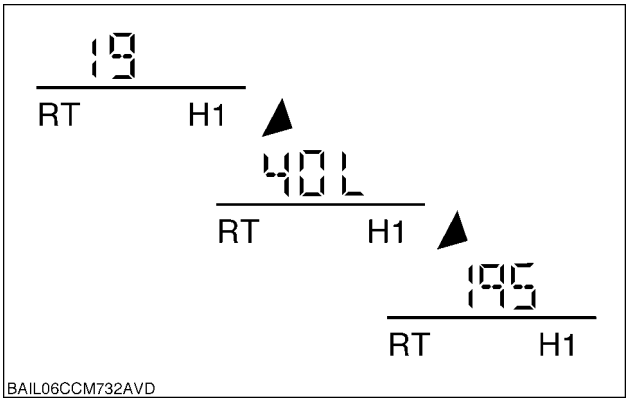
Select the H6 menu by depressing the "menu" key.



BAIL06CCM182AVC 46

The upper section of the display will automatically cycle through as the example:

- 19 = Number of gears
- 40L = Transmission speed
- 195 = Engine power



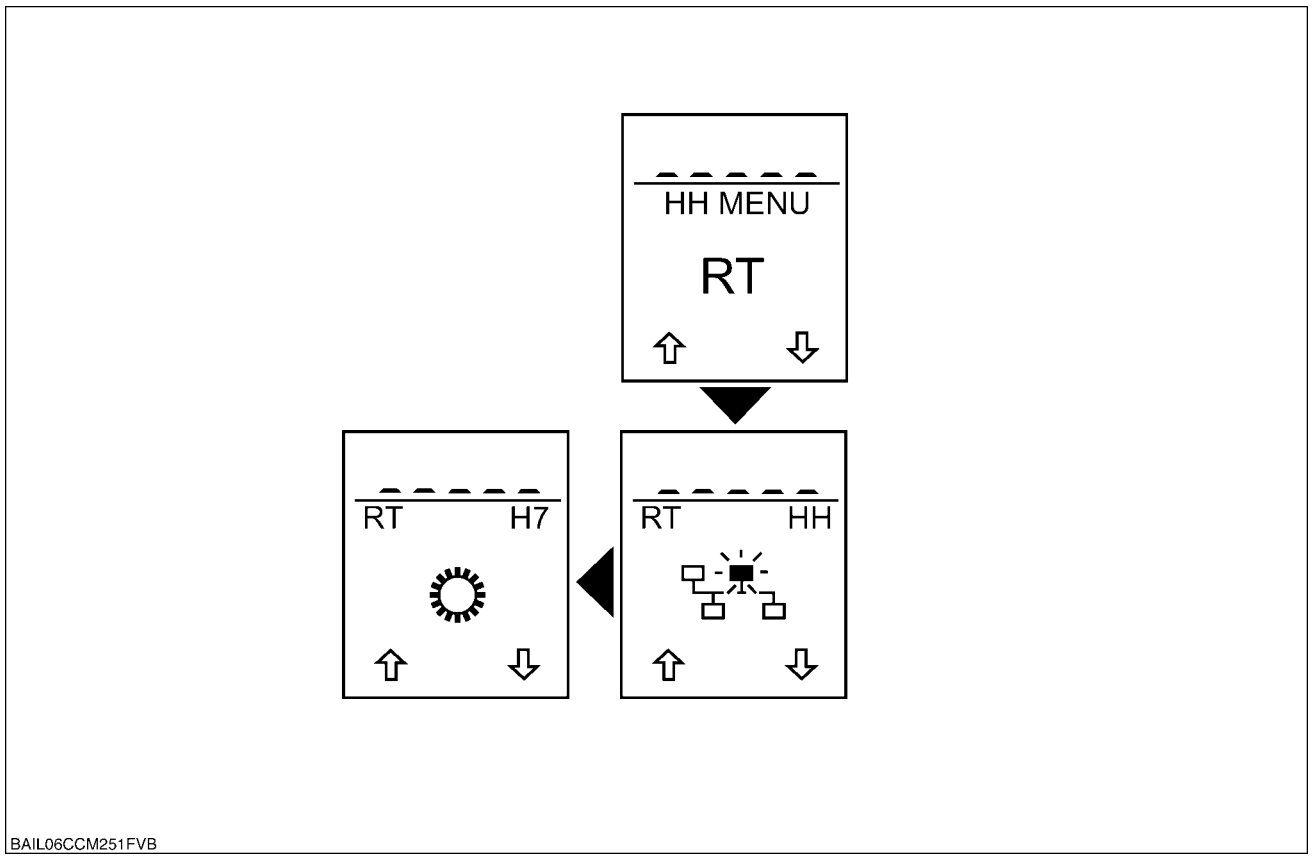
BAIL06CCM732AVD 47

At the end of the cycle the display will return to continue navigating through the “HH" menus.

H7 - TEST MODES

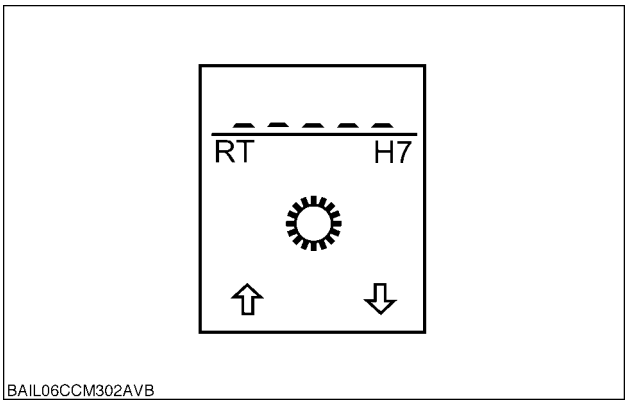
This menu is used to carry out various transmission tests and adjustments.

H7 Menu Screen Select Diagram



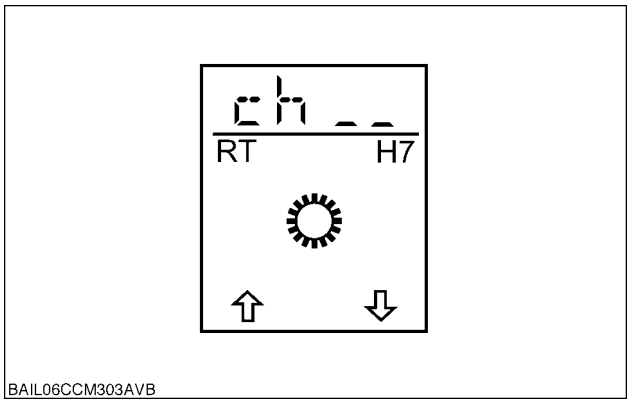
BAIL06CCM251FVB 48

Select the H7 menu by depressing the "menu" key.



BAIL06CCM302AVB 49

The upper section of the display will display "ch _ _"



BAIL06CCM303AVB 50

The required channel can be selected by using the navigation “up" and “down" keys (see the table below for the description of each channel).

Channel	Description
Ch 1	Clutch disconnect switch test
Ch 2	Manual clutch adjustment
Ch 3	Manual quick fill adjustment
Ch 4	Clutch pressure test
Ch 5	Clutch switch adjustment
Ch 6	Self bed in of clutches

Channel 1 - Clutch Disconnect Switch Test

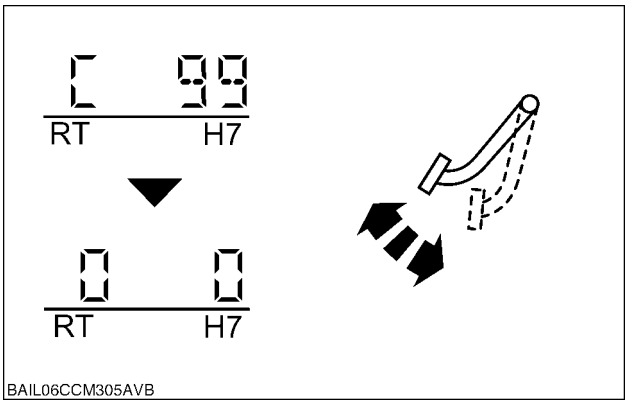
This channel is used to display the clutch pedal position and status. In addition it also displays the oil temperature.

The clutch position is shown as a percentage of travel between (99-0):

- 99 = Clutch pedal is fully up
- 0 = Clutch pedal is fully down

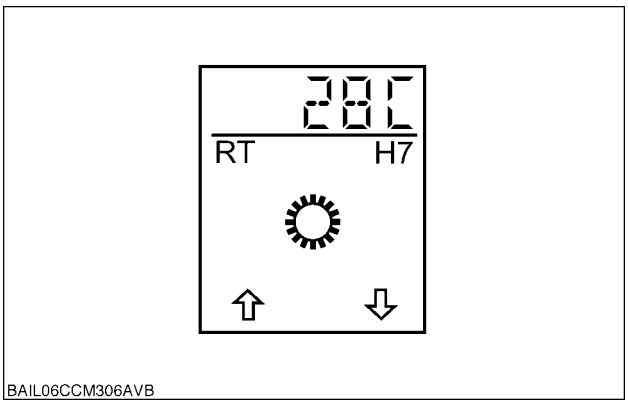
The clutch position is also shown as in it's switch state:

- O = Clutch pedal switch is open
- C = Clutch pedal switch is closed



BAIL06CCM305AVB 51

If the clutch pedal has been left in the fully up position for more than 5 seconds, the oil temperature will be displayed in the upper section of the display.



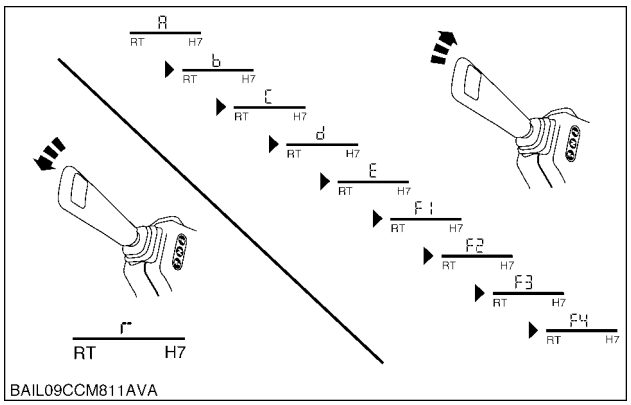
BAIL06CCM306AVB 52

Depress the "menu" key to continue navigating through the "HH" menus.

Channel 2 - Manual clutch adjustment

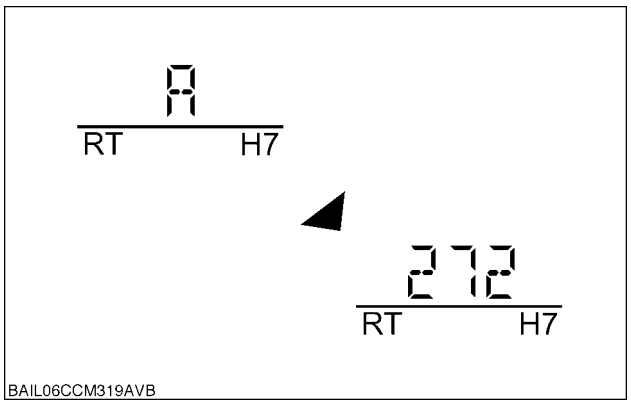
This channel is used to manually test and adjust the calibration values for each clutch.

Select the clutch to be set by depressing the clutch pedal and engaging the shuttle lever.
By engaging the shuttle lever in Forwards, the clutches A to F4 may be engaged. Moving the shuttle lever from Neutral to Forward will cycle through the clutches A to F4.
By engaging the shuttle lever in Reverse, the reverse clutch is selected.



BAIL09CCM811AVA 53

After a delay, the currently stored value for the selected clutch is displayed on the upper section of the display.



BAIL06CCM319AVB 54

The calibration values can be altered using the Upshift and Downshift buttons.
To check the calibration, move the shuttle lever out of the Neutral position and release the clutch pedal completely. Two clutches are subjected to low pressure to create torque through the transmission. Then the set clutch is pressurised up to the value at which it reaches the biting point and begins to engage.
To test the same clutch again, depress the clutch pedal a little and then release again.

Channel 3 - Manual quick fill adjustment

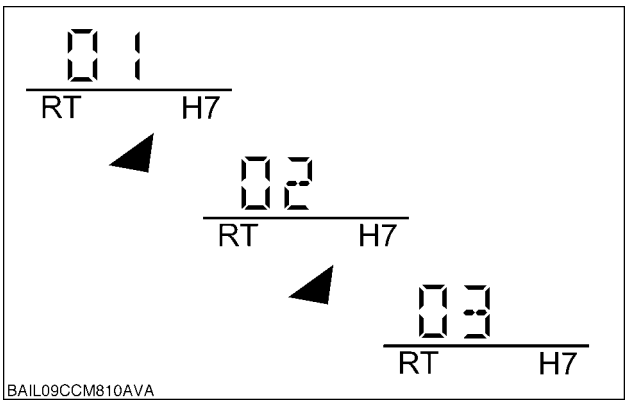
This channel is used to adjust and test the quick fill settings for each clutch.

The quick fill settings can be tested in one of three ways.

The quick fill test methods are:

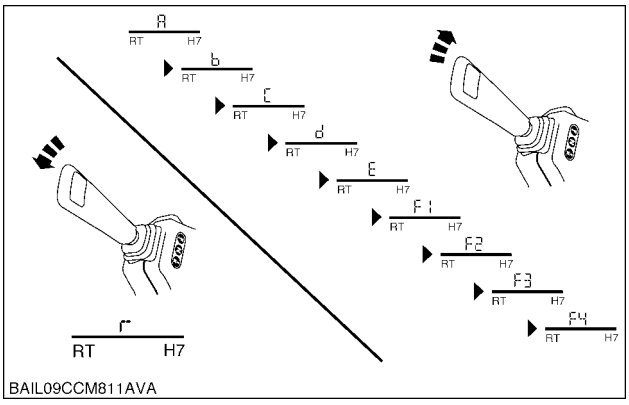
1. Two clutches are subjected to low pressure to create a torque through the transmission. The clutch being tested is subjected to its CAL_P_NOM pressure.
2. One clutch is subjected to low pressure, a second clutch is subjected to low pressure together with the clutch, which is to be set to its CAL_P_NOM pressure.
3. Two clutches are subjected to low pressure and at the same time, the CAL_P_NOM pressure is applied to the clutch being calibrated.

To select the test method, with the shuttle lever in Neutral, depress the clutch pedal and scroll through the options using the Upshift button.



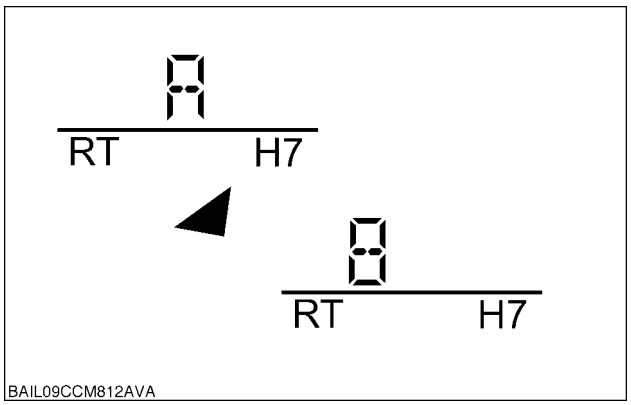
BAIL09CCM810AVA 55

Select the clutch to be set by depressing the clutch pedal and engaging the shuttle lever.
By engaging the shuttle lever in Forwards, the clutches A to F4 may be engaged. Moving the shuttle lever from Neutral to Forward will cycle through the clutches A to F4.
By engaging the shuttle lever in Reverse, the reverse clutch is selected.



BAIL09CCM811AVA 56

After a delay, the code for the clutch solenoid valve and then the currently stored value are displayed.



BAIL09CCM812AVA 57

To adjust the setting, move the shuttle lever to Neutral, release the clutch pedal and press the Upshift or Downshift button, until the desired setting appears.
To use the "HH" menu further, press the Menu button.

Channel 4 - Clutch pressure test

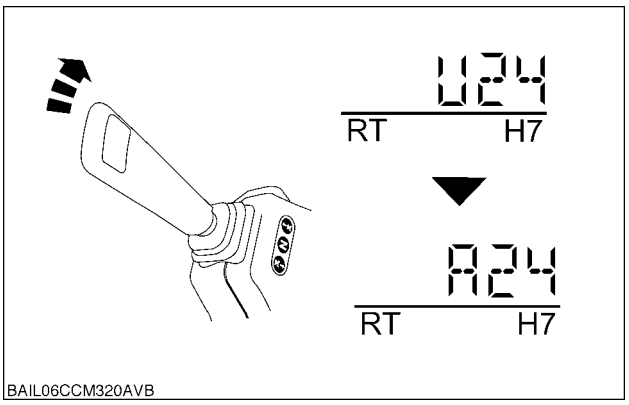
This channel is used to test the pressure of the individual clutches.

Place the shuttle lever in the Forwards position.

The following is displayed in the upper display:

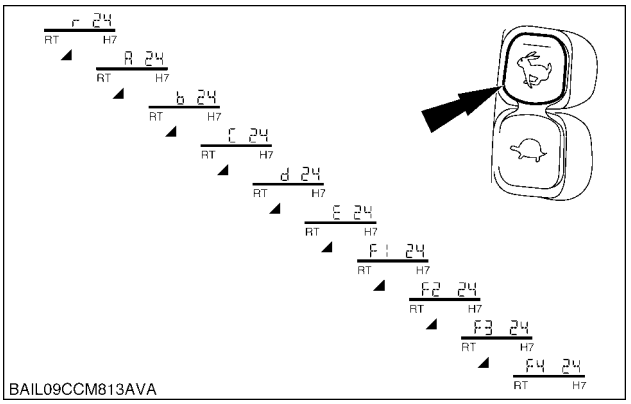
- U23 = Neutral position
- A24 = Forward

The parking brake must be ON, or the fault code 'U20' is shown on the display.



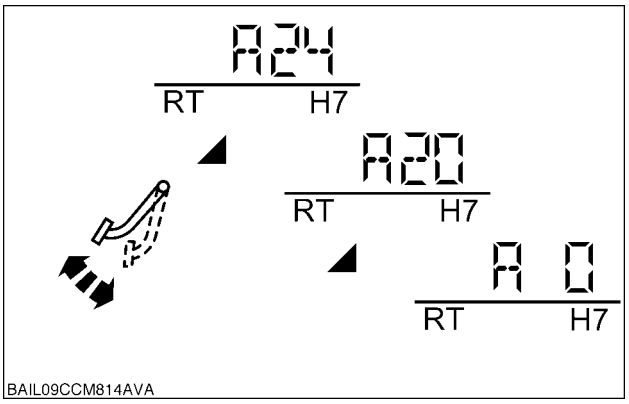
BAIL06CCM320AVB 58

Select the clutch to be tested by pressing the Upshift button.



BAIL09CCM813AVA 59

If the clutch pedal is operated from the upper limit, the upper section of the display displays 'A24' and then 'A20' backwards to 'A0'.



BAIL09CCM814AVA 60

If the clutch pedal position is lower than **30 %**, then the pressure value is set to zero.
With a pedal position of **30 %** the clutch pressure is set to **1 bar** and rises linearly to **20 bar** as soon as the clutch pedal is moved up to **75 %**.
Above **75 %** of the clutch pedal travel, the pressure is set to the maximum pressure of **24 bar**.

Press and hold the Downshift button to switch on the power supply to the clutch solenoid valve.

Channel 5- Clutch Switch Adjustment

This channel is an alternative to channel 1 for adjusting the clutch switch. The transmission is enabled in this state.

Place the shuttle lever into the forward position The display will show ’n’ if the lever is in neutral.

- When the display shows "CP", cycle the clutch pedal.
- When the clutch pedal is released the display will show a value in the range 8-14, if the switch is correctly adjusted.
- If the switch is incorrectly adjusted the display will show "CL" and the screw will need to be rotated clockwise, or the display will show "CCL" and the screw will need to be rotated in an anti-clockwise direction.

Adjust the screw in the direction indicated by the display and cycle the clutch pedal and repeat the procedure until the display shows the correct value.

Channel 6 - Self Bed In Of Clutches

This channel is used for the self bed in of the transmission clutches.

Start the machine, leave the shuttle lever in the neutral position, engage the parking brake, set the engine to any suitable speed, disengage the PTO, release the clutch pedal, disengage the creeper and select any gear other than 19th.

- Press the downshift button on the hand controller to start the procedure.
- Press the upshift button on the hand controller to finish the procedure.

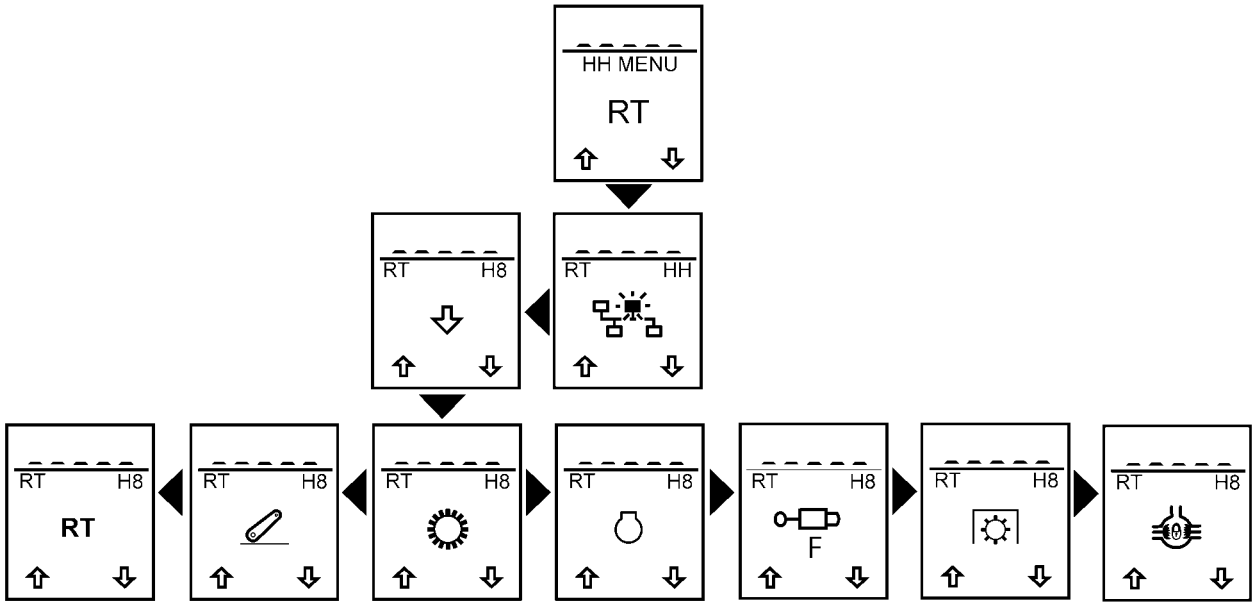
H8 - CLEAR ELECTRICAL ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM)

This menu clears calibration values and stored error codes by resetting all EEPROM values back to default. EEPROM is where all calibration values and error codes are stored. This memory is retained even if there is no power to the controller, i.e. if the battery is disconnected.

NOTE: *H8 will not change the configuration settings. The H3 menu mode must be used for this.*

NOTE: *To erase only the stored error codes and not affect the calibration data use the HC menu mode.*

H8 Menu Screen Select Diagram

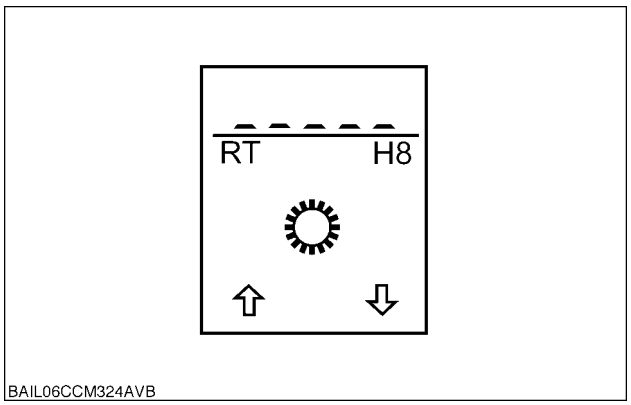


BAIL06CCM307FVC

BAIL06CCM307FVC 61

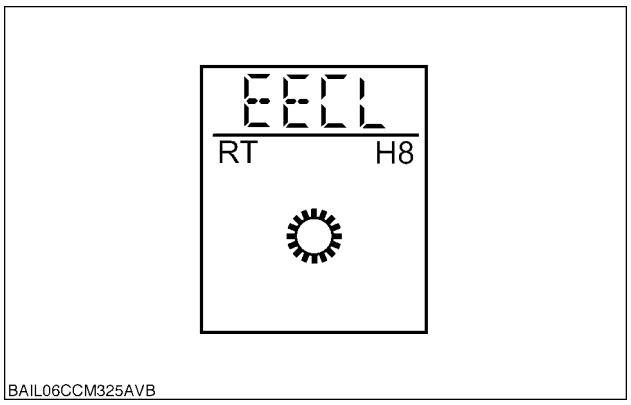
IMPORTANT: *By selecting the screen display with the controller identifier "RT" displayed will reset the EEPROM in all the sub-systems.*

If only a specific sub-system EEPROM requires to be reset, select the sub-system that requires the EEPROM to be reset by depressing the "menu" key, as the example shown.



BAIL06CCM324AVB 62

The upper section of the display will display “EECL" .



BAIL06CCM325AVB 63

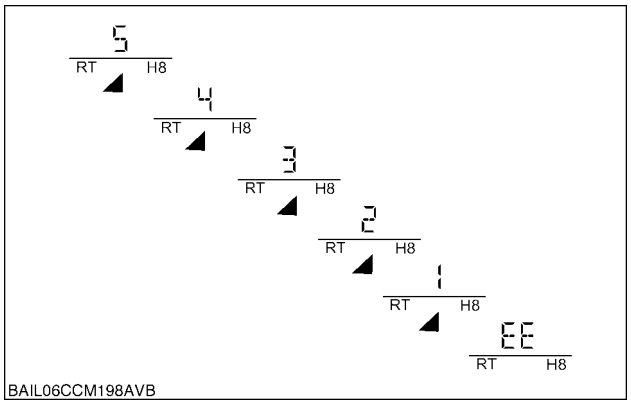
⚠ CAUTION ⚠

H8 will clear all calibrations values and stored error codes.

B006

NOTE: *If the navigation “down" key is released before the countdown finishes, the procedure will be aborted.*

Depress and hold the navigation “down" key to confirm the resetting of the EEPROM.
The upper section of the display will countdown from 5 to 1, then “EE" will be displayed to indicate the EEPROM has been cleared.
Turn the keystart OFF.



BAIL06CCM198AVB 64

NOTE: *If the "down" key is released before the countdown finishes, the procedure will be aborted.*

Turn the keystart OFF.

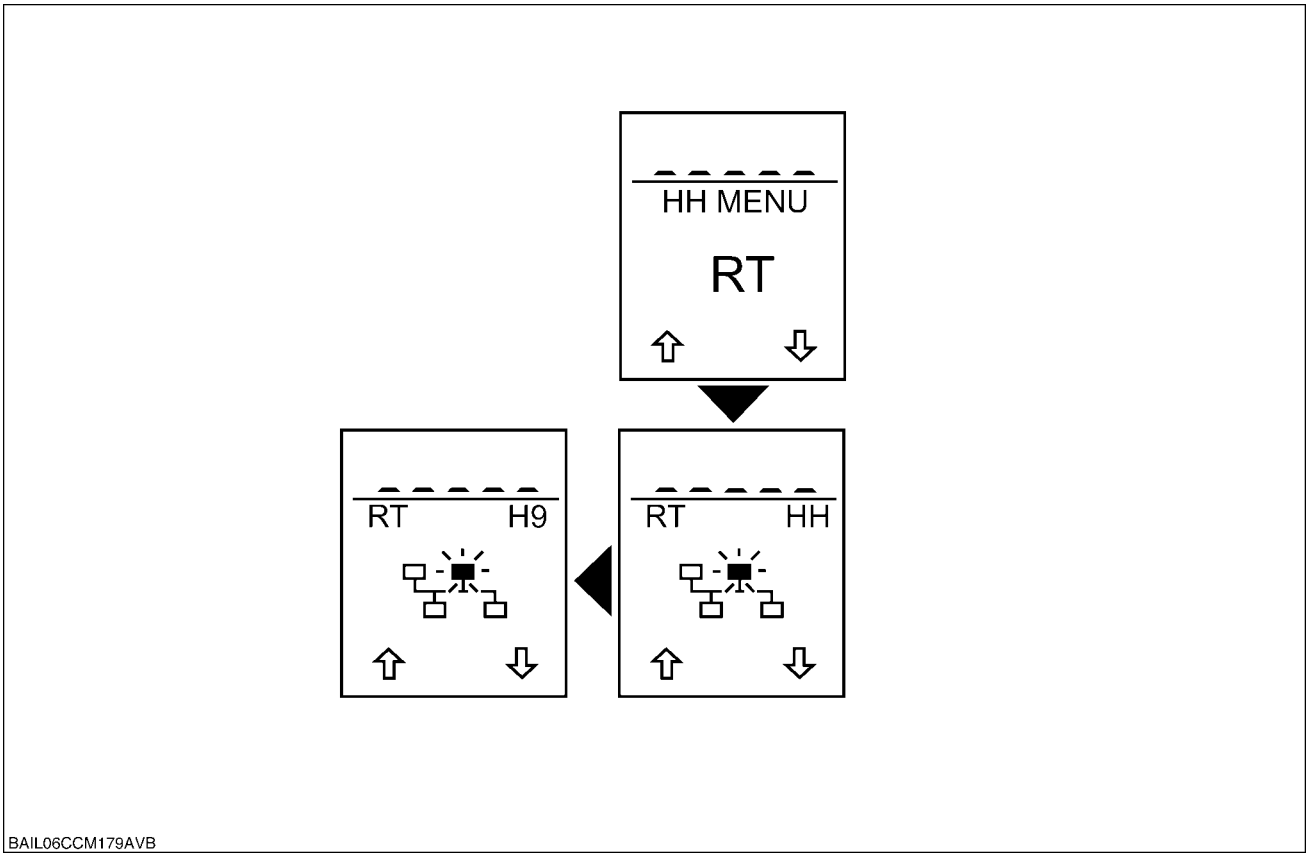
H9 - VOLTMETER

This menu is used to verify the operation of various potentiometers, voltage supplies, and solenoid current circuits. If an intermittent fault is detected within a circuit, a 'wiggle' test can be performed on the related wiring while watching the display for sudden changes in values, to help locate the area where the fault exists.

NOTE: *The vehicle may be driven while in this menu.*

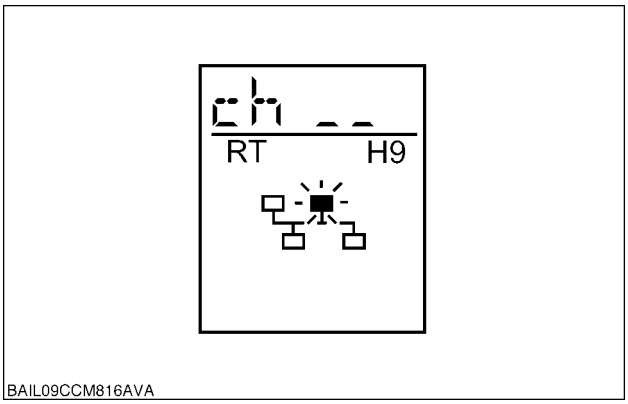
Common to all sub-systems.

H9 Menu Screen Select Diagram



BAIL06CCM179AVB 65

Select the H9 menu by depressing the "menu" key.
The upper section of the display will display "ch _ _"



BAIL09CCM816AVA 66

The required channel can be selected by using the navigation "up" and "down" keys.
After a delay the value will be displayed. Compare the value displayed with the typical reading shown in the table below.

NOTE: *The value is the input voltage or signal into the controller. This cannot be directly translated into a voltage due to the internal processes of the controller. A zero equates to* ***0 volts****.*

If the value displayed varies by more than **10 %** to that shown in the table below, a fault is indicated in either the component or the wiring harness relevant to that channel.

NOTE: *Check the connectors of the effected circuit, including the controller connectors, prior to replacing any components.*

Channel	Description	Control module connector and pin	Standard value	Comments
1	Clutch pedal position	CN4-20	76 Not depressed 29 Depressed	
2	Transmission temperature sensor	CN1B-14	**75 %** at **40 °C**.	
3	Fuse 38 sense line	CN1B-11	99	
5	**+5 Volt** voltage supply to the sensors	CN1B-16	48	
6	**+8 Volt** voltage supply to the sensors	CN1B-25	79	
7	**+12 Volt** VF input signal (see explanation below)	CN1A-1	43	
8	**+12 Volt** VD input signal (see explanation below)	CN1A-8	43	Shuttle lever in forward or reverse position
9	**+12 Volt** VH input signal (see explanation below)	CN1A-20	43	
10	**+12 Volt** VT input signal (see explanation below)	CN3B-24	43	
11	Seat switch	CN4-9	69 in seat 36 not in seat	
12	Transmission output speed sensor	CN3B-34	50 (engine not running)	
13	Flywheel speed sensor	CN3B-22	50 (engine not running)	
18	Engine speed	-	**850 - 2350 RPM**	
19	Wheel speed	-	2780 @ **10 km/h**	
20	Radar speed	-	2780 @ **10 km/h**	
29	Creeper position potentiometer	CN3A-9	26 Off - 54 On	
30	Raise solenoid for the EDC control valve	CN2-4	0 Off - 66 On	
31	Lower solenoid for the EDC control valve	CN2-5	0 Off - 66 On	
32	Lifting arm position potentiometer	CN1B-2	6 Lowered 79 Raised	
33	Position control potentiometer	via CAN	0 Lowered 100 Raised	
34	Drop rate potentiometer	via CAN	0 anti-clockwise, 100 clockwise	
35	Height limit potentiometer	via CAN	0 anti-clockwise, 100 clockwise	
36	Sensitivity potentiometer	via CAN	0 anti-clockwise, 100 clockwise	
37	Slip limit potentiometer	via CAN	0 anti-clockwise, 100 clockwise	
38	Right hand draft load pin	CN1B-9	46	No mounted implement
39	Left hand draft load pin	CN1B-10	46	No mounted implement
40	Draft load potentiometer	via CAN	0 anti-clockwise, 100 clockwise	
43	Clutch A solenoid current	CN2-8	0 Not Engaged - 70 Engaged	
44	Clutch B solenoid current	CN2-1	0 Not Engaged - 70 Engaged	
45	Clutch C solenoid current	CN2-5	0 Not Engaged - 70 Engaged	
46	Clutch D solenoid current	CN2-3	0 Not Engaged - 70 Engaged	
47	Clutch E solenoid current	CN3B-1	0 Not Engaged - 70 Engaged	

Chan-nel	Description	Control module connector and pin	Standard value	Comments
49	Rear PTO solenoid current	CN3B-18	0 Off - 99 On	
50	Neutral switch (shuttle lever)	CN4-16	30 released, 65 depressed	
52	Creeper solenoid current	CN3B-2	0 Not Engaged - 99 Engaged	
58	Low range solenoid current	CN3B-3	0 Not Engaged - 70 Engaged	
59	Mid range solenoid current	CN2-7	0 Not Engaged - 70 Engaged	
60	High range solenoid current	CN2-2	0 Not Engaged - 70 Engaged	
61	19th gear solenoid current	CN2-13	0 Not Engaged - 70 Engaged	
62	19th gear dump solenoid current	CN2-10	0 Not Engaged - 70 Engaged	
66	Reverse range solenoid current	CN3B-4	0 Not Engaged - 70 Engaged	
76	Forward switch (shuttle lever)	CN1B-12	30 Neutral, 68 forward	
77	Reverse switch (shuttle lever)	CN1B-13	30 Neutral, 68 forward	
90	Hand throttle potentiometer	via CAN	0 at idle 100 at max speed	
91	Accelerator pedal potentiometer	CN1B-1	10 at idle, 85 at max speed	
97	EHR joystick (X)	via CAN	0 at centre, 100 left/right	
98	EHR joystick (Y)	via CAN	0 at centre, 100 up/down	
107	Rear PTO speed selection position sensor	CN4-8	75@1000 33@1000E	
109	Transmission oil pressure sensor	CN1B-7		
133	PTO twist sensor	CN2-14	50 (engine not running)	

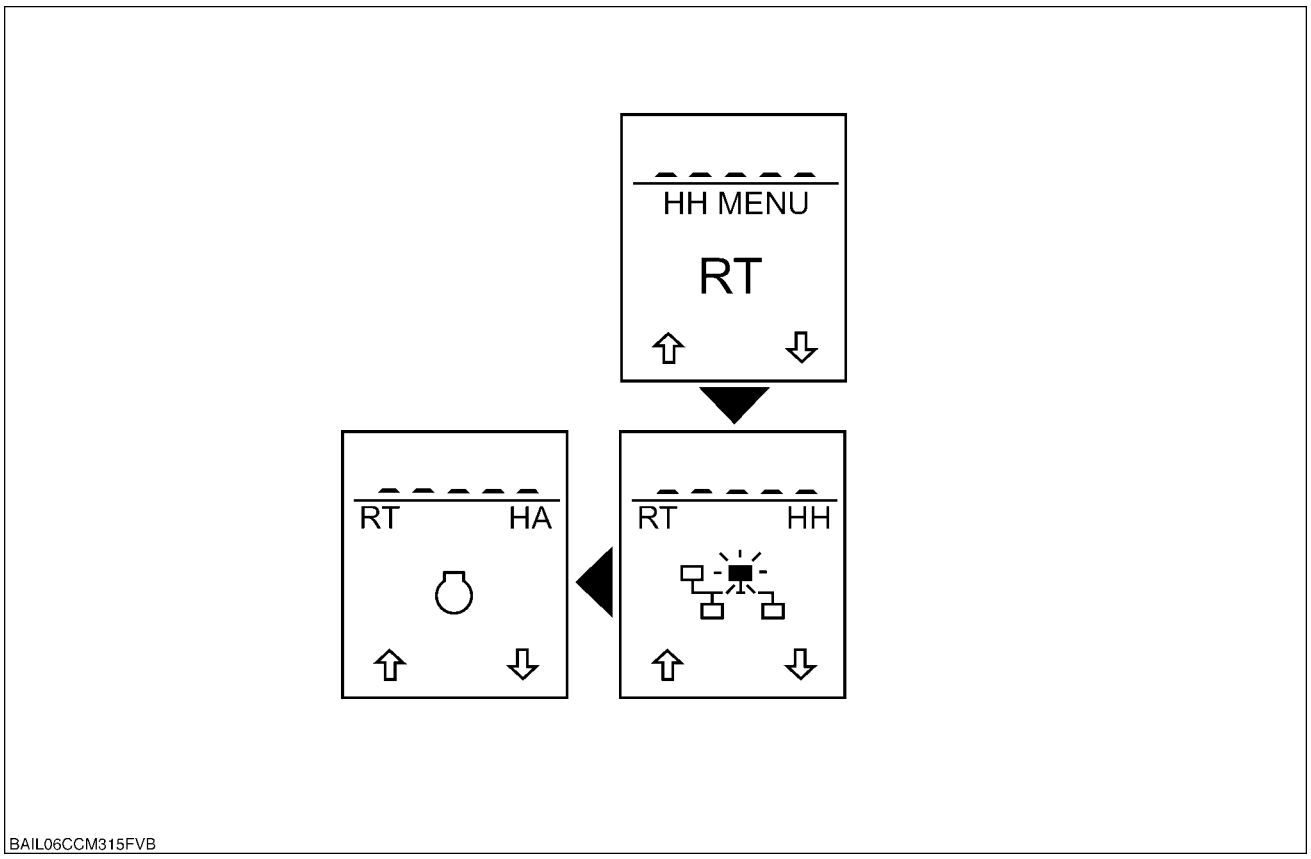
Explanations:
VF Input: This is the input voltage into the controller to transmission components not directly affected by the clutch pedal switch, i.e. forward and reverse synchroniser solenoids, creeper solenoid and four wheel drive solenoid.
VD Input: This is the input voltage into the controller to transmission components which are affected by the clutch pedal switch, i.e. PWM solenoids.
VH Input: This is the input voltage into the controller to electronic draft control components, i.e. raise and lower solenoids.
VT Input: This is the input voltage into the controller to rear PTO and Differential lock, i.e. rear PTO clutch, Rear PTO brake, and differential lock solenoids.

CN1a = **X092** CN1b = **X093** CN2 = **X091**
CN3a = **X094** CN3b = **X095** CN4 = **X097**

HA - DEMONSTRATION MENU

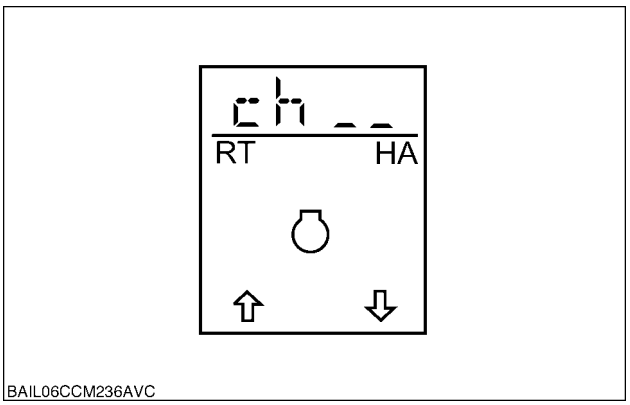
Used to demonstrate engine power boost.

HA Menu Screen Select Diagram



BAIL06CCM315FVB 67

Select the HA sub-system by depressing the "menu" key.
The upper section of the display will display "ch _ _"



BAIL06CCM236AVC 68

The required channel can be selected by using the navigation “up" and “down" keys (see the table below for the description of each channel).

Channel	Description
Ch 1	Engine power boost demonstration

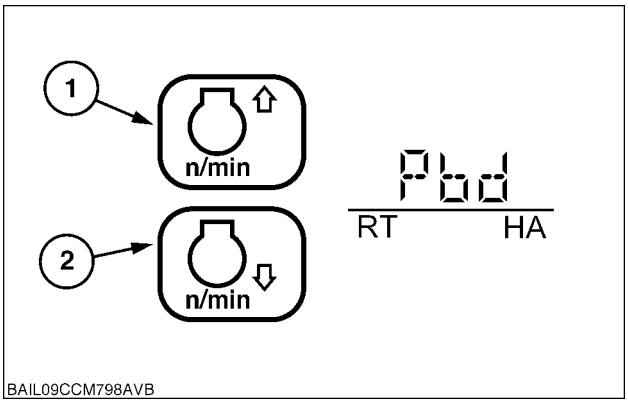
Channel 1 - Engine Power Boost Demonstration

Power boost will only be active under the following conditions:

- No PTO torque sensor or calibration fault codes
- PTO is fully engaged
- Wheel speed is greater than **0.5 Km/h**.
- Engine speed is greater than **1300 rev/min**.
- Coolant temperature is below **105 °C**.
- PTO has at least **250 Nm** torque applied

The upper section of the display will display “Pbd" (Power boost demonstration).
Start the engine and operate the vehicle to activate engine power boost. The power boost lamp on the ICU3 will be illuminated when power boost is enabled.
Engine power boost will work as normal, but using the CRPM adjustment switch will turn the powerboost on and off.
CRPM increase switch **(1)** to turn power boost ON
CRPM decrease switch **(2)** to turn power boost OFF

NOTE: *Power boost demonstration will be disabled after turning the keystart OFF.*

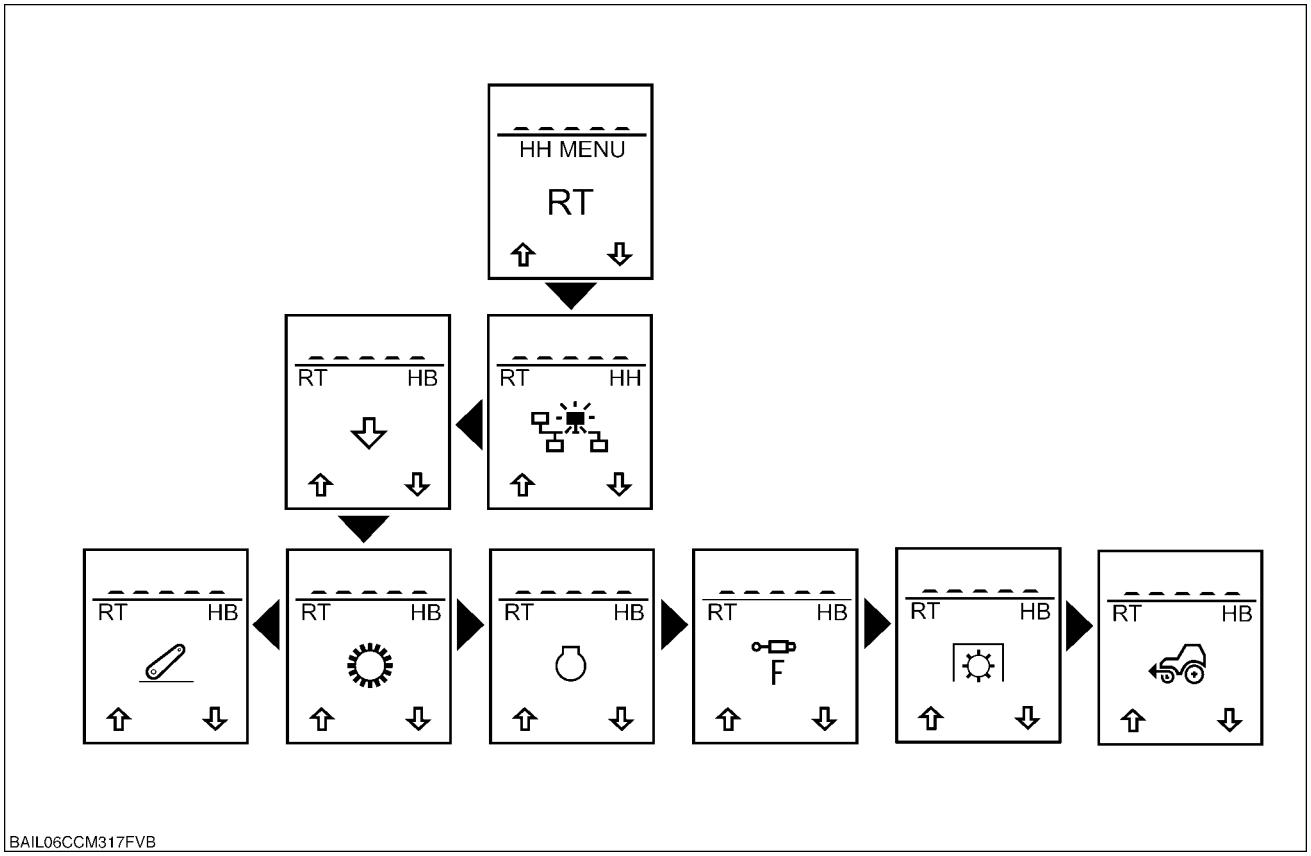


BAIL09CCM798AVB 69

HB - DISPLAY STORED FAULT CODES

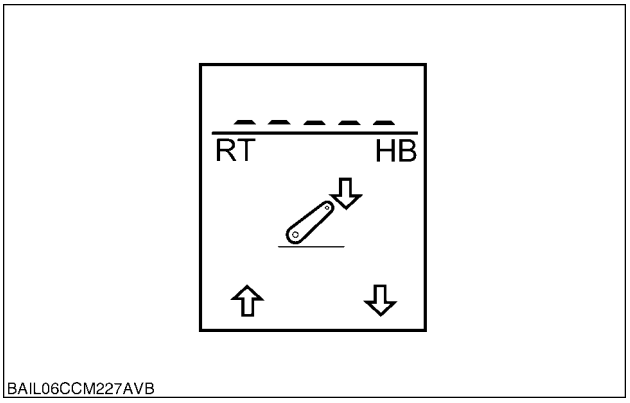
This menu is used to display fault codes which are stored in the EEPROM of the controller.
A maximum of ten fault codes for each sub-system can be stored.
Common to all sub-systems.

HB Menu Screen Select Diagram



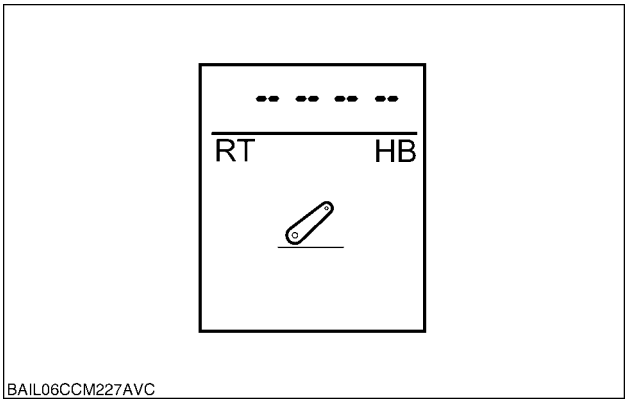
BAIL06CCM317FVB 70

Select the required sub-system by depressing the "menu" key, as the example shown.



BAIL06CCM227AVB 71

The upper section of the display will display "- - - -", if no fault code is stored in the selected sub-system.

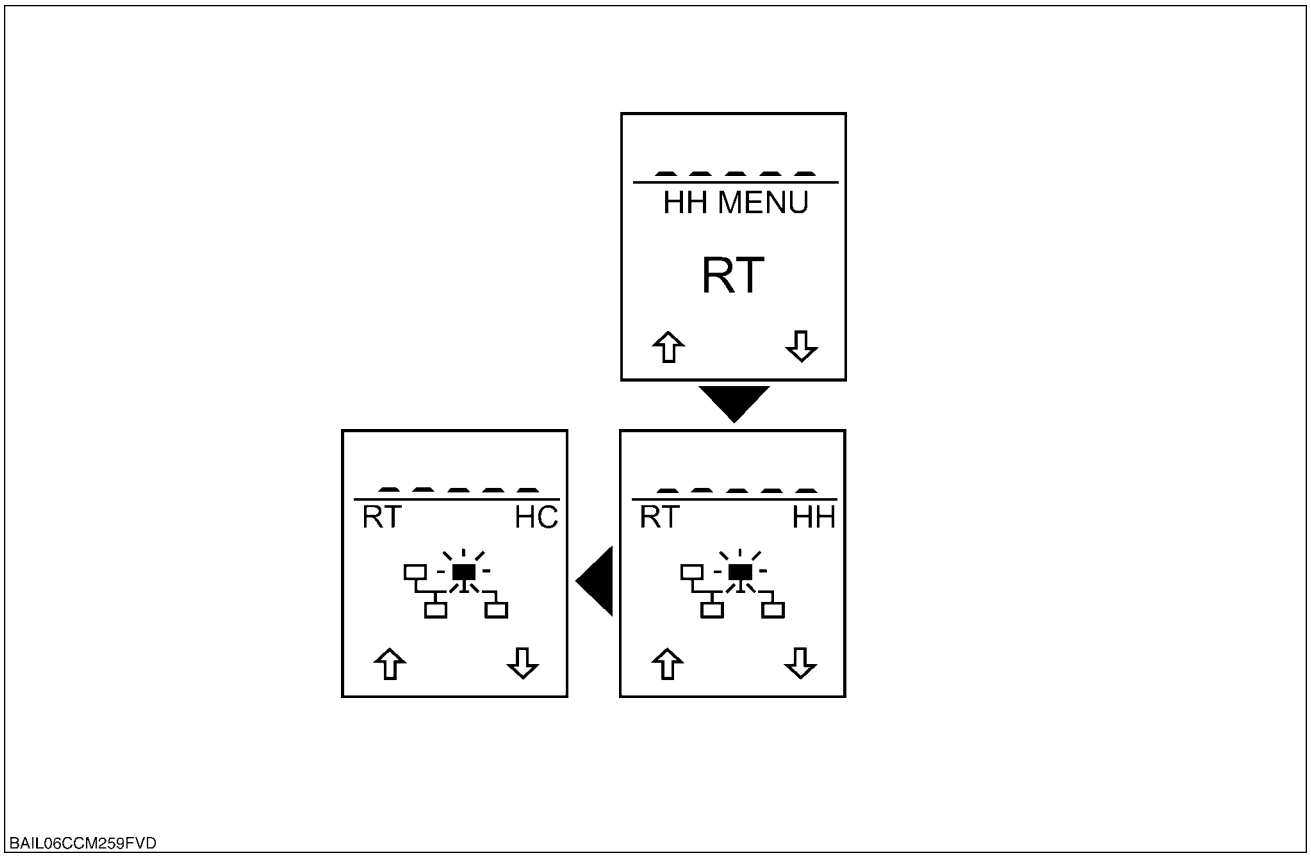


BAIL06CCM227AVC 72

The upper section of the display will display "F", if a fault code is stored in the selected sub-system.
The fault code would then automatically cycle through as an example:
1024 = Fault code
0 = Hour of first occurrence
49 = Hour of last occurrence
54 = Number of occurrences of the fault
Depress the navigation “up" or “down" key to change to the next fault code in the list.
The upper section of the display will display “- - -" at the end of the list.
Depress the “menu" key to continue navigating through the “HH" menus.

HC - CLEAR STORED FAULT CODES

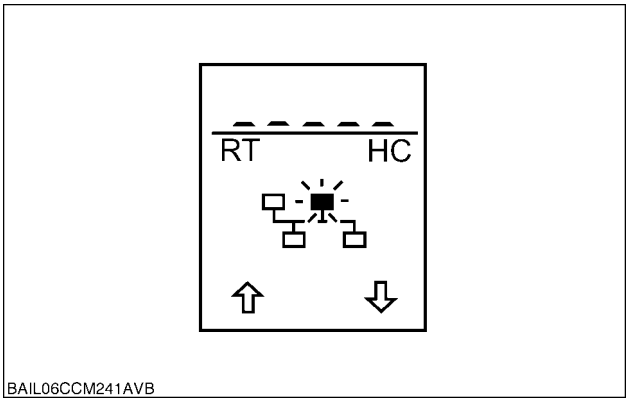
HC Menu Screen Select Diagram



BAIL06CCM259FVD 73

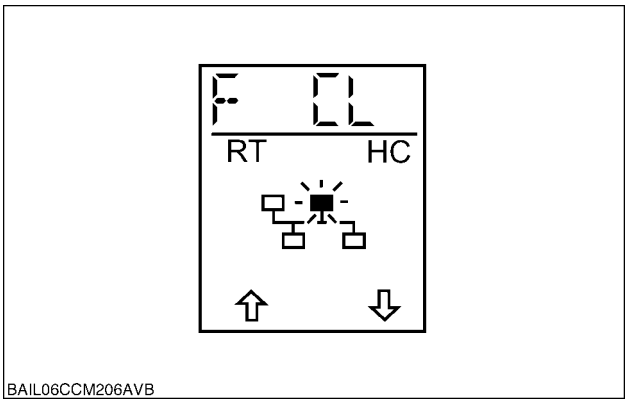
NOTE: *Always make a note of the fault codes stored, before clearing.*

Select the HC menu by depressing the “menu" key.



BAIL06CCM241AVB 74

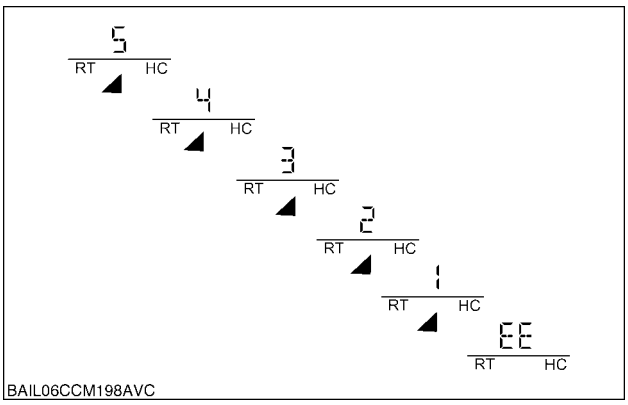
The upper section of the display will display “F CL".



BAIL06CCM206AVB 75

NOTE: *If the navigation “down" key is released before the countdown finishes, the procedure will be aborted.*

Depress and hold the navigation “down" key to confirm the resetting of the EEPROM.
The upper section of the display will countdown from 05 to 01, then “EE" will be displayed to indicate the EEPROM has been cleared.



BAIL06CCM198AVC 76

Depress the “menu" key to continue navigating through the “HH" menus.

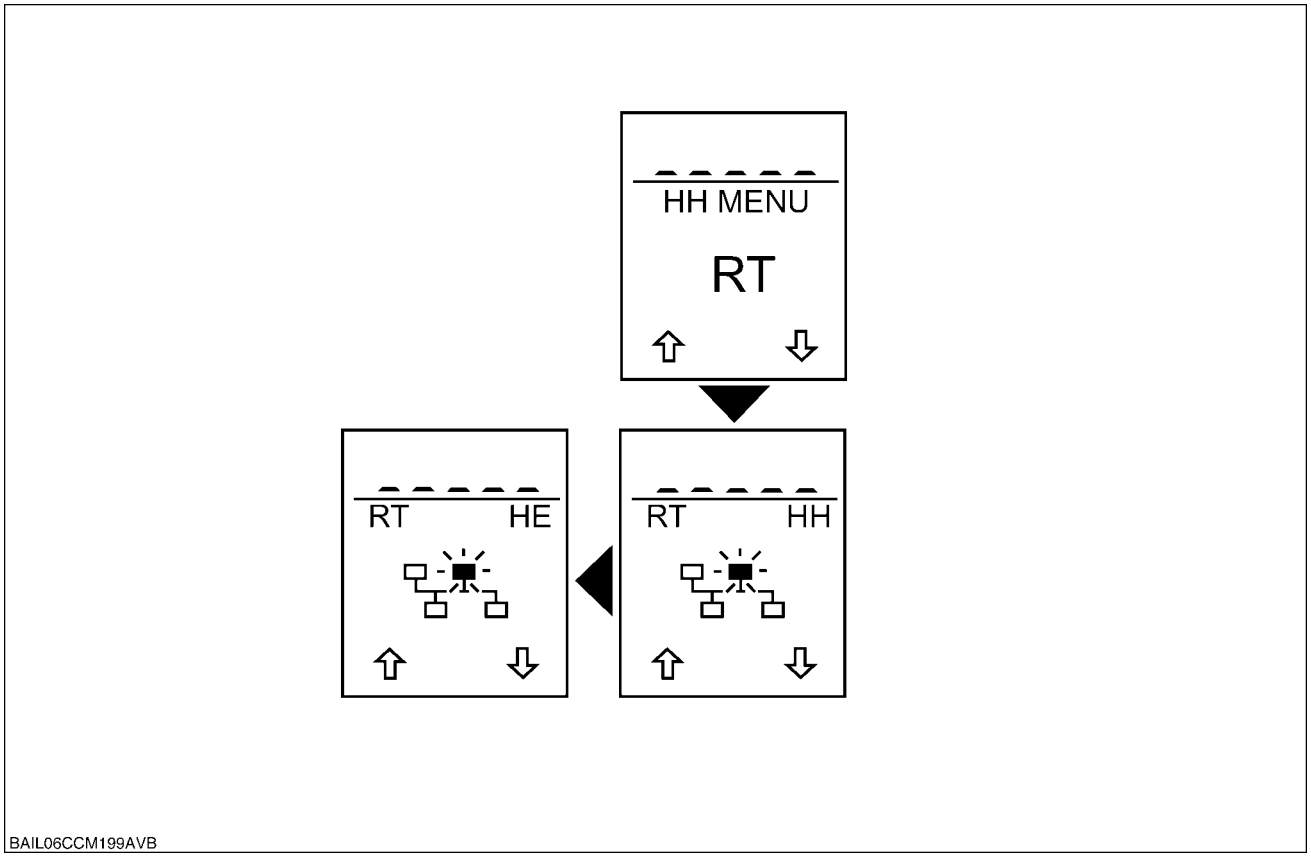
HE - DISPLAY ALL SPEED INPUTS

This menu is used to verify the operation of various frequency inputs.

NOTE: *The vehicle may be driven while in this menu.*

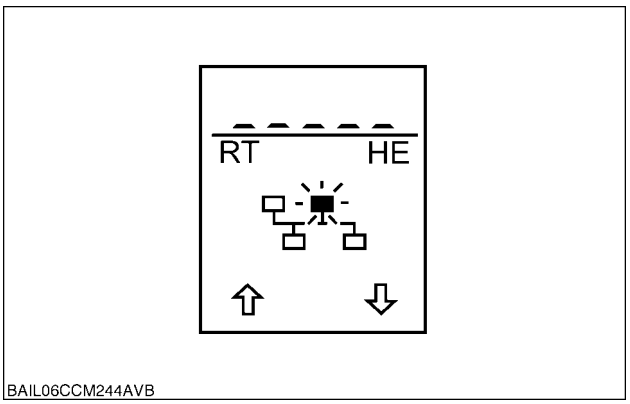
Common to all sub-systems.

HE Menu Screen Select Diagram



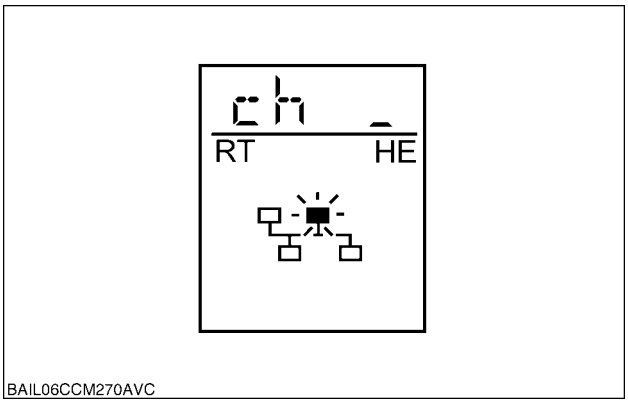
BAIL06CCM199AVB 77

Select the HE menu by depressing the "menu" key.



BAIL06CCM244AVB 78

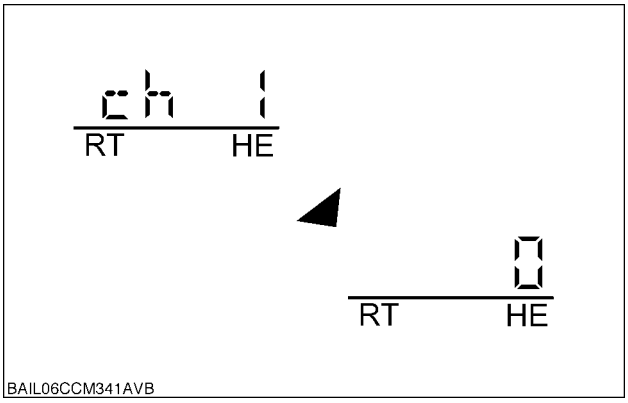
The upper section of the display will display "ch _"
The required channel can be selected by using the navigation “up" and “down" keys.
See the table below for the description of each channel.



BAIL06CCM270AVC 79

Channel	Description	Typical Reading	Notes
1	Wheel speed sensor frequency	**8000 @ 10 km/h**	
2	Radar	**3700 @ 10 km/h**	
3	Not used	-	
4	Rear PTO speed	**1100 @ 2000 RPM**	
5	Not used	-	
6	Mid speed sensor frequency	**4300 @ 10 km/h**.	
7	PTO twist angle (relative to damper)	4500 to 13500 (degrees x 100)	
8	Engine flywheel speed	**560 @ 850 RPM**	
9	PTO Shaft twist (relative to reference)	**-15 - 140 °**	

After a delay the value will be displayed.
Depress the “menu" key to continue navigating through the “HH" menus.

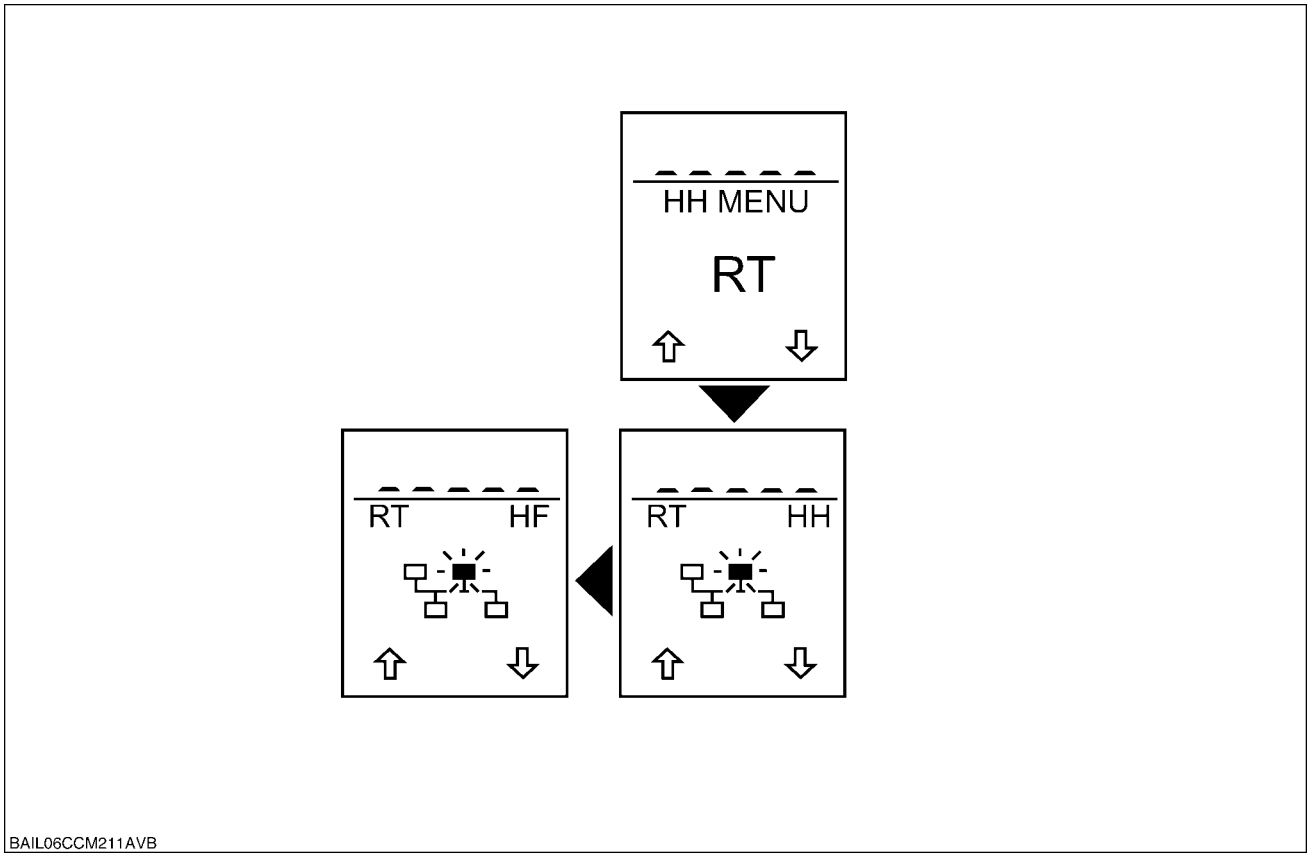


BAIL06CCM341AVB 80

HF - VIEW CONTROLLER HARDWARE INFORMATION

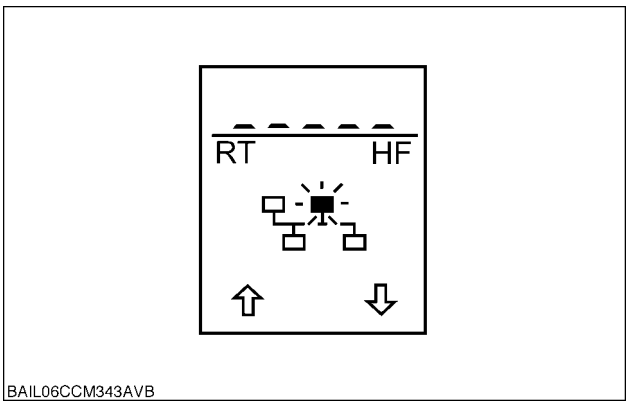
This menu allows the hardware identification, hardware version and serial number to be displayed. Common to all sub-systems.

HF Menu Screen Select Diagram



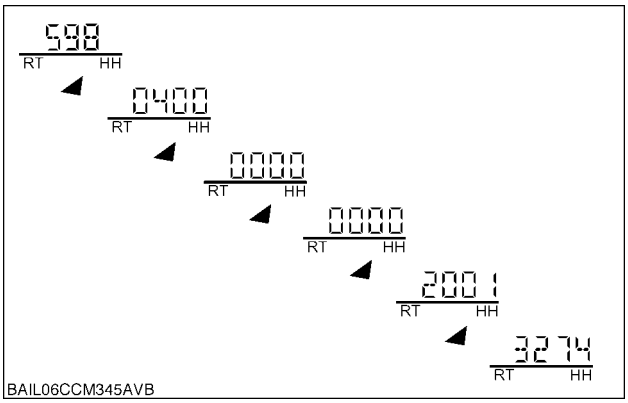
BAIL06CCM211AVB 81

Select the HF menu by depressing the "menu" key.



BAIL06CCM343AVB 82

The upper section of the display will automatically cycle through as the example:
598 = Hardware identification
0400 = Hardware version
0000 = Hardware version
0000 = Serial number
2001 = Serial number
3274 = Serial number
and return to allow navigation of the “HH" menus.



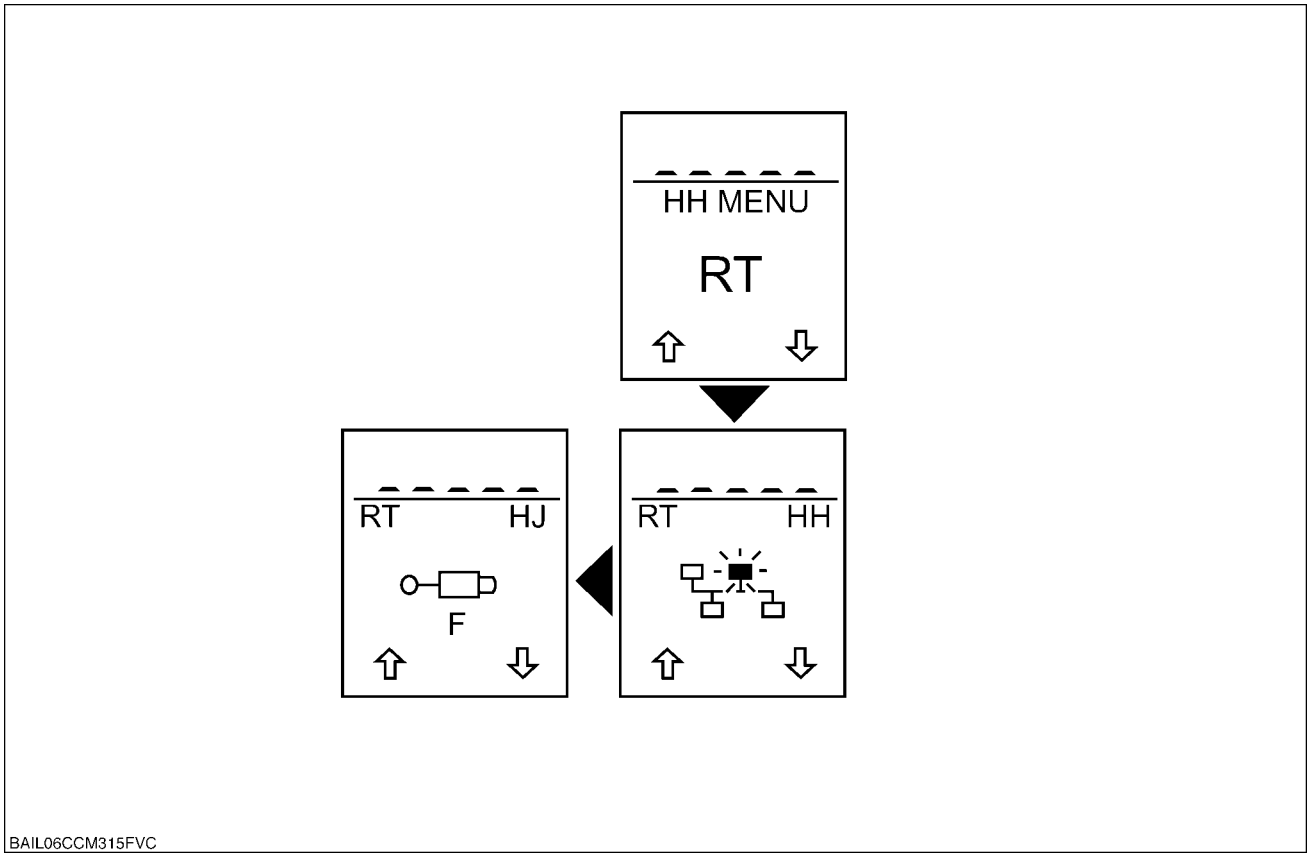
BAIL06CCM345AVB 83

HJ - ELECTRONIC HYDRAULIC REMOTE CONTROL VALVE SET-UP

This menu allows the front Electronic Hydraulic Remote (EHR) control valve numbers to be reset.
The EHR valve stores a number to indicate its position in the remote control valve stack, i.e. valve number 1,2, 3, 4 or 5. If a valve assembly has been replaced it will be necessary to reprogram the number of each valve within the complete assembly. New valves are supplied without an assigned number.

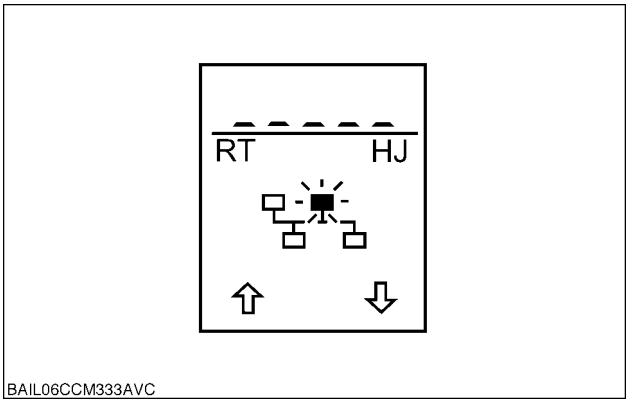
NOTE: *The renumbering procedure for all of the valves, either rear or mid mount valves, must be completed before commencing the procedure for the other set of valves.*

HJ Menu Screen Select Diagram



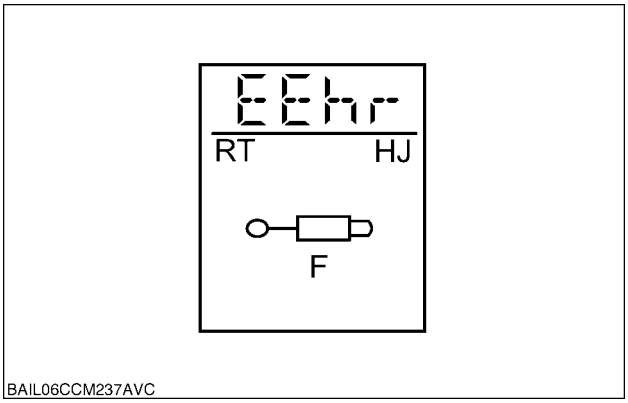
BAIL06CCM315FVC 84

With all of the rear remotes connected, navigate the H-menus and select the HJ menu by depressing the "menu" key.



BAIL06CCM333AVC 85

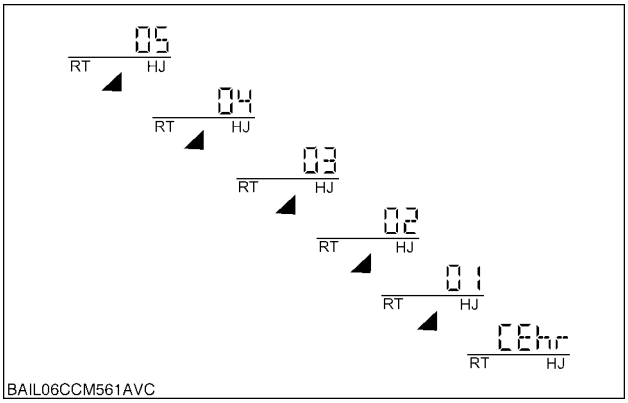
The upper section of the display will display "EEhr".



BAIL06CCM237AVC 86

NOTE: *HJ will clear all the EHR valve numbers.*

Depress and hold the down button, the display will change to show ’5’ and countdown to ’1’ then change to ’Cehr’, this signifies that the valve numbers have been cleared.



BAIL06CCM561AVC 87

NOTE: *If the navigation "down" key is released before the countdown finishes, the procedure will be aborted.*

Turn the keystart OFF. Disconnect the connectors from each of the remote valves, except for valve number 1.

Turn the keystart ON and enter HJ menu again. The cluster display will momentarily flash ’Ehr_’ followed by ’Ehr1’, an audible beep will be heard, indicating that number 1 valve has been recognised and renumbered. The display will then change to flash ’Ehr2’ to signify that the controller is ready for the next valve to be connected.

Connect each remote valve in the correct order. As each valve is connected an audible beep will signify the valve is recognised.

As each valve is connected the display will change to show the next valve number to be connected until ’Ehr_5’ is displayed.

If there are less than 5 rear remotes then the procedure can be exited by depressing and holding the navigation ’down’ key , the display will change to ’End’ to indicate programming is complete. If the maximum number of valves are fitted then the procedure will end automatically and display ’End’.

Turn the keystart OFF to store the new valve numbers.

Calibrate the remote valves. Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)**.

Control module - Configure KA - Steering Control

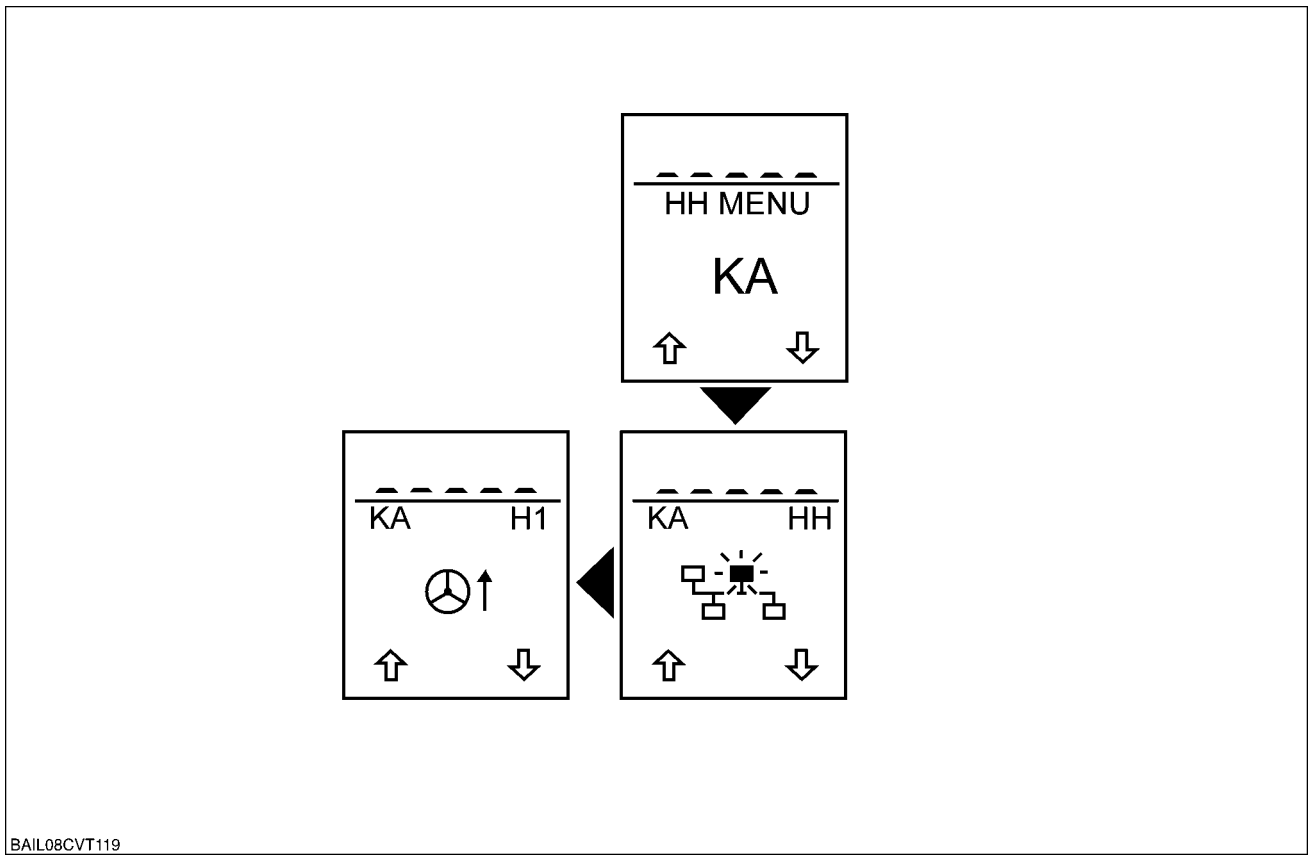
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

HH	Service Menu	Figure Number
H1	Calibration procedures	**1**
H2	View stored calibration values	**2**
H3	Not Used	-
H4	View software revision level	**5**
H5	Switch operation test	**8**
H6	Not used	-
H7	Not used	-
H8	Clear Electrically Erasable Programmable Read Only Memory (EEPROM)	**12**
H9	Voltmeter	**15**
HA	Not used	-
HB	Display stored fault codes	**18**
HC	Clear all stored fault codes	**23**
HD	Not used	-
HE	Display frequency inputs	**27**
HF	View controller hardware information	**30**

H1 - CALIBRATION PROCEDURES

This menu is used to calibration the steering controller. Refer to **Fast steer system - Calibrate (D.20.C)**.

H1 Menu Screen Select Diagram

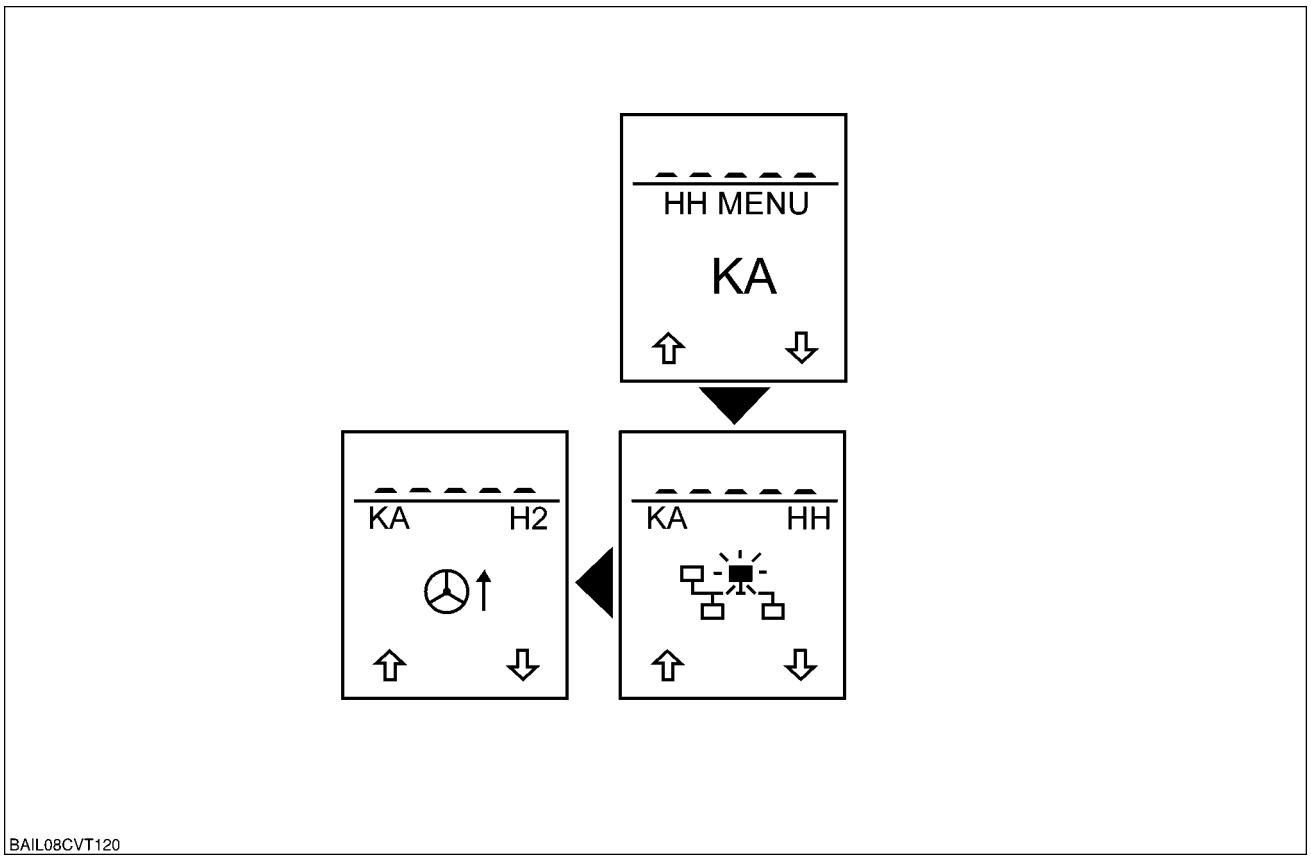


BAIL08CVT119 1

H2 - VIEW STORED CALIBRATION VALUES

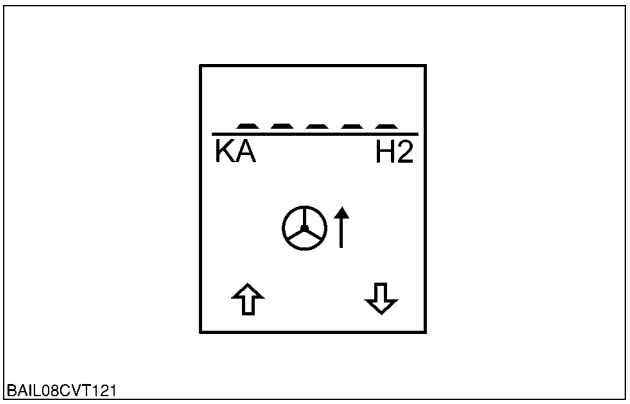
This menu is used to display the calibration values stored in the steering controller.

H2 Menu Screen Select Diagram



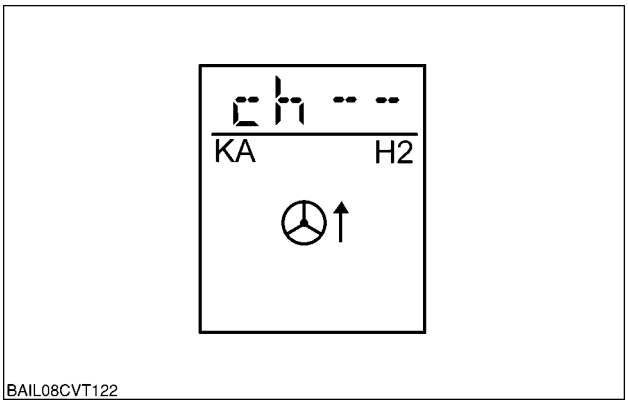
BAIL08CVT120 2

Select the steering sub-system by depressing the “menu" key.



BAIL08CVT121 3

The display will show “ch - -".



BAIL08CVT122 4

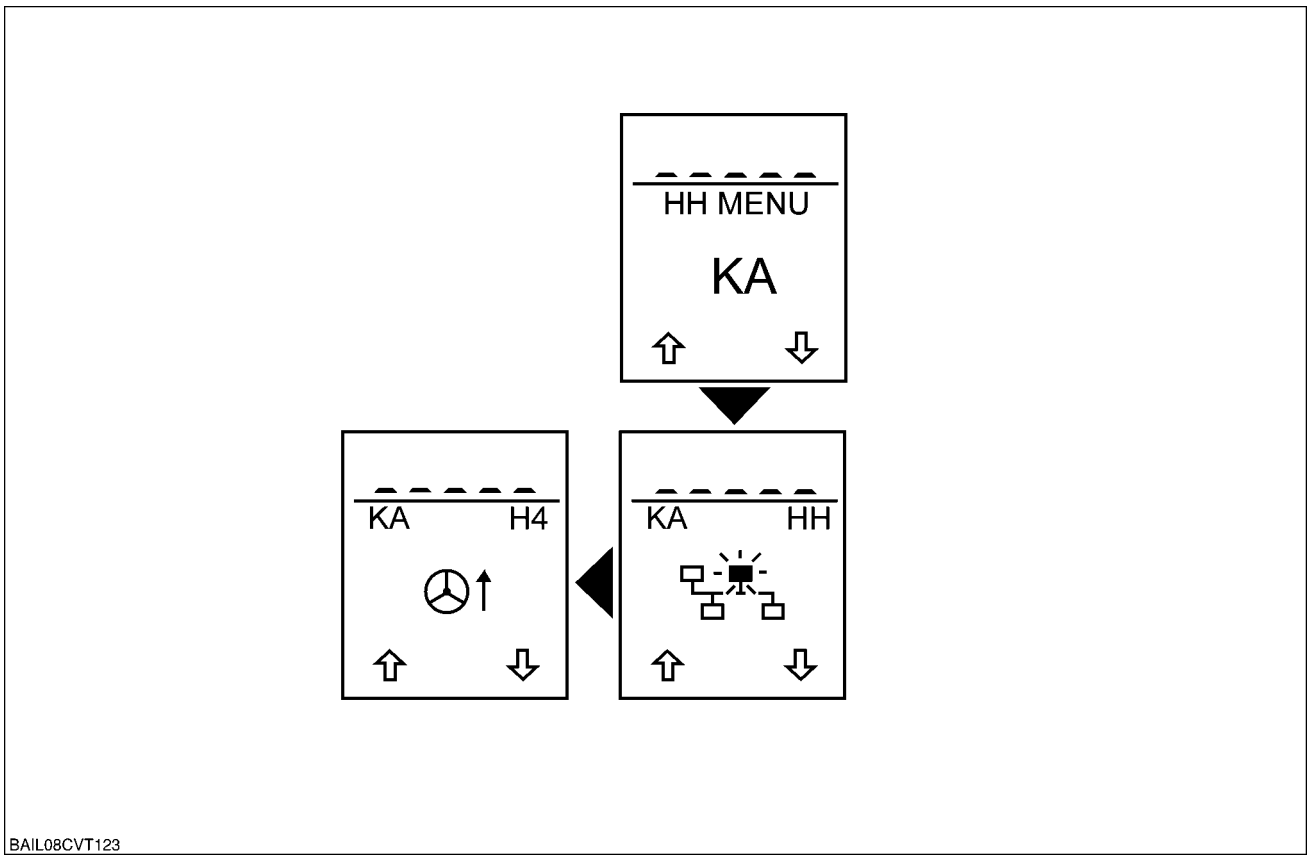
The required channel can be selected by using the “up" and “down" keys.
After a delay the calibration value will be displayed. (see the table below for the description of the channel).
Depress the “menu" key to continue navigating through the “HH" menus.

Channel	Description	Default	Value Range
Ch 1	Proximity switch open	350	0 to 999
Ch 2	Proximity switch closed	295	0 to 999
Ch 3	LVDT secondary signal 1 open	400	400 to 750
Ch 4	LVDT secondary signal 2 open	500	400 to 750
Ch 5	LVDT secondary signal 1 closed	500	400 to 750
Ch 6	LVDT secondary signal 2 closed	400	400 to 750

H4 - VIEW SOFTWARE REVISION LEVEL

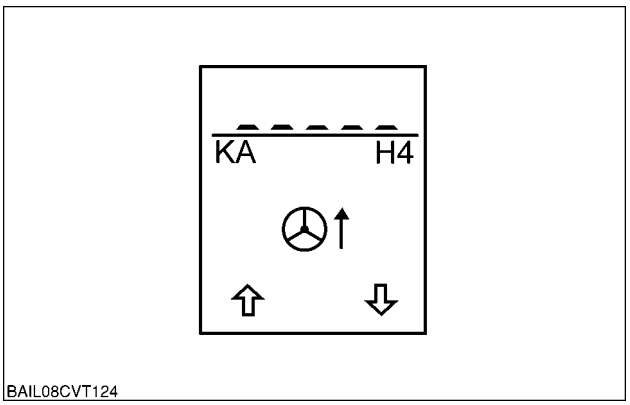
Common to all sub-systems.

H4 Menu Screen Select Diagram



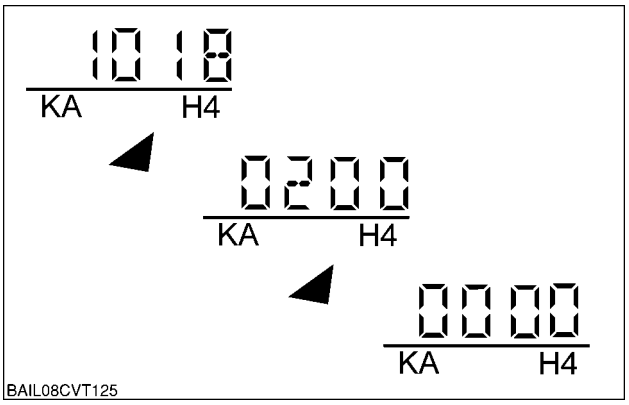
BAIL08CVT123 5

Select the H4 menu by depressing the "menu" key.



BAIL08CVT124 6

The display will automatically cycle through the software release, as the example shown and return to allow navigation of the "HH" menus.

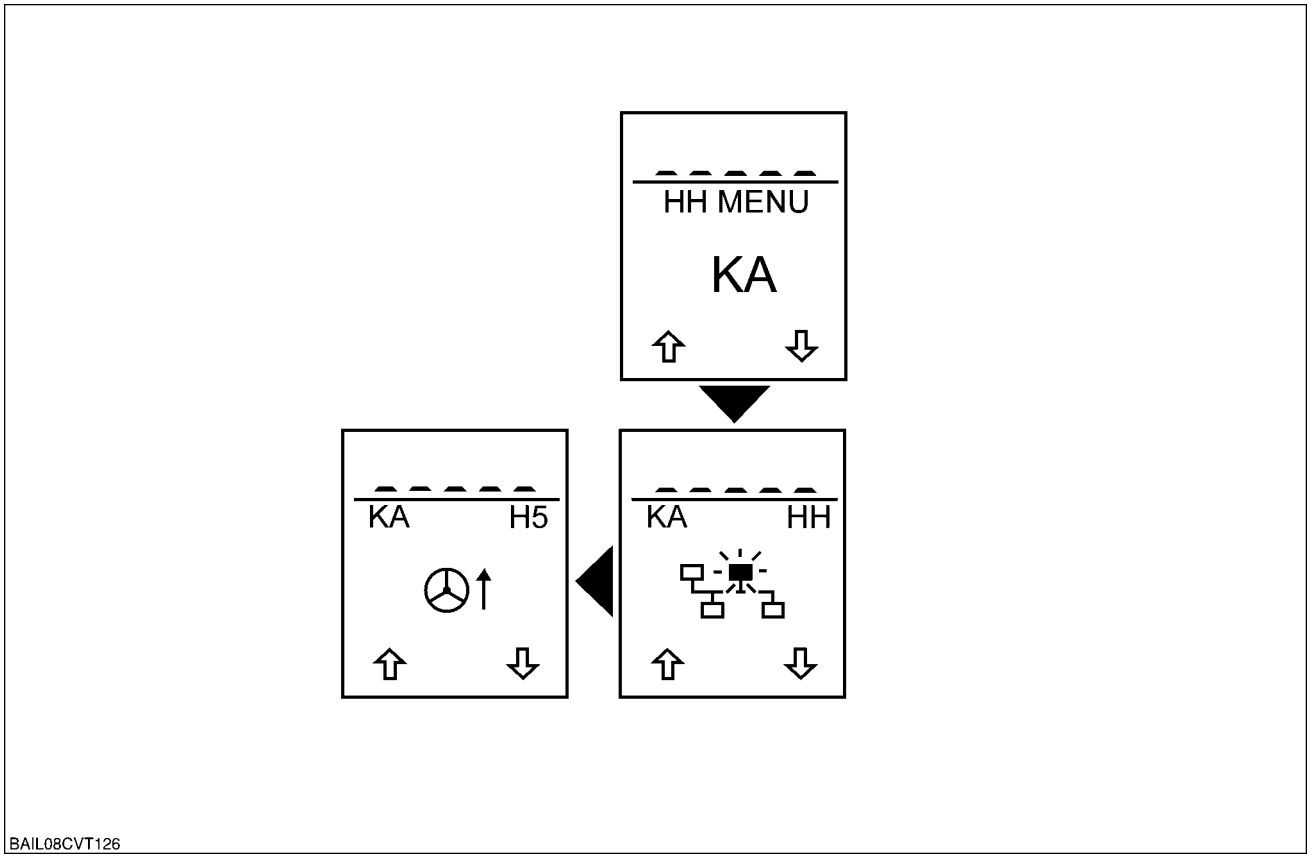


BAIL08CVT125 7

H5 - SWITCH OPERATION TEST

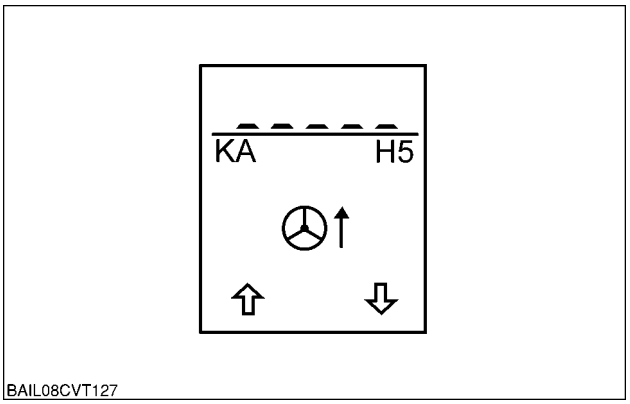
This menu displays a designated code when a switch transition is detected.
Common to all sub-systems.

H5 Menu Screen Select Diagram



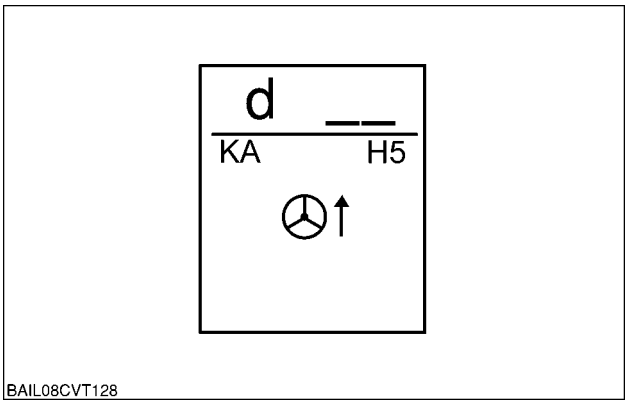
BAIL08CVT126 8

Select the H5 menu by depressing the "menu" key.



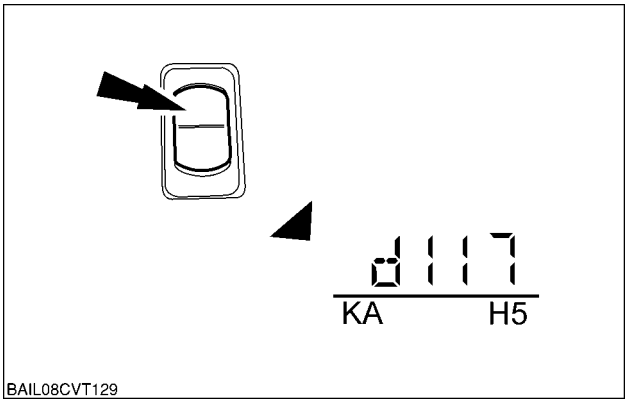
BAIL08CVT127 9

The display will show "d _ _"



BAIL08CVT128 10

When a switch is operated, a code will be displayed and an audible tone should be heard to indicate the correct function.
If a switch code is not displayed and the audible tone not heard, a 'wiggle' test can be performed on the related wiring, while watching the display or listening for the audible tone, to help locate the fault.



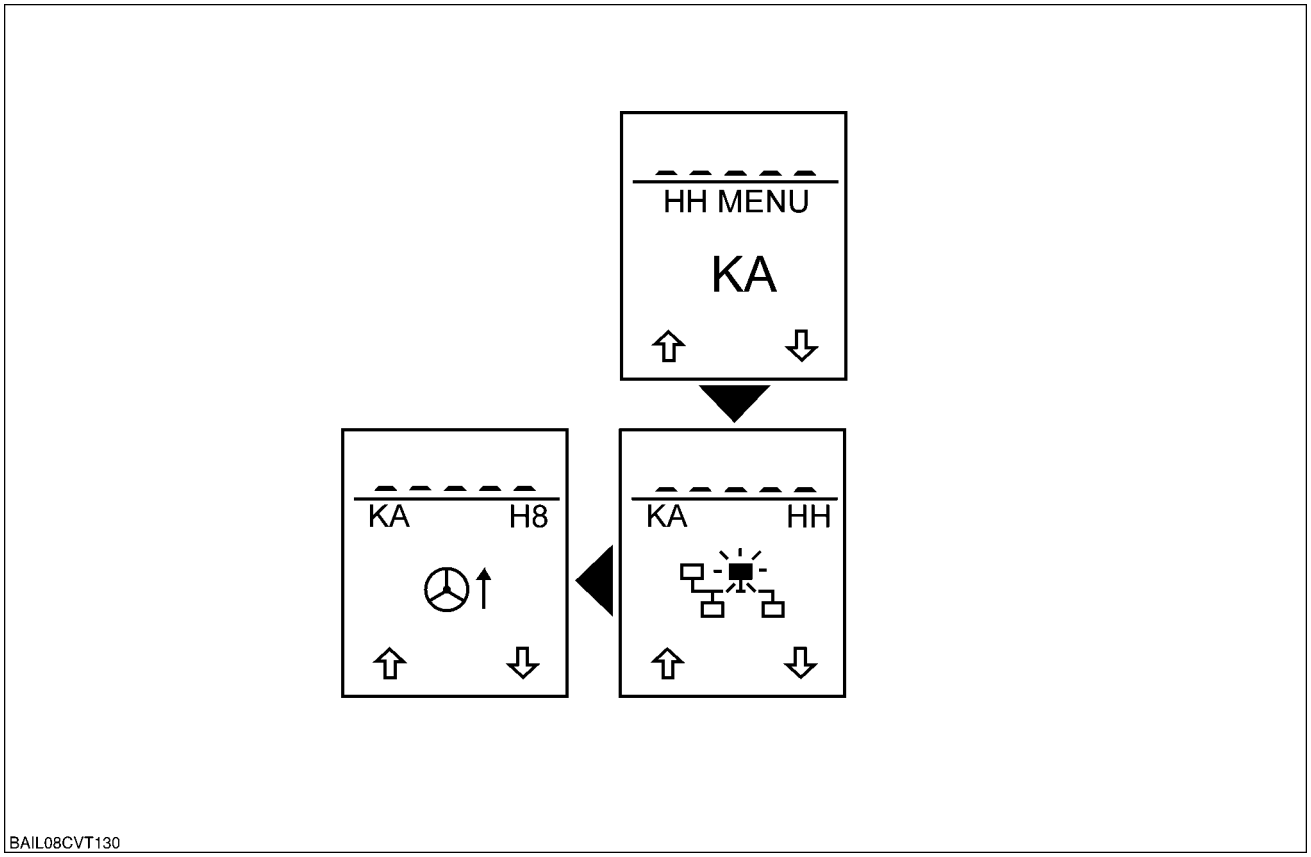
BAIL08CVT129 11

Identifier	Controller Connector	Switch / Input	Special Requirements
d117	A1	Enable switch	-
d118	C4	Safety switch	-
d119	B4	Proximity switch	-
d120	-	LVDT	-

H8 - CLEAR ELECTRICAL ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM)

This menu clears calibration values and stored error codes by resetting all EEPROM values back to default. EEPROM is where all calibration values and error codes are stored. This memory is retained even if there is no power to the controller, i.e. if the battery is disconnected.

H8 Menu Screen Select Diagram



BAIL08CVT130 12

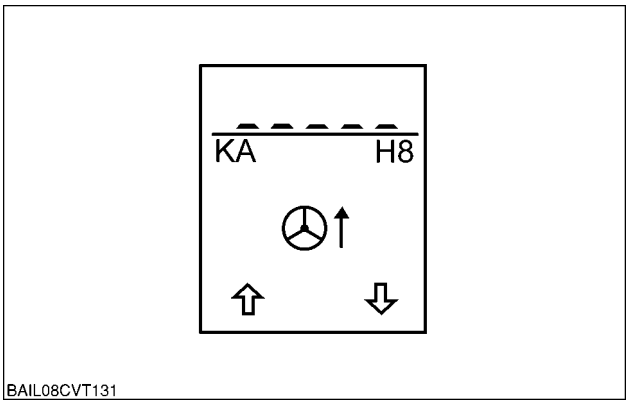
⚠ CAUTION ⚠

H8 will clear all calibrations values and stored error codes.

B006

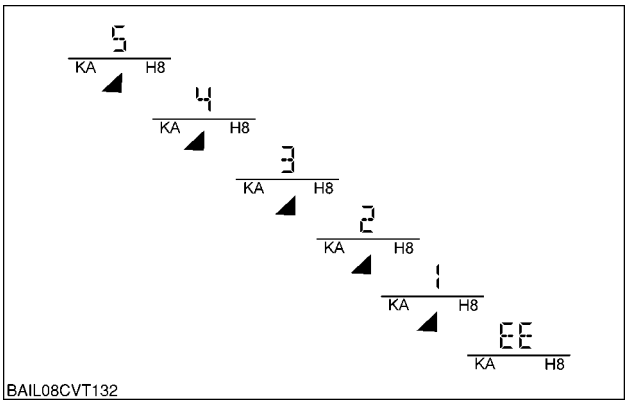
NOTE: *If the navigation “down" key is released before the countdown finishes, the procedure will be aborted.*

Select the H8 menu by depressing the "menu" key.



BAIL08CVT131 13

Depress and hold the “down" key to confirm the resetting of the EEPROM.
The display will countdown from 05 to 01, then “EE" will be displayed to indicate the EEPROM has been cleared.
Turn the keystart OFF.



BAIL08CVT132 14

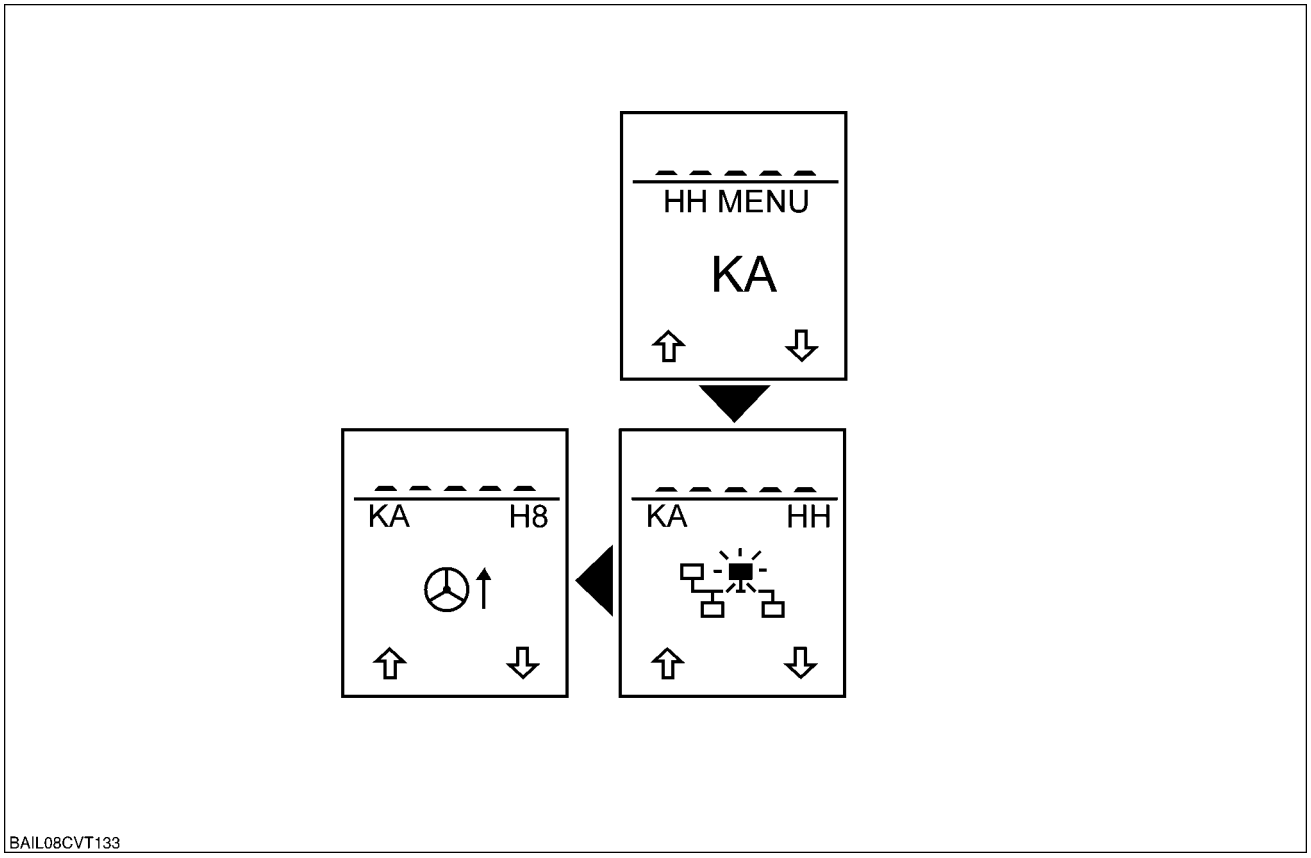
H9 - VOLTMETER

This menu is used to verify the operation of various potentiometers, voltage supplies, and solenoid current circuits. If an intermittent fault is detected within a circuit, a 'wiggle' test can be performed on the related wiring while watching the display for sudden changes in values, to help locate the area where the fault exists.

NOTE: *The vehicle may be driven while in this menu.*

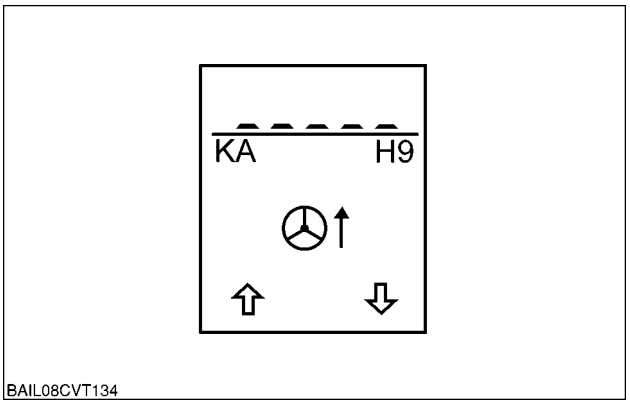
Common to all sub-systems.

H9 Menu Screen Select Diagram



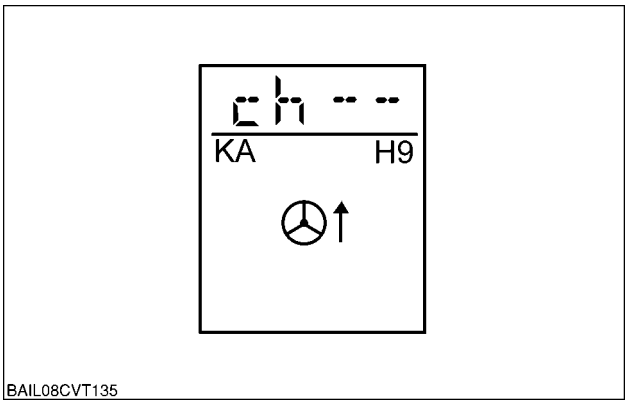
BAIL08CVT133 15

Select the H9 menu by depressing the "menu" key.



BAIL08CVT134 16

The display will show "ch - -"



BAIL08CVT135 17

The required channel can be selected by using the "up" and "down" keys.
After a delay the value will be displayed. Compare the value displayed with the typical reading shown in the table below.

NOTE: *The value is the input voltage or signal into the controller. This cannot be directly translated into a voltage due to the internal processes of the controller. A zero equates to* ***0 volts****.*

If the value displayed varies by more than **10 %** to that shown in the table below, a fault is indicated in either the component or the wiring harness relevant to that channel.

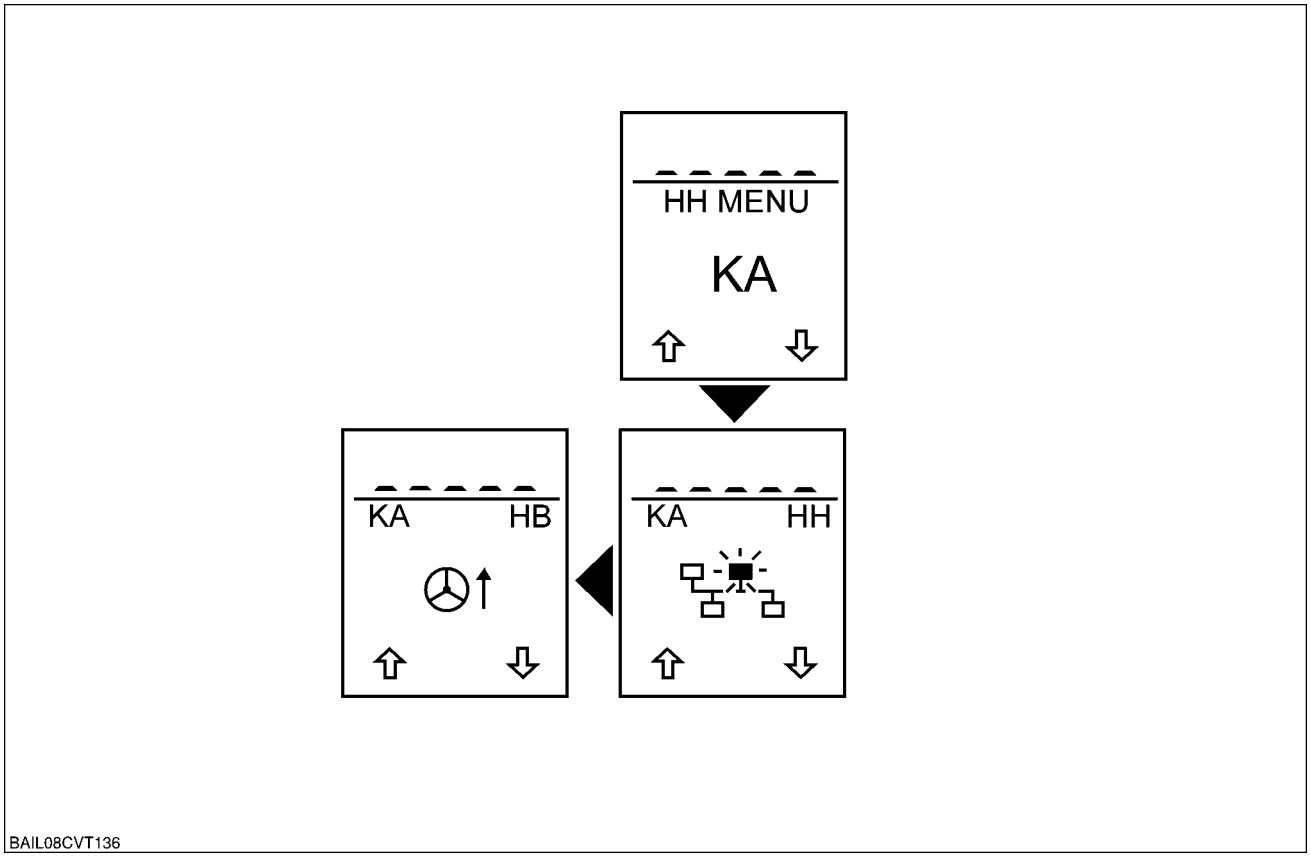
NOTE: *Check the connectors of the effected circuit, including the controller connectors, prior to replacing any components.*

Channel	Description	Module Pin	Typical Reading
1	LVDT secondary winding 1	B5	450 to 750
2	LVDT secondary winding 2	B6	450 to 750
3	Proximity sensor	B4	50 to 800
4	Electrovalve	A6	350 to 500 mA

HB - DISPLAY STORED FAULT CODES

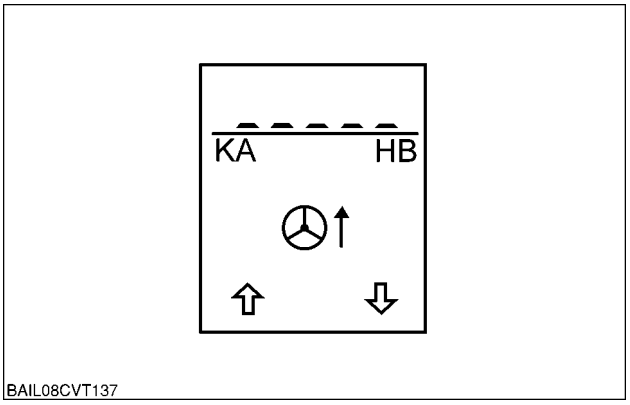
This menu is used to display fault codes which are stored in the EEPROM of the controller.
A maximum of ten fault codes for each sub-system can be stored.
Common to all sub-systems.

HB Menu Screen Select Diagram



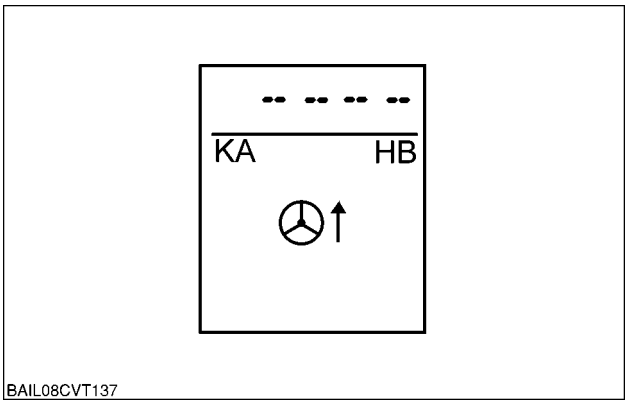
BAIL08CVT136 18

Select the steering sub-system by depressing the "menu" key, as the example shown.



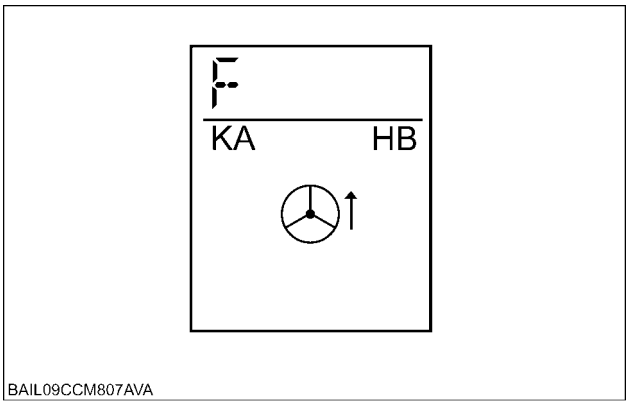
BAIL08CVT137 19

The display will show "_ _ _ _", if no fault code is stored in the selected sub-system.



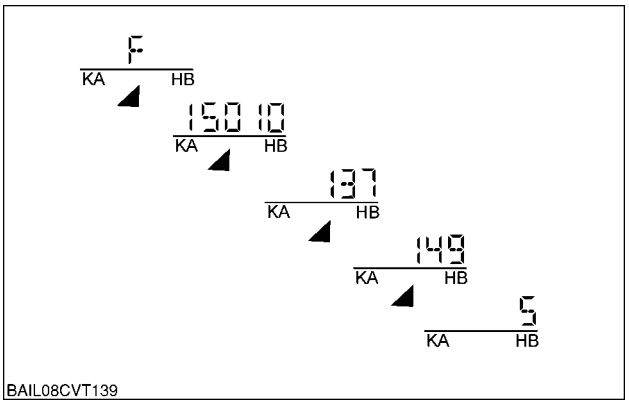
BAIL08CVT138 20

The display will show "F" if a fault code is stored in the selected sub-system.



BAIL09CCM807AVA 21

The display will then automatically cycle through as the example:
15010 Fault code
137 Hour of first occurrence
149 Hour of last occurrence
5 Number of occurrences of the fault

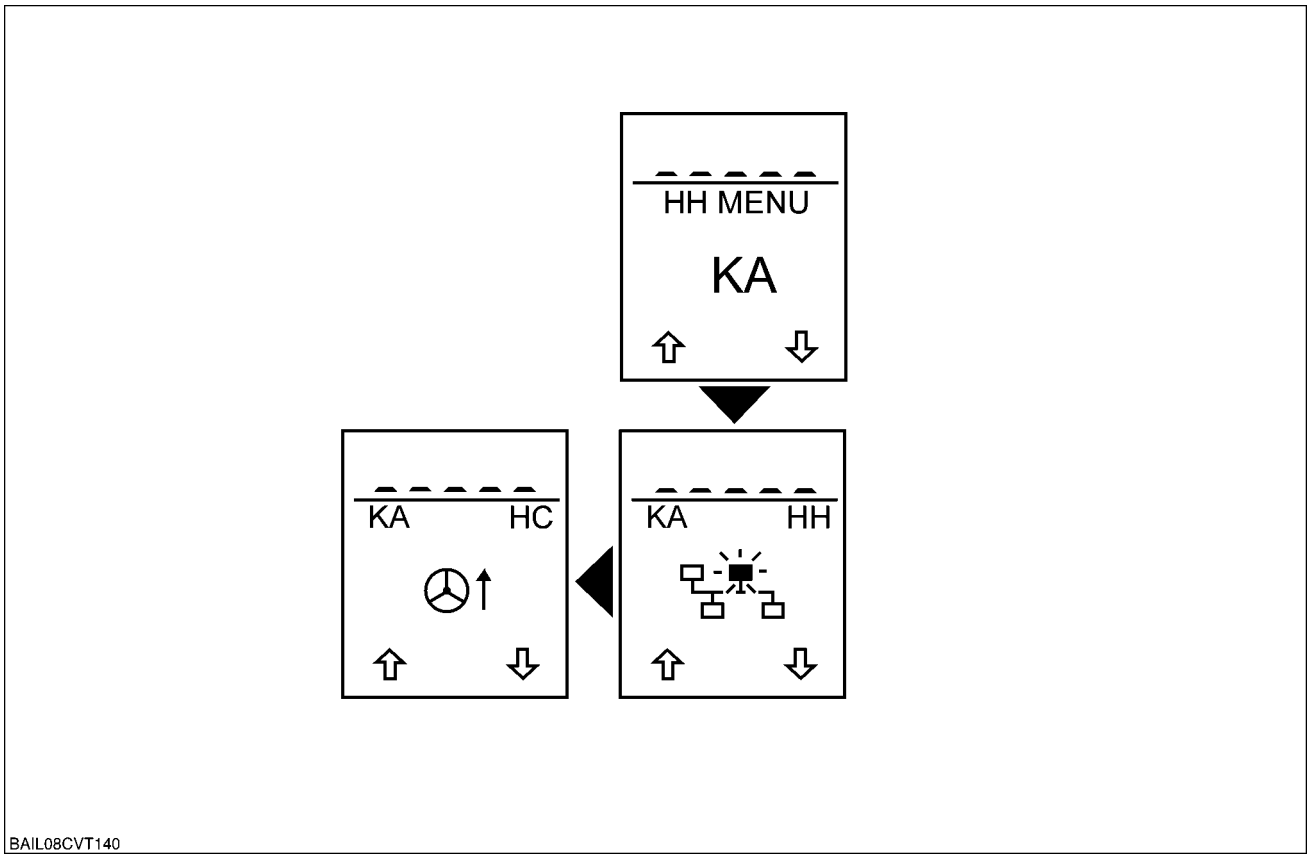


BAIL08CVT139 22

Depress the “up" or “down" key to change to the next fault code in the list.
The lower central display will display “_ _ _" at the end of the list.
Depress the “menu" key to continue navigating through the “HH" menus.

HC - CLEAR STORED FAULT CODES

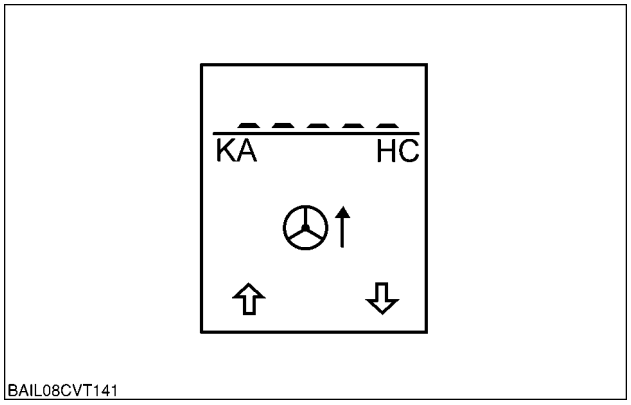
HC Menu Screen Select Diagram



BAIL08CVT140 23

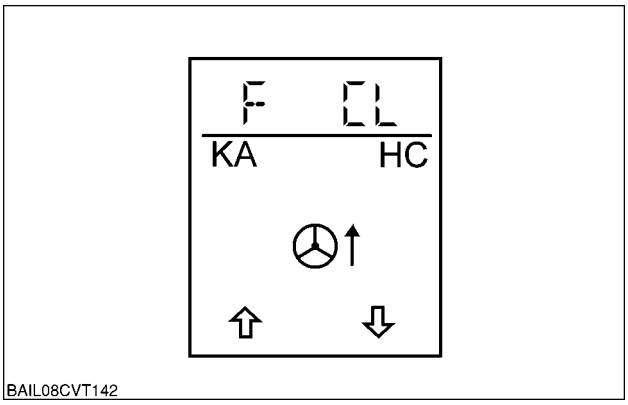
NOTE: *Always make a note of the fault codes stored, before clearing.*

Select the HC menu by depressing the “menu" key.



BAIL08CVT141 24

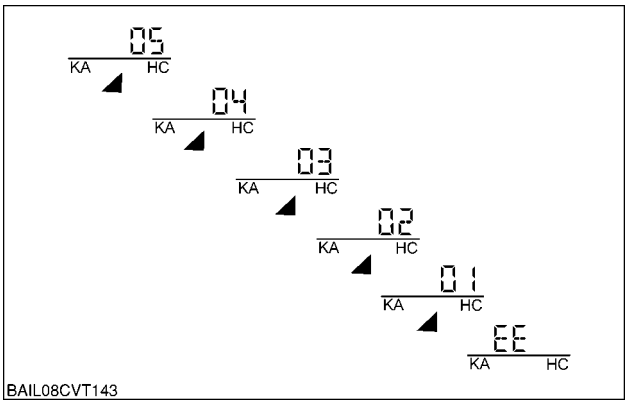
The display will show “F CL".



BAIL08CVT142 25

NOTE: *If the navigation “down" key is released before the countdown finishes, the procedure will be aborted.*

Depress and hold the “down" key to confirm the clearing of the memory.
The display will countdown from 05 to 01, then “EE" will be displayed to indicate the fault codes have been cleared.
Depress the “menu" key to continue navigating through the “HH" menus.



BAIL08CVT143 26

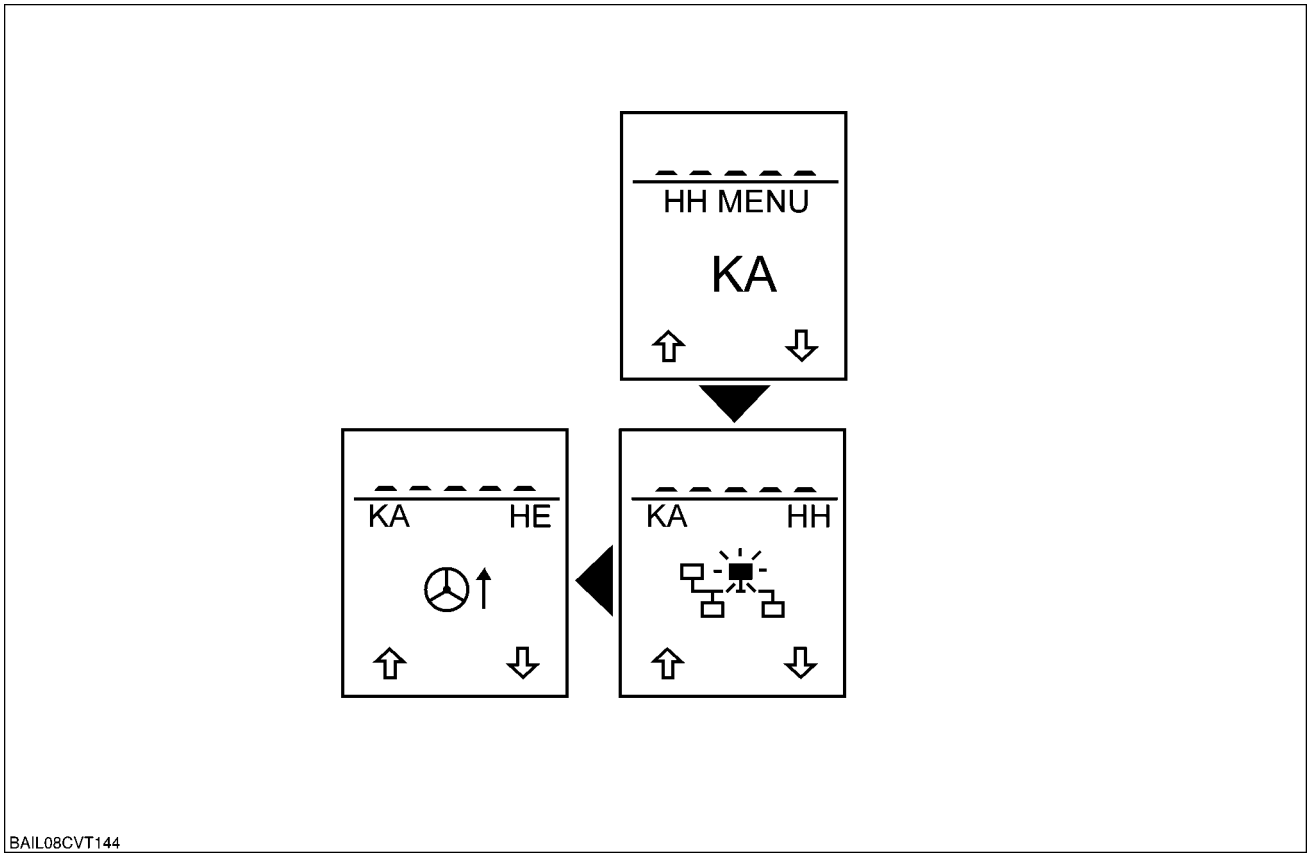
HE - DISPLAY ALL SPEED INPUTS

This menu is used to verify the operation of various frequency inputs.

NOTE: *The vehicle may be driven while in this menu.*

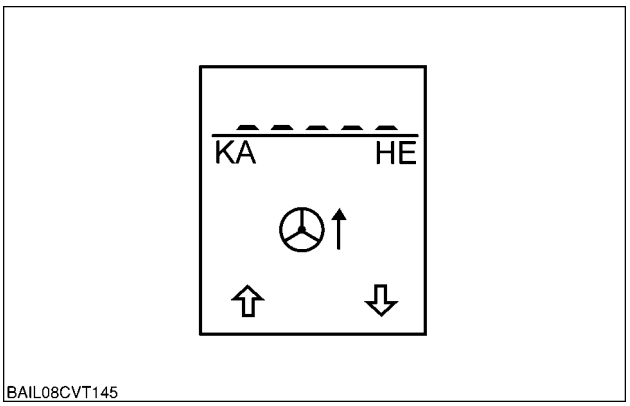
Common to all sub-systems.

HE Menu Screen Select Diagram



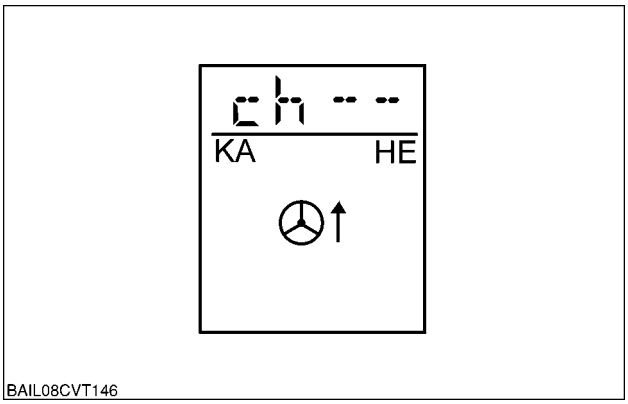
BAIL08CVT144 27

Select the HE menu by depressing the "menu" key.



BAIL08CVT145 28

The display will show "ch - -"
The required channel can be selected by using the “up" and “down" keys.
Refer to the table below for the available channels.



BAIL08CVT146 29

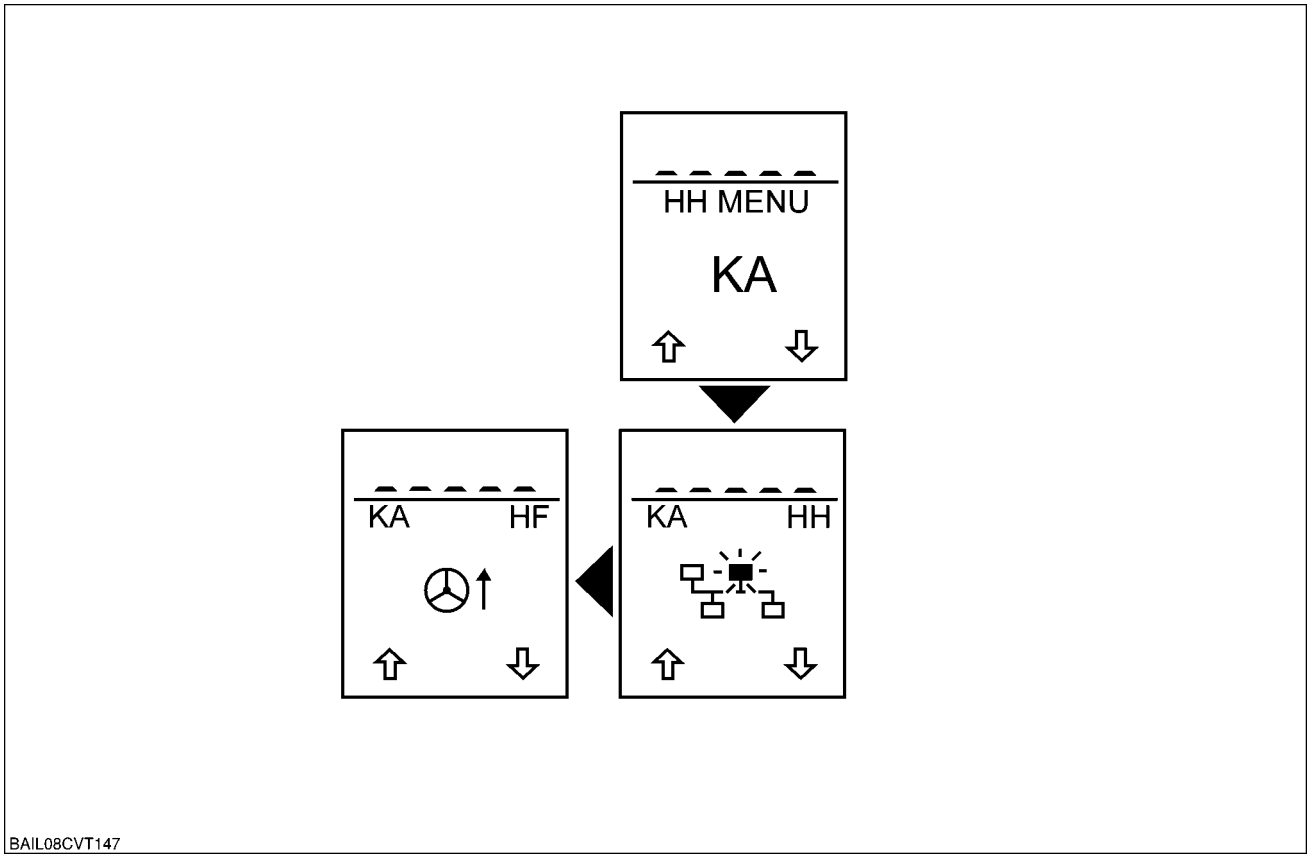
After a delay the value will be displayed.
Depress the “dimming" button to continue navigating through the “HH" menus.

Channel	Description	Typical Reading
1		
2		

HF - VIEW CONTROLLER HARDWARE INFORMATION

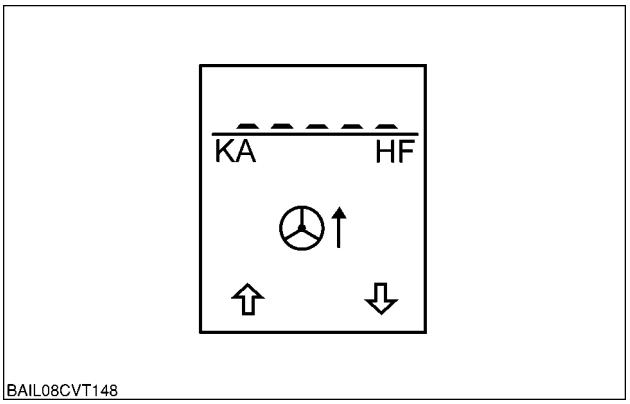
This menu allows the hardware identification, hardware version and serial number to be displayed.
Common to all sub-systems.

HF Menu Screen Select Diagram



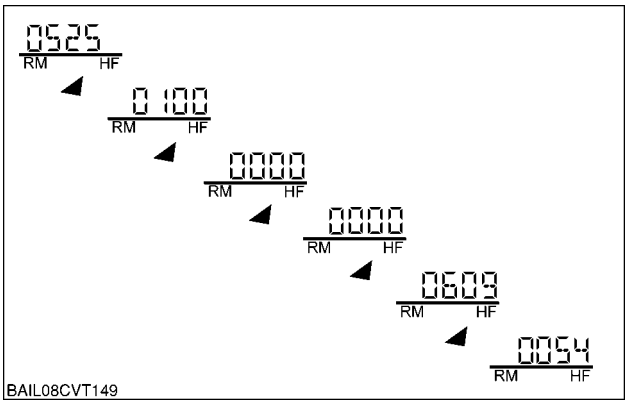
BAIL08CVT147 30

Select the HF menu by depressing the "menu" key.



BAIL08CVT148 31

The display will automatically cycle through as the example:
0525 Hardware identification
0100 Hardware version
0000 Hardware version
0000 Serial number
0609 Serial number
0054 Serial number
and return to allow navigation of the “HH" menus.



BAIL08CVT149 32

Control module - Configure Armrest

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

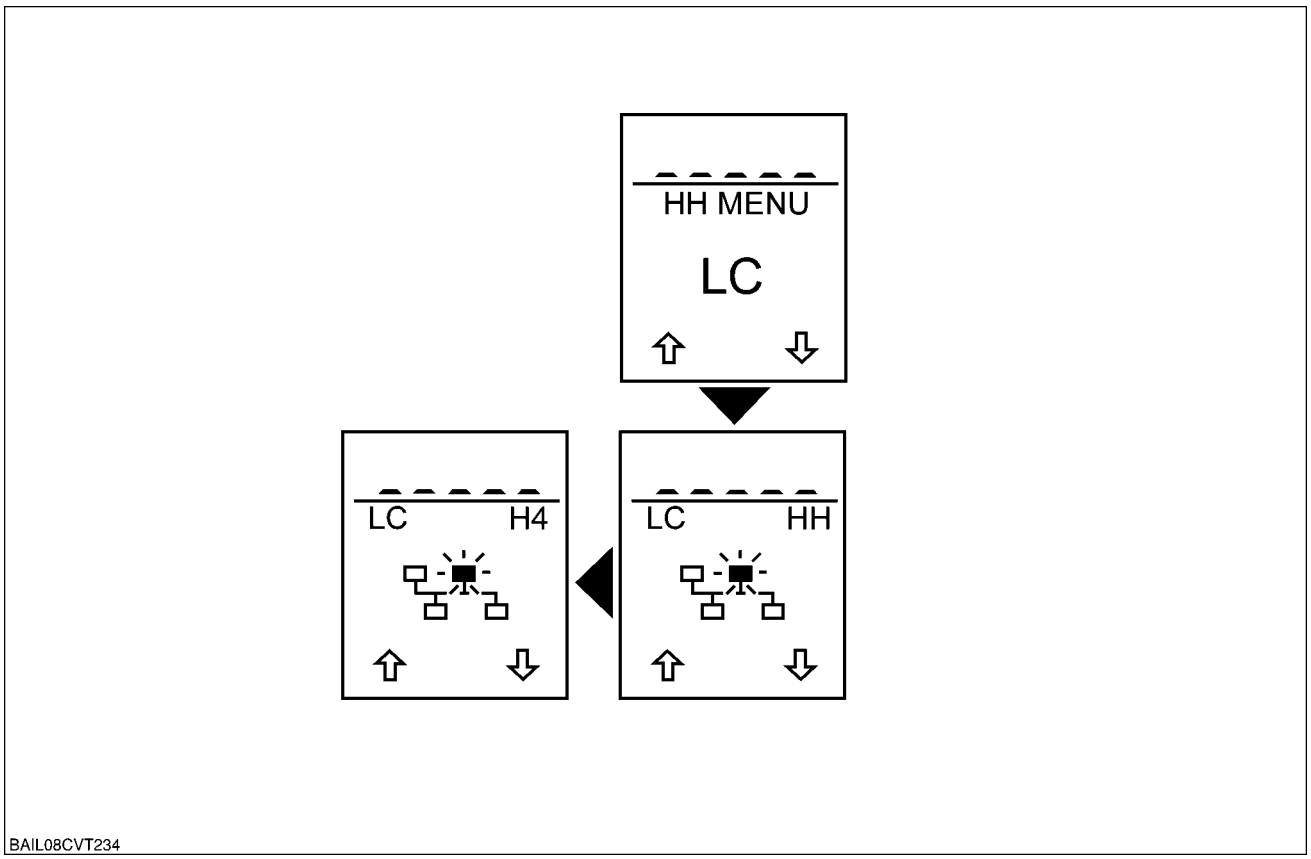
LC - Armrest (ARU)

HH	Service menu	Figure
H1	Not used	-
H2	Not used	-
H3	Not used	-
H4	Display software version level	**1**
H5	Switch diagnostics	**4**
H6	Not used	-
H7	Not used	-
H8	Not used	-
H9	Voltmeter diagnostics	**8**
HA	Not used	-
HB	Display stored fault codes	**[Invalid Refer-ence]**
HC	Clear all stored fault codes	**16**
HD	Not used	-
HE	Not used	-
HF	Display controller hardware information	**20**
HJ	Not used	-

H4 - DISPLAY SOFTWARE VERSION LEVEL

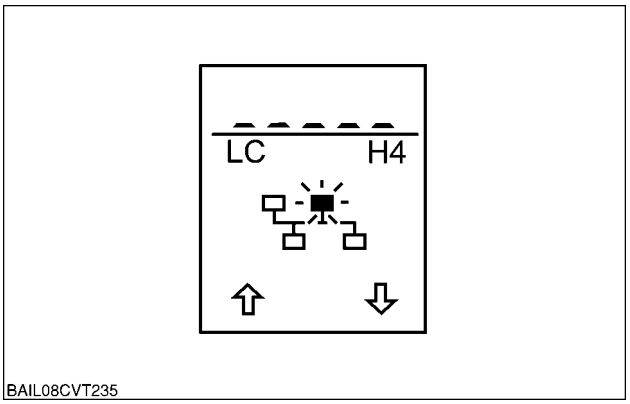
This function is available in all sub-systems.

H4 Menu page selection diagram



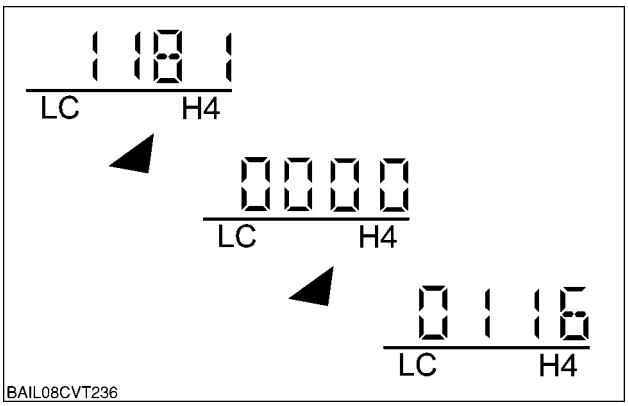
BAIL08CVT234 1

Select the H4 menu by depressing the "menu" key.



BAIL08CVT235 2

The upper section of the display will automatically cycle through the software release, as the example shown and return to allow navigation of the "HH" menus.

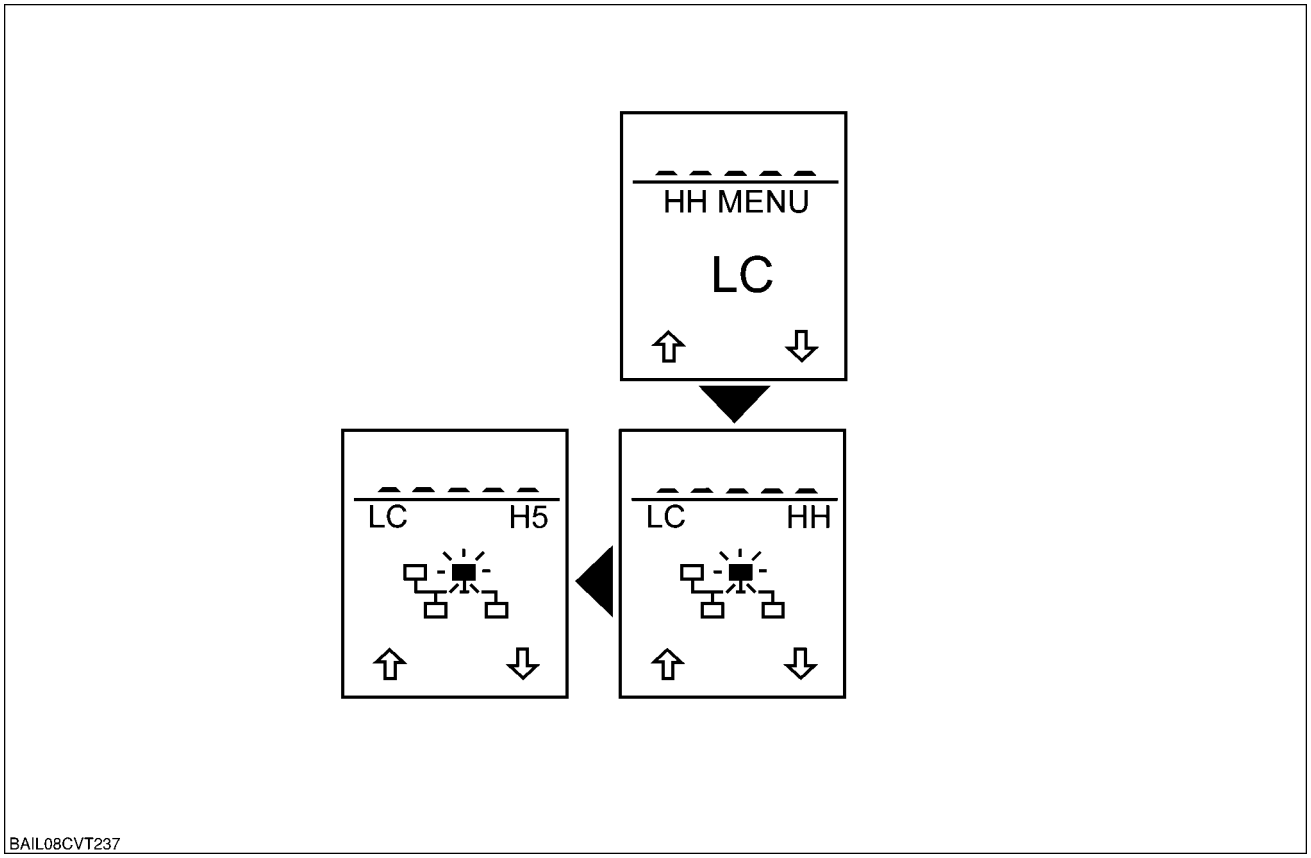


BAIL08CVT236 3

H5 - SWITCH OPERATION TEST

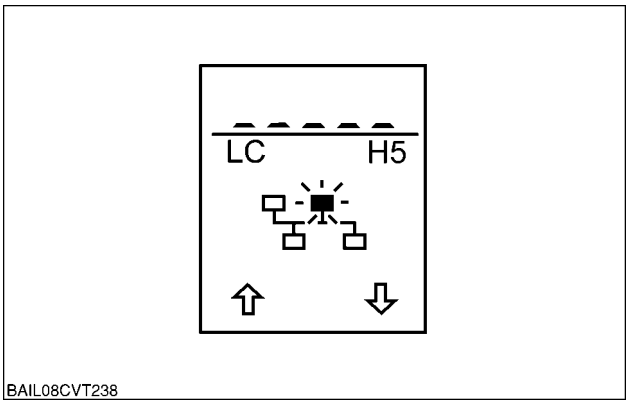
This menu displays a designated code when a switch transition is detected.
Common to all sub-systems.

H5 Menu Screen Select Diagram



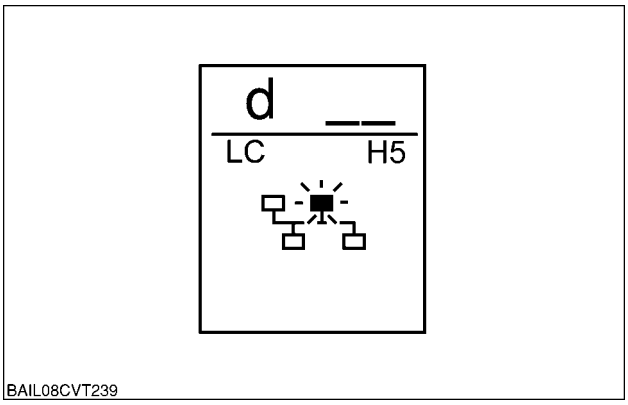
BAIL08CVT237 4

Select the H5 menu by depressing the “menu" key.



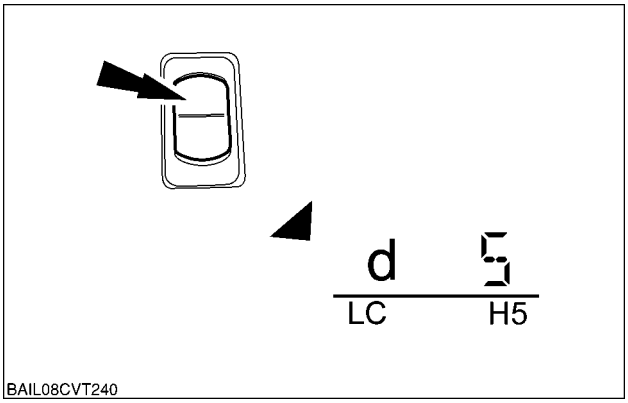
BAIL08CVT238 5

The top section of the display will display “d _ _".



BAIL08CVT239 6

When a switch is operated, a code will be displayed and an audible tone should be heard to indicate the correct function.
If a switch code is not displayed and the audible tone not heard, a ’wiggle’ test can be performed on the related wiring while watching the display or listening for the audible tone, to help locate the fault.



BAIL08CVT240 7

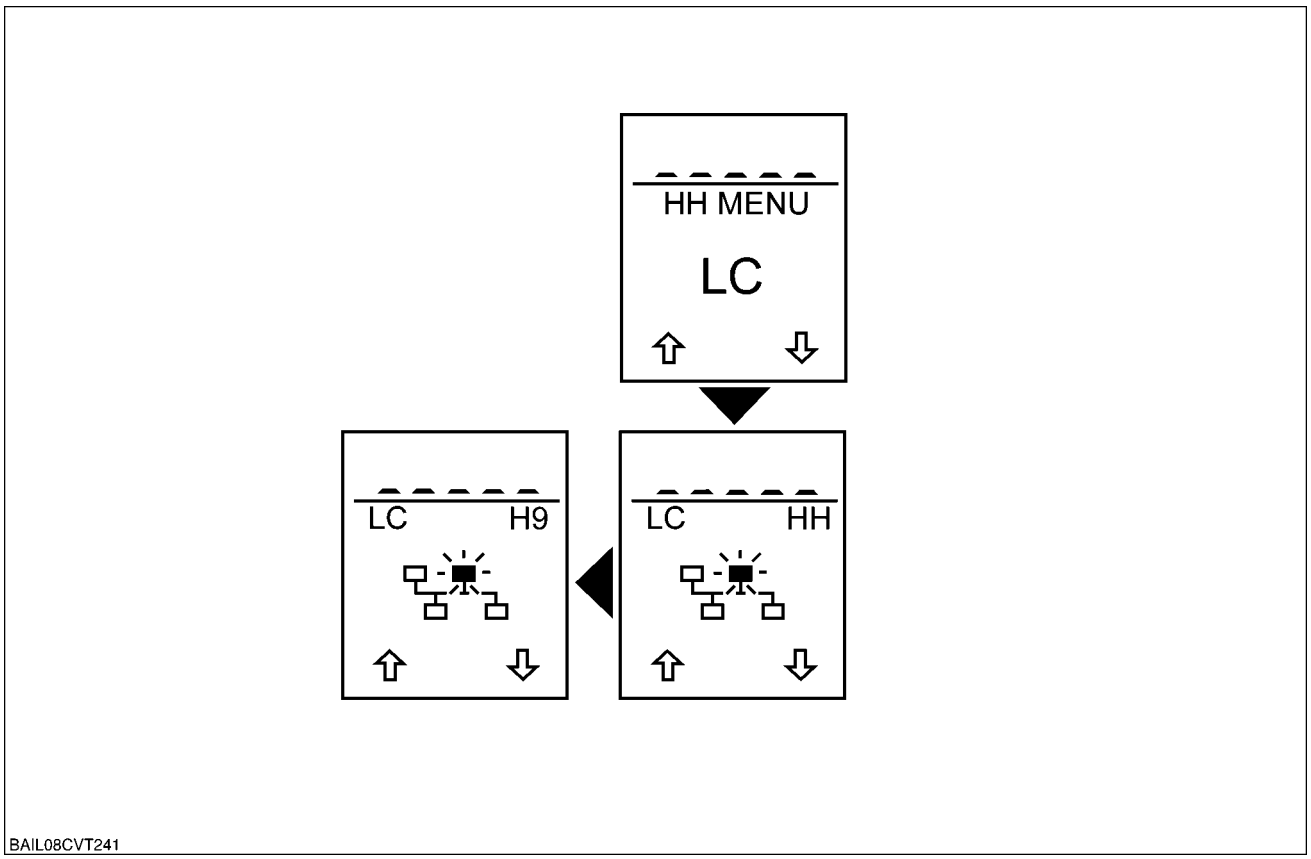
Identifier	Switch / Input	Notes
d5	Multi function handle (MFH) - Rear hitch work switch	
d6	MFH - Rear hitch raise switch	
d19	MFH - 2nd function handle	
d92	Front hitch height limit enable switch	
d95	EHR 1 program / motor mode switch	
d96	EHR 2 program / motor mode switch	
d97	EHR 3 program / motor mode switch	
d98	EHR 4 program / motor mode switch	
d104	MFH - Headland Turn system (HTS) step switch	
d136	MFH - Reverse switch	
d137	MFH - Forward switch	
d153	Joystick 1 - switch 1	
d154	Joystick 1 - switch 2	
d155	Joystick 1 - switch 3	
d159	EHR flow control encoder switch	
d165	EHR float control switch	
d169	MFH - CVT range increase switch	
d170	MFH - CVT range decrease switch	
d177	MFH - Autoguidance engage on/off switch	
d178	MFH EHR 1 extend switch	
d179	MFH EHR 1 retract switch	

H9 - VOLTMETER

This menu is used to verify the operation of various potentiometers, voltage supplies, and solenoid current circuits. If an intermittent fault is detected within a circuit, a 'wiggle' test can be performed on the related wiring while watching the display for sudden changes in values, to help locate the area where the fault exists.

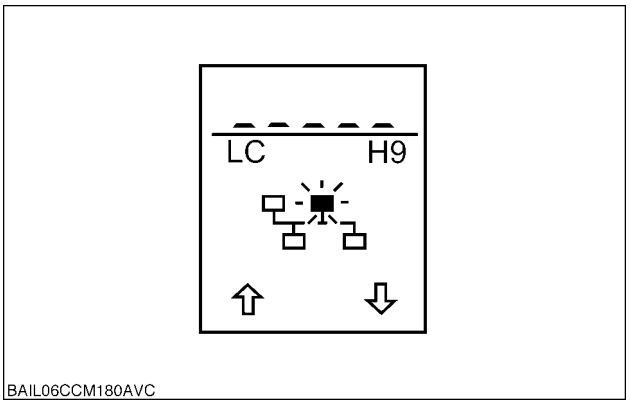
NOTE: *The vehicle may be driven while in this menu.*

H9 Menu Screen Select Diagram



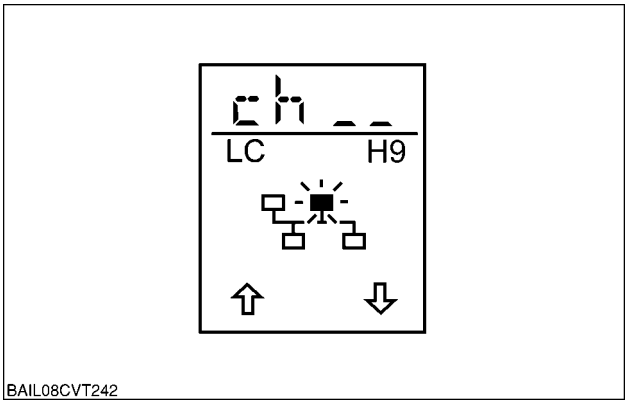
BAIL08CVT241 8

Select the H9 menu by depressing the "menu" key.



BAIL06CCM180AVC 9

The upper section of the display will display "ch _ _".



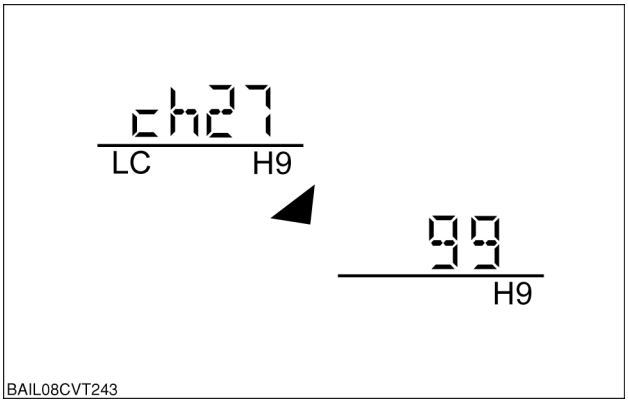
BAIL08CVT242 10

The required channel can be selected by using the navigation “up" and “down" keys.
After a delay the value will be displayed. Compare the value displayed with the typical reading shown in the table below.

NOTE: *The value is the input voltage or signal into the controller. This cannot be directly translated into a voltage due to the internal processes of the controller. A zero equates to* ***0 volts****.*

If the value displayed varies by more than **10 %** to that shown in the table below, a fault is indicated in either the component or the wiring harness relevant to that channel.

NOTE: *Check the connectors of the effected circuit, including the controller connectors, prior to replacing any components.*



BAIL08CVT243 11

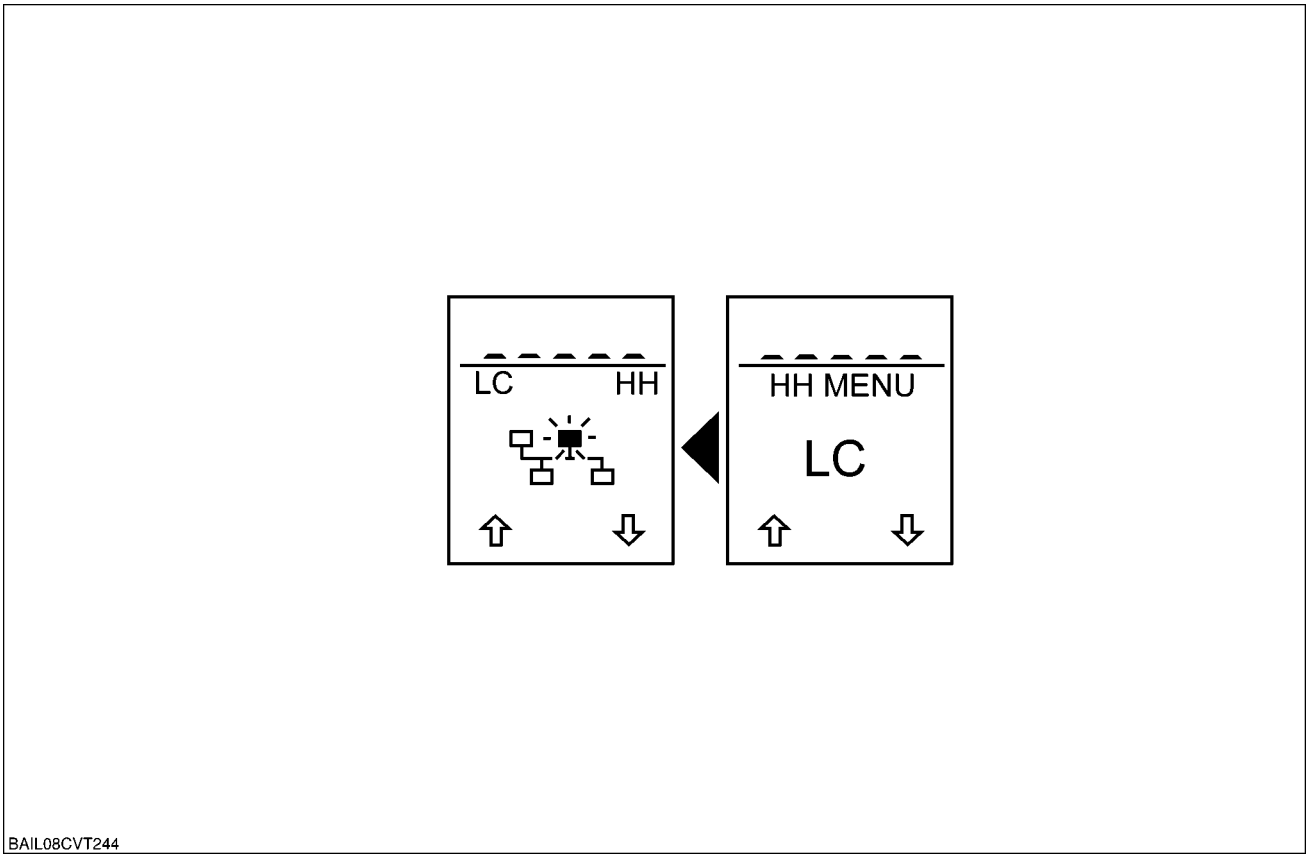
Channel	Description	Typical Reading
27	Front hitch - height limit control	0 anti-clockwise 100 clockwise
33	Rear hitch - position control	0 anti-clockwise 100 clockwise
34	Rear hitch - drop rate control	0 anti-clockwise 100 clockwise
35	Rear hitch - height limit control	0 anti-clockwise 100 clockwise
36	Rear hitch - sensitivity control	0 anti-clockwise 100 clockwise
37	Rear hitch - slip control	0 anti-clockwise 100 clockwise
40	Rear hitch - draft control	0 anti-clockwise 100 clockwise
89	Hand throttle No.2 position	0.0 min throttle 100.0 max throttle
90	Hand throttle No.1 position	0.0 min throttle 100.0 max throttle

Channel	Description	Typical Reading
97	Joystick 1 - X position	0.0 at centre 100.0 left/right
98	Joystick 1 - Y position	0.0 at centre 100.0 up/down
101	EHR No.1 lever position	97.0 raise, 55.0 neutral 12.0 lower, 1.0 float
102	EHR No.2 lever position	97.0 raise, 55.0 neutral 12.0 lower, 1.0 float
103	EHR No.3 lever position	97.0 raise, 55.0 neutral 12.0 lower, 1.0 float
104	EHR No.4 lever position	97.0 raise, 55.0 neutral 12.0 lower, 1.0 float
137	Front hitch position pressure	0 anti-clockwise 100 clockwise
138	Front hitch drop rate	0 anti-clockwise 100 clockwise
139	Front hitch position pressure mix	0 anti-clockwise 100 clockwise
140	Multifunction handle position	0.0 fully back 100.0 fully forward
143	Joystick 1 - proportional rocker	50 centre 0 pressed down, 100 pressed up
145	Vref 1	927
149	EHR flow encoder	Not available
150	Multi Function Handle encoder	Not available

HB - DISPLAY STORED FAULT CODES

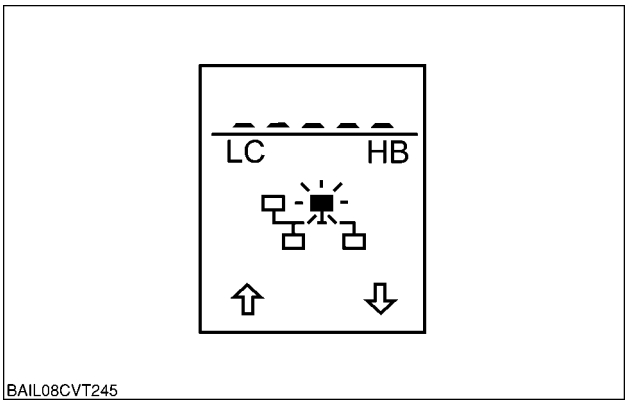
This menu is used to display the fault codes, which are stored in the EEPROM of the electronic control unit. This function is available in all sub-systems.

HB Menu page selection diagram



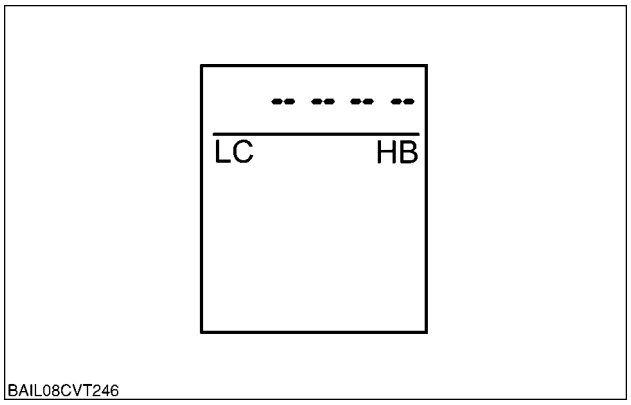
BAIL08CVT244 12

Select the HB menu by depressing the "menu" key.



BAIL08CVT245 13

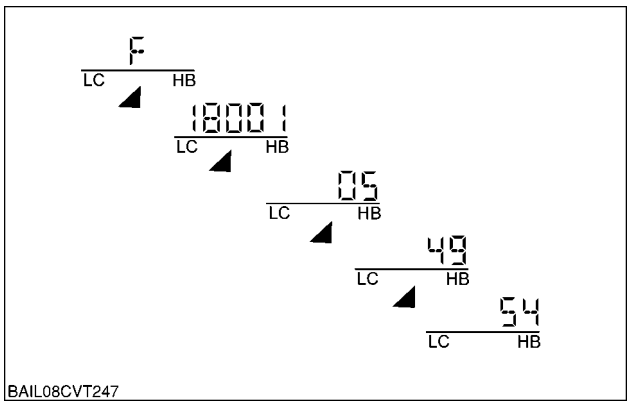
"_ _ _ _" is displayed in the upper section of the display, when no fault code is stored in the selected sub-system.



BAIL08CVT246 14

"F" is displayed in the upper section of the display, if a fault code is stored in the selected sub-system.
The sequence of the data display runs through in the upper section of the display, for example, as follows:

18001 Fault code
05 Operating hours at the time of the first occurrence
49 Operating hours at the time of the last occurrence
54 Frequency of occurrence



BAIL08CVT247 15

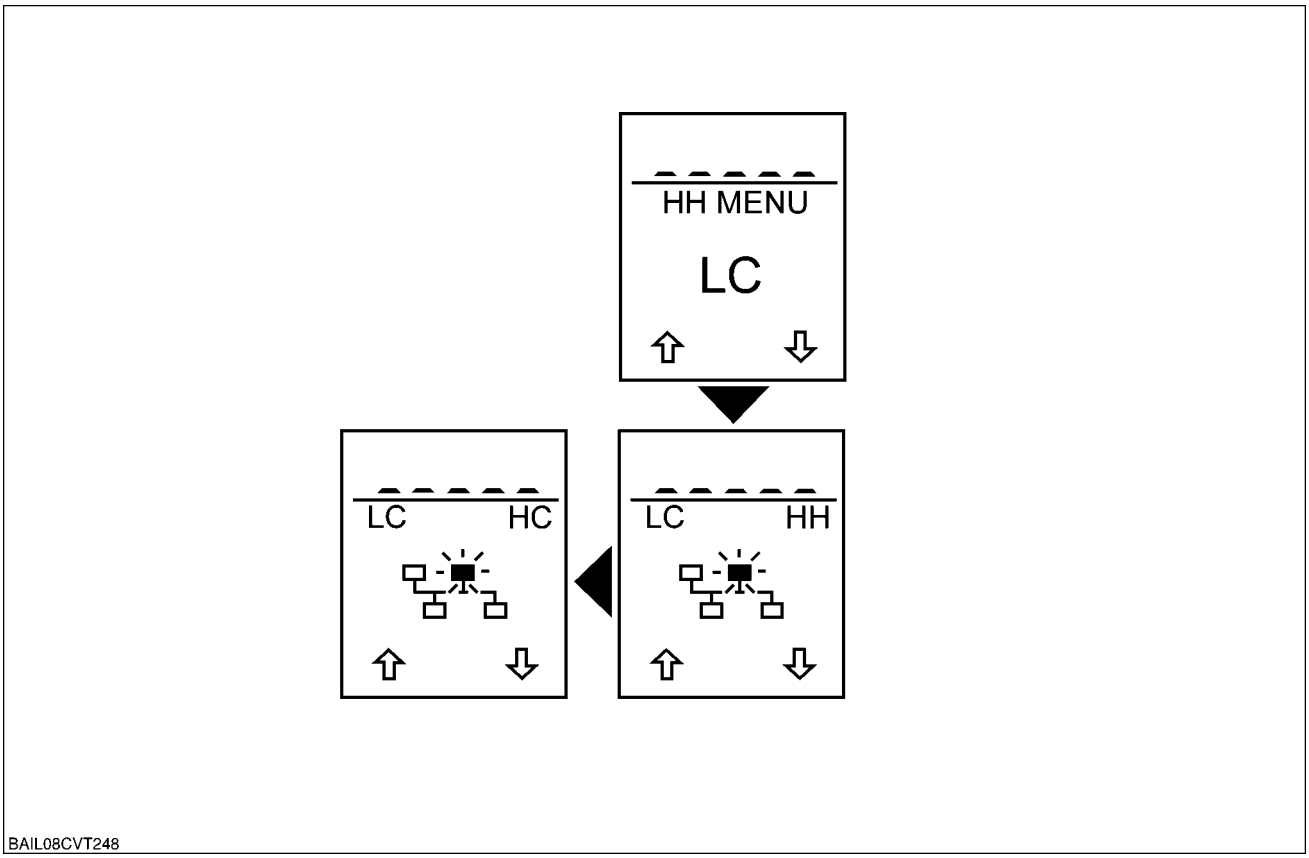
Press the "Up" or "Down" navigation button to change to the next fault code in the list.

As soon as the end of the list is reached, "_ _ _" is displayed in the upper section of the display.

To use the "HH" menu further, press the Menu button.

HC - CLEAR ALL STORED FAULT CODES

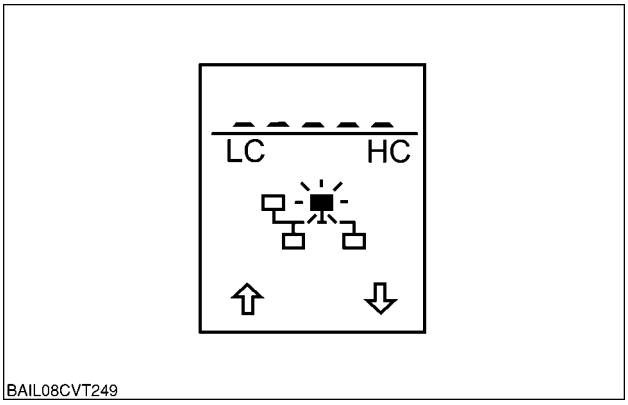
HC Menu page selection diagram



BAIL08CVT248 16

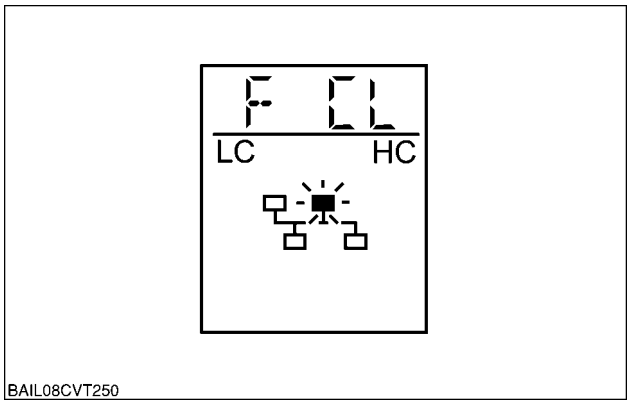
NOTE: *Always write the stored fault codes down before clearing.*

Select the HC menu by depressing the menu key.



BAIL08CVT249 17

"F CL" is displayed in the upper section of the display.



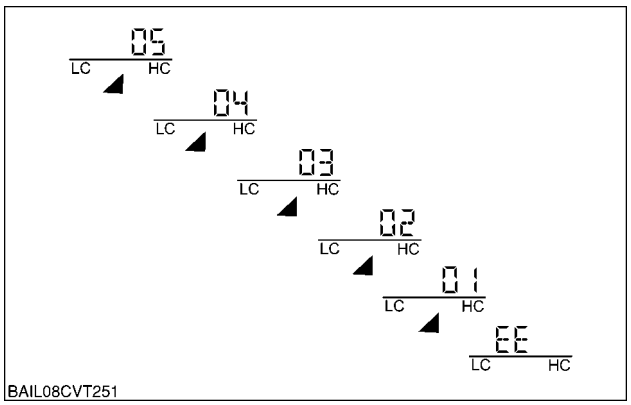
BAIL08CVT250 18

NOTE: *If the "Down" navigation button is released before the end of the countdown, the process is aborted.*

To confirm clearing the memory, press and hold the "Down" navigation button.

NOTE: *The numbers 05 to 01 run backwards in the upper section of the display, then "EE" appears to inform you that the fault codes have been cleared.*

To use the "HH" menu further, press the Menu button.

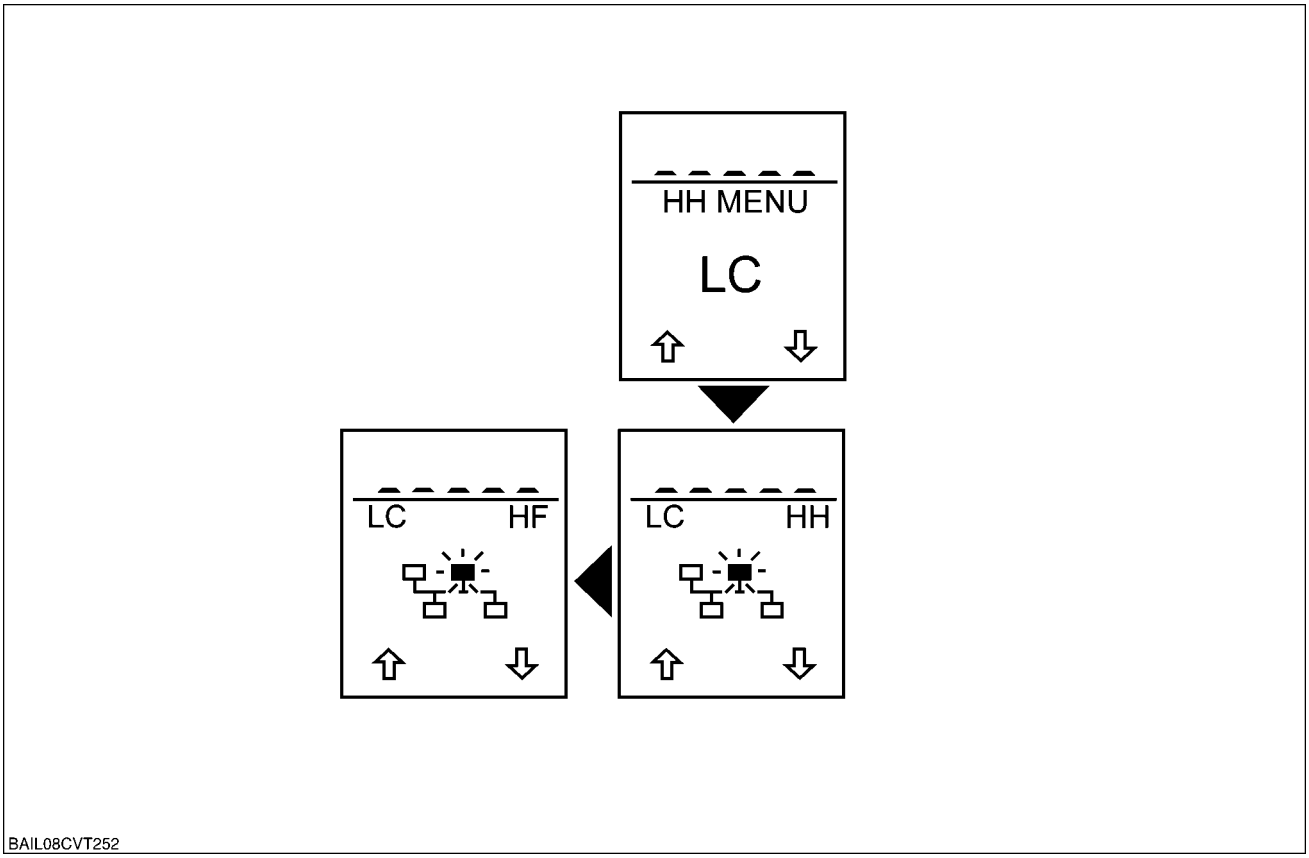


BAIL08CVT251 19

HF - DISPLAY CONTROLLER HARDWARE INFORMATION

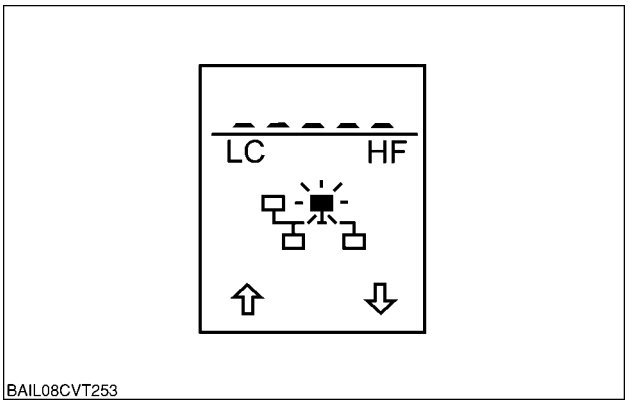
This menu makes possible hardware identification; the hardware version and serial number are displayed. This function is available in all sub-systems.

HF Menu page selection diagram



BAIL08CVT252 20

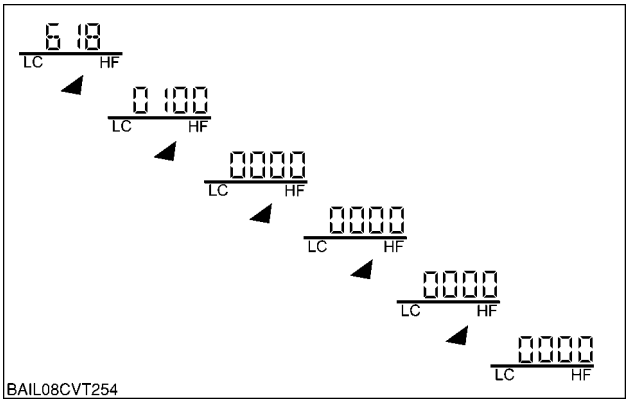
Select the HF menu by depressing the menu key.



BAIL08CVT253 21

The sequence of the data display runs through automatically in the upper section of the display, for example, as follows:

618 Hardware identification
0100 Hardware version
0000 Hardware version
0000 Serial number
0000 Serial number
0000 Serial number
After that the "HH" menu can be used again.



BAIL08CVT254 22

Control module - Configure Electronic Park Lock (EPL)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

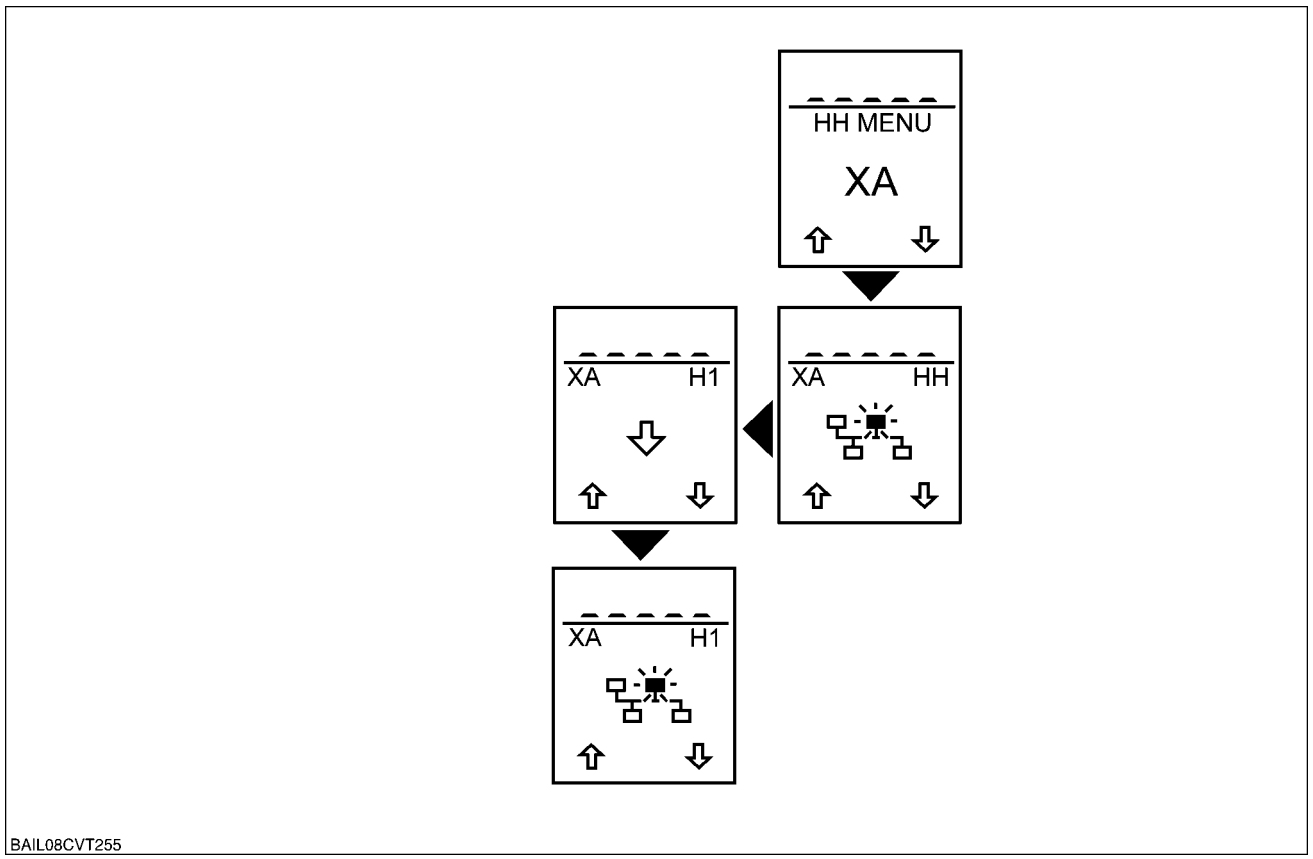
XA Control Module

HH	Service Menu	Figure Number
H1	Calibration procedures	**1**
H2	View stored calibration values	**2**
H3	Configurations and options	**5**
H4	View software revision level	**10**
H5	Switch operation test	**13**
H6	Not used	-
H7	Not used	-
H8	Clear Electrically Erasable Programmable Read Only Memory (EEPROM)	**17**
H9	Voltmeter	**21**
HA	Not used	-
HB	Display stored fault codes	**25**
HC	Clear all stored fault codes	**29**
HE	Not used	-
HF	View controller hardware information	**33**
HJ	Not used	-

H1 - CALIBRATION PROCEDURES

This menu is used to calibrate the Electronic Park Lock, refer to **PARKING BRAKE Electronic - Calibrate (D.32.D)**.

H1 Menu Screen Select Diagram

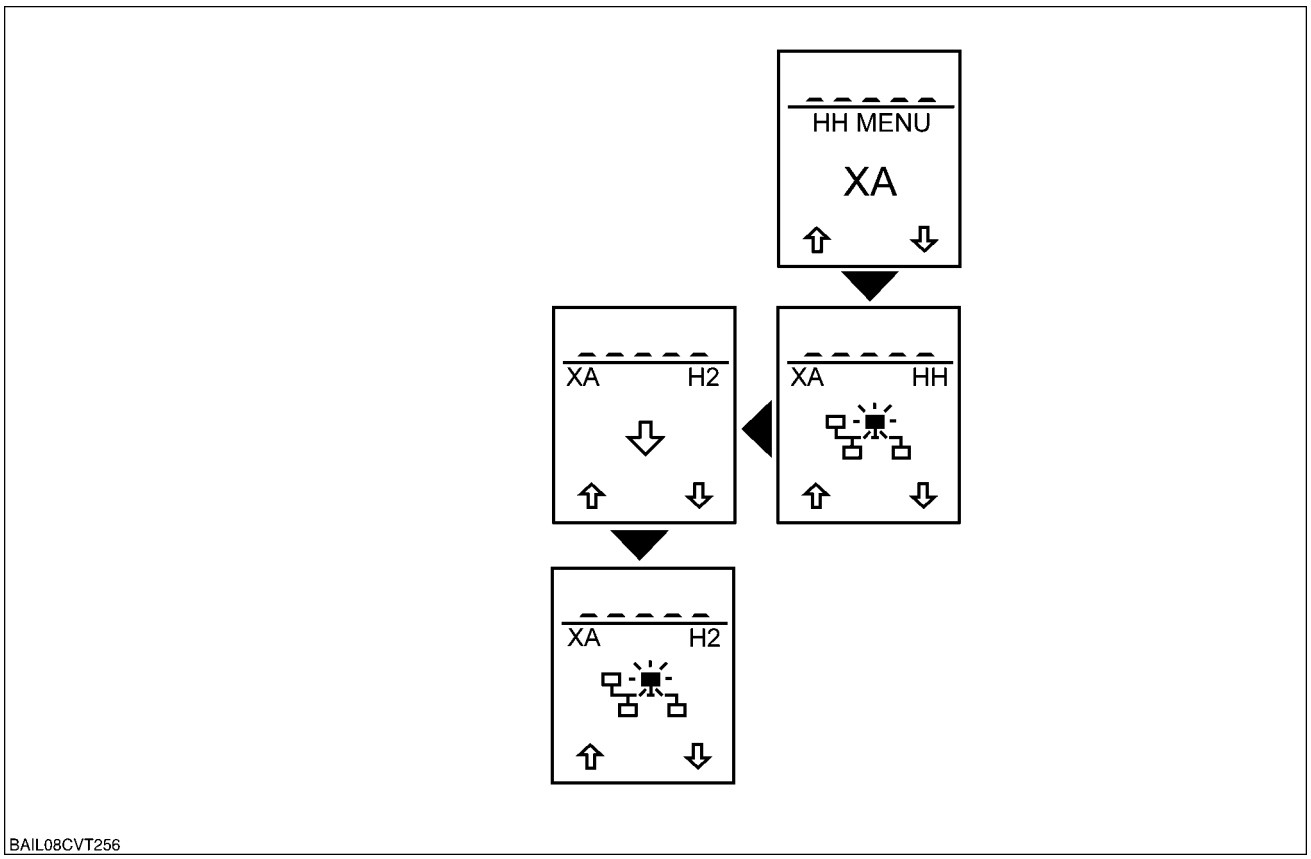


BAIL08CVT255 1

H2 - VIEW STORED CALIBRATION VALUES

This menu is used to display the calibration values stored in the controller for the Electronic Park Lock

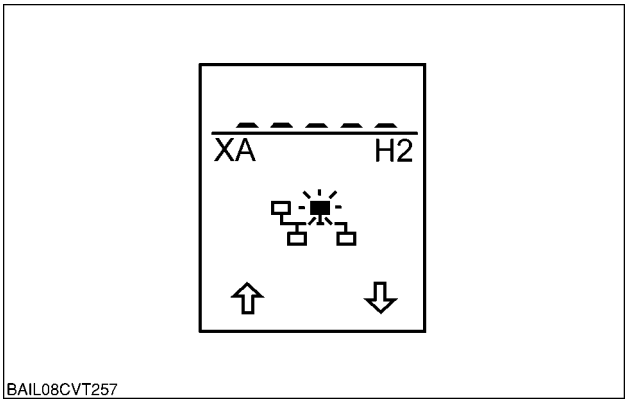
H2 Menu Screen Select Diagram



BAIL08CVT256 2

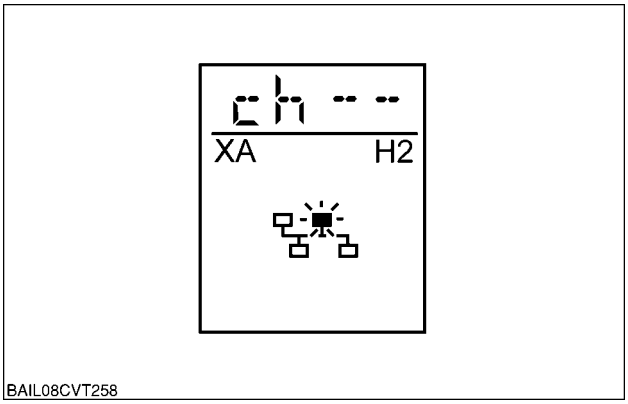
ELECTRONIC PARK LOCK VALUES

Select the electronic park lock sub system by depressing the "menu" key.



BAIL08CVT257 3

The upper section of the display will display "ch - -".
The required channel can be selected by using the navigation "up" and "down" keys.



BAIL08CVT258 4

After a delay the code followed by the calibration value will be displayed, (refer to the table below for the description of each channel).
Depress the "menu" key to continue navigating through the "HH" menus.

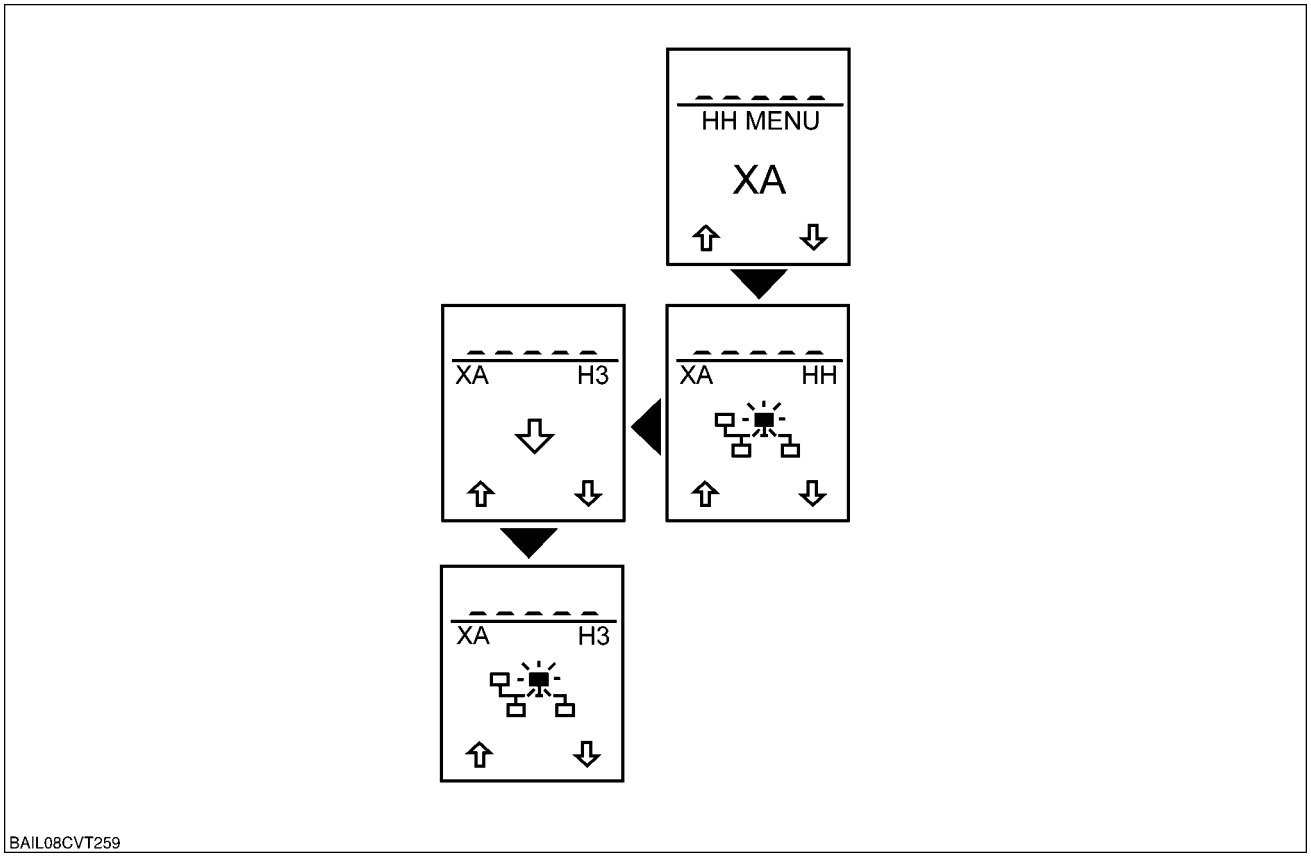
Channel	Description	Value Range
Ch 1	Accelerometer offset	-45.0 to 45.0
Ch 2	Applied position	0.0 to 65.0
Ch 3	Released position	0.0 to 65.0
Ch 4	Bite point position	0.0 to 65.0
Ch 5	Number of apply actuations	0 to 99999999
Ch 6	Number of apply actuations while tractor moving	0 to 99999999

H3 - CONFIGURATIONS

Used to display the configurations available for the electronic park lock.

1. Electronic park lock
   - Ch.1 Electronic park lock enable option
   - Ch.2 Trailer brake present

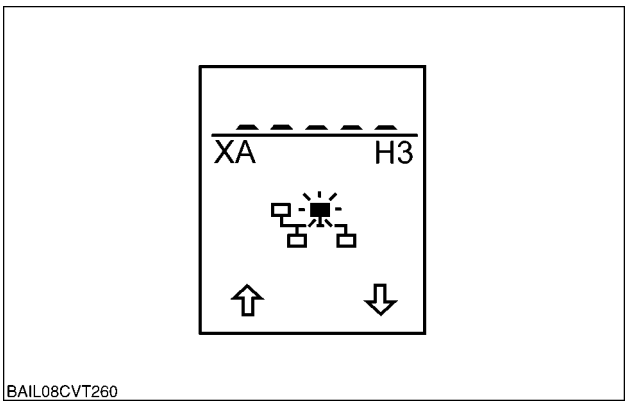
H3 Menu Screen Select Diagram



BAIL08CVT259 5

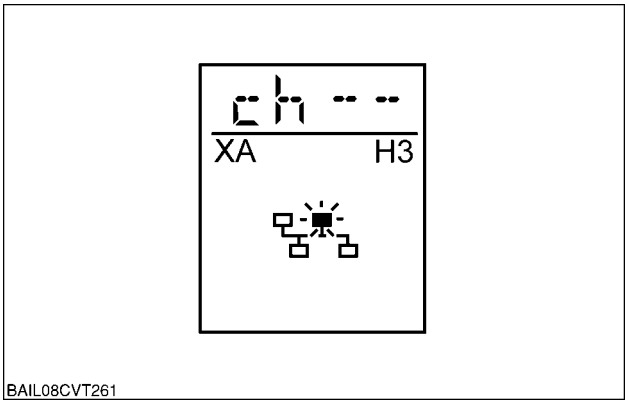
ELECTRONIC PARK BRAKE OPTIONS

Select the EPL sub-system by depressing the "menu" key.



BAIL08CVT260 6

The upper section of the display will display "ch - -".
The required channel can be selected by using the "up" and "down" keys.



BAIL08CVT261 7

After a delay the current setting will be displayed. (see the table below for the description of each channel).

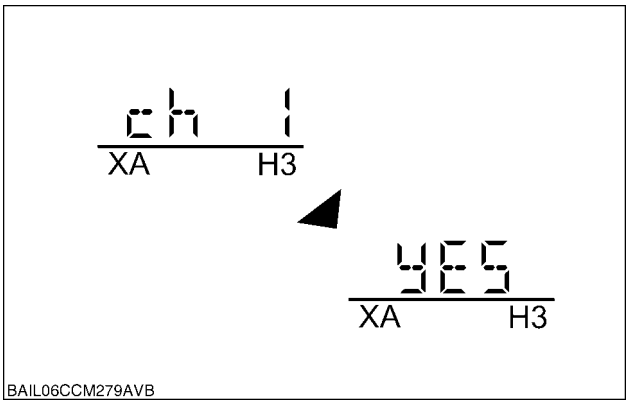
Channel	Description
Ch 1	Electronic Park Lock enable option
Ch 2	Trailer brake present

Channel 1 - Electronic Park Lock Option

Scroll through the available options using the navigation "up" or "down" key.

The options available are:

- YES - Enable EPL
- NO - Disable EPL



BAIL06CCM279AVB 8

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

Depress the "menu" key to continue navigating through the "HH" menus.

NOTE: *The default setting for this channel is "NO" - EPL not enabled.*

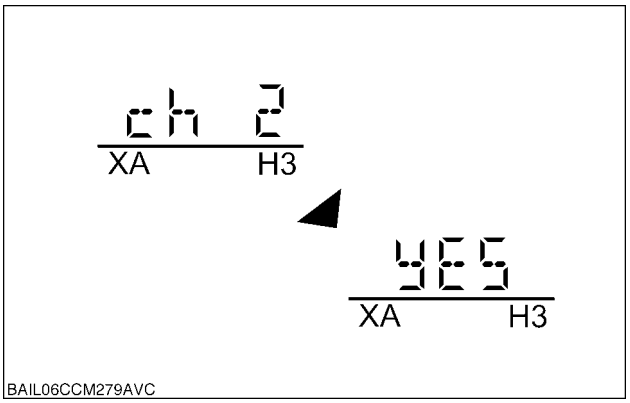
Channel 2 - Trailer Brake Present

This channel is used to select whether trailer brakes are present or not.

Scroll through the available options using the navigation "up" or "down" key.

The options available are:

- YES - Trailer brakes present
- NO - Trailer brakes not present



BAIL06CCM279AVC 9

To save the desired option, depress and hold the navigation "up" or "down" key until the instrument cluster bleeps, indicating that the selection has been saved.

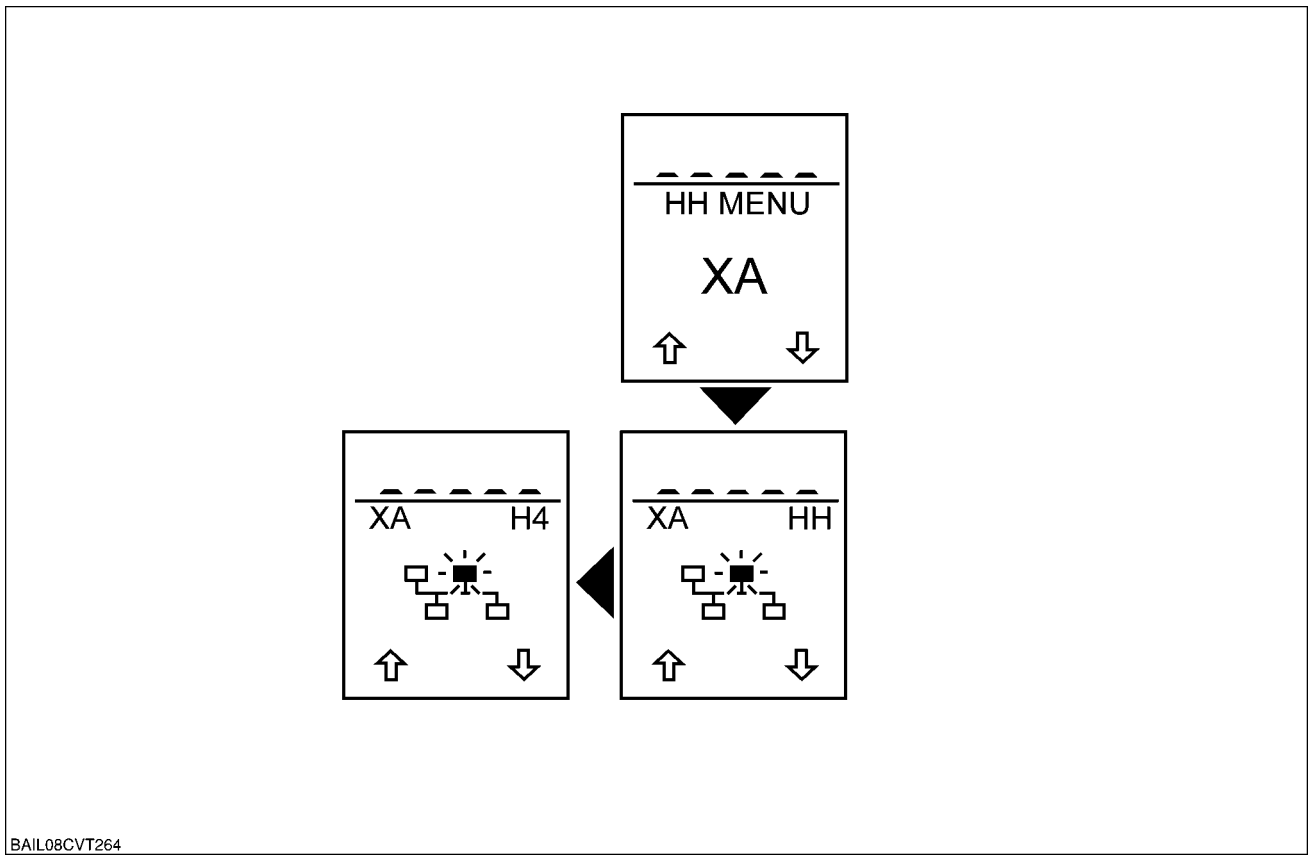
Depress the "menu" key to continue navigating through the "HH" menus.

NOTE: *The default setting for this channel is "YES" - Trailer brakes present.*

H4 - VIEW SOFTWARE REVISION LEVEL

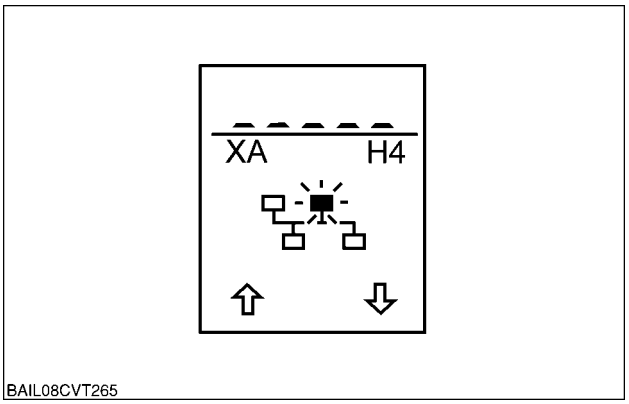
Common to all sub-systems.

H4 Menu Screen Select Diagram



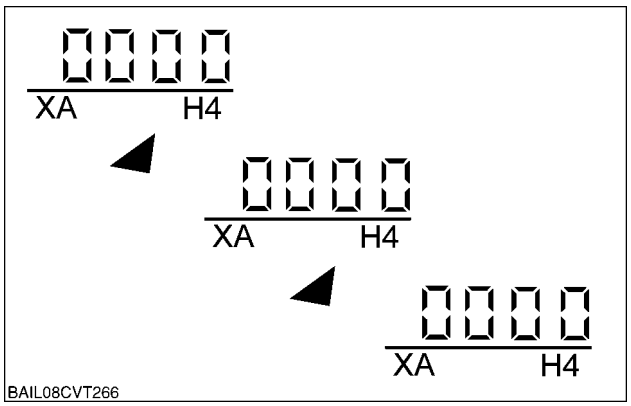
BAIL08CVT264 10

Select the H4 menu by depressing the "menu" key.



BAIL08CVT265 11

The upper section of the display will automatically cycle through the software release, as the example shown and return to allow navigation of the "HH" menus.

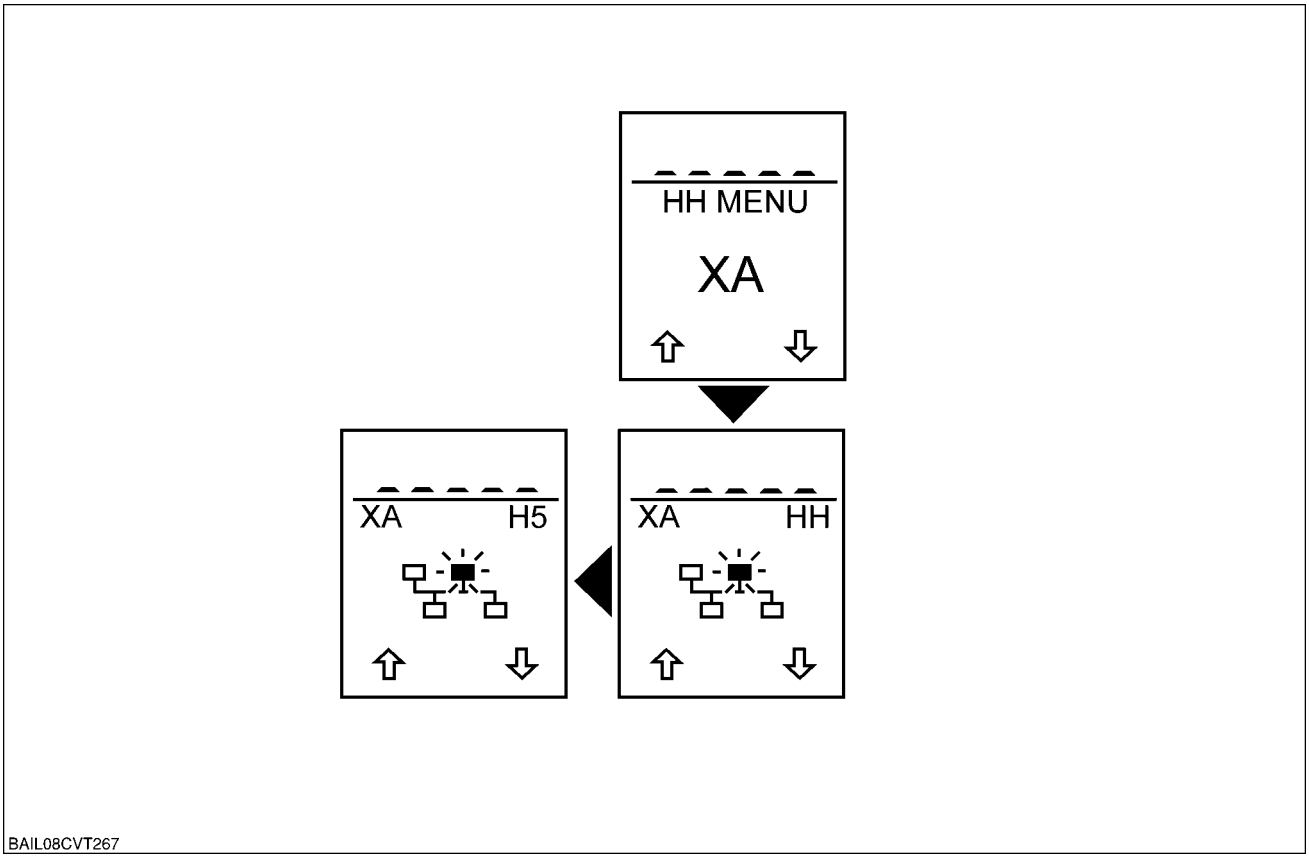


BAIL08CVT266 12

H5 - SWITCH OPERATION TEST

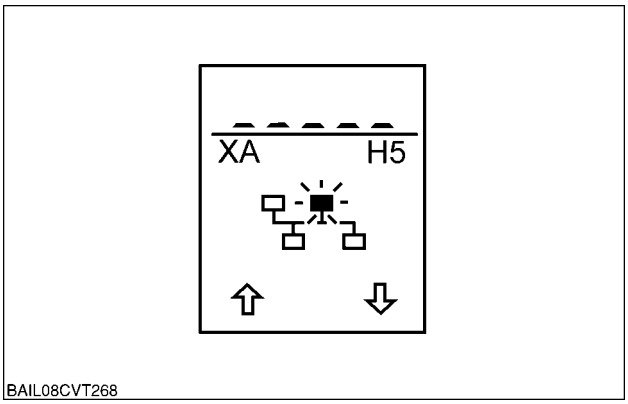
This menu displays a designated code when a switch transition is detected.
Common to all sub-systems.

H5 Menu Screen Select Diagram



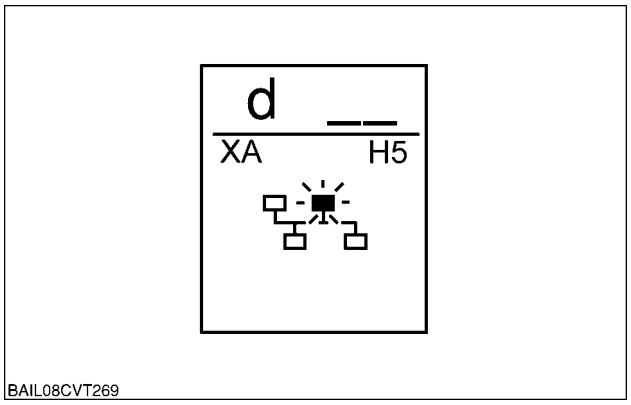
BAIL08CVT267 13

Select the H menu by depressing the "menu" key.



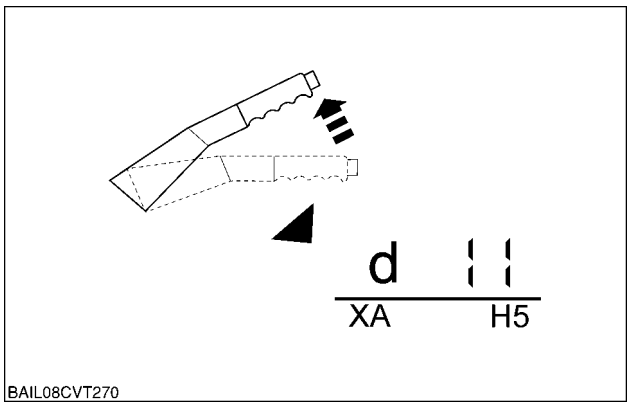
BAIL08CVT268 14

The upper section of the display will display "d_ _"



BAIL08CVT269 15

When a switch is operated, a code will be displayed and an audible tone should be heard to indicate the correct function.
If a switch code is not displayed and the audible tone not heard, a 'wiggle' test can be performed on the related wiring, while watching the display or listening for the audible tone, to help locate the fault.



BAIL08CVT270 16

Identifier	Controller Pin number	Switch / Input
d8	B4	Cranking status
d11	B3	Handbrake switch
d28	C7	Shuttle lever park switch

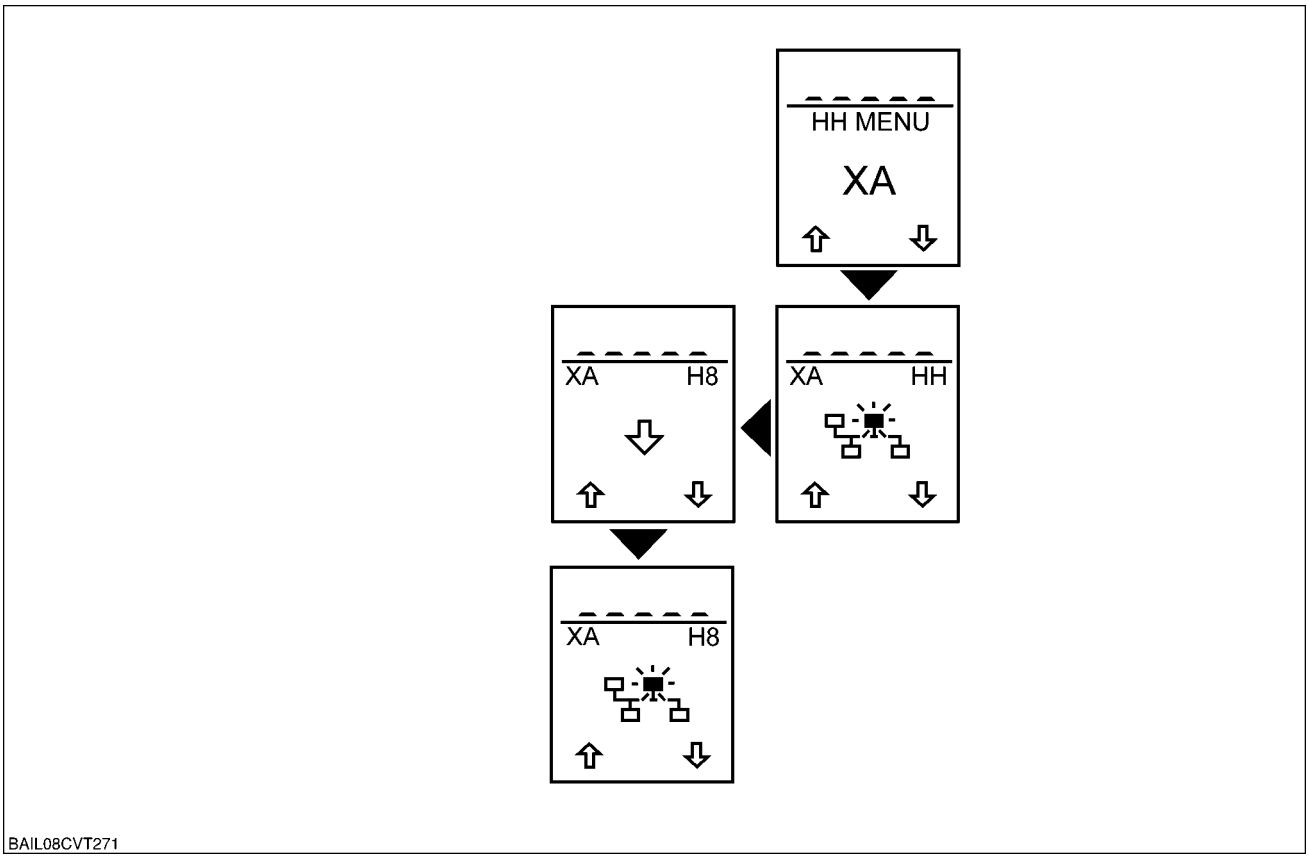
H8 - CLEAR ELECTRICAL ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM)

This menu clears calibration values and stored error codes by resetting all EEPROM values back to default. EEPROM is where all calibration values and error codes are stored. This memory is retained even if there is no power to the controller, i.e. if the battery is disconnected.

NOTE: *H8 will not change the configuration settings. The H3 menu mode must be used for this.*

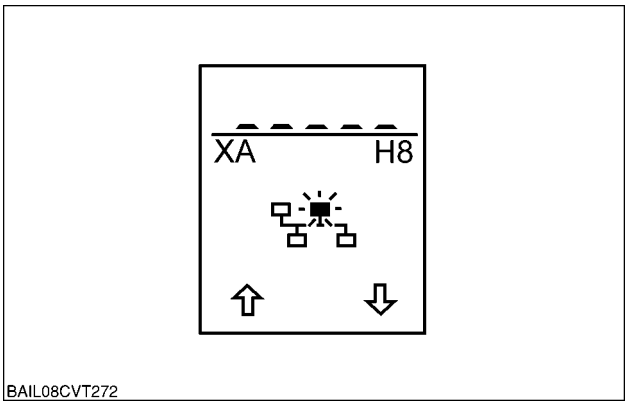
NOTE: *To erase only the stored error codes and not affect the calibration data use the HC menu mode.*

H8 Menu Screen Select Diagram



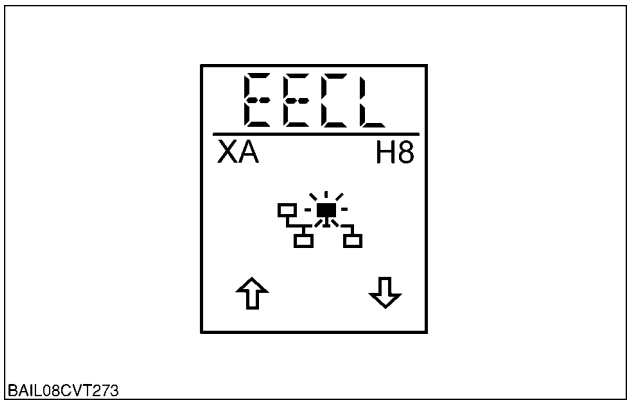
BAIL08CVT271 17

Press the "menu" button to accept the menu selection.



BAIL08CVT272 18

The upper section of the display will display "EECL".



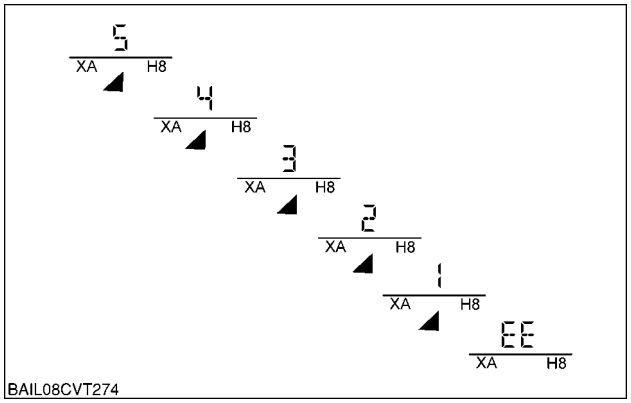
BAIL08CVT273 19

⚠ CAUTION ⚠

H8 will clear all calibrations values and stored error codes.

B006

Depress and hold the navigation "down" key to confirm the resetting of the EEPROM.
The upper section of the display will countdown from 5 to 1, then "EE" will be displayed to indicate the EEPROM has been cleared.



BAIL08CVT274 20

NOTE: *If the "down" key is released before the countdown finishes, the procedure will be aborted.*

Turn the keystart OFF.

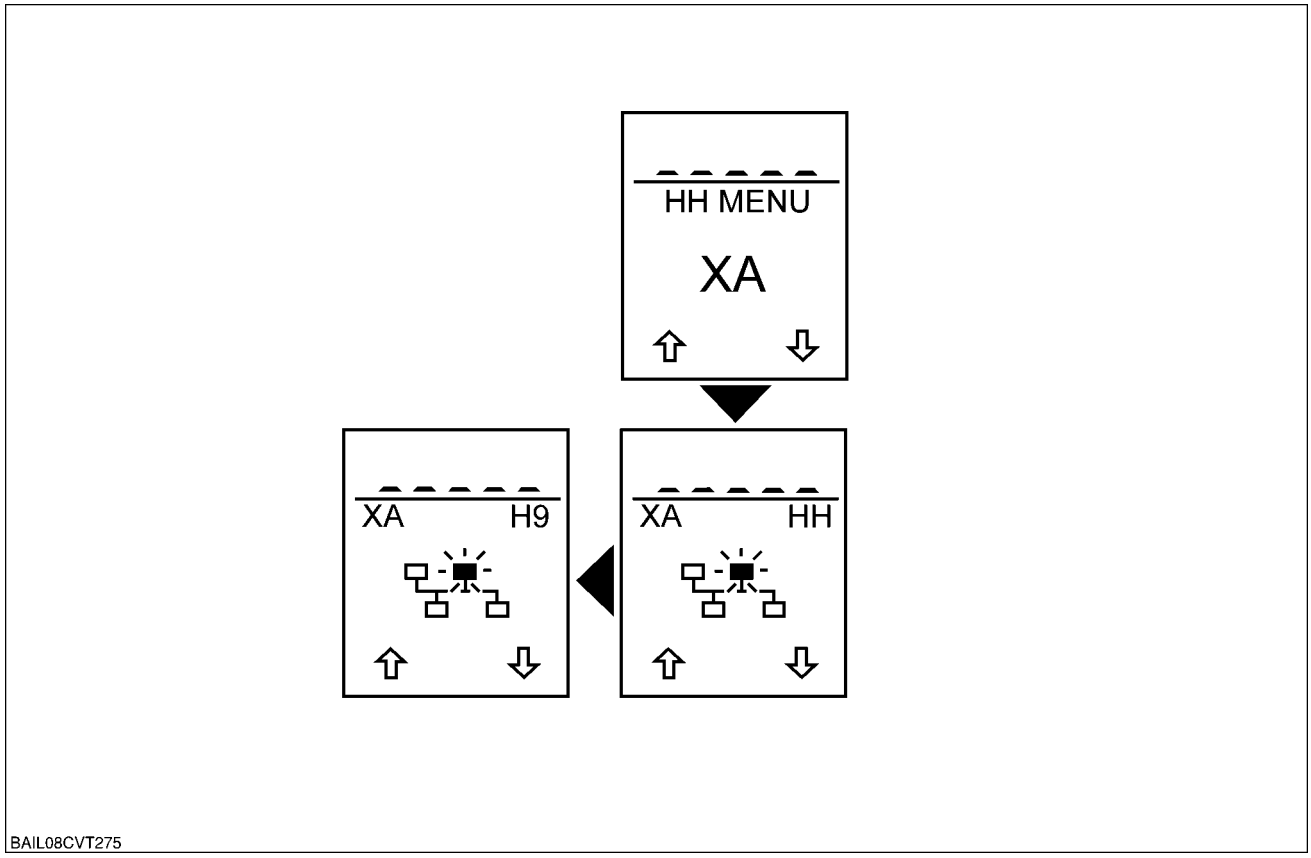
H9 - VOLTMETER

This menu is used to verify the operation of various potentiometers, voltage supplies, and solenoid current circuits. If an intermittent fault is detected within a circuit, a 'wiggle' test can be performed on the related wiring while watching the display for sudden changes in values, to help locate the area where the fault exists.

NOTE: *The vehicle may be driven while in this menu.*

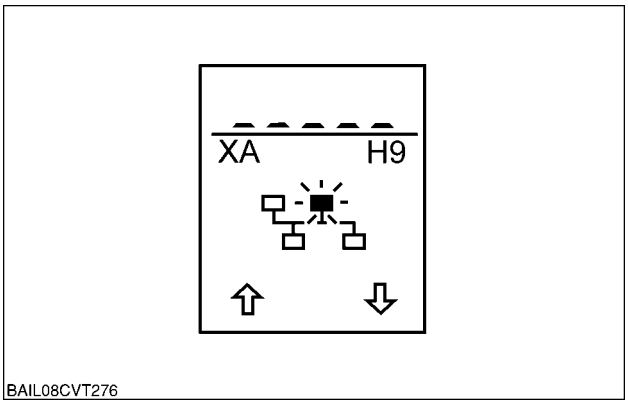
Common to all sub-systems.

H9 Menu Screen Select Diagram



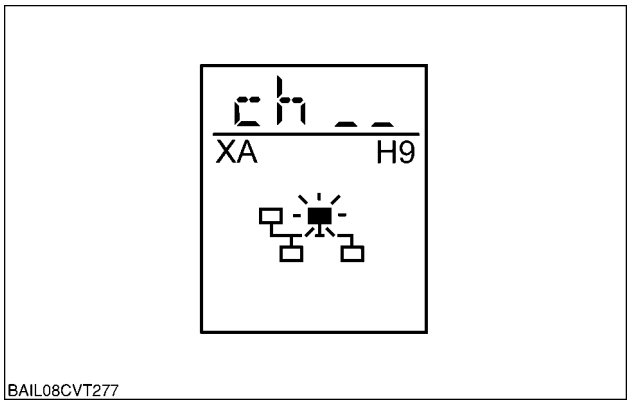
BAIL08CVT275 21

Select the H9 menu by depressing the "menu" key.



BAIL08CVT276 22

The upper section of the display will display "ch - -"



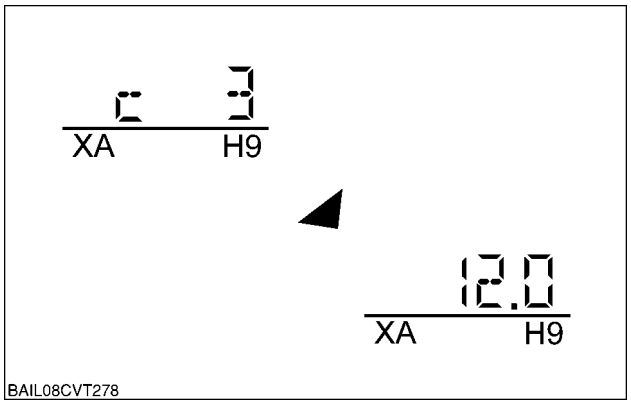
BAIL08CVT277 23

The required channel can be selected by using the navigation "up" and "down" keys.
After a delay the value will be displayed. Compare the value displayed with the typical reading shown in the table below.

NOTE: *The value is the input voltage or signal into the controller. This cannot be directly translated into a voltage due to the internal processes of the controller. A zero equates to* ***0 volts****.*

If the value displayed varies by more than **10 %** to that shown in the table below, a fault is indicated in either the component or the wiring harness relevant to that channel.

NOTE: *Check the connectors of the effected circuit, including the controller connectors, prior to replacing any components.*



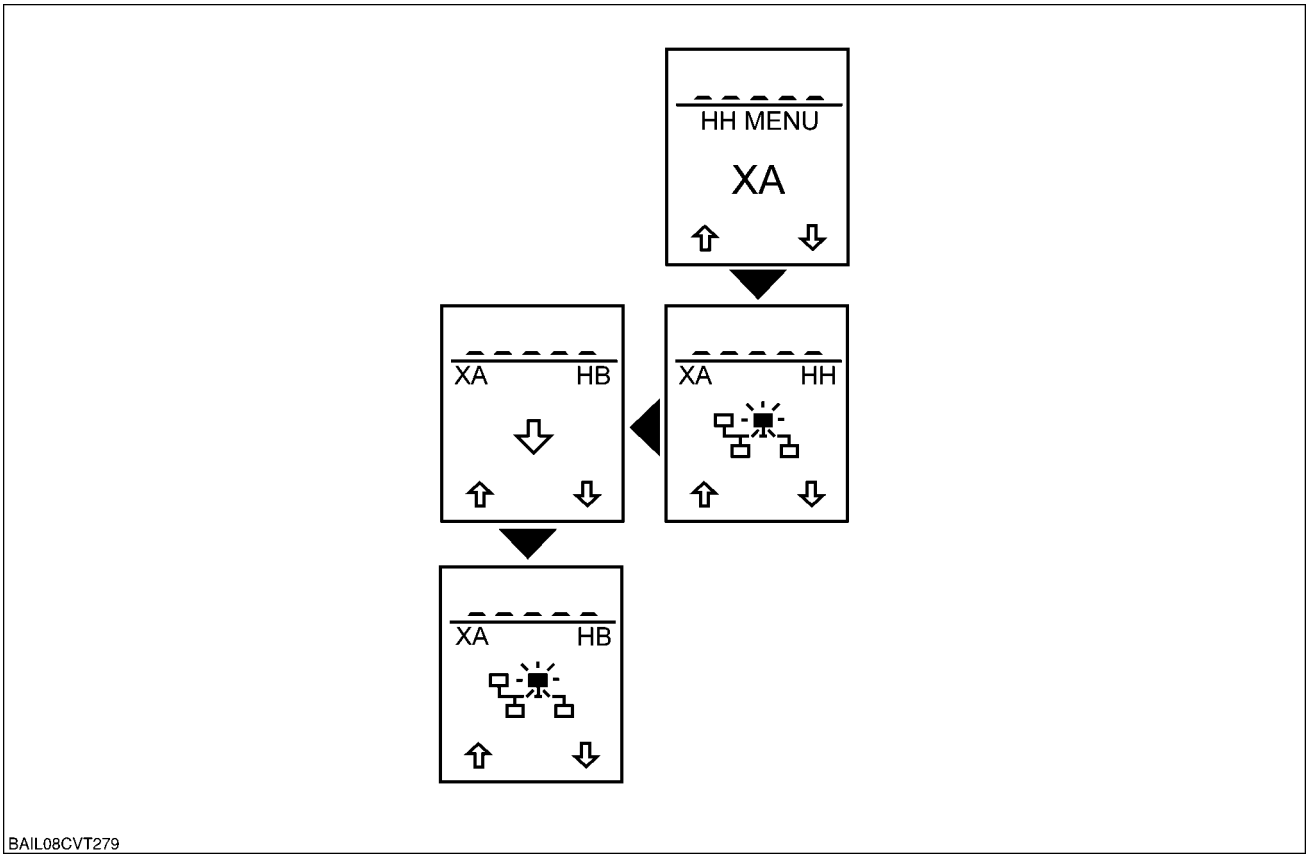
BAIL08CVT278 24

Channel	Description	Typical Reading
1	ASNS_AI_1 input	0 to 5V
2	Shuttle lever park switch	0 to 5V
3	Battery voltage	2.7 to 14.8V
4	Ignition switch voltage	0 to 14.8V
5	Accelerometer	-1.5 to 1.5g
6	Temperature	**-40 °C** to **120 °C**

HB - DISPLAY STORED FAULT CODES

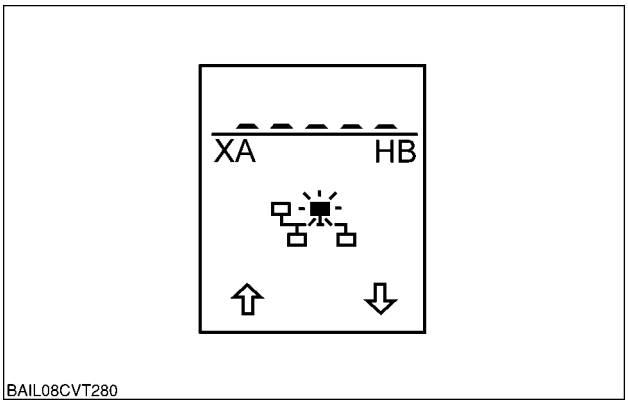
This menu is used to display fault codes which are stored in the EEPROM of the controller. Common to all sub-systems.

HB Menu Screen Select Diagram



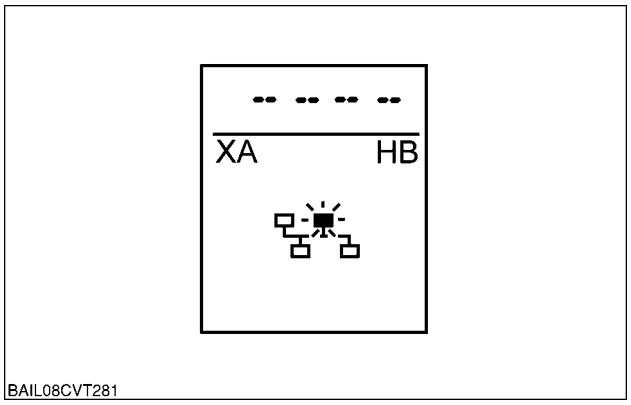
BAIL08CVT279 25

Select the HB menu by depressing the "menu" key.



BAIL08CVT280 26

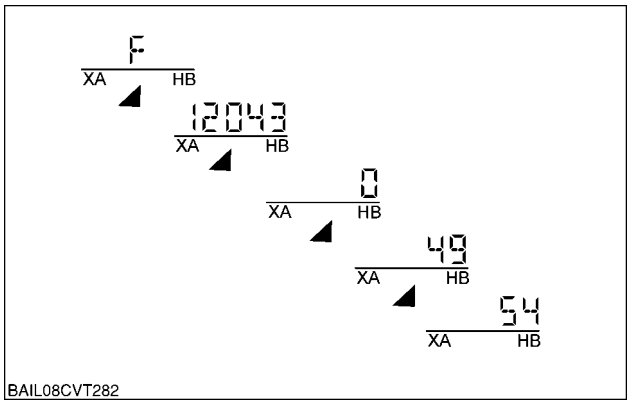
The upper section of the display will display "- - - -", if no fault is stored in the selected sub-system.



BAIL08CVT281 27

The upper section of the display will display "F", if a fault code is stored in the selected sub-system.
The upper section of the display will then automatically cycle through as the example:

12043 Fault code
00 Hour of first occurrence
49 Hour of last occurrence
54 Number of occurrences of the fault

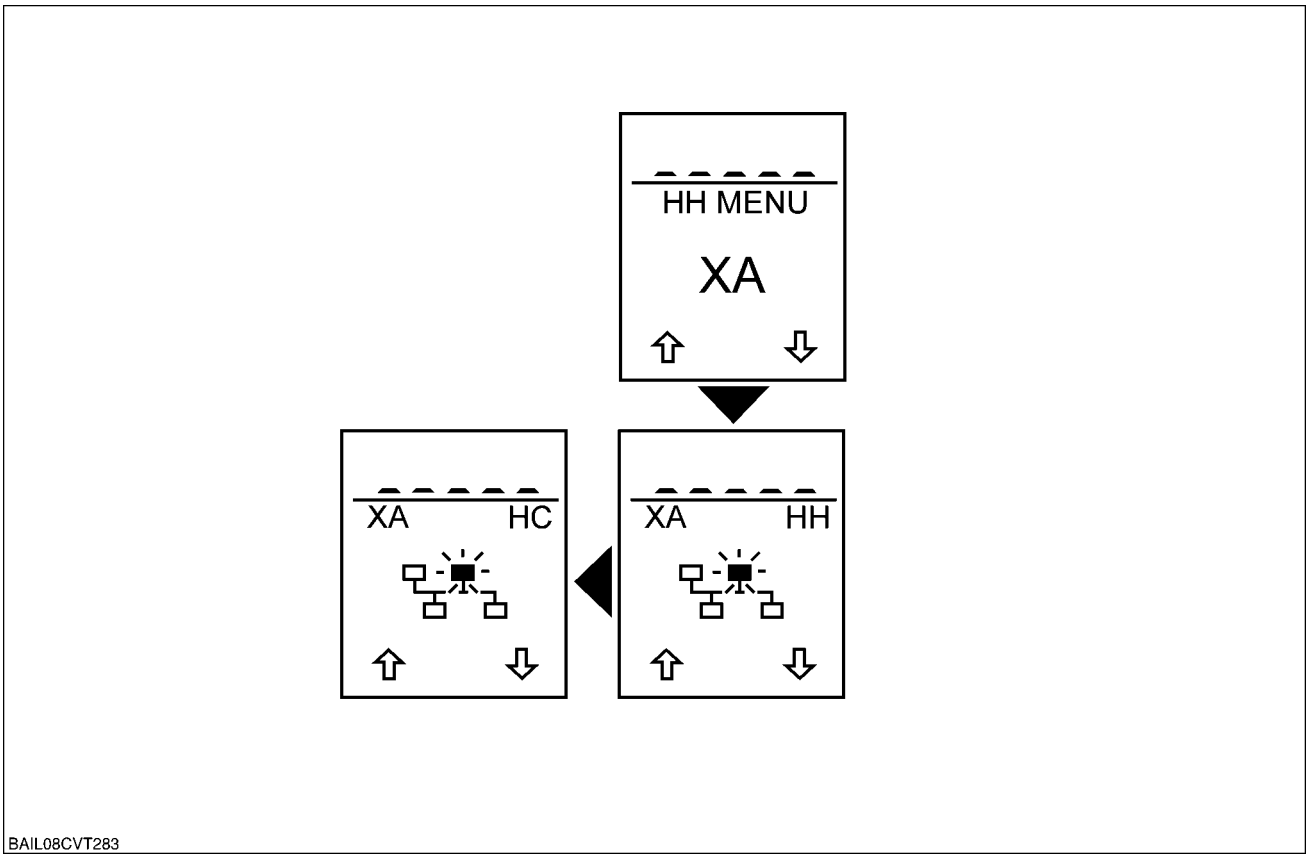


BAIL08CVT282 28

Depress the navigation "up" or "down" key to change to the next fault code in the list.
The upper section of the display will display "_ _ _" at the end of the list.
Depress the "menu" key to continue navigating through the "HH" menus.

HC - CLEAR STORED FAULT CODES

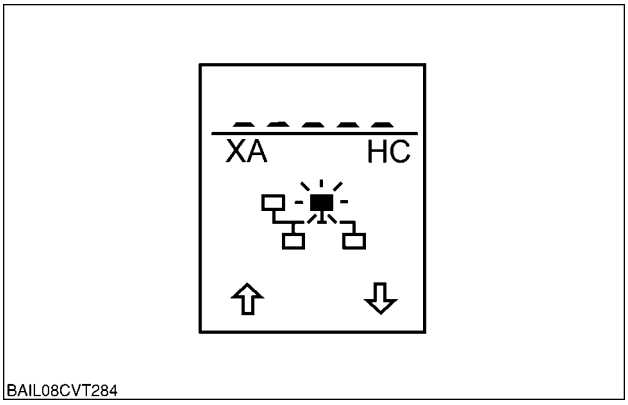
HC Menu Screen Select Diagram



BAIL08CVT283 29

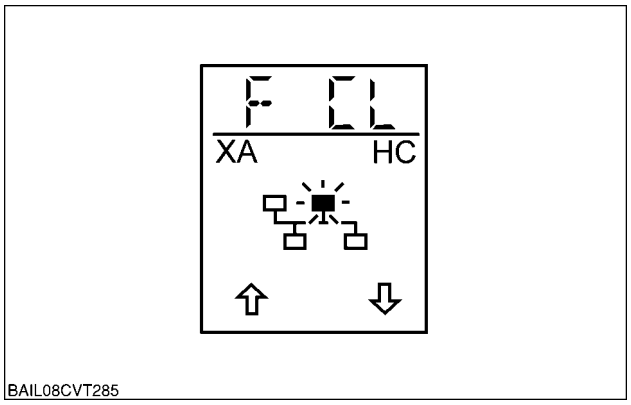
NOTE: *Always make a note of the fault codes stored, before clearing.*

Select the HC menu by depressing the "menu" key.



BAIL08CVT284 30

The upper section of the display will display "F CL".



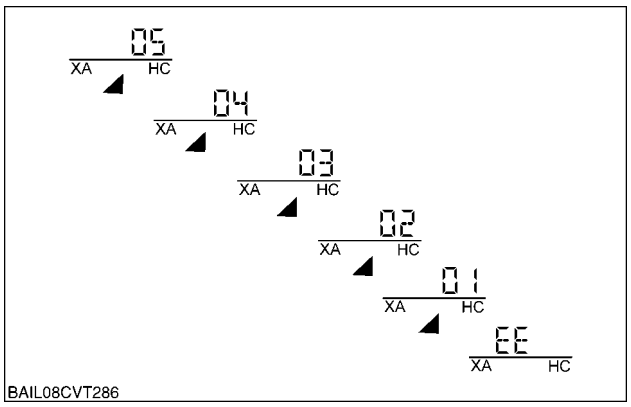
BAIL08CVT285 31

NOTE: *f the navigation "down" key is released before the countdown finishes, the procedure will be aborted.*

Depress and hold the navigation "down" key to confirm the clearing of the memory.

NOTE: *The upper section of the display will countdown from 05 to 01, then "EE" will be displayed to indicate the fault codes have been cleared.*

Depress the "menu" key to continue navigating through the "HH" menus.

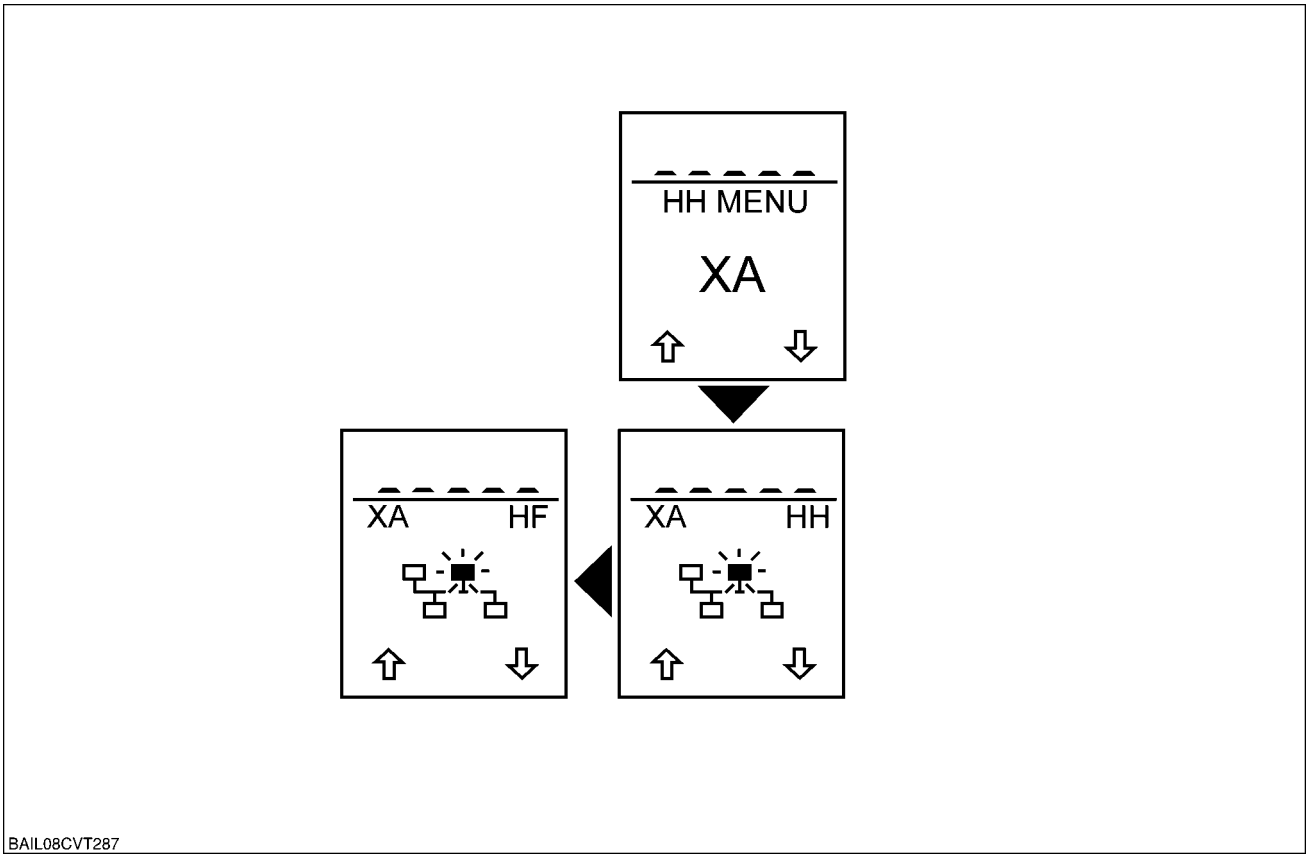


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HF - VIEW CONTROLLER HARDWARE INFORMATION

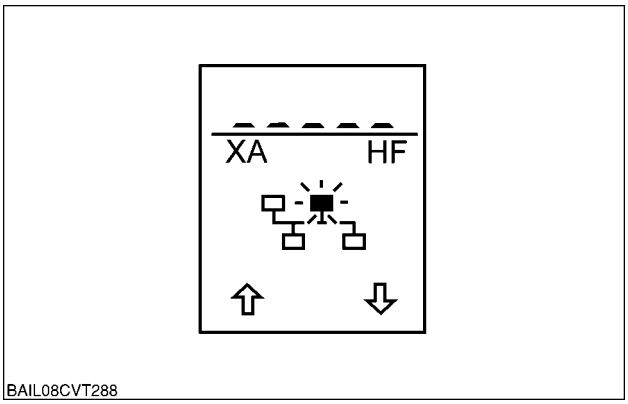
This menu allows the hardware identification, hardware version and serial number to be displayed. Common to all sub-systems.

HF Menu Screen Select Diagram



BAIL08CVT287 33

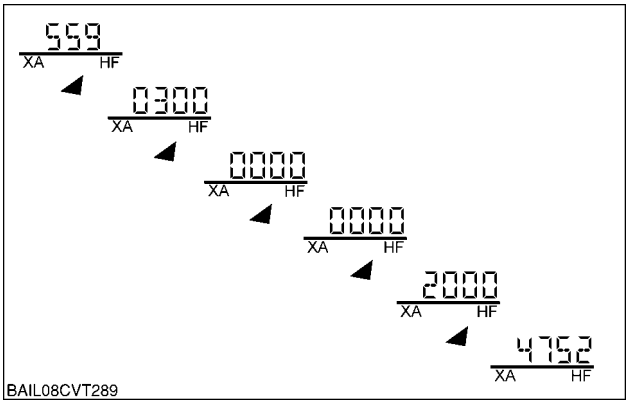
Select the HF menu by depressing the "menu" key.



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The upper section of the display will automatically cycle through as the example:

559 Hardware identification
0300 Hardware version
0000 Hardware version
0000 Serial number
2000 Serial number
4752 Serial number
and return to allow navigation of the "HH" menus.



BAIL08CVT289 35

ELECTRONIC SYSTEM - Static description

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Fault Codes and Fault Finding

The tractors have an inbuilt self diagnostic facility. This facility utilises the digital display of the Instrument cluster to indicate, in coded format, malfunctions in the electrical and electronic circuitry and in the micro-processor. It should be noted that the self diagnostic capability is generally limited to diagnosis of the electrical and electronic circuitry and related components, however, there are some codes, which can be generated if pressure switch circuits are not closed because of an actual lack of hydraulic pressure. Any malfunction of the mechanical and hydraulic components must be diagnosed using conventional techniques, performance characteristics and tooling, such as pressure testing equipment.
Trouble-shooting and fault finding should always be carried out in a logical and planned sequence, many apparent faults associated with electronic components are often hastily diagnosed and result in the replacement of expensive components. An extra few minutes confirming the apparent fault will result in a more positive and cost effective repair.
With the use of micro-processors it is often that this item is blamed for any malfunction but the real truth is that this item is usually sound and that the fault is due to poor contacts in the associated connectors.
Each electrical connector illustrated and identified in the wiring diagrams and referred to in the following fault finding procedures, has the same identification reference. For example, one of the processor connectors is referred to as Connector C100 in the illustration and also referred to as C100 the fault finding procedure. In the faultfinding procedure the connector, pin and wire colour are shown as, C100 pin 21 in **(GY)**. If all the wires are the same colour, the circuit number is also included to aid in wire identification. For example, C100 pin 21 (694-GY). This is broken down as follows:
C100 Connector number
694 Circuit number
GY Wire colour
All tests are carried out on the harness side of the connector, unless otherwise stated.
Refer to the relevant chapter for complete wiring diagrams and how to use them **Wiring harness - Static description (A.30.A)**.
Where the fault finding procedure requires checks for continuity a visual inspection of the wiring should be made prior to conducting tests to ensure that obvious ‘mechanical’ damage has not occurred to the harness or the connectors.
A good quality multi-meter is an essential item to perform fault finding. It should be capable of measuring resistance of at least **20,000 ohms** and measuring voltage and current. When using the multi-meter it is good practice to select a high range and work downwards to avoid damaging the instrument. Refer to the ’Basic Multi-Meter use’ section of this chapter for further details.

IMPORTANT: *Care should be used when using the multi-meter, only use the instrument as instructed to avoid damage to the internal elements of the micro-processor. When checking the continuity of wiring, sensors or switches it is necessary to isolate the electronic micro-processor and ensure the keystart is turned off to prevent possible further damage. The keystart should only be switched on and the processor connected where specifically instructed in the fault finding procedure.*

If it is found necessary to clean the connectors a contact spray should be used. DO NOT USE ANY OTHER METHOD FOR CLEANING TERMINALS. Do not use a cleaner that contains Trichloro-ethylene, this solvent will damage the plastic body of the connector. It is preferable to use a cleaner with a Freon T.F. base.

SPECIAL TOOLS

Description	Tool No.
Electrical Repair Tool Kit (North America Only)	FNH 01000 / 380040089
Harness Repair Kit (Except North America)	**380030042**
Test Probe Kit (Except North America)	**380050010**

WIRING HARNESS REPAIRS

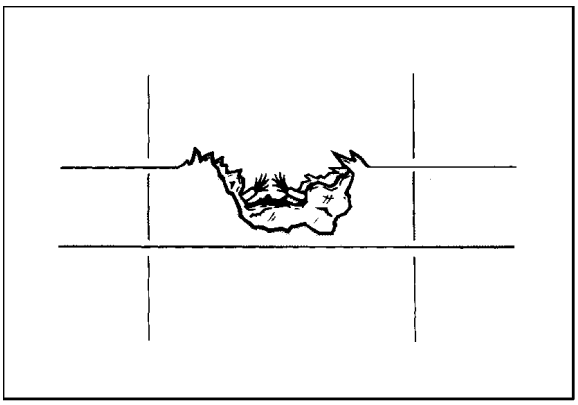
Temporary Wiring Harness Repair

NOTE: *It is acceptable to use the following repair procedure on the CAN BUS wiring. It is important though to ensure that the wire lengths are not altered from the original as this will affect the performance of the CAN BUS system.*

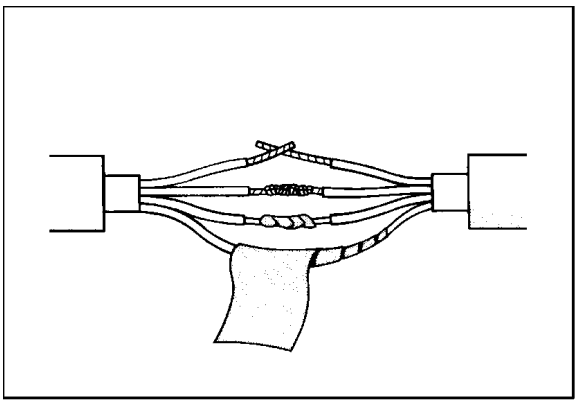
The following method to repair wiring is a temporary expedient only. Wiring should be replaced as soon as possible. Do not attempt to repair the wire on any system sensors as these are sealed and should only be replaced with a new component.

NOTE: *When conducting a cable repair it is important that only RESIN CORED SOLDER is used. Use of other types of solder may result in further cable damage.*

To carry out a temporary repair, proceed as follows:-

1. Locate damaged portion of cable then cut away outer protective cover on both sides of the damaged area, Figure **1**.
2. 

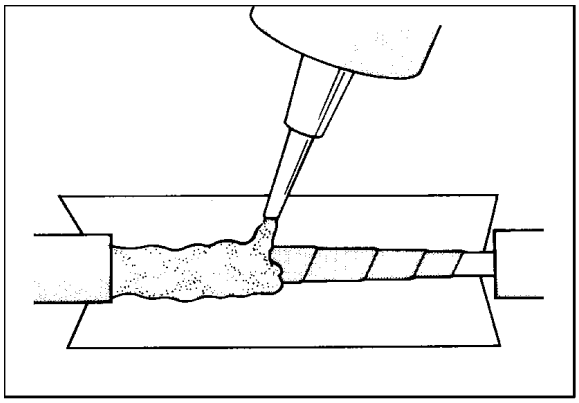
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1. Using a suitable solvent, clean about 2 inches (**50 mm**) from each cover end. Clean the grey cable cover and the individual leads.
2. Twist two bare leads together for each damaged lead, being careful to match wire colours, then solder the leads using resin cored solder. Tape each repaired lead with vinyl insulation tape, Figure **2**.
3. 

1b0o2004061089 2

1. Wind a layer of vinyl insulation tape up to the grey cable cover at each end of the repair section. Make a paper trough, Figure **3**, then apply silicon rubber compound (non hardening sealant) over the repaired section up to the cover ends. Sufficient sealant must be used to fill the ends of the cut away area.

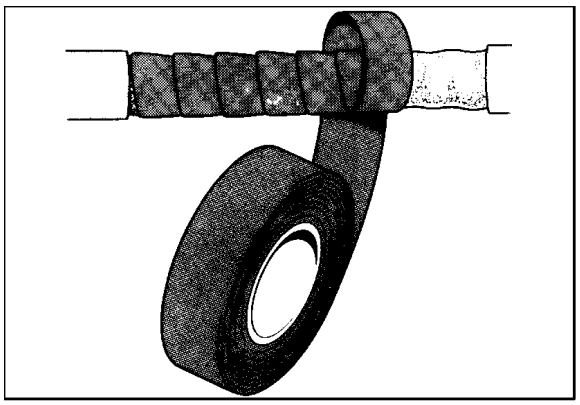
2.



1b0o2004061090 3

1. Allow the compound to cure then cover the area with insulating tape taking the tape well over each end of the repair. An overlap of at least 2 inches (**50 mm**) of tape at each end is necessary, **4**.
2. Check to ensure the repair is satisfactory and secure the repaired cable so that repeat damage is avoided.

NOTE: *This is a temporary repair only. Ensure the damaged cable is replaced as soon as possible to prevent ingress of water or chemicals.*



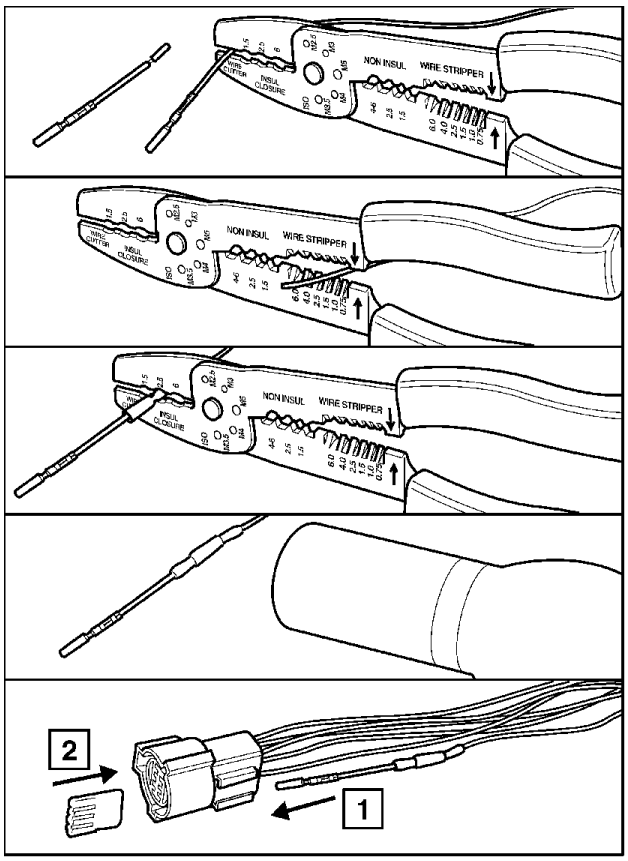
1b0o2004061091 4

Harness Wire Replacement

If a wire within the harness is found to be beyond repair or is open circuit, a jumper wire may be installed as a temporary repair until such time when a new harness assembly can be installed. Use the following procedure to install an additional wire:

1. Locate the faulty wire using the procedures described in the fault code charts.
2. Disconnect the affected connectors.
3. If fitted carefully roll back the seal between the connector and harness outer covering.
4. Remove the pins from the connector blocks of the affected wire using the appropriate removal tool found in the harness repair kit.

NOTE: *Use the instructions supplied with the kit to ensure correct pin removal.*



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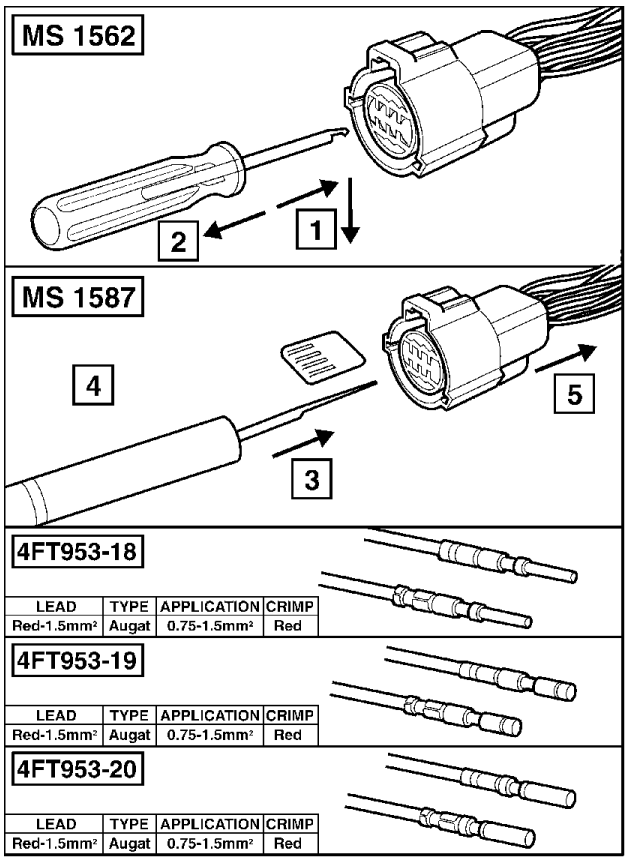
From the harness repair kit select the correct pin for the connectors. Obtain locally the correct cross-sectional size wire and measure out the length required by following the harness routing.

If possible attempt to run the new wire within the existing harness outer covering, if this is not possible run the wire along the harness, securing regularly with suitable ties. With the wire correctly routed instal the second terminal into its connector block. Replace the connector seal if removed.

Join the new wire to the new pins as described in the harness repair kit and install one of the pins into its connector.

To ensure that the repair has been effective check for continuity of the new wire using a suitable multi-meter.

NOTE: *This is a temporary repair only. Ensure the damaged cable is replaced as soon as possible to prevent ingress of water or chemicals.*



1b0o2004061093 6

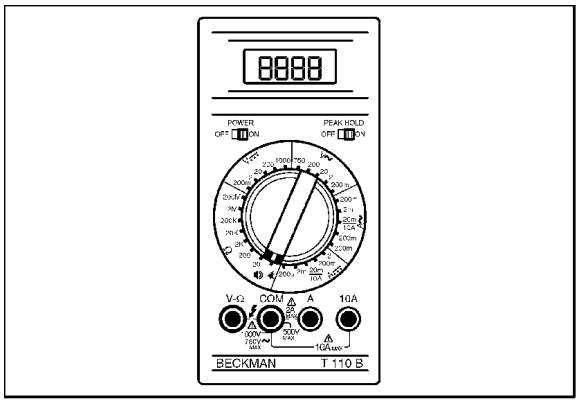
THE DIGITAL MULTI-METER

NOTE: *This section is only intended as a general guide to using a digital multimeter. Always refer to the manufactures operators manual for correct operation*

A multimeter is an electronic measuring device. The different types of measurement that can be made depend upon the make and model of the multimeter. Most types of multimeter have the capacity to measure:

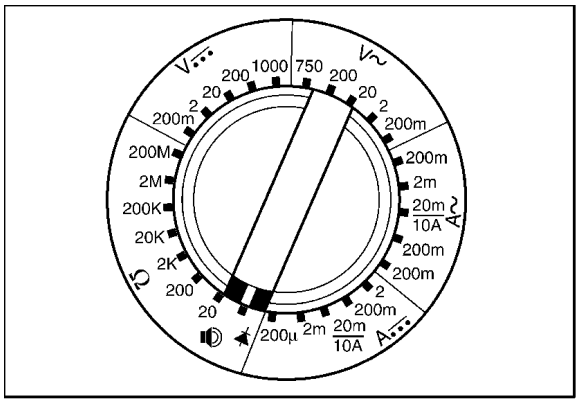
- Current **(A)** ac or dc
- Resistance (Ω)
- Voltage **(V)** ac or dc
- Continuity (Buzz test)

More expensive multimeters have other functions, such as the capacity to measure frequency **(Hz)** and test diodes.



1b0o2004061094 7

General Operation:
Before proceeding with a test, decide on what is going to be measured (Voltage, Current etc.). Rotate the dial until the pointer is within the relevant zone. Within each zone there are different scales. The scale that is selected will represent the maximum value that the multimeter will read. Always select a scale which is greater than the value that you intend to measure. If you are unsure of the value to be measured, always select the highest scale and then reduce the scale once you have an idea of the measured value.



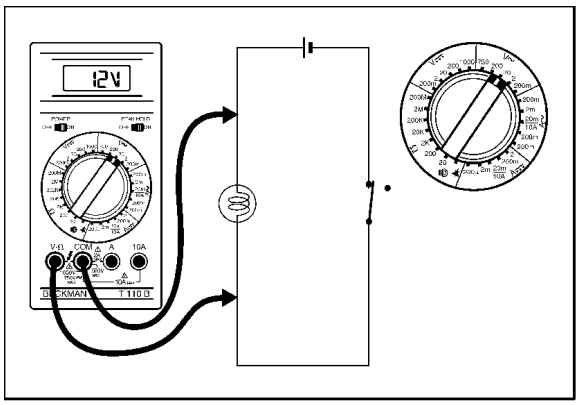
1b0o2004061095 8

Why are there different scales ?
The closer that the scale is to the measured value, the more accurate the reading will be e.g. If measuring the voltage of a battery with the scale set at **200 V**, the display may read **12 V**. However, if the scale was set to **20 V** the display may read a more accurate reading of **12.27 V**
.

Giga	G	1,000,000,000	10^{9}
Mega	M	1,000,000	10^{6}
Kilo	K	1,000	10^{3}
milli	m	0.001	10^{-3}
micro	µ	0.000 001	10^{-6}
nano	n	0.000 000 001	10^{-9}
pico	p	0.000 000 000 001	10^{-12}

1b0o2004061096 9

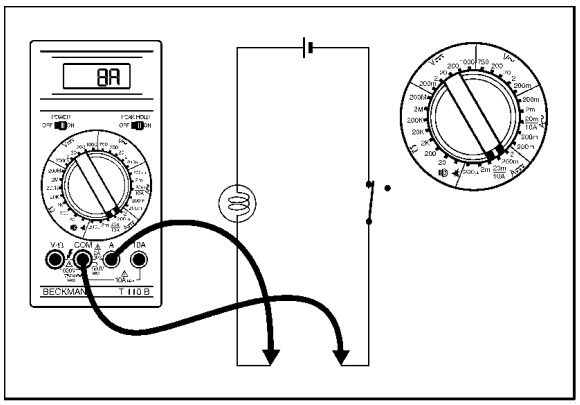
Measuring Voltage (Volts):
Set the range dial to either ac or dc volts. Connect the Black test probe to the "COM" terminal and the Red test probe to the "V/Ω" terminal. Place the test probes across the component to be measured with the circuit complete (closed). Read off the display value.



1b0o2004061097 10

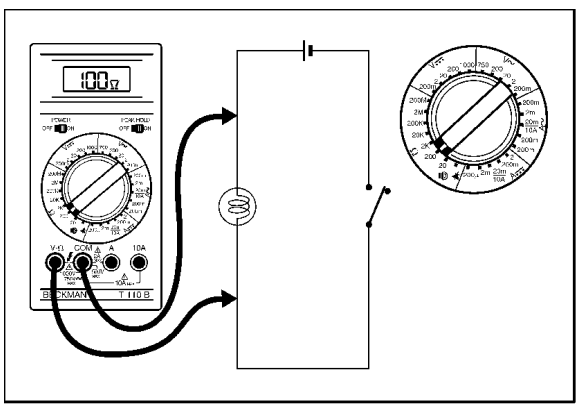
Measuring Current (Amps):
Set the range dial to either ac or dc current. When measuring current up to **2 amps**, connect the Red test probe to the "A" terminal. When measuring current up to **10 amps**, connect the Red test probe to the 10 "A" terminal. Always connect the Black test probe to the "COM" terminal. When taking measurement of current, always break the circuit and connect the multi meter in series with the circuit. Read off the display value.

NOTE: *For protection, multi meters are usually fused at 1OA.*



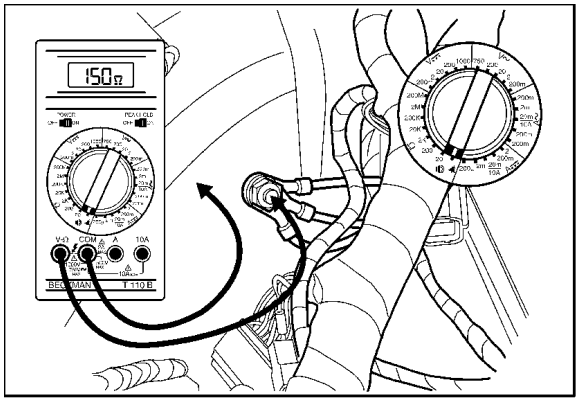
1b0o2004061098 11

Measuring Resistance (Ohms):
Set the range dial to the desired Q position. Connect the Red test probe to the “V/Ω" terminal. Connect the Black test probe to the “COM" terminal. If the resistance being measured is connected in a circuit, then turn off the power to the circuit. Connect the test probes to the measuring point and read off the display value.



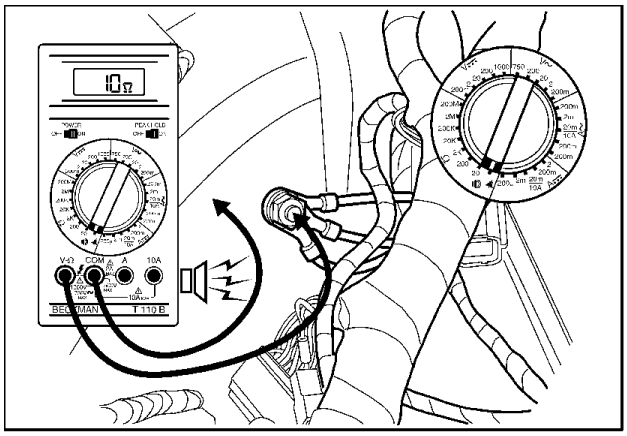
1b0o2004061099 12

Continuity (Buzzer) test:
Set the range dial to the “Buzz" position. Connect the Red test probe to the “V/Ω" terminal. Connect the Black test probe to the “COM" terminal. Connect the test probes to the measuring point. In general, if the resistance is less than **50 ohm** then the buzzer will sound, indicating continuity.



1b0o2004061100 13

Note: Buzzers on different multi meters will sound at different ohmic values, depending on the quality of the meter. This can often be misleading. For example, when checking a corroded earth point. A poor quality multi meter may buzz at **150 ohm**, indicating continuity and no problem. When using a higher quality multi meter for the same test, it would not buzz due to the high resistance. When carrying out such tests, we should always check the value of resistance as well as listening out for the buzz.
A good connection gives low resistance.
A bad connection gives high resistance.



1b0o2004061101 14

SUMMARY:
When measuring -
Voltage (V):
Connect across the component with the circuit closed.
Current (A):
Connect in series with the circuit. Circuit closed.
Resistance (Ω):
Connect across the component with the circuit open.
Continuity (Buzz):
Connect the meter across the component with the circuit open. (Always check the value of resistance as well!!)

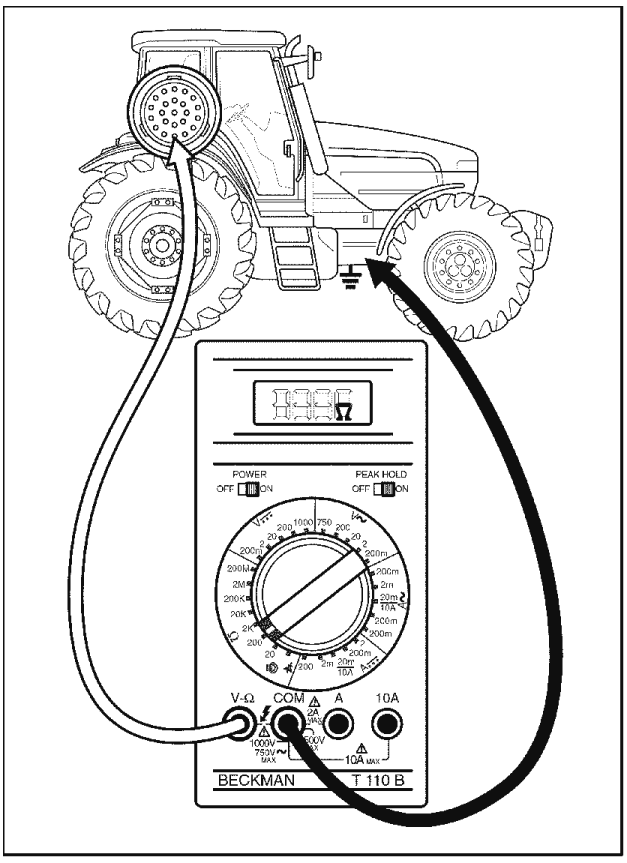
ELECTRICAL TEST PROCEDURES

Four electrical tests will be required to properly troubleshoot electrical concerns on the vehicle.
Each test is described in detail. Ensure that all steps are reviewed and followed when testing.

1. Continuity Test, Short to ground
2. Voltage measurement, short to **12 volts**.
3. Resistance test for components
4. Continuity test, Open circuits

ELECTRICAL TEST PROCEDURE 1: CONTINUITY TEST - SHORT TO GROUND

CONDITIONS FOR PERFORMING TESTS:

1. Power OFF, Keyswitch OFF, (sometimes battery disconnected or fuse pulled out if specified in procedure).
2. Connectors at each end or ends of circuit disconnected to prevent false readings.
3. Set meter to measure resistance or ohms, and measure circuit resistance. Use black lead to make contact with a plated metal part on the chassis such as a jump start post if fitted. Make sure the surface of the part is not corroded. Use the red meter lead to touch the connector pins, one pin at a time, and avoid contact with the case of metal connectors.
4. Determine if measured resistance falls within guidelines specified in the procedure. **3 - 4 ohms** indicates a direct short to chassis ground and must be located and repaired. Higher resistances usually indicate circuit paths through modules, and that an additional connector needs to be disconnected to perform the test. More than **100K ohms** indicates that the circuit is free of shorts to ground.
5. 

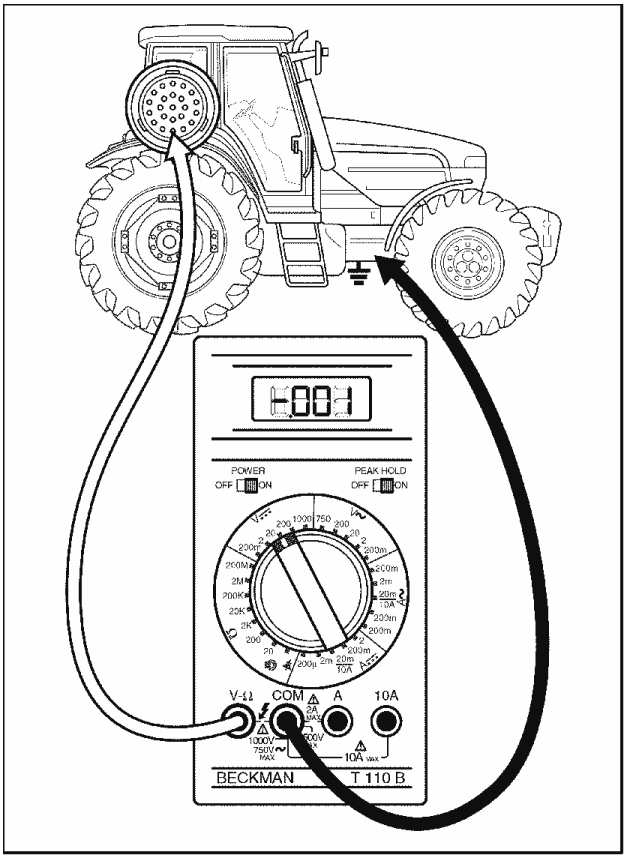
1b0o2004061102 15

ELECTRICAL TEST PROCEDURE 2: VOLTAGE MEASUREMENT OR SHORT TO POSITIVE SUPPLY VOLTS

CONDITIONS FOR PERFORMING SHORT TO POSITIVE SUPPLY TESTS:

1. Keyswitch ON (sometimes OFF, if specified in procedure).
2. Connectors at sensor, switch or potentiometer end disconnected. All other connectors must be reconnected to perform test.
3. Set meter to measure DC VOLTS, and measure circuit voltage as illustrated. Use the red meter lead to touch the connector pins, one pin at a time, and avoid contact with the case of metal connectors. Use the black lead to

make contact with a plated metal part on the chassis such as a jump start post if fitted. Make sure the surface of the part is not corroded.

4. Determine if measured voltage falls within guidelines specified in the procedure.
5. 

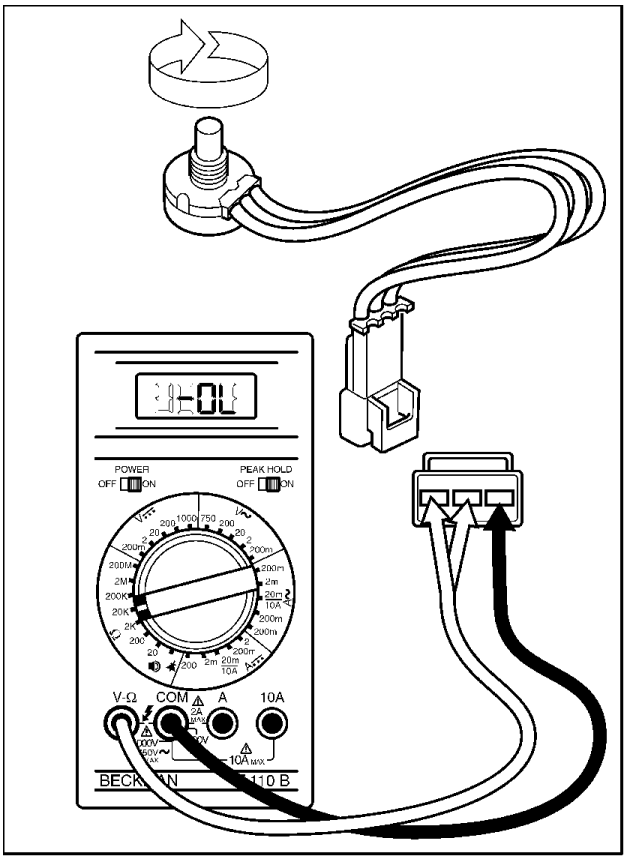
1b0o2004061103 16

ELECTRICAL TEST PROCEDURE 3: RESISTANCE TEST FOR ELECTRICAL PARTS

CONDITIONS FOR PERFORMING RESISTANCE TEST

1. Disconnect tractor part by unplugging electrical connectors to expose the part assembly connector for testing.
2. Set electrical meter to measure resistance or Ohms and insert test probes into connector terminals specified in procedure. When checking potentiometers, measure from wiper terminal to each of the other terminals while TURNING THE POT SHAFT. This will ensure no open spots escape detection. When checking rocker or rotary switches, actuate the switch while measuring for opens and shorts.
3. Compare measured values to values specified in the fault code procedures. Allow plus or minus 5 percent of range tolerance for all measurements.

4.



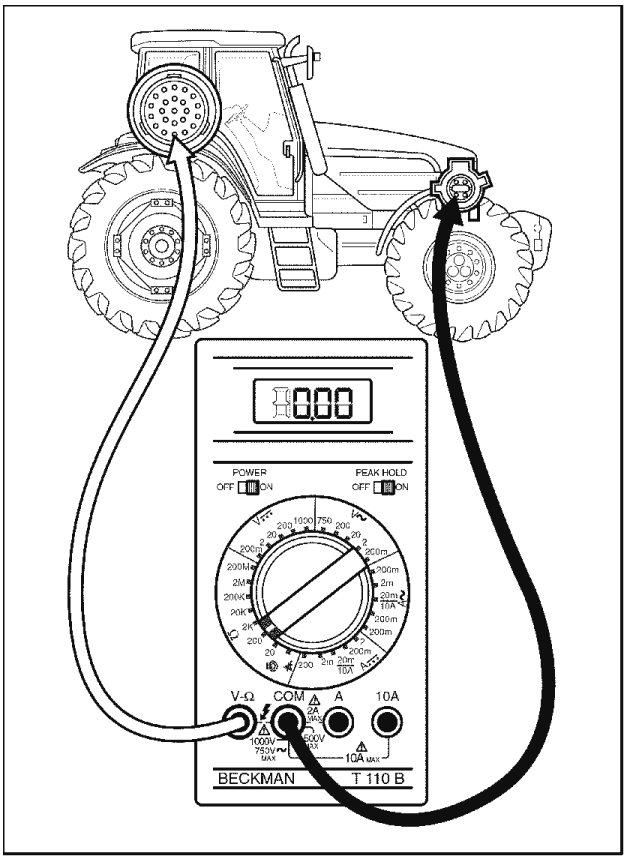
1b0o2004061104 17

ELECTRICAL TEST PROCEDURE 4: CONTINUITY TEST - CHECK FOR OPEN CIRCUITS

CONDITIONS FOR PERFORMING CONTINUITY TESTS:

1. Keyswitch OFF (sometimes disconnect battery or pull fuses).
2. Connectors at both ends of the circuit disconnected. All other connectors must be reconnected to perform test.
3. Set meter to measure resistance or ohms, and measure circuit resistance as illustrated. Use the red meter lead to touch the connector pins, one pin at a time, and avoid contact with the case of metal connectors. Use the black lead to make contact with the connector pin at the other end of the circuit. Avoid contact with other pins in the connector and the connector case, if it is metal.
4. Determine if measured resistance falls within guidelines specified in the procedure. If the resistance is no more than **3 - 4 ohms**, the circuit is continuous. More resistance usually indicates dirty or corroded terminals in connectors, and **100K ohms** indicates an open circuit.

5.

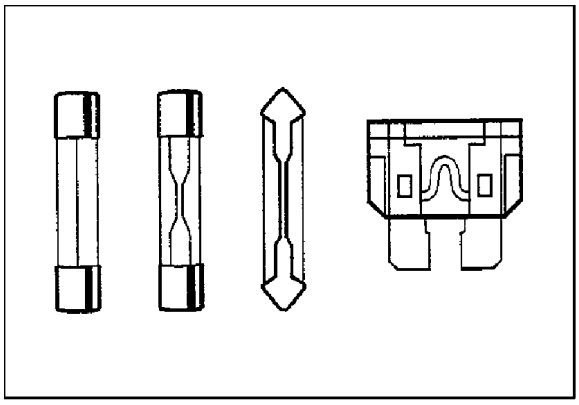


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CIRCUIT COMPONENTS - BASIC DESCRIPTION

CIRCUIT PROTECTION DEVICES

Circuit protection devices are used to protect wiring and components from excessive current. Three different types of protection are fitted in tractors. Two of them (fuses and fusible links) are currently used, while circuit breakers are no longer used.

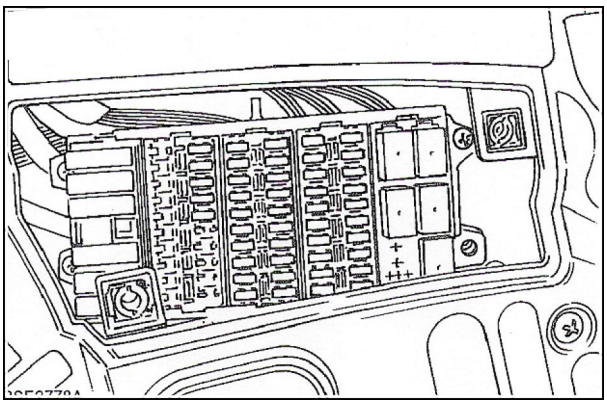


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FUSES, FUSIBLE LINKS

Fuses and fusible links protect circuits with thin pieces of metal and wire which heat up and melt to open up the circuit when too much current flows through them.
Fuses are used to protect the circuit from overload. This can occur in the event of a short circuit or by connecting equipment which demands a current greater than the circuit is designed to carry.
There are several types of fuses, but they all consist of a metal conductor which is capable of carrying a limited current. If the specified current is exceeded then the metal conductor will overheat, causing it to melt and break. This will in turn cause an open circuit.
The rating of the fuse relates to the current that the fuse can carry continuously.

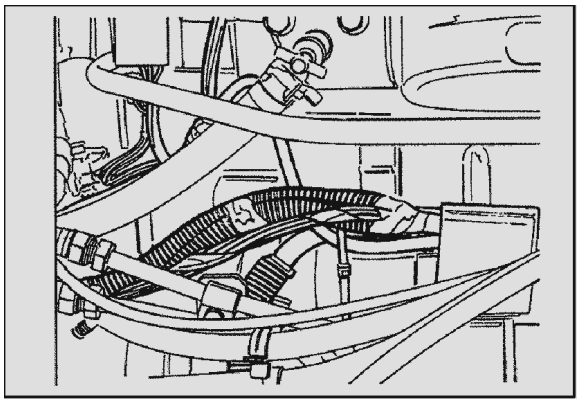
If a fuse blows, it must be replaced with a fuse of the correct rating, and if it blows again, then the cause must be investigated.



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FUSE LINKS

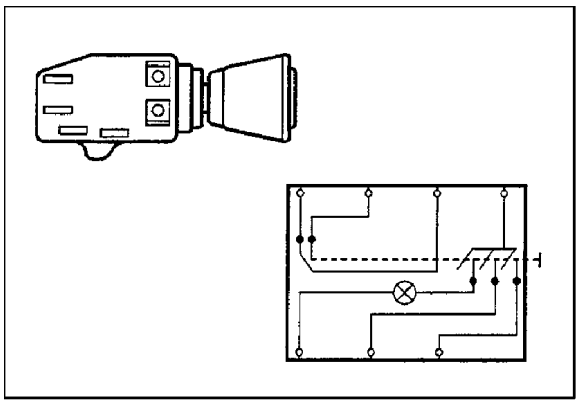
A fuse link is a wire that acts like a fuse, breaking down and causing an open circuit when the current that passes through it exceeds a certain amperage. For primary fuse protection the main supplies from the starter solenoid are fitted with fuse links.



1b0o2004061107 21

CIRCUIT CONTROL DEVICES

Some of the components in a circuit are used to interrupt and direct current flow either through an action of the operator or automatically. The current interrupters you are probably most familiar with are switches.

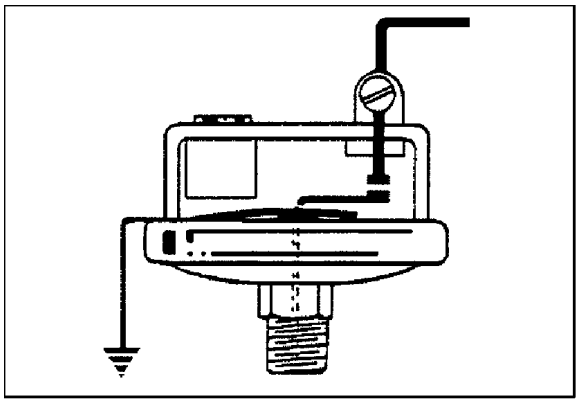


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SWITCHES

Switches are a vital part of an electric circuit, providing a method of controlling the circuit itself. One switch can control a number of different circuits at the same time. This is achieved by having several separate connections and/or multi-connector switches (several switch 'positions').
There are several types of switch, and they may incorporate a warning light.

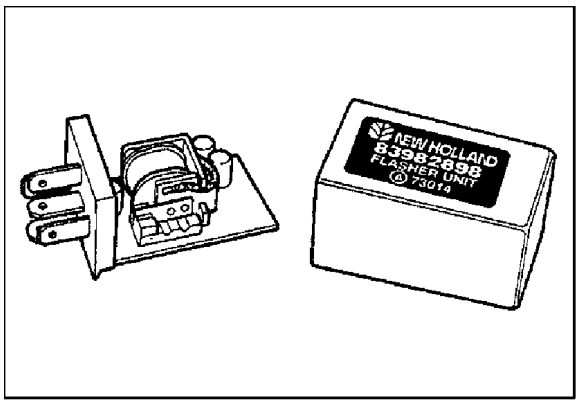
Switches can be as simple as that used to turn on an implement lamp or as complex as the ones used to operate the starting and lighting systems. Checking the operation of switches is usually just a matter of testing for power going into the switch and for power leaving the switch at the appropriate contacts when the switch is operated.
One of the most common type of switches is the pressure switch (Fig. **23**), a switch opened or closed by a fluid pressure. An example of this type of switch is the engine oil pressure switch, a simple on/off device that opens (or closes) when oil pressure rises above **10 psi**.



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FLASHERS

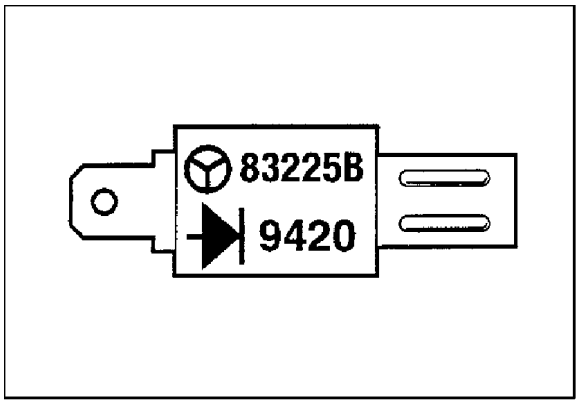
Flashers work automatically to interrupt and connect the flow of current. Their operation is similar to that of the circuit breaker described earlier.
In the flasher, a heating element warms a bimetallic strip. The strip bends, breaking contact with the power source. When it cools, the bimetallic strip once again makes contact and the process begins again.



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DIODES

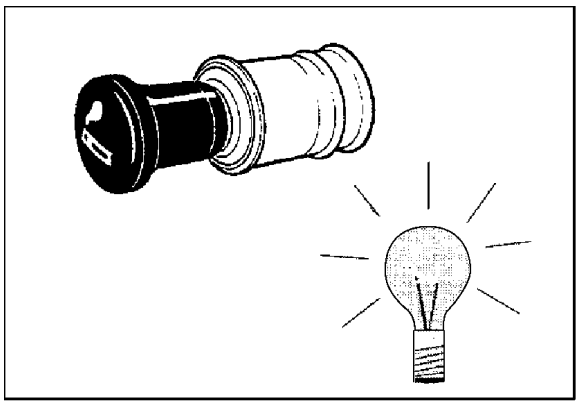
Some components use a semiconductor material instead of moving parts to direct current. Diodes for example, allow current flow in one direction only.
They are essential in converting the alternating current that an alternator produces to the direct current that the tractor electrical system components use.



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RESISTANCE DEVICES

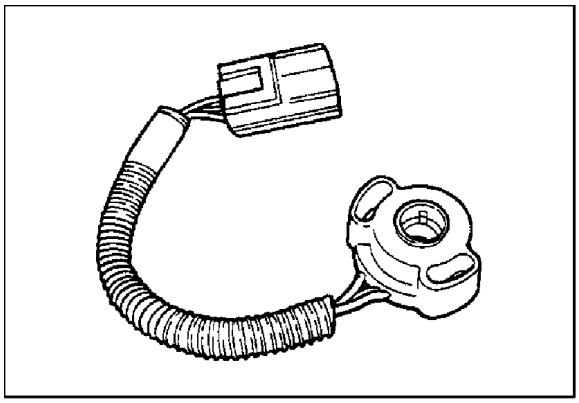
A number of electrical components alter or make use of electricity through their resistance to current flow. Resistors are components which are generally used to regulate the supply of voltage and current to other electrical components. In some cases, the purpose of resistance in an electrical circuit is to provide light or heat. Lamps and cigar lighters are examples. Lamps convert electricity into light, and cigar lighters convert it into heat. Both lamps and lighters make use of the same physical principle, that is Ohms Law.



1b0o2004061112 26

POTENTIOMETERS

Potentiometers are variable resistors which are dependant on mechanical movement, i.e. Lateral float movement, to vary the resistance of the component and therefore alter the output voltage.
In order to verify the correct operation of a potentiometer, the resistance should be measured at the minimum and maximum positions and a smooth and continuous change of resistance should be observed between. As the resistance varies with temperature, the test specifications are usually given at **20 °C**.



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ELECTROMAGNETIC DEVICES

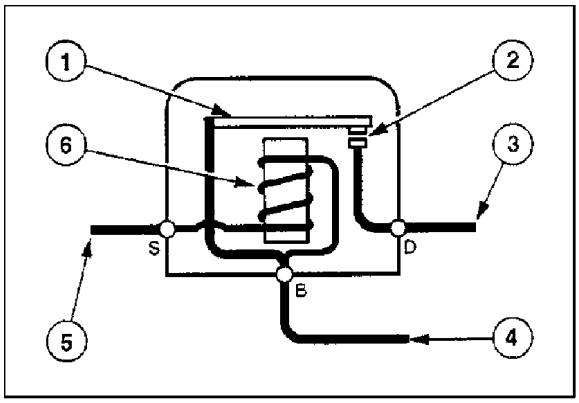
In general, they use the magnetic field created by flowing current to move metal parts within the components.

RELAYS

The relay is an electromagnetic switch that uses a small amount of current to switch a larger amount on and off.
When the operator closes a switch, current flows through the relay's control circuit. In this circuit there are windings surrounding an iron core which is fixed in place (see Fig. **28**).
Current turns the iron core into an electromagnet. The core then attracts an arm which has a contact point on it. When the point on the arm contacts the stationary point, current flows through the power circuit.
Relays are basically electrically operated switches. They are used to switch a circuit on/off in similar way to a manual switch.
Two circuits are connected to the relay:

- A work circuit, which is switched on/off by the relay, and provides the supply for the equipment to be operated, i.e., bulbs, solenoids, etc.;
- A control circuit, switched on/off by manual switches, used to operate the relay.

The part of the relay which is connected to the control circuit consists of the winding of an electro-magnet. When the control circuit is switched off, the contacts are kept apart by a return spring. When the control circuit is switched on, a current flows through the coil and a magnetic force is produced. This force, which is stronger than the spring pressure, pulls the contacts of the relay together, causing the work circuit to operate.



1b0o2004061114 28

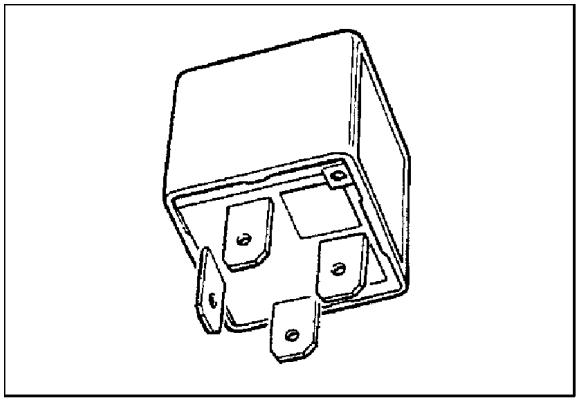
A switch-relay system has two main advantages over a simple switch:

- The current that flows through the switch is not the same as all the current requested by the equipment to be operated, but usually by a smaller current: this allows the usage of smaller and less expensive switches;
- The distance from the supply, to the equipment, can be made as short as possible to minimise voltage drop.

There are several types of relays. They can be normally open or normally closed. They may have internal electronic circuits to give special operating features. For example, they can turn the switch on/off at timed intervals (flasher relay), be sensitive to current, temperature, etc. The relay cover usually gives information about the features of the relay.
On the relay cover there are usually 4 or 5 terminal markings :

- 30: input terminal direct from battery positive, normally live.
- 85: winding output terminal, usually to ground.
- 86: winding input terminal.
- 87: output terminal for normally closed contact.
- 87a: output terminal for normally open contact.

Brown relays are normally open relays, blue ones are normally closed.

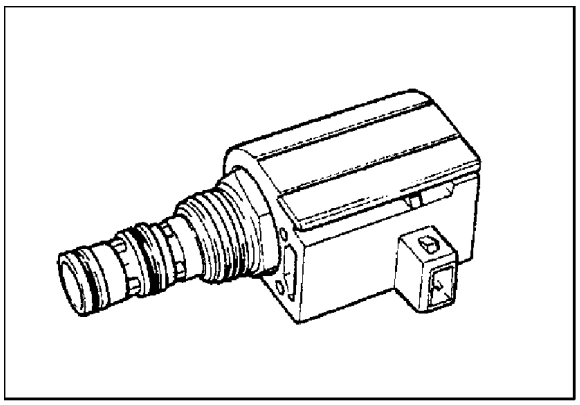


1b0o2004061115 29

SOLENOIDS

Solenoids (**30**) work in much the same way as relays, except that the iron core is not fixed in place.
As a result, the windings in the control cause the iron core to move.
In the starting system, for example, the movement of this core is used to send large amounts of current to the starter motor.
A solenoid is basically a winding around an iron core. In the centre of the core there is a plunger which is free to move through the core. When an electrical current passes through the winding an electro-magnetic force is produced

which causes the plunger to move through the core. If the current is switched off, the magnetic force is stopped and the plunger is returned by a spring.



1b0o2004061116 30

The solenoid plunger may have different uses: the most common are moving a hydraulic spool or a mechanical lever. The use of solenoids to control hydraulic pressure instead of the hydraulic valves is highly recommended wherever there is a long distance between the control panel and the valve (more than 10 meters) or a fast action is required.
A coil should:

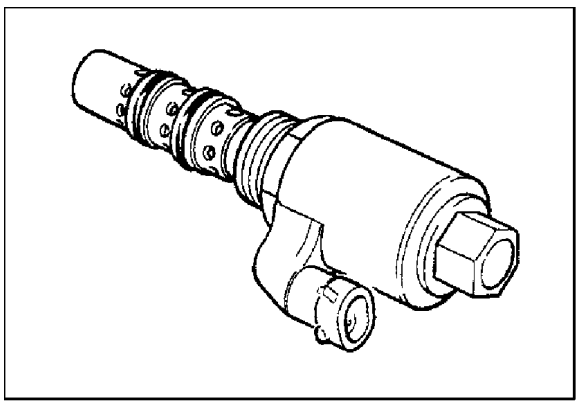
- Be non-sensitive to vibrations;
- Be silent in operation
- Have large frequency of activation (30-35 times per second)
- It should be possible to fit it in any position.
- Be insulated, in order to function correctly for a wide range of temperatures (**-40 °C** to **+85 °C**), and with high humidity conditions.

The MOST COMMON FAULTS that can occur are:

- Short circuit winding: if a section of the winding allows the current to pass directly from positive (+) to negative (-) terminals without passing through the winding, this will cause the relevant circuit fuse to blow.
- Broken winding: causing an open circuit, it will not allow the current to pass through the winding, so the solenoid will not operate.
- Seized plunger (and/or connected components): the solenoid will only move the plunger if all components are free to move.

PWM SOLENOID VALVES

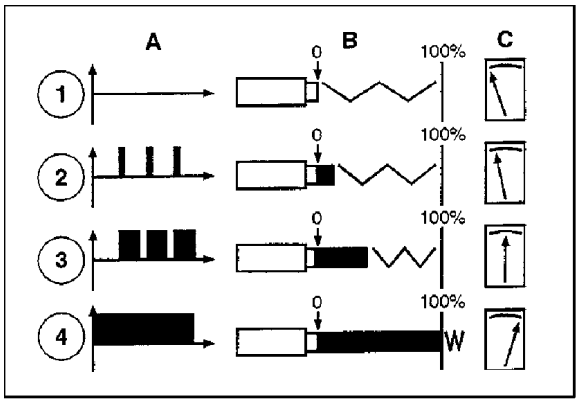
Whenever it is necessary to provide proportional control to the solenoid valves, it is much better to use a principle of operation called pulse width modulation (PWM). PWM is a variable DC voltage signal that is used to control the solenoid valves. The voltage signal is pulsed on and off many times a second (at a constant frequency of **500 Hz**) at a constant supply voltage of **12 V**.



1b0o2004061117 31

The processors contain transistors that are supplied with a constant input voltage which is switched on and off to achieve the variable input range. In this way the control module is able to limit the armature movement, so the

hydraulic output flow of the solenoid is proportional to the average DC voltage. The lower voltage also allows the solenoid to operate with less residual magnetism and so the entire circuit will operate smoother.
The variable DC voltage signal level is determined by varying the duration of the ON pulse relative to the OFF pulse (see Fig. **32**). The ratio between the ON time and the cycle time is called duty cycle and is stated as a percentage of one complete cycle.
With reference to Fig. **32**, diagrams 1 to 3 show the normal operating range of the PWM valve, and diagram 4 shows the initial **12 V** programming and fill time only. The diagrams in column A show the voltage signal that is sent to the valve, whereas column B shows the relevant spring pressure and column C the reading on a voltmeter connected to the solenoid valve.
Diagram 1 shows the OFF position: no signal is directed to the valve, which means no spring pressure in the valve at all and results in a zero voltage reading. Increasing the duty cycle causes some pressure to be made on the circuit (Diagram 2), which results in a voltmeter reading increase. Diagram 3 shows the maximum signal that is used during the normal activity of the valve: its duty cycle is around 0.5, which results in a spring pressure for the half of its run and in an indication of a **6 volt** average DC current.
The electrical circuit to the solenoids can be checked by using a digital or analogue DC voltmeter, which will indicate the average voltage readings.



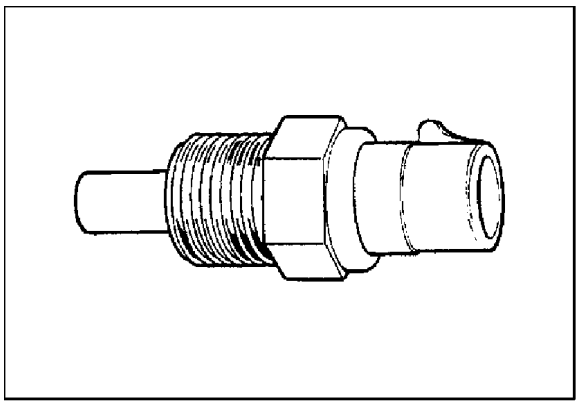
1b0o2004061118 32

SENSORS

A sensor is the primary component of a measurement chain that converts the input variable (temperature, capacitance, reluctance) into a signal suitable for measurement. The relationship between the input variable and the measured signal is a characteristic of the sensor.
In the above mentioned measurement chain the signal is filtered and treated in order to adapt it to its use. It consists of three elements: the sensor itself; the converter, which converts the output signal from the sensor (in most of the cases into an electric signal); and the conditioner, which transforms the output signal from the converter in the most suitable form. Generally the term sensor indicates the entire measurement chain.

TEMPERATURE SENSORS

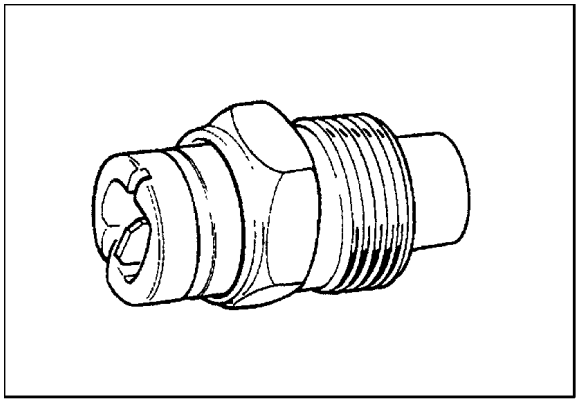
Generally based on a simple circuit with a thermistor. A thermistor is a resistor that changes its resistance according to the temperature.
There are two groups of thermistors: NTC (Negative Temperature Coefficient) and PTC (positive Temperature Coefficient). In the first case the higher the temperature, the lower is the resistance, and for the PTC the higher the temperature, the higher the resistance. The NTC are often used as sensors to indicate temperature change in fluids, such as the engine coolant fluid.
An example of these type of senders is the coolant temperature sender. The changes in its resistance (which varies with temperature) are relayed to the Instrument Cluster, which operates the bargraph and the warning indicators accordingly.



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PRESSURE SENDER

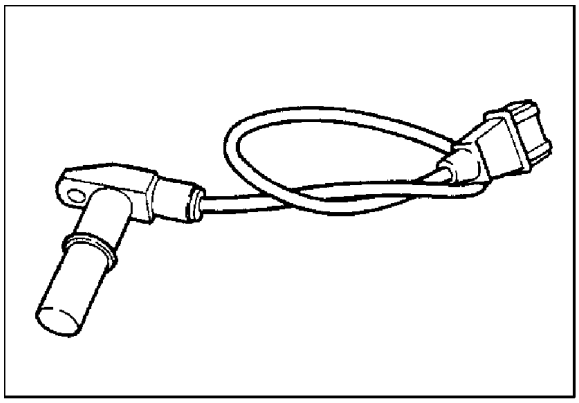
A pressure sender receives a supply signal and it varies it according to the (oil) pressure. An example is the oil pressure sender, which receives a **5 volt** signal and varies it according to the oil pressure. The Instrument Cluster keeps track of these variations and changes its readouts and warnings accordingly.



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SPEED SENSOR

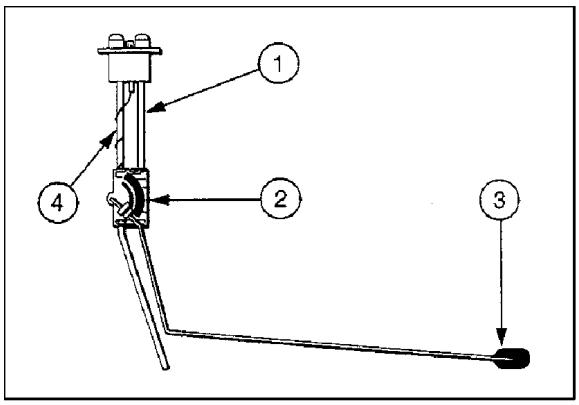
The speed sensor is typically a reluctance sensor. An example is the axle speed sender, which is fitted into the transmission and gets pulses off the gears, counting the gear teeth. The sender uses a pickup coil close to four wheel drive coupling. The action of the gear close to the pickup creates pulses which are relayed to the Instrument Cluster. The Instrument Cluster converts the frequency of the pulses into ground speed.
Possible failures are due to vibration, open circuits.



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FLUID LEVEL SENDER

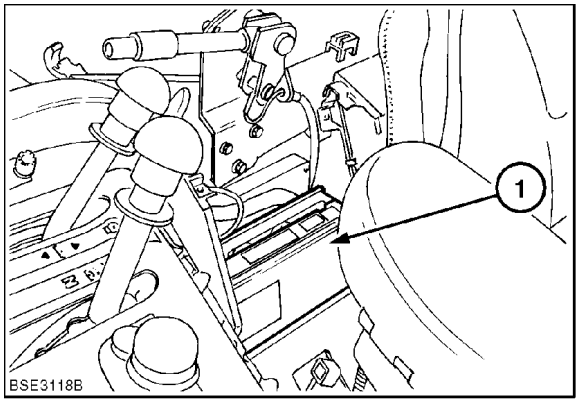
It operates by varying resistance through the movement of a float. An example is the fuel level sender.



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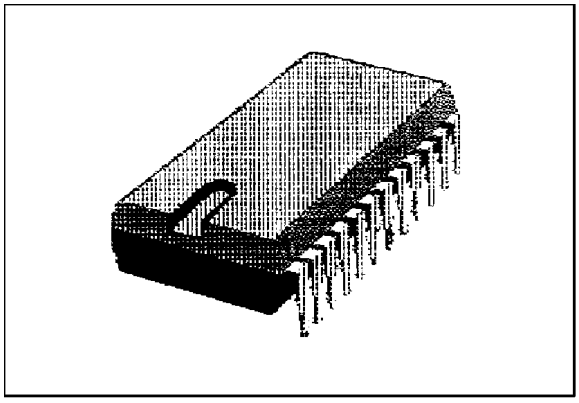
ELECTRONIC MODULES

The electronic modules are the "black boxes" that provide control on many of the functions of the tractor. These functions may vary according to the options that are fitted on the tractor.
Inside these "black boxes" there is a processor, the "thinking part" of the module, and inside some of them there is one or more memories, which may allow the module to store calibration values, the configuration of the vehicle (which optional tools or devices have been installed) and the error codes.



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A processor has a series of pins, which are electrical contacts (see Fig. **38**). There are three main types of pins: for the inputs of the signals, for the outputs and for the processor supply.
The processor, the memories and the link between them form the hardware of the module, its "physical" part.
Then some software is needed, to handle the communication between the processor and the memories and to manage the various signals going into and out of the processor. The software is designed to operate in a different way for every module, and is called functional code.

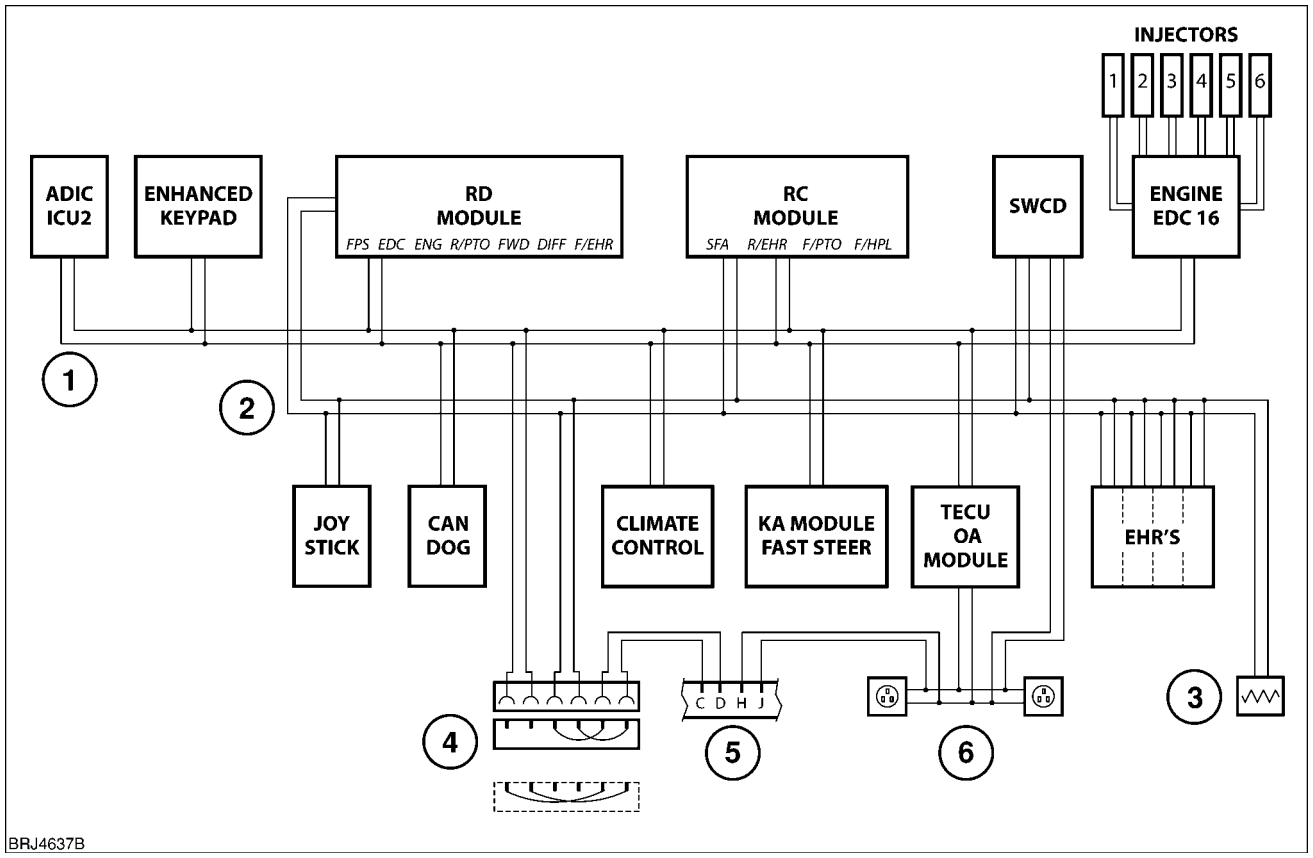


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A serial data link is a kind of communication where data is sent along a single wire, so the information regarding different functions of the same processor are sent to the Instrument Cluster in different moments.
To provide a continuous control on components, the processor continuously scans all the inputs in a time-sharing mode, with a cycle lasting **1O ms**. This means that all the components controlled by the processor are checked one by one, and that every component is checked 100 times per second.

The electronic modules are often blamed as responsible for most of the problems of the modern tractors, while they are for certain among the most protected parts of the tractor. In fact, the pins of the module are protected against spikes (high pulses) of current, and the signals are filtered by the hardware and by the software in input and in output to give the best handling of information.

CONTROLLER AREA NETWORK (CAN) SYSTEM



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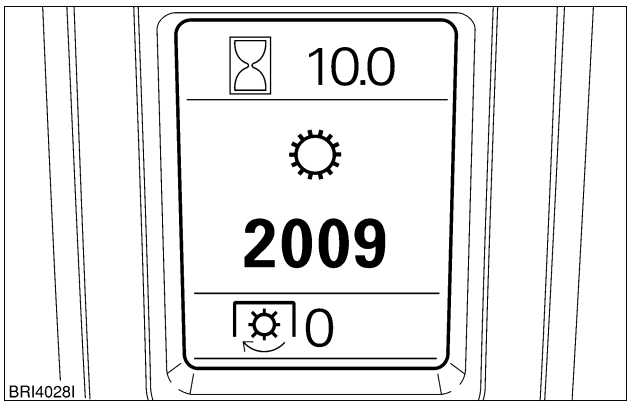
CAN BUS Architecture

1. CAN BUS 1
2. CAN BUS 2 (EHR's)
3. CAN BUS 2 Terminating Resistor
4. CAN BUS Select
5. Diagnostic Connector
6. Implement BUS

The tractor utilises a CAN (Controller Area Network) in addition to the standard wiring harnesses. The CAN is a 2-wire system which uses a series of numeric values sent at very high speed to transmit data between controllers and components. A CAN system has the advantage of being able to use one component for many applications without the need for hard wiring to each application, as in a conventional system.
Depending on the model specification, controllers are used to control a number of systems on the tractor. Refer to Figure **39** for details of processors and CAN BUS connections.

FAULT CODE DISPLAYS

All fault codes are displayed on the analog digital instrument cluster (ADIC) dot matrix display (DMD). Only disabling errors will be displayed on the DMD and will be visible to the operator. Less serious errors are stored and can be retrieved via the H-Menus, refer to **Control module - Static description (A.50.A)** for more detailed information.



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Fault Code Symbols

1. Engine
2. Transmission
3. Differential lock
4. CAN malfunction
5. Electronic draft control
6. Front hitch
7. P.T.O. system
8. Electronic remote valves
9. Front suspension
10. Four wheel drive
11. Instrument panel electrical fault
12. Fast steer system

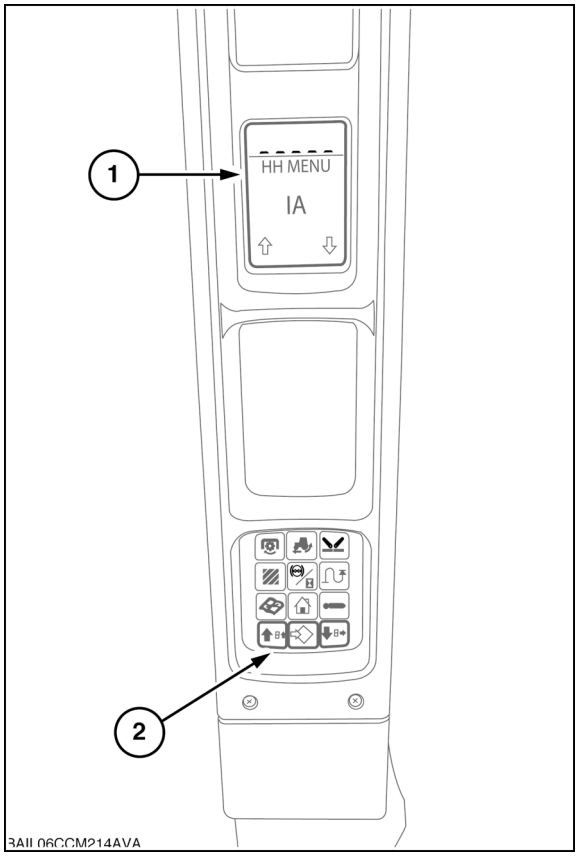
The ADIC will display a symbol accompanied by a four or five digit code to indicate a fault has occured. The symbol represents the system in which the fault is detected and the code specifies the cause of the detected fault.
The fault codes are grouped by system using the following numbered ranges:

- 1001-2000 (Electronic Draft Control)
- 2001-3000 (Transmission)
- 3001-4000 (Engine)
- 4100-4400 (Rear Electro - Hydraulic Remotes)
- 4500-4600 (Front Electro - Hydraulic Remotes)
- 5001-6000 (Rear Power Take Off)
- 6001-7000 (Four wheel drive)
- 7001-8000 (Differential lock)
- 8001-9000 (Front PTO)
- 9001-10000 (Front hitch)
- 10001-11000 (Front suspension)
- 14001-15000 (Instrument cluster)
- 15001-16000 (Steering controller)

- 16001-17000 (Air conditioning)

H-MENU DIAGNOSTIC MODE

The H-menu diagnostic mode can be used to access and clear the fault codes which may be stored in the various controllers. The H-menu diagnostic mode also contains many other useful functions which may be used to assist with diagnostics.
Refer to the Diagnostic H Routines chapter in **Control module - Static description (A.50.A)**.



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ELECTRONIC SYSTEM - Static description

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Fault Codes and Fault Finding

The tractors have an inbuilt self diagnostic facility. This facility utilises the digital display of the Instrument cluster to indicate, in coded format, malfunctions in the electrical and electronic circuitry and in the micro-processor. It should be noted that the self diagnostic capability is generally limited to diagnosis of the electrical and electronic circuitry and related components, however, there are some codes, which can be generated if pressure switch circuits are not closed because of an actual lack of hydraulic pressure. Any malfunction of the mechanical and hydraulic components must be diagnosed using conventional techniques, performance characteristics and tooling, such as pressure testing equipment.
Troubleshooting and fault finding should always be carried out in a logical and planned sequence, many apparent faults associated with electronic components are often hastily diagnosed and result in the replacement of expensive components. An extra few minutes confirming the apparent fault will result in a more positive and cost effective repair. With the use of micro-processors it is often that this item is blamed for any malfunction but the real truth is that this item is usually sound and that the fault is due to poor contacts in the associated connectors.
Each electrical connector illustrated and identified in the wiring diagrams and referred to in the following fault finding procedures, has the same identification reference. For example, one of the processor connectors is referred to as Connector **X095** in the illustration and also referred to as **X095** the fault finding procedure. In the fault finding procedure the connector, pin and wire colour are shown as, **X095** pin 17 **(Y)**. If all the wires are the same colour, the circuit number is also included to aid in wire identification. For example, **X095** pin 17 (Y,3024). This is broken down as follows:
X095 Connector number
Y Wire colour
3024 Circuit number
All tests are carried out on the harness side of the connector, unless otherwise stated.
Refer to the relevant chapter for complete wiring diagrams and how to use them **Wiring harness - Static description (A.30.A)**.
Where the fault finding procedure requires checks for continuity a visual inspection of the wiring should be made prior to conducting tests to ensure that obvious ‘mechanical’ damage has not occurred to the harness or the connectors.
A good quality multi-meter is an essential item to perform fault finding. It should be capable of measuring resistance of at least **20,000 ohms** and measuring voltage and current. When using the multi-meter it is good practice to select a high range and work downwards to avoid damaging the instrument. Refer to the ’Basic Multi-Meter use’ section of this chapter for further details.

IMPORTANT: *Care should be used when using the multi-meter, only use the instrument as instructed to avoid damage to the internal elements of the micro-processor. When checking the continuity of wiring, sensors or switches it is necessary to isolate the electronic micro-processor and ensure the keystart is turned off to prevent possible further damage. The keystart should only be switched on and the processor connected where specifically instructed in the fault finding procedure.*

If it is found necessary to clean the connectors a contact spray should be used. DO NOT USE ANY OTHER METHOD FOR CLEANING TERMINALS. Do not use a cleaner that contains Trichloro-ethylene, this solvent will damage the plastic body of the connector. It is preferable to use a cleaner with a Freon T.F. base.

SPECIAL TOOLS

Description	Tool No.
Electrical Repair Tool Kit (North America Only)	FNH 01000 / 380040089
Harness Repair Kit (Except North America)	**380030042**
Test Probe Kit (Except North America)	**380050010**

WIRING HARNESS REPAIRS

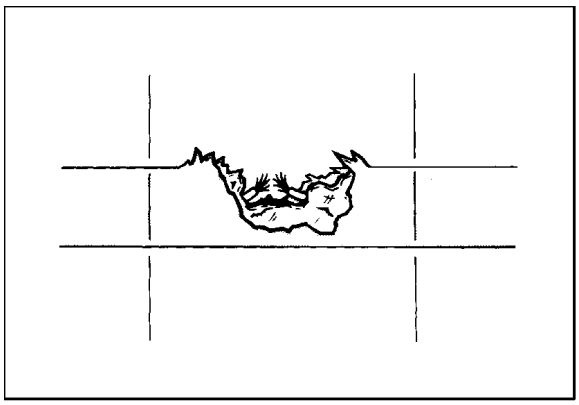
Temporary Wiring Harness Repair

NOTE: *It is acceptable to use the following repair procedure on the CAN BUS wiring. It is important though to ensure that the wire lengths are not altered from the original as this will affect the performance of the CAN BUS system.*

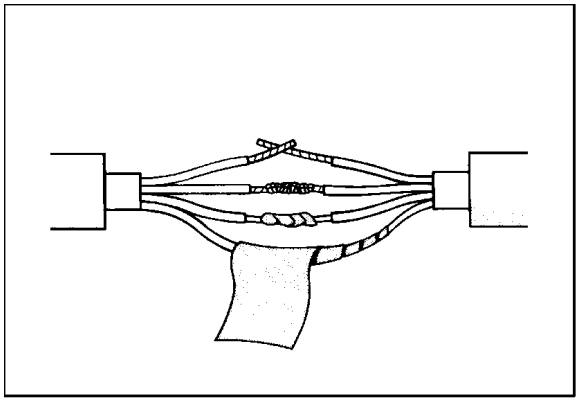
The following method to repair wiring is a temporary expedient only. Wiring should be replaced as soon as possible. Do not attempt to repair the wire on any system sensors as these are sealed and should only be replaced with a new component.

NOTE: *When conducting a cable repair it is important that only RESIN CORED SOLDER is used. Use of other types of solder may result in further cable damage.*

To carry out a temporary repair, proceed as follows:-

1. Locate damaged portion of cable then cut away outer protective cover on both sides of the damaged area, Figure **1**.
2. 

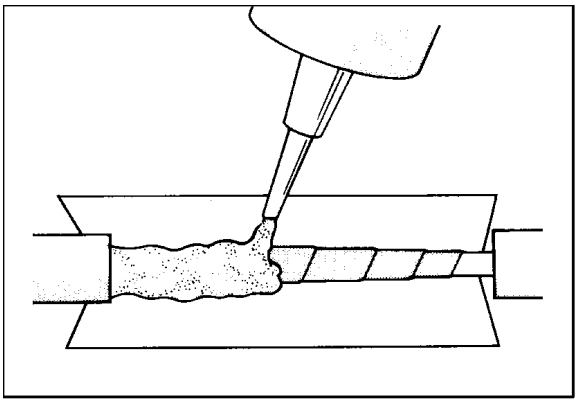
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1. Using a suitable solvent, clean about 2 inches (**50 mm**) from each cover end. Clean the grey cable cover and the individual leads.
2. Twist two bare leads together for each damaged lead, being careful to match wire colours, then solder the leads using resin cored solder. Tape each repaired lead with vinyl insulation tape, Figure **2**.
3. 

1b0o2004061089 2

1. Wind a layer of vinyl insulation tape up to the grey cable cover at each end of the repair section. Make a paper trough, Figure **3**, then apply silicon rubber compound (non hardening sealant) over the repaired section up to the cover ends. Sufficient sealant must be used to fill the ends of the cut away area.

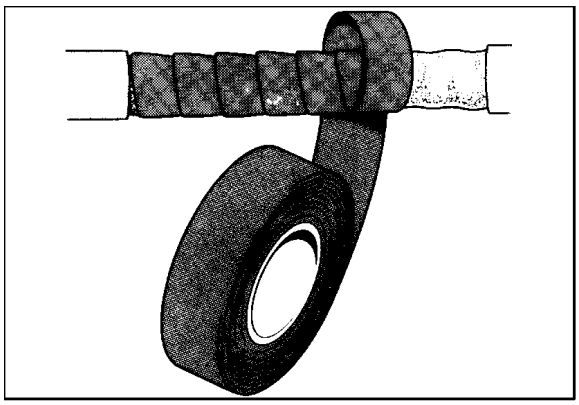
2.



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1. Allow the compound to cure then cover the area with insulating tape taking the tape well over each end of the repair. An overlap of at least 2 inches (**50 mm**) of tape at each end is necessary, **4**.
2. Check to ensure the repair is satisfactory and secure the repaired cable so that repeat damage is avoided.

NOTE: *This is a temporary repair only. Ensure the damaged cable is replaced as soon as possible to prevent ingress of water or chemicals.*



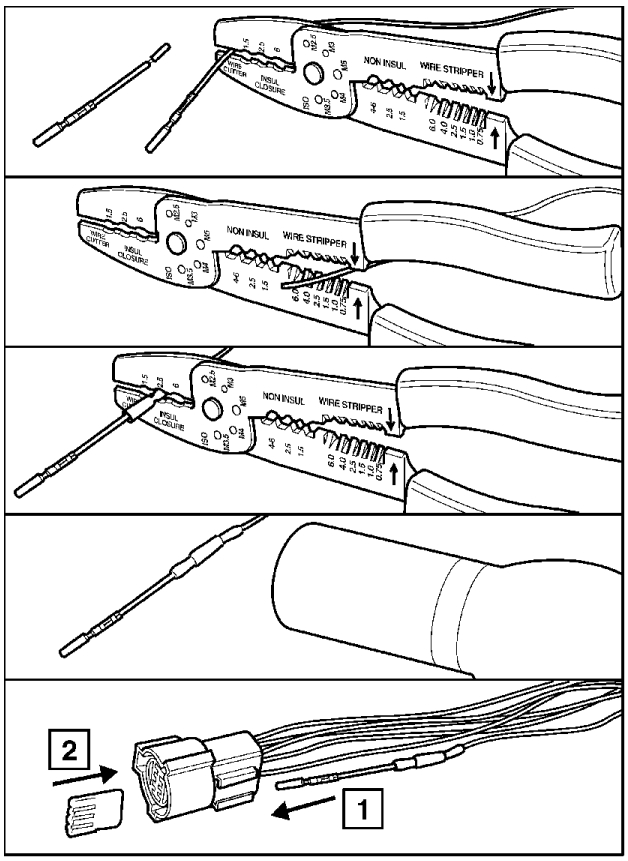
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Harness Wire Replacement

If a wire within the harness is found to be beyond repair or is open circuit, a jumper wire may be installed as a temporary repair until such time when a new harness assembly can be installed. Use the following procedure to install an additional wire:

1. Locate the faulty wire using the procedures described in the fault code charts.
2. Disconnect the affected connectors.
3. If fitted carefully roll back the seal between the connector and harness outer covering.
4. Remove the pins from the connector blocks of the affected wire using the appropriate removal tool found in the harness repair kit.

NOTE: *Use the instructions supplied with the kit to ensure correct pin removal.*



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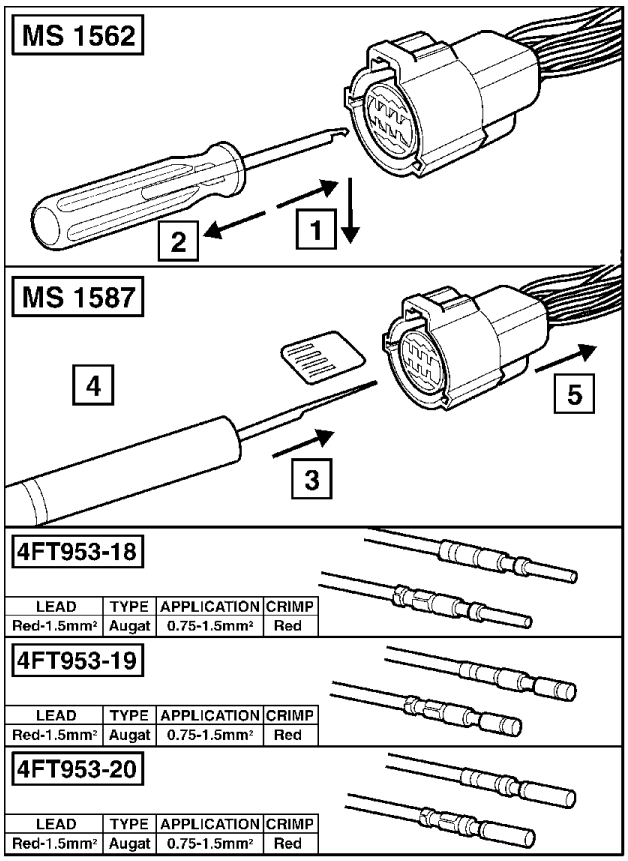
From the harness repair kit select the correct pin for the connectors. Obtain locally the correct cross-sectional size wire and measure out the length required by following the harness routing.

If possible attempt to run the new wire within the existing harness outer covering, if this is not possible run the wire along the harness, securing regularly with suitable ties. With the wire correctly routed instal the second terminal into its connector block. Replace the connector seal if removed.

Join the new wire to the new pins as described in the harness repair kit and install one of the pins into its connector.

To ensure that the repair has been effective check for continuity of the new wire using a suitable multi-meter.

NOTE: *This is a temporary repair only. Ensure the damaged cable is replaced as soon as possible to prevent ingress of water or chemicals.*



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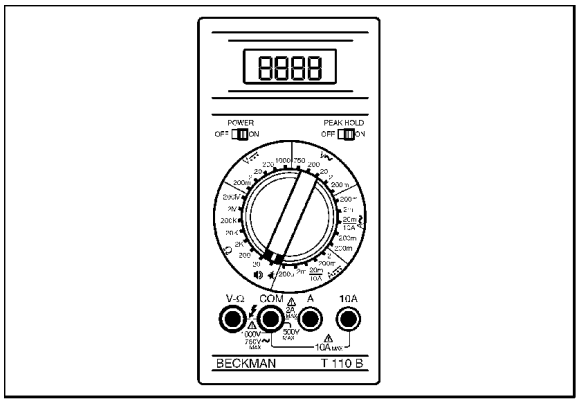
THE DIGITAL MULTI-METER

NOTE: *This section is only intended as a general guide to using a digital multimeter. Always refer to the manufactures operators manual for correct operation*

A multimeter is an electronic measuring device. The different types of measurement that can be made depend upon the make and model of the multimeter. Most types of multimeter have the capacity to measure:

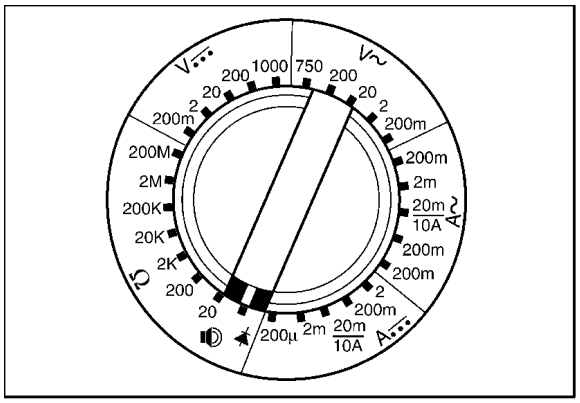
- Current **(A)** ac or dc
- Resistance (Ω)
- Voltage **(V)** ac or dc
- Continuity (Buzz test)

More expensive multimeters have other functions, such as the capacity to measure frequency **(Hz)** and test diodes.



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General Operation:
Before proceeding with a test, decide on what is going to be measured (Voltage, Current etc.). Rotate the dial until the pointer is within the relevant zone. Within each zone there are different scales. The scale that is selected will represent the maximum value that the multimeter will read. Always select a scale which is greater than the value that you intend to measure. If you are unsure of the value to be measured, always select the highest scale and then reduce the scale once you have an idea of the measured value.



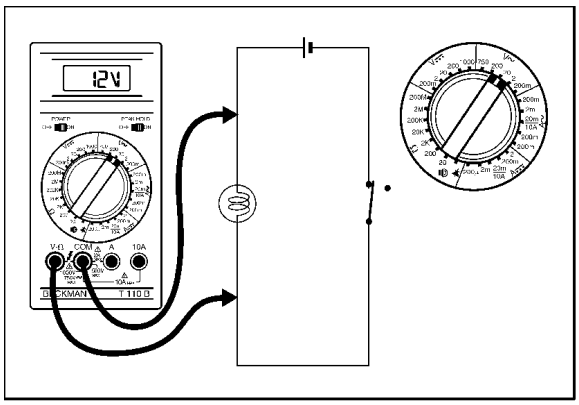
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Why are there different scales ?
The closer that the scale is to the measured value, the more accurate the reading will be e.g. If measuring the voltage of a battery with the scale set at **200 V**, the display may read **12 V**. However, if the scale was set to **20 V** the display may read a more accurate reading of **12.27 V**
.

Giga	G	1,000,000,000	10^{9}
Mega	M	1,000,000	10^{6}
Kilo	K	1,000	10^{3}
milli	m	0.001	10^{-3}
micro	µ	0.000 001	10^{-6}
nano	n	0.000 000 001	10^{-9}
pico	p	0.000 000 000 001	10^{-12}

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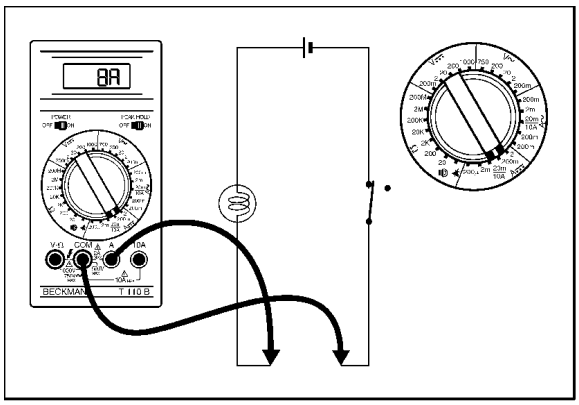
Measuring Voltage (Volts):
Set the range dial to either ac or dc volts. Connect the Black test probe to the "COM" terminal and the Red test probe to the "V/Ω" terminal. Place the test probes across the component to be measured with the circuit complete (closed). Read off the display value.



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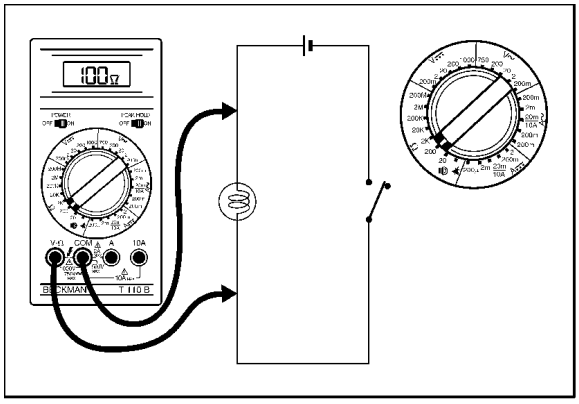
Measuring Current (Amps):
Set the range dial to either ac or dc current. When measuring current up to **2 amps**, connect the Red test probe to the "A" terminal. When measuring current up to **10 amps**, connect the Red test probe to the 10 "A" terminal. Always connect the Black test probe to the "COM" terminal. When taking measurement of current, always break the circuit and connect the multi meter in series with the circuit. Read off the display value.

NOTE: *For protection, multi meters are usually fused at 1OA.*



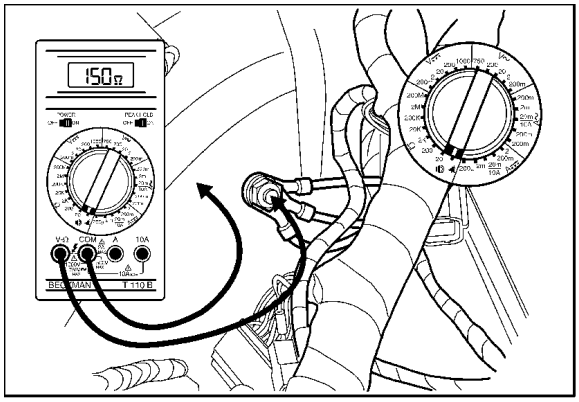
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Measuring Resistance (Ohms):
Set the range dial to the desired Q position. Connect the Red test probe to the “V/Ω" terminal. Connect the Black test probe to the “COM" terminal. If the resistance being measured is connected in a circuit, then turn off the power to the circuit. Connect the test probes to the measuring point and read off the display value.



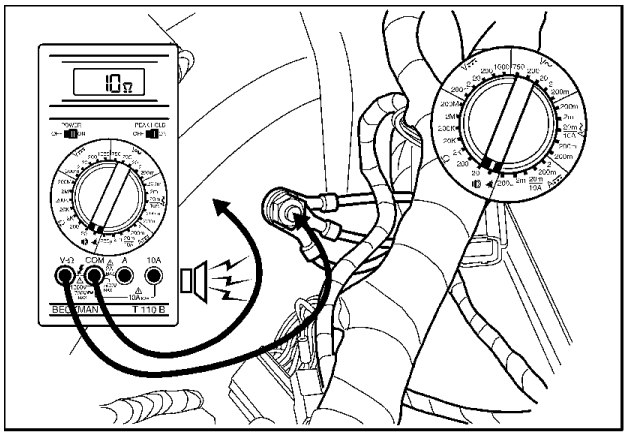
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Continuity (Buzzer) test:
Set the range dial to the “Buzz" position. Connect the Red test probe to the “V/Ω" terminal. Connect the Black test probe to the “COM" terminal. Connect the test probes to the measuring point. In general, if the resistance is less than **50 ohm** then the buzzer will sound, indicating continuity.



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Note: Buzzers on different multi meters will sound at different ohmic values, depending on the quality of the meter. This can often be misleading. For example, when checking a corroded earth point. A poor quality multi meter may buzz at **150 ohm**, indicating continuity and no problem. When using a higher quality multi meter for the same test, it would not buzz due to the high resistance. When carrying out such tests, we should always check the value of resistance as well as listening out for the buzz.
A good connection gives low resistance.
A bad connection gives high resistance.



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SUMMARY:
When measuring -
Voltage (V):
Connect across the component with the circuit closed.
Current (A):
Connect in series with the circuit. Circuit closed.
Resistance (Ω):
Connect across the component with the circuit open.
Continuity (Buzz):
Connect the meter across the component with the circuit open. (Always check the value of resistance as well!)

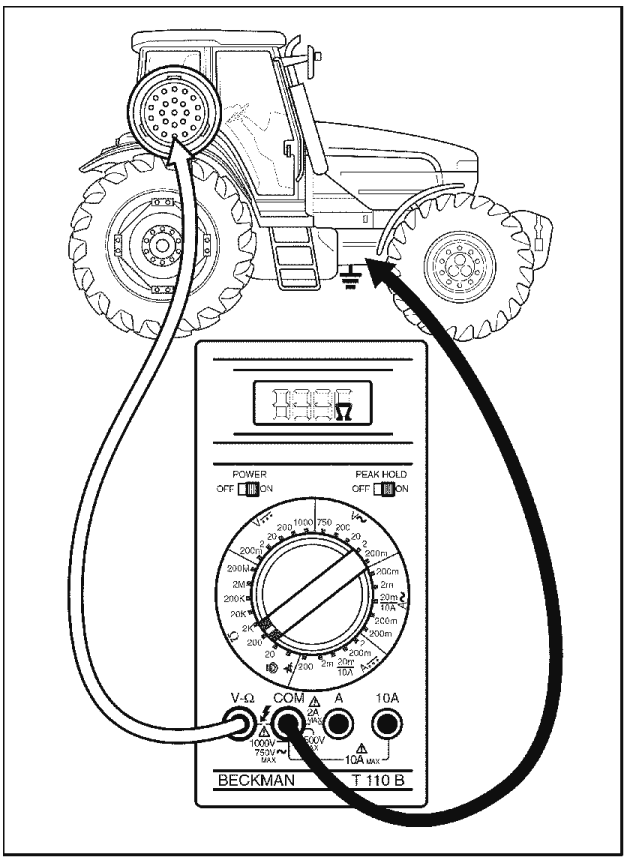
ELECTRICAL TEST PROCEDURES

Four electrical tests will be required to properly troubleshoot electrical concerns on the vehicle.
Each test is described in detail. Ensure that all steps are reviewed and followed when testing.

1. Continuity Test, Short to ground
2. Voltage measurement, short to **12 volts**.
3. Resistance test for components
4. Continuity test, Open circuits

ELECTRICAL TEST PROCEDURE 1: CONTINUITY TEST - SHORT TO GROUND

CONDITIONS FOR PERFORMING TESTS:

1. Power OFF, Keyswitch OFF, (sometimes battery disconnected or fuse pulled out if specified in procedure).
2. Connectors at each end or ends of circuit disconnected to prevent false readings.
3. Set meter to measure resistance or ohms, and measure circuit resistance. Use black lead to make contact with a plated metal part on the chassis such as a jump start post if fitted. Make sure the surface of the part is not corroded. Use the red meter lead to touch the connector pins, one pin at a time, and avoid contact with the case of metal connectors.
4. Determine if measured resistance falls within guidelines specified in the procedure. **3 - 4 ohms** indicates a direct short to chassis ground and must be located and repaired. Higher resistances usually indicate circuit paths through modules, and that an additional connector needs to be disconnected to perform the test. More than **100K ohms** indicates that the circuit is free of shorts to ground.
5. 

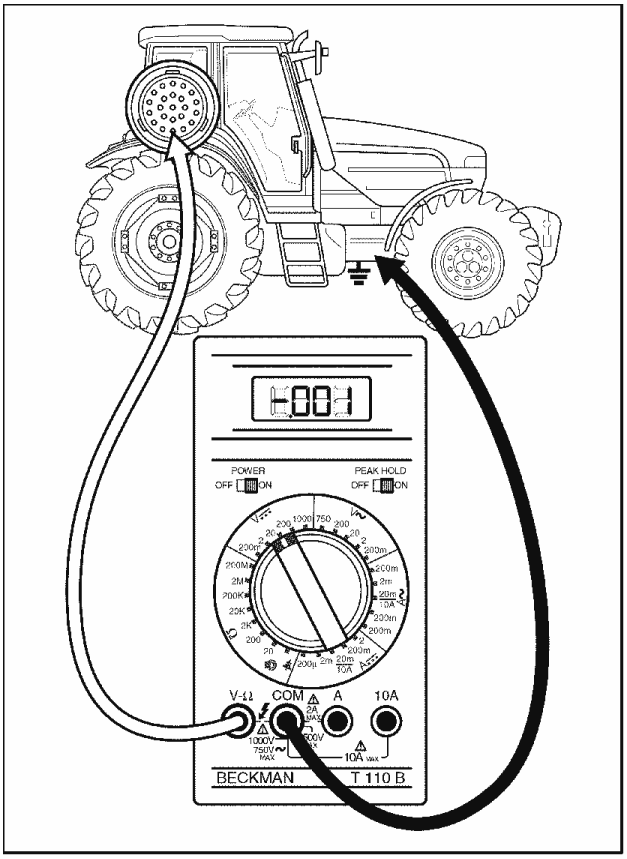
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ELECTRICAL TEST PROCEDURE 2: VOLTAGE MEASUREMENT OR SHORT TO POSITIVE SUPPLY VOLTS

CONDITIONS FOR PERFORMING SHORT TO POSITIVE SUPPLY TESTS:

1. Keyswitch ON (sometimes OFF, if specified in procedure).
2. Connectors at sensor, switch or potentiometer end disconnected. All other connectors must be reconnected to perform test.
3. Set meter to measure DC VOLTS, and measure circuit voltage as illustrated. Use the red meter lead to touch the connector pins, one pin at a time, and avoid contact with the case of metal connectors. Use the black lead to

make contact with a plated metal part on the chassis such as a jump start post if fitted. Make sure the surface of the part is not corroded.

4. Determine if measured voltage falls within guidelines specified in the procedure.
5. 

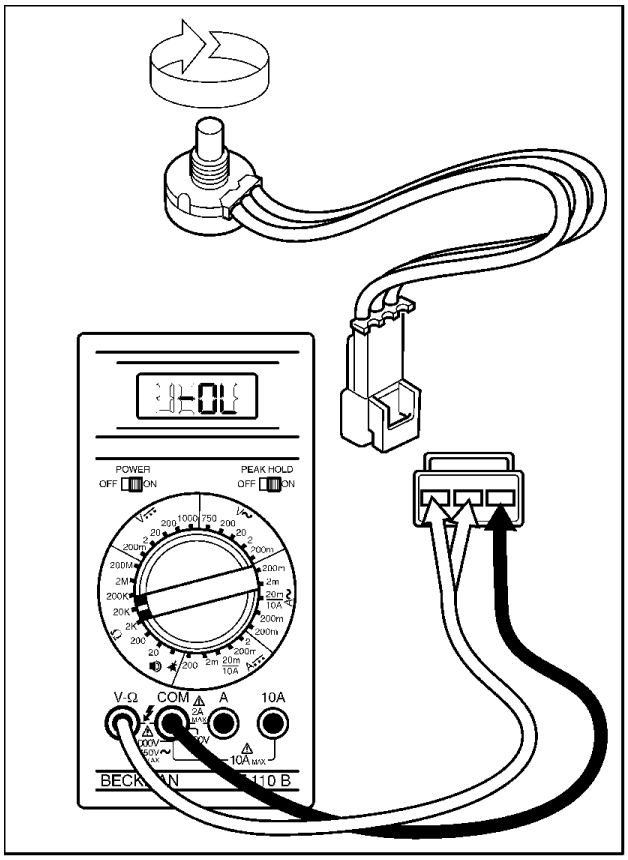
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ELECTRICAL TEST PROCEDURE 3: RESISTANCE TEST FOR ELECTRICAL PARTS

CONDITIONS FOR PERFORMING RESISTANCE TEST

1. Disconnect tractor part by unplugging electrical connectors to expose the part assembly connector for testing.
2. Set electrical meter to measure resistance or Ohms and insert test probes into connector terminals specified in procedure. When checking potentiometers, measure from wiper terminal to each of the other terminals while TURNING THE POT SHAFT. This will ensure no open spots escape detection. When checking rocker or rotary switches, actuate the switch while measuring for opens and shorts.
3. Compare measured values to values specified in the fault code procedures. Allow plus or minus 5 percent of range tolerance for all measurements.

4.



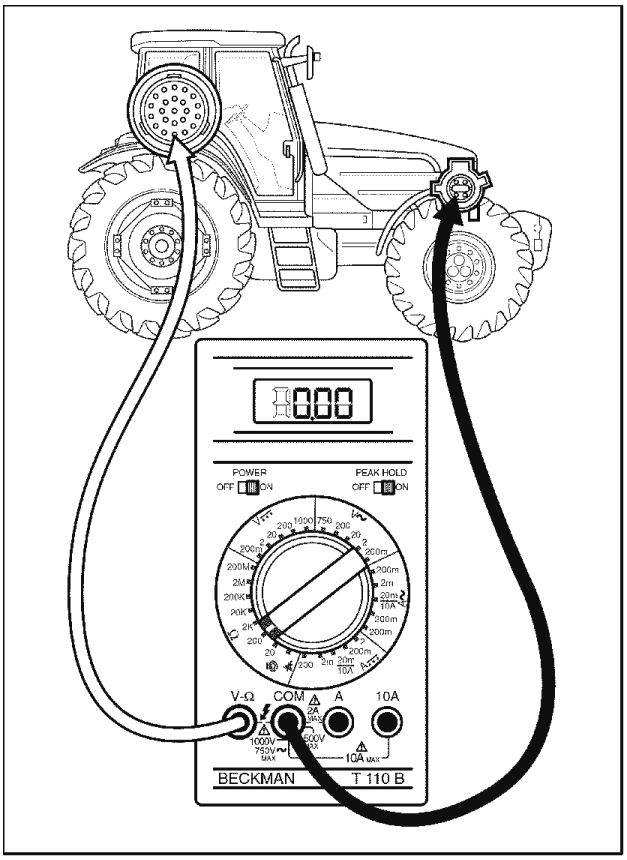
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ELECTRICAL TEST PROCEDURE 4: CONTINUITY TEST - CHECK FOR OPEN CIRCUITS

CONDITIONS FOR PERFORMING CONTINUITY TESTS:

1. Keyswitch OFF (sometimes disconnect battery or pull fuses).
2. Connectors at both ends of the circuit disconnected. All other connectors must be reconnected to perform test.
3. Set meter to measure resistance or ohms, and measure circuit resistance as illustrated. Use the red meter lead to touch the connector pins, one pin at a time, and avoid contact with the case of metal connectors. Use the black lead to make contact with the connector pin at the other end of the circuit. Avoid contact with other pins in the connector and the connector case, if it is metal.
4. Determine if measured resistance falls within guidelines specified in the procedure. If the resistance is no more than **3 - 4 ohms**, the circuit is continuous. More resistance usually indicates dirty or corroded terminals in connectors, and **100K ohms** indicates an open circuit.

5.

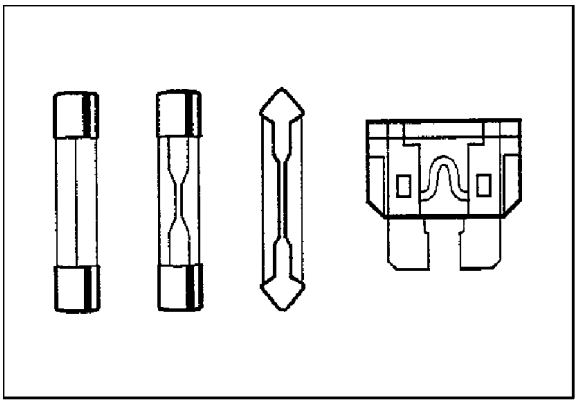


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CIRCUIT COMPONENTS - BASIC DESCRIPTION

CIRCUIT PROTECTION DEVICES

Circuit protection devices are used to protect wiring and components from excessive current. Three different types of protection are fitted in tractors. Two of them (fuses and fusible links) are currently used, while circuit breakers are no longer used.

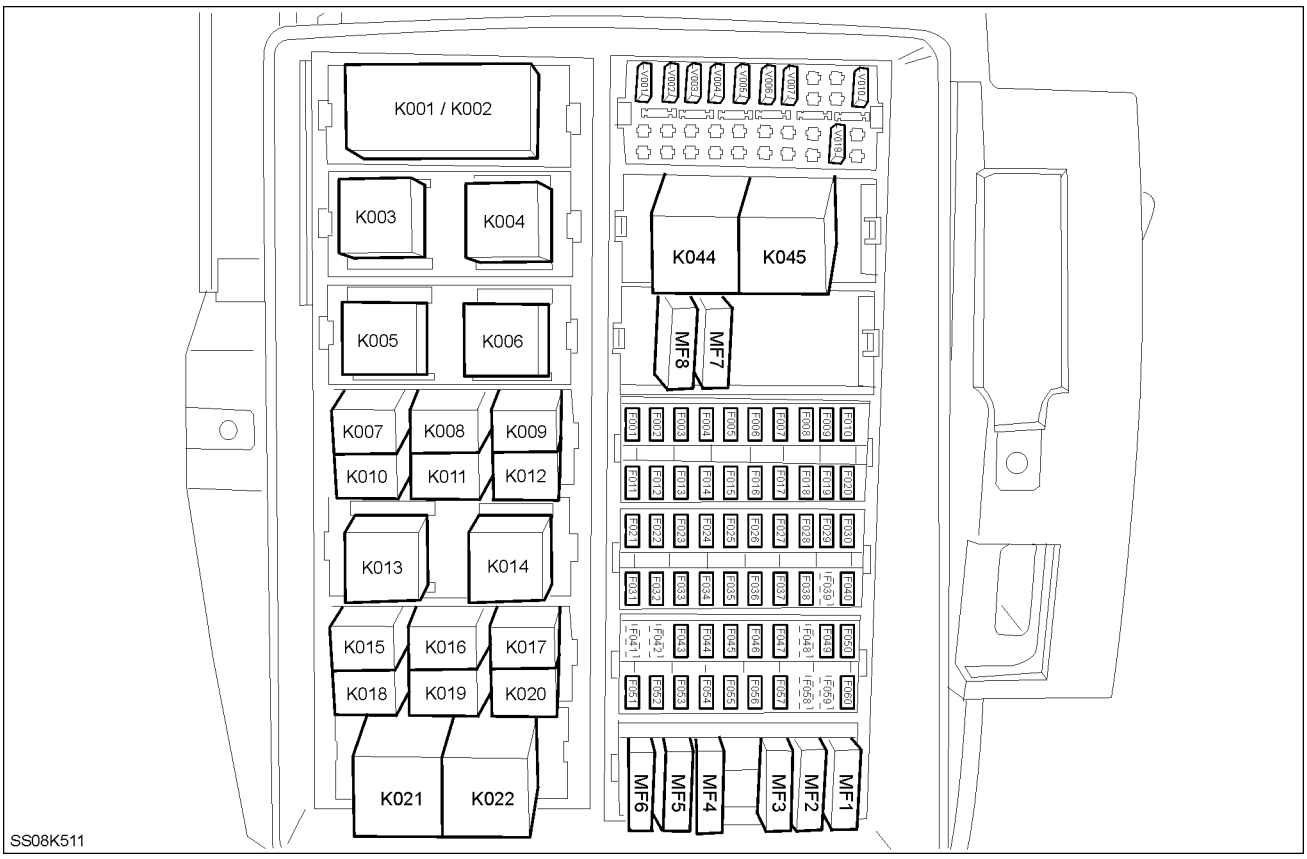


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FUSES

Fuses protect circuits with thin pieces of metal and wire which heat up and melt to open up the circuit when too much current flows through them.
Fuses are used to protect the circuit from overload. This can occur in the event of a short circuit or by connecting equipment which demands a current greater than the circuit is designed to carry.
There are several types of fuses, but they all consist of a metal conductor which is capable of carrying a limited current. If the specified current is exceeded then the metal conductor will overheat, causing it to melt and break. This will in turn cause an open circuit.
The rating of the fuse relates to the current that the fuse can carry continuously.

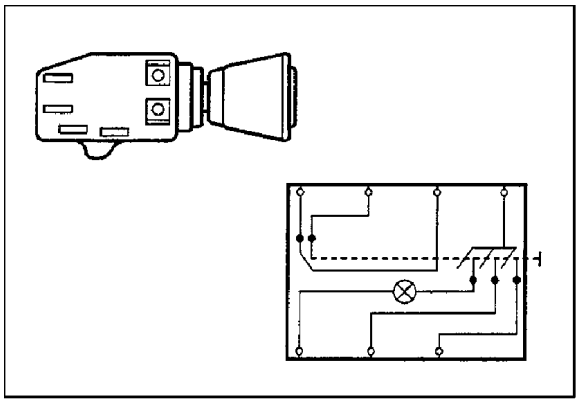
If a fuse blows, it must be replaced with a fuse of the correct rating, and if it blows again, then the cause must be investigated.



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CIRCUIT CONTROL DEVICES

Some of the components in a circuit are used to interrupt and direct current flow either through an action of the operator or automatically. The current interrupters you are probably most familiar with are switches.

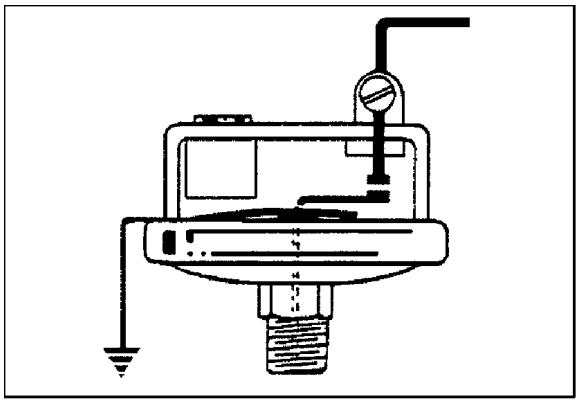


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SWITCHES

Switches are a vital part of an electric circuit, providing a method of controlling the circuit itself. One switch can control a number of different circuits at the same time. This is achieved by having several separate connections and/or multi-connector switches (several switch 'positions').
There are several types of switch, and they may incorporate a warning light.
Switches can be as simple as that used to turn on an implement lamp or as complex as the ones used to operate the starting and lighting systems. Checking the operation of switches is usually just a matter of testing for power going into the switch and for power leaving the switch at the appropriate contacts when the switch is operated.

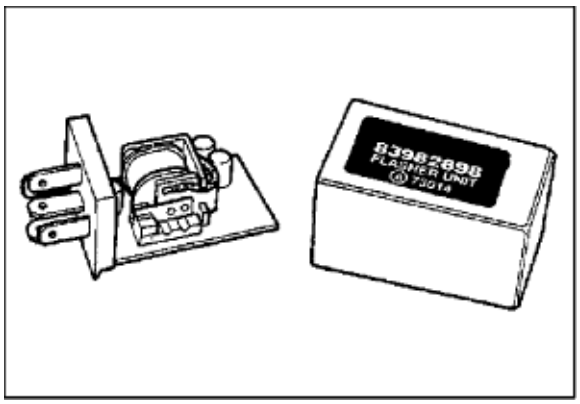
One of the most common type of switches is the pressure switch (Fig. **22**), a switch opened or closed by a fluid pressure. An example of this type of switch is the engine oil pressure switch, a simple on/off device that opens (or closes) when oil pressure rises above **10 psi**.



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FLASHERS

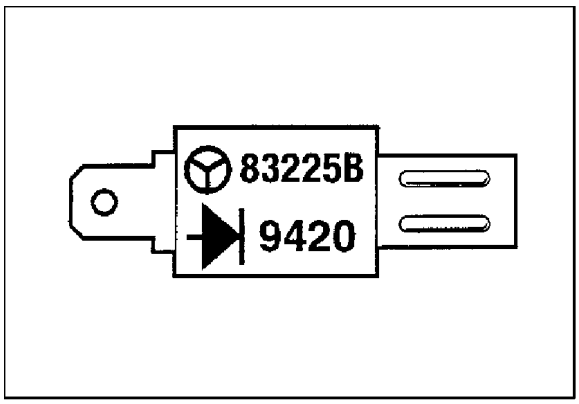
Flashers work automatically to interrupt and connect the flow of current. Their operation is similar to that of the circuit breaker described earlier.
Flasher units may be either a mechanical device where a heating element warms a bimetallic strip. The strip bends, breaking contact with the power source. When it cools, the bimetallic strip once again makes contact and the process begins again, or as is more common now, it is a solid state unit where the switching is done via electrical components.



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DIODES

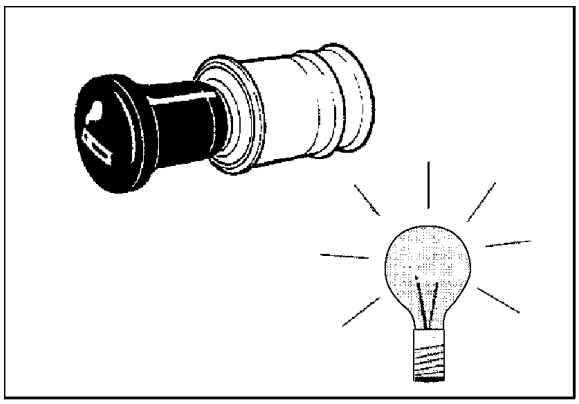
Some components use a semiconductor material instead of moving parts to direct current. Diodes for example, allow current flow in one direction only.
They are essential in converting the alternating current that an alternator produces to the direct current that the tractor electrical system components use.



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RESISTANCE DEVICES

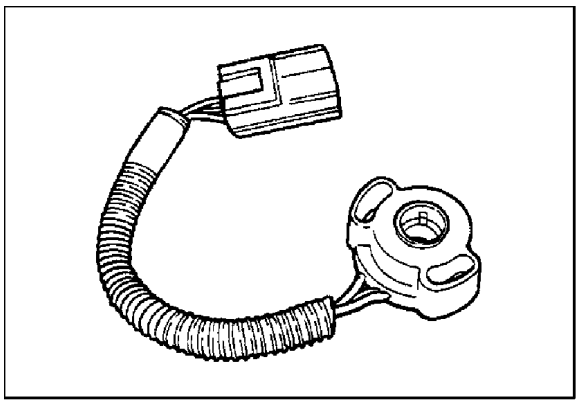
A number of electrical components alter or make use of electricity through their resistance to current flow. Resistors are components which are generally used to regulate the supply of voltage and current to other electrical components. In some cases, the purpose of resistance in an electrical circuit is to provide light or heat. Lamps and cigar lighters are examples. Lamps convert electricity into light, and cigar lighters convert it into heat. Both lamps and lighters make use of the same physical principle, that is Ohms Law.



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POTENTIOMETERS

Potentiometers are variable resistors which are dependant on mechanical movement, i.e. Lateral float movement, to vary the resistance of the component and therefore alter the output voltage.
In order to verify the correct operation of a potentiometer, the resistance should be measured at the minimum and maximum positions and a smooth and continuous change of resistance should be observed between. As the resistance varies with temperature, the test specifications are usually given at **20 °C**.



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ELECTROMAGNETIC DEVICES

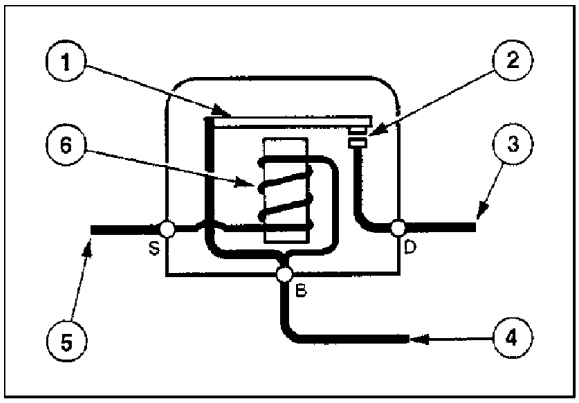
In general, they use the magnetic field created by flowing current to move metal parts within the components.

RELAYS

The relay is an electromagnetic switch that uses a small amount of current to switch a larger amount on and off.
When the operator closes a switch, current flows through the relay's control circuit. In this circuit there are windings surrounding an iron core which is fixed in place (see Fig. **27**).
Current turns the iron core into an electromagnet. The core then attracts an arm which has a contact point on it. When the point on the arm contacts the stationary point, current flows through the power circuit.
Relays are basically electrically operated switches. They are used to switch a circuit on/off in similar way to a manual switch.
Two circuits are connected to the relay:

- A work circuit, which is switched on/off by the relay, and provides the supply for the equipment to be operated, i.e., bulbs, solenoids, etc.;
- A control circuit, switched on/off by manual switches, used to operate the relay.

The part of the relay which is connected to the control circuit consists of the winding of an electro-magnet. When the control circuit is switched off, the contacts are kept apart by a return spring. When the control circuit is switched on, a current flows through the coil and a magnetic force is produced. This force, which is stronger than the spring pressure, pulls the contacts of the relay together, causing the work circuit to operate.



1b0o2004061114 27

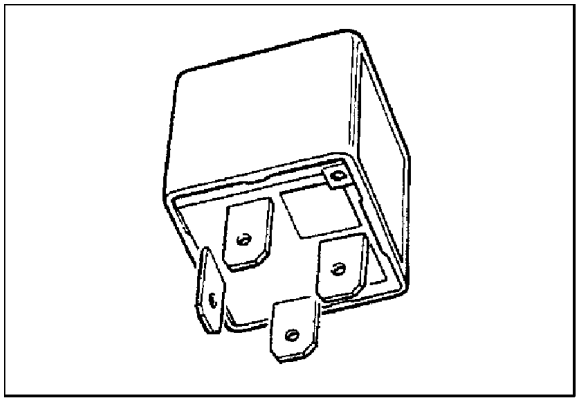
A switch-relay system has two main advantages over a simple switch:

- The current that flows through the switch is not the same as all the current requested by the equipment to be operated, but usually by a smaller current: this allows the usage of smaller and less expensive switches;
- The distance from the supply, to the equipment, can be made as short as possible to minimise voltage drop.

There are several types of relays. They can be normally open or normally closed. They may have internal electronic circuits to give special operating features. For example, they can turn the switch on/off at timed intervals (flasher relay), be sensitive to current, temperature, etc. The relay cover usually gives information about the features of the relay.
On the relay cover there are usually 4 or 5 terminal markings :

- 30: input terminal direct from battery positive, normally live.
- 85: winding output terminal, usually to ground.
- 86: winding input terminal.
- 87: output terminal for normally closed contact.
- 87a: output terminal for normally open contact.

Brown relays are normally open relays, blue ones are normally closed.

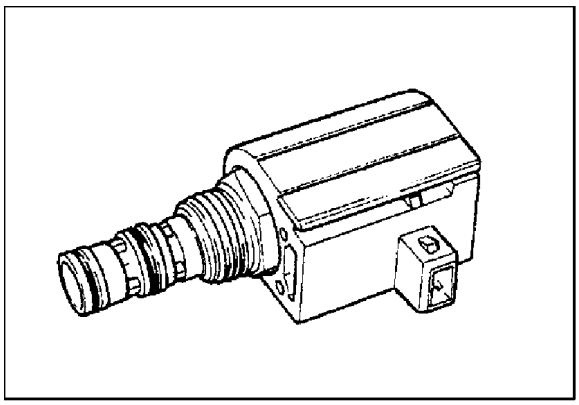


1b0o2004061115 28

SOLENOIDS

Solenoids (**29**) work in much the same way as relays, except that the iron core is not fixed in place.
As a result, the windings in the control cause the iron core to move.
In the starting system, for example, the movement of this core is used to send large amounts of current to the starter motor.
A solenoid is basically a winding around an iron core. In the centre of the core there is a plunger which is free to move through the core. When an electrical current passes through the winding an electro-magnetic force is produced

which causes the plunger to move through the core. If the current is switched off, the magnetic force is stopped and the plunger is returned by a spring.



1b0o2004061116 29

The solenoid plunger may have different uses: the most common are moving a hydraulic spool or a mechanical lever. The use of solenoids to control hydraulic pressure instead of the hydraulic valves is highly recommended wherever there is a long distance between the control panel and the valve (more than 10 meters) or a fast action is required.
A coil should:

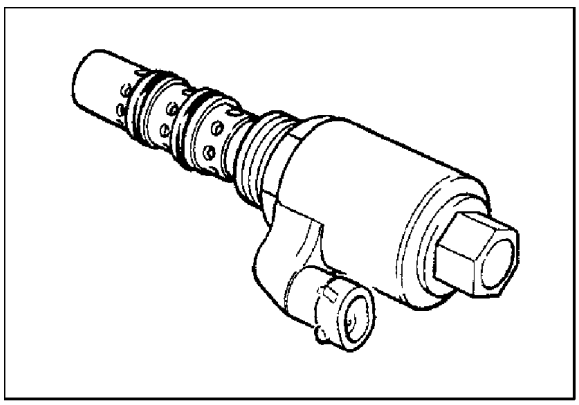
- Be non-sensitive to vibrations;
- Be silent in operation
- Have large frequency of activation (30-35 times per second)
- It should be possible to fit it in any position.
- Be insulated, in order to function correctly for a wide range of temperatures (**-40 °C** to **+85 °C**), and with high humidity conditions.

The MOST COMMON FAULTS that can occur are:

- Short circuit winding: if a section of the winding allows the current to pass directly from positive (+) to negative (-) terminals without passing through the winding, this will cause the relevant circuit fuse to blow.
- Broken winding: causing an open circuit, it will not allow the current to pass through the winding, so the solenoid will not operate.
- Seized plunger (and/or connected components): the solenoid will only move the plunger if all components are free to move.

PWM SOLENOID VALVES

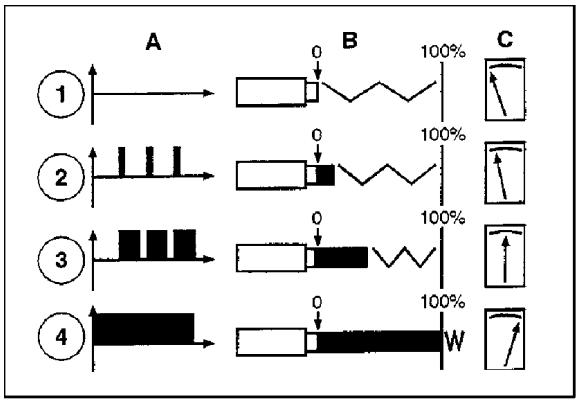
Whenever it is necessary to provide proportional control to the solenoid valves, it is much better to use a principle of operation called pulse width modulation (PWM). PWM is a variable DC voltage signal that is used to control the solenoid valves. The voltage signal is pulsed on and off many times a second (at a constant frequency of **500 Hz**) at a constant supply voltage of **12 V**.



1b0o2004061117 30

The processors contain transistors that are supplied with a constant input voltage which is switched on and off to achieve the variable input range. In this way the control module is able to limit the armature movement, so the

hydraulic output flow of the solenoid is proportional to the average DC voltage. The lower voltage also allows the solenoid to operate with less residual magnetism and so the entire circuit will operate smoother.
The variable DC voltage signal level is determined by varying the duration of the ON pulse relative to the OFF pulse (see Fig. **31**). The ratio between the ON time and the cycle time is called duty cycle and is stated as a percentage of one complete cycle.
With reference to Fig. **31**, diagrams 1 to 3 show the normal operating range of the PWM valve, and diagram 4 shows the initial **12 V** programming and fill time only. The diagrams in column A show the voltage signal that is sent to the valve, whereas column B shows the relevant spring pressure and column C the reading on a voltmeter connected to the solenoid valve.
Diagram 1 shows the OFF position: no signal is directed to the valve, which means no spring pressure in the valve at all and results in a zero voltage reading. Increasing the duty cycle causes some pressure to be made on the circuit (Diagram 2), which results in a voltmeter reading increase. Diagram 3 shows the maximum signal that is used during the normal activity of the valve: its duty cycle is around 0.5, which results in a spring pressure for the half of its run and in an indication of a **6 volt** average DC current.
The electrical circuit to the solenoids can be checked by using a digital or analogue DC voltmeter, which will indicate the average voltage readings.



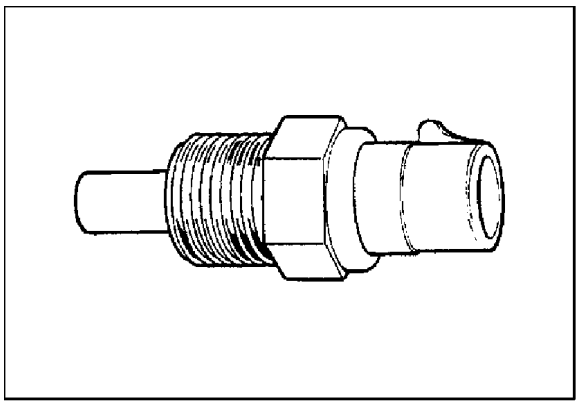
1b0o2004061118 31

SENSORS

A sensor is the primary component of a measurement chain that converts the input variable (temperature, capacitance, reluctance) into a signal suitable for measurement. The relationship between the input variable and the measured signal is a characteristic of the sensor.
In the above mentioned measurement chain the signal is filtered and treated in order to adapt it to its use. It consists of three elements: the sensor itself; the converter, which converts the output signal from the sensor (in most of the cases into an electric signal); and the conditioner, which transforms the output signal from the converter in the most suitable form. Generally the term sensor indicates the entire measurement chain.

TEMPERATURE SENSORS

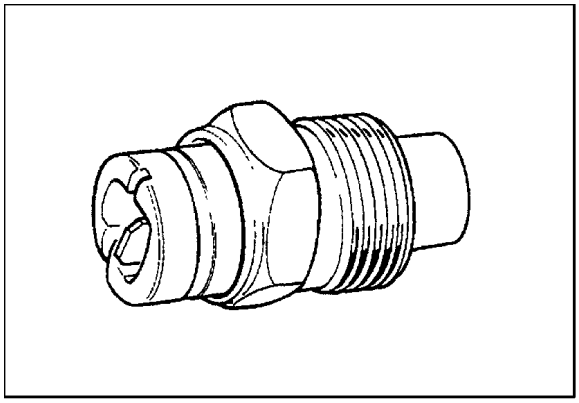
Generally based on a simple circuit with a thermistor. A thermistor is a resistor that changes its resistance according to the temperature.
There are two groups of thermistors: NTC (Negative Temperature Coefficient) and PTC (positive Temperature Coefficient). In the first case the higher the temperature, the lower is the resistance, and for the PTC the higher the temperature, the higher the resistance. The NTC are often used as sensors to indicate temperature change in fluids, such as the engine coolant fluid.
An example of these type of senders is the coolant temperature sender. The changes in its resistance (which varies with temperature) are relayed to the Instrument Cluster, which operates the bar graph and the warning indicators accordingly.



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PRESSURE SENDER

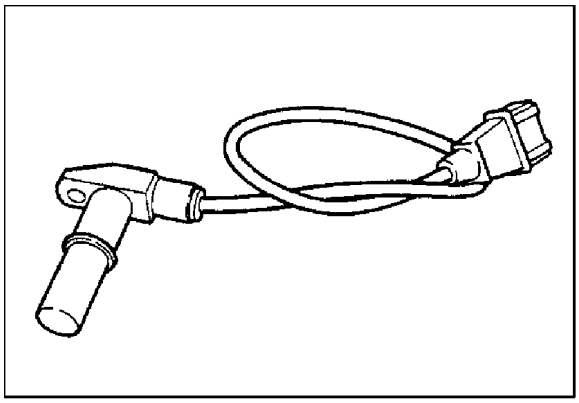
A pressure sender receives a supply signal and it varies it according to the (oil) pressure. An example is the oil pressure sender, which receives a **5 volt** signal and varies it according to the oil pressure. The Instrument Cluster keeps track of these variations and changes its readouts and warnings accordingly.



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SPEED SENSOR

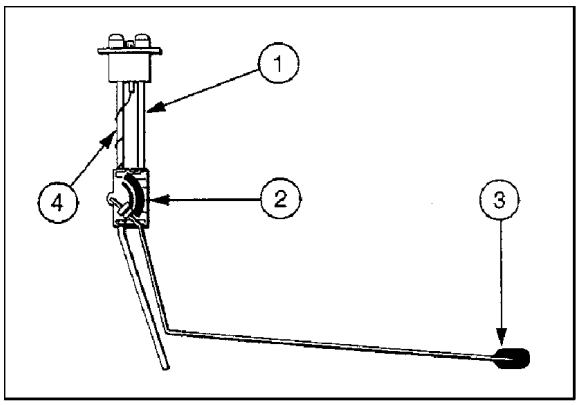
The speed sensor is typically a reluctance sensor. An example is the axle speed sender, which is fitted into the transmission and gets pulses off the gears, counting the gear teeth. The sender uses a pickup coil close to four wheel drive coupling. The action of the gear close to the pickup creates pulses which are relayed to the Instrument Cluster. The Instrument Cluster converts the frequency of the pulses into ground speed.
Possible failures are due to vibration, open circuits.



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FLUID LEVEL SENDER

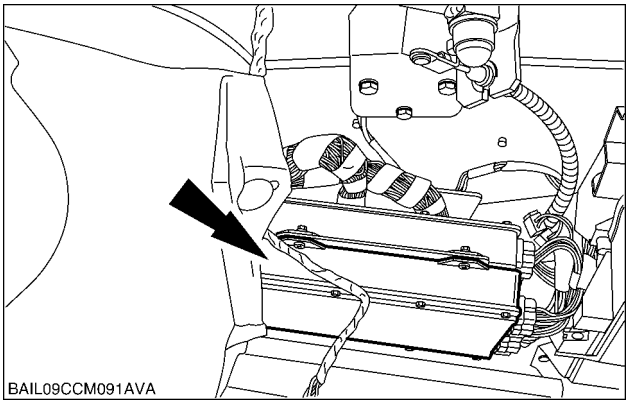
It operates by varying resistance through the movement of a float. An example is the fuel level sender.



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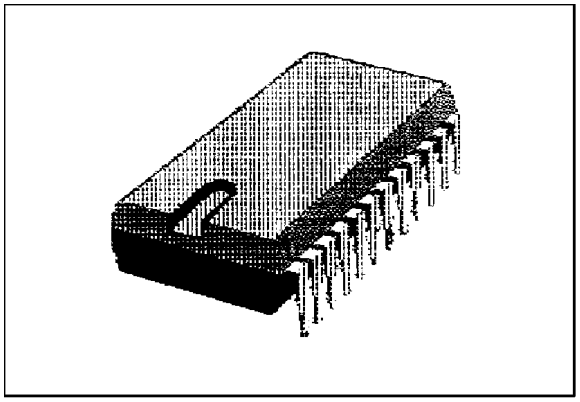
ELECTRONIC MODULES

The electronic modules are the "black boxes" that provide control on many of the functions of the tractor. These functions may vary according to the options that are fitted on the tractor.
Inside these "black boxes" there is a processor, the "thinking part" of the module, and inside some of them there is one or more memories, which may allow the module to store calibration values, the configuration of the vehicle (which optional tools or devices have been installed) and the error codes.



BAIL09CCM091AVA 36

A processor has a series of pins, which are electrical contacts (see Fig. **37**). There are three main types of pins: for the inputs of the signals, for the outputs and for the processor supply.
The processor, the memories and the link between them form the hardware of the module, its "physical" part.
Then some software is needed, to handle the communication between the processor and the memories and to manage the various signals going into and out of the processor. The software is designed to operate in a different way for every module, and is called functional code.

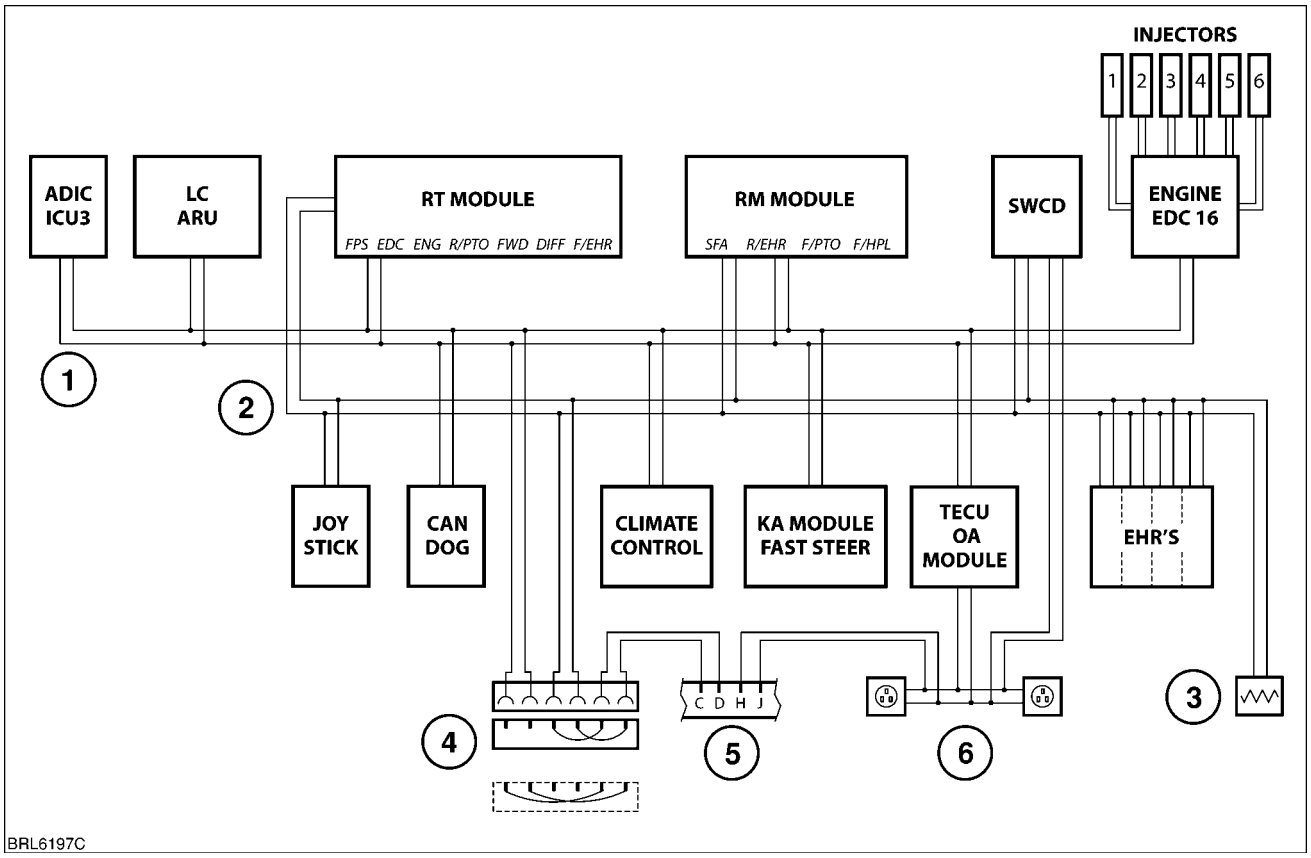


1b0o2004061123 37

A serial data link is a kind of communication where data is sent along a single wire, so the information regarding different functions of the same processor are sent to the Instrument Cluster in different moments.
To provide a continuous control on components, the processor continuously scans all the inputs in a time-sharing mode, with a cycle lasting **1O ms**. This means that all the components controlled by the processor are checked one by one, and that every component is checked 100 times per second.

The electronic modules are often blamed as responsible for most of the problems of the modern tractors, while they are for certain among the most protected parts of the tractor. In fact, the pins of the module are protected against spikes (high pulses) of current, and the signals are filtered by the hardware and by the software in input and in output to give the best handling of information.

CONTROLLER AREA NETWORK (CAN) SYSTEM



BRL6197C 38

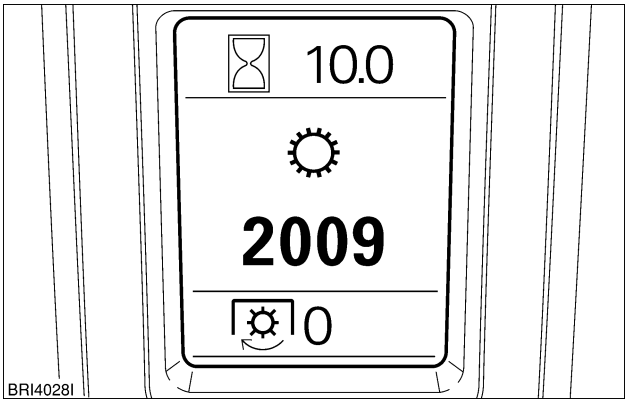
CAN BUS Architecture

1. CAN BUS 1
2. CAN BUS 2 (EHR's)
3. CAN BUS 2 Terminating Resistor
4. CAN BUS Select
5. Diagnostic Connector
6. Implement BUS

The tractor utilises a CAN (Controller Area Network) in addition to the standard wiring harnesses. The CAN is a 2-wire system which uses a series of numeric values sent at very high speed to transmit data between controllers and components. A CAN system has the advantage of being able to use one component for many applications without the need for hard wiring to each application, as in a conventional system.
Depending on the model specification, controllers are used to control a number of systems on the tractor.

FAULT CODE DISPLAYS

All fault codes are displayed on the analog digital instrument cluster (ADIC) dot matrix display (DMD). Only disabling errors will be displayed on the DMD and will be visible to the operator. Less serious errors are stored and can be retrieved via the H-Menus, refer to **Control module - Static description (A.50.A)** for more detailed information.



BRI4028I 39

Fault Code Symbols

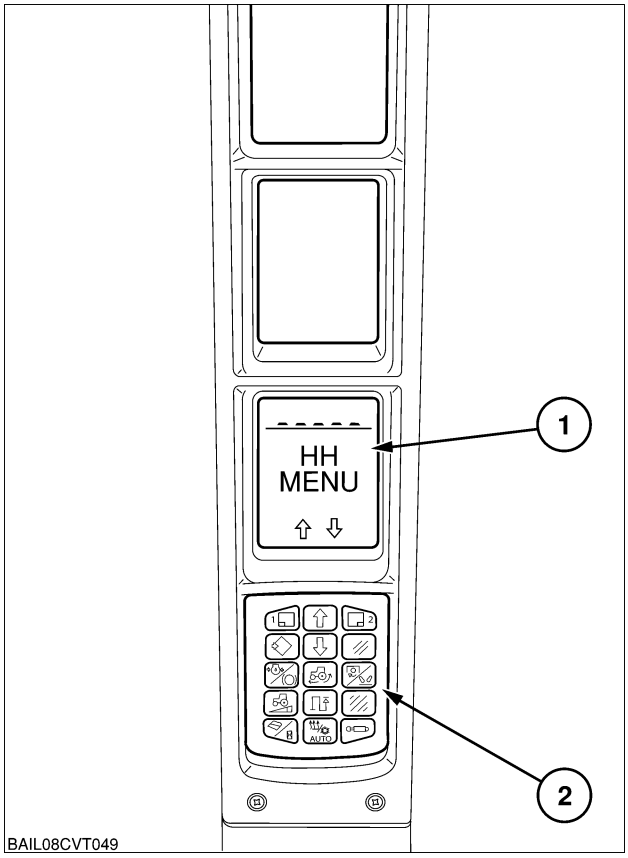
1. Engine
2. Transmission
3. Differential lock
4. CAN malfunction
5. Electronic draft control
6. Front hitch
7. P.T.O. system
8. Electronic remote valves
9. Electronic remote valves
10. Front suspension
11. Four wheel drive
12. Instrument panel electrical fault
13. Fast steer system
14. Air conditioning system

The ICU3 will display a symbol accompanied by a four or five digit code to indicate a fault has occurred. The symbol represents the system in which the fault is detected and the code specifies the cause of the detected fault.
The fault codes are grouped by system using the following numbered ranges:

- 1001-2000 (Electronic Draft Control)
- 2001-3000 (Transmission)
- 3001-4000 (Engine)
- 4100-4400 (Rear Electro - Hydraulic Remotes)
- 4500-4600 (Front Electro - Hydraulic Remotes)
- 5001-6000 (Rear Power Take Off)
- 6001-7000 (Four wheel drive)
- 7001-8000 (Differential lock)
- 8001-9000 (Front PTO)
- 9001-10000 (Front hitch)
- 10001-11000 (Front suspension)
- 14001-15000 (Instrument cluster)
- 15001-16000 (Steering controller)
- 16001-17000 (Air conditioning)
- 18001-19000 (Armrest unit)

H-MENU DIAGNOSTIC MODE

The H-menu diagnostic mode can be used to access and clear the fault codes which may be stored in the various controllers. The H-menu diagnostic mode also contains many other useful functions which may be used to assist with diagnostics.
Refer to the Diagnostic H Routines chapter in **Control module - Static description (A.50.A)**.



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ELECTRONIC SYSTEM - Fault code index

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Transmission Calibration 'U' Error Codes

Code	Description	Possible Failure
U16	ERPM dropped too soon during clutch calibration	1) Engine lugged down too soon. Possible PWM valve faulty or a mechanical fault within the transmission
U17	Seat switch not activated	1) Open circuit for the seat switch input to the transmission module 2) Faulty seat switch 3) Switched 12v supply fuse blown Note: Use the H5 switch diagnostics to detect if the seat switch is connected
U19	Oil temperature below **10 °C**	1) Open circuit for the temperature sensor input to module 2) Faulty temperature sensor Note: Use the H9 in the transmission module to see if the temperature sensor input is OK
U20	Handbrake is not set	1) Open circuit for the handbrake feed into the transmission module 2) Faulty handbrake switch 3) Switched 12v supply fuse blown Note: Use the H5 switch diagnostics to detect if the handbrake is connected
U21	ERPM is below 1150, increase throttle	1) Operator has not set the correct engine speed 2) Instrument cluster is not powered 3) Broken CAN Note: Use the H9 in the transmission module to see if the engine speed is being detected
U22	ERPM is above 1350, reduce throttle	1) Operator has not set the correct engine speed
U23	Shuttle lever is in neutral, shift it to forward	1) Operator has not selected forward on the shuttle lever 2) Open circuit between the shuttle lever and the transmission module 3) Switched 12v supply fuse blown Note: Use the H5 switch diagnostics to detect if the switch is connected
U26	Clutch pedal is not up, release clutch pedal	1) Operator has not released the clutch pedal 2) The clutch potentiometer linkage is sticking or broken Note: Use the H9 in the transmission module to see if the clutch input is OK
U31	Wheel speed sensed	1) Handbrake not applied 2) Brakes not working Note: If the brakes are OK move the vehicle forward slightly and repeat calibration
U36	Max allowed clutch calibration value exceeded	1) Current value exceeded without lugging the engine down. Possible PWM valve faulty or a low hydraulic pressure fault
U68	Creeper not engaged	-
U69	Creeper stuck	-
U75	Quick fill calibration value too high	-
U76	Quick fill calibration value too low	-
U77	Damper calibration value too high	-
U78	Damper calibration value too low	-

Electronic Draft Control Calibration 'U' Error Codes

Code	Description	Possible Failure
Note: There are no 'U' error codes defined for the electronic draft control calibration procedure. However the following error codes may be displayed during the procedure.		
1068	Height limit control not fully clockwise	1) The height limit control is not turned fully clockwise 2) The height limit control is faulty

PTO Torque Calibration 'U' Error Codes

Code	Description	Possible Failure
U51	Engine speed error	1) Check engine speed sensor is fitted 2) Instrument cluster is not powered 3) Broken CAN link Note: Use the HE menu function in the transmission module to see if the engine speed is being detected
U52	Constant ERPM switch detected	1) CRPM switch operated greater than 3 times, repeat start procedure
U55	PTO started	1) PTO turned on while completing Calibration procedure. Repeat the calibration
U58	PTO twist sensor open circuit	-
U59	PTO twist sensor short circuit	-
U70	PTO twist sensor not calibrated	-

Front Suspension Calibration 'U' Error Codes

Code	Description	Possible Failure
U01	Front axle potentiometer open circuit - ACP will not work	1) Check the wiring harness 2) Check the displayed potentiometer reading during calibration. If less than 51 then replace the potentiometer
U02	Front axle potentiometer threshold is higher than set limit	1) Check the potentiometer installation 2) Check the displayed potentiometer reading during calibration. If greater than 970 then change the potentiometer 3) Check the wiring harness
U03	Front axle potentiometer short circuit - ACP will not work	1) Check the wiring harness 2) Check if signal ground on potentiometer is open circuit 3) Change the potentiometer
U04	Front axle potentiometer threshold is lower than set limit	1) Change the potentiometer
U05	Suspension is not reaching its minimum/maximum position during ACP procedure	1) Check the range of the potentiometer, calibration will not work if the range of the potentiometer is less than 150 2) Check the suspension mechanics 3) Check the potentiometer linkage
U07	Suspension is stationary during the raise command in the ACP procedure	1) Check the raise solenoid harness 2) Check the suspension mechanics 3) Check the pressure of the accumulators 4) Check the hydraulic pressure 5) Disconnect implement
U08	Suspension unable to reach maximum height within 20 seconds	1) Check the raise valve installation 2) Check the unload solenoid installation 3) Check the suspension mechanics 4) Check the hydraulic pressure 5) Disconnect implement
U09	Suspension is stationary during the lowering command in the ACP procedure	1) Check the unload solenoid harness 2) Check the suspension mechanics 3) Check the hydraulic pressure 4) Disconnect implement
U10	Suspension unable to reach minimum height within 25 seconds	1) Check unload solenoid installation 2) Check the hydraulic pressure 3) Disconnect implement

Code	Description	Possible Failure
U11	Unable to calibrate suspension	1) The lockout switch was pressed more than 3 times to initiate calibration 2) Check the suspension mechanics 3) Check the hydraulic pressure
U12	ACP stopped, vehicle not stationary	1) Handbrake not applied 2) Rear axle speed sensor faulty
U13	Valve 30 solenoid open circuit	1) Check the wiring harness
U14	Valve 31 solenoid open circuit	1) Check the wiring harness
U15	Valve 30 and Valve 31 solenoid drive swapped	1) Check the wiring harness
U16	Valve 30 and Valve 31 current sense inputs swapped	1) Check the wiring harness
U17	Pressure switch open circuit	1) Check the wiring harness
U18	Pressure switch short circuit	1) Check the wiring harness

Rear Hydraulic Electronic Remote Valves Calibration 'U' Error Codes

Code	Description	Possible Failure
U61	Lever No.1 not in neutral	-
U62	Lever No.2 not in neutral	-
U63	Lever No.3 not in neutral	-
U64	Lever No.4 not in neutral	-

Front Hitch Calibration 'U' Error Codes

Code	Description	Possible Failure
U110	Position potentiometer value too high or the hitch is not lowered	-
U111	Position potentiometer value too low or the hitch is not raised	-

Steering Calibration 'U' Error Codes

Code	Description	Possible Failure
U21	ERPM is below 1300, increase throttle	1) Operator has not set the correct engine speed 2) Instrument cluster is not powered 3) Broken CAN bus Note: Use the HE menu to see if the engine speed is being detected
U71	Calibration attempted while enable switch is off	1) The enable switch is in the off position 2) The enable switch is in the on position at start up but needs to be cycled through off then on to enable the system
U72	Proximity sensor input is out of range - open	1) Incorrect position of steering wheel 2) Faulty proximity sensor 3) Check the proximity sensor connection
U73	Proximity sensor input is out of range - closed	1) Incorrect position of steering wheel 2) Faulty proximity sensor 3) Check the proximity sensor connection
U74	LVDT calibration has been unsuccessful (out of range after 4th attempt)	1) Faulty LVDT sensor 2) Faulty steering hydraulic valve 3) Incorrect assembly of hydraulic valve 4) Check the LVDT sensor connection

EDC - Error Codes

Code	Description
1002	Radar disconnected
1003	Speed sensor error
1004	Wheel speed sensor - signal too high
1006	Slip control potentiometer - voltage too low
1007	Slip control potentiometer - voltage too high
1008	Raise / work switch failure (command arm)
1009	Both external switches operated at the same time
1010	Height limit control potentiometer - voltage too low
1011	Height limit control potentiometer - voltage too high
1012	Drop rate control potentiometer - voltage too low
1013	Drop rate control potentiometer - voltage too high
1014	R/H load sensing pin - signal too low
1015	R/H load sensing pin - signal too high
1016	L/H load sensing pin - signal too low
1017	L/H load sensing pin - signal too high
1018	Both load sensing pins disconnected
1019	Load sensing pin 8V reference - voltage too low
1020	Load sensing pin 8V reference - voltage too high
1021	Draft sensitivity control potentiometer - voltage too low
1022	Draft sensitivity control potentiometer - voltage too high
1023	Command arm / control panel disconnected
1024	Perform the hydraulic lift calibration
1025	Position control potentiometer - voltage too low
1026	Position control potentiometer - voltage too high
1027	Lift arm position sensor - voltage too low
1028	Lift arm position sensor - voltage too high
1029	Hydraulic control valve disconnected
1030	Signal ground open circuit
1031	Chassis harness disconnected
1032	Draft control potentiometer - voltage too high
1033	Draft control potentiometer - voltage too low
1049	Wheel speed sensor open circuit
1053	5 Volt reference - short to +12v
1054	5 Volt reference - short to ground
1059	8 Volt reference error (draft load pins)
1063	Hydraulic valve lower solenoid - open circuit
1064	Hydraulic valve raise solenoid - open circuit
1065	Hydraulic valve lower solenoid - short circuit
1066	Hydraulic valve raise solenoid - short circuit
1067	Hydraulic valve supply voltage – voltage too low
1068	Height limit control not set to maximum during calibration
1069	Raise / work switch failure (transmission bone or multicontroller armrest)
1070	Hydraulic ram configuration not set

Transmission - Error Codes

Code	Description
2001	“N” – shuttle too fast error
2002	Flash “N” error
2003	“CP” – clutch pedal required
2004	“P” – handbrake error
2005	Creeper selection error
2009	Seat switch input – voltage too low
2010	Seat switch input – voltage too high

Code	Description
2011	Clutch pedal potentiometer – voltage too low
2012	Clutch pedal potentiometer – voltage too high
2016	Creeper solenoid error
2021	Transmission harness disconnected
2024	All clutches not calibrated
2026	Engine speed – too high
2027	Engine speed – no signal
2037	Clutch pedal switch – open circuit
2046	Fuse sense input – open circuit
2047	Clutch pedal switch set too high
2048	Clutch pedal switch set too low
2049	Wheel speed sensor – open circuit
2050	Wheel speed sensor – short circuit
2051	Oil temperature sensor – open circuit
2052	Oil temperature sensor – short circuit
2053	5V reference voltage – too high
2054	5V reference voltage – too low
2055	Output speed sensor – no signal
2058	Seat switch closed for 25 hours
2059	Shuttle lever switch disagreement
2070	Shuttle lever forward switch – voltage too high
2071	Shuttle lever forward switch – voltage too low
2072	Shuttle lever reverse switch – voltage too high
2073	Shuttle lever reverse switch – voltage too low
2075	Flywheel speed sensor signal error
2076	Flywheel speed sensor – open circuit
2077	Flywheel speed sensor – short circuit
2124	Flywheel speed sensor not calibrated
2300	19th gear solenoid open circuit or short to ground
2302	19th gear clutch dump solenoid open circuit or short to ground
2303	Damper calibration – low error
2304	Damper calibration – high error
2305	19th gear clutch solenoid over voltage
2306	19th gear clutch dump solenoid over voltage
2308	Reverse not allowed
2310	Upshift switch – voltage too low
2311	Upshift switch – voltage too high
2312	Downshift switch – voltage too low
2313	Downshift switch – voltage too high
2314	Forward pressure switch – open circuit or short to ground
2315	Reverse pressure switch – open circuit or short to ground
2323	Transmission mid speed sensor - open circuit
2324	Transmission mid speed sensor - short to ground
2325	Mid speed sensor and output speed sensor swapped
2326	Engine torque/RPM sensor swapped with either mid or output speed sensors
2328	No signal from transmission mid speed sensor
2330	Transmission output RPM too high for the selected gear
2331	Clutch slipping fault
2334	Pressure indicated on the forward clutch pressure switches when the clutch solenoids are off
2335	Pressure indicated on the reverse clutch pressure switch when the clutch solenoids are off
2336	Creeper fails to engage
2337	Creeper fails to disengage
2338	Creeper potentiometer – short circuit to 8V or 12V
2339	Creeper potentiometer – open circuit or short circuit to ground
2342	Clutch A solenoid – open circuit or short circuit to ground

Code	Description
2343	Clutch B solenoid – open circuit or short circuit to ground
2344	Clutch C solenoid – open circuit or short circuit to ground
2345	Clutch D solenoid – open circuit or short circuit to ground
2346	Clutch E solenoid – open circuit or short circuit to ground
2347	Low range clutch solenoid – open circuit or short circuit to ground
2348	Medium range clutch solenoid – open circuit or short circuit to ground
2349	High range clutch solenoid – open circuit or short circuit to ground
2350	Reverse clutch solenoid – open circuit or short circuit to ground
2351	Creeper solenoid – open circuit or short circuit to ground
2352	Clutch A solenoid – over voltage
2353	Clutch B solenoid – over voltage
2354	Clutch C solenoid – over voltage
2355	Clutch D solenoid – over voltage
2356	Clutch E solenoid – over voltage
2357	Low range clutch solenoid – over voltage
2358	Medium range clutch solenoid – over voltage
2359	High range clutch solenoid – over voltage
2360	Reverse clutch solenoid – over voltage
2361	Creeper solenoid – over voltage
2362	Clutch A not calibrated
2363	Clutch B not calibrated
2364	Clutch C not calibrated
2365	Clutch D not calibrated
2366	Clutch E not calibrated
2367	Low range clutch not calibrated
2368	Medium range clutch not calibrated
2369	High range clutch not calibrated
2370	Reverse clutch not calibrated
2371	Creeper position out of range
2372	Creeper not calibrated
2373	Clutch 19 not calibrated
2374	Creeper calibration error
2375	Creeper - cold oil
2376	Fault on 19th gear valve
2377	Fault on dump valve
2378	Parklock switch - voltage too low
2379	Parklock switch - voltage too high
2385	Inconsistent ratio of transmission output speed and engine speed when exiting from Auto mode

Transmission - Error Codes only for PUMA Multicontroller

Code	Description
2102	ARU forward/reverse switch - out of range high
2103	ARU forward/reverse switch - out of range low
2106	ARU auto transmission switch – out of range low
2107	ARU auto transmission switch – out of range high
2108	ARU transmission upshift switch – out of range low
2109	ARU transmission upshift switch – out of range high
2110	Momentary shuttle lever neutral – too low
2111	Momentary shuttle lever neutral – too high

Engine - Error Codes

Code	Description
3001	Foot throttle sensor - signal not plausible
3002	Foot throttle sensor - signal above range maximum
3003	Foot throttle sensor - signal below range minimum

Code	Description
3004	Foot throttle sensor - no signal
3006	Coolant temperature signal - signal not plausible
3007	Coolant temperature signal - signal above range maximum
3008	Coolant temperature signal - signal below range minimum
3010	Air intake temperature sensor - signal above range maximum
3011	Air intake temperature sensor - signal below range minimum
3015	Fuel temperature sensor - signal above range maximum
3016	Fuel temperature sensor - signal below range minimum
3019	Boost pressure sensor - signal above range maximum
3022	Boost pressure sensor - signal not plausible
3023	Atmospheric pressure sensor - signal not plausible
3024	Atmospheric pressure sensor - signal above range maximum
3025	Atmospheric pressure sensor - signal below range minimum
3028	Oil pressure too low
3029	Oil pressure sensor – short circuit to battery
3030	Oil pressure sensor – short circuit to ground
3032	Oil pressure sensor - value too high
3033	Oil temperature sensor - signal not plausible
3034	Oil temperature sensor - signal above range maximum
3035	Oil temperature sensor - signal below range minimum
3037	Boost pressure sensor - signal low
3038	Constant engine RPM activate / select switch – shortcircuit to battery
3047	High pressure pump relay – short circuit to battery
3048	High pressure pump relay – short circuit to ground
3051	Battery voltage to ECM - voltage too high
3052	Battery voltage to ECM - voltage too low
3060	Cylinder 1 - unclassifiable error in injector
3061	Cylinder 1 - injector cable short circuit (low side to battery)
3063	Cylinder 1 - injector cable short circuit (high side to ground)
3064	Cylinder 5 - unclassifiable error in injector
3065	Cylinder 5 - injector cable short circuit (low side to battery)
3067	Cylinder 5 - injector cable short circuit (high side to ground)
3068	Cylinder 3 - unclassifiable error in injector
3069	Cylinder 3 - injector cable short circuit (low side to battery)
3071	Cylinder 3 - injector cable short circuit (high side to ground)
3072	Cylinder 6 - unclassifiable error in injector
3073	Cylinder 6 - injector cable short circuit (low side to battery)
3075	Cylinder 6 - injector cable short circuit (high side to ground)
3076	Cylinder 2 - unclassifiable error in injector
3077	Cylinder 2 - injector cable short circuit (low side to battery)
3079	Cylinder 2 - injector cable short circuit (high side to ground)
3080	Cylinder 4 - unclassifiable error in injector
3081	Cylinder 4 - injector cable short circuit (low side to battery)
3083	Cylinder 4 - injector cable short circuit (high side to ground)
3088	Crankshaft sensor - no signal
3089	Crankshaft sensor - invalid signal
3090	Camshaft sensor - no signal
3091	Camshaft sensor - invalid signal
3093	Offset between camshaft and crankshaft - outside boundaries
3095	Operating with camshaft sensor only - backup mode
3096	ECM busoff on CAN A
3102	Rail pressure sensor CP3 - signal below range minimum
3104	Rail pressure relief valve – open
3105	Rail pressure relief valve - pressure shock requested

Code	Description
3106	Rail pressure relief valve - did not open after pressure shock
3107	Metering unit - shortcircuit to battery
3108	Metering unit - shortcircuit to ground
3110	Rail pressure sensor monitoring - signal below range minimum
3111	Rail pressure sensor monitoring - signal above range maximum
3112	Rail pressure sensor CP3 - signal above maximum range
3117	PTO twist sensor – out of range
3120	PTO twist sensor – not plausible
3121	PTO twist sensor - open circuit
3122	PTO twist sensor - short circuit to ground
3123	PTO twist sensor - not calibrated
3124	Hand throttle - channel 2 signal above range maximum
3125	Hand throttle - channel 2 signal below range minimum
3126	Hand throttle - channel 1 signal above range maximum
3127	Hand throttle - channel 1 signal below range minimum
3128	Hand throttle - channel difference error
3129	Hand throttle - idle switch closed circuit
3130	Hand throttle - idle switch open circuit
3131	Grid heater always switched on
3137	Metering unit - open load
3138	Metering unit - temperature too high
3141	Fuel flow setpoint too low
3142	High pressure test - test active
3145	Terminal 15 - no signal
3147	Oil temperature too high
3148	Coolant temperature sensor dynamic test - failure
3154	Grid heater relay - short circuit to battery
3155	Grid heater relay - short circuit to ground
3156	Grid heater relay - no load
3157	ECM not detected on CAN bus
3158	Invalid ECM checksum
3159	Invalid engine reference torque
3160	Fan actuator - short circuit to battery
3161	Fan actuator - short circuit to ground
3162	Fan actuator - temperature too high
3163	Fan actuator - no load
3176	Setpoint of metering unit not plausible in overrun
3177	Engine overspeed detected
3179	Timeout of CAN message BC2EDC2
3180	Timeout of CAN message VM2EDC
3182	Timeout of CAN message RxCCVS
3185	Timeout of CAN message TF
3188	Cylinder 1 warning - open load
3192	Cylinder 2 warning - open load
3196	Cylinder 3 warning - open load
3200	Cylinder 4 warning - open load
3204	Cylinder 5 warning - open load
3208	Cylinder 6 warning - open load
3210	Bank 1 - general short circuit to injection cable
3211	Bank 1 - injection cable short circuit low side to ground
3213	Bank 1 - unclassifiable error
3218	Bank 2 - general short circuit to injection cable
3219	Bank 2 - injection cable short circuit low side to ground
3221	Bank 2 - unclassifiable error
3227	Injection processor (CY33X) error - internal reset / clock loss / voltage too low

Code	Description
3228	Injection processor (CY33X) error - unlocked / initialisation failure
3229	Injection processor (CY33X) error - injections limited by software
3230	Injection processor (CY33X) error - SPI communication failure
3231	Injection processor error - internal reset / clock loss / voltage too low
3232	Injection processor error - unlocked / initialisation failure
3233	Injection processor error - test mode
3234	Injection processor error - SPI communication failure
3238	ECM internal SPI communications error - CJ940
3239	ECM EEPROM - read operation failure
3240	ECM EEPROM - write operation failure
3241	ECM EEPROM - default value used
3242	ECM (locked) recovery occurred
3243	ECM recovery (suppressed) - recovery occurred
3244	ECM recovery (visible) - recovery occurred
3245	ECM processor - watchdog not plausible
3246	Shutoff paths during initialisation - watchdog
3247	Shutoff paths during initialisation - supply voltage too high
3248	Shutoff paths during initialisation - supply voltage too low
3249	TPU monitoring - time deviation between TPU and system not plausible
3250	Dataset - variant defect
3251	Dataset - requested variant could not be set
3252	Controller watchdog - SPI communication failure
3253	ADC monitoring - reference voltage too low
3254	ADC monitoring - reference voltage too high
3255	ADC monitoring - test impulse error
3256	ADC monitoring - queue error
3263	ECM BusOff on CAN C
3265	Overrun monitoring
3266	Redundant engine speed in overrun monitoring
3278	ECM internal supply voltage too high
3279	ECM internal supply voltage too low
3280	Sensor supply voltage 1
3281	Sensor supply voltage 1
3283	Sensor supply voltage 2
3284	Sensor supply voltage 2
3285	Sensor supply voltage 3
3286	Sensor supply voltage 3
3297	Rail pressure positive deviation high and high fuel flow setpoint value
3301	Rail pressure negative deviation too high on minimum metering
3305	Rail pressure below minimum limit in controller mode
3309	Rail pressure above maximum limit in controlled mode
3313	Rail pressure drop rate too high
3316	Minimum number of injections not reached - stop engine
3334	Timeout of CAN message TSC1-PE Torque (when active)
3335	Timeout of CAN message TSC1-PE Torque (when inactive)
3338	Timeout of CAN message TSC1-VE Speed (when inactive)
3339	Timeout of CAN message TSC1-VE Speed (when active)
3345	Total throttle failure
3367	Coolant temperature test failure
3368	INFO: Torque limitation due to OBD Performance Limiter by legislation
3369	INFO: Torque reduction due to smoke reduction
3370	INFO: Torque limitation due to Engine Protection (against excessive torque, engine overspeed and overheat)
3371	INFO: Torque limitation due to Fuel Quantity Limitation because of injector system errors
3375	Constant engine RPM increase / decrease switch – shortcircuit to battery

Code	Description
3999	Unknown ECM SPN Error Code

Rear EHR - Error Codes

Code	Description
4100	Rear remote no.1 – no control message received
4101	Rear remote no.1 – control message not plausible
4102	Rear remote no.1 – EEPROM error
4103	Rear remote no.1 – switched to failsafe
4104	Rear remote no.1 – under voltage
4105	Rear remote no.1 – over voltage
4106	Rear remote no.1 – spool movement too low
4107	Rear remote no.1 – spool movement too high
4108	Rear remote no.1 – float position not reached
4109	Rear remote no.1 – manually operated
4110	Rear remote no.1 – driver faulty
4111	Rear remote no.1 – potentiometer faulty
4112	Rear remote no.1 – unable to reach neutral
4113	Rear remote no.1 – spool not in neutral at key on
4114	Rear remote no.2 – no control message received
4115	Rear remote no.2 – control message not plausible
4116	Rear remote no.2 – EEPROM error
4117	Rear remote no.2 – switched to failsafe
4118	Rear remote no.2 – under voltage
4119	Rear remote no.2 – over voltage
4120	Rear remote no.2 – spool movement too low
4121	Rear remote no.2 – spool movement too high
4122	Rear remote no.2 – float position not reached
4123	Rear remote no.2 – manually operated
4124	Rear remote no.2 – driver faulty
4125	Rear remote no.2 – potentiometer faulty
4126	Rear remote no.2 – unable to reach neutral
4127	Rear remote no.2 – spool not in neutral at key on
4128	Rear remote no.3 – no control message received
4129	Rear remote no.3 – control message not plausible
4130	Rear remote no.3 – EEPROM error
4131	Rear remote no.3 – switched to failsafe
4132	Rear remote no.3 – under voltage
4133	Rear remote no.3 – over voltage
4134	Rear remote no.3 – spool movement too low
4135	Rear remote no.3 – spool movement too high
4136	Rear remote no.3 – float position not reached
4137	Rear remote no.3 – manually operated
4138	Rear remote no.3 – driver faulty
4139	Rear remote no.3 – potentiometer faulty
4140	Rear remote no.3 – unable to reach neutral
4141	Rear remote no.3 – spool not in neutral at key on
4142	Rear remote no.4 – no control message received
4143	Rear remote no.4 – control message not plausible
4144	Rear remote no.4 – EEPROM error
4145	Rear remote no.4 – switched to failsafe
4146	Rear remote no.4 – under voltage
4147	Rear remote no.4 – over voltage
4148	Rear remote no.4 – spool movement too low
4149	Rear remote no.4 – spool movement too high
4150	Rear remote no.4 – float position not reached

Code	Description
4151	Rear remote no.4 – manually operated
4152	Rear remote no.4 – driver faulty
4153	Rear remote no.4 – potentiometer faulty
4154	Rear remote no.4 – unable to reach neutral
4155	Rear remote no.4 – spool not in neutral at key on
4156	Rear remote no.5 – no control message received
4157	Rear remote no.5 – control message not plausible
4158	Rear remote no.5 – EEPROM error
4159	Rear remote no.5 – switched to failsafe
4160	Rear remote no.5 – under voltage
4161	Rear remote no.5 – over voltage
4162	Rear remote no.5 – spool movement too low
4163	Rear remote no.5 – spool movement too high
4164	Rear remote no.5 – float position not reached
4165	Rear remote no.5 – manually operated
4166	Rear remote no.5 – driver faulty
4167	Rear remote no.5 – potentiometer faulty
4168	Rear remote no.5 – unable to reach neutral
4169	Rear remote no.5 – spool not in neutral at key on
4170	Rear EHR control No.1 – not calibrated
4171	Rear EHR control No.1 – open circuit
4172	Rear EHR control No.1 – short circuit
4173	Rear EHR control No.2 – not calibrated
4174	Rear EHR control No.2 – open circuit
4175	Rear EHR control No.2 – short circuit
4176	Rear EHR timer switch no.1/no.2 - not connected
4177	Rear EHR control no.3 – not calibrated
4178	Rear EHR control no.3 – open circuit
4179	Rear EHR control no.3 – short circuit
4180	Rear EHR control no.4 – not calibrated
4181	Rear EHR control no.4 – open circuit
4182	Rear EHR control no.4 – short circuit
4183	Rear EHR timer switch no.3/no.4 - not connected
4184	EHR joystick potentiometer X – open circuit
4185	EHR joystick potentiometer X – short circuit
4186	EHR joystick potentiometer Y – open circuit
4187	EHR joystick potentiometer Y – short circuit
4190	Rear remote no.1 - no communications
4191	Rear remote no.2 - no communications
4192	Rear remote no.3 - no communications
4193	Rear remote no.4 - no communications
4194	Rear EHR no.1 motor mode switch faulty
4195	Rear EHR no.2 motor mode switch faulty
4196	Rear EHR no.3 motor mode switch faulty
4197	Rear EHR no.4 motor mode switch faulty
4198	Rear remote no.5 - no communications
4199	Joystick detected but selection switch not detected
4200	Selection switch detected but joystick not detected
4300	Top link switch not fitted
4301	Side link switch not fitted

Rear EHR - Error Codes only for PUMA Multicontroller

Code	Description
4009	ARU Aux 3 joystick lever – out of range low
4010	ARU Aux 3 joystick lever – out of range high

Code	Description
4040	ARU supply voltage – too low (<8V)
4041	ARU supply voltage – too high (>18V)
4042	ARU CAN bus off
4044	ARU controller fault (flash memory)
4045	ARU controller fault (data memory)
4052	ARU thumbwheel – out of range high
4053	ARU thumbwheel – out of range low

Front EHR - Error Codes

Code	Description
4500	Front remote no.1 – no control message received
4501	Front remote no.1 – control message not plausible
4502	Front remote no.1 – EEPROM error
4503	Front remote no.1 – switched to failsafe
4504	Front remote no.1 – under voltage
4505	Front remote no.1 – over voltage
4506	Front remote no.1 – spool movement too low
4507	Front remote no.1 – spool movement too high
4508	Front remote no.1 – float position not reached
4509	Front remote no.1 – manually operated
4510	Front remote no.1 – driver faulty
4511	Front remote no.1 – potentiometer faulty
4512	Front remote no.1 – unable to reach neutral
4513	Front remote no.1 – spool not in neutral at key on
4514	Front remote no.2 – no control message received
4515	Front remote no.2 – control message not plausible
4516	Front remote no.2 – EEPROM error
4517	Front remote no.2 – switched to failsafe
4518	Front remote no.2 – under voltage
4519	Front remote no.2 – over voltage
4520	Front remote no.2 – spool movement too low
4521	Front remote no.2 – spool movement too high
4522	Front remote no.2 – float position not reached
4523	Front remote no.2 – manually operated
4524	Front remote no.2 – driver faulty
4525	Front remote no.2 – potentiometer faulty
4526	Front remote no.2 – unable to reach neutral
4527	Front remote no.2 – spool not in neutral at key on
4528	Front remote no.3 – no control message received
4529	Front remote no.3 – control message not plausible
4530	Front remote no.3 – EEPROM error
4531	Front remote no.3 – switched to failsafe
4532	Front remote no.3 – under voltage
4533	Front remote no.3 – over voltage
4534	Front remote no.3 – spool movement too low
4535	Front remote no.3 – spool movement too high
4536	Front remote no.3 – float position not reached
4537	Front remote no.3 – manually operated
4538	Front remote no.3 – driver faulty
4539	Front remote no.3 – potentiometer faulty
4540	Front remote no.3 – unable to reach neutral
4541	Front remote no.3 – spool not in neutral at key on
4542	Front remote no.4 – no control message received
4543	Front remote no.4 – control message not plausible
4544	Front remote no.4 – EEPROM error

Code	Description
4545	Front remote no.4 – switched to failsafe
4546	Front remote no.4 – under voltage
4547	Front remote no.4 – over voltage
4548	Front remote no.4 – spool movement too low
4549	Front remote no.4 – spool movement too high
4550	Front remote no.4 – float position not reached
4551	Front remote no.4 – manually operated
4552	Front remote no.4 – driver faulty
4553	Front remote no.4 – potentiometer faulty
4554	Front remote no.4 – unable to reach neutral
4555	Front remote no.4 – spool not in neutral at key on
4560	Front remote no.1 - no communications
4561	Front remote no.2 - no communications
4562	Front remote no.3 - no communications
4563	Front remote no.4 - no communications
4564	EHR joystick - no communications
4565	High flow pump connection error
4566	High flow pump configuration error

Rear PTO - Error Codes

Code	Description
5003	Rear PTO brake output - open circuit
5005	Rear PTO brake switch – open circuit
5007	Rear PTO solenoid – stuck off
5008	Rear PTO solenoid – open circuit
5027	Rear PTO speed sensor – open circuit
5033	Rear PTO cab normally closed switch – open circuit
5034	Rear PTO fender switch – open circuit / short to ground
5035	Rear PTO fender switch – input short to 12V
5037	Rear PTO cab normally open switch – stuck closed
5042	Rear PTO management switch – stuck closed
5043	Rear PTO fender switch stuck on
5044	Rear PTO speed sensor – short to ground
5098	Rear PTO fender switch option not enabled
5099	Auto PTO mode not enabled

Four Wheel Drive - Error Codes

Code	Description
6020	FWD switch error
6023	FWD solenoid – open circuit
6025	No FWD pressure
6026	FWD pressure switch – stuck on

Difflock - Error Codes

Code	Description
7014	Difflock switch error
7017	Difflock solenoid – open circuit
7024	Steering angle sensor not calibrated
7032	Steering angle sensor - signal too low
7033	No difflock pressure
7034	Difflock pressure switch – stuck on

Front PTO - Error Codes

Code	Description
8007	Front PTO solenoid – stuck on

Code	Description
8008	Front PTO solenoid – open circuit
8033	Front PTO cab normally closed switch – open circuit
8036	Front PTO failure to start
8037	Front PTO cab normally open switch – stuck closed
8042	Front PTO management switch – short circuit
8099	Front PTO option not enabled

Front Hitch - Error Codes

Code	Description
9001	Front hitch position sensor – short circuit to 12V
9002	Front hitch position sensor – open circuit / short circuit to 0V
9003	Front hitch fender up switch error
9004	Front hitch fender down switch error
9005	Front hitch fender common switch error
9006	Front hitch position potentiometer – not calibrated

Suspended Front Axle - Error Codes

Code	Description
10001	Upper lockout solenoid error
10002	Raise solenoid error
10003	Lower solenoid error
10004	Front axle position sensor – threshold higher than set limit
10005	Front axle position sensor – threshold lower than set limit
10008	Go down error – suspension unable to return to set point
10009	Lower lockout solenoid error
10010	Chassis accelerometer – voltage too low (short circuit to ground / open circuit)
10011	Chassis accelerometer – voltage too high (short circuit to 5V)
10024	Front suspension not calibrated
10099	Front suspension not enabled

ICU2 - Error Codes

Code	Description
14013	Steering angle sensor - short circuit to Vcc
14014	Steering angle sensor - short circuit to GND or open circuit
14015	5V supply voltage - too high
14016	5V supply voltage - too low
14021	Cranking line – shorted to +12V
14022	Cranking line – shorted to GND
14051	Fuel level sensor - short circuit to Vcc or open circuit
14052	Fuel level sensor - short circuit to GND
14061	Air brake pressure sensor – short circuit to VCC or option set but sensor not connected
14100	Air brake pressure - not configured
14102	SWCD - present but not configured
14900	Transmission controller missing (RB/RD/RF/RG)
14901	Engine controller missing (EDC16)
14902	Auxiliary controller missing (RC/RH/RK/RL)
14904	Armrest Controller missing
14906	Steering controller missing (KA)
14908	TECU missing (OA)
14909	SWCD missing (VA)
14910	Climate controller missing

Steering Controller - Error Codes

Code	Description
15002	Steering wheel control proximity sensor - open circuit

Code	Description
15003	Steering wheel control proximity sensor - short circuit
15006	Split valve LVDT - open circuit
15007	Split valve LVDT - short circuit
15008	Change valve solenoid - open circuit
15009	Change valve solenoid - short circuit across
15010	Safety switch fail
15011	Maximum engagement time elapsed (5 minutes)
15012	Split valve spool - stuck open
15013	Change valve or split valve spools - stuck closed
15014	Split valve spool stuck in transition zone - can’t identify which steering mode the tractor is definitely in.
15024	System not calibrated

Air Conditioning Controller - Error Codes

Code	Description
16111	Cab temperature sensor open or shorted to power plus
16112	Cab temperature sensor shorted to ground
16113	Outlet temperature sensor open or shorted to power plus
16114	Outlet temperature sensor shorted to ground
16115	Evaporator temperature sensor open or shorted to power plus
16116	Evaporator temperature sensor shorted to ground
16117	Outside air temperature sensor open or shorted to power plus
16118	Outside air temperature sensor shorted to ground
16121	Temperature select potentiometer open or shorted to power plus
16125	High pressure- low pressure switch (+) input shorted to power plus
16126	High pressure- low pressure switch (+) input shorted to ground
16127	High pressure- low pressure switch (-) input shorted to power plus
16128	High pressure- low pressure switch (-) input shorted to ground
16129	High pressure cycling error (2 in 1 minute)
16130	Low pressure switch (+) input shorted to power plus
16131	Low pressure switch (+) input shorted to ground
16132	Low pressure switch (-) input shorted to power plus
16133	Low pressure switch (-) input shorted to ground
16134	Low pressure switch open for greater than 1 minute

ELECTRONIC SYSTEM - Fault code index

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Full Powershift (FPS) Transmission Calibration 'U' Error Codes

Code	Description	Possible Failure
U16	ERPM dropped too soon during clutch calibration	1) Engine lugged down too soon. Possible PWM valve faulty or a mechanical fault within the transmission
U17	Seat switch not activated	1) Operator not in seat 2) Open circuit for the seat switch input to the transmission module 3) Faulty seat switch 4) Switched 12v supply fuse blown Note: Use the H5 switch diagnostics to detect if the seat switch is connected
U19	Oil temperature below **10 °C**	1) Open circuit for the temperature sensor input to module 2) Faulty temperature sensor Note: Use the H9 in the transmission module to see if the temperature sensor input is OK
U20	Handbrake is not set	1) Open circuit for the handbrake feed into the transmission module 2) Faulty handbrake switch 3) Switched 12v supply fuse blown Note: Use the H5 switch diagnostics to detect if the handbrake is connected
U21	ERPM is below 1100, increase throttle	1) Operator has not set the correct engine speed 2) Instrument cluster is not powered 3) Broken CAN Note: Use the H9 in the transmission module to see if the engine speed is being detected
U22	ERPM is above 1300, reduce throttle	1) Operator has not set the correct engine speed
U23	Shuttle lever is in neutral, shift it to forward	1) Operator has not selected forward on the shuttle lever 2) Open circuit between the shuttle lever and the transmission module 3) Switched 12v supply fuse blown Note: Use the H5 switch diagnostics to detect if the switch is connected
U26	Clutch pedal is not up, release clutch pedal	1) Operator has not released the clutch pedal 2) The clutch potentiometer / linkage is sticking or broken Note: Use the H9 in the transmission module to see if the clutch input is OK
U31	Wheel speed sensed - tractor moving	1) Handbrake not applied 2) Brakes not working Note: If the brakes are OK move the vehicle forward slightly and repeat calibration
U36	Max allowed clutch calibration value exceeded	1) Current value exceeded without lugging the engine down. Possible PWM valve faulty or a low hydraulic pressure fault
U68	Creeper not engaged	1) -
U69	Creeper stuck	1) -
U75	Quick fill calibration value too high	1) Wiring problem (on clutch solenoid) 2) Clutch solenoid damaged 3) Clutch mechanical problem
U76	Quick fill calibration value too low	1) Wiring problem (on clutch solenoid) 2) Clutch solenoid damaged 3) Clutch mechanical problem
U77	Damper calibration value too high	1) Wiring problem 2) Sensor damaged 3) Wrong damper installation 4) Mechanical problem on driveline

Code	Description	Possible Failure
U78	Damper calibration value too low	1) Wiring problem 2) Sensor damaged 3) Wrong damper installation 4) Mechanical problem on driveline

Electronic Draft Control Calibration 'U' Error Codes

Code	Description	Possible Failure
Note: There are no 'U' error codes defined for the electronic draft control calibration procedure. However the following error codes may be displayed during the procedure.		
1068	Height limit control not fully clockwise	1) The height limit control is not turned fully clockwise 2) The height limit control is faulty
1070	EDC hydraulic ram size not configured	Ram size not configured on a new controller or following H8 procedure Note: Use EDC H3, channel 1 to configure

Shiftable PTO Calibration 'U' Error Codes

Code	Description	Possible Failure
U112	PTO speed select cable stalled while extending	1) Cable not connected correctly in neutral position 2) Cable jammed 3) Sensor not connected
U113	PTO speed select cable stalled while retracting	1) Cable not connected correctly in neutral position 2) Cable jammed 3) Sensor not connected
U124	PTO speed select switch in optional speed position	1) Speed select switch is in the wrong position – selector switch set to 1000 or N position instead of optional speed position 2) Selector switch wiring incorrect 3) Speed selector switch faulty
U125	Speed sensor error	1) No signal from PTO speed sensor 2) No engine speed signal 3) PTO not started
U126	No movement from position sensor	1) -

Front Suspension Calibration 'U' Error Codes

Code	Description	Possible Failure
U01	Front axle potentiometer open circuit – ACP will not work	1) Check the wiring harness 2) Check the displayed potentiometer reading during calibration. If less than 10 then replace the potentiometer
U02	Front axle potentiometer threshold is higher than set limit	1) Check the potentiometer installation 2) Check the displayed potentiometer reading during calibration. If greater than 972 then change the potentiometer 3) Check the wiring harness
U03	Front axle potentiometer short circuit – ACP will not work	1) Check the wiring harness 2) Check if signal ground on potentiometer is open circuit 3) Change the potentiometer
U04	Front axle potentiometer threshold is lower than set limit	1) Change the potentiometer
U05	Suspension is not reaching its minimum / maximum position during ACP procedure	1) Check the range of the potentiometer, calibration will not work if the range of the potentiometer is less than 150 2) Check the suspension mechanics 3) Check the potentiometer linkage
U07	Suspension is stationary during the raise command in the ACP procedure	1) Check the raise solenoid harness 2) Check the suspension mechanics 3) Check the potentiometer linkage 4) Check the pressure of the accumulators 5) Check the hydraulic pressure 6) Disconnect implement

Code	Description	Possible Failure
U08	Suspension unable to reach maximum height within 20 seconds	1) Check the raise valve installation 2) Check the unload solenoid installation 3) Check the suspension mechanics 4) Check the hydraulic pressure 5) Disconnect implement
U09	Suspension is stationary during the lowering command in the ACP procedure	1) Check the unload solenoid harness 2) Check the suspension mechanics 3) Check the potentiometer linkage 4) Check the hydraulic pressure 5) Disconnect implement
U10	Suspension unable to reach minimum height within 25 seconds	1) Check unload solenoid installation 2) Check the hydraulic pressure 3) Disconnect implement
U11	Unable to calibrate suspension	1) The lockout switch was pressed more than 3 times to initiate calibration 2) Check the suspension mechanics 3) Check the hydraulic pressure
U12	ACP stopped, vehicle not stationary	1) Handbrake not applied 2) Rear axle speed sensor faulty
U13	Valve 30 (upper lockout) solenoid open circuit	1) Check the wiring harness
U14	Valve 31 (lower lockout) solenoid open circuit	1) Check the wiring harness
U15	Valve 30 (upper lockout) and Valve 31 (lower lockout) solenoid connectors swapped	1) Check the wiring harness
U16	Valve 30 (upper lockout) and Valve 31 (lower lockout) current sense inputs swapped	1) Check the wiring harness
U17	Front suspension pressure switch open circuit	1) Check the wiring harness
U18	Front suspension pressure switch short circuit	1) Check the wiring harness

Rear Electronic Hydraulic Remote Valves Calibration 'U' Error Codes

Code	Description	Possible Failure
U61	Lever No.1 not in neutral	–
U62	Lever No.2 not in neutral	–
U63	Lever No.3 not in neutral	–
U64	Lever No.4 not in neutral	–

Front Hitch Calibration 'U' Error Codes

Code	Description	Possible Failure
U110	Position potentiometer value too low or the hitch is not raised	Hitch was not raised before height limit control was changed from ON to OFF position
U111	Position potentiometer value too high or the hitch is not lowered	Hitch was not lowered before height limit control was changed from ON to OFF position

Steering Calibration 'U' Error Codes

Code	Description	Possible Failure
U19	Oil temperature below **5 °C**	1) Open circuit for the temperature sensor input to the transmission module 2) Faulty temperature sensor Note: Use the H9 menu in the transmission module to see if the temperature sensor input is okay

Code	Description	Possible Failure
U21	ERPM is below 1300, increase throttle	1) Operator has not set the correct engine speed 2) Open circuit for the engine speed sensor going to the cluster – mechanical engines only 3) Instrument cluster is not powered 4) Broken CAN bus Note: Use the HE menu to see if the engine speed is being detected
U71	Calibration attempted while enable switch is off	1) The enable switch is in the off position 2) The enable switch is in the on position at start up but needs to be cycled through off then on to enable the system
U72	Proximity sensor input is out of range – open	1) Incorrect position of steering wheel 2) Faulty proximity sensor 3) Check the proximity sensor connection
U73	Proximity sensor input is out of range – closed	1) Incorrect position of steering wheel 2) Faulty proximity sensor 3) Check the proximity sensor connection
U74	LVDT calibration has been unsuccessful (out of range after 4th attempt)	1) Faulty LVDT sensor 2) Faulty steering hydraulic valve 3) Incorrect assembly of hydraulic valve 4) Check the LVDT sensor connection

EPL Calibration 'U' Error Codes

Code	Description	Possible Failure
U114	Hand brake applied	1) Blue cable (on the handbrake switch connector) cut off 2) Mismatch between the handbrake switch status hardwired to the EPL and the VCU_HB_SWITCH parameter in the VCU2EPL CAN message
U115	Shuttle lever not in the park position	1) Pins A4 or C7 of the EPL module short to ground 2) Pins A4 or C7 of the EPL module cut off 3) Pins A4 or C7 of the EPL module short to supply voltage 4) Shuttle lever damaged
U116	APP position too high	1) Wrong mechanical adjustment of the EPL transmission lever 2) Possible wear in the braking pads
U117	APP position too low	1) Stiffness of the system is too high – possible mechanical interferences 2) Wrong mechanical installation of the EPL
U118	Error codes active preventing completion of initialization procedure	1) High recovery level error code is being activated
U119	Bowden cable not connected	1) Bowden cable not connected
U120	Inclinometer self test failed	1) Inclinometer broken
U121	Inclinometer calibration procedure not OK	–
U122	Inclinometer offset out of range	1) Check the inclinometer installation 2) Vehicle not on flat ground 3) Remove any rear attachment 4) Incorrect wheels could be installed
U123	Vehicle moving	1) Vehicle not stationary 2) Vehicle speed sensor failed

Electronic Draft Control (EDC) – Error Codes

Code	Description	Cause	Controller pin	Information
1002	Radar disconnected	Pin (radar present) is open circuit or shorted to ground or radar frequency input is low (indicates < 0.9 kph while wheels indicate > 1	CN1B/19	Radar connector **X233**. Controller connector **X093**
1003	Speed sensor error	The indicated radar ground speed is more than 4 times the indicated wheel speed. Delay is 30 secs	CN1B/33	Radar, Radar alignment, Speed sensor, Speed pick-up gear,
1004	Wheel speed sensor – signal too high	Fault(s) that raise "Wheel speed indicates > 60 kph Delay is 2.5 secs"	CN1B/34	Speed sensor, Speed pick-up gear,
1008	Raise / work switch failure (command arm)	Either: Both switches closed. Or PropAcmTrans message indicates a switch fault.	via CAN	H13 - Integrated control panel (ICP). Armrest controller and connectors,
1009	Both external switches operated at the same time	Both pins > 4.5V (i.e. Up selected on 1 side and Down on the other)	CN1B/29, CN1B/30	HPL fender switch/es and connector(s) **X407**, inline harness connectors **X110** and **X127**, controller connector **X093**.
1014	R/H load sensing pin – signal too low	1016 is not prevalent Pin voltage < 0.49V	CN1B/9	R/H Load sensing pin connector **X256** and L/H **X266**, inline harness connector **X022**, controller connector **X093**
1015	R/H load sensing pin – signal too high	Pin voltage > 4.95V	CN1B/9	R/H Load sensing pin connector **X256** and L/H **X266**, inline harness connector **X022**, controller connector **X093**
1016	L/H load sensing pin – signal too low	1014 is not prevalent Pin voltage < 0.49V	CN1B/10	L/H Load sensing pin connector **X266** and R/H **X256** ,inline harness connector **X022**, controller connector **X093**
1017	L/H load sensing pin – signal too high	Pin voltage > 4.95V	CN1B/10	L/H Load sensing pin connector **X266** and R/H **X256**, inline harness connector **X022**, controller connector **X093**
1018	Both load sensing pins disconnected	Raise instead of 1014 and 1016 when both are prevalent and 1027 is not prevalent	CN1B/9, CN1B/10	Inline harness connector **X022**, controller connector **X093**, load sensing pin connectors R/H **X256** and L/H **X266**
1019	Load sensing pin 8V reference – voltage too low	Pin voltage < 7.0 V	CN1B/25	Controller connector **X093**, load sensing pin connectors R/H **X256** and L/H **X266**
1020	Load sensing pin 8V reference – voltage too high	Pin voltage > 9.0 V	CN1B/25	Controller connector **X093**, load sensing pin connectors R/H **X256** and L/H **X266**

Code	Description	Cause	Controller pin	Information
1024	Perform the hydraulic lift calibration	The EDC is not calibrated (EDC calibration is cleared from H8 menu)	N/A	Hydraulic lift calibration procedure. Refer to **HITCH Electronic draft control - Calibrate (H.10.D)**
1027	Lift arm position sensor – voltage too low	Pin open circuit or voltage < 0.12V	CN1B/2	Lift arm position potentiometer connector **X267**, inline harness connector **X022**, controller connector **X093**
1028	Lift arm position sensor – voltage too high	Pin voltage > 4.83 V	CN1B/2	Lift arm position potentiometer connector **X267**, inline harness connector **X022**, controller connector **X093**
1029	Hydraulic control valve disconnected	One of 1063 or 1064 is raised as the hitch is raised/ lowered. The other (1063 or 1064) will then raise this alarm as the hitch is lowered/ raised.	CN1A/12, CN2/5, CN1A/5, CN2/4	Hydraulic control valve solenoid connectors **X268**, **X269**, controller connectors **X091** and **X092**
1030	Signal ground open circuit	All pins are indicating voltage > 4.6 V. (Sensitivity, drop rate and height limit pots)	CN1B/4, CN1B/5, CN1B/6	Controller connector **X095**, command arm connector **X080**
1031	Chassis harness disconnected	Raise instead of 1014 and 1016 when both are prevalent and 1027 is prevalent	CN1B/2/9/10 (at once)	Chassis connectors **X022** and **X020**
1049	Wheel speed sensor open circuit	2049 error is prevalent (while slip control is active) (Pin open circuit or > 4.24V)	CN1B/34	Wheel speed sensor connector **X257**, controller connector **X093**.
1053	5 Volt reference – short to +12v	2053 error is prevalent i.e. Voltage > 5.8V (and EDC is present)	CN1B/16	Controller connector **X093**
1054	5 Volt reference – short to ground	2054 error is prevalent i.e. Internally generated 5V reference voltage < 4.2V (and EDC is present)	CN1B/16	Controller connector **X093**
1059	8 Volt reference error (draft load pins)	7.0V < Voltage < 9.0V (The 8V ref voltage is generated within the XCM. It can be pulled up)	CN1B/25	R/H side load sensing pin connector **X256**, L/H side load sensing pin connector **X266**, inline harness connector **X022**, controller connector **X093**
1063	Hydraulic valve lower solenoid – open circuit	No current (< 285 mA) is sensed when the solenoid is on.	CN1A/12, CN2/5	EDC valve lower solenioid connector **X269**, Inline harness connector **X022** Controller connectors **X092** and **X091**

Code	Description	Cause	Controller pin	Information
1064	Hydraulic valve raise solenoid – open circuit	No current (< 285 mA) is sensed when the solenoid is on.	CN1A/5, CN2/4	EDC valve lower solenoid connector **X268**, inline harness connector **X022**, controller connectors **X092** and **X091**
1065	Hydraulic valve lower solenoid – short circuit	Current (> 2.14 A) is detected while the solenoid is off.	CN1A/12	EDC valve lower solenoid connector **X269**, inline harness connector **X022**, controller connectors **X092** and **X091**
1066	Hydraulic valve raise solenoid – short circuit	Current (> 2.14 A) is detected while the solenoid is off.	CN1A/5	EDC valve raise solenoid connector **X268**, inline harness connector **X022**, controller connectors **X092** and **X091**.
1067	Hydraulic valve supply voltage – voltage too low	Pin voltage < 2.25 V	CN1A/20	Controller connector **X092**
1068	Height limit control not set to maximum during calibration	Attempt made to calibrate EDC without the Height limit control set fully clock-wise. (Pin voltage < 4.04V i.e. ADC value < 3307)	CN1B/5	The height limit control has not been turned fully clockwise to the maximum height position.
1070	Hydraulic ram configuration not set	EDC Gain has not been set.	N/A	Configure the hydraulic ram(s). **Control module - Configure (A.50.A)**

Full Powershift (FPS) Transmission - Error Codes

Code	Description
2005	Creeper engagement error
2007	Low power 5V reverence - voltage too low
2008	Low power 5V reverence - voltage too high
2009	Seat switch input – voltage too low
2010	Seat switch input – voltage too high
2011	Clutch pedal potentiometer – voltage too low
2012	Clutch pedal potentiometer – voltage too high
2016	Creeper solenoid error
2021	Transmission harness disconnected
2024	All clutches not calibrated
2026	Engine speed – too high
2027	Engine speed – no signal
2037	Clutch pedal switch – open circuit
2046	Fuse sense input – open circuit
2047	Clutch pedal switch set too high
2048	Clutch pedal switch set too low
2049	Wheel speed (transmission output speed) sensor – short to ground or open circuit
2050	Wheel speed sensor – short to 12V
2051	Oil temperature sensor – open circuit
2052	Oil temperature sensor – short circuit
2053	5V reference voltage – too high
2054	5V reference voltage – too low
2055	Wheel speed (transmission output speed) sensor – no signal
2058	Seat switch closed for 25 hours
2059	Shuttle lever switch disagreement
2070	Shuttle lever forward switch – voltage too high
2071	Shuttle lever forward switch – voltage too low
2072	Shuttle lever reverse switch – voltage too high
2073	Shuttle lever reverse switch – voltage too low
2075	Flywheel speed sensor signal error
2076	Flywheel speed sensor – open circuit
2077	Flywheel speed sensor – short circuit
2079	Flywheel speed sensor - no signal
2124	Flywheel speed sensor not calibrated
2300	19th gear solenoid open circuit or short to ground
2302	19th gear clutch dump solenoid open circuit or short to ground
2303	Damper calibration – low error
2304	Damper calibration – high error
2305	19th gear clutch solenoid over voltage
2306	19th gear clutch dump solenoid over voltage
2308	Reverse not allowed
2310	Upshift switch – voltage too low
2311	Upshift switch – voltage too high
2312	Downshift switch – voltage too low
2313	Downshift switch – voltage too high
2314	Forward pressure switch – open circuit or short to ground
2315	Reverse pressure switch – open circuit or short to ground
2316	Transmission oil pressure sensor not configured
2317	Transmission oil pressure sensor configuration error
2323	Transmission mid speed sensor - open circuit
2324	Transmission mid speed sensor - short to ground
2325	Mid speed sensor and output speed sensor swapped
2326	Engine torque/RPM sensor swapped with either mid or output speed sensors

Code	Description
2328	No signal from transmission mid speed sensor
2330	Transmission output RPM too high for the selected gear
2331	Clutch slipping fault
2334	Pressure indicated on the forward clutch pressure switches when the clutch solenoids are off
2335	Pressure indicated on the reverse clutch pressure switch when the clutch solenoids are off
2336	Creeper fails to engage
2337	Creeper fails to disengage
2338	Creeper potentiometer – short circuit to 8V or 12V
2339	Creeper potentiometer – open circuit or short circuit to ground
2342	Clutch A solenoid – open circuit or short circuit to ground
2343	Clutch B solenoid – open circuit or short circuit to ground
2344	Clutch C solenoid – open circuit or short circuit to ground
2345	Clutch D solenoid – open circuit or short circuit to ground
2346	Clutch E solenoid – open circuit or short circuit to ground
2347	Low range clutch solenoid – open circuit or short circuit to ground
2348	Medium range clutch solenoid – open circuit or short circuit to ground
2349	High range clutch solenoid – open circuit or short circuit to ground
2350	Reverse clutch solenoid – open circuit or short circuit to ground
2351	Creeper solenoid – open circuit or short circuit to ground
2352	Clutch A solenoid – over voltage
2353	Clutch B solenoid – over voltage
2354	Clutch C solenoid – over voltage
2355	Clutch D solenoid – over voltage
2356	Clutch E solenoid – over voltage
2357	Low range clutch solenoid – over voltage
2358	Medium range clutch solenoid – over voltage
2359	High range clutch solenoid – over voltage
2360	Reverse clutch solenoid – over voltage
2361	Creeper solenoid – over voltage
2362	Clutch A not calibrated
2363	Clutch B not calibrated
2364	Clutch C not calibrated
2365	Clutch D not calibrated
2366	Clutch E not calibrated
2367	Low range clutch not calibrated
2368	Medium range clutch not calibrated
2369	High range clutch not calibrated
2370	Reverse clutch not calibrated
2371	Creeper position out of range
2372	Creeper not calibrated
2373	Clutch 19 not calibrated
2374	Creeper calibration error
2375	Creeper - cold oil
2376	Fault on 19th gear valve
2377	Fault on dump valve
2378	Parklock switch - voltage too low
2379	Parklock switch - voltage too high
2380	Parklock - unable to reach desired position
2381	Parklock - bus off
2382	Parklock - bus integrity error
2385	Inconsistent ratio of transmission output speed and engine speed
2386	Voltage with momentary shuttle lever in neutral - too high
2501	Transmission oil pressure sensor open circuit or short circuit to ground
2502	Transmission oil pressure sensor short circuit to 5V

Engine – Error Codes

Code	Description	Cause	Controller Pin	Component
3001	Foot throttle sensor – signal not plausible	Either Idle switch is closed indicating foot is on pedal but Pot voltage < 0.7V indicating foot is off pedal Or Idle switch is open indicating foot is off pedal but Pot voltage > 0.8V indicating foot is on pedal"	CN1B/1 CN1B/32	Foot throttle pedal **X015**
3002	Foot throttle sensor – signal above range maximum	Voltage > 4.5V	CN1B/1	Foot throttle pedal **X015**
3003	Foot throttle sensor – signal below range minimum	Voltage < 0.25V	CN1B/1	Foot throttle pedal **X015**
3006	Coolant temperature signal – signal not plausible	The plausibility of the CTS is done using the oil temperature sensor (OTS). The CTS plausibility error is set if Fid_CTSCD_Plaus is inhibited by the OTSCD plausibiliy check.	CNA/58	Coolant temperature sensor **X831**
3007	Coolant temperature signal – signal above range maximum	If the raw value of the coolant temperature sensor (CTSCD_uRaw) is above 4960.9 mV over 500 ms.	CNA/58	Coolant temperature sensor **X831**
3008	Coolant temperature signal – signal below range minimum	If the raw value of the coolant temperature sensor (CTSCD_uRaw) is below 205.28 mV over 500 ms.	CNA/58	Coolant temperature sensor **X831**
3010	Air intake temperature sensor – signal above range maximum	If the raw value of the induction air temperature sensor (IATSCD_uRaw) is above 4951.12 mV over 500 ms.	CNA/53	Boost pressure/ temperature sensor **X828**
3011	Air intake temperature sensor – signal below range minimum	If the raw value of the induction air temperature sensor (IATSCD_uRaw) is below 200.39 mV over 500 ms.	CNA/53	Boost pressure/ temperature sensor **X828**
3015	Fuel temperature sensor – signal above range maximum	If the raw value of the fuel temperature sensor (FTSCD_uRaw) is above 4936.46 mV over 500 ms.	CNA/52	Fuel temperature sensor **X832**
3016	Fuel temperature sensor – signal below range minimum	If the raw value of the fuel temperature sensor (FTSCD_uRaw) is below 131.96 mV over 500 ms.	CNA/52	Fuel temperature sensor **X832**
3019	Boost pressure sensor – signal above range maximum	The sensor raw voltage value BPSCD_uRawVal is above 4848.48 mV over 500 ms.	CNA/40	Boost pressure/ temperature sensor **X828**
3022	Boost pressure sensor – signal not plausible	At engine start (engine not turning) the difference between BPS and APS is outside of plausibility window (-200 to 200 hPa) over 2000 ms.	CNA/40	Boost pressure/ temperature sensor **X828**
3023	Atmospheric pressure sensor – signal not plausible	At engine start (engine not turning) the difference between BPS and APS is outside of plausibility window (-200 to 200 hPa) over 800 ms.	N/A	Atmospheric pressure sensor (integrated in the engine controller)

Code	Description	Cause	Controller Pin	Component
3024	Atmospheric pressure sensor – signal above range maximum	The sensor raw signal APSCD_uRaw is above 4701.857 mV over 800 ms.	N/A	Atmospheric pressure sensor (integrated in the engine controller)
3025	Atmospheric pressure sensor – signal below range minimum	The sensor raw signal APSCD_uRaw is below 2199.413 mV over 800 ms.	N/A	Atmospheric pressure sensor (integrated in the engine controller)
3028	Oil pressure too low	The oil pressure is below the engine speed dependant threshold (OPSCD_pMin calculated from curve OPSCD_pMin_CUR) over 10000 ms.	CNA/54	Oil pressure/ temperature sensor **X829**
3029	Oil pressure sensor – short circuit to battery	If the raw value of the oil pressure sensor (OPSCD_uRaw) is above 4921.8 mV over 500 ms.	CNA/54	Oil pressure/ temperature sensor **X829**
3030	Oil pressure sensor – short circuit to ground	If the raw value of the oil pressure sensor (OPSCD_uRaw) is below 136.85 mV over 500 ms.	CNA/54	Oil pressure/ temperature sensor **X829**
3032	Oil pressure sensor – value too high	The engine oil temperature is above 79.96Â°C and the oil pressure is above the engine speed dependant threshold (OPSCD_pMax calculated from curve OPSCD_pMax_CUR) over 10000 ms.	N/A	Oil pressure/ temperature sensor **X829**
3033	Oil temperature sensor – signal not plausible	The oil temperature exceeds 89.96Â°C and the coolant temperature does not exceed 54.96Â°C within 120 ms. Debouncing time is 5000 ms.	CNA/58	Oil pressure/ temperature sensor **X829**
3034	Oil temperature sensor – signal above range maximum	If the raw value of the oil temperature sensor (OTSCD_uRaw) is above 4931.57 mV over 500 ms.	CNA/36	Oil pressure/ temperature sensor **X829**
3035	Oil temperature sensor – signal below range minimum	If the raw value of the oil temperature sensor (OTSCD_uRaw) is below 224.83 mV over 500 ms.	CNA/36	Oil pressure/ temperature sensor **X829**
3037	Boost pressure sensor – signal low	The sensor raw voltage value BPSCD_uRawVal is below 337.24 mV over 500 ms.	CNA/40	Boost pressure/ temperature sensor **X828**
3038	Constant engine RPM activate / select switch – short circuit to battery	"The CRPM select/ cycle switch appears not to be present (both poles < 0.5V). The engine transmission option is enabled - H3,Engine,channel 2 for short wheelbase, always enabled for long wheelbase. (The engine is electronic, i.e engine configuration messag"	via CAN	Armrest Configuration. Integrated control panel (ICP). H13.
3047	High pressure pump relay – short circuit to battery	If the main relay does not open within 2000 ms when the after run has been completed an EEPROM flag is set (MRlyCD_stPrevOpening.1=1). At the next ECU initialization this flag triggers the error.	CNA/72	Engine main relay R13 (stuck on) engine controller and connector **X218**, engine main relay R13 and connector **X037**

Code	Description	Cause	Controller Pin	Component
3048	High pressure pump relay – short circuit to ground	If the EEPROM counter for 'too early opening of the main relay' (MRlyCD_ctTooEarly_mp) exceeds the limit of 3.	CNA/72	Engine main relay R13 (stuck on) engine controller and connector **X218**, engine main relay R13 and connector **X037**
3051	Battery voltage to ECM – voltage too high	The battery sensor raw voltage (BattCD_uRaw) is above 3734.12 mV over 1000 ms.	N/A	Charging system. External power supply. Engine controller.
3052	Battery voltage to ECM – voltage too low	The battery sensor raw voltage (BattCD_uRaw) is below 1246.33 mV over 1000 ms.	CNK/1, CNK/5 CNK/28	Charging system. External power supply. Engine controller.
3060	Cylinder 1 – unclassifiable error in injector	An unclassifiable error in the injector is present over 7 camshaft revolutions.	CNA/16, CNA/33, CNA/48	Fuel injectors 1 and 2 connector **X825**, fuel injector 3 and connector **X826**
3061	Cylinder 1 – injector cable short circuit (low side to battery)	A short circuit of the injector cable (low side to battery voltage) is detected over 3 camshaft revolutions.	CNA/47	Fuel injector solenoid 1 and connector **X825**
3063	Cylinder 1 – injector cable short circuit (high side to ground)	Short circuit of high-side to low-side is detected over 3 camshaft revolutions.	CNA/16, CNA/47	Fuel injector solenoid 1 and connector **X825**
3064	Cylinder 5 – unclassifiable error in injector	An unclassifiable error in the injector is present over 7 camshaft revolutions.	CNA/32	Fuel injector 4 and connector **X826**, fuel injectors 5 and 6 and connector **X827**
3065	Cylinder 5 – injector cable short circuit (low side to battery)	A short circuit of the injector cable (low side to battery voltage) is detected over 3 camshaft revolutions	CNA/46	Fuel injector solenoid 5 and connector **X827**
3067	Cylinder 5 – injector cable short circuit (high side to ground)	Short circuit of high-side to low-side is detected over 3 camshaft revolutions	CNA/1, CNA/46	Fuel injector solenoid 5 and connector **X827**
3068	Cylinder 3 – unclassifiable error in injector	An unclassifiable error in the injector is present over 7 camshaft revolutions	CNA/16, CNA/17, CNA/18, CNA/47, CNA/48	Fuel injectors 1 and 2 and connector **X825**, fuel injector 3 and connector **X826**
3069	Cylinder 3 – injector cable short circuit (low side to battery)	A short cicuit of the injector cable (low side to battery voltage) is detected over 3 camshaft revolutions.	CNA/33	Fuel injector 3 and connector **X826**
3071	Cylinder 3 – injector cable short circuit (high side to ground)	Short circuit of high-side to low-side is detected over 3 camshaft revolutions	CNA/17, CNA/33	Fuel injector 3 and connector **X826**
3072	Cylinder 6 – unclassifiable error in injector	An unclassifiable error in the injector is present over 7 camshaft revolutions.	CNA/03, CNA/01, CNA/32 CNA/31	Fuel injector 4 and connector **X826**.Fuel injectors 5 and 6 and connector **X827**
3073	Cylinder 6 – injector cable short circuit (low side to battery)	A short cicuit of the injector cable (low side to battery voltage) is detected over 3 camshaft revolutions.	CNA/31, CNA/2	Fuel injector 6 and connector **X827**
3075	Cylinder 6 – injector cable short circuit (high side to ground)	Short circuit of high-side to low-side is detected over 3 camshaft revolutions	CNA/31	Fuel injector 6 and connector **X827**

Code	Description	Cause	Controller Pin	Component
3076	Cylinder 2 – unclassifiable error in injector	An unclassifiable error in the injector is present over 7 camshaft revolutions.	CNA/16, CNA/17, CNA/18, CNA/47, CNA/33	Fuel injectors 1 and 2 and connector **X825**, fuel injector 3 and connector **X826**
3077	Cylinder 2 – injector cable short circuit (low side to battery)	A short cicuit of the injector cable (low side to battery voltage) is detected over 3 camshaft revolutions.	CNA/48	Fuel injector 2 and connector **X825**
3079	Cylinder 2 – injector cable short circuit (high side to ground)	Short circuit of high-side to low-side is detected over 3 camshaft revolutions.	CNA/18, CNA/48	Fuel injector 2 and connector **X825**
3080	Cylinder 4 – unclassifiable error in injector	An unclassifiable error in the injector is present over 7 camshaft revolutions.	CNA/1, CNA/3, CNA/46	Fuel injector 4 and connector **X826**, Fuel injectors 5 and 6 and connector **X827**
3081	Cylinder 4 – injector cable short circuit (low side to battery)	A short cicuit of the injector cable (low side to battery voltage) is detected over 3 camshaft revolutions.	CNA/32	Fuel injector 4 and connector **X826**
3083	Cylinder 4 – injector cable short circuit (high side to ground)	Short circuit of high-side to low-side is detected over 3 camshaft revolutions.	CNA/3, CNA/32	Fuel injector 4 and connector **X826**
3088	Crankshaft sensor – no signal	Not used	CNA/27 CNA12	Crankshaft speed sensor and connector **X834**
3089	Crankshaft sensor – invalid signal	1) If the increment frequency CrSCD_nIncr exceeds 6000 rpm (dynamically implausible) OR 2) The increment system waits for the first gap (CrSCD_stIncSig_mp=32) and more than 312 increment signals are categorized as defective OR 3) Too few increment signals are acquired but the phase sensor (camshaft) detectes more then 42 phase signals since the last interrupt.	N/A	Crankshaft speed sensor and connector **X834**
3090	Camshaft sensor – no signal	Not used	CNA/20, CNA/50, CNA/11	Camshaft speed sensor and connector **X835**
3091	Camshaft sensor – invalid signal	1) Synchronisation plausibilty check not successful (EngM_stCaSVerifyDiag >= 10hex) OR 2) A valid position of the crankshaft increment signal is detected (CrSCD_stIncSig_mp=64) but no valid camshaft phase signal is detected over 240 crankshaft signal increments.	CNA/50	Camshaft speed sensor and connector **X835**

Code	Description	Cause	Controller Pin	Component
3093	Offset between camshaft and crankshaft – outside boundaries	1) If the angular system is in the WAIT for PHASE (EngM_stSync=32) attempting to determine the angular position based on the phase signal. If a position is found which is shifted more than 12Â°CrS to the previously found position of the crankshaft increment signal the angular system state remains unchanged and the fault path becomes defective after 255 interrupts OR 2) The angular position cannot be determined from the phase signal and the distortion angle between the phase and increment position is greater than 0Â°CrS but smaller then 12Â°CrS over 6 phase buffer entries.	N/A	Crankshaft speed sensor and connector **X834**, camshaft speed sensor and connector **X835**
3095	Operating with camshaft sensor only – backup mode	Not used	CNA/27, CNA/12	Crankshaft speed sensor and connector **X834**
3096	ECM busoff on CAN A	Bus off state of CAN controller for CAN A is present over 500 ms.	via CAN	CAN BUS interference. Instrument cluster connector **X009**
3102	Rail pressure sensor CP3 – signal below range minimum	The rail pressure sensor raw voltage (RailCD_uPeakRaw) is below 254.15 mV over 200 ms	CNA/43	Fuel rail pressure sensor and connector **X830**
3104	Rail pressure relief valve – open	If PRV was recognized as OPEN (PRV_stMon.7=1) longer than 0 ms. The state PRV_stMon.7 is only set if the two regular pressure gradient evaluation procedures for 'PRV OPEN' detection do not detect the PRV to have opened. This happens if the rail pressure sensor is judged to be defect which evokes a kickoff execution and PRV_stMon.7 will be set automatically once the kickoff has terminated.	CNA/19, CNA49	Fuel rail pressure sensor and connector **X830**, fuel system leak.
3105	Rail pressure relief valve – pressure shock requested	Pressure shock (kickoff) is requested (PRV_stMon.5=1) longer than 0 ms. This request occurs if the rail pressure exceeds 1685000 hPa remains above this limit for 1000 ms.	N/A	Rail pressure relief valve (PRV). Iinjection component
3106	Rail pressure relief valve – did not open after pressure shock	PRV did not open after pressure shock (PRV_stMon.6=1) and debouncing time 0 has elapsed. The status PRV_stMon.6 is set if a kickoff request is present longer than 2000 ms.	N/A	Rail pressure relief valve (PRV) (sticking). Injection component
3107	Metering unit – short circuit to battery	Power stage hardware reports 'short circuit to battery' (on the low side of the metering unit) longer than 0 ms.	CNA/49	Fuel metering unit and connector **X833**

Code	Description	Cause	Controller Pin	Component
3108	Metering unit – short circuit to ground	Power stage hardware reports 'short circuit to ground' (on the low side of the metering unit) longer than 280 ms.	CNA/49	Fuel metering unit and connector **X833**
3110	Rail pressure sensor monitoring – signal below range minimum	If the raw value of the rail pressure sensor (RailCD_uPeakRaw) exceeds the limit 650.05 mV over 100 ms during after-run.	N/A	Fuel rail pressure sensor and connector **X830**
3111	Rail pressure sensor monitoring – signal above range maximum	If the raw value of the rail pressure sensor (RailCD_uPeakRaw) lies below the limit 351.91 mV over 100 ms during after-run.	N/A	Fuel rail pressure sensor and connector **X830**
3112	Rail pressure sensor CP3 – signal above maximum range	The rail pressure sensor raw voltage (RailCD_uPeakRaw) exceeds 4750.73 mV over 200 ms	CNA/43	Fuel rail pressure sensor and connector **X830**
3120	PTO twist sensor – not plausible	PTO twist measurement is not plausible	N/A	PTO twist sensor and connector **X262**
3121	PTO twist sensor – open circuit	Pin open circuit or > 4.25V	CN2/14	PTO twist sensor and connector **X262**
3122	PTO twist sensor – short circuit to ground	Pin shorted to 0V or < 0.15V	CN2/14	PTO twist sensor and connector **X262**
3123	PTO twist sensor – not calibrated	The PTO twist sensor is not calibrated. (PTO twist calibration is cleared via H8 menu - engine.) (To re-calibrate use H1 menu-engine or perform general calibration)	N/A	PTO torque recalibrate **TRANSMISSION Powershift - Calibrate (C.20.E)**
3124	Hand throttle – channel 2 signal above range maximum	Voltage > 4.8V	via CAN	Armrest controller and configuration. Hand throttle and connector H6 Connectors.
3125	Hand throttle – channel 2 signal below range minimum	Pin open circuit or Voltage < 0.2V	via CAN	Armrest controller and configuration. Hand throttle and connector H6 Connectors.
3126	Hand throttle – channel 1 signal above range maximum	No Data	via CAN	Armrest controller and configuration. Hand throttle and connector H6 Connectors.
3127	Hand throttle – channel 1 signal below range minimum	No Data	via CAN	Armrest controller and configuration. Hand throttle and connector H6 Connectors.
3128	Hand throttle – channel difference error	No Data	via CAN	Armrest controller and configuration. Hand throttle and connector H6 Connectors.
3129	Hand throttle – idle switch closed circuit	No Data	via CAN	Armrest controller and configuration. Hand throttle and connector H6 Connectors.

Code	Description	Cause	Controller Pin	Component
3130	Hand throttle – idle switch open circuit	No Data	via CAN	Armrest controller and configuration. Hand throttle and connector H6 Connectors.
3131	Grid heater always switched on	If the difference of the battery voltage to AirHt_uStickTstHtrOnIv_mp is below 508.31 mV for longer than 5000 ms an error is detected.	N/A	Grid heater relay and connector **X215**
3137	Metering unit – open load	Power stage hardware reports 'open load' in the metering unit longer than 200 ms	CNA/19, CNA/49	Fuel metering unit and connector **X833**
3138	Metering unit – temperature too high	Power stage hardware reports 'excess temperature' for longer than 200 ms.	N/A	Fuel metering unit and connector **X833**
3141	Fuel flow setpoint too low	The metering unit current control setpoint current (MeUnCD_iSetFlt) is below a calculated minimum limit over 2500 ms. This limit is calculated from various curves	N/A	Fuel metering unit and connector **X833**, fuel rail pressure sensor and connector **X830**
3142	High pressure test – test active	The 'High Pressure Test' is running	N/A	Information code only indicating a high pressure system test is running
3145	Terminal 15 – no signal	During EDC initialization the debounced status of terminal 15 is 'off' (T15CD_stDebVal=0) and no recovery is carried out (HWEMon_numRecovery=0 --> Normal EDC switch on).	N/A	Fuse F43 (10A) and the keystart switch connector **X003**
3147	Oil temperature too high	The oil temperature exceeds 124.96Â°C over 5000 ms	CNA/36	Oil lubrication system (blocked, poor circulation). Oil pressure/ temperature sensor and connector **X829**
3148	Coolant temperature sensor dynamic test – failure	The rise in coolant temperature (current temp. - start temp.) is below the limit Clg_dtMinDynTst (from curve Clg_dtMinDynTst_CUR depending on start temp.) when the timer exceeds the maximum test time Clg_tiMaxDynTst (from curve Clg_tiMaxDynTst_CUR depending on start temp.)	N/A	Coolant temperature sensor and connector **X831**
3154	Grid heater relay – short circuit to battery	Power stage hardware reports 'short circuit to battery' longer than 200 ms.	N/A	Grid heater relay and connector **X215**
3155	Grid heater relay – short circuit to ground	Power stage hardware reports 'short circuit to ground' longer than 500 ms.	CNK/93	Grid heater relay and connector **X215**
3156	Grid heater relay – no load	Power stage hardware reports 'open load' longer than 500 ms	CNK/93	Grid heater relay and connector **X215**
3157	ECM not detected on CAN bus	A Eec Eng message is not received within 3 seconds of power up	via CAN	Instrument cluster and connector **X009**. Open circuit on the CAN BUS.

Code	Description	Cause	Controller Pin	Component
3158	Invalid ECM checksum	N/A	N/A	Clear error code. Download correct level of software. Engine controller.
3159	Invalid engine reference torque	The received engine configuration does not match the previously stored EEPROM value.	N/A	Clear error code. Download correct level of software. Engine controller.
3160	Fan actuator – short circuit to battery	Power stage hardware reports 'short circuit to battery' longer than 200 ms.	CNK/90	Vistronic fan and connector **X219**
3161	Fan actuator – short circuit to ground	Power stage hardware reports 'short circuit to ground' longer than 2000 ms.	CNK/90	Vistronic fan and connector **X219**
3162	Fan actuator – temperature too high	Power stage hardware reports 'open load' longer than 2000 ms	CNK/90	Vistronic fan and connector **X219**
3163	Fan actuator – no load	Power stage hardware reports 'excess temperature' longer than 300 ms	N/A	Vistronic fan and connector **X219**
3176	Setpoint of metering unit not plausible in overrun	The setpoint value of the rail pressure governor for the fuel volume flow through the metering unit exceeds an upper limit over 2500 ms. This limit is interpolated from the rail pressure dependent curve Rail_dvolMeUnOvrRun_CUR [mm^3/s].	N/A	Vistronic fan and connector **X219**
3177	Engine overspeed detected	Engine speed (Eng_nAvg) exceeds 3050rpm over 5000ms	N/A	Clear the error code If the driving conditions seem okay, download the correct level of software. If the fault re-occurs, remove and replace the engine controller.
3179	Timeout of CAN message BC2EDC2	Not used	via CAN	Check all power supplies and grounds to CAN-BUS controllers If ok and fault re-ocurrs, remove and replace engine controller.
3180	Timeout of CAN message VM2EDC	Not used	via CAN	Check all power supplies and grounds to CAN-BUS controllers If ok and fault re-ocurrs, remove and replace engine controller.
3182	Timeout of CAN message RxCCVS	CAN controller of the EDC reports a reception timeout for the BC or VCM message RxCCVS over 100 ms.	via CAN	Check all power supplies and grounds to CAN-BUS controllers If ok and fault re-ocurrs, remove and replace engine controller.

Code	Description	Cause	Controller Pin	Component
3185	Timeout of CAN message TF	Not used	via CAN	Check all power supplies and grounds to CAN-BUS controllers. Engine controller.
3188	Cylinder 1 warning – open load	An injector cable open load error is detected over 3 camshaft revolutions.	CNA-47, CNA-16	Fuel injector 1 solenoid and connector **X825**
3192	Cylinder 2 warning – open load	An injector cable open load error is detected over 3 camshaft revolutions.	CNA/48, CNA/18	Fuel injector 2 solenoid and connector **X825**
3196	Cylinder 3 warning – open load	An injector cable open load error is detected over 3 camshaft revolutions.	CNA/33, CNA/17	Fuel injector 3 solenoid and connector **X826**
3200	Cylinder 4 warning – open load	An injector cable open load error is detected over 3 camshaft revolutions.	CNA/32, CNA/03	Fuel injector 4 solenoid and connector **X826**
3204	Cylinder 5 warning – open load	An injector cable open load error is detected over 3 camshaft revolutions.	CNA/46, CNA/01	Fuel injector 5 and connector **X827**
3208	Cylinder 6 warning – open load	An injector cable open load error is detected over 3 camshaft revolutions.	CNA/31, CNA/02	Fuel injector 6 and connector **X827**
3210	Bank 1 – general short circuit to injection cable	A general short circuit of the injector cable is detected over 4 camshaft revolutions.	CNA/16, CNA/18, CNA/17	Fuel injectors 1 and 2 and connector **X825**, fuel injector 3 and connector **X826**
3211	Bank 1 – injection cable short circuit low side to ground	A low-side short circuit to ground in the injection cable is detected over 4 camshaft revolutions.	N/A	Fuel injectors 1 and 2 and connector **X825**, fuel injector 3 and connector **X826**
3213	Bank 1 – unclassifiable error	An unclassifiable error in the injector cable is present over 9 camshaft revolutions.	N/A	Fuel injection system mechanical operation. Correct software level loaded. Engine controller
3218	Bank 2 – general short circuit to injection cable	A general short circuit of the injector cable is detected over 4 camshaft revolutions.	CNA/03, CNA/01, CNA/02	Fuel injector 4 and connector **X826**, fuel injectors 5 and 6 and connector **X827**
3219	Bank 2 – injection cable short circuit low side to ground	A low-side short circuit to ground in the injection cable is detected over 4 camshaft revolutions.	N/A	Fuel injector 4 connector and **X826**, fuel injectors 5 and 6 connector and **X827**
3221	Bank 2 – unclassifiable error	An unclassifiable error in the injector cable is present over 9 camshaft revolutions.	N/A	Fuel injection system mechanical operation. Correct software level loaded. Engine controller
3227	Injection processor (CY33X) error – internal reset / clock loss / voltage too low	An internal reset is present longer than 3 camshaft revolutions.	N/A	Engine controller fuses F46 and F47. Harness. Engine controller and connector **X218**
3228	Injection processor (CY33X) error – unlocked / initialisation failure	After a reset the power stage component was not successfully initialized after 3 camshaft revolutions.	N/A	Clear error. Correct software level. Engine controller

Code	Description	Cause	Controller Pin	Component
3229	Injection processor (CY33X) error – injections limited by software	Power stage component is in 'TESTMODE' (used to test injection failures) longer than 3 camshaft revolutions.	N/A	Clear error. Correct software level. Engine controller
3230	Injection processor (CY33X) error – SPI communication failure	Disturbed SPI communication	N/A	Clear error. Correct software level. Engine controller
3231	Injection processor error – internal reset / clock loss / voltage too low	Internal parity error is present longer than 3 camshaft revolutions.	N/A	Clear error. Correct software level. Engine controller
3232	Injection processor error – unlocked / initialisation failure	Internal programm flow error longer than 3 camshaft revolutions.	N/A	Clear error. Correct software level. Engine controller
3233	Injection processor error – test mode	The 'YSEL' signal was not inverted as requested during injection for over3 camshaft revolutions.	N/A	Clear error. Correct software level. Engine controller
3234	Injection processor error – SPI communication failure	Power stage component On timeout is present for at least 1 cylinder longer than 3 camshaft revolutions.	N/A	Clear error. Correct software level. Engine controller
3238	ECM internal SPI communications error – CJ940	If the error counter for defective SPI bus communication reaches or exceeds the value of 5 the error becomes active.	N/A	Clear error. Correct software level. Engine controller
3239	ECM EEPROM – read operation failure	A status flag of the EEPROM indicates an error during the last read operation.	N/A	Incorrect programming. Correct software level. Engine controller.
3240	ECM EEPROM – write operation failure	A status flag of the EEPROM indicates an error during the last write operation.	N/A	Incorrect programming. Correct software level. Engine controller.
3241	ECM EEPROM – default value used	A status flag of the EEPROM indicates that substitute values for the EEPROM values are used. This happens if a checksum error (CRC)is registered during reading the EEPROM. In this case EEPROM data is read from a second (mirror) area and used as default values.	N/A	Incorrect programming. Correct software level. Engine controller.
3242	ECM (locked) recovery occurred	During system start up a hardware error or configuration problem was detected which leads to a ECU recovery that is stored as protected.	N/A	Clear error. Correct software level. Engine controller
3243	ECM recovery (suppressed) – recovery occurred	During system start up a hardware error or configuration problem was detected which leads to a ECU recovery that is not stored.	N/A	Clear error. Correct software level. Engine controller
3244	ECM recovery (visible) – recovery occurred	During system start up a hardware error or configuration problem was detected which leads to a ECU recovery that is visible in the error memory.	N/A	Clear error Correct software level. Engine controller.

Code	Description	Cause	Controller Pin	Component
3245	ECM processor – watchdog not plausible	One of the two error counters WD-Com_dErrorCountForCntler_u8 or WDCom_dErrorCountForWD_u8 exceeds the value of 5.	N/A	Clear error Correct software level. Engine controller.
3246	Shutoff paths during initialisation – watchdog	Injection occurred although internal shut-off path of the ECU watchdog was active.	N/A	Clear error Correct software level. Engine controller.
3247	Shutoff paths during initialisation – supply voltage too high	Injection occurred although internal shut-off path of the overvoltage monitoring was active.	N/A	Clear error Correct software level. Engine controller.
3248	Shutoff paths during initialisation – supply voltage too low	Injection occurred although internal shut-off path of the undervoltage monitoring was active.	N/A	Clear error Correct software level. Engine controller.
3249	TPU monitoring – time deviation between TPU and system not plausible	If the maximum time difference between the TPU and CPU time base exceeds the threshold 81000 us OR the minimum time difference is below the limit -81000 us OR the absolute value of the sum of time differences is above 81000 us an error counter (TPUMon_ctUpDwnDeb) is incremented. If this counter exceeds the value of 4 this fault path is set.	N/A	Clear error Correct software level. Engine controller.
3250	Dataset – variant defect	Variant dataset defective	N/A	Clear error Correct software level. Engine controller.
3251	Dataset – requested variant could not be set	Requested variant could not be set	N/A	Clear error Correct software level. Engine controller.
3252	Controller watchdog – SPI communication failure	Error counter (WDCom_dError-CountForSpi_u8) for failed SPI communication between CPU and monitoring module exceeds 2 over 2*20ms (two tests).	N/A	Clear error Correct software level. Engine controller.
3253	ADC monitoring – reference voltage too low	If reference voltage exceeds 3870.97 mV for longer than 150 ms. Test frequency is 20 ms.	N/A	Clear error Correct software level. Engine controller.
3254	ADC monitoring – reference voltage too high	If reference voltage falls below 3372.43 mV for longer than 150 ms. Test frequency is 20 ms.	N/A	Clear error Correct software level. Engine controller.
3255	ADC monitoring – test impulse error	Monitoring for no-load test pulse is switched off (only allowed for poti/switch accelerator pedal!!)	N/A	Clear error Correct software level. Engine controller.
3256	ADC monitoring – queue error	An error is detected if not all ADC queues are converted within a time window. Time to defect: 150 ms. Test frequency is 20 ms.	N/A	Clear error Correct software level. Engine controller.
3263	ECM BusOff on CAN C	Bus off state of CAN controller for CAN C is present over 500 ms.	N/A	Instrument cluster connector **X009**, CAN-BUS open circuit

Code	Description	Cause	Controller Pin	Component
3265	Overrun monitoring	The sum of all torque-forming energizing times of an individual cylinder (OvRMon_tiTDCAvrg_mp) exceeds the limit OvRMon_tiLimET_mp (calculated from the map OvRMon_tiLimET_MAP depending on the engine speed and the time since the overrun monitoring is active) for more than 100 test events (test frequency every 10ms).	N/A	Clear error Correct software level. Engine controller.
3266	Redundant engine speed in overrun monitoring	The absolute value of the deviation between engine speed Eng_nAvrg (layer 1) and redundant segment speed OvRMon_nSeg (layer 2) exceeds 320 rpm over 800 ms while the redundant segment speed is above 1000 rpm.	N/A	External power supply connected. Charging system. Engine controller. .
3278	ECM internal supply voltage too high	A CJ940 has detected its voltage supply to be above an upper limit.	N/A	External power supply connected. Charging system. Engine controller. .
3279	ECM internal supply voltage too low	A CJ940 has detected its voltage supply to be below a lower limit.	N/A	Engine controller and connector **X218**, fuses F46 and F47. Battery. Battery Terminals. Power supplies and grounds.
3280	Sensor supply voltage 1 high	The hardware has detected the sensor voltage supply 1 to exceed an upper limit over 100 ms.	N/A	Engine sensor, engine controller
3281	Sensor supply voltage 1 low	The hardware has detected the sensor voltage supply 1 to be below a lower limit over 100 ms.	N/A	Engine sensor, engine controller
3283	Sensor supply voltage 2 high	The hardware has detected the sensor voltage supply 2 to exceed an upper limit over 100 ms.	N/A	Engine sensor, engine controller
3284	Sensor supply voltage 2 low	The hardware has detected the sensor voltage supply 2 to be below a lower limit over 100 ms.	N/A	Engine sensor, engine controller
3285	Sensor supply voltage 3 high	The hardware has detected the sensor voltage supply 3 to exceed an upper limit over 100 ms.	N/A	Engine sensor, engine controller
3286	Sensor supply voltage 3 low	The hardware has detected the sensor voltage supply 3 to be below a lower limit over 100 ms.	N/A	Engine sensor, engine controller
3297	Rail pressure positive deviation high and high fuel flow setpoint value	The positive rail pressure governor deviation (Rail_pDvt) exceeds the engine speed dependent limit from curve Rail_pMeUnDvtUpLim_CUR [hPa] AND the rail pressure governor setpoint value of the fuel volume flow (Rail_dvolMeUnSet) is above the engine speed dependent limit from curve Rail_dvolMeUnCtlUpLim_CUR [mm^3/s] over 2500 ms.	N/A	Fuel system leak. Injector. High pressure pump CP3. . Gear pump. Fuel filter.

Code	Description	Cause	Controller Pin	Component
3301	Rail pressure negative deviation too high on minimum metering	The negative rail pressure governor deviation (Rail_pDvt) is below the engine speed dependent limit from curve Rail_pMeUnDvtMin_CUR AND the rail pressure governor setpoint value of the fuel volume flow (Rail_dvolMeUnSet) is below -100 mm^3/s over 8000 ms.	N/A	Fuel metering unit and connector **X833**, engine controller and connector **X213**, fuel system leak and pressure.
3305	Rail pressure below minimum limit in controller mode	The rail pressure (Rail_pPeak) is below the engine speed dependent limit from curve Rail_pMeUnPeakMin_CUR [hPa] over 2500 ms.	N/A	Fuel system leak. Injector. High pressure pump CP3. Gear pump. Fuel filter.
3309	Rail pressure above maximum limit in controlled mode	The rail pressure (Rail_pPeak) exceeds the maximum pressure 1700000 hPa over 1000 ms.	N/A	Fuel metering unit and connector **X833**, engine controller and connector **X213**, fuel system leak and pressure. Open circuit.
3313	Rail pressure drop rate too high	The current rail pressure (Rail_pPeak) is below a certain minimum pressure limit over 2500 ms. This pressure limit is calculated from the rail pressure at the last funciton call (t-20ms) minus the maximum admissible pressure drop determined from curve Rail_dpDecMonMax_CUR [hPa/s] multiplied by the function call cycle (20ms).	N/A	Fuel system leak. Injector. High pressure pump CP3. Pressure relief valve.
3316	Minimum number of injections not reached – stop engine	The number of cylinders with error or shut off exceeds 2 over 1 test cycles (injections)	see tests 3210 + 3218	Fuel injector related codes.
3334	Timeout of CAN message TSC1–PE Torque (when active)	CAN controller of the EDC reports a reception timeout for the PTO message TSC1PEActIv over 200 ms while the override control mode is active.	via CAN	Power supplies and grounds to the controllers on the CAN BUS. Engine controller
3335	Timeout of CAN message TSC1–PE Torque (when inactive)	Not used	N/A	Power supplies and grounds to the controllers on the CAN BUS. Engine controller
3338	Timeout of CAN message TSC1–VE Speed (when inactive)	Not used	N/A	Power supplies and grounds to the controllers on the CAN BUS. Engine controller
3339	Timeout of CAN message TSC1–VE Speed (when active)	CAN controller of the EDC reports a reception timeout for the VCM/BC message TSC1VEActIv over 200 ms while the override control mode is active.	via CAN	Power supplies and grounds to the controllers on the CAN BUS. Engine controller
3345	Total throttle failure	Not used	N/A	Engine controller

Code	Description	Cause	Controller Pin	Component
3367	Coolant temperature test failure	The coolant temperature does not reach the minimum threshold Clg_tMinAbsTst (from curve Clg_tMinAbsTst_CUR depending on start temp.) when the timer exceeds the maximum test time Clg_tiMaxAbsTst (from curve Clg_tiMaxAbsTst_CUR depending on start temp.)	N/A	Coolant temperature sensor and connector **X831**
3368	INFO: Torque limitation due to OBD Performance Limiter by legislation	A power reduction due to the OBD performance limiter because of inhibited urea injection (via limiting torque CoVeh_trqPrflmLimDes) is active causing a torque limitation greater than 25% of the desired torque (CoEng_trqInrDesSlow) for longer than 60000 ms	N/A	Error codes and 3368
3369	INFO: Torque reduction due to smoke reduction	A power reduction due to smoke limitation (via limiting torque CoEng_trqSlpLim) is active causing a torque limitation greater than 25% of the desired torque (CoEng_trqInrDesSlow) for longer than 60000 ms	N/A	Error codes and 3369
3370	INFO: Torque limitation due to Engine Protection (against excessive torque, engine overspeed and overheat)	A power reduction due to engine mechanics protection (via limiting torque EngPrt_trqPrtLim) is active causing a torque limitation greater than 25% of the desired torque (CoEng_trqInrDesSlow) for longer than 60000 ms	N/A	Error codes and 3369
3371	INFO: Torque limitation due to Fuel Quantity Limitation because of injector system errors	A power reduction due to limiting fuel quantity (via limiting torque InjCtl_trqInrLim) is active causing a torque limitation greater than 25% of the desired torque (CoEng_trqInrDesSlow) for longer than 60000 ms	N/A	Error codes and 3371
3375	Constant engine RPM increase / decrease switch – short circuit to battery	"Both poles of the CRPM adjustment switch are closed (>3.5 V). The engine transmission option is enabled - H3,Engine,channel 2 for short wheelbase, always enabled for long wheelbase. (The engine is electronic, i.e engine configuration messages are received"	via CAN	Armrest controller connectors and configuration. Integrated Control Panel.
3999	Unknown ECM SPN Error Code	The Iveco fault code raised by the engine control module (SPN and FMI) is not recognised, i.e. does not match any of the codes listed (in DM1_ERROR in Engine_DM1.c).	N/A	Power supplies and grounds to the engine controller. Download correct level of software. Engine controller.

Rear Electronic Hydraulic Remote Valves – Error Codes

Code	Description	Cause	Controller Pin	Information
4100	Rear remote no.1 – no control message received	EHR1_DIAGNOSTIC CAN message indicates no control messages (Fault code = 0x11)	N/A	EHR valve connector **X305**, inline harness connector **X020**
4101	Rear remote no.1 – control message not plausible	EHR1_DIAGNOSTIC CAN message indicates control message is corrupted (Fault code = 0x13)	N/A	EHR valve connector **X305**, inline harness connector **X020**
4102	Rear remote no.1 – EEPROM error	EHR1_DIAGNOSTIC CAN message indicates valve EEPROM is corrupted (Fault code = 0x16)	N/A	Driveline oil temperature, .EHR valve. **Control module - Configure (A.50.A)**
4103	Rear remote no.1 – switched to failsafe	EHR1_DIAGNOSTIC CAN message indicates valve is set to fail safe because a setpoint is required (Fault code = 0x17)	N/A	EHR valve. **Control module - Configure (A.50.A)**
4104	Rear remote no.1 – under voltage	EHR1_DIAGNOSTIC CAN message indicates under voltage (Fault code = 0x21)	N/A	EHR valve connector **X305**, inline harness connector **X020**, EHR valve. **Control module - Configure (A.50.A)**
4105	Rear remote no.1 – over voltage	EHR1_DIAGNOSTIC CAN message indicates over voltage (Fault code = 0x22)	N/A	External power supply connected. Charging system. EHR valve. **Control module - Configure (A.50.A)**
4106	Rear remote no.1 – spool movement too low	EHR1_DIAGNOSTIC CAN message indicates spool movement is too low (Fault code = 0x23)	N/A	EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4107	Rear remote no.1 – spool movement too high	EHR1_DIAGNOSTIC CAN message indicates spool movement is too high (Fault code = 0x24)	N/A	EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4108	Rear remote no.1 – float position not reached	EHR1_DIAGNOSTIC CAN message indicates float is not reached (Fault code = 0x25)	N/A	EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4109	Rear remote no.1 – manually operated	EHR1_DIAGNOSTIC CAN message indicates valve is set for manual operation (Fault code = 0x26)	N/A	EHR lever. calibration. EHR valve. **Control module - Configure (A.50.A)**
4110	Rear remote no.1 – driver faulty	EHR1_DIAGNOSTIC CAN message indicates driver is faulty (Fault code = 0x42)	N/A	Driveline oil temperature. Driveline oil contamination. EHR valve. **Control module - Configure (A.50.A)**

Code	Description	Cause	Controller Pin	Information
4111	Rear remote no.1 – potentiometer faulty	EHR1_DIAGNOSTIC CAN message indicates pot is faulty (Fault code = 0x43)	N/A	Driveline oil temperature. EHR valve. **Control module - Configure (A.50.A)**
4112	Rear remote no.1 – unable to reach neutral	EHR1_DIAGNOSTIC CAN message indicates unable to reach neutral (Fault code = 0x81)	N/A	Driveline oil temperature. Driveline oil contamination. Hydraulic pressures. EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4113	Rear remote no.1 – spool not in neutral at key on	EHR1_DIAGNOSTIC CAN message indicates spool is not neutral at key on (Fault code = 0x82)	N/A	EHR valve **Hydraulic pump - Pressure test (A.10.A)** EHR valve. **Control module - Configure (A.50.A)**
4114	Rear remote no.2 – no control message received	EHR2_DIAGNOSTIC CAN message indicates no control messages (Fault code = 0x11)	N/A	EHR valve connector **X306**, inline harness connector **X020**, EHR valve. **Control module - Configure (A.50.A)**
4115	Rear remote no.2 – control message not plausible	EHR2_DIAGNOSTIC CAN message indicates control message is corrupted (Fault code = 0x13)	N/A	EHR valve connector **X306**, inline harness connector **X020**, EHR valve. **Control module - Configure (A.50.A)**
4116	Rear remote no.2 – EEPROM error	EHR2_DIAGNOSTIC CAN message indicates valve EEPROM is corrupted (Fault code = 0x16)	N/A	Driveline oil temperature. EHR valve. **Control module - Configure (A.50.A)**
4117	Rear remote no.2 – switched to failsafe	EHR2_DIAGNOSTIC CAN message indicates valve is set to fail safe because a setpoint is required (Fault code = 0x17)	N/A	Faulty EHR valve **Control module - Configure (A.50.A)**
4118	Rear remote no.2 – under voltage	EHR2_DIAGNOSTIC CAN message indicates under voltage (Fault code = 0x21)	N/A	EHR valve and connector **X306**, inline harness connector **X020**.
4119	Rear remote no.2 – over voltage	EHR2_DIAGNOSTIC CAN message indicates over voltage (Fault code = 0x22)	N/A	External power supply connected. Charging system. EHR valve. **Control module - Configure (A.50.A)**
4120	Rear remote no.2 – spool movement too low	EHR2_DIAGNOSTIC CAN message indicates spool movement is too low (Fault code = 0x23)	N/A	EHR valve. Hydraulic pressure, **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**

Code	Description	Cause	Controller Pin	Information
4121	Rear remote no.2 – spool movement too high	EHR2_DIAGNOSTIC CAN message indicates spool movement is too high (Fault code = 0x24)	N/A	EHR valve. Hydraulic pressure, **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4122	Rear remote no.2 – float position not reached	EHR2_DIAGNOSTIC CAN message indicates float is not reached (Fault code = 0x25)	N/A	EHR valve. Hydraulic pressure, **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4123	Rear remote no.2 – manually operated	EHR2_DIAGNOSTIC CAN message indicates valve is set for manual operation (Fault code = 0x26)	N/A	EHR lever. Calibration EHR valve. **Control module - Configure (A.50.A)**
4124	Rear remote no.2 – driver faulty	EHR2_DIAGNOSTIC CAN message indicates driver is faulty (Fault code = 0x42)	N/A	Driveline oil temperature. Driveline oil contamination. Hydraulic pressures. EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4125	Rear remote no.2 – potentiometer faulty	EHR2_DIAGNOSTIC CAN message indicates pot is faulty (Fault code = 0x43)	N/A	Driveline oil temperature. EHR valve. **Control module - Configure (A.50.A)**
4126	Rear remote no.2 – unable to reach neutral	EHR2_DIAGNOSTIC CAN message indicates unable to reach neutral (Fault code = 0x81)	N/A	Driveline oil temperature. Driveline oil contamination. Hydraulic pressures. EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4127	Rear remote no.2 – spool not in neutral at key on	EHR2_DIAGNOSTIC CAN message indicates spool is not neutral at key on (Fault code = 0x82)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4128	Rear remote no.3 – no control message received	EHR3_DIAGNOSTIC CAN message indicates no control messages (Fault code = 0x11)	N/A	EHR valve and connector **X307**, inline harness connector **X020**, EHR valve. **Control module - Configure (A.50.A)**

Code	Description	Cause	Controller Pin	Information
4129	Rear remote no.3 – control message not plausible	EHR3_DIAGNOSTIC CAN message indicates control message is corrupted (Fault code = 0x13)	N/A	EHR valve and connector **X307**, inline harness connector **X020**, EHR valve. **Control module - Configure (A.50.A)**
4130	Rear remote no.3 – EEPROM error	EHR3_DIAGNOSTIC CAN message indicates valve EEPROM is corrupted (Fault code = 0x16)	N/A	Driveline oil temperature. EHR valve. **Control module - Configure (A.50.A)**
4131	Rear remote no.3 – switched to failsafe	EHR3_DIAGNOSTIC CAN message indicates valve is set to fail safe because a setpoint is required (Fault code = 0x17)	N/A	EHR valve. **Control module - Configure (A.50.A)**
4132	Rear remote no.3 – under voltage	EHR3_DIAGNOSTIC CAN message indicates under voltage (Fault code = 0x21)	N/A	EHR valve and connector **X307**, inline harness connector **X020**. EHR valve. **Control module - Configure (A.50.A)**
4133	Rear remote no.3 – over voltage	EHR3_DIAGNOSTIC CAN message indicates over voltage (Fault code = 0x22)	N/A	External power supply connected. Charging system. EHR valve. **Control module - Configure (A.50.A)**
4134	Rear remote no.3 – spool movement too low	EHR3_DIAGNOSTIC CAN message indicates spool movement is too low (Fault code = 0x23)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4135	Rear remote no.3 – spool movement too high	EHR3_DIAGNOSTIC CAN message indicates spool movement is too high (Fault code = 0x24)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4136	Rear remote no.3 – float position not reached	EHR3_DIAGNOSTIC CAN message indicates float is not reached (Fault code = 0x25)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4137	Rear remote no.3 – manually operated	EHR3_DIAGNOSTIC CAN message indicates valve is set for manual operation (Fault code = 0x26)	N/A	EHR lever. calibration **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)** EHR valve. **Control module - Configure (A.50.A)**

Code	Description	Cause	Controller Pin	Information
4138	Rear remote no.3 – driver faulty	EHR3_DIAGNOSTIC CAN message indicates driver is faulty (Fault code = 0x42)	N/A	Driveline oil temperature. Driveline oil contamination. Hydraulic pressures. EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4139	Rear remote no.3 – potentiometer faulty	EHR3_DIAGNOSTIC CAN message indicates pot is faulty (Fault code = 0x43)	N/A	Driveline oil temperature. EHR valve. **Control module - Configure (A.50.A)**
4140	Rear remote no.3 – unable to reach neutral	EHR3_DIAGNOSTIC CAN message indicates unable to reach neutral (Fault code = 0x81)	N/A	Driveline oil temperature. Driveline oil contamination. Hydraulic pressures. EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4141	Rear remote no.3 – spool not in neutral at key on	EHR3_DIAGNOSTIC CAN message indicates spool is not neutral at key on (Fault code = 0x82)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4142	Rear remote no.4 – no control message received	EHR4_DIAGNOSTIC CAN message indicates no control messages (Fault code = 0x11)	N/A	EHR valve and connector **X307**, inline harness connector **X020**, EHR valve. **Control module - Configure (A.50.A)**
4143	Rear remote no.4 – control message not plausible	EHR4_DIAGNOSTIC CAN message indicates control message is corrupted (Fault code = 0x13)	N/A	EHR valve and connector **X307**, inline harness connector **X020**. EHR valve. **Control module - Configure (A.50.A)**
4144	Rear remote no.4 – EEPROM error	EHR4_DIAGNOSTIC CAN message indicates valve EEPROM is corrupted (Fault code = 0x16)	N/A	Driveline oil temperature. EHR valve. **Control module - Configure (A.50.A)**
4145	Rear remote no.4 – switched to failsafe	EHR4_DIAGNOSTIC CAN message indicates valve is set to fail safe because a setpoint is required (Fault code = 0x17)	N/A	EHR valve. **Control module - Configure (A.50.A)**

Code	Description	Cause	Controller Pin	Information
4146	Rear remote no.4 – under voltage	EHR4_DIAGNOSTIC CAN message indicates under voltage (Fault code = 0x21)	N/A	EHR valve and connector **X307**, inline harness connector **X020**. EHR valve. **Control module - Configure (A.50.A)**
4147	Rear remote no.4 – over voltage	EHR4_DIAGNOSTIC CAN message indicates over voltage (Fault code = 0x22)	N/A	External power supply connected. Charging system. EHR valve. **Control module - Configure (A.50.A)**
4148	Rear remote no.4 – spool movement too low	EHR4_DIAGNOSTIC CAN message indicates spool movement is too low (Fault code = 0x23)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4149	Rear remote no.4 – spool movement too high	EHR4_DIAGNOSTIC CAN message indicates spool movement is too high (Fault code = 0x24)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4150	Rear remote no.4 – float position not reached	EHR4_DIAGNOSTIC CAN message indicates float is not reached (Fault code = 0x25)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4151	Rear remote no.4 – manually operated	EHR4_DIAGNOSTIC CAN message indicates valve is set for manual operation (Fault code = 0x26)	N/A	EHR lever. calibration **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)**, EHR valve. **Control module - Configure (A.50.A)**
4152	Rear remote no.4 – driver faulty	EHR4_DIAGNOSTIC CAN message indicates driver is faulty (Fault code = 0x42)	N/A	Driveline oil temperature. Driveline oil contamination. Hydraulic pressures. EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4153	Rear remote no.4 – potentiometer faulty	EHR4_DIAGNOSTIC CAN message indicates pot is faulty (Fault code = 0x43)	N/A	Driveline oil temperature. EHR valve. **Control module - Configure (A.50.A)**

Code	Description	Cause	Controller Pin	Information
4154	Rear remote no.4 – unable to reach neutral	EHR4_DIAGNOSTIC CAN message indicates unable to reach neutral (Fault code = 0x81)	N/A	Driveline oil temperature. Driveline oil contamination. Hydraulic pressures. EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4155	Rear remote no.4 – spool not in neutral at key on	EHR4_DIAGNOSTIC CAN message indicates spool is not neutral at key on (Fault code = 0x82)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4156	Rear remote no.5 – no control message received	EHR5_DIAGNOSTIC CAN message indicates no control messages (Fault code = 0x11)	N/A	EHR valve and connector **X307**, inline harness connector **X020**, EHR valve. **Control module - Configure (A.50.A)**
4157	Rear remote no.5 – control message not plausible	EHR5_DIAGNOSTIC CAN message indicates control message is corrupted (Fault code = 0x13)	N/A	EHR valve and connector **X307**, inline harness connector **X020**. EHR valve. **Control module - Configure (A.50.A)**
4158	Rear remote no.5 – EEPROM error	EHR5_DIAGNOSTIC CAN message indicates valve EEPROM is corrupted (Fault code = 0x16)	N/A	Driveline oil temperature. EHR valve. **Control module - Configure (A.50.A)**
4159	Rear remote no.5 – switched to failsafe	EHR5_DIAGNOSTIC CAN message indicates valve is set to fail safe because a setpoint is required (Fault code = 0x17)	N/A	EHR valve. **Control module - Configure (A.50.A)**
4160	Rear remote no.5 – under voltage	EHR5_DIAGNOSTIC CAN message indicates under voltage (Fault code = 0x21)	N/A	EHR valve and connector **X307**. Inline harness connector **X020**. EHR valve. **Control module - Configure (A.50.A)**
4161	Rear remote no.5 – over voltage	EHR5_DIAGNOSTIC CAN message indicates over voltage (Fault code = 0x22)	N/A	External power supply connected. Charging system. EHR valve. **Control module - Configure (A.50.A)**

Code	Description	Cause	Controller Pin	Information
4162	Rear remote no.5 – spool movement too low	EHR5_DIAGNOSTIC CAN message indicates spool movement is too low (Fault code = 0x23)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4163	Rear remote no.5 – spool movement too high	EHR5_DIAGNOSTIC CAN message indicates spool movement is too high (Fault code = 0x24)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4164	Rear remote no.5 – float position not reached	EHR5_DIAGNOSTIC CAN message indicates float is not reached (Fault code = 0x25)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4165	Rear remote no.5 – manually operated	EHR5_DIAGNOSTIC CAN message indicates valve is set for manual operation (Fault code = 0x26)	N/A	EHR lever. calibration **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)**, EHR valve. **Control module - Configure (A.50.A)**
4166	Rear remote no.5 – driver faulty	EHR5_DIAGNOSTIC CAN message indicates driver is faulty (Fault code = 0x42)	N/A	Driveline oil temperature. Driveline oil contamination. Hydraulic pressures. EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4167	Rear remote no.5 – potentiometer faulty	EHR5_DIAGNOSTIC CAN message indicates pot is faulty (Fault code = 0x43)	N/A	Driveline oil temperature. Driveline oil contamination. Hydraulic pressures. EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**

Code	Description	Cause	Controller Pin	Information
4168	Rear remote no.5 – unable to reach neutral	EHR5_DIAGNOSTIC CAN message indicates unable to reach neutral (Fault code = 0x81)	N/A	Driveline oil temperature. Driveline oil contamination. Hydraulic pressures. EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4169	Rear remote no.5 – spool not in neutral at key on	EHR5_DIAGNOSTIC CAN message indicates spool is not neutral at key on (Fault code = 0x82)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)**
4170	Rear EHR control No.1 – not calibrated	EHR no. 1 lever is not calibrated. (Use H1/ EHR menu to Set EHR no. 1 lever to uncalibrated i.e. press timer switch 3 times - program/ timer lamp lights. Key off then on)	N/A	Controller. EHR lever. calibration **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)**
4173	Rear EHR control No.2 – not calibrated	EHR no. 2 lever is not calibrated. (Use H1/ EHR menu to Set EHR no. 1 lever to uncalibrated i.e. press timer switch 3 times - program/ timer lamp lights. Key off then on)	N/A	Controller. EHR lever. calibration **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)**
4177	Rear EHR control no.3 – not calibrated	EHR no. 3 lever is not calibrated. (Use H1/ EHR menu to Set EHR no. 1 lever to uncalibrated i.e. press timer switch 3 times - program/ timer lamp lights. Key off then on)	N/A	Controller. EHR lever. calibration **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)**
4180	Rear EHR control no.4 – not calibrated	EHR no. 4 lever is not calibrated. (Use H1/ EHR menu to Set EHR no. 1 lever to uncalibrated i.e. press timer switch 3 times - program/ timer lamp lights. Key off then on)	N/A	Controller. EHR lever. calibration **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Calibrate (A.10.C)**

Code	Description	Cause	Controller Pin	Information
4190	Rear remote no.1 – no communications	No EHR1_DIAGNOSTIC CAN message received in 3 secs	N/A	EHR valve and connector **X307**, inline harness connector **X020**, EHR valve. **Control module - Configure (A.50.A)**
4191	Rear remote no.2 – no communications	No EHR2_DIAGNOSTIC CAN message received in 3 secs	N/A	EHR valve and connector **X307**, inline harness connector **X020**, EHR valve. **Control module - Configure (A.50.A)**
4192	Rear remote no.3 – no communications	No EHR3_DIAGNOSTIC CAN message received in 3 secs	N/A	EHR valve and connector **X307**, inline harness connector **X020**, EHR valve. **Control module - Configure (A.50.A)**
4193	Rear remote no.4 – no communications	No EHR4_DIAGNOSTIC CAN message received in 3 secs	N/A	EHR valve and connector **X308**, inline harness connector **X020**, EHR valve. **Control module - Configure (A.50.A)**
4198	Rear remote no.5 – no communications	No EHR5_DIAGNOSTIC CAN message received in 3 secs	N/A	EHR valve and connector **X309**, inline harness connector **X020**, EHR valve. **Control module - Configure (A.50.A)**
4216	Rear remote no.1 – spool not calibrated	EHR1_DIAGNOSTIC CAN message indicates spool is not calibrated (Fault code = 0x14)	No Data	Controller. EHR valve calibration. **Control module - Configure (A.50.A)**.
4217	Rear remote no.2 – spool not calibrated	EHR2_DIAGNOSTIC CAN message indicates spool is not calibrated (Fault code = 0x14)	No Data	Controller. EHR valve calibration. **Control module - Configure (A.50.A)**.
4218	Rear remote no.3 – spool not calibrated	EHR3_DIAGNOSTIC CAN message indicates spool is not calibrated (Fault code = 0x14)	No Data	Controller. EHR valve calibration. **Control module - Configure (A.50.A)**.
4219	Rear remote no.4 – spool not calibrated	EHR4_DIAGNOSTIC CAN message indicates spool is not calibrated (Fault code = 0x14)	No Data	Controller. EHR valve calibration. **Control module - Configure (A.50.A)**.
4220	Rear remote no.5 – spool not calibrated	EHR5_DIAGNOSTIC CAN message indicates spool is not calibrated (Fault code = 0x14)	No Data	Controller. EHR valve calibration. **Control module - Configure (A.50.A)**.

Front Electronic Hydraulic Remote Valves – Error Codes

Code	Description	Cause	Controller Pin	Information
4500	Front remote no.1 – no control message received	MID EHR1_DIAGNOSTIC CAN message indicates no control messages (Fault code = 0x11)	N/A	EHR valve and connector **X697**, inline harness connector **X304**
4501	Front remote no.1 – control message not plausible	MID EHR1_DIAGNOSTIC CAN message indicates control message is corrupted (Fault code = 0x13)	N/A	EHR valve and connector **X697**, inline harness connector **X304**
4502	Front remote no.1 – EEPROM error	MID EHR1_DIAGNOSTIC CAN message indicates valve EEPROM is corrupted (Fault code = 0x16)	N/A	Driveline oil temperature. EHR valve. **Control module - Configure (A.50.A)**
4503	Front remote no.1 – switched to failsafe	MID EHR1_DIAGNOSTIC CAN message indicates valve is set to fail safe because a setpoint is required (Fault code = 0x17)	N/A	EHR valve. error code 4503. **Control module - Configure (A.50.A)**
4504	Front remote no.1 – under voltage	MID EHR1_DIAGNOSTIC CAN message indicates under voltage (Fault code = 0x21)	N/A	EHR valve. error code 4503. **Control module - Configure (A.50.A)**
4505	Front remote no.1 – over voltage	MID EHR1_DIAGNOSTIC CAN message indicates over voltage (Fault code = 0x22)	N/A	External power supply connected. Charging system. EHR valve. **Control module - Configure (A.50.A)**
4506	Front remote no.1 – spool movement too low	MID EHR1_DIAGNOSTIC CAN message indicates spool movement is too low (Fault code = 0x23)	N/A	Hydraulic pressure. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve **Control module - Configure (A.50.A)**
4507	Front remote no.1 – spool movement too high	MID EHR1_DIAGNOSTIC CAN message indicates spool movement is too high (Fault code = 0x24)	N/A	Hydraulic pressure. **Hydraulic pump - Pressure test (A.10.A)** EHR valve **Control module - Configure (A.50.A)**
4508	Front remote no.1 – float position not reached	MID EHR1_DIAGNOSTIC CAN message indicates float is not reached (Fault code = 0x25)	N/A	Hydraulic pressure. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve **Control module - Configure (A.50.A)**
4509	Front remote no.1 – manually operated	MID EHR1_DIAGNOSTIC CAN message indicates valve is set for manual operation (Fault code = 0x26)	N/A	Controller. EHR lever. calibration. EHR valve. **Control module - Configure (A.50.A)**

Code	Description	Cause	Controller Pin	Information
4510	Front remote no.1 – driver faulty	MID EHR1_DIAGNOSTIC CAN message indicates driver is faulty (Fault code = 0x42)	N/A	Driveline oil temperature. Driveline oil contamination. Hydraulic pressures. EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4511	Front remote no.1 – potentiometer faulty	MID EHR1_DIAGNOSTIC CAN message indicates pot is faulty (Fault code = 0x43)	N/A	Driveline oil temperature. EHR valve. **Control module - Configure (A.50.A)**
4512	Front remote no.1 – unable to reach neutral	MID EHR1_DIAGNOSTIC CAN message indicates unable to reach neutral (Fault code = 0x81)	N/A	Driveline oil temperature. Driveline oil contamination. Hydraulic pressures. EHR valve **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4513	Front remote no.1 – spool not in neutral at key on	MID EHR1_DIAGNOSTIC CAN message indicates spool is not neutral at key on (Fault code = 0x82)	N/A	Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4514	Front remote no.2 – no control message received	MID EHR2_DIAGNOSTIC CAN message indicates no control messages (Fault code = 0x11)	N/A	Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4515	Front remote no.2 – control message not plausible	MID EHR2_DIAGNOSTIC CAN message indicates control message is corrupted (Fault code = 0x13)	N/A	EHR valve connector **X698**, inline harness connector **X304**, EHR valve. **Control module - Configure (A.50.A)**.
4516	Front remote no.2 – EEPROM error	MID EHR2_DIAGNOSTIC CAN message indicates valve EEPROM is corrupted (Fault code = 0x16)	N/A	Driveline oil temperature. EHR valve. **Control module - Configure (A.50.A)**
4517	Front remote no.2 – switched to failsafe	MID EHR2_DIAGNOSTIC CAN message indicates valve is set to fail safe because a setpoint is required (Fault code = 0x17)	N/A	EHR valve. **Control module - Configure (A.50.A)** Error code 4517
4518	Front remote no.2 – under voltage	MID EHR2_DIAGNOSTIC CAN message indicates under voltage (Fault code = 0x21)	N/A	EHR valve connector **X698**, inline harness connector **X304**, EHR valve. **Control module - Configure (A.50.A)**.

Code	Description	Cause	Controller Pin	Information
4519	Front remote no.2 – over voltage	MID EHR2_DIAGNOSTIC CAN message indicates over voltage (Fault code = 0x22)	N/A	External power supply connected. Charging system. EHR valve. **Control module - Configure (A.50.A)**
4520	Front remote no.2 – spool movement too low	MID EHR2_DIAGNOSTIC CAN message indicates spool movement is too low (Fault code = 0x23)	N/A	Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4521	Front remote no.2 – spool movement too high	MID EHR2_DIAGNOSTIC CAN message indicates spool movement is too high (Fault code = 0x24)	N/A	Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4522	Front remote no.2 – float position not reached	MID EHR2_DIAGNOSTIC CAN message indicates float is not reached (Fault code = 0x25)	N/A	Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4523	Front remote no.2 – manually operated	MID EHR2_DIAGNOSTIC CAN message indicates valve is set for manual operation (Fault code = 0x26)	N/A	EHR valve. EHR lever. calibration. **Control module - Configure (A.50.A)**
4524	Front remote no.2 – driver faulty	MID EHR2_DIAGNOSTIC CAN message indicates driver is faulty (Fault code = 0x42)	N/A	Driveline oil temperature. Driveline oil contamination. Hydraulic pressures. EHR valve. **Control module - Configure (A.50.A)**
4525	Front remote no.2 – potentiometer faulty	MID EHR2_DIAGNOSTIC CAN message indicates pot is faulty (Fault code = 0x43)	N/A	Driveline oil temperature. EHR valve. **Control module - Configure (A.50.A)**
4526	Front remote no.2 – unable to reach neutral	MID EHR2_DIAGNOSTIC CAN message indicates unable to reach neutral (Fault code = 0x81)	N/A	Driveline oil temperature. Driveline oil contamination. . EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4527	Front remote no.2 – spool not in neutral at key on	MID EHR2_DIAGNOSTIC CAN message indicates spool is not neutral at key on (Fault code = 0x82)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, **Control module - Configure (A.50.A)**

Code	Description	Cause	Controller Pin	Information
4528	Front remote no.3 – no control message received	MID EHR3_DIAGNOSTIC CAN message indicates no control messages (Fault code = 0x11)	N/A	EHR valve and connector **X699**, inline harness and connector **X304**
4529	Front remote no.3 – control message not plausible	MID EHR3_DIAGNOSTIC CAN message indicates control message is corrupted (Fault code = 0x13)	N/A	CAN BUS wires (R) and (U).. EHR valve and connector **X699**, inline harness and connector **X304**. EHR valve. **Control module - Configure (A.50.A)**
4530	Front remote no.3 – EEPROM error	MID EHR3_DIAGNOSTIC CAN message indicates valve EEPROM is corrupted (Fault code = 0x16)	N/A	Driveline oil temperature. EHR valve **Control module - Configure (A.50.A)**
4531	Front remote no.3 – switched to failsafe	MID EHR3_DIAGNOSTIC CAN message indicates valve is set to fail safe because a setpoint is required (Fault code = 0x17)	N/A	EHR valve. error code 4531. **Control module - Configure (A.50.A)**
4532	Front remote no.3 – under voltage	MID EHR3_DIAGNOSTIC CAN message indicates under voltage (Fault code = 0x21)	N/A	EHR valve and connector **X699**, inline harness and connector **X304**. EHR valve. **Control module - Configure (A.50.A)**
4533	Front remote no.3 – over voltage	MID EHR3_DIAGNOSTIC CAN message indicates over voltage (Fault code = 0x22)	N/A	External power supply connected. Charging system. EHR valve. **Control module - Configure (A.50.A)**
4534	Front remote no.3 – spool movement too low	MID EHR3_DIAGNOSTIC CAN message indicates spool movement is too low (Fault code = 0x23)	N/A	EHR valve.. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, **Control module - Configure (A.50.A)**
4535	Front remote no.3 – spool movement too high	MID EHR3_DIAGNOSTIC CAN message indicates spool movement is too high (Fault code = 0x24)	N/A	EHR valve.. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, **Control module - Configure (A.50.A)**
4536	Front remote no.3 – float position not reached	MID EHR3_DIAGNOSTIC CAN message indicates float is not reached (Fault code = 0x25)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, **Control module - Configure (A.50.A)**
4537	Front remote no.3 – manually operated	MID EHR3_DIAGNOSTIC CAN message indicates valve is set for manual operation (Fault code = 0x26)	N/A	EHR valve. EHR lever. calibration. **Control module - Configure (A.50.A)**

Code	Description	Cause	Controller Pin	Information
4538	Front remote no.3 – driver faulty	MID EHR3_DIAGNOSTIC CAN message indicates driver is faulty (Fault code = 0x42)	N/A	EHR valve. EHR lever. calibration. **Control module - Configure (A.50.A)**
4539	Front remote no.3 – potentiometer faulty	MID EHR3_DIAGNOSTIC CAN message indicates pot is faulty (Fault code = 0x43)	N/A	Driveline oil temperature. EHR valve **Control module - Configure (A.50.A)**
4540	Front remote no.3 – unable to reach neutral	MID EHR3_DIAGNOSTIC CAN message indicates unable to reach neutral (Fault code = 0x81)	N/A	Driveline oil temperature. Driveline oil contamination. . EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4541	Front remote no.3 – spool not in neutral at key on	MID EHR3_DIAGNOSTIC CAN message indicates spool is not neutral at key on (Fault code = 0x82)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, **Control module - Configure (A.50.A)**
4542	Front remote no.4 – no control message received	MID EHR4_DIAGNOSTIC CAN message indicates no control messages (Fault code = 0x11)	N/A	EHR valve and connector **X700**, inline harness and connector **X304**. **Control module - Configure (A.50.A)**
4543	Front remote no.4 – control message not plausible	MID EHR4_DIAGNOSTIC CAN message indicates control message is corrupted (Fault code = 0x13)	N/A	EHR valve and connector **X700**, inline harness and connector **X304**. **Control module - Configure (A.50.A)**
4544	Front remote no.4 – EEPROM error	MID EHR4_DIAGNOSTIC CAN message indicates valve EEPROM is corrupted (Fault code = 0x16)	N/A	Driveline oil temperature. EHR valve **Control module - Configure (A.50.A)**
4545	Front remote no.4 – switched to failsafe	MID EHR4_DIAGNOSTIC CAN message indicates valve is set to fail safe because a setpoint is required (Fault code = 0x17)	N/A	EHR valve. error code 4103. **Control module - Configure (A.50.A)**
4546	Front remote no.4 – under voltage	MID EHR4_DIAGNOSTIC CAN message indicates under voltage (Fault code = 0x21)	N/A	EHR valve and connector **X700**, inline harness and connector **X304**. **Control module - Configure (A.50.A)**
4547	Front remote no.4 – over voltage	MID EHR4_DIAGNOSTIC CAN message indicates over voltage (Fault code = 0x22)	N/A	External power supply connected. Charging system. EHR valve. **Control module - Configure (A.50.A)**

Code	Description	Cause	Controller Pin	Information
4548	Front remote no.4 – spool movement too low	MID EHR4_DIAGNOSTIC CAN message indicates spool movement is too low (Fault code = 0x23)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, **Control module - Configure (A.50.A)**
4549	Front remote no.4 – spool movement too high	MID EHR4_DIAGNOSTIC CAN message indicates spool movement is too high (Fault code = 0x24)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, **Control module - Configure (A.50.A)**
4550	Front remote no.4 – float position not reached	MID EHR4_DIAGNOSTIC CAN message indicates float is not reached (Fault code = 0x25)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, **Control module - Configure (A.50.A)**
4551	Front remote no.4 – manually operated	MID EHR4_DIAGNOSTIC CAN message indicates valve is set for manual operation (Fault code = 0x26)	N/A	EHR valve. EHR lever. calibration. **Control module - Configure (A.50.A)**
4552	Front remote no.4 – driver faulty	MID EHR4_DIAGNOSTIC CAN message indicates driver is faulty (Fault code = 0x42)	N/A	Driveline oil temperature. Driveline oil contamination. . EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4553	Front remote no.4 – potentiometer faulty	MID EHR4_DIAGNOSTIC CAN message indicates pot is faulty (Fault code = 0x43)	N/A	Driveline oil temperature. EHR valve. **Control module - Configure (A.50.A)**
4554	Front remote no.4 – unable to reach neutral	MID EHR4_DIAGNOSTIC CAN message indicates unable to reach neutral (Fault code = 0x81)	N/A	Driveline oil temperature. Driveline oil contamination. . EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Control module - Configure (A.50.A)**
4555	Front remote no.4 – spool not in neutral at key on	MID EHR4_DIAGNOSTIC CAN message indicates spool is not neutral at key on (Fault code = 0x82)	N/A	EHR valve. Hydraulic pressures. **Hydraulic pump - Pressure test (A.10.A)**, EHR valve. **Mid-mount remote control valve - No signal (A.10.C)**

Code	Description	Cause	Controller Pin	Information
4560	Front remote no.1 – no communications	MID EHR1_DIAGNOSTIC CAN message indicates no comms with the EHR (Fault code = 0xFF)	via CAN	EHR valve and connector **X697**, inline harness and connector **X304**. **Control module - Configure (A.50.A)**
4561	Front remote no.2 – no communications	MID EHR2_DIAGNOSTIC CAN message indicates no comms with the EHR (Fault code = 0xFF)	via CAN	EHR valve and connector **X698**, inline harness and connector **X304**. **Control module - Configure (A.50.A)**
4562	Front remote no.3 – no communications	MID EHR3_DIAGNOSTIC CAN message indicates no comms with the EHR (Fault code = 0xFF)	via CAN	EHR valve and connector **X698**, inline harness and connector **X304**. **Control module - Configure (A.50.A)**
4563	Front remote no.4 – no communications	MID EHR4_DIAGNOSTIC CAN message indicates no comms with the EHR (Fault code = 0xFF)	via CAN	EHR valve and connector **X700**, **X304 Control module - Configure (A.50.A)**
4565	High flow pump connection error	"High flow pump links indicate pump is not present (one of pins > 3.5 V) while the High Flow pump option is selected (H3 option, RT, Front EHR, Channel 5) and tractor is LWB. Delay = 1 sec."	CN4/21, CN4/24	High flow pump and connector **X661**, inline harness and connector **X020**, controller and connector **X097**. Pump earth connection.
4566	High flow pump configuration error	Link indicates pump is present (pin < 0.5 V) yet the High Flow pump option is not selected (H3 option, RT, Front EHR, Channel 5) and tractor is LWB. Delay = 1 sec.	CN4/24	High flow pump option not set. On H3 menu set **Control module - Configure (A.50.A)**

Rear PTO – Error Codes

Code	Description	Cause	Controller Pin	Information
5003	Rear PTO brake output – open circuit	No amps are sensed when the solenoid is activated	CN3B/8	PTO brake solenoid and connector **X277**, inline harness and connector **X022**, controller and connector **X095**.
5005	Rear PTO brake switch – open circuit	Switch found to be activated (i.e. pin open circuit or < 0.5V) when not expected - within 0.5 - 3 secs from switch-on or when PTO clutch is engaged.	CN3B/24	Rear PTO brake switch and connector **X067**, rear PTO lever mounted brake switch and connector (if equipped) **X059A**, lever mounted PTO mating half (if equipped) **X059B**, controller and connector **X095**
5007	Rear PTO solenoid – stuck off	No amps are sensed when the solenoid is activated.(Using the status signal from the driver)	CN3B/14	PTO solenoid and connector **X278**, controller and connector **X095**
5008	Rear PTO solenoid – open circuit	No amps (< 56 mA) are sensed when the solenoid is activated.(Using Cursen)	CN3B/14, CN3B/18	PTO solenoid and connector **X278**, inline harness and connector **X022**, controller and connector **X095**
5010	Rear PTO shift motor – open circuit	No amps (< 0.32A) are sensed while the PTO actuator motor is driven	No Data	PTO shift motor and connector **X781**, PTO shift position sensor and connector **X780**, PTO drive A relay and connector **X782**, PTO drive B relay **X783**, inline harness and connector **X748**, controller and connectors **X091** and **X097**
5011	Rear PTO shift motor – short circuit	Amps (>1.6A) are sensed while the PTO actuator motor is not driven	No Data	PTO shift motor and connector **X781**, PTO shift position sensor and connector **X780**, PTO drive A relay and connector **X782**, PTO drive B relay **X783**, inline harness and connector **X748**, controller and connectors **X091** and **X097**

Code	Description	Cause	Controller Pin	Information
5012	Rear PTO shift sensor error	PTO switch position sensor pot is not indicating required movement	No Data	PTO shift motor and connector **X781**, PTO shift position sensor and connector **X780**, PTO drive A relay and connector **X782**, PTO drive B relay **X783**, inline harness and connector **X748**, controller and connectors **X091** and **X097**
5013	Rear PTO shift switch – open circuit	None of the 3 poles are closed	No Data	PTO speed selector switch and connector **X784**, inline harness and connector **X748**, controller and connectors **X094** and **X097**
5014	Rear PTO shift switch – short circuit	2 of the 3 poles are closed simultaneously	No Data	PTO speed selector switch and connector **X784**, inline harness and connector **X748**, controller and connectors **X094** and **X097**
5027	Rear PTO speed sensor – open circuit	Pin open circuit or > 4.25V	CN2/20	Speed sensor and connector **X251**, inline harness and connector **X022**, controller and connector **X091**
5033	Rear PTO cab normally closed switch – open circuit	Both change over poles are closed	CN3A/12, CN3A/13	Armrest controller and connector **X776**, controller and connector **X094**, H10 - Rear PTO. H13 - Integrated control panel (ICP)
5034	Rear PTO fender switch – open circuit / short to ground	Both change over poles are open, Or Fender switch is stuck, i.e. fails to release after 10 secs.	CN3A/3, CN3A/18	Fender mounted rear PTO switch connectors **X406**, inline harness and connectors **X110**, and **X127**, controller and connector **X094**
5035	Rear PTO fender switch – input shorted to 12V	Both change over poles are closed, Or Fender switch is stuck, i.e. fails to release after 10 secs.	CN3A/3, CN3A/18	Fender mounted rear PTO switch connectors **X406**, controller and connector **X094**
5037	Rear PTO cab normally open switch – stuck closed	Both change over poles are open	CN3A/12, CN3A/13"	Armrest controller connector **X776**, controller and connector **X094**, H10 Rear PTO

Code	Description	Cause	Controller Pin	Information
5042	Rear PTO management switch – stuck closed	Both momentary action positions appear to be active simultaneously. i.e. both pins open circuit or < 0.5V (PTO management option selected, no delay)	via CAN	H13 - Integrated control panel (ICP). Armrest controller configuration and connectors. Codes 18000. H4 - EDC panel.
5043	Rear PTO fender switch stuck on	"PTO is off - Press fender switch PTO comes on keep fender switch pressed for 12 secs PTO will stop and PTO warning lamp will be lit Keep fender switch pressed for a further 10 secs Error is raised"	CN3A/3, CN3A/18	Fender mounted rear PTO switch connectors **X406**, inline harness and connectors **X110**, and **X127**, controller and connector **X094**
5044	Rear PTO speed sensor – short to ground	Pin short circuit to ground or < 0.15V	CN2/20	Speed sensor and connector **X251**, inline harness and connector **X022**, controller and connector **X091**
5098	Rear PTO fender switch option not enabled	Rear PTO fender switches option is set "No" by H3 Menu, PTO, Channel 2. When PTO is engaged (via cab switch) a fender switch press is detected.	N/A	Using H3 Channel 2 set the rear PTO fender option to 'Yes'. For additional information refer to **Control module - Configure (A.50.A)**

Four Wheel Drive – Error Codes

Code	Description	Cause	Controller Pin	Information
6023	FWD solenoid – open circuit	No amps are sensed when the solenoid is activated.(Using the status signal from the driver)	CN3B/17	4WD solenoid and connector **X279**, controller and connector **X095**, inline harness and connector **X022**

Difflock – Error Codes

Code	Description	Cause	Controller Pin	Information
7017	Difflock solenoid – open circuit	No amps are sensed when the solenoid is activated.(Using the status signal from the driver)	CN3B/9	Differential lock solenoid and connector **X276**, controller connector **X095**, inline harness and connector **X022**
7024	Steering angle sensor not calibrated	Steering angle sensor is not calibrated	N/A	Clear the non-volatile memory (EEPROM). Recalibrate the steering angle sensor, **FRONT AXLE - Calibrate (D.10.A)**.
7032	Steering angle sensor – signal too low	Value of steering angle sensor potentiometer as conveyed by CAN message RxMsg_PropAdic1 is < 300 (0.37 V).	CN3/22 on ICU3	Ssteering angle sensor and connector **X235**, controller and connectors **X005** and **X009**. Steering angle sensor calibration **FRONT AXLE - Calibrate (D.10.A)**

Front PTO – Error Codes

Code	Description	Cause	Controller Pin	Information
8007	Front PTO solenoid – stuck on	Current (> 0.42 A) is sensed when the solenoid off. (Using the current sense)	CN1A/13, CN2/7	Front PTO solenoid and connector **X393**, controller and connectors **X098** and **X099**, inline harness connectors **X024**, **X227** and **X817**
8008	Front PTO solenoid – open circuit	No current (< 56 mA) is sensed when the solenoid is activated. (Using the current sense)	CN1A/13, CN2/7	Front PTO solenoid and connector **X393**, controller and connectors **X098** and **X099**, inline harness connectors **X024**, **X227** and **X817**
8033	Front PTO cab normally closed switch – open circuit	Both change over poles are closed (Not checked < 3 secs since key on or engine stationary)	CN1B/11, CN1B/12	Armrest controller and connector **X776**, controller and connector **X100**, H11 Front PTO. H4 EDC panel.
8037	Front PTO cab normally open switch – stuck closed	Both change over poles are open (Not checked < 3 secs since key on or engine stationary)	CN1B/11, CN1B/12	Armrest controller and connector **X776**, controller and connector **X100**, H11 Front PTO. H4 EDC panel.
8099	Front PTO option not enabled	Front PTO Cab Switch found to be present (according to Icp2XcmFast message) while the Front PTO management option is not selected (H3-RM-Front PTO-Channel 2).	N/A	On H3 Channel 2 set the front PTO management option to 'Yes'. **Control module - Configure (A.50.A)**.

Front Hitch – Error Codes

Code	Description	Cause	Controller Pin	Information
9001	Front hitch position sensor – short circuit to 12V	Front hitch position pot voltage too high (> 4.7 V) Only raised if Front hitch option is selected (H3-RM-Front Hitch-Channel 1)	CN1B/2	HPL potentiometer and connector **X395**, inline harness and connectors **X024**, **X227**, **X817**, controller and connector **X100**
9002	Front hitch position sensor – open circuit / short circuit to 0V	Front hitch position pot open circuit or voltage too low (< 0.2 V) Only raised if Front hitch option is selected (H3-RM-Front Hitch-Channel 1)	CN1B/2	HPL potentiometer and connector **X395**, inline harness and connectors **X024**, **X227**, **X817**, controller and connector **X100**
9003	Front hitch fender up switch error	Switch found to be activated (i.e. both pins closed or >3.0V) when not expected i.e. within 3 secs from switch-on. Also raised if common, up and down terminals are closed simultaneously or > 3.0V. Only raised if Front hitch option (H3-RK-Front Hitch-Channel 1) and the front hitch fender switches option (H3-RM-Front Hitch-Channel 2) is selected.	CN1B/22, CN1B/26	Front hitch fender mounted raise switch and connector **X394**, lower switch and connector **X392**, inline harness and connectors **X227**, **X024**, **X026**, **X817**, controller and connector **X100**
9004	Front hitch fender down switch error	Switch found to be activated (i.e. both pins closed or >3.0V) when not expected i.e. within 3 secs from switch-on. Also raised if common, up and down terminals are closed simultaneously or > 3.0V. Only raised if Front hitch option (H3-RK-Front Hitch-Channel 1) and the front hitch fender switches option (H3-RM-Front Hitch-Channel 2) is selected.	CN1B/22, CN1B/19	Front hitch fender mounted raise switch and connector **X394**, lower switch and connector **X392**, inline harness and connectors **X227**, **X024**, **X026**, **X817**, controller and connector **X100**
9005	Front hitch fender common switch error	Either all pins are found to be open or < 0.5 v within 3 secs from switch-on. Or Common found to be open (< 0.5 V) while either up or down is closed (>3.0). Only raised if Front hitch option (H3-RM-Front Hitch-Channel 1) and the front hitch fender switches option (H3-RM-Front Hitch-Channel 2) is selected.	CN1B/22, CN1B/26, CN1B/19	Front hitch fender mounted raise switch and connector **X394**, lower switch and connector **X392**, inline harness and connectors **X227**, **X024**, **X026**, **X817**, controller and connector **X100**
9006	Front hitch position potentiometer – not calibrated	Front hitch potentiometer is not calibrated. Only raised if Front hitch option is selected (H3-RM-Front Hitch-Channel 1) To test: Clear the calibration settings for front hitch using H8 menu. Key on.	CN1B/2	Clear the non-volatile memory (EEPROM) using H8. Recalibrate the front hitch position potentiometer **HITCH Front hitch - Calibrate (H.10.B)**

Suspended Front Axle – Error Codes

Code	Description	Cause	Controller Pin	Information
10001	Upper lockout solenoid error	No current (< 0.14A) is sensed when the solenoid is on.	CN1A/6, CN2/6	Upper lockout solenoid and connector **X507**, front suspension connector **X259**, inline harness and connector **X020**, controller andconnectors **X098**, **X099**
10002	Raise solenoid error	No amps are sensed when the solenoid is activated.(Using the status signal from the driver)	CN1A/11	Raise solenoid and connector **X505**, front suspension connector **X259**, iinline harness and connector **X020**, controller and connectors **X098**, **X099**
10003	Lower solenoid error	No amps are sensed when the solenoid is activated.(Using the status signal from the driver)	CN1A/10	Lower solenoid and connector **X506**, front suspension connector **X259**, inline harness and connector **X020**, controller and connectors **X098**, **X099**
10004	Front axle position sensor – threshold higher than set limit	Axle position pot voltage too high (> 4.7 V).	CN1B/6	Front axle potentiometer and connector **X234**, inline harness and connector **X024**, controller and connector **X100**. Auto calibration procedure (ACP) **Control valve - Calibrate (D.40.C)**
10005	Front axle position sensor – threshold lower than set limit	Axle position pot voltage too low (< 0.73 V).	CN1B/6	Front axle potentiometer and connector **X234**, inline harness and connector **X024**, controller and connector **X100**. Auto calibration procedure (ACP) **Control valve - Calibrate (D.40.C)**
10008	Go down error – suspension unable to return to set point	"The axle position pot indicates an unacceptably low level for 5 mins in spite of attempts to recover the situation with the raise solenoid. Test is performed if wheel speed > 1 kph and mode is control or standy."	N/A	Potentiometer linkage length is 97mm and not damaged. Auto calibration procedure (ACP) **Control valve - Calibrate (D.40.C)**

Code	Description	Cause	Controller Pin	Information
10009	Lower lockout solenoid error	No current (< 0.14A) is sensed when the solenoid is on.	CN1A/7, CN2/3	Lower lockout solenoid and connector **X508**, front suspension connector **X259** and the inline harness connector **X020**, controller and connectors **X098**, **X099**
10010	Chassis accelerometer – voltage too low (short circuit to ground / open circuit)	Pin voltage > 4.8V	CN1B/5	Accelerometer and connector **X248**, inline connector **X024**, controller and connector **X100**
10011	Chassis accelerometer – voltage too high (short circuit to 5V)	Pin voltage < 0.2V	CN1B/5	Accelerometer and connector **X248**, inline connector **X024**, controller and connector **X100**
10024	Front suspension not calibrated	Front suspension is not calibrated. To test: Clear the calibration settings for front suspension using H8 menu. Key on.	N/A	Auto calibration procedure (ACP). **Control valve - Calibrate (D.40.C)**

Electronic Park Lock – Error Codes

Code	Description	Cause	Controller Pin	Information
12011	Power stage – over voltage protection	Overvoltage protection	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12012	Power stage – PH_A open circuit or PH_B open circuit, motor open	PH_A open circuit or PH_B open circuit Motor open	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12013	Power stage – PH_A or PH_B short circuit to ground	PH_A or PH_B short to gnd	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12014	Power stage – PH_A or PH_B short circuit to Vbatt	PH_A or PH_B short to Vbatt	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12017	Power stage – internal service voltage (Vr)not viable	Internal Service Voltage (Vr) not available	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12018	Power stage – current over absolute range / motor short	Current over absolute range	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12019	Power stage – current over dynamic set point	Current over dynamic set point	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**

Code	Description	Cause	Controller Pin	Information
12020	Power stage – unexpected current	Unexpected current	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12024	Ignition key – key hardware Vs CAN signals coherence check	KEY hardware vs CAN signals coherence check	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12032	Encoder – hardware fault on power supply	Hardware fault on power supply	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12033	Encoder virtual peripheral failure (XGATE) wrong sequence, interrupt failure	Encoder virtual peripheral failure (XGATE) wrong sequence interrupt failure	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12034	Encoder function not available (A or B signal not available)	Encoder function not available (A or B signal not available)	No Data	Shuttle switch connector **X012** Electronic park brake relay **X036** Handbrake switch connector **X121** Electronic park brake connector **X745**
12043	Inclinometer – self test	Self test	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12052	Battery – lower than 9V	Battery_Read lower than 10 V	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**

Code	Description	Cause	Controller Pin	Information
12053	Battery – Higher than 16V	Battery_Read higher than 16 V	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12054	Battery – out of range / spike diagnosis	Battery_Read out of range/spike diagnosis	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12066	Trailer relay – open wire / load and output to 12V	Open wire/load	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12068	Trailer relay – output short circuit to ground	Output short to Ground	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12073	Output status – output incongruence Vs Input	Output incongruence vs Input	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12132	CAN – bus off	Bus OFF	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12133	CAN – mute	Mute	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**

Code	Description	Cause	Controller Pin	Information
12142	CAN – VCU_TRAIL_BRAKE-INH error / not available	VCU_TRAIL_BRAKE_INH integrity check triggered	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12143	CAN – VCU_VEH_DI-RECTION error / not available	VCU_VEH_DIRECTION integrity check triggered	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12144	CAN – VCU_SPEED error / not available	VEH_SPEED error/not available	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12145	CAN – VCU_CMD error / not available	VCU_CMD integrity check triggered	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12146	CAN – VCU_KEY_OFF_AA_INH error / not available	VCU_KEY_OFF_AA_INH integrity check triggered	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12147	CAN – engine RPM error / not available	ENGINE_RPM error/not available	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12148	CAN – VCU_KEY error / not available	VCU_KEY integrity check triggered	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**

Code	Description	Cause	Controller Pin	Information
12150	CAN – VCU_HB_SWITCH error / not available	VCU_HB_SWITCH integrity check triggered	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12151	Logic core – second microprocessor not present	Second microprocessor not present	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12160	Logic core – EEPROM check	EEPROM check	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12162	ACU temperature – out of range / spike diagnosis	Out of range/spike	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12163	ACU temperature – power stage over temperature	Power stage Overtemperature	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12172	Actuator – cable disconnection	Cable disconnection	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12183	Actuator – actuator moving without command	Actuator moving without command	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**

Code	Description	Cause	Controller Pin	Information
12184	Actuator – actuator end stop zone reached	Applied Endstop zone reached (Triggered in Release)	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12185	Actuator – actuation timeout (energy) expired	Actuation timeout (Energy) expired	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12188	Actuator – excess pad wear	Excessive pad wear	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12192	Shuttle park – shuttle park invalid status	Shuttle park invalid status	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12202	Handbrake switch – handbrake switch incongruence	Hand Brake Switch congruence	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12212	Factory – accelerometer not calibrated	Accelerometer not calibrated	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12213	Factory – actuator not initialised	Actuator not initialized	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**

Code	Description	Cause	Controller Pin	Information
12214	Factory – disable actuation	Disable actuation	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**
12215	Factory – trailer relay present but not configured	Trailer Relay present but not configured	No Data	Shuttle switch connector **X012**, electronic park brake relay **X036**, park brake switch connector **X121**, electronic park brake connector **X745**

Cluster – Error Codes

Code	Description	Cause	Controller Pin	Information
14013	Steering angle sensor – short circuit to Vcc	Steering sensor analog input at max limit Delay = 2 secs.	CN3/22	Steering sensor and connector **X235**, instrument cluster and connector **X009**
14014	Steering angle sensor – short circuit to ground or open circuit	Steering sensor input is low (<0.25V), auto_guidance is off according to PropAdicRc message. (10 seconds has lapsed from power-up/ cranking). Delay = 2 secs.	CN3/22	Steering sensor and connector **X235**, instrument cluster and connector **X009**
14015	5V supply voltage – too high	Internally generated 5V ref pin > 6.0V (i.e. voltage reference failed or pin is being pulled up) Delay = 1 secs.	N/A	Controller and connector **X005**
14016	5V supply voltage – too low	Internally generated 5V ref pin < 4.0V (i.e. voltage reference failed or pin is being pulled down) Delay = 1 secs.	N/A	Controller and connector **X005**
14021	Cranking line – shorted to 12V	Crank line is high for > 1 min.	CN1/16	Instrument cluster and connector **X005**, starter crank relay **X035**
14022	Cranking line – shorted to ground	Engine has started without the crank line ever going high.	CN1/16	Instrument cluster and connector **X005** Starter crank relay **X035**
14051	Fuel level sensor – short circuit to Vcc or open circuit	Fuel sensor input is high (>3.28 V) Delay = 1 secs.	CN3/14	Fuel tank level sender and connector **X265**, instrument cluster and connectors **X009**, **X005**, inline harness and connector **X020**
14052	Fuel level sensor – short circuit to ground	Fuel sensor input is low (<0.14 V) Delay = 1 secs.	CN3/14	Fuel tank level sender and connector **X265**, instrument cluster and connectors **X009**, **X005**, inline harness and connector **X020**
14061	Air brake pressure sensor – short circuit to VCC or option set but sensor not connected	Airbrake sensor input is high (> 4.5V) (Airbrake present EEPROM option is enabled.) Delay = 1 secs.	CN3/15	Airbrake pressure connector **X430**, instrument cluster and connectors **X005**, **X009**, inline harness and connectors **X020**, **X254** and **X255**
14100	Air brake pressure – not configured	A plausible airbrake sensor (0.15V < Signal < 4.5V) is present yet the EEPROM option is disabled.	N/A	**Control module - Configure (A.50.A)**
14102	SWCD – present but not configured	A SwcdAddrClaim message with the correct 8 byte name field for the VT(SWCD) controller has been received while the eeprom incicates that a VT(SWCD) controller should not be present.	N/A	AFS 200 option to 'Yes'. Refer to **Control module - Configure (A.50.A)**

Code	Description	Cause	Controller Pin	Information
14104	EFH – present but not configured	No Data	No Data	Set the electronic front hitch option to 'Yes'. Refer to **Control module - Configure (A.50.A)**.
14105	Electronic park lock – not configured	No Data	N/A	Using the H3 options menu, set the EPL option to '0001'. **Control module - Configure (A.50.A)**
14106	Steering sensor – present but not configured	A plausible steering sensor (0.25 < Signal < 4.98) is present yet the EEPROM option is disabled.	N/A	Using the H3 options menu, set the steering sensor option to 'YES'. **Control module - Configure (A.50.A)**
14300	Electronic park lock– mismatch between CAN and direct frequency input value	No Data	N/A	No Data
14301	Electronic park lock– direct frequency input shorted to Vcc or open circuit	No Data	N/A	No Data
14304	Electronic park lock– status not validated	No Data	N/A	No Data
14900	Transmission controller missing (RT)	A SwcdAddrClaim message with the correct 8 byte name field for the RT controller has not been received while the eeprom indicates that a RT controller should be present.	via CAN	Instrument cluster connector **X009**, transmission controller connector **X092**, diagnostic connector **X030**
14901	Engine controller missing (EDC16)	A SwcdAddrClaim message with the correct 8 byte name field for the engine controller has not been received while the eeprom incicates that the engine controller should be present.	via CAN	Instrument cluster connector **X009**, engine controller and connector **X218**, diagnostic connector **X030**
14902	Auxiliary controller missing (RM)	"ICU: A SwcdAddrClaim message with the correct 8 byte name field for the RM controller has not been received while the eeprom indicates that a RM controller should be present. ADIC: Network configuration is inclomplete and neither RA nor a RB XCM has been detected."	via CAN	Instrument cluster connector **X009**, controller connector **X099**, diagnostic connector **X030**
14904	Armrest controller missing (LC)	A SwcdAddrClaim message with the correct 8 byte name field for the LB controller has not been received while the eeprom incicates that a LB controller should be present.	via CAN	Instrument cluster connector **X009**, ARU connector **X776**, diagnostic connector **X030**
14905	Keypad missing (JA)(ADIC only)	A SwcdAddrClaim message with the correct 8 byte name field for the JA controller has not been received while the eeprom incicates that a JA controller should be present.	via CAN	Instrument cluster connector **X009**, keypad connector **X008**, diagnostic connector **X030**

Code	Description	Cause	Controller Pin	Information
14906	Steering controller missing (KA)	A SwcdAddrClaim message with the correct 8 byte name field for the KA controller has not been received while the eeprom incicates that a KA controller should be present.	via CAN	Instrument cluster connector **X009**, steering controller connector **X621**, diagnostic connector **X030**
14908	TECU missing (OA)	A SwcdAddrClaim message with the correct 8 byte name field for the OA controller has not been received while the eeprom incicates that a OA controller should be present.	via CAN	Instrument cluster connector **X009**, TECU controller connector **X616**, diagnostic connector **X030**
14909	SWCD missing (VA)	A SwcdAddrClaim message with the correct 8 byte name field for the VT controller has not been received while the eeprom incicates that a VT controller should be present.	via CAN	TECU connector **X616**, AFS 200 connector **X485**, diagnostic connector **X030**
14910	Climate controller missing	A SwcdAddrClaim message with the correct 8 byte name field for the TA controller has not been received while the eeprom incicates that a TA controller should be present.	via CAN	Instrument cluster connector **X009**, climate controller connector **X755**, diagnostic connector **X030**
14914	Electronic park lock controller missing	No Data	No Data	Instrument cluster connector **X009**, EPL controller connector **X745**, diagnostic connector **X030**
14920	Configuration error (ADIC only)	Network configuration is incomplete and neither XCM has been detected.	N/A	**Control module - Configure (A.50.A)**

Steering Controller – Error Codes

Code	Description	Cause	Controller Pin	Information
15002	Steering wheel control proximity sensor – open circuit	Steering proximity sensor input is < 3% of FSD.	CN1/B4	Proximity sensor and connector **X625**, controller and connector **X621**
15003	Steering wheel control proximity sensor – short circuit	Raw steering proximity sensor input is > 4.9 V.	CN1/B4	Proximity sensor and connector **X625**, controller and connector **X621**
15006	Split valve LVDT – open circuit	DC value of either LVDT secondary input < 0.5V	CN1/B5, CN1/B6	LVDT sensor and connector **X626**, controller and connector **X621**
15007	Split valve LVDT – short circuit	Never raised (search for SPLIT_SENS_CC)	NA	LVDT sensor and connector **X626**, controller and connector **X621**
15008	Change valve solenoid – open circuit	Current sense indicates no current is being drawn while the solenoid is activated.	CN1/A2	Change valve solenoid and connector **X627**, controller and connector **X621**
15009	Change valve solenoid – short circuit across	Current sense indicates excessive current is being drawn while the solenoid is activated.	CN1/A2, CN1/A6	Change valve solenoid **X627**, controller and connector **X621**
15010	Safety switch fail	Enable switch is detected closed (Enable pin > 3.5V) but safety switch is detected closed (Safety pin < 0.5 V)	Enable: CN1/A1 Safety: CN1/C4	Connector **X624**, controller and connector **X621**
15011	Maximum engagement time elapsed (5 minutes)	Fast steer has been active for > 5 mins.	NA	Operator error Clear error code and test system for normal operation
15012	Split valve spool – stuck open	Split valve sensed as being open while the solenoid is not activated.	CN1/B5 , CN1/C3	Mechanical Fault in Split Valve assembly, harness or LVDT sensor.
15013	Change valve or split valve spools – stuck closed	Split valve sensed as being closed while the solenoid is activated.	NA	Fault in Split Valve assembly
15014	Split valve spool stuck in transition zone – can't identify which steering mode the tractor is definitely in.	Split valve sensed as being in the dead zone at start-up or while the solenoid is activated.	CN1/B5, CN1/B6	Fault in Split Valve assembly, harness or LVDT sensor. Check harness to the valve and at connector **X627**.
15024	System not calibrated	Either the steering proximity switch or the LVDT split valve position sensor is not calibrated	N/A	Perform calibration procedure **Fast steer system - Calibrate (D.20.C)**

Air Conditioning Controller – Error Codes

Code	Description	Cause	Controller Pin	Information
16111	Cab temperature sensor open or shorted to power	Wire harness/connector failure Temperature sensor failure ATC module failure	Data from error codes on pins is Connector X755 Pins are 21 and 18. Connector X754 Pins 7 - 8	Connectors **X755** and **X754**. **Sensing system Temperature sensor - Replace (Cab temperature) (E.40.D) Electronic HVAC control - Replace (E.40.D)**.
16112	Cab temperature sensor shorted to ground	Wire harness/connector failure Temperature sensor failure ATC module failure	Data from error codes on pins are Connector X755 Pins are 21 and 18. Connector X754 Pins 7 - 8	Connectors **X755** and **X754**. **Sensing system Temperature sensor - Replace (Cab temperature) (E.40.D) Electronic HVAC control - Replace (E.40.D)**.
16113	Outlet temperature sensor open or shorted to power	Wire harness/connector failure Temperature sensor failure ATC module failure	Data from error codes on pins is Connector X755 Pins are 21 and 18. Connector X753 Pins A - Pin D	Connectors **X755** and **X753**. **Sensing system Temperature sensor - Replace (Outlet temperature) (E.40.D) Electronic HVAC control - Replace (E.40.D)**
16114	Outlet temperature sensor shorted to ground	Wire harness/connector failure Temperature sensor failure ATC module failure	Data from error codes on pins is Connector X755 Pins are 21 and 18. Connector X753 Pins A - Pin D	Connectors **X755** and **X753**. **Sensing system Temperature sensor - Replace (Outlet temperature) (E.40.D) Electronic HVAC control - Replace (E.40.D)**
16115	Evaporator temperature sensor open or shorted to power	Wire harness/connector failure Temperature sensor failure ATC module failure	Data from error codes on pins is Connector X755 Pins are 23 and 18. Connector X753 Pins B- Pin D	Connectors **X755** and **X753**. **Sensing system Evaporator temperature sensor - Replace (E.40.D) Electronic HVAC control - Replace (E.40.D)**
16116	Evaporator temperature sensor shorted to ground	Wire harness/connector failure Temperature sensor failure ATC module failure	Data from error codes on pins is Connector X755 Pin 23. Connector X753 Pins B- Pin D	Connectors **X755** and **X753**. **Sensing system Evaporator temperature sensor - Replace (E.40.D) Electronic HVAC control - Replace (E.40.D)**
16117	Outside air temperature sensor open or shorted to power	Wire harness/connector failure Temperature sensor failure ATC module failure	Data from error codes on pins is Connector X755 Pins 24 - 18. Connector X754 Pins 6 - 8	Connectors **X755** and **X754**. **Sensing system Temperature sensor - Replace (Outside temperature) (E.40.D) Electronic HVAC control - Replace (E.40.D)**

Code	Description	Cause	Controller Pin	Information
16118	Outside air temperature sensor shorted to ground	Wire harness/connector failure Temperature sensor failure ATC module failure	Data from error codes on pins is Connector X755 Pin 24. Connector X754 Pins 6 - 8	Connectors **X755** and **X754**. **Sensing system Temperature sensor - Replace (Outside temperature) (E.40.D) Electronic HVAC control - Replace (E.40.D)**
16120	Blower speed select potentiometer open or shorted to power	Wire harness/connector failure Blower speed selector failure ATC module failure NOTE: CCM platform uses a discrete switch for selecting blower speeds. An open or short to power condition on any leg of this switch will cause this error. All other platforms use a potentiometer for selecting blower speeds.	Data from error codes on pins is Connector X755 Pin 5. Connector X754 Pins 3 - 4	Connectors **X755** and the blower unit connector **X754**.
16121	Temperature select potentiometer open or shorted to power	Wire harness/connector failure Temperature pot failure ATC module failure	Data from error codes on pins is Connector X755 Pins 29 - 18. Connector X751 Pins A - B	Connectors **X755** and **X751**. **Electrical control Temperature control potentiometer - Replace (E.40.D) Electronic HVAC control - Replace (E.40.D)**
16122	Mode select potentiometer open or shorted to power	Wire harness/connector failure Mode pot failure ATC module failure	Data from error codes on pins is Connector X755 Pins 25 - 26. Connector X752 Pins 1 - 2 - 3	Connectors **X755** and the A/C mode select switch connector **X752**
16125	High pressure– low pressure switch (+) input shorted to power	Wire harness/connector failure - If system is properly charged then high pressure switch will be closed and the short could be on either leg of the switch. ATC module failure	Data from error codes on pins is Connector X755 Pin 33	Connectors **X755** and **X225** and **X695** and **X025**. **Sensing system - Replace (High pressure- low pressure switch) (E.40.D) Electronic HVAC control - Replace (E.40.D)**
16126	High pressure– low pressure switch (+) input shorted to ground	Wire harness/connector failure - If system is properly charged then high pressure switch will be closed and the short could be on either leg of the switch. ATC module failure	Data from error codes on pins is Connector X755 Pin 33. Connector X225 Pin A	Errors 16128 or 16126. Connectors **X755** and **X225** and **X695** and **X024**. **Sensing system - Replace (High pressure- low pressure switch) (E.40.D) Electronic HVAC control - Replace (E.40.D)**

Code	Description	Cause	Controller Pin	Information
16127	High pressure– low pressure switch (–) input shorted to power	Wire harness/connector failure - If system is properly charged then high pressure switch will be closed and the short could be on either leg of the switch. ATC module failure	Data from error codes on pins is Connector X755 Pin 34	Connectors **X755** and **X225** and **X695** and **X024 Sensing system - Replace (High pressure- low pressure switch) (E.40.D) Electronic HVAC control - Replace (E.40.D)**
16128	High pressure– low pressure switch (–) input shorted to ground	Wire harness/connector failure - If system is properly charged then high pressure switch will be closed and the short could be on either leg of the switch. ATC module failure	Data from error codes on pins is Connector X755 Pin 34. Connector X225 Pin B	Connectors **X755** and **X225** and **X695** and **X024**. **Sensing system - Replace (High pressure- low pressure switch) (E.40.D) Electronic HVAC control - Replace (E.40.D)**
16129	High pressure cycling error (2 in 1 minute)	"Incorrect charge in system Wire harness/connector failure - If system is properly charged then high pressure switch will be closed and the failure could be on either leg of the switch. High pressure switch failure ATC module failure "	Data from error codes on pins is Connector X755 Pins 33 and 34. Connector X225 Pins A and B	Check **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Troubleshooting (E.40.D)**. Connectors **X755** and **X225** and **X695** and **X024 Electronic HVAC control - Replace (E.40.D) Sensing system - Replace (High pressure- low pressure switch) (E.40.D)**
16130	Low pressure switch (+) input shorted to power	Wire harness/connector failure - If system is properly charged then low pressure switch will be closed and the short could be on either leg of the switch. ATC module failure	Data from error codes on pins is Connector X753 Pin 35	Connectors **X755** and **X753 Electronic HVAC control - Replace (E.40.D)**.
16131	Low pressure switch (+) input shorted to ground	Wire harness/connector failure - If system is properly charged then low pressure switch will be closed and the short could be on either leg of the switch. ATC module failure	NOTE Data from error codes on pins is Connector X755 Pin 35. Connector X753 Pin C	Connectors **X755** and **X753 Sensing system Low pressure switch - Replace (E.40.D) Electronic HVAC control - Replace (E.40.D)**.
16132	Low pressure switch (–) input shorted to power	Wire harness/connector failure - If system is properly charged then low pressure switch will be closed and the short could be on either leg of the switch. ATC module failure	NOTE Data from error codes on pins is Connector X755 Pin 36	Connectors **X755** and **X753 Electronic HVAC control - Replace (E.40.D)**.
16133	Low pressure switch (–) input shorted to ground	"Wire harness/connector failure - If system is properly charged then low pressure switch will be closed and the short could be on either leg of the switch. ATC module failure "	Data from error codes on pins is Connector X755 Pin 36. Connector X753 Pin G	Connectors **X755** and **X753 Sensing system Low pressure switch - Replace (E.40.D) Electronic HVAC control - Replace (E.40.D)**.

Code	Description	Cause	Controller Pin	Information
16134	Low pressure switch open for greater than 1 minute	Incorrect charge in system Wire harness/connector failure - If system is properly charged then low pressure switch will be closed and the failure could be on either leg of the switch. Low pressure switch failure ATC module failure	NOTE Data from error codes on pins is Connector X755 Pins 35 and 36 Connector X753 Pins C and G	Check **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Charging (E.40.D)**. Connectors **X755** and **X754 X753**. **Sensing system Low pressure switch - Replace (E.40.D) Electronic HVAC control - Replace (E.40.D)**.

Armrest – Error Codes

Code	Description	Cause	Controller Pin	Information
18001	Hand throttle number 1 – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H6 - Hand throttle H13 - Integrated control panel (ICP)
18002	Hand throttle number 1 – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H6 - Hand throttle H13 - Integrated control panel (ICP)
18003	Hand throttle number 2 – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H6 - Hand throttle H13 - Integrated control panel (ICP)
18004	Hand throttle number 2 – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H6 - Hand throttle H13 - Integrated control panel (ICP)
18007	Multi-function handle – switch error	N/A	N/A	Configuration Armrest Controller Connectors H1- Multi function handle H4 - EDC panel H13 - Integrated control panel (ICP)
18008	Multi-function handle – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H1- Multi function handle H4 - EDC panel H13 - Integrated control panel (ICP)
18009	Multi-function handle – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H1- Multi function handle - H4 - EDC panel H13 - Integrated control panel (ICP)
18010	Powershift throttle – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H1- Multi function handle H4 - EDC panel H13 - Integrated control panel (ICP)
18011	Powershift throttle – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H1- Multi function handle H4 - EDC panel H13 - Integrated control panel (ICP)

Code	Description	Cause	Controller Pin	Information
18012	Mode switch error	N/A	N/A	Configuration Armrest Controller Connectors H5 - CVT mode power / economy H4 - EDC panel H13 - Integrated control panel (ICP)
18013	Multi-function handle – encoder position error	N/A	N/A	Configuration Connectors H1- Multi function handle H4 - EDC panel H13 - Integrated control panel (ICP)
18014	Rear hitch position control potentiometer – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H1- Multi function handle H4 - EDC panel H13 - Integrated control panel (ICP)
18015	Rear hitch position control potentiometer – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP)
18016	Rear hitch draft control potentiometer – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP)
18017	Rear hitch draft control potentiometer – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP)
18018	Rear hitch height limit potentiometer – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP)
18019	Rear hitch height limit potentiometer – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP)
18020	Rear hitch drop rate potentiometer – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP)
18021	Rear hitch drop rate potentiometer – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP)
18022	Rear hitch sensitivity control potentiometer – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP)

Code	Description	Cause	Controller Pin	Information
18023	Rear hitch sensitivity control potentiometer – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP)
18024	EHR flow encoder position error	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP) H12 - EHR flow encoder
18025	Rear hitch slip control potentiometer – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP)
18026	Rear hitch slip control potentiometer – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP)
18027	EHR 5 lever position – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP) H15 - EHR 5 & 6
18028	EHR 5 lever position – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP) H15 - EHR 5 & 6
18029	EHR 6 lever position – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP) H15 - EHR 5 & 6
18030	EHR 6 lever position – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H13 - Integrated control panel (ICP) H15 - EHR 5 & 6
18031	Front hitch position / pressure control potentiometer – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H3 - Front EDC H13 - Integrated control panel (ICP)
18032	Front hitch position / pressure control potentiometer – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H3 - Front EDC H13 - Integrated control panel (ICP)

Code	Description	Cause	Controller Pin	Information
18033	Front hitch position / pressure mix potentiometer – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H3 - Front EDC H13 - Integrated control panel (ICP)
18034	Front hitch position / pressure mix potentiometer – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H3 - Front EDC H13 - Integrated control panel (ICP)
18035	Front hitch position height limit potentiometer – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H3 - Front EDC H13 - Integrated control panel (ICP)
18036	Front hitch position height limit potentiometer – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H3 - Front EDC H13 - Integrated control panel (ICP)
18037	Front hitch height limit enable switch error	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H3 - Front EDC H13 - Integrated control panel (ICP)
18038	Front hitch position drop rate potentiometer – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H3 - Front EDC H13 - Integrated control panel (ICP)
18039	Front hitch position drop rate potentiometer – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H3 - Front EDC H13 - Integrated control panel (ICP)
18040	EHR 1 lever position – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H8 - EHR 1 & 2 - H13 - Integrated control panel (ICP)
18041	EHR 1 lever position – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H8 - EHR 1 & 2 - H13 - Integrated control panel (ICP)
18042	EHR 2 lever position – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H8 - EHR 1 & 2 - H13 - Integrated control panel (ICP)

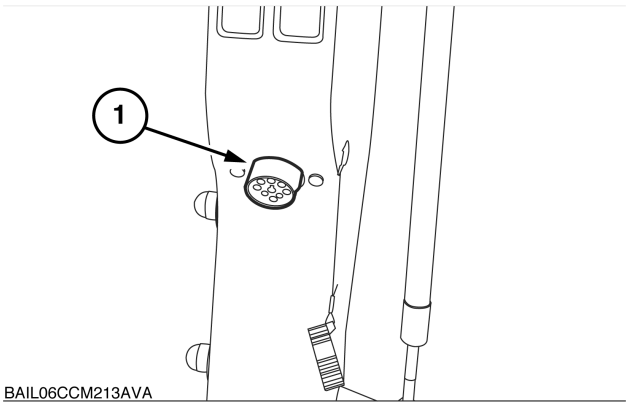
Code	Description	Cause	Controller Pin	Information
18043	EHR 2 lever position – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel H8 - EHR 1 & 2 - H13 - Integrated control panel (ICP)
18044	EHR 3 lever position – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel - H9 - EHR 3 & 4 - H13 - Integrated control panel (ICP)
18045	EHR 3 lever position – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4 - EDC panel - H9 - EHR 3 & 4 - H13 - Integrated control panel (ICP)
18046	EHR float control switch error	N/A	N/A	Configuration Armrest Controller Connectors H1- Multi function handle - H4 - EDC panel - H9 - EHR 3 & 4 - H13 - Integrated control panel (ICP)
18047	EHR 4 lever position – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H1- Multi function handle - H4 - EDC panel - H9 - EHR 3 & 4 - H13 - Integrated control panel (ICP)
18048	EHR 4 lever position – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H1- Multi function handle - H4 - EDC panel - H9 - EHR 3 & 4 - H13 - Integrated control panel (ICP)
18049	Joystick 1 X-axis position – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H7 - Joystick 1 - H13 - Integrated control panel (ICP)
18050	Joystick 1 X-axis position – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H7 - Joystick 1 - H13 - Integrated control panel (ICP)
18051	Joystick 1 Y-axis position – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H7 - Joystick 1 - H13 - Integrated control panel (ICP)

Code	Description	Cause	Controller Pin	Information
18052	Joystick 1 Y-axis position – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H7 - Joystick 1 - H13 - Integrated control panel (ICP)
18053	Joystick 1 proportional rocker switch – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H7 - Joystick 1 - H13 - Integrated control panel (ICP)
18054	Joystick 1 proportional rocker switch – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H7 - Joystick 1 - H13 - Integrated control panel (ICP)
18055	Joystick 2 X-axis position – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H14 - Joystick 2 - H13 - Integrated control panel (ICP)
18056	Joystick 2 X-axis position – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H14 - Joystick 2 - H13 - Integrated control panel (ICP)
18057	Joystick 2 Y-axis position – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H14 - Joystick 2 - H13 - Integrated control panel (ICP)
18058	Joystick 2 Y-axis position – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H14 - Joystick 2 - H13 - Integrated control panel (ICP)
18059	Joystick 2 proportional rocker switch – voltage too low	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H14 - Joystick 2 - H13 - Integrated control panel (ICP)
18060	Joystick 2 proportional rocker switch – voltage too high	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H14 - Joystick 2 - H13 - Integrated control panel (ICP)
18061	Reference voltage – short circuit to ground	N/A	N/A	Configuration Armrest Controller
18062	Reference voltage – short circuit to 12V	N/A	N/A	Configuration Armrest Controller
18063	EEEPROM error	N/A	N/A	Configuration Armrest Controller

Code	Description	Cause	Controller Pin	Information
18064	MFH communication error	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H1- Multi function handle - H13 - Integrated control panel (ICP)
18065	MFH basic assurance test error	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H1- Multi function handle - H13 - Integrated control panel (ICP)
18066	EHR 1 lever implausibility error	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H8 - EHR 1 & 2 - H13 - Integrated control panel (ICP)
18067	EHR 2 lever implausibility error	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H8 - EHR 1 & 2 - H13 - Integrated control panel (ICP)
18068	EHR 3 lever implausibility error	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H9 - EHR 3 & 4 - H13 - Integrated control panel (ICP)
18069	EHR 4 lever implausibility error	N/A	N/A	Configuration Armrest Controller Connectors H4- EDC panel -H9 - EHR 3 & 4 - H13 - Integrated control panel (ICP)

Diagnostic connector - Static description

A single diagnostic port, located on the rear right hand ’C’ pillar, is used to interrogate all of the controllers. With the aid of special service tool **380000843**, the port can be used to gain access to the on-board H-menu diagnostics, see **Control module - Static description (A.50.A)** for full details, or to connect in more specialised diagnostic equipment such as the E.S.T. (Electronic Service Tool), which provides greater diagnostic capability and software download facility.



BAIL06CCM213AVA 1

Control module - Static description

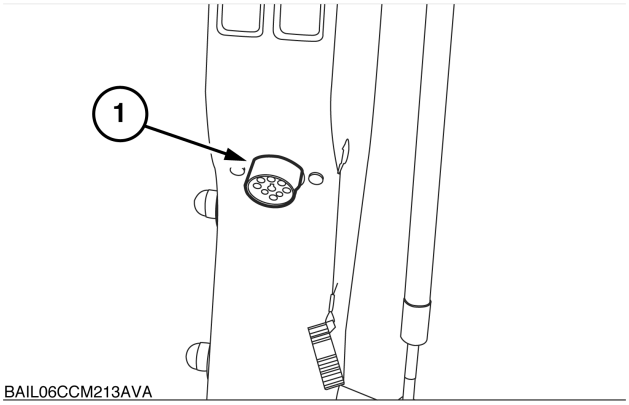
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Identifier	Control unit functions in the PUMA Standard
IA	Enhanced ICU2
IB	Basic version of the ICU2
RD	Full powershift transmission, EDC, rear PTO, four-wheel drive/differential lock, front EHRs, engine
RC	Front axle suspension, rear EHRs, front PTO, front hitch
KA	fast steer

Identifier	Control unit functions in the PUMA Multicontroller
IA	Enhanced ICU2
IB	Basic ICU2
RG	Full powershift transmission, EDC, rear PTO, four-wheel drive/differential lock, front EHRs, engine
RH	Front axle suspension, rear EHRs, front PTO, hitch
KA	Fast steer
LB	Multicontroller - Armrest

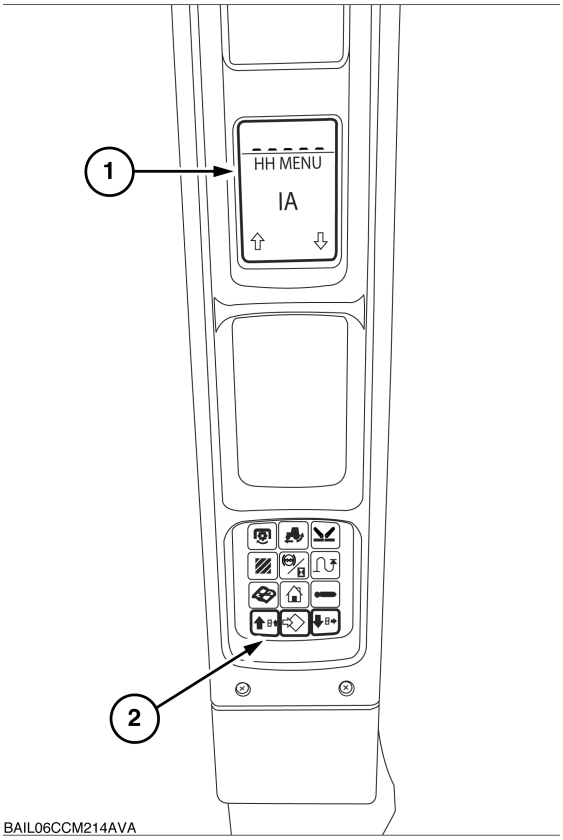
INTRODUCTION

The ’H’ Menu mode is part of the on-board diagnostics and supplies information on configuration and diagnostics for all system resources.
In order to be able to access the diagnostic routines of the ’H’ Menu mode, you must insert the diagnostics switch, special tool **380000843 (1)** into the tractor's diagnostics socket C278 on the rear right-hand pillar.



BAIL06CCM213AVA 1

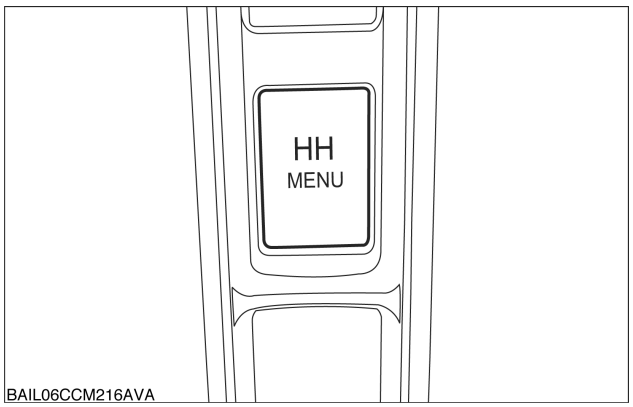
The dot matrix display (ICU2) of the instrument cluster **(1)** is integrated in the right-hand A-pillar and displays all information from the ’H’ Menus.
The navigation buttons for the ’H’ Menu **(2)** are located on the key pad.



BAIL06CCM214AVA 2

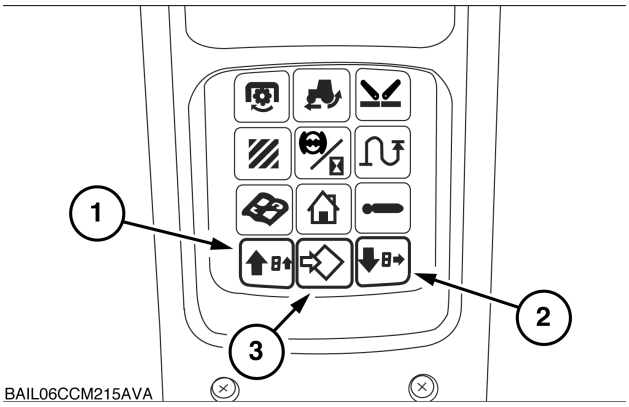
Navigation in the H Menu

Connect the special tool **380000843** to the diagnostics socket and turn the starter switch to ON.
At key ON, the ICU2 will automatically build a list of the controllers connected on the Controller Area Network (CAN), which is then stored in the Electronic Erasable Programmable Read Only Memory (EEPROM).
"HH MENU" on the dot matrix display indicates that the "H" Menu has been called up.



BAIL06CCM216AVA 3

The "Up" and "Down" navigation buttons (scrolling of the menu options) are used to scroll through the H Menu, as is the Menu button (selection of the desired control unit or H Menu).
(1) "Up" button
(2) "Down" button
(3) "Menu" button (Return/Esc)



BAIL06CCM215AVA 4

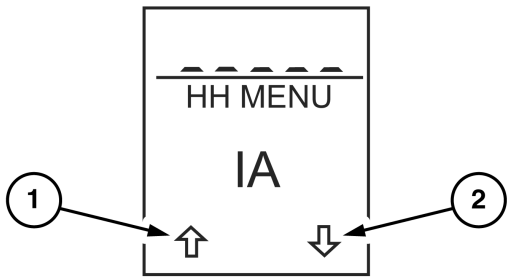
Table of control unit identifiers

Control units are identified with a two-letter code, for example IA - Enhanced ICU2.

Identifier	Control unit functions in the PUMA Standard
IA	Enhanced ICU2
IB	Basic ICU2
RD	Full powershift transmission, EDC, rear PTO, four-wheel drive/differential lock, front EHRs, engine
RC	Front axle suspension, rear EHRs, front PTO, front hitch
KA	Fast steer

Identifier	Control unit functions in the PUMA Multicontroller
IA	Enhanced ICU2
IB	Basic ICU2
RG	Full powershift transmission, EDC, rear PTO, four-wheel drive/differential lock, front EHRs, engine
RH	Front axle suspension, rear EHRs, front PTO, front hitch
KA	Fast steer
LB	Multicontroller - Armrest

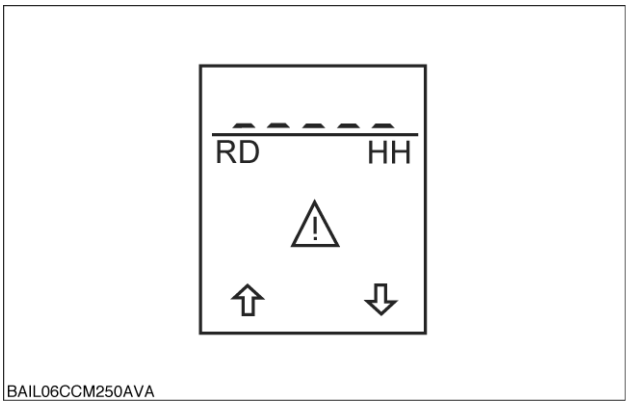
Select the control unit which requires diagnosis or configuration.
Press the "Menu" button to call up the first control unit identcode in the list.
The up arrow **(1)** and down arrow **(2)** indicate that other control units are present.
The "up" and "down" buttons are used to scroll through the control unit list.



BAIL06CCM218AVA

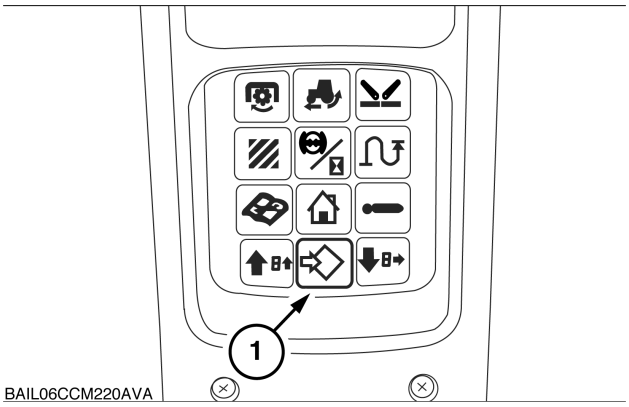
BAIL06CCM218AVA 5

If a certain control unit cannot be found on the CAN bus, a corresponding symbol indicates that there is no communication between the electronic instrument cluster ICU2 and the selected control unit.



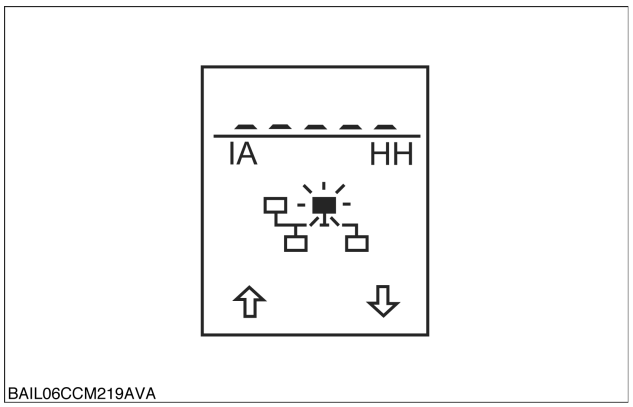
BAIL06CCM250AVA 6

If the desired control unit is in the list, you select it by pressing the Menu button **(1)**.



BAIL06CCM220AVA 7

The display changes and shows the HH selection menu.



BAIL06CCM219AVA 8

H Menu - General Functions

The H Menus include the following menu codes.

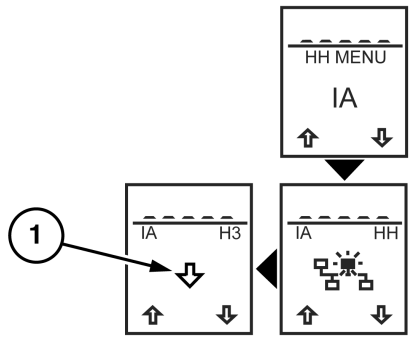
NOTE: *Please note that not all of the H Menus listed here are available for all control units.*

HH	Service menu
H1	Calibration procedures
H2	Display stored calibration values
H3	Configurations and options
H4	Display software version number
H5	Switch operation test
H6	Display vehicle information
H7	Vehicle test modes
H8	Clearing the EEPROM memory
H9	Voltmeter
HA	Demonstration mode
HB	Display stored fault codes
HC	Clear all stored fault codes
HD	Direct access to transmission set-ups (not available using the diagnostics switch)
HE	Display frequency inputs
HF	Display controller hardware information
HJ	EHR valve number programming

Symbols in the dot matrix display

1. Engine 
2. Transmission 
3. Differential lock 
4. EDC 
5. Front hitch 
6. PTO 
7. EHR valves 
8. Front axle suspension 
9. Four-wheel drive 
10. Steering assistance 

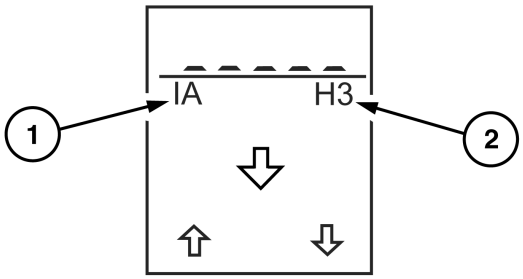
The Up arrow and Down arrow indicate that other "H" Menus are available.
The "Up" and "Down" buttons are used to scroll through the list of H Menus.
The Down arrow **(1)** indicates that the same menu is used by several sub-systems (multi-functional H Menu).
Press the Menu button to call up the desired H Menu.



BAIL06CCM221AVA

BAIL06CCM221AVA 9

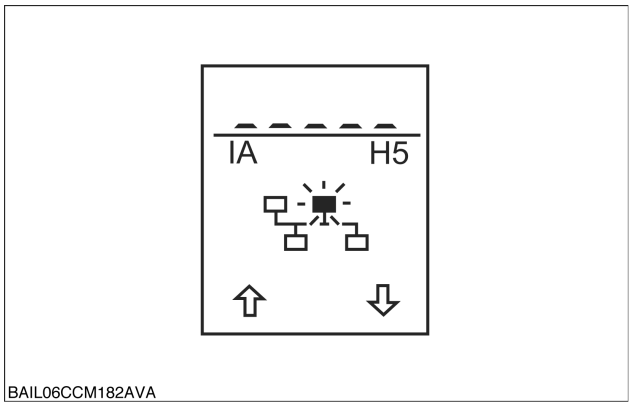
The selected control unit is displayed top left in the dot matrix display **(1)**.
The H Menu is displayed top right in the dot matrix display **(2)**.



BAIL06CCM222AVA

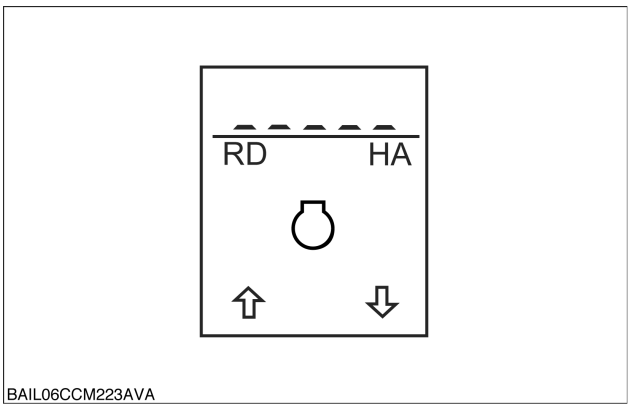
BAIL06CCM222AVA 10

The H Menu selection page appears when all sub-systems use the same menu, such as e. g. H5 - Switch test and H9 - Voltmeter.



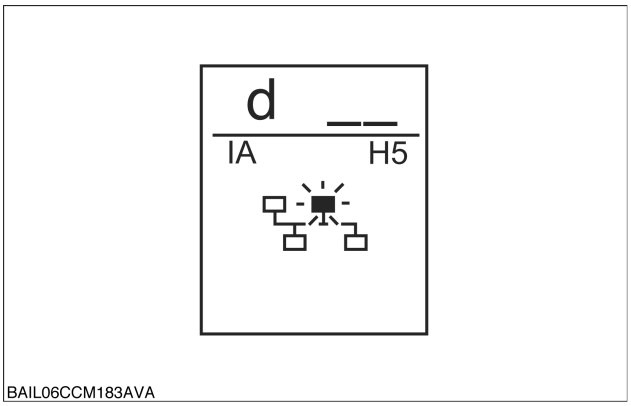
BAIL06CCM182AVA 11

If the menu only applies for a certain sub-system, then the corresponding symbol is displayed in the centre of the dot matrix display, for example, the engine symbol for HA - Demo mode.



BAIL06CCM223AVA 12

After the sub-system is selected, the navigation arrows are not longer lit.
The upper section of the dot matrix display is used to display the settings or parameter values of the selected sub-system.



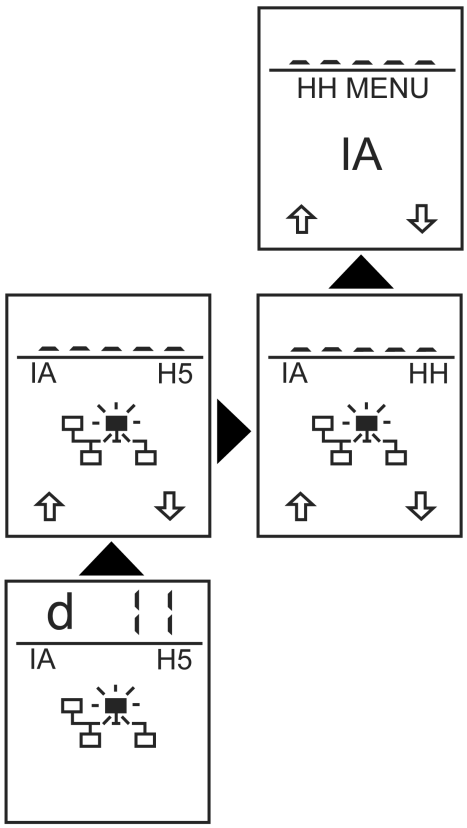
BAIL06CCM183AVA 13

NOTE: *To go back from the Sub-menu H1 - Calibrations to the H Menu selection page, the starter switch must be switched to OFF. This stores the completed calibrations.*

Afterwards, press the Menu button to go back to the H Menu selection page.

NOTE: *To be able to go back to the control unit selection page, "HH" must be displayed top right on the dot matrix display.*

To go back to the control unit selection page, press the Menu button again.



BAIL06CCM224FVA

BAIL06CCM224FVA 14

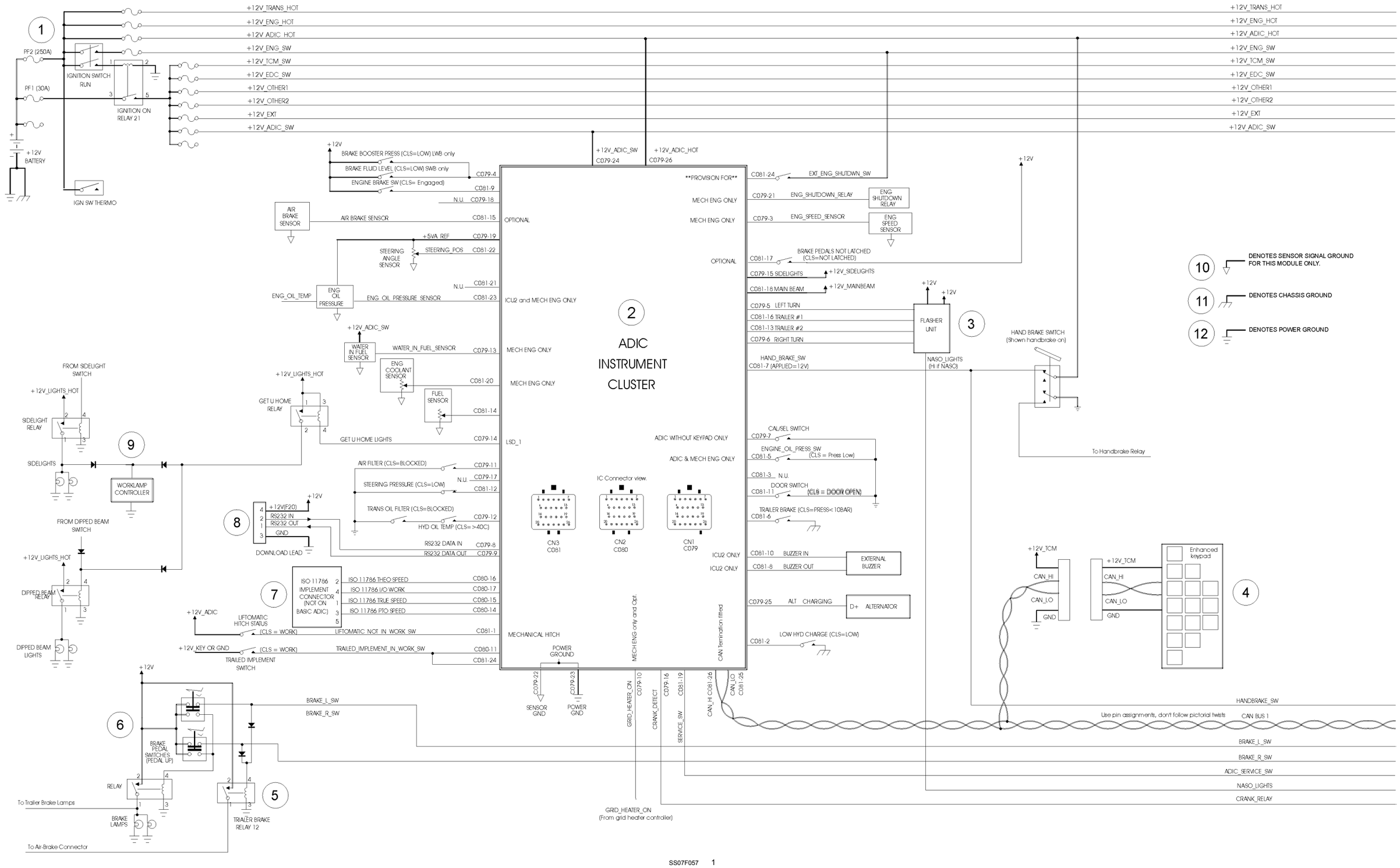
Control module - Electronic schema Instrument panel

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component designation	DASHBOARD - TERMINALS
1. BATTERY AND FUSES	**PLUG CONNECTOR C079**
2. INSTRUMENT PANEL	1.
3. FLASHER UNIT	2.
4. EXTENDED KEYPAD	3. NOT USED
5. TRAILER BRAKE RELAY	4. BRAKE SERVO - LP PRESSSURE SWITCH
6. BRAKE PEDAL SWITCH	5. LEFT DIRECTION INDICATOR
7. INSTRUMENT SOCKET	6. RIGHT DIRECTION INDICATOR
8. SOFTWARE DOWNLOAD CABLE	7. CAN SELECT SWITCH
9. FIELD LIGHTS CONTROL MODULE	8. RS232 DATA IN
10. SENSOR SIGNAL GROUND	9. RS232 DATA OUT
11. CHASSIS GROUND	10. NOT USED
12. SUPPLY GROUND	11. CLOGGED AIR FILTER INDICATION SWITCH
	12. CLOGGED GEARBOX OIL FILTER INDICATION SWITCH
	13. NOT USED
	14. TREADPLATE LIGHTING
	15. SIDE MARKER LAMPS (+12V)
	16. CRANKSHAFT SPEED SENSOR
	17.
	18.
	19. +5V REFERENCE VOLTAGE
	20.
	21. NOT USED
	22. SENSOR GROUND
	23. SUPPLY GROUND
	24. +12V VOLTAGE VIA START SWITCH
	25. ALTERNATOR SIGNAL
	26. +12V SUPPLY VIA BATTERY

DASHBOARD - TERMINALS	**PLUG CONNECTOR C081**
PLUG CONNECTOR C080	1.
1.	2. HYDRAULIC OIL FEED PRESSURE SWITCH
2.	3.
3.	4.
4.	5. ENGINE OIL PRESSURE SWITCH
5.	6. TRAILER BRAKE PRESSURE SWITCH
6.	7. HANDBRAKE SWITCH
7.	8. EXTERNAL BUZZER - OUTPUT

DASHBOARD - TERMINALS	PLUG CONNECTOR C081
8.	9.
9.	10. EXTERNAL BUZZER - INPUT
10.	11. DOOR CONTACT SWITCH
11. TRAILER UNIT SWITCH	12.
12.	13. TRAILER FLASHER UNIT 2
13.	14.
14. INSTRUMENT SOCKET - POWER TAKE-OFF SPEED	15.
15. INSTRUMENT SOCKET - ACTUAL SPEED OF TRAVEL	16. TRAILER FLASHER UNIT 1
16. INSTRUMENT SOCKET - THEORETICAL SPEED OF TRAVEL	17. BRAKE PEDAL NOT LOCKED CONTROL SWITCH (OPTIONAL VERSION)
17. INSTRUMENT SOCKET - INPUT/OUTPUT, SERVICE	18. MAIN BEAM HEADLIGHTS
18.	19. DIAGNOSTICS SWITCH
19.	20.
20.	21.
21.	22.
22.	23.
23.	24. TRAILER UNIT SWITCH
24.	25. CAN LO
25.	26. CAN HI
26.	


1
PF2 (250A)
PF1 (30A)
IGNITION SWITCH RUN
IGNITION ON RELAY 21
IGN SW THERMO
+12V BATTERY
+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ADIC_HOT
+12V_ENG_SW
+12V_TCM_SW
+12V_EDC_SW
+12V_OTHER1
+12V_OTHER2
+12V_EXT
+12V_ADIC_SW
2
ADIC INSTRUMENT CLUSTER
IC Connector view.
CN3 C081
CN2 C080
CN1 C079
PROVISION FOR
MECH ENG ONLY
OPTIONAL
ICU2 and MECH ENG ONLY
ADIC WITHOUT KEYPAD ONLY
ADIC & MECH ENG ONLY
ICU2 ONLY
MECHANICAL HITCH
MECH ENG only and Opt.
CAN termination fitted
BRAKE BOOSTER PRESS (CLS=LOW) LWB only
BRAKE FLUID LEVEL (CLS=LOW) SWB only
ENGINE BRAKE SW (CLS= Engaged)
AIR BRAKE SENSOR
STEERING ANGLE SENSOR
ENG OIL PRESSURE
WATER IN FUEL SENSOR
ENG COOLANT SENSOR
FUEL SENSOR
EXT_ENG_SHUTDWN_SW
ENG_SHUTDOWN_RELAY
ENG_SPEED_SENSOR
BRAKE PEDALS NOT LATCHED (CLS=NOT LATCHED)
+12V_SIDELIGHTS
+12V_MAINBEAM
LEFT TURN
TRAILER #1
TRAILER #2
RIGHT TURN
HAND_BRAKE_SW (APPLIED=12V)
3
FLASHER UNIT
NASO_LIGHTS (Hi if NASO)
HAND BRAKE SWITCH (Shown handbrake on)
To Handbrake Relay
CAL/SEL SWITCH
ENGINE_OIL_PRESS_SW (CLS = Press Low)
N.U.
DOOR SWITCH (CLS = DOOR OPEN)
TRAILER BRAKE (CLS=PRESS< 10BAR)
BUZZER IN
BUZZER OUT
EXTERNAL BUZZER
ALT CHARGING
D+ ALTERNATOR
LOW HYD CHARGE (CLS=LOW)
10 DENOTES SENSOR SIGNAL GROUND FOR THIS MODULE ONLY.
11 DENOTES CHASSIS GROUND
12 DENOTES POWER GROUND
FROM SIDELIGHT SWITCH
SIDELIGHT RELAY
SIDELIGHTS
WORKLAMP CONTROLLER
9
GET U HOME RELAY
GET U HOME LIGHTS
FROM DIPPED BEAM SWITCH
DIPPED BEAM RELAY
DIPPED BEAM LIGHTS
8
DOWNLOAD LEAD
RS232 IN
RS232 OUT
GND
RS232 DATA IN
RS232 DATA OUT
AIR FILTER (CLS=BLOCKED)
STEERING PRESSURE (CLS=LOW)
TRANS OIL FILTER (CLS=BLOCKED)
HYD OIL TEMP (CLS= >40C)
7
ISO 11786 IMPLEMENT CONNECTOR (NOT ON BASIC ADIC)
ISO 11786 THEO SPEED
ISO 11786 I/O WORK
ISO 11786 TRUE SPEED
ISO 11786 PTO SPEED
LIFTOMATIC HITCH STATUS (CLS = WORK)
LIFTOMATIC_NOT_IN_WORK_SW
TRAILED IMPLEMENT SWITCH
TRAILED_IMPLEMENT_IN_WORK_SW
6
BRAKE PEDAL SWITCHES (PEDAL UP)
BRAKE_L_SW
BRAKE_R_SW
RELAY
BRAKE LAMPS
To Trailer Brake Lamps
5
TRAILER BRAKE RELAY 12
To Air-Brake Connector
SENSOR GND
POWER GND
GRID_HEATER_ON
CRANK_DETECT
SERVICE_SW
CAN_HI
CAN_LO
GRID_HEATER_ON (From grid heater controller)
4
Enhanced keypad
Use pin assignments, don't follow pictorial twists
CAN BUS 1
HANDBRAKE_SW
BRAKE_L_SW
BRAKE_R_SW
ADIC_SERVICE_SW
NASO_LIGHTS
CRANK_RELAY

SS07F057 1

Control module - Electronic schema ICU2

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component designation

1. BATTERY AND FUSES
2. ICU2
3. FLASHER UNIT
4. TRAILER BRAKE RELAY
5. BRAKE PEDAL SWITCH
6. INSTRUMENT SOCKET (ISO standard)
7. SOFTWARE DOWNLOAD CABLE (not for EST)
8. FIELD LIGHTS CONTROL MODULE
9. SENSOR SIGNAL GROUND
10. CHASSIS GROUND
11. SUPPLY GROUND

DASHBOARD - TERMINALS

PLUG CONNECTOR C079

1.
2.
3.
4. BRAKE SERVO - LP PRESSSURE SWITCH
5. LEFT DIRECTION INDICATOR
6. RIGHT DIRECTION INDICATOR
7.
8. RS232 DATA IN
9. RS232 DATA OUT
10. NOT USED
11. CLOGGED AIR FILTER INDICATION SWITCH
12. CLOGGED GEARBOX OIL FILTER INDICATION SWITCH
13. NOT USED
14. TREADPLATE LIGHTING
15. SIDE MARKER LAMPS (+12V)
16. STARTER SIGNAL
17.
18.
19. +5V REFERENCE VOLTAGE
20.
21.
22. SENSOR GROUND
23. SUPPLY GROUND
24. +12V VOLTAGE VIA START SWITCH
25. ALTERNATOR SIGNAL
26. +12V SUPPLY VIA BATTERY

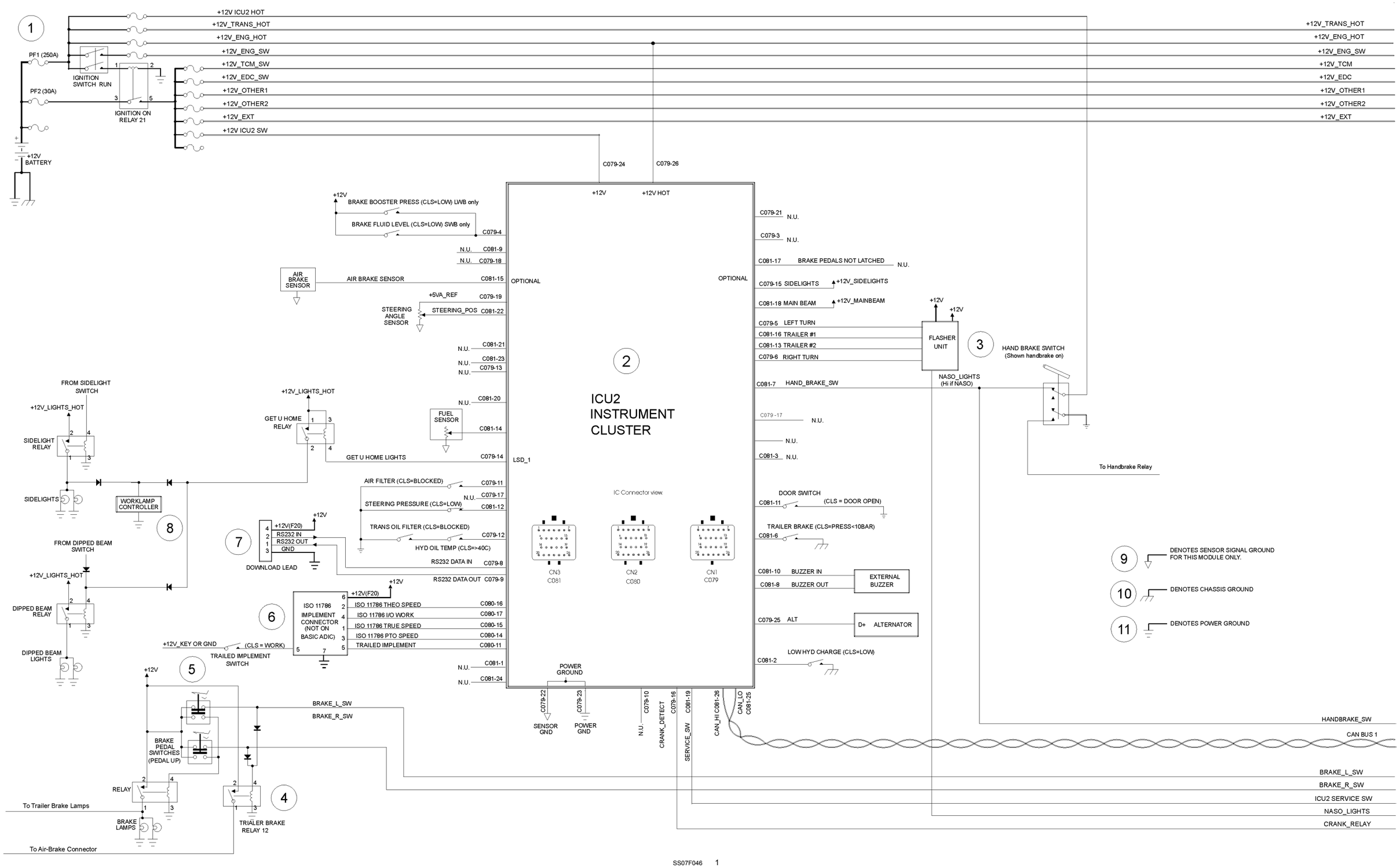
DASHBOARD - TERMINALS

PLUG CONNECTOR C080

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11. TRAILER UNIT SWITCH
12.
13.
14. INSTRUMENT SOCKET - POWER TAKE-OFF SPEED
15. INSTRUMENT SOCKET - ACTUAL SPEED OF TRAVEL
16. INSTRUMENT SOCKET - THEORETICAL SPEED OF TRAVEL
17. INSTRUMENT SOCKET - INPUT/OUTPUT, SERVICE
18.
19.
20.
21.
22.
23.
24.
25.
26.

PLUG CONNECTOR C081

1.
2. HYDRAULIC OIL FEED PRESSURE SWITCH
3.
4.
5.
6. TRAILER BRAKE PRESSURE SWITCH
7. HANDBRAKE SWITCH
8. EXTERNAL BUZZER - OUTPUT
9.
10. EXTERNAL BUZZER - OUTPUT
11. DOOR CONTACT SWITCH
12. STEERING PRESSURE SWITCH
13. TRAILER FLASHER UNIT 2
14. FUEL SENSOR
15. COMPRESSED AIR SENSOR
16. TRAILER FLASHER UNIT 1
17.
18. MAIN BEAM HEADLIGHTS
19. DIAGNOSTICS SWITCH
20.
21.
22. STEERING ANGLE SENSOR
23.
24.
25. CAN LO
26. CAN HI

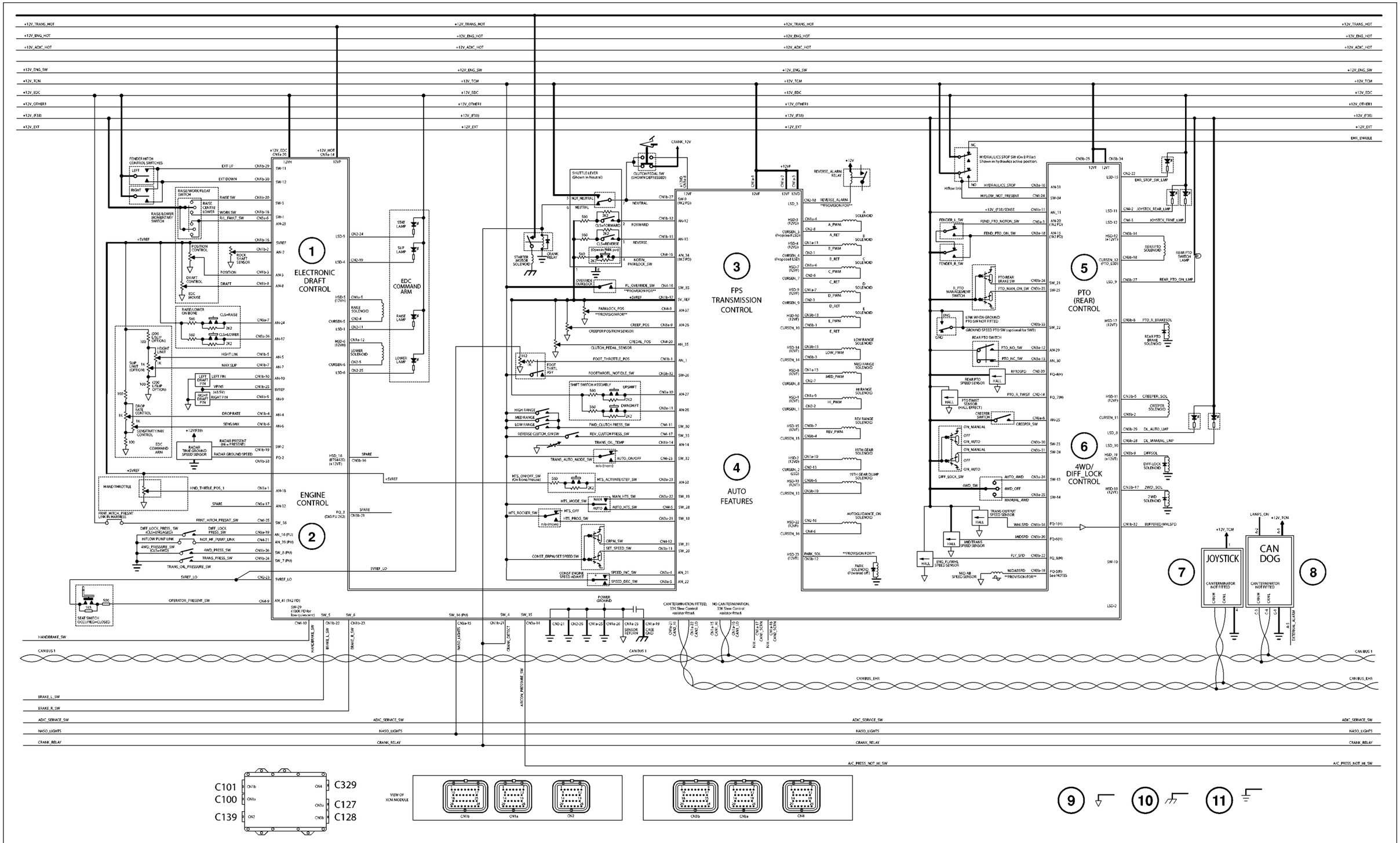

1
PF1 (250A)
PF2 (30A)
IGNITION SWITCH RUN
IGNITION ON RELAY 21
+12V BATTERY
+12V ICU2 HOT
+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ENG_SW
+12V_TCM_SW
+12V_EDC_SW
+12V_OTHER1
+12V_OTHER2
+12V_EXT
+12V ICU2 SW
C079-24
C079-26
+12V
+12V HOT
BRAKE BOOSTER PRESS (CLS=LOW) LWB only
BRAKE FLUID LEVEL (CLS=LOW) SWB only
C079-4
N.U. C081-9
N.U. C079-18
AIR BRAKE SENSOR
AIR BRAKE SENSOR C081-15
OPTIONAL
+5VA_REF C079-19
STEERING ANGLE SENSOR
STEERING_POS C081-22
N.U. C081-21
N.U. C081-23
N.U. C079-13
N.U. C081-20
FUEL SENSOR
C081-14
GET U HOME LIGHTS C079-14
LSD_1
AIR FILTER (CLS=BLOCKED) C079-11
N.U. C079-17
STEERING PRESSURE (CLS=LOW) C081-12
TRANS OIL FILTER (CLS=BLOCKED) C079-12
HYD OIL TEMP (CLS=>40C)
RS232 DATA IN C079-8
RS232 DATA OUT C079-9
ISO 11786 IMPLEMENT CONNECTOR (NOT ON BASIC ADIC)
+12V(F20)
ISO 11786 THEO SPEED C080-16
ISO 11786 I/O WORK C080-17
ISO 11786 TRUE SPEED C080-15
ISO 11786 PTO SPEED C080-14
TRAILED IMPLEMENT C080-11
N.U. C081-1
N.U. C081-24
2
ICU2 INSTRUMENT CLUSTER
IC Connector view
CN3 C081
CN2 C080
CN1 C079
POWER GROUND
C079-22 SENSOR GND
C079-23 POWER GND
N.U. C079-10
CRANK_DETECT C079-16
SERVICE_SW C081-19
CAN_HI C081-26
CAN_LO C081-25
OPTIONAL
C079-21 N.U.
C079-3 N.U.
C081-17 BRAKE PEDALS NOT LATCHED N.U.
C079-15 SIDELIGHTS +12V_SIDELIGHTS
C081-18 MAIN BEAM +12V_MAINBEAM
C079-5 LEFT TURN
C081-16 TRAILER #1
C081-13 TRAILER #2
C079-6 RIGHT TURN
FLASHER UNIT
C081-7 HAND_BRAKE_SW
C079 -17 N.U.
N.U.
C081-3 N.U.
DOOR SWITCH
C081-11 (CLS = DOOR OPEN)
TRAILER BRAKE (CLS=PRESS<10BAR)
C081-6
C081-10 BUZZER IN
C081-8 BUZZER OUT
EXTERNAL BUZZER
C079-25 ALT
D+ ALTERNATOR
LOW HYD CHARGE (CLS=LOW)
C081-2
3
HAND BRAKE SWITCH (Shown handbrake on)
NASO_LIGHTS (Hi if NASO)
To Handbrake Relay
FROM SIDELIGHT SWITCH
+12V_LIGHTS_HOT
SIDELIGHT RELAY
SIDELIGHTS
WORKLAMP CONTROLLER
8
GET U HOME RELAY
7
+12V(F20)
RS232 IN
RS232 OUT
GND
DOWNLOAD LEAD
FROM DIPPED BEAM SWITCH
DIPPED BEAM RELAY
DIPPED BEAM LIGHTS
6
+12V_KEY OR GND
(CLS = WORK)
TRAILED IMPLEMENT SWITCH
5
BRAKE_L_SW
BRAKE_R_SW
BRAKE PEDAL SWITCHES (PEDAL UP)
RELAY
To Trailer Brake Lamps
BRAKE LAMPS
4
TRAILER BRAKE RELAY 12
To Air-Brake Connector
9 DENOTES SENSOR SIGNAL GROUND FOR THIS MODULE ONLY.
10 DENOTES CHASSIS GROUND
11 DENOTES POWER GROUND
HANDBRAKE_SW
CAN BUS 1
BRAKE_L_SW
BRAKE_R_SW
ICU2 SERVICE SW
NASO_LIGHTS
CRANK_RELAY

SS07F046 1

Control module - Electronic schema Full Powershift Central Control Unit (RD module)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

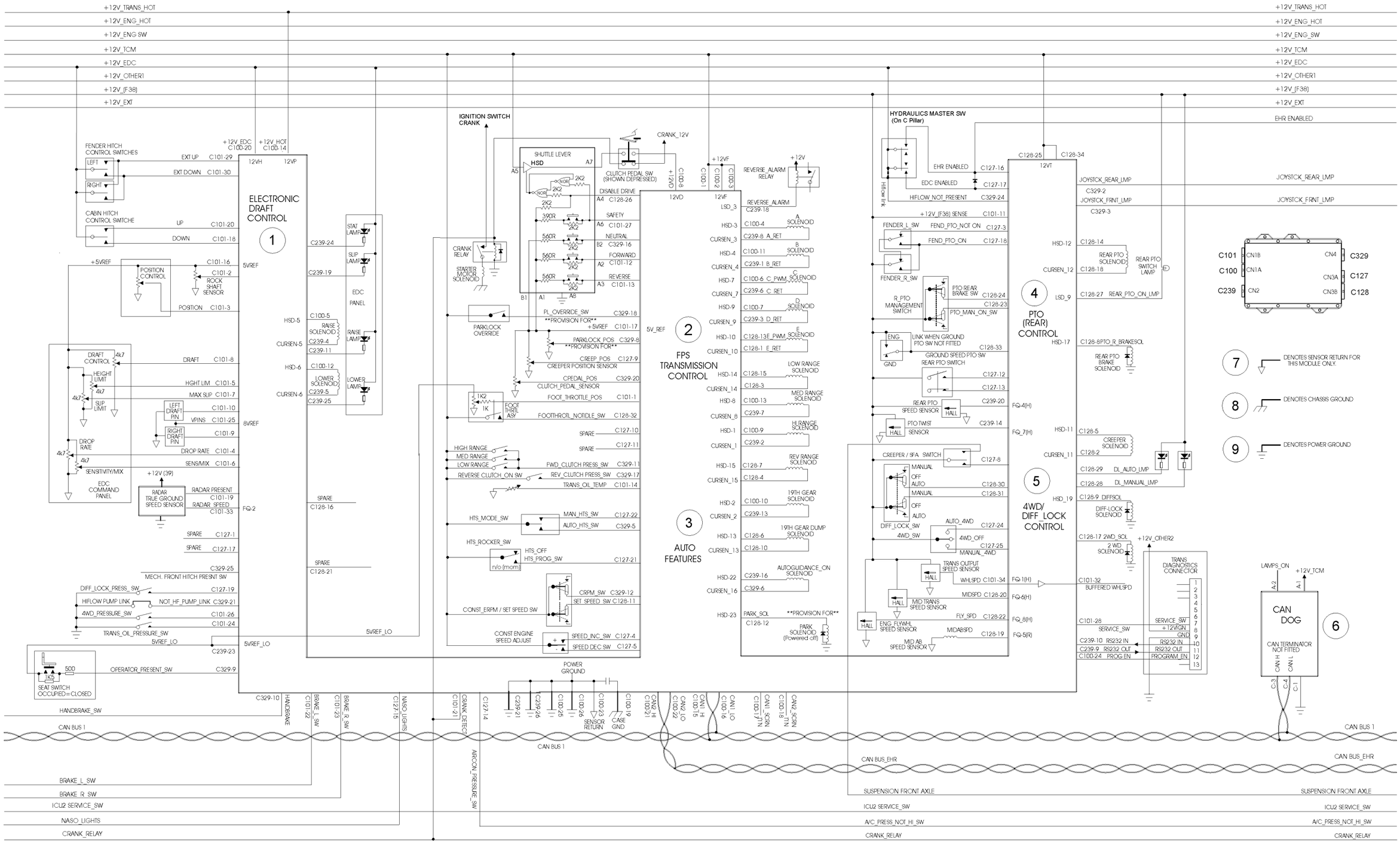
Component Identification	
1. Electronic Draft Control	
2. Engine Control	
3. Transmission Control	
4. System Auto Features	
5. PTO (Rear) Control	
6. Four wheel drive and differential lock control	
7. Remote Valve Joystick Unit	
8. CAN Display of Gears (DOG) Unit	
9. Sensor Ground	
10. Chassis Ground	
11. Power Ground	


1
ELECTRONIC DRAFT CONTROL
2
ENGINE CONTROL
3
FPS TRANSMISSION CONTROL
4
AUTO FEATURES
5
PTO (REAR) CONTROL
6
4WD/ DIFF_LOCK CONTROL
7
JOYSTICK
8
CAN DOG
9
10
11
+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ADIC_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
+12V_EXT
EMS_ENABLE
CAN BUS 1
CAN BUS_EHR
HANDBRAKE_SW
BRAKE_L_SW
BRAKE_R_SW
ADIC_SERVICE_SW
NASO_LIGHTS
CRANK_RELAY
A/C_PRESS_NOT_HI_SW
AIRCON_PRESSURE_SW
C101
C100
C139
C329
C127
C128
VIEW OF XCM MODULE
BRI4236B

Control module - Electronic schema Full power shift main control module (RG module)

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component designation	
1. Electronic power lift control	
2. Transmission Control System	
3. Automatic functions of the system (HTS)	
4. Rear power take-off controller	
5. All-wheel drive and differential lock controller	
6. CAN BUS gear indication	
7. Sensor ground	
8. Chassis ground	
9. Supply ground	

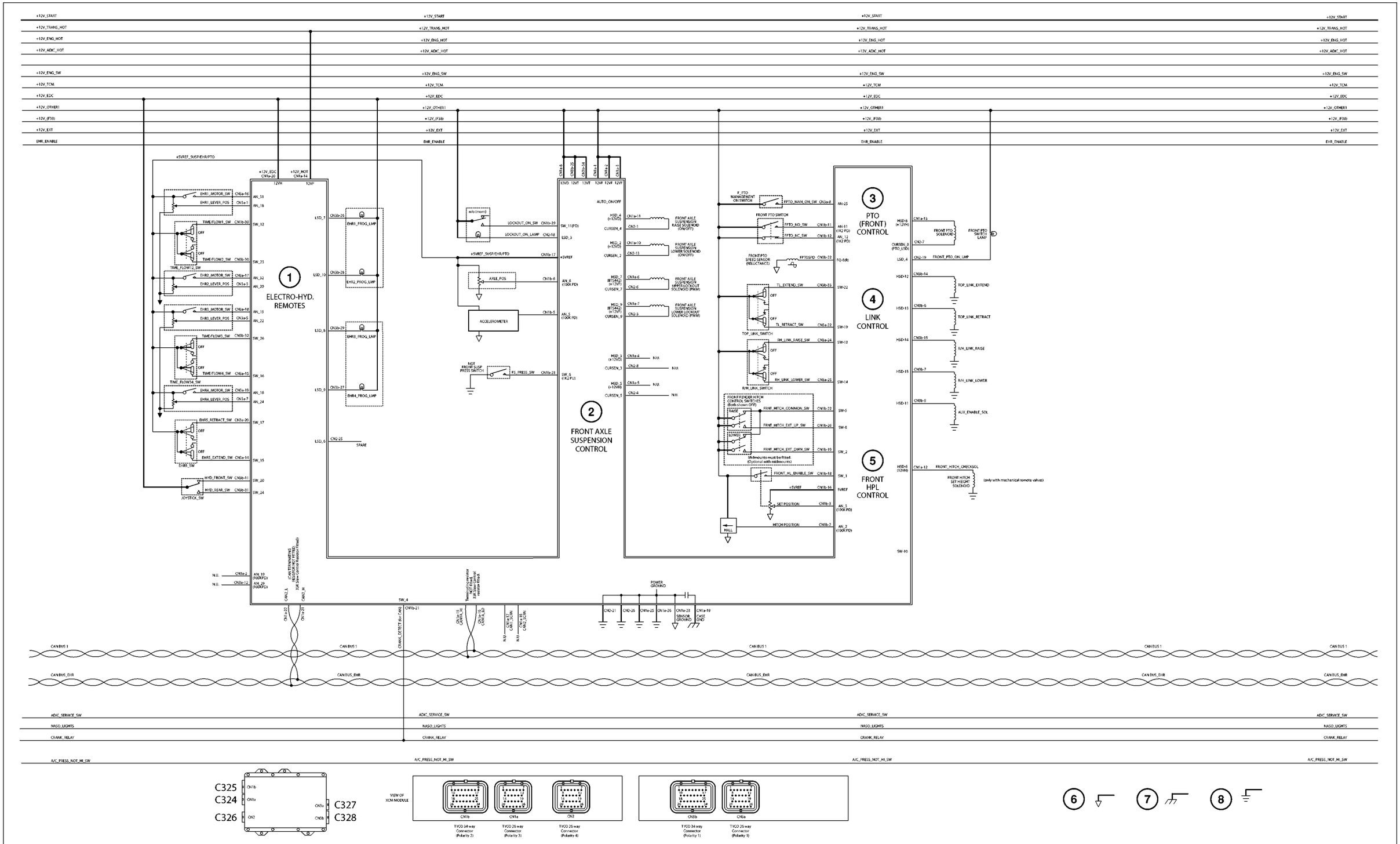

+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
+12V_EXT
EHR ENABLED
ELECTRONIC DRAFT CONTROL
1
FENDER HITCH CONTROL SWITCHES
LEFT
RIGHT
EXT UP C101-29
EXT DOWN C101-30
CABIN HITCH CONTROL SWITCHE
UP C101-20
DOWN C101-18
+5VREF
POSITION CONTROL
C101-16
C101-2
ROCK SHAFT SENSOR
POSITION C101-3
+12V_EDC C100-20
+12V_HOT C100-14
12VH
12VP
5VREF
STAT LAMP
SLIP LAMP
EDC PANEL
RAISE SOLENOID
RAISE LAMP
LOWER SOLENOID
LOWER LAMP
C239-24
C239-19
C239-4
C239-11
C239-5
C239-25
HSD-5
HSD-6
CURSEN-5
CURSEN-6
C100-5
C100-12
DRAFT CONTROL 4k7
DRAFT C101-8
HEIGHT LIMIT
HGHT LIM C101-5
MAX SLIP C101-7
SLIP LIMIT
LEFT DRAFT PIN
RIGHT DRAFT PIN
VPINS C101-25
C101-10
C101-9
DROP RATE
DROP RATE C101-4
SENSMIX C101-6
SENSITIVITY/MIX
EDC COMMAND PANEL
+12V (39)
RADAR TRUE GROUND SPEED SENSOR
RADAR PRESENT C101-19
RADAR SPEED C101-33
FQ-2
8VREF
SPARE C127-1
SPARE C127-17
SPARE C128-16
SPARE C128-21
C329-25
MECH. FRONT HITCH PRESNT SW
DIFF_LOCK_PRESS_SW C127-19
HIFLOW PUMP LINK NOT_HF_PUMP_LINK C329-21
4WD_PRESSURE_SW C101-26
TRANS_OIL_PRESSURE_SW C101-24
5VREF_LO
C239-23
500
OPERATOR_PRESENT_SW C329-9
SEAT SWITCH OCCUPIED=CLOSED
IGNITION SWITCH CRANK
CRANK_12V
CRANK RELAY
STARTER MOTOR SOLENOID
SHUTTLE LEVER
HSD
A5
A7
B1
A1
A8
CLUTCH PEDAL SW (SHOWN DEPRESSED)
+12VD
C100-8
DISABLE DRIVE A4 C128-26
SAFETY A6 C101-27
NEUTRAL B2 C329-16
FORWARD A2 C101-12
REVERSE A3 C101-13
2K2
390R
560R
PARKLOCK OVERRIDE
PL_OVERRIDE_SW C329-18
PROVISION FOR
+5VREF C101-17
PARKLOCK POS C329-8
CREEP POS C127-9
CREEPER POSITION SENSOR
CPEDAL_POS C329-20
CLUTCH_PEDAL_SENSOR
FOOT_THROTTLE_POS C101-1
FOOTHROTL NOTIDLE_SW C128-32
1K2
1K
FOOT THRTL ASY
SPARE C127-10
SPARE C127-11
HIGH RANGE
MED RANGE
LOW RANGE
REVERSE CLUTCH_ON SW
FWD_CLUTCH PRESS_SW C329-11
REV_CLUTCH PRESS_SW C329-17
TRANS_OIL_TEMP C101-14
HTS_MODE_SW
MAN_HTS_SW C127-22
AUTO_HTS_SW C329-5
HTS_ROCKER_SW
HTS_OFF
HTS_PROG_SW C127-21
r/o (mom)
CRPM_SW C329-12
SET_SPEED_SW C128-11
CONST_ERPM / SET SPEED SW
CONST ENGINE SPEED ADJUST
SPEED_INC_SW C127-4
SPEED_DEC SW C127-5
5VREF_LO
5V_REF
2
FPS TRANSMISSION CONTROL
+12VF
C100-1
C100-2
C100-3
12VD
12VF
REVERSE_ALARM RELAY
REVERSE_ALARM C239-18
LSD_3
HSD-3
CURSEN_3
HSD-4
CURSEN_4
HSD-7
CURSEN_7
HSD-9
CURSEN_9
HSD-10
CURSEN_10
HSD-14
CURSEN_14
HSD-8
CURSEN_8
HSD-1
CURSEN_1
HSD-15
CURSEN_15
HSD-2
CURSEN_2
HSD-13
CURSEN_13
HSD-22
CURSEN_16
HSD-23
A SOLENOID
B SOLENOID
C SOLENOID
D SOLENOID
E SOLENOID
C100-4
C239-8 A_RET
C100-11
C239-1 B_RET
C100-6 C_PWM_SOLENOID
C239-6 C_RET
C100-7
C239-3 D_RET
C128-13 E_PWM_SOLENOID
C128-1 E_RET
LOW RANGE SOLENOID
MED RANGE SOLENOID
HI RANGE SOLENOID
REV RANGE SOLENOID
19TH GEAR SOLENOID
19TH GEAR DUMP SOLENOID
AUTOGUIDANCE_ON SOLENOID
PARK_SOL C128-12
PROVISION FOR
PARK SOLENOID (Powered off)
C128-15
C128-3
C100-13
C239-7
C100-9
C239-2
C128-7
C128-4
C100-10
C239-13
C128-6
C128-10
C239-16
C239-6
3
AUTO FEATURES
HYDRAULICS MASTER SW (On C Pillar)
HIFLOW IHK
EHR ENABLED
EDC ENABLED
HIFLOW_NOT_PRESENT
+12V_(F38) SENSE
C127-16
C127-17
C329-24
C101-11
FENDER_L_SW
FEND_PTO_NOT ON C127-3
FEND_PTO_ON C127-18
FENDER_R_SW
R_PTO MANAGEMENT SWITCH
PTO REAR BRAKE SW
PTO_MAN_ON_SW
C128-24
C128-23
ENG
GND
LINK WHEN GROUND PTO SW NOT FITTED
GROUND SPEED PTO SW
REAR PTO SWITCH
C128-33
C127-12
C127-13
REAR PTO SPEED SENSOR
HALL
C239-20
PTO TWIST SENSOR
C239-14
CREEPER / SFA SWITCH
C127-8
MANUAL
OFF
AUTO
C128-30
C128-31
DIFF_LOCK_SW
4WD_SW
AUTO_4WD
4WD_OFF
MANUAL_4WD
C127-24
C127-25
TRANS OUTPUT SPEED SENSOR
WHLSPD C101-34
MIDSPD C128-20
MID TRANS SPEED SENSOR
FLY_SPD C128-22
ENG_FLYWHL SPEED SENSOR
MIDABSPD
C128-19
MID AB SPEED SENSOR
FQ-1(H)
FQ-6(H)
FQ_8(H)
FQ-5(R)
FQ-4(H)
FQ_7(H)
C128-25
C128-34
12VT
4
PTO (REAR) CONTROL
LSD_9
HSD-17
HSD-12
CURSEN_12
C128-14
C128-18
REAR PTO SOLENOID
REAR PTO SWITCH LAMP
C128-27 REAR_PTO_ON_LMP
C128-8PTO_R_BRAKESOL
REAR PTO BRAKE SOLENOID
HSD-11
CURSEN_11
C128-5
C128-2
CREEPER SOLENOID
C128-29 DL_AUTO_LMP
C128-28 DL_MANUAL_LMP
5
4WD/ DIFF_LOCK CONTROL
HSD_19
C128-9 DIFFSOL
DIFF-LOCK SOLENOID
C128-17 2WD_SOL
2 WD SOLENOID
+12V_OTHER2
C101-32
BUFFERED WHLSPD
C101-28
SERVICE_SW
C239-10 RS232 IN
C239-9 RS232 OUT
C100-24 PROG EN
TRANS DIAGNOSTICS CONNECTOR
+12VIGN
GND
RS232 IN
RS232 OUT
PROGRAM_EN
LAMPS_ON
+12V_TCM
A-2
A-1
CAN DOG
6
CAN TERMINATOR NOT FITTED
CAN H
CAN L
C-3
C-4
C-1
JOYSTCK_REAR_LMP
JOYSTCK_FRNT_LMP
C329-2
C329-3
C101
C100
C239
CN1B
CN1A
CN2
CN4
CN3A
CN3B
C329
C127
C128
7
DENOTES SENSOR RETURN FOR THIS MODULE ONLY.
8
DENOTES CHASSIS GROUND
9
DENOTES POWER GROUND
POWER GROUND
C329-10
HANDBRAKE
C101-22
BRAKE_L_SW
C101-23
BRAKE_R_SW
C127-15
NASO_LIGHTS
C101-21
CRANK DETECT
C127-14
C239-21
C239-26
C100-25
C100-26
C100-23
SENSOR RETURN
C100-19
CASE GND
C100-21
CAN2_H
C100-22
CAN2_LO
C100-15
CAN1_H
C100-16
CAN1_LO
C100-17
CAN1_SCRN
C100-18
CAN2_SCRN
HANDBRAKE_SW
CAN BUS 1
BRAKE_L_SW
BRAKE_R_SW
ICU2 SERVICE_SW
NASO_LIGHTS
CRANK_RELAY
AIRCON_PRESSURE_SW
CAN BUS_EHR
SUSPENSION FRONT AXLE
ICU2 SERVICE_SW
A/C_PRESS_NOT_HI_SW
CRANK_RELAY

SS07F047 1

Control module - Electronic schema Auxiliary Control Unit (RC module)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]

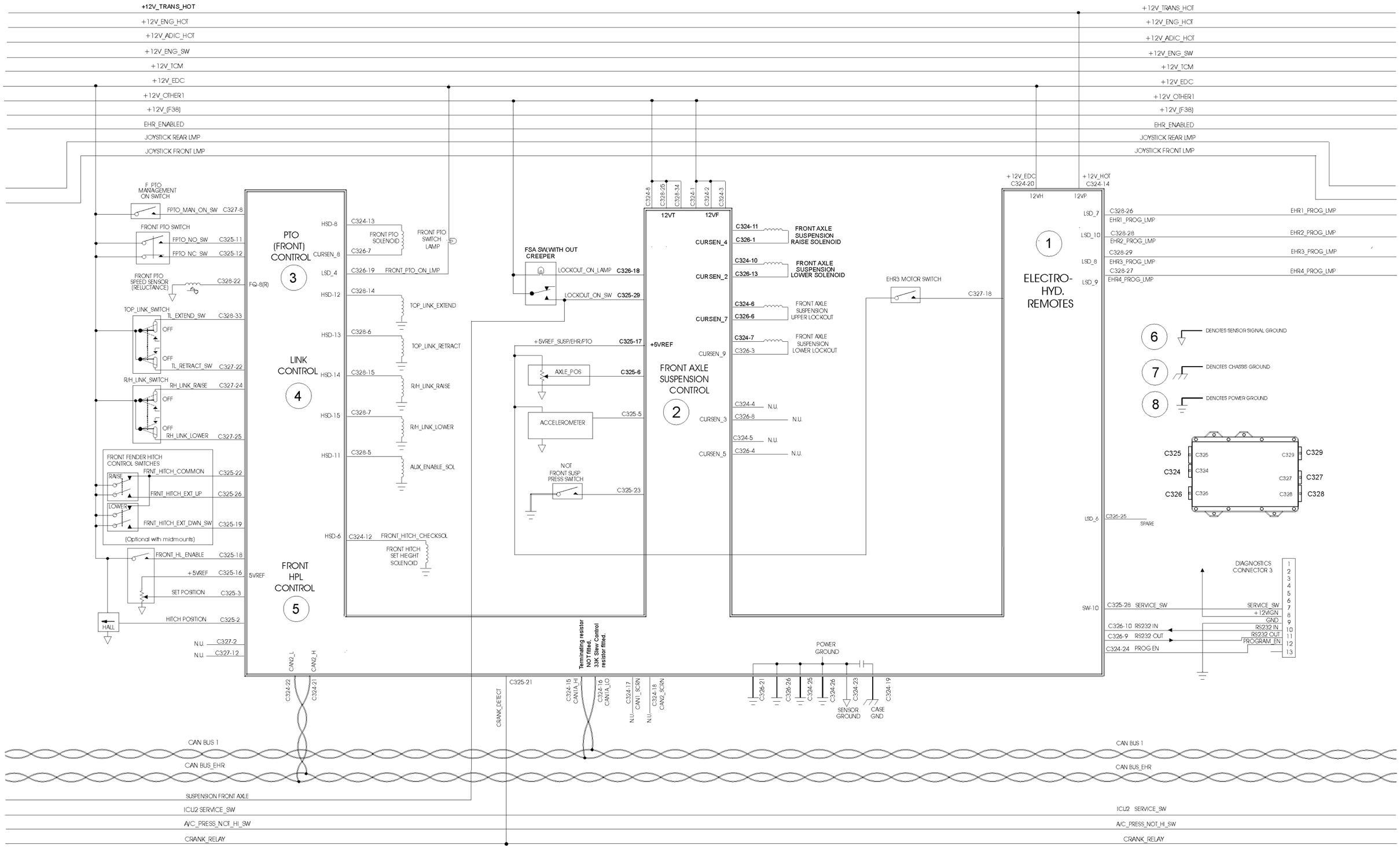
Component Identification	
1. Electro-Hydraulic Remotes (EHR's)	
2. Front Axle Suspension Control	
3. PTO (front) Control	
4. Top Link Lift Rod Control	
5. Front Hydraulic Power Lift (HPL) Control	
6. Sensor Signal Ground	
7. Chassis Ground	
8. Power Ground	


+12V_START
+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ADIC_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_IF38
+12V_EXT
EHR_ENABLE
+5VREF_SUSP/EHR/PTO
1
ELECTRO-HYD. REMOTES
EHR1_MOTOR_SW
EHR1_LEVER_POS
TIME/FLOW1_SW
TIME/FLOW2_SW
TIME_FLOW12_SW
EHR2_MOTOR_SW
EHR2_LEVER_POS
EHR3_MOTOR_SW
EHR3_LEVER_POS
TIME/FLOW3_SW
TIME/FLOW4_SW
TIME_FLOW34_SW
EHR4_MOTOR_SW
EHR4_LEVER_POS
EHR5_RETRACT_SW
EHR5_EXTEND_SW
EHR5_SW
HYD_FRONT_SW
HYD_REAR_SW
JOYSTICK_SW
EHR1_PROG_LMP
EHR2_PROG_LMP
EHR3_PROG_LMP
EHR4_PROG_LMP
SPARE
2
FRONT AXLE SUSPENSION CONTROL
m/o (mom)
LOCKOUT_ON_SW
LOCKOUT_ON_LAMP
AXLE_POS
ACCELEROMETER
NOT FRONT SUSP PRESS SWITCH
PS_PRESS_SW
AUTO_ON/OFF
FRONT AXLE SUSPENSION RAISE SOLENOID (ON/OFF)
FRONT AXLE SUSPENSION LOWER SOLENOID (ON/OFF)
FRONT AXLE SUSPENSION LOWER LOCKOUT SOLENOID (PWM)
3
PTO (FRONT) CONTROL
F. PTO MANAGEMENT ON SWITCH
FRONT PTO SWITCH
FRONT PTO SPEED SENSOR (RELUCTANCE)
FRONT PTO SOLENOID
FRONT PTO SWITCH LAMP
FRONT_PTO_ON_LMP
4
LINK CONTROL
TL_EXTEND_SW
TL_RETRACT_SW
TOP_LINK_SWITCH
RH_LINK_RAISE_SW
RH_LINK_LOWER_SW
R/H_LINK_SWITCH
TOP_LINK_EXTEND
TOP_LINK_RETRACT
R/H_LINK_RAISE
R/H_LINK_LOWER
AUX_ENABLE_SOL
FRONT FENDER HITCH CONTROL SWITCHES (Both shown OFF)
FRONT_HITCH_COMMON_SW
FRONT_HITCH_EXT_UP_SW
FRONT_HITCH_EXT_DWN_SW
Midmounts must be fitted. (Optional with midmounts)
5
FRONT HPL CONTROL
FRONT_HL_ENABLE_SW
SET POSITION
HITCH POSITION
HALL
FRONT_HITCH_CHECKSOL
FRONT HITCH SET HEIGHT SOLENOID
(only with mechanical remote valves)
SW-10
N.U.
AN_10 (100KPD)
AN_20 (100KPD)
CAN-ENHANCED RESISTOR FITTED (Jumper Fitted)
CAN-STANDARD RESISTOR FITTED (No Jumper Fitted)
Terminal resistor NOT Fitted (Must be Jumper Fitted)
POWER GROUND
SENSOR GROUND
CASE GND
CAN BUS 1
CAN BUS_EHR
CRANK_DETECT for_CAN
ADIC_SERVICE_SW
NASO_LIGHTS
CRANK_RELAY
A/C_PRESS_NOT_HI_SW
C325
C324
C326
C327
C328
VIEW OF XCM MODULE
TYCO 34 way Connector (Polarity 2)
TYCO 26 way Connector (Polarity 3)
TYCO 26 way Connector (Polarity 4)
TYCO 34 way Connector (Polarity 1)
TYCO 26 way Connector (Polarity 1)
6
7
8
BRI4229B

Control module - Electronic schema Supplementary control unit (RH module)

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component designation	
1. Electrohydraulic supplementary control units - rear	
2. Front axle suspension system	
3. Front power take-off	
4. Top link adjustment	
5. Front hitch	
6. Sensor signal ground	
7. Chassis ground	
8. Supply ground	

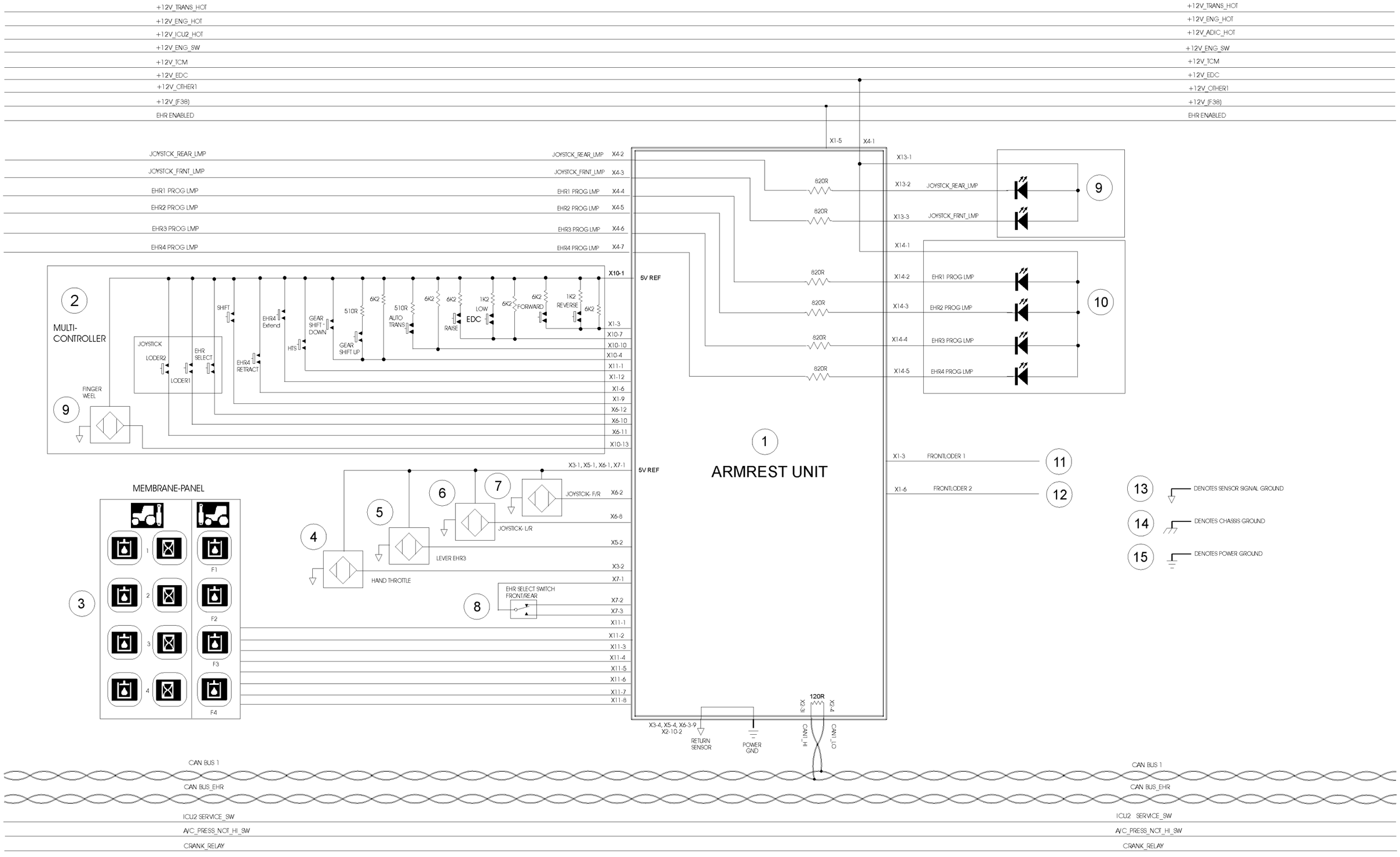

+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ADIC_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR_ENABLED
JOYSTICK REAR LMP
JOYSTICK FRONT LMP
F_PTO MANAGEMENT ON SWITCH
FPTO_MAN_ON_SW C327-8
FRONT PTO SWITCH
FPTO_NO_SW C325-11
FPTO_NC_SW C325-12
FRONT PTO SPEED SENSOR (RELUCTANCE)
C328-22
FQ-8(R)
TOP_LINK_SWITCH
TL_EXTEND_SW C328-33
OFF
TL_RETRACT_SW C327-22
R/H_LINK_SWITCH
RH_LINK_RAISE C327-24
RH_LINK_LOWER C327-25
FRONT FENDER HITCH CONTROL SWITCHES
RAISE
LOWER
FRNT_HITCH_COMMON C325-22
FRNT_HITCH_EXT_UP C325-26
FRNT_HITCH_EXT_DWN_SW C325-19
(Optional with midmounts)
FRONT_HL_ENABLE C325-18
+5VREF C325-16
SET POSITION C325-3
HITCH POSITION C325-2
HALL
N.U. C327-2
N.U. C327-12
5VREF
PTO (FRONT) CONTROL 3
LINK CONTROL 4
FRONT HPL CONTROL 5
HSD-8
CURSEN_8
LSD_4
HSD-12
HSD-13
HSD-14
HSD-15
HSD-11
HSD-6
C324-13
FRONT PTO SOLENOID
C326-7
FRONT PTO SWITCH LAMP
C326-19 FRONT_PTO_ON_LMP
C328-14 TOP_LINK_EXTEND
C328-6 TOP_LINK_RETRACT
C328-15 R/H_LINK_RAISE
C328-7 R/H_LINK_LOWER
C328-5 AUX_ENABLE_SOL
C324-12 FRONT_HITCH_CHECKSOL
FRONT HITCH SET HIEGHT SOLENOID
FSA SW.WITH OUT CREEPER
LOCKOUT_ON_LAMP C326-18
LOCKOUT_ON_SW C325-29
+5VREF_SUSP/EHR/PTO C325-17
AXLE_POS C325-6
ACCELEROMETER C325-5
N.O. FRONT SUSP PRESS SWITCH
C325-23
C324-8
C328-25
C328-34
C324-1
C324-2
C324-3
12VT
12VF
+5VREF
CURSEN_4
CURSEN_2
CURSEN_7
CURSEN_9
CURSEN_3
CURSEN_5
FRONT AXLE SUSPENSION CONTROL 2
C324-11
C326-1
FRONT AXLE SUSPENSION RAISE SOLENOID
C324-10
C326-13
FRONT AXLE SUSPENSION LOWER SOLENOID
C324-6
C326-6
FRONT AXLE SUSPENSION UPPER LOCKOUT
C324-7
C326-3
FRONT AXLE SUSPENSION LOWER LOCKOUT
C324-4 N.U.
C326-8 N.U.
C324-5 N.U.
C326-4 N.U.
EHR3 MOTOR SWITCH
C327-18
+12V_EDC C324-20
+12V_HOT C324-14
12VH
12VP
1 ELECTRO-HYD. REMOTES
LSD_7
LSD_10
LSD_8
LSD_9
C328-26 EHR1_PROG_LMP
EHR1_PROG_LMP
C328-28 EHR2_PROG_LMP
EHR2_PROG_LMP
C328-29 EHR3_PROG_LMP
EHR3_PROG_LMP
C328-27 EHR4_PROG_LMP
EHR4_PROG_LMP
6 DENOTES SENSOR SIGNAL GROUND
7 DENOTES CHASSIS GROUND
8 DENOTES POWER GROUND
C325
C324
C326
C329
C327
C328
LSD_6
C326-25 SPARE
DIAGNOSTICS CONNECTOR 3
SW-10
C325-28 SERVICE_SW
SERVICE_SW
+12VIGN
GND
C326-10 RS232 IN
RS232 IN
C326-9 RS232 OUT
RS232 OUT
PROGRAM_EN
C324-24 PROG EN
1 2 3 4 5 6 7 8 9 10 11 12 13
Terminating resistor NOT fitted. 33K Slew Control resistor fitted.
POWER GROUND
C326-21
C326-26
C324-25
C324-26
C324-23
C324-19
SENSOR GROUND
CASE GND
CAN2_L
CAN2_H
C324-22
C324-21
CRANK_DETECT
C325-21
C324-15 CAN1A_HI
C324-16 CAN1A_LO
C324-17 CAN1_SCRN
C324-18 CAN2_SCRN
N.U.
N.U.
CAN BUS 1
CAN BUS_EHR
SUSPENSION FRONT AXLE
ICU2 SERVICE_SW
A/C_PRESS_NOT_HI_SW
CRANK_RELAY
CAN BUS 1
CAN BUS_EHR
ICU2 SERVICE_SW
A/C_PRESS_NOT_HI_SW
CRANK_RELAY

SS07F056 1

Control module - Electronic schema Armrest (LB module)

PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component designation	
1. Armrest controller	
2. Multicontroller	
3. Membrane keypad	
4. Manual accelerator slider	
5. Control lever EDC 3 (black)	
6. Joystick EDC 2 left / right	
7. Joystick EDC 1 forwards / backwards	
8. Selector switch for EDC valves front / rear	
9. LEDs for EDC valves front / rear	
10. Timer LEDs for EDC valves 1 -4	
11. To changeover valve relay - front loader 1	
12. To changeover valve relay - front loader 2	
13. Sensors ground	
14. Chassis ground	
15. Supply ground	

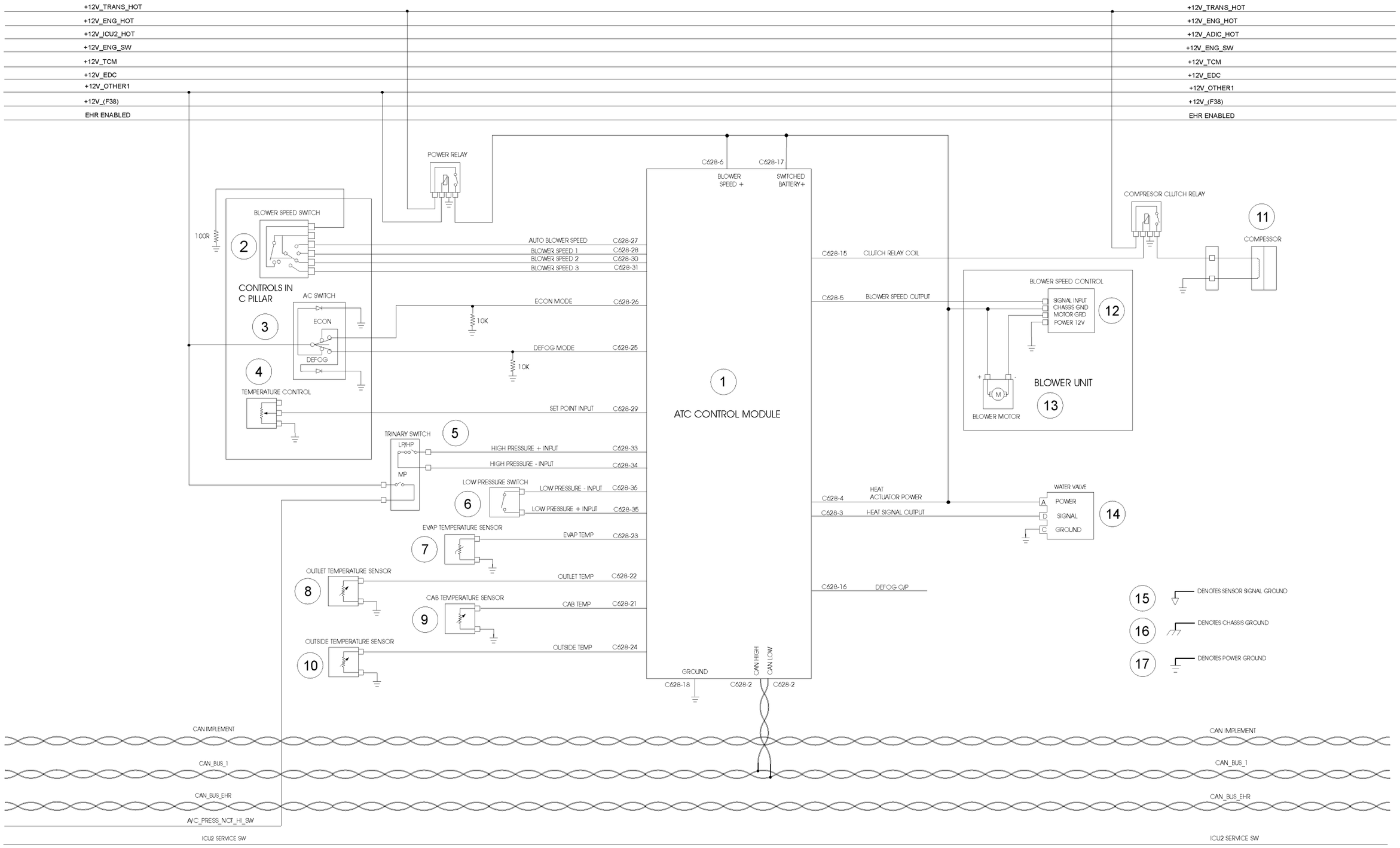

+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ICU2_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR ENABLED
+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ADIC_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR ENABLED
JOYSTCK_REAR_LMP
JOYSTCK_FRNT_LMP
EHR1 PROG LMP
EHR2 PROG LMP
EHR3 PROG LMP
EHR4 PROG LMP
X4-2
X4-3
X4-4
X4-5
X4-6
X4-7
X1-5
X4-1
X13-1
X13-2
X13-3
820R
9
X14-1
X14-2
X14-3
X14-4
X14-5
10
X10-1
5V REF
2
MULTI-
CONTROLLER
SHIFT
EHR4
Extend
GEAR
SHIFT
DOWN
510R
6K2
510R
AUTO
TRANS
6K2
6K2
RAISE
EDC
1K2
LOW
6K2
6K2
FORWARD
1K2
REVERSE
6K2
JOYSTICK
LODER2
EHR
SELECT
LODER1
EHR4
RETRACT
HTS
GEAR
SHIFT UP
X1-3
X10-7
X10-10
X10-4
X11-1
X1-12
X1-6
X1-9
X6-12
X6-10
X6-11
X10-13
FINGER
WEEL
9
1
ARMREST UNIT
X1-3
FRONTLODER 1
11
X1-6
FRONTLODER 2
12
13
DENOTES SENSOR SIGNAL GROUND
14
DENOTES CHASSIS GROUND
15
DENOTES POWER GROUND
X3-1, X5-1, X6-1, X7-1
5V REF
MEMBRANE-PANEL
3
1
2
3
4
F1
F2
F3
F4
4
5
6
7
JOYSTICK- F/R
X6-2
X6-8
JOYSTICK- L/R
X5-2
LEVER EHR3
X3-2
HAND THROTTLE
X7-1
8
EHR SELECT SWITCH
FRONT/REAR
X7-2
X7-3
X11-1
X11-2
X11-3
X11-4
X11-5
X11-6
X11-7
X11-8
120R
X2-3
X2-4
CAN1_HI
CAN1_LO
X3-4, X5-4, X6-3-9
X2-10-2
RETURN
SENSOR
POWER
GND
CAN BUS 1
CAN BUS_EHR
ICU2 SERVICE_SW
A/C_PRESS_NOT_HI_SW
CRANK_RELAY
CAN BUS 1
CAN BUS_EHR
ICU2 SERVICE_SW
A/C_PRESS_NOT_HI_SW
CRANK_RELAY

SS07F049 1

Control module - Electronic schema Automatic air conditioning

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component designation	
1. Climate control microprocessor	
2. Blower speed switch	
3. Air conditioning switch	
4. Temperature transmitter	
5. High pressure switch	
6. Low pressure switch	
7. Evaporator temperature sensor	
8. Outlet temperature sensor	
9. Cab temperature sensor	
10. Outside temperature sensor	
11. A/C compressor coupling	
12. Blower control unit	
13. Blower motor	
14. Water valve (heating)	
15. Sensors ground	
16. Chassis ground	
17. Supply ground	

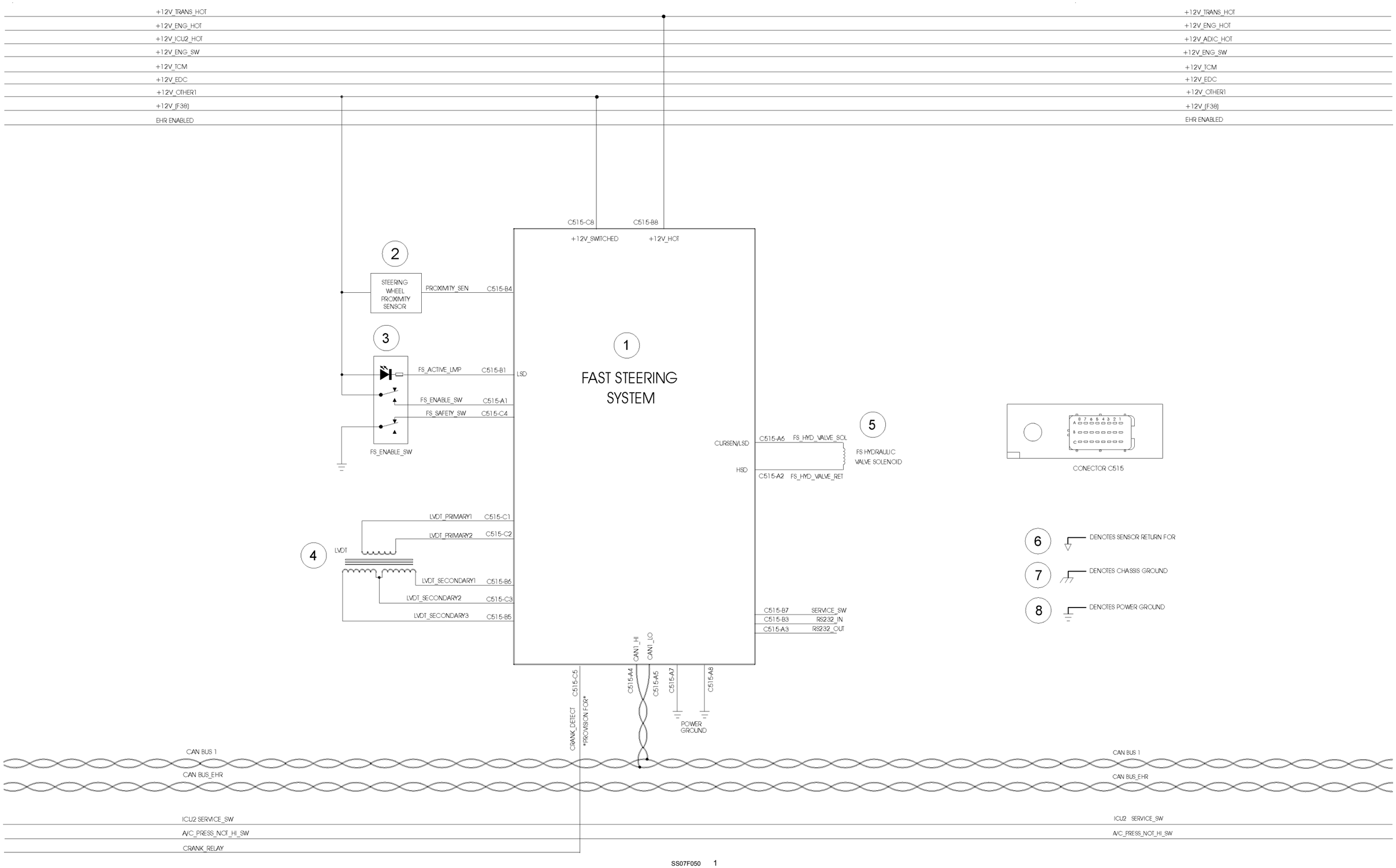

+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ICU2_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR ENABLED
POWER RELAY
C628-6
BLOWER SPEED +
C628-17
SWITCHED BATTERY+
BLOWER SPEED SWITCH
100R
2
CONTROLS IN C PILLAR
AC SWITCH
ECON
DEFOG
3
4
TEMPERATURE CONTROL
AUTO BLOWER SPEED C628-27
BLOWER SPEED 1 C628-28
BLOWER SPEED 2 C628-30
BLOWER SPEED 3 C628-31
ECON MODE C628-26
10K
DEFOG MODE C628-25
10K
SET POINT INPUT C628-29
TRINARY SWITCH
5
LP/HP
MP
HIGH PRESSURE + INPUT C628-33
HIGH PRESSURE - INPUT C628-34
LOW PRESSURE SWITCH
6
LOW PRESSURE - INPUT C628-36
LOW PRESSURE + INPUT C628-35
EVAP TEMPERATURE SENSOR
7
EVAP TEMP C628-23
OUTLET TEMPERATURE SENSOR
8
OUTLET TEMP C628-22
CAB TEMPERATURE SENSOR
9
CAB TEMP C628-21
OUTSIDE TEMPERATURE SENSOR
10
OUTSIDE TEMP C628-24
1
ATC CONTROL MODULE
GROUND
C628-18
CAN HIGH
CAN LOW
C628-2
C628-2
+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ADIC_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR ENABLED
COMPRESOR CLUTCH RELAY
11
COMPESSOR
C628-15
CLUTCH RELAY COIL
C628-5
BLOWER SPEED OUTPUT
BLOWER SPEED CONTROL
SIGNAL INPUT
CHASSIS GND
MOTOR GRD
POWER 12V
12
BLOWER UNIT
BLOWER MOTOR
13
C628-4
HEAT ACTUATOR POWER
C628-3
HEAT SIGNAL OUTPUT
WATER VALVE
POWER
SIGNAL
GROUND
14
C628-16
DEFOG O/P
15
DENOTES SENSOR SIGNAL GROUND
16
DENOTES CHASSIS GROUND
17
DENOTES POWER GROUND
CAN IMPLEMENT
CAN_BUS_1
CAN_BUS_EHR
A/C_PRESS_NOT_HI_SW
ICU2 SERVICE SW
CAN IMPLEMENT
CAN_BUS_1
CAN_BUS_EHR
ICU2 SERVICE SW

SS07F053 1

Control module - Electronic schema Steering system

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component designation	
1. Turn Assist electronic control unit	
2. Steering wheel monitor proximity switch	
3. Turn Assist ON/OFF switch	
4. LVDT sensor (position transmitter)	
5. Hydraulics solenoid valve	
6. Sensor signal ground	
7. Chassis ground	
8. Supply ground	


+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ICU2_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR ENABLED
+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ADIC_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR ENABLED
C515-C8
+12V_SWITCHED
C515-B8
+12V_HOT
2
STEERING WHEEL PROXIMITY SENSOR
PROXIMITY_SEN
C515-B4
3
FS_ACTIVE_LMP
C515-B1
LSD
FS_ENABLE_SW
C515-A1
FS_SAFETY_SW
C515-C4
FS_ENABLE_SW
1
FAST STEERING SYSTEM
CURSEN/LSD
C515-A6
FS_HYD_VALVE_SOL
HSD
C515-A2
FS_HYD_VALVE_RET
5
FS HYDRAULIC VALVE SOLENOID
CONECTOR C515
4
LVDT
LVDT_PRIMARY1
C515-C1
LVDT_PRIMARY2
C515-C2
LVDT_SECONDARY1
C515-B6
LVDT_SECONDARY2
C515-C3
LVDT_SECONDARY3
C515-B5
C515-B7
SERVICE_SW
C515-B3
RS232_IN
C515-A3
RS232_OUT
6
DENOTES SENSOR RETURN FOR
7
DENOTES CHASSIS GROUND
8
DENOTES POWER GROUND
CAN1_HI
CAN1_LO
C515-A4
C515-A5
C515-A7
C515-A8
C515-C5
CRANK_DETECT
PROVISION FOR
POWER GROUND
CAN BUS 1
CAN BUS_EHR
CAN BUS 1
CAN BUS_EHR
ICU2 SERVICE_SW
A/C_PRESS_NOT_HI_SW
CRANK_RELAY
ICU2 SERVICE_SW
A/C_PRESS_NOT_HI_SW

SS07F050 1

Control module - Electronic schema ISOBUS display

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component designation	
1. ISOBUS display	
2. Front ISOBUS instrument socket	
3. Sensor signal ground	
4. Chassis ground	
5. Supply ground	

+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ICU2_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR ENABLED

+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ADIC_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR ENABLED

2

ISOBUS
IMPLEMENT SIDE CONNECTIONS

FRONT BREAKAWAY CONNECTOR

PCB

TERM BREAKAWAY CON POWER
CAN_IMPLEMENT_HI
TERM BREAKAWAY CON RETURN
CAN_IMPLEMENT_LO

TWISTED QUAD

FROM MAXIFUSE (Fnn-20A)
POWER GROUND
IMPLMNT ECU_PWR
ECU POWER RELAY
IMPLMNT_PWR
FROM MAXIFUSE (Fnn-60A)
IMPLEMENT POWER RELAY
CHASSIS GND

TWISTED QUAD

TERM BREAKAWAY CON POWER
CAN_IMPLEMENT_HI
TERM BREAKAWAY CON RETURN
CAN_IMPLEMENT_LO
ECU_POWER_RELAY
IMPL_POWER_RELAY

+12V_SWITCHED C595-15
+12V_HOT C595-13
C595-6 CAN2H_IN
C595-5 CAN2LO_IN

1

ISO-BUS Display

12V
180R
C595-20 ENCODER_SUPPLY

C595-19
C595-17
C595-18
C595-11 SPEAKER+ N.U.
C595-12 SPEAKER- N.U.
C595-10 VT_RS232_IN N.U.
C595-9 VT_RS232_OUT N.U.
N.U.
C595-21 5V_USB_PWR
C595-22 USB+
C595-23 USB-
C595-24 USB_GND

Download connector (TBD)

USB CONNECTOR (Female)
Pin1
Pin3
Pin2
Pin4

3 DENOTES SENSOR RETURN FOR THIS MODULE ONLY.
4 DENOTES CHASSIS GROUND
5 DENOTES POWER GROUND

DENOTES CO-AXIAL CABLE.
BLUETOOTH INTERFACE.

N.U. COMP_VIDEO CN2
N.U.
VIDEO_INPUT_BNC
VIDEO_INPUT_GND

N.U. C595-7 SPARE
N.U. C595-8 SPARE
N.U. C595-16 SPARE
N.U. RESERVED1 C595-25
N.U. RESERVED2 C595-26

USB Female Connector (Mating face)
CN
26 way Connector

C595-14
POWER GROUND
CAN1_HI C595-1
CAN1_LO C595-2

CAN_BUS_1
CAN_BUS_EHR
ICU2 SERVICE SW
A/C_PRESS_NOT_HI_SW

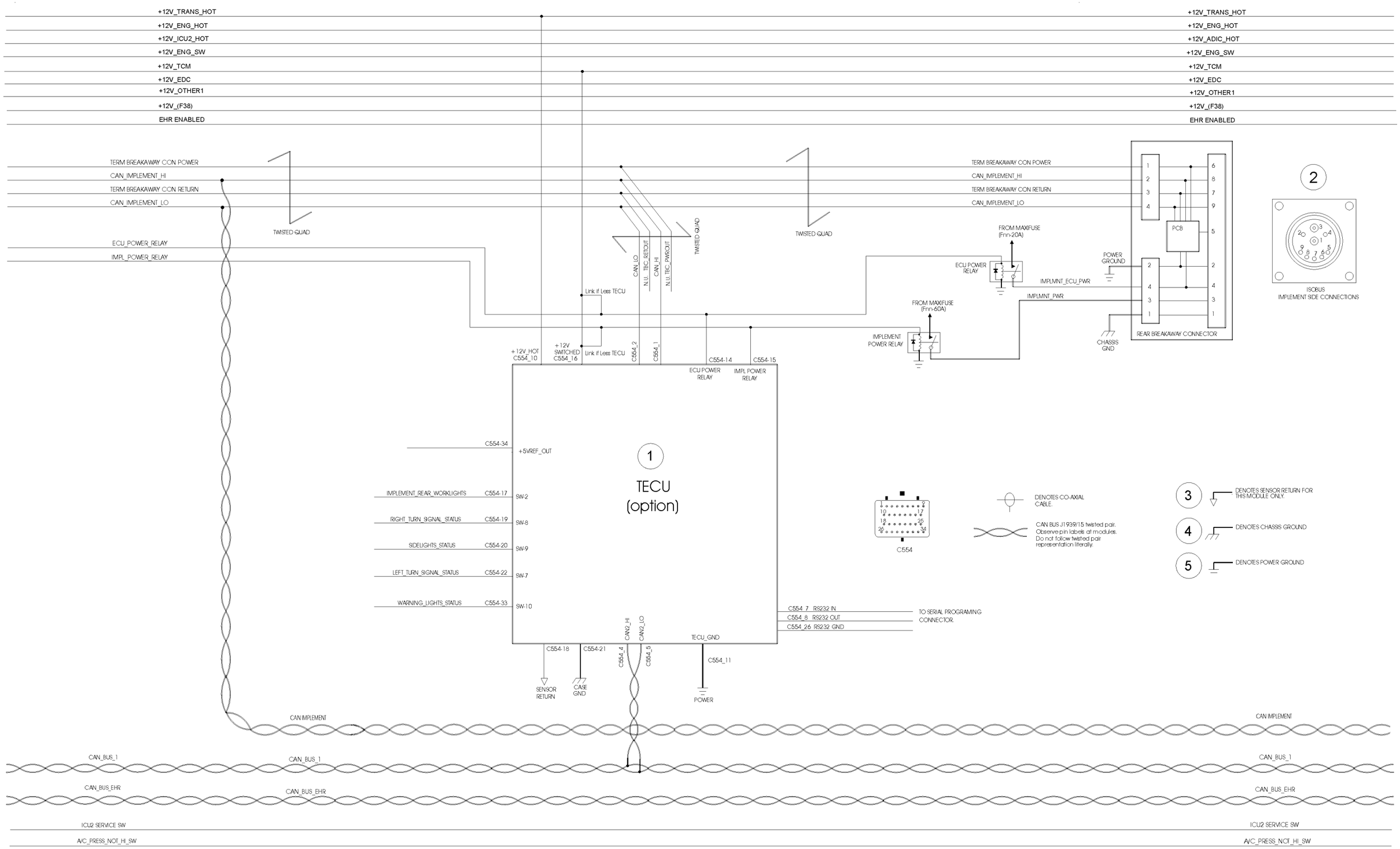
CAN_BUS_1
CAN_BUS_EHR
ICU2 SERVICE SW
A/C_PRESS_NOT_HI_SW

SS07F051 1

Control module - Electronic schema TECU module

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component designation	
1. TECU module	
2. Rear ISOBUS instrument socket	
3. Sensor signal ground	
4. Chassis ground	
5. Supply ground	

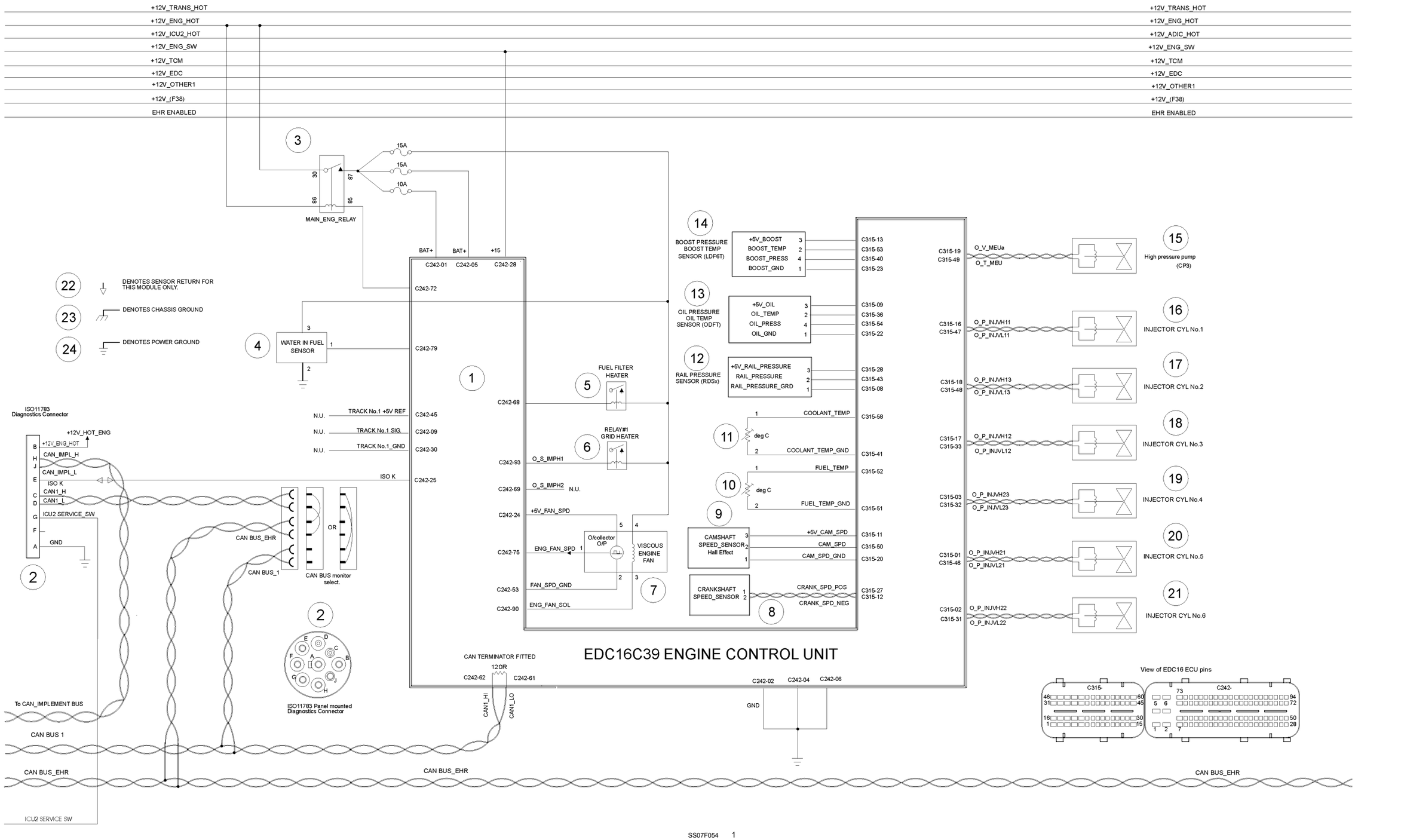

+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ICU2_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR ENABLED
TERM BREAKAWAY CON POWER
CAN_IMPLEMENT_HI
TERM BREAKAWAY CON RETURN
CAN_IMPLEMENT_LO
TWISTED QUAD
ECU_POWER_RELAY
IMPL_POWER_RELAY
CAN_LO
N.U. TBC_RETOUT
CAN_HI
N.U. TBC_PWROUT
Link if Less TECU
+12V HOT C554_10
+12V SWITCHED C554_16
C554_2
C554_1
C554-14
C554-15
ECU POWER RELAY
IMPL POWER RELAY
C554-34
+5VREF_OUT
IMPLEMENT_REAR_WORKLIGHTS C554-17 SW-2
RIGHT_TURN_SIGNAL_STATUS C554-19 SW-8
SIDELIGHTS_STATUS C554-20 SW-9
LEFT_TURN_SIGNAL_STATUS C554-22 SW-7
WARNING_LIGHTS_STATUS C554-33 SW-10
1
TECU
(option)
C554_7 RS232 IN
C554_8 RS232 OUT
C554_26 RS232 GND
TO SERIAL PROGRAMING CONNECTOR.
CAN2_HI
CAN2_LO
TECU_GND
C554-18
C554-21
C554_4
C554_5
C554_11
SENSOR RETURN
CASE GND
POWER
FROM MAXIFUSE (Fnn-20A)
ECU POWER RELAY
FROM MAXIFUSE (Fnn-60A)
IMPLEMENT POWER RELAY
IMPLMNT_ECU_PWR
IMPLMNT_PWR
POWER GROUND
CHASSIS GND
PCB
REAR BREAKAWAY CONNECTOR
2
ISOBUS IMPLEMENT SIDE CONNECTIONS
C554
DENOTES CO-AXIAL CABLE.
CAN BUS J1939/15 twisted pair. Observe pin labels at modules. Do not follow twisted pair representation literally.
3 DENOTES SENSOR RETURN FOR THIS MODULE ONLY.
4 DENOTES CHASSIS GROUND
5 DENOTES POWER GROUND
CAN IMPLEMENT
CAN_BUS_1
CAN_BUS_EHR
ICU2 SERVICE SW
A/C_PRESS_NOT_HI_SW

SS07F052 1

Control module - Electronic schema Engine control unit (EDC 16)

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component designation	
1. Engine control unit (EDC 16)	
2. Diagnostics plug	
3. Main relay	
4. Fuel filter water sensor	
5. Fuel preheater relay	
6. Heating element relay	
7. Viscofan	
8. Crankshaft speed sensor	
9. Camshaft speed sensor	
10. Fuel temperature sensor	
11. Coolant temperature sensor	
12. Rail pressure sensor	
13. Oil pressure/temperature sensor	
14. Boost pressure/temperature sensor	
15. Fuel flowmeter	
16. Injector, No. 1 cylinder	
17. Injector, No. 2 cylinder	
18. Injector, No. 3 cylinder	
19. Injector, No. 4 cylinder	
20. Injector, No. 5 cylinder	
21. Injector, No. 6 cylinder	
22. Sensors ground	
23. Chassis ground	
24. Supply ground	

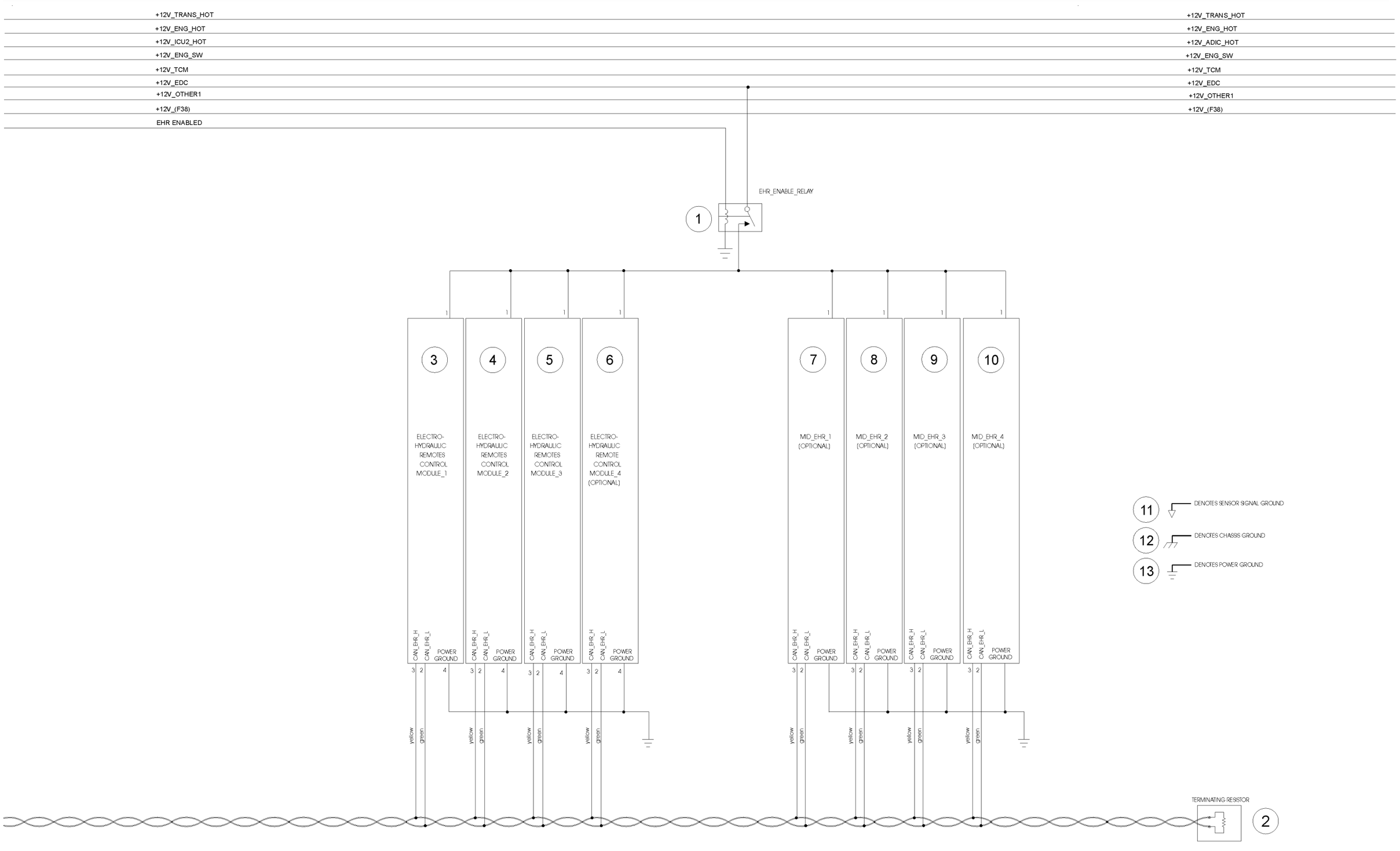

+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ICU2_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR ENABLED
+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ADIC_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR ENABLED
3
15A
15A
10A
30
87
86
85
MAIN_ENG_RELAY
BAT+
BAT+
+15
C242-01
C242-05
C242-28
C242-72
22
DENOTES SENSOR RETURN FOR THIS MODULE ONLY.
23
DENOTES CHASSIS GROUND
24
DENOTES POWER GROUND
4
WATER IN FUEL SENSOR
C242-79
1
C242-68
5
FUEL FILTER HEATER
ISO11783
Diagnostics Connector
N.U.
TRACK No.1 +5V REF
C242-45
N.U.
TRACK No.1 SIG
C242-09
N.U.
TRACK No.1_GND
C242-30
ISO K
C242-25
+12V_HOT_ENG
+12V_ENG_HOT
CAN_IMPL_H
CAN_IMPL_L
ISO K
CAN1_H
CAN1_L
ICU2 SERVICE_SW
GND
CAN BUS_EHR
CAN BUS_1
OR
CAN BUS monitor select.
2
RELAY#1 GRID HEATER
6
O_S_IMPH1
C242-93
O_S_IMPH2
N.U.
C242-69
+5V_FAN_SPD
C242-24
O/collector O/P
ENG_FAN_SPD
C242-75
VISCOUS ENGINE FAN
FAN_SPD_GND
C242-53
ENG_FAN_SOL
C242-90
7
14
BOOST PRESSURE BOOST TEMP SENSOR (LDF6T)
+5V_BOOST
BOOST_TEMP
BOOST_PRESS
BOOST_GND
C315-13
C315-53
C315-40
C315-23
13
OIL PRESSURE OIL TEMP SENSOR (ODFT)
+5V_OIL
OIL_TEMP
OIL_PRESS
OIL_GND
C315-09
C315-36
C315-54
C315-22
12
RAIL PRESSURE SENSOR (RDSx)
+5V_RAIL_PRESSURE
RAIL_PRESSURE
RAIL_PRESSURE_GRD
C315-28
C315-43
C315-08
11
COOLANT_TEMP
deg C
COOLANT_TEMP_GND
C315-58
C315-41
10
FUEL_TEMP
deg C
FUEL_TEMP_GND
C315-52
C315-51
9
CAMSHAFT SPEED_SENSOR Hall Effect
+5V_CAM_SPD
CAM_SPD
CAM_SPD_GND
C315-11
C315-50
C315-20
CRANKSHAFT SPEED_SENSOR
CRANK_SPD_POS
CRANK_SPD_NEG
C315-27
C315-12
8
C315-19
C315-49
O_V_MEUa
O_T_MEU
15
High pressure pump (CP3)
C315-16
C315-47
O_P_INJVH11
O_P_INJVL11
16
INJECTOR CYL No.1
C315-18
C315-48
O_P_INJVH13
O_P_INJVL13
17
INJECTOR CYL No.2
C315-17
C315-33
O_P_INJVH12
O_P_INJVL12
18
INJECTOR CYL No.3
C315-03
C315-32
O_P_INJVH23
O_P_INJVL23
19
INJECTOR CYL No.4
C315-01
C315-46
O_P_INJVH21
O_P_INJVL21
20
INJECTOR CYL No.5
C315-02
C315-31
O_P_INJVH22
O_P_INJVL22
21
INJECTOR CYL No.6
EDC16C39 ENGINE CONTROL UNIT
CAN TERMINATOR FITTED
120R
C242-62
C242-61
CAN1_HI
CAN1_LO
C242-02
C242-04
C242-06
GND
View of EDC16 ECU pins
C315-
C242-
To CAN_IMPLEMENT BUS
CAN BUS 1
CAN BUS_EHR
CAN BUS_EHR
CAN BUS_EHR
ICU2 SERVICE SW
ISO11783 Panel mounted Diagnostics Connector

SS07F054 1

Control module - Electronic schema Electrohydraulic supplementary controllers - EDC

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Component designation	
1. Supply relay EDCs	
2. CAN BUS terminating resistor	
3. EDC 1 rear	
4. EDC 2 rear	
5. EDC 3 rear	
6. EDC 4 rear	
7. EDC 1 FRONT (MID)	
8. EDC 2 FRONT (MID)	
9. EDC 3 FRONT (MID)	
10. EDC 4 FRONT (MID)	
11. Sensor signal ground	
12. Chassis ground	
13. Supply ground	


+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ICU2_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR ENABLED
+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ADIC_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
EHR_ENABLE_RELAY
1
3
4
5
6
7
8
9
10
ELECTRO-HYDRAULIC REMOTES CONTROL MODULE_1
ELECTRO-HYDRAULIC REMOTES CONTROL MODULE_2
ELECTRO-HYDRAULIC REMOTES CONTROL MODULE_3
ELECTRO-HYDRAULIC REMOTE CONTROL MODULE_4 (OPTIONAL)
MID_EHR_1 (OPTIONAL)
MID_EHR_2 (OPTIONAL)
MID_EHR_3 (OPTIONAL)
MID_EHR_4 (OPTIONAL)
CAN_EHR_H
CAN_EHR_L
POWER GROUND
yellow
green
11 DENOTES SENSOR SIGNAL GROUND
12 DENOTES CHASSIS GROUND
13 DENOTES POWER GROUND
TERMINATING RESISTOR
2

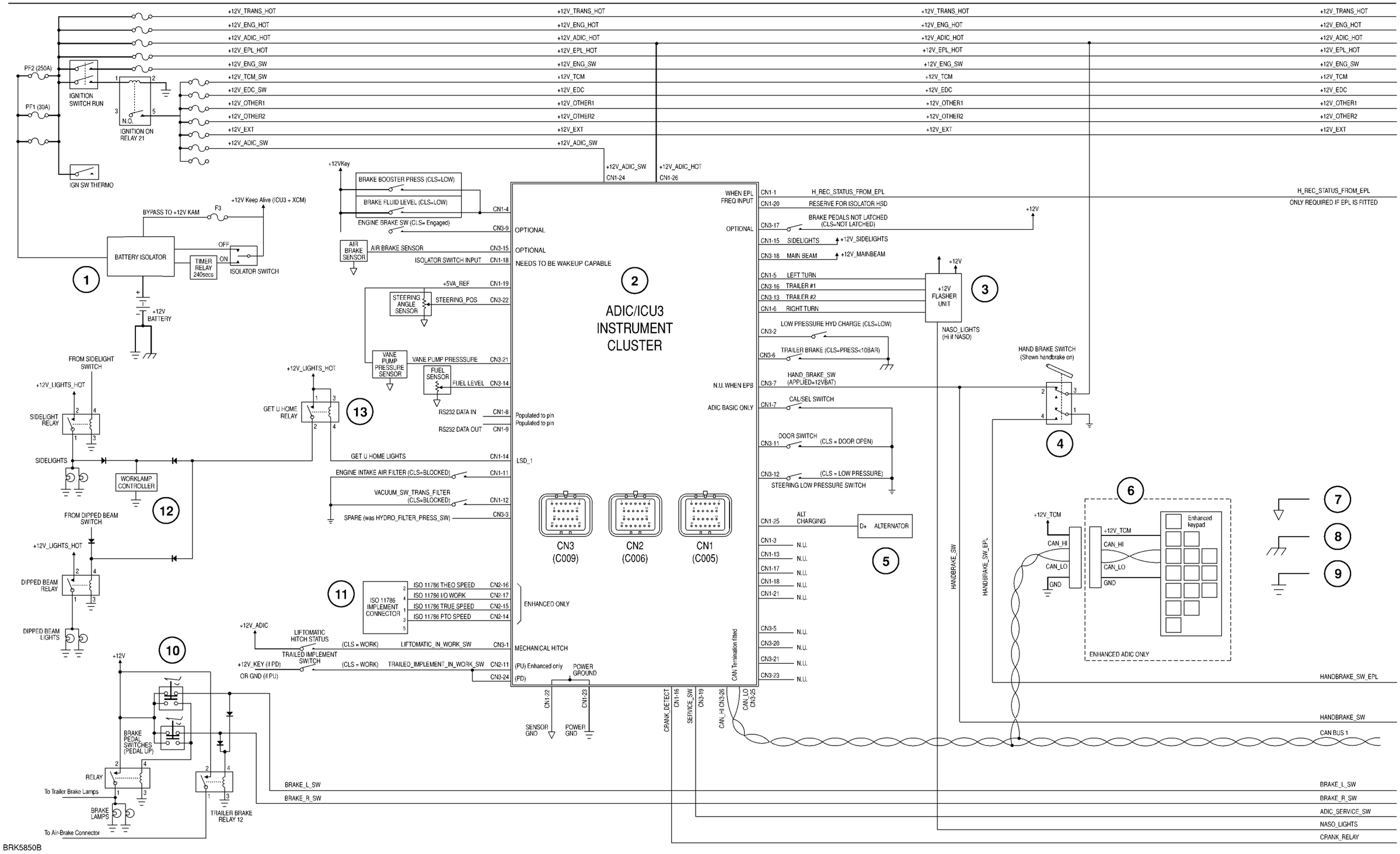
SS07F055 1

Control module - Electronic schema Instrument Cluster - ICU3 Module IE

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component Identification

1. BATTERY ISOLATOR
2. INSTRUMENT CLUSTER ASSEMBLY
3. INDICATOR FLASHER UNIT
4. HANDBRAKE SWITCH
5. ALTERNATOR
6. ENHANCED KEYPAD
7. SENSOR SIGNAL GROUND
8. CHASSIS GROUND
9. POWER GROUND
10. BRAKE PEDAL SWITCHES AND TRAILER BRAKE RELAYS
11. IMPLEMENT CONNECTOR
12. WORKLAMP CONTROLLER
13. GET-U-HOME LIGHTS RELAY



BRK5850B

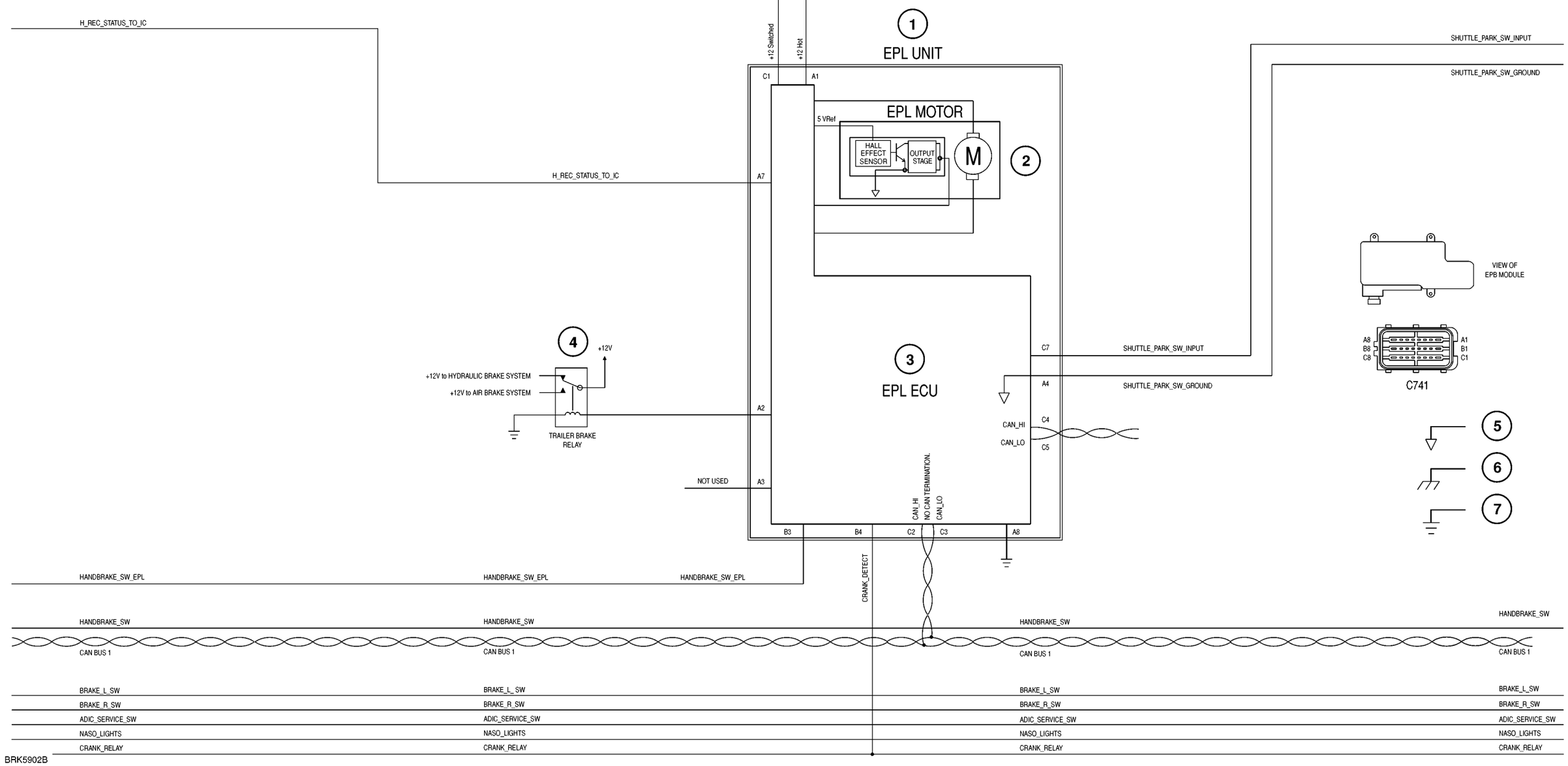
14_BRK5903 1

Control module - Electronic schema Electronic Park Lock (EPL) - Module XA

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component Identification	
1. EPL unit (Module and motor assembly)	
2. EPL Motor	
3. EPL Module	
4. Trailer Brake Relay	
5. Sensor Signal Ground	
6. Chassis Ground	
7. Power Ground	

+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT
+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT
+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT
+12V_EPL_HOT	+12V_EPL_HOT	+12V_EPL_HOT	+12V_EPL_HOT
+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW
+12V_TCM_SW	+12V_TCM	+12V_TCM	+12V_TCM
+12V_EDC_SW	+12V_EDC	+12V_EDC	+12V_EDC
+12V_OTHER1	+12V_OTHER1	+12V_OTHER1	+12V_OTHER1
+12V_(F38)	+12V_(F38)	+12V_(F38)	+12V_(F38)
+12V_EXT	+12V_EXT	+12V_EXT	+12V_EXT



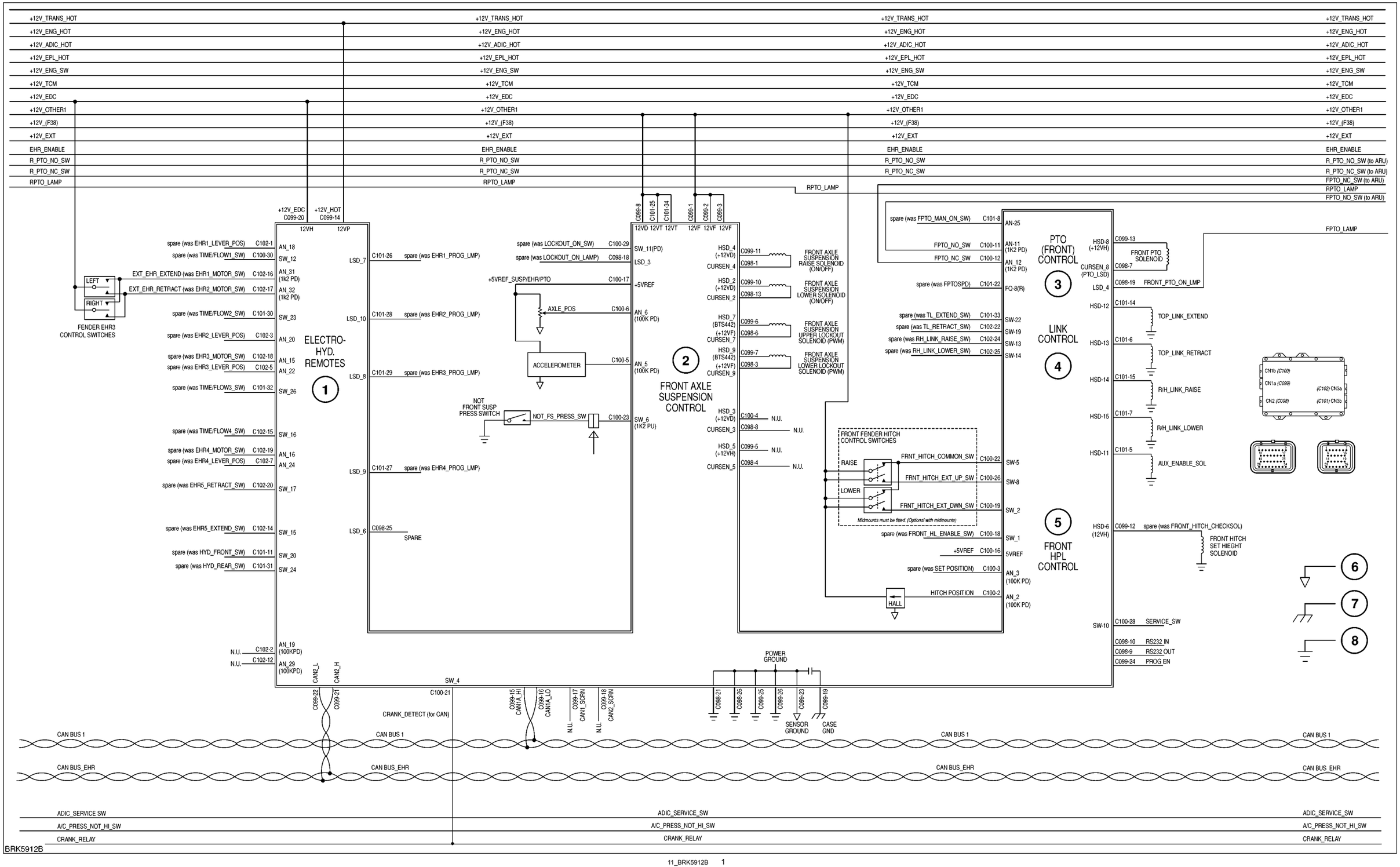
BRK5902B

13_BRK5902B 1

Control module - Electronic schema Auxiliary Control Unit (RM module)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component Identification	
1. Electro-Hydraulic Remotes (EHR's)	
2. Front Axle Suspension Control	
3. PTO (front) Control	
4. Top Link Lift Rod Control	
5. Front Hydraulic Power Lift (HPL) Control	
6. Sensor Signal Ground	
7. Chassis Ground	
8. Power Ground	

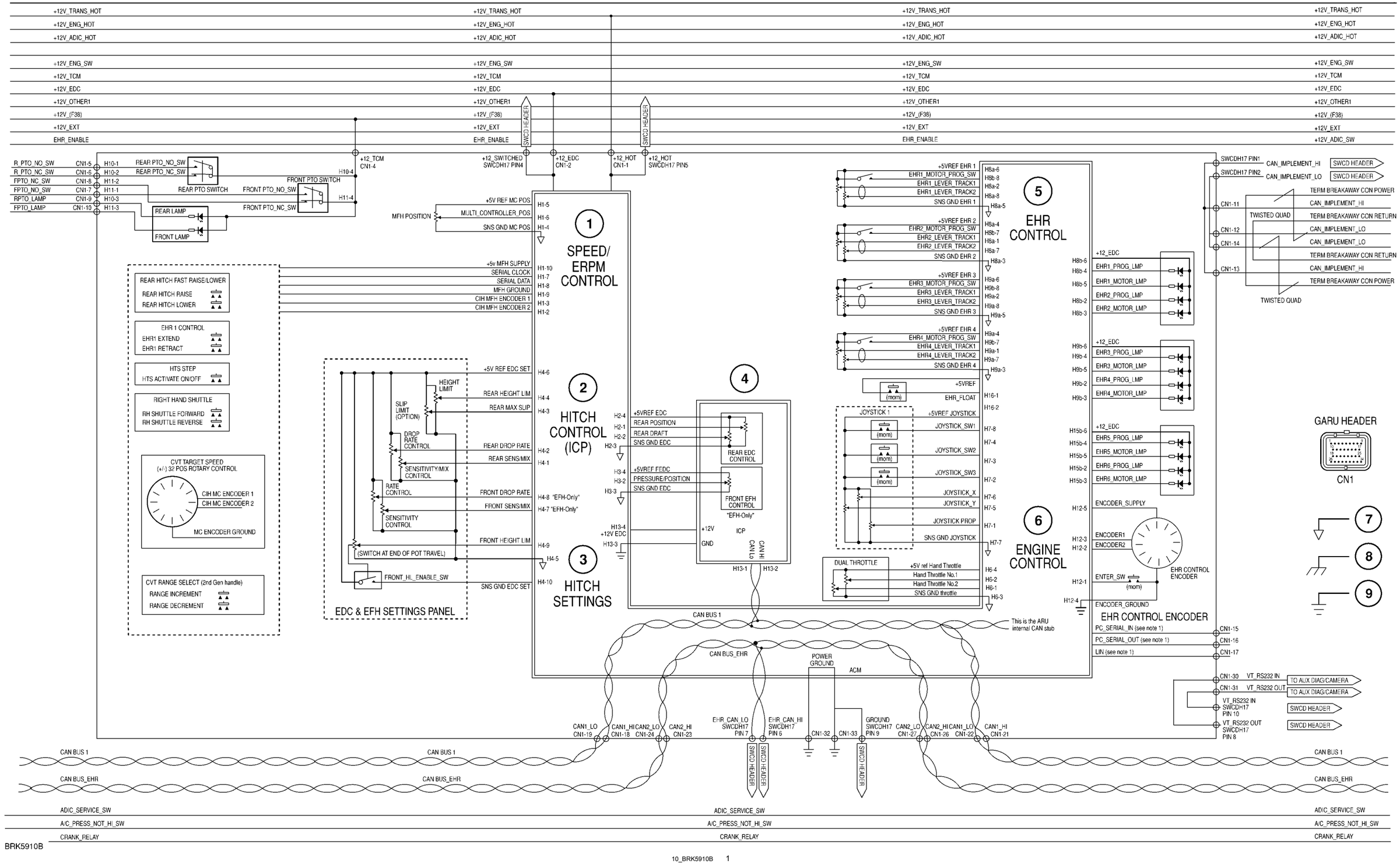


11_BRK5912B 1

Control module - Electronic schema Arm Rest Control Unit (LC module)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component Identification	
1. Arm Rest Control Unit	
2. Speed / Engine RPM Control	
3. Hitch Control (Integrated Control Panel)	
4. Hitch Settings	
5. Electronic Draft Control and Electronic Front Hitch Settings Panel	
6. Electro Hydraulic Remotes Control	
7. Engine Control	
8. Multi Function Handle controller	
9. Rear PTO and Front PTO Lamps	
10. Rear PTO Switch	
11. Front PTO Switch	
12. Sensor Ground	
13. Chassis Ground	
14. Power Ground	


+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ADIC_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
+12V_EXT
EHR_ENABLE
+12V_ADIC_SW
SWCD HEADER
+12_TCM CN1-4
+12_SWITCHED SWCDH17 PIN4
+12_EDC CN1-2
+12_HOT CN1-1
+12_HOT SWCDH17 PIN5
R_PTO_NO_SW CN1-5 H10-1
R_PTO_NC_SW CN1-6 H10-2
FPTO_NC_SW CN1-8 H11-2
FPTO_NO_SW CN1-7 H11-1
RPTO_LAMP CN1-9 H10-3
FPTO_LAMP CN1-10 H11-3
REAR PTO_NO_SW
REAR PTO_NC_SW
REAR PTO SWITCH
FRONT PTO SWITCH
FRONT PTO_NO_SW
FRONT PTO_NC_SW
H10-4
H11-4
REAR LAMP
FRONT LAMP
MFH POSITION
+5V REF MC POS
MULTI_CONTROLLER_POS
SNS GND MC POS
H1-5
H1-6
H1-4
1
SPEED/ ERPM CONTROL
+5V MFH SUPPLY
SERIAL CLOCK
SERIAL DATA
MFH GROUND
CIH MFH ENCODER 1
CIH MFH ENCODER 2
H1-10
H1-7
H1-8
H1-9
H1-3
H1-2
REAR HITCH FAST RAISE/LOWER
REAR HITCH RAISE
REAR HITCH LOWER
EHR 1 CONTROL
EHR1 EXTEND
EHR1 RETRACT
HTS STEP
HTS ACTIVATE ON/OFF
RIGHT HAND SHUTTLE
RH SHUTTLE FORWARD
RH SHUTTLE REVERSE
CVT TARGET SPEED (+/-) 32 POS ROTARY CONTROL
CIH MC ENCODER 1
CIH MC ENCODER 2
MC ENCODER GROUND
CVT RANGE SELECT (2nd Gen handle)
RANGE INCREMENT
RANGE DECREMENT
+5V REF EDC SET
REAR HEIGHT LIM
REAR MAX SLIP
REAR DROP RATE
REAR SENS/MIX
FRONT DROP RATE
FRONT SENS/MIX
FRONT HEIGHT LIM
SNS GND EDC SET
HEIGHT LIMIT
SLIP LIMIT (OPTION)
DROP RATE CONTROL
SENSITIVITY/MIX CONTROL
RATE CONTROL
SENSITIVITY CONTROL
(SWITCH AT END OF POT TRAVEL)
FRONT_HI_ENABLE_SW
EDC & EFH SETTINGS PANEL
H4-6
H4-4
H4-3
H4-2
H4-1
H4-8 "EFH-Only"
H4-7 "EFH-Only"
H4-9
H4-5
H4-10
2
HITCH CONTROL (ICP)
3
HITCH SETTINGS
+5VREF EDC
REAR POSITION
REAR DRAFT
SNS GND EDC
+5VREF FEDC
PRESSURE/POSITION
SNS GND EDC
H2-4
H2-1
H2-2
H2-3
H3-4
H3-2
H3-3
REAR EDC CONTROL
FRONT EFH CONTROL
"EFH-Only"
+12V
GND
ICP
CAN Lo
CAN HI
H13-4
+12V EDC
H13-3
H13-1
H13-2
4
+5VREF EHR 1
EHR1_MOTOR_PROG_SW
EHR1_LEVER_TRACK1
EHR1_LEVER_TRACK2
SNS GND EHR 1
+5VREF EHR 2
EHR2_MOTOR_PROG_SW
EHR2_LEVER_TRACK1
EHR2_LEVER_TRACK2
SNS GND EHR 2
+5VREF EHR 3
EHR3_MOTOR_PROG_SW
EHR3_LEVER_TRACK1
EHR3_LEVER_TRACK2
SNS GND EHR 3
+5VREF EHR 4
EHR4_MOTOR_PROG_SW
EHR4_LEVER_TRACK1
EHR4_LEVER_TRACK2
SNS GND EHR 4
+5VREF
(mom)
EHR_FLOAT
H8a-6
H8b-8
H8a-2
H8a-8
H8a-5
H8a-4
H8b-7
H8a-1
H8a-7
H8a-3
H9a-6
H9b-8
H9a-2
H9a-8
H9a-5
H9a-4
H9b-7
H9a-1
H9a-7
H9a-3
H16-1
H16-2
5
EHR CONTROL
+12_EDC
EHR1_PROG_LMP
EHR1_MOTOR_LMP
EHR2_PROG_LMP
EHR2_MOTOR_LMP
EHR3_PROG_LMP
EHR3_MOTOR_LMP
EHR4_PROG_LMP
EHR4_MOTOR_LMP
H8b-6
H8b-4
H8b-5
H8b-2
H8b-3
H9b-6
H9b-4
H9b-5
H9b-2
H9b-3
JOYSTICK 1
(mom)
+5VREF JOYSTICK
JOYSTICK_SW1
JOYSTICK_SW2
JOYSTICK_SW3
JOYSTICK_X
JOYSTICK_Y
JOYSTICK PROP
SNS GND JOYSTICK
H7-8
H7-4
H7-3
H7-2
H7-6
H7-5
H7-1
H7-7
DUAL THROTTLE
+5V ref Hand Throttle
Hand Throttle No.1
Hand Throttle No.2
SNS GND throttle
H6-4
H6-2
H6-1
H6-3
6
ENGINE CONTROL
+12_EDC
EHR5_PROG_LMP
EHR5_MOTOR_LMP
EHR6_PROG_LMP
EHR6_MOTOR_LMP
H15b-6
H15b-4
H15b-5
H15b-2
H15b-3
ENCODER_SUPPLY
ENCODER1
ENCODER2
ENTER_SW
(mom)
ENCODER_GROUND
H12-5
H12-3
H12-2
H12-1
H12-4
EHR CONTROL ENCODER
SWCDH17 PIN1
SWCDH17 PIN2
CAN_IMPLEMENT_HI
CAN_IMPLEMENT_LO
CN1-11
CN1-12
CN1-14
CN1-13
TWISTED QUAD
TERM BREAKAWAY CON POWER
CAN_IMPLEMENT_HI
TERM BREAKAWAY CON RETURN
CAN_IMPLEMENT_LO
CAN_IMPLEMENT_LO
TERM BREAKAWAY CON RETURN
CAN_IMPLEMENT_HI
TERM BREAKAWAY CON POWER
GARU HEADER
CN1
7
8
9
CAN BUS 1
This is the ARU internal CAN stub
CAN BUS_EHR
POWER GROUND
ACM
PC_SERIAL_IN (see note 1)
PC_SERIAL_OUT (see note 1)
LIN (see note 1)
CN1-15
CN1-16
CN1-17
CN1-30 VT_RS232 IN
CN1-31 VT_RS232 OUT
TO AUX DIAG/CAMERA
VT_RS232 IN SWCDH17 PIN 10
VT_RS232 OUT SWCDH17 PIN 8
SWCD HEADER
CAN1_LO CN1-19
CAN1_HI CN1-18
CAN2_LO CN1-24
CAN2_HI CN1-23
EHR_CAN_LO SWCDH17 PIN 7
EHR_CAN_HI SWCDH17 PIN 6
CN1-32
CN1-33
GROUND SWCDH17 PIN 9
CAN2_LO CN1-27
CAN2_HI CN1-26
CAN1_LO CN1-22
CAN1_HI CN1-21
ADIC_SERVICE_SW
A/C_PRESS_NOT_HI_SW
CRANK_RELAY
BRK5910B
10_BRK5910B 1

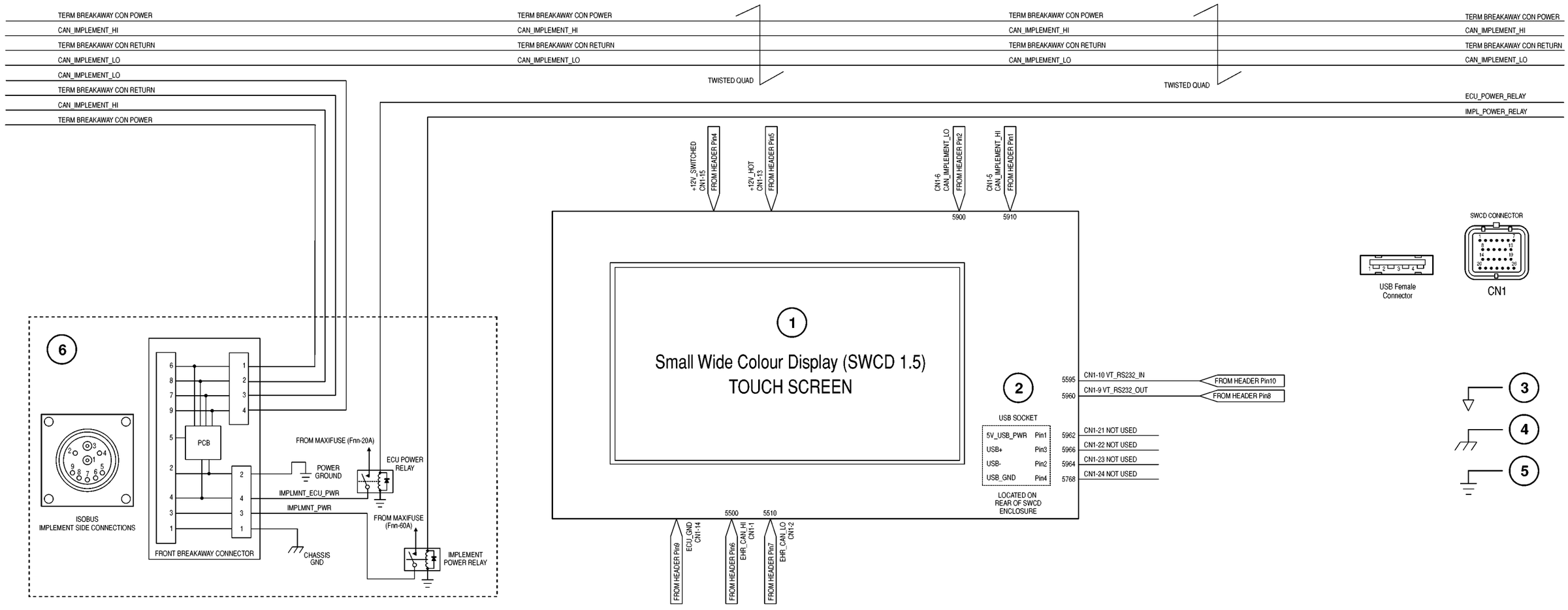
Control module - Electronic schema Small Wide Colour Display

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component Identification	
1. Small Wide Colour Display (SWCD screen)	
2. USB Socket	
3. Sensor Ground	
4. Chassis Ground	
5. Power Ground	
6. ISO BUS implement Connector	

+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT
+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT
+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT
+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW
+12V_TCM	+12V_TCM	+12V_TCM	+12V_TCM
+12V_EDC	+12V_EDC	+12V_EDC	+12V_EDC
+12V_OTHER1	+12V_OTHER1	+12V_OTHER1	+12V_OTHER1
+12V_(F38)	+12V_(F38)	+12V_(F38)	+12V_(F38)
+12V_EXT	+12V_EXT	+12V_EXT	+12V_EXT
EHR_ENABLE	EHR_ENABLE	EHR_ENABLE	EHR_ENABLE

TERM BREAKAWAY CON POWER	TERM BREAKAWAY CON POWER	TERM BREAKAWAY CON POWER	TERM BREAKAWAY CON POWER
CAN_IMPLEMENT_HI	CAN_IMPLEMENT_HI	CAN_IMPLEMENT_HI	CAN_IMPLEMENT_HI
TERM BREAKAWAY CON RETURN	TERM BREAKAWAY CON RETURN	TERM BREAKAWAY CON RETURN	TERM BREAKAWAY CON RETURN
CAN_IMPLEMENT_LO	CAN_IMPLEMENT_LO	CAN_IMPLEMENT_LO	CAN_IMPLEMENT_LO
CAN_IMPLEMENT_LO	TWISTED QUAD	TWISTED QUAD	
TERM BREAKAWAY CON RETURN			ECU_POWER_RELAY
CAN_IMPLEMENT_HI			IMPL_POWER_RELAY
TERM BREAKAWAY CON POWER			



CAN_BUS_1	CAN_BUS_1	CAN_BUS_1
CAN_BUS_EHR	CAN BUS_EHR	CAN_BUS_EHR
	VT_RS232_OUT	
ADIC_SERVICE_SW	ADIC_SERVICE_SW	ADIC_SERVICE_SW
A/C_PRESS_NOT_HI_SW	A/C_PRESS_NOT_HI_SW	A/C_PRESS_NOT_HI_SW
CRANK_RELAY	CRANK_RELAY	CRANK_RELAY

BRK5907B

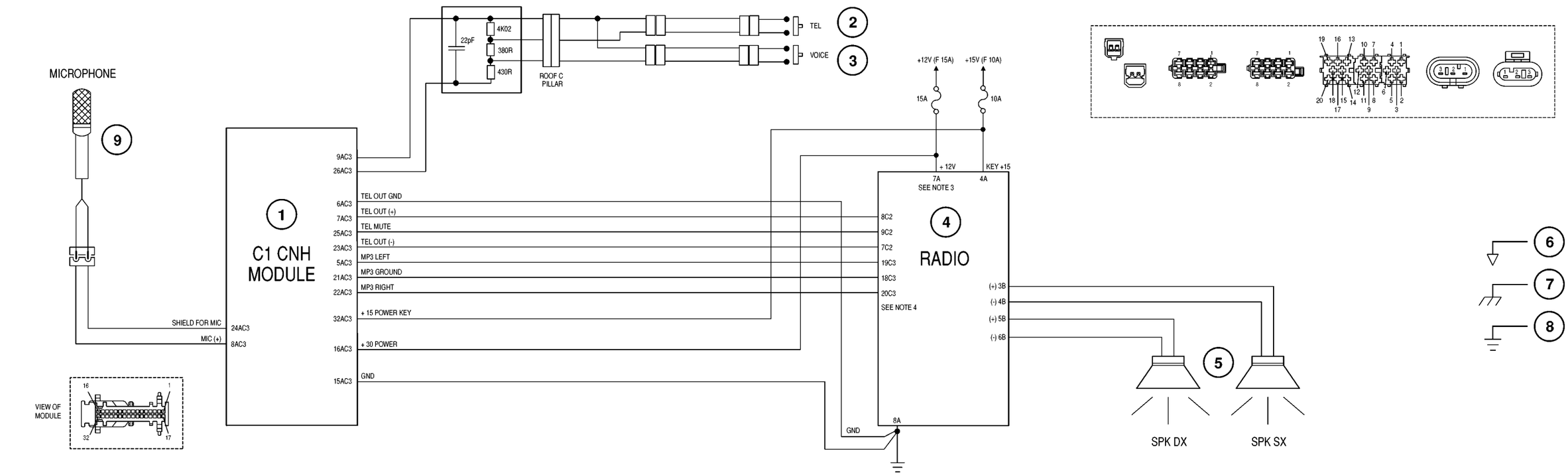
9_BRK5907B 1

Control module - Electronic schema Radio and Hands Free module

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component designation	
1. Hands Free Module	
2. Phone Button	
3. Voice Button	
4. Radio	
5. Speakers	
6. Sensor Ground	
7. Chassis Ground	
8. Power Ground	
9. Microphone	

+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT
+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT
+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT
+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW
+12V_TCM	+12V_TCM	+12V_TCM	+12V_TCM
+12V_EDC	+12V_EDC	+12V_EDC	+12V_EDC
+12V_OTHER1	+12V_OTHER1	+12V_OTHER1	+12V_OTHER1
+12V_(F38)	+12V_(F38)	+12V_(F38)	+12V_(F38)
+12V_EXT	+12V_EXT	+12V_EXT	+12V_EXT
EHR_ENABLE	EHR_ENABLE	EHR_ENABLE	+12V_ADIC_SW
TERM BREAKAWAY CON POWER	TERM BREAKAWAY CON POWER	TERM BREAKAWAY CON POWER	TERM BREAKAWAY CON POWER
CAN_IMPLEMENT_HI	CAN_IMPLEMENT_HI	CAN_IMPLEMENT_HI	CAN_IMPLEMENT_HI
TERM BREAKAWAY CON RETURN	TERM BREAKAWAY CON RETURN	TERM BREAKAWAY CON RETURN	TERM BREAKAWAY CON RETURN
CAN_IMPLEMENT_LO	CAN_IMPLEMENT_LO	CAN_IMPLEMENT_LO	CAN_IMPLEMENT_LO
ECU_POWER_RELAY	ECU_POWER_RELAY	ECU_POWER_RELAY	ECU_POWER_RELAY
IMPL_POWER_RELAY	IMPL_POWER_RELAY	IMPL_POWER_RELAY	IMPL_POWER_RELAY



CAN BUS 1		
CAN BUS_EHR		CAN BUS_EHR
ADIC_SERVICE SW	ADIC_SERVICE SW	ADIC_SERVICE SW
A/C_PRESS_NOT_HI_SW	A/C_PRESS_NOT_HI_SW	A/C_PRESS_NOT_HI_SW
CRANK_RELAY	CRANK_RELAY	CRANK_RELAY

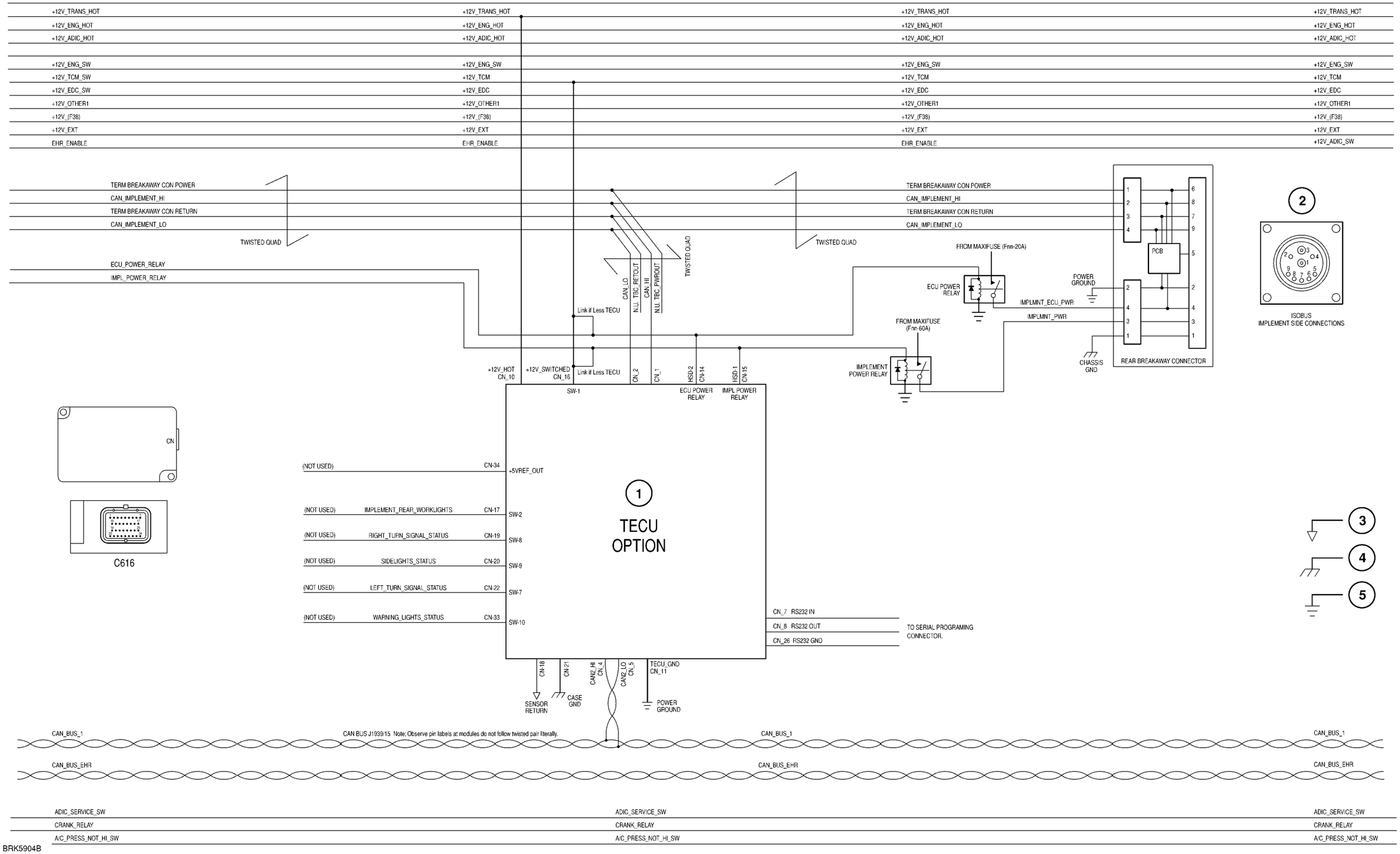
BRK5904B

7_BRK5908B 1

Control module - Electronic schema Tractor Electronic Control Unit (TECU)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component designation	
1. TECU Module	
2. ISO BUS implement connector	
3. Sensor ground	
4. Chassis ground	
5. Supply ground	



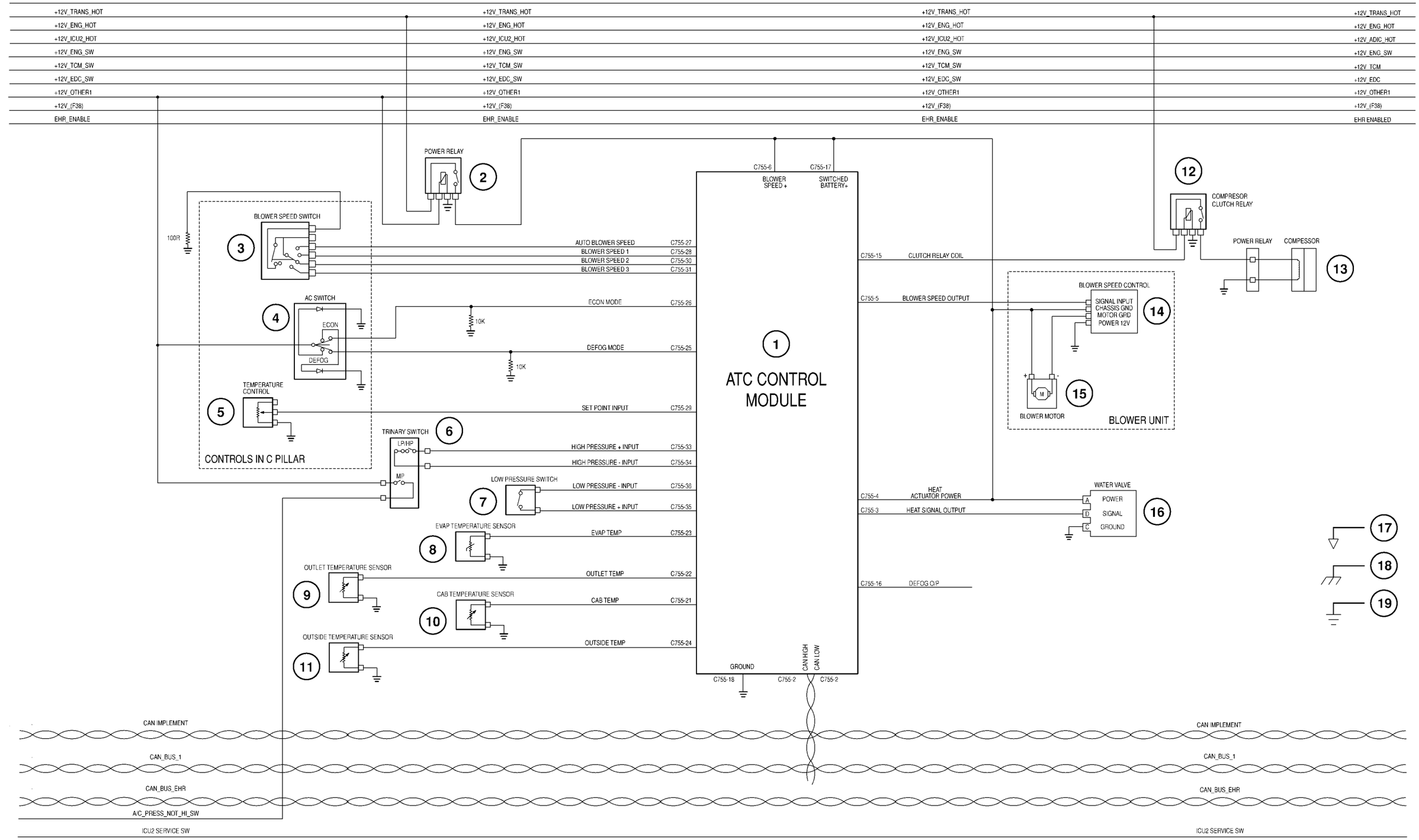
BRK5904B

6_BRK5904B 1

Control module - Electronic schema Automatic Temperature Control

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component designation	
1. Climate control module	
2. Power Relay	
3. Blower speed switch	
4. Air conditioning switch	
5. Temperature transmitter	
6. High pressure switch	
7. Low pressure switch	
8. Evaporator temperature sensor	
9. Outlet temperature sensor	
10. Cab temperature sensor	
11. Outside temperature sensor	
12. A/C compressor clutch relay	
13. Compressor	
14. Blower speed control	
15. Blower motor	
16. Water valve	
17. Sensor Ground	
18. Chassis Ground	
19. Power Ground	



BRK5909B

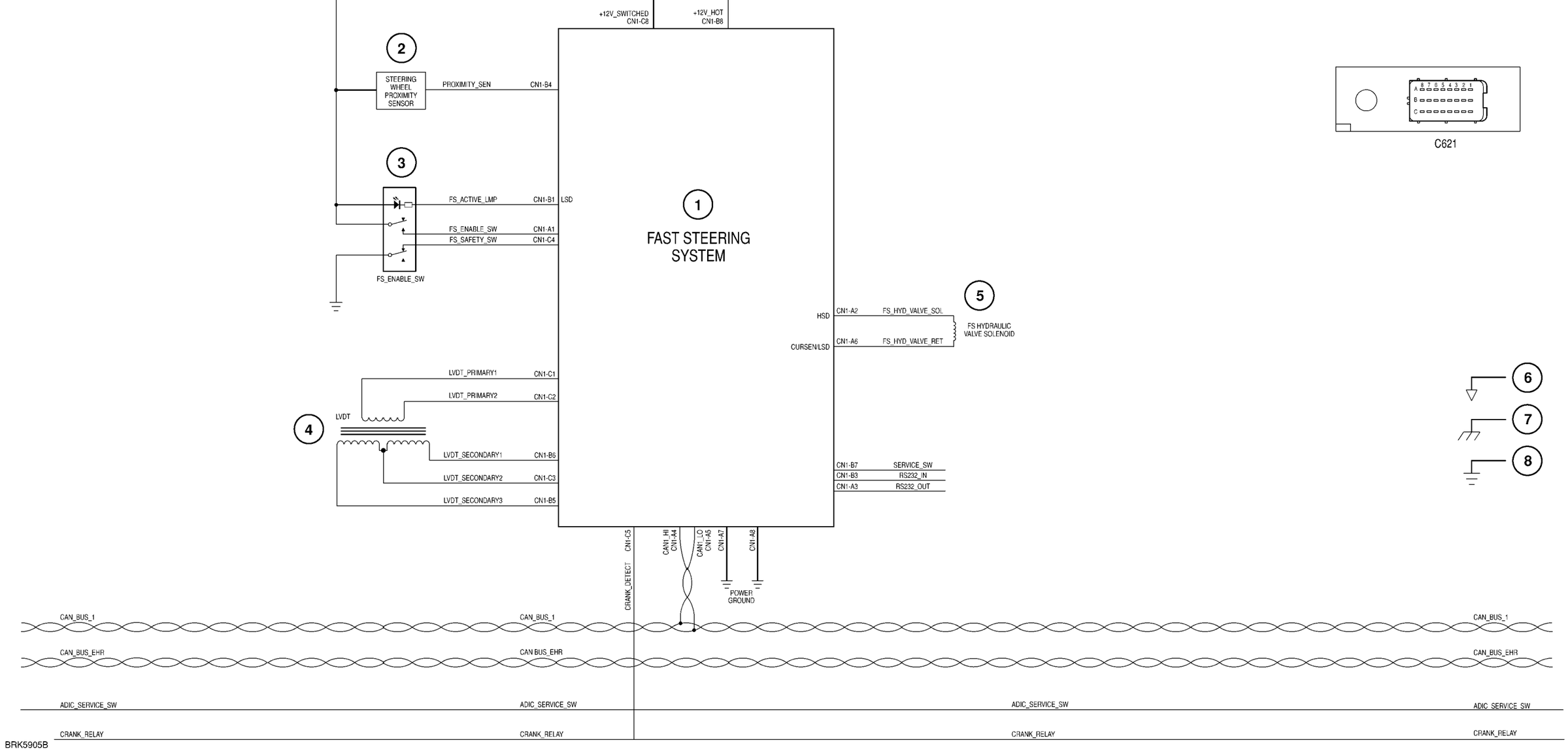
5_BRK5909C 1

Control module - Electronic schema Fast Steer (KA Module)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component designation	
1. Turn Assist electronic control unit	
2. Steering wheel monitor proximity switch	
3. Turn Assist ON/OFF switch	
4. LVDT sensor (position transmitter)	
5. Hydraulics solenoid valve	
6. Sensor signal ground	
7. Chassis ground	
8. Supply ground	

+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT
+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT
+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT
+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW
+12V_TCM	+12V_TCM	+12V_TCM	+12V_TCM
+12V_EDC	+12V_EDC	+12V_EDC	+12V_EDC
+12V_OTHER1	+12V_OTHER1	+12V_OTHER1	+12V_OTHER1
+12V_(F38)	+12V_(F38)	+12V_(F38)	+12V_(F38)
+12V_EXT	+12V_EXT	+12V_EXT	+12V_EXT
EHR_ENABLE	EHR_ENABLE	EHR_ENABLE	+12V_ADIC_SW



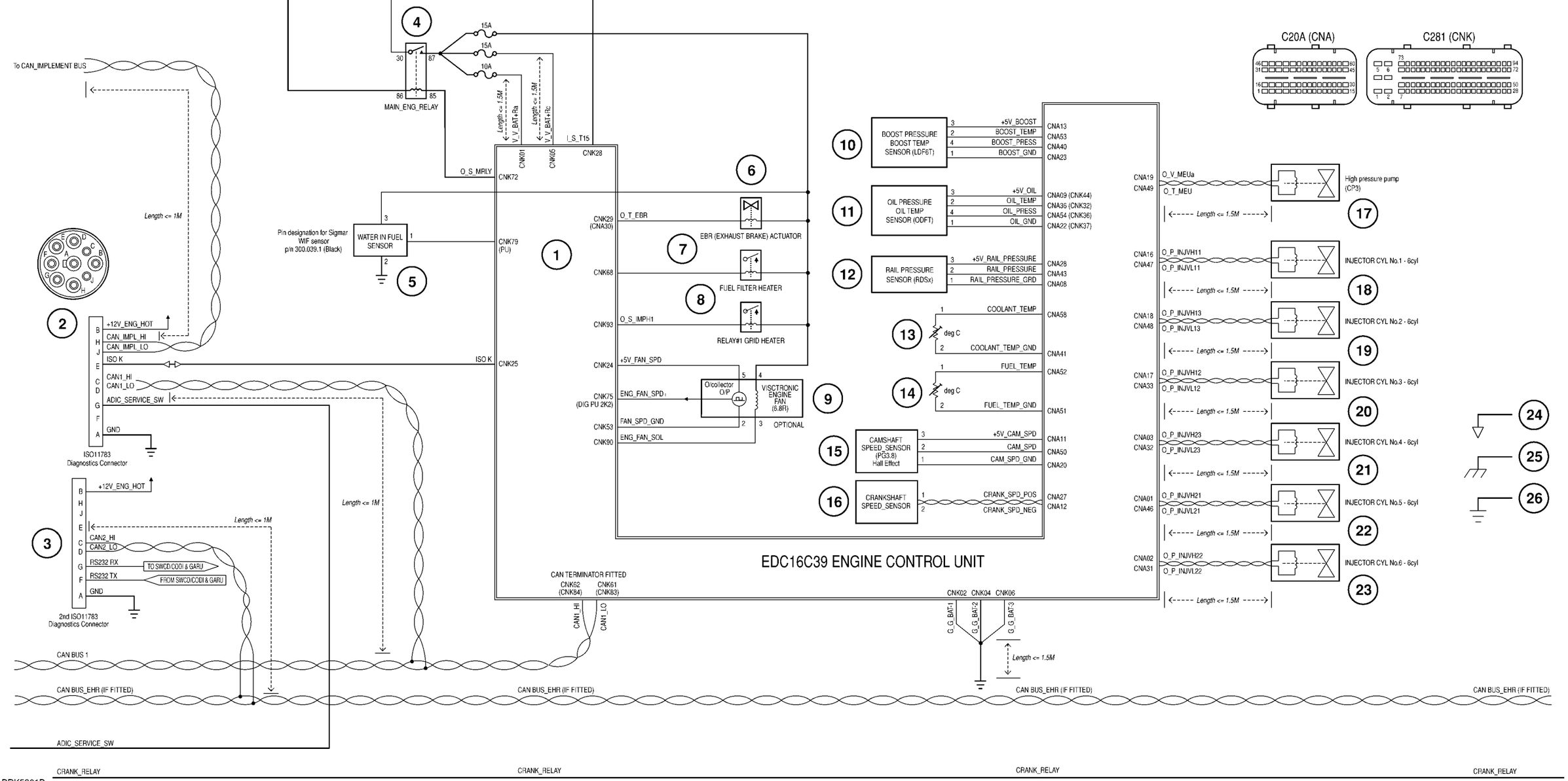
C621

Control module - Electronic schema Engine control Module (EDC 16)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component designation	
1. Engine control module(EDC 16)	
2. Diagnostics plug - CAN 1	
3. Diagnostics plug CAN 2	
4. Main relay	
5. Fuel filter water sensor	
6. EBR (Exhaust Brake) actuator	
7. Fuel filter heater relay	
8. Heating element relay	
9. Vistronic fan	
10. Boost pressure / boost temperature sensor	
11. Oil pressure / oil temperature sensor	
12. Rail pressure sensor	
13. Coolant temperature sensor	
14. Fuel temperature sensor	
15. Camshaft speed sensor	
16. Crankshaft speed sensor	
17. High pressure pump	
18. Injector, No. 1 cylinder	
19. Injector, No. 2 cylinder	
20. Injector, No. 3 cylinder	
21. Injector, No. 4 cylinder	
22. Injector, No. 5 cylinder	
23. Injector, No. 6 cylinder	
24. Sensors ground	
25. Chassis ground	
26. Supply ground	

+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT
+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT
+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT
+12V_EPL_HOT	+12V_EPL_HOT	+12V_EPL_HOT	+12V_EPL_HOT
+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW
+12V_TCM_SW	+12V_TCM	+12V_TCM	+12V_TCM
+12V_EDC_SW	+12V_EDC	+12V_EDC	+12V_EDC
+12V_OTHER1	+12V_OTHER1	+12V_OTHER1	+12V_OTHER1
+12V_OTHER2	+12V_OTHER2	+12V_OTHER2	+12V_OTHER2
+12V_EXT	+12V_EXT	+12V_EXT	+12V_EXT
+12V_ADIC_SW	+12V_ADIC_SW	+12V_ADIC_SW	+12V_ADIC_SW



BRK5901B

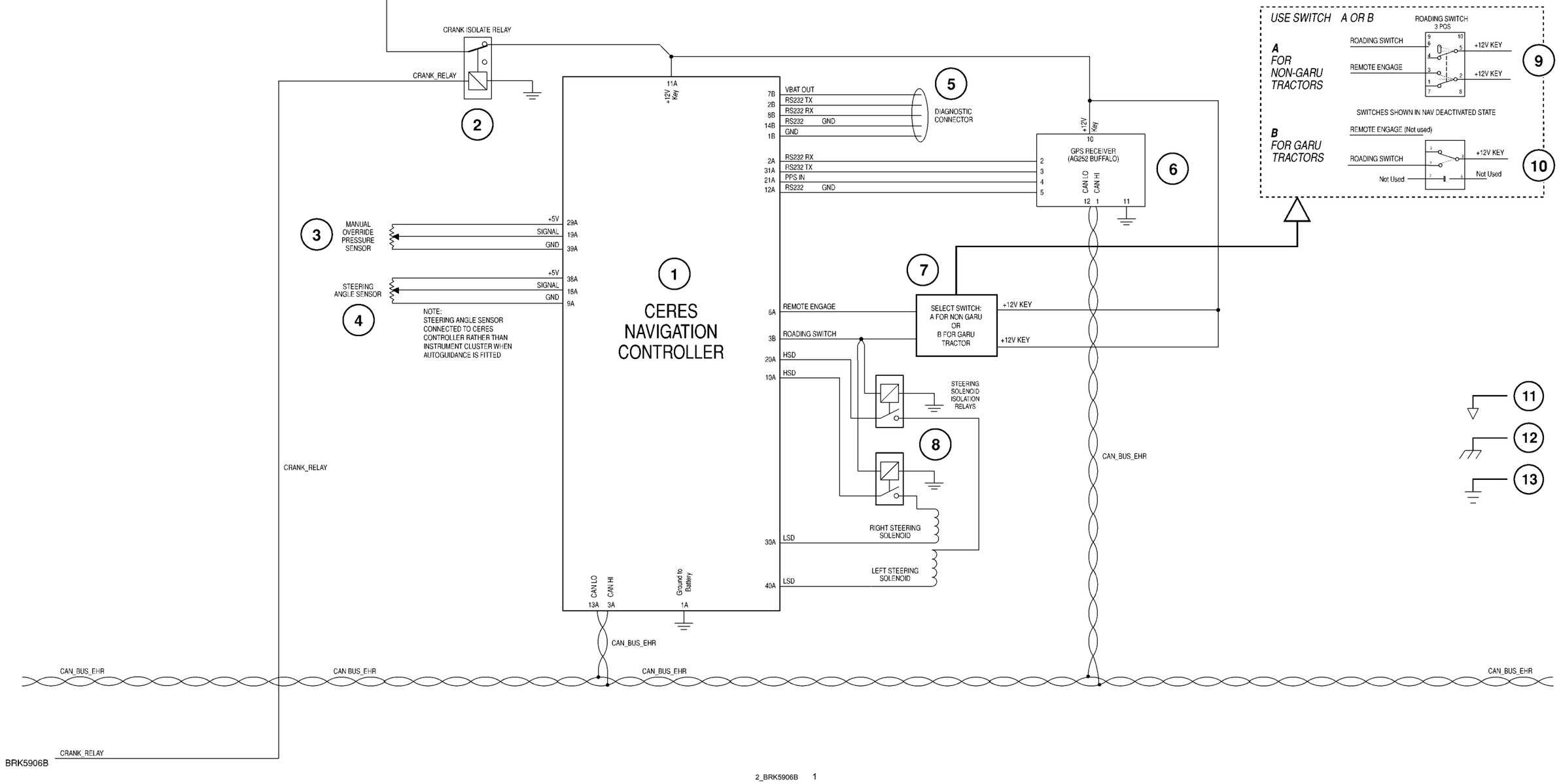
3_BRK5901B 1

Control module - Electronic schema Auto Guidance Module

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component designation	
1. Autoguidance module	
2. Crank Relay	
3. Manual override pressure sensor	
4. Steering angle sensor	
5. Diagnostic connector	
6. GPS (global positioning system) receiver	
7. Select switch (A=non GARU, B=with GARU	
8. Steering solenoids	
9. Switch type A	
10. Switch type B	
11. Sensor ground	
12. Chassis Ground	
13. Power Ground	

+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT
+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT
+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT
+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW
+12V_TCM	+12V_TCM	+12V_TCM	+12V_TCM
+12V_EDC	+12V_EDC	+12V_EDC	+12V_EDC
+12V_OTHER1	+12V_OTHER1	+12V_OTHER1	+12V_OTHER1
+12V_(F38)	+12V_(F38)	+12V_(F38)	+12V_(F38)
+12V_EXT	+12V_EXT	+12V_EXT	+12V_EXT
EHR_ENABLE	EHR_ENABLE	EHR_ENABLE	+12V_ADIC_SW



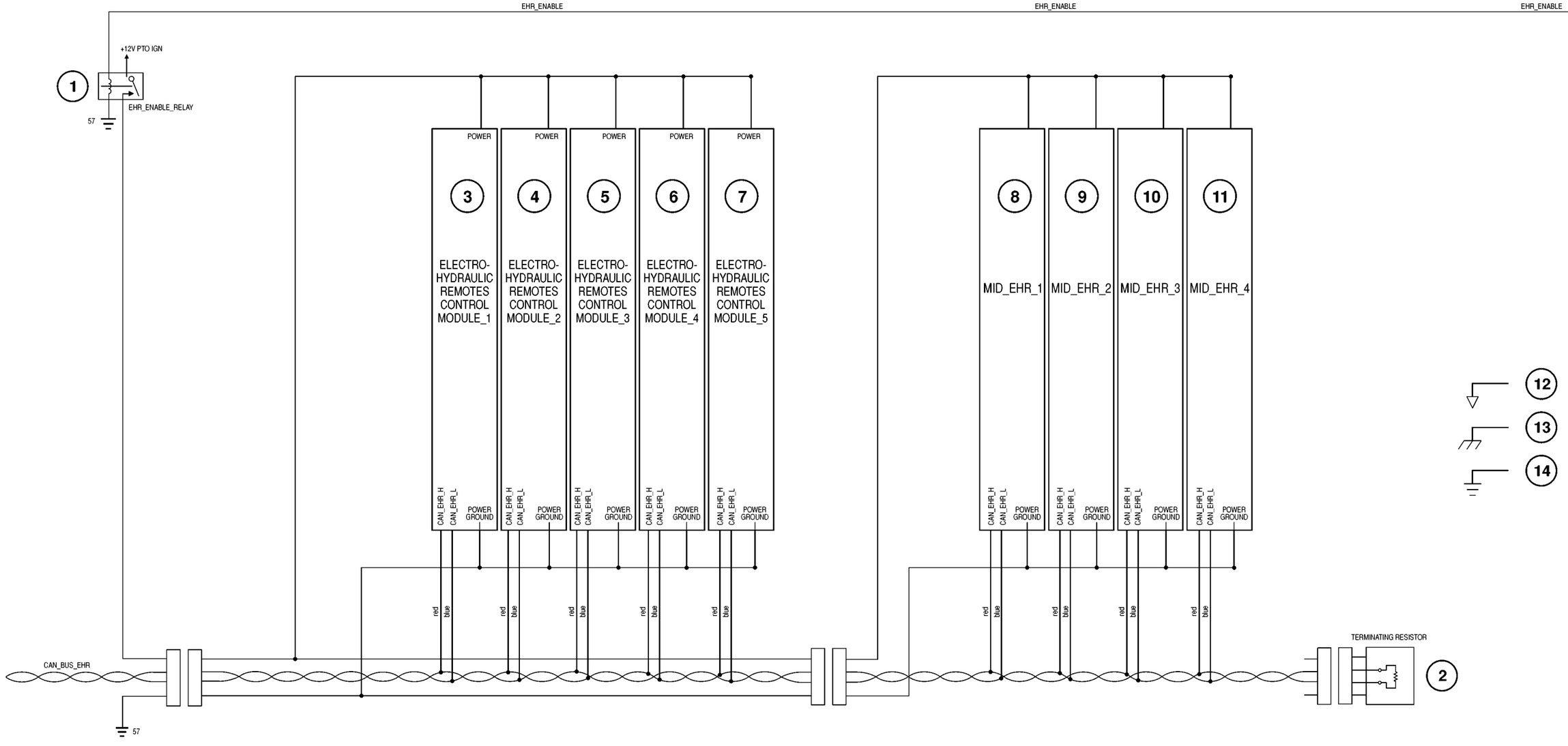
2_BRK5906B 1

Control module - Electronic schema Electro-Hydraulic Remotes

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component designation	
1. Supply relay EHRs	
2. CAN BUS terminating resistor	
3. EHR 1 rear	
4. EHR 2 rear	
5. EHR 3 rear	
6. EHR 4 rear	
7. EHR 5 rear	
8. EHR 1 FRONT (MID)	
9. EHR 2 FRONT (MID)	
10. EHR 3 FRONT (MID)	
11. EHR 4 FRONT (MID)	
12. Sensor signal ground	
13. Chassis ground	
14. Supply ground	

+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT	+12V_TRANS_HOT
+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT	+12V_ENG_HOT
+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT	+12V_ADIC_HOT
+12V_EPL_HOT	+12V_EPL_HOT	+12V_EPL_HOT	+12V_EPL_HOT
+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW	+12V_ENG_SW
+12V_TCM_SW	+12V_TCM	+12V_TCM	+12V_TCM
+12V_EDC_SW	+12V_EDC	+12V_EDC	+12V_EDC
+12V_OTHER1	+12V_OTHER1	+12V_OTHER1	+12V_OTHER1
+12V_OTHER2	+12V_OTHER2	+12V_OTHER2	+12V_OTHER2
+12V_EXT	+12V_EXT	+12V_EXT	+12V_EXT



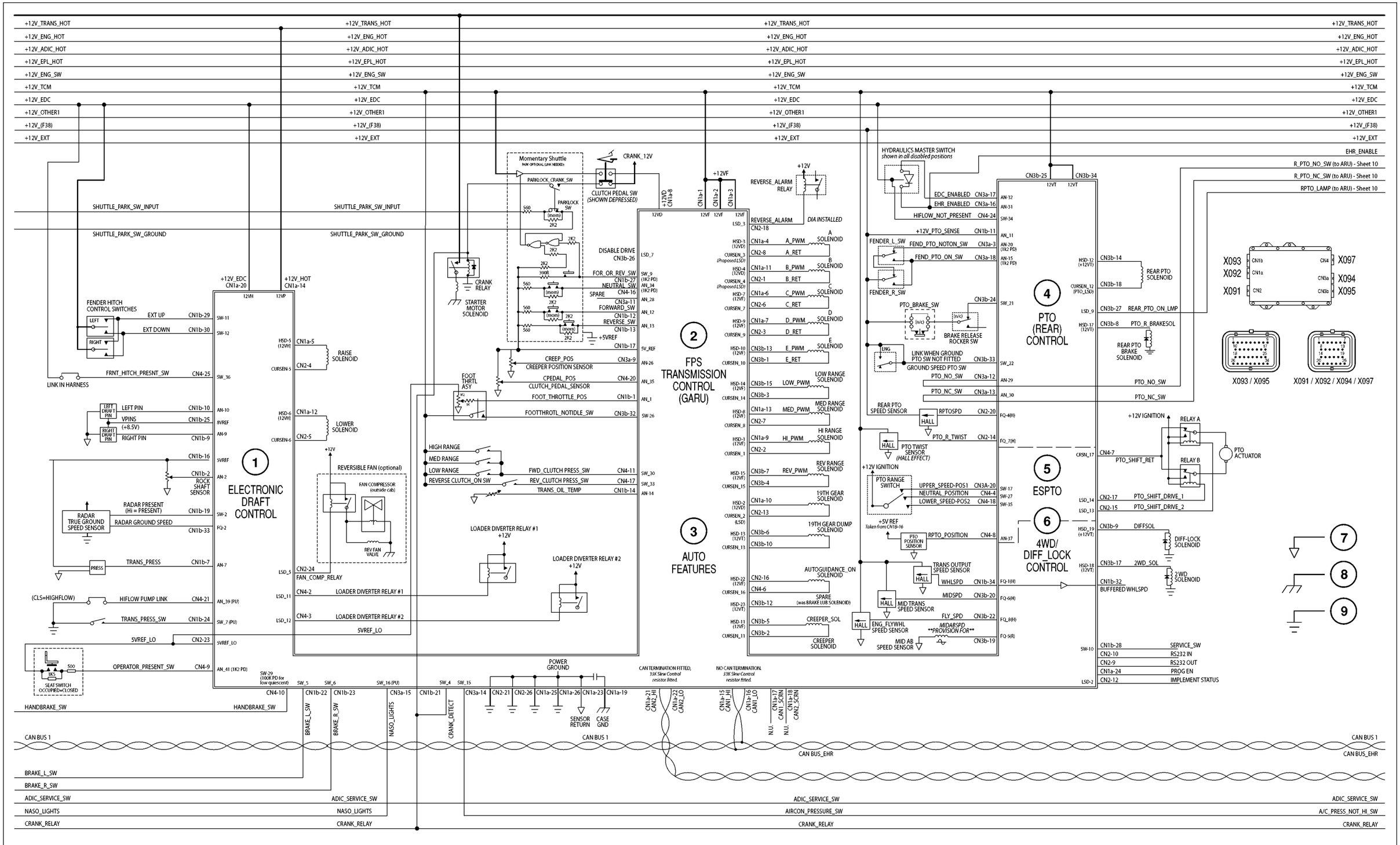
BRK5900B

1_BRK5900B 1

Control module - Electronic schema Full powershift central control unit (RT Module)

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Component Identification	
1. Electronic Draft Control	
2. Transmission Control	
3. System Auto Features	
4. PTO (Rear) Control	
5. Electronic shiftable PTO, Four wheel drive and differential lock control	
6.. Four wheel drive and differential lock control	
7. Sensor Ground	
8. Chassis Ground	
9. Power Ground	


+12V_TRANS_HOT
+12V_ENG_HOT
+12V_ADIC_HOT
+12V_EPL_HOT
+12V_ENG_SW
+12V_TCM
+12V_EDC
+12V_OTHER1
+12V_(F38)
+12V_EXT
SHUTTLE_PARK_SW_INPUT
SHUTTLE_PARK_SW_GROUND
EHR_ENABLE
R_PTO_NO_SW (to ARU) - Sheet 10
R_PTO_NC_SW (to ARU) - Sheet 10
RPTO_LAMP (to ARU) - Sheet 10
1 ELECTRONIC DRAFT CONTROL
2 FPS TRANSMISSION CONTROL (GARU)
3 AUTO FEATURES
4 PTO (REAR) CONTROL
5 ESPTO
6 4WD/ DIFF_LOCK CONTROL
7
8
9
FENDER HITCH CONTROL SWITCHES
EXT UP
EXT DOWN
LEFT
RIGHT
FRNT_HITCH_PRESNT_SW
LINK IN HARNESS
LEFT DRAFT PIN
RIGHT DRAFT PIN
VPINS (+8.5V)
LEFT PIN
RIGHT PIN
ROCK SHAFT SENSOR
RADAR PRESENT (HI = PRESENT)
RADAR TRUE GROUND SPEED SENSOR
RADAR GROUND SPEED
TRANS_PRESS
PRESS
(CLS=HIGHFLOW)
HIFLOW PUMP LINK
TRANS_PRESS_SW
5VREF_LO
SEAT SWITCH OCCUPIED=CLOSED
OPERATOR_PRESENT_SW
RAISE SOLENOID
LOWER SOLENOID
REVERSIBLE FAN (optional)
FAN COMPRESSOR (outside cab)
REV FAN VALVE
FAN_COMP_RELAY
LOADER DIVERTER RELAY #1
LOADER DIVERTER RELAY #2
CRANK RELAY
STARTER MOTOR SOLENOID
Momentary Shuttle
PARKLOCK_CRANK_SW
PARKLOCK SW
CLUTCH PEDAL SW (SHOWN DEPRESSED)
DISABLE DRIVE CN3b-26
FOR_OR_REV_SW
NEUTRAL_SW
SPARE
FORWARD_SW
REVERSE_SW
+5VREF
CREEP_POS
CREEPER POSITION SENSOR
CPEDAL_POS
CLUTCH_PEDAL_SENSOR
FOOT THRTL ASY
FOOT_THROTTLE_POS
FOOTTHROTL_NOTIDLE_SW
HIGH RANGE
MED RANGE
LOW RANGE
REVERSE CLUTCH_ON SW
FWD_CLUTCH PRESS_SW
REV_CLUTCH PRESS_SW
TRANS_OIL_TEMP
REVERSE_ALARM RELAY
REVERSE_ALARM
DIA INSTALLED
A SOLENOID
B SOLENOID
C SOLENOID
D SOLENOID
E SOLENOID
LOW RANGE SOLENOID
MED RANGE SOLENOID
HI RANGE SOLENOID
REV RANGE SOLENOID
19TH GEAR SOLENOID
19TH GEAR DUMP SOLENOID
AUTOGUIDANCE_ON SOLENOID
CREEPER_SOL
CREEPER SOLENOID
HYDRAULICS MASTER SWITCH shown in all disabled positions
EDC_ENABLED
EHR_ENABLED
HIFLOW_NOT_PRESENT
+12V_PTO_SENSE
FENDER_L_SW
FENDER_R_SW
FEND_PTO_NOTON_SW
FEND_PTO_ON_SW
PTO_BRAKE_SW
BRAKE RELEASE ROCKER SW
LINK WHEN GROUND PTO SW NOT FITTED
GROUND SPEED PTO SW
PTO_NO_SW
PTO_NC_SW
REAR PTO SPEED SENSOR
RPTOSPD
PTO_R_TWIST
PTO TWIST SENSOR (HALL EFFECT)
+12V IGNITION
PTO RANGE SWITCH
UPPER_SPEED-POS1
NEUTRAL_POSITION
LOWER_SPEED-POS2
+5V REF Taken from CN1b-16
PTO POSITION SENSOR
RPTO_POSITION
TRANS OUTPUT SPEED SENSOR
WHLSPD
MIDSPD
MID TRANS SPEED SENSOR
FLY_SPD
ENG_FLYWHL SPEED SENSOR
MIDABSPD
PROVISION FOR
MID AB SPEED SENSOR
REAR PTO SOLENOID
REAR_PTO_ON_LMP
PTO_R_BRAKESOL
REAR PTO BRAKE SOLENOID
PTO_NO_SW
PTO_NC_SW
+12V IGNITION
RELAY A
RELAY B
PTO ACTUATOR
PTO_SHIFT_RET
PTO_SHIFT_DRIVE_1
PTO_SHIFT_DRIVE_2
DIFFSOL
DIFF-LOCK SOLENOID
2WD_SOL
2WD SOLENOID
BUFFERED WHLSPD
X093
X092
X091
X097
X094
X095
X093 / X095
X091 / X092 / X094 / X097
SERVICE_SW
RS232 IN
RS232 OUT
PROG EN
IMPLEMENT STATUS
POWER GROUND
SENSOR RETURN
CASE GND
CAN TERMINATION FITTED, 33K Slew Control resistor fitted.
NO CAN TERMINATION. 33K Slew Control resistor fitted.
CAN BUS 1
CAN BUS_EHR
HANDBRAKE_SW
BRAKE_L_SW
BRAKE_R_SW
ADIC_SERVICE_SW
NASO_LIGHTS
CRANK_RELAY
AIRCON_PRESSURE_SW
A/C_PRESS_NOT_HI_SW
CRANK_DETECT

BRL6196B

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DISTRIBUTION SYSTEMS - A

ELECTRONIC SYSTEM - 50.A

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Control module - Electronic schema Full Powershift Central Control Unit (RD module) 494
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]
Control module - Electronic schema Full power shift main control module (RG module) 496
PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000]
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PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Control module - Electronic schema Steering system 506
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Control module - Electronic schema ISOBUS display 508
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
Control module - Electronic schema TECU module 510
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
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DISTRIBUTION SYSTEMS - A

FAULT CODES - 50.A

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16120	Blower Speed Select Potentiometer Open Or Shorted To Power	
16121	Temperature Select Potentiometer Open Or Shorted To Power	
16121	Temperature Select Potentiometer Open Or Shorted To Power	
16122	Mode Select Potentiometer Open Or Shorted To Power	
16125	High Pressure Switch (+) Input Shorted To Power	
16125	High Pressure Switch (+) Input Shorted To Power	
16126	High Pressure Switch (+) Input Shorted To Ground	
16126	High Pressure Switch (+) Input Shorted To Ground	
16127	High Pressure Switch (-) Input Shorted To Power	
16127	High Pressure Switch (-) Input Shorted To Power	
16128	High Pressure Switch (-) Input Shorted To Ground	
16128	High Pressure Switch (-) Input Shorted To Ground	
16129	High Pressure Cycling Error (2 in 1 Minute)	
16129	High Pressure Cycling Error (2 in 1 Minute)	
16130	Low Pressure Switch (+) Input Shorted To Power	
16130	Low Pressure Switch (+) Input Shorted To Power	
16131	Low Pressure Switch (+) Input Shorted To Ground	
16131	Low Pressure Switch (+) Input Shorted To Ground	
16132	Low Pressure Switch (-) Input Shorted To Power	
16132	Low Pressure Switch (-) Input Shorted To Power	
16133	Low Pressure Switch (-) Input Shorted To Ground	
16133	Low Pressure Switch (-) Input Shorted To Ground	
16134	Low Pressure Switch Open For Greater Than 1 Minute	
16134	Low Pressure Switch Open For Greater Than 1 Minute	
18001	Hand Throttle Number 1 - Voltage Too Low	
18002	Hand Throttle Number 1 - Voltage Too High	
18003	Hand Throttle Number 2 - Voltage Too Low	

Reference	Description	Controller
18004	Hand Throttle Number 2 - Voltage Too High	
18007	Multi-function Handle - Switch Error	
18008	Multi-function Handle - Voltage Too Low	
18010	Powershift Throttle - Voltage Too Low	
18011	Powershift Throttle - Voltage Too High	
18013	Multi-function Handle - Encoder Position Error	
18014	Rear Hitch Position Control Potentiometer - Voltage Too Low	
18015	Rear Hitch Position Control Potentiometer - Voltage Too High	
18016	Rear Hitch Draft Control Potentiometer - Voltage Too Low	
18017	Rear Hitch Draft Control Potentiometer - Voltage Too High	
18018	Rear Hitch Height Limit Potentiometer - Voltage Too Low	
18019	Rear Hitch Height Limit Potentiometer - Voltage Too High	
18020	Rear Hitch Drop Rate Potentiometer - Voltage Too Low	
18021	Rear Hitch Drop Rate Potentiometer - Voltage Too High	
18022	Rear Hitch Sensitivity Control Potentiometer - Voltage Too Low	
18023	Rear Hitch Sensitivity Control Potentiometer - Voltage Too High	
18025	Rear Hitch Slip Control Potentiometer - Voltage Too Low	
18026	Rear Hitch Slip Control Potentiometer - Voltage Too High	
18027	EHR 5 Lever Position - Voltage Too Low	
18028	EHR 5 Lever Position - Voltage Too High	
18029	EHR 6 Lever Position - Voltage Too Low	
18030	EHR 6 Lever Position - Voltage Too High	
18031	Front Hitch Position / Pressure Control Potentiometer - Voltage Too High	
18032	Front Hitch Position / Pressure Control Potentiometer - Voltage Too Low	
18033	Front Hitch Position / Pressure Mix Potentiometer - Voltage Too High	
18034	Front Hitch Position / Pressure Mix Potentiometer - Voltage Too Low	
18035	Front Hitch Position Height Limit Potentiometer - Voltage Too High	
18036	Front Hitch Height Limit Potentiometer - Voltage Too Low	
18037	Front Hitch Height Limit Enable Switch Error	

Reference	Description	Controller
18038	Front Hitch Position Drop Rate Potentiometer - Voltage Too High	
18039	Front Hitch Position Drop Rate Potentiometer - Voltage Too Low	
18040	EHR 1 Lever Position - Voltage Too Low	
18041	EHR 1 Lever Position - Voltage Too High	
18042	EHR 2 Lever Position - Voltage Too Low	
18043	EHR 2 Lever Position - Voltage Too High	
18044	EHR 3 Lever Position - Voltage Too Low	
18045	EHR 3 Lever Position - Voltage Too High	
18046	EHR Float Control Switch Error	
18047	EHR 4 Lever Position - Voltage Too Low	
18048	EHR 4 Lever Position - Voltage Too High	
18049	Joystick 1 X-Axis Position - Voltage Too Low	
18050	Joystick 1 X-Axis Position - Voltage Too High	
18051	Joystick 1 Y-Axis Position - Voltage Too Low	
18052	Joystick 1 Y-Axis Position - Voltage Too High	
18053	Joystick 1 Proportional Rocker Switch - Voltage Too Low	
18054	Joystick Proportional Rocker Switch - Voltage Too High	
18055	Joystick 2 X-Axis Position - Voltage Too Low	
18056	Joystick 2 X-Axis Position - Voltage Too High	
18057	Joystick 2 Y-Axis Position - Voltage Too Low	
18058	Joystick 2 Y-Axis Position - Voltage Too High	
18059	Joystick 2 Proportional Rocker Switch - Voltage Too Low	
18060	Joystick 2 Proportional Rocker Switch - Voltage Too High	
18061	Reference Voltage - Short Circuit To Ground	
18062	Reference Voltage - Short Circuit To 12V	
18063	EEEPROM Error	
18064	Multi-function Handle Communication Error	
18065	Multi-function Handle Basic Assurance Test Error	
18066	EHR 1 Lever Implausibility Error	
18067	EHR 2 Lever Implausibility Error	
18068	EHR 3 Lever Implausibility Error	
18069	EHR 4 Lever Implausibility Error	

Reference	Description	Controller
2001	TRANSMISSION Powershift , Disabled , Shuttle Too Fast (N)	
2002	TRANSMISSION Powershift , Disabled , Flash "N" Error	
2003	CP - clutch pedal required	
2004 (P)	HANDBRAKE ERROR	
2005	Creeper selection error	
2007	Low Power 5V Reference - Voltage Too Low	
2008	Low Power 5V Reference - Voltage Too High	
2009	Seat Switch Input - Voltage Too Low	
2009	Seat Switch Input - Voltage Too Low	
2010	Seat Switch Input - Voltage Too High	
2010	Seat Switch Input - Voltage Too High	
2011	Clutch Pedal Potentiometer - Voltage Too Low	
2011	Clutch Pedal Potentiometer - Voltage Too Low	
2012	Clutch Pedal Potentiometer - Voltage Too High	
2012	Clutch Pedal Potentiometer - Voltage Too High	
2016	Creeper solenoid solenoid error	
2021	Transmission Harness Disconnected	
2021	Transmission Harness Disconnected	
2024	All Clutches Not Calibrated	
2024	All Clutches Not Calibrated	
2027	Engine Speed Too Low / No Signal	
2037	Clutch Pedal Disconnect Switch - Open Circuit	
2037	Clutch Pedal Disconnect Switch - Open Circuit	
2046	Fuse Sense Input - Open Circuit	
2046	Fuse Sense Input - Open Circuit	
2047	Clutch Pedal Disconnect Switch Set Too High	
2047	Clutch Pedal Disconnect Switch Set Too High	
2048	Clutch Pedal Disconnect Switch Set Too Low	
2048	Clutch Pedal Disconnect Switch Set Too Low	
2049	Wheel Speed Sensor - Open Circuit	
2049	Wheel Speed Sensor - Open Circuit	
2050	Wheel Speed Sensor - Short Circuit	
2050	Wheel Speed Sensor - Short Circuit	
2051	Oil Temperature Sensor Open Circuit	
2051	Oil Temperature Sensor Open Circuit	
2052	Oil Temperature Sensor - Short Circuit	
2052	Oil Temperature Sensor - Short Circuit	
2053	5 Volt Reference Voltage Too High	
2053	5 Volt Reference Voltage Too High	
2054	5 Volt Reference Voltage Too Low	
2054	5 Volt Reference Voltage Too Low	

Reference	Description	Controller
2055	Wheel Speed (Transmission Output Speed) Sensor - No Signal	
2055	Wheel Speed (Transmission Output Speed) Sensor - No Signal	
2058	Seat switch closed	
2059	SHUTTLE LEVER SWITCH DISAGREEMENT	
2070	Shuttle Lever Forward Switch Voltage Too High	
2070	Shuttle Lever Forward Switch Voltage Too High	
2071	Shuttle Lever Forward Switch Voltage Too Low	
2071	Shuttle Lever Forward Switch Voltage Too Low	
2072	Shuttle Lever Reverse Switch Voltage Too High	
2072	Shuttle Lever Reverse Switch Voltage Too High	
2073	Shuttle Lever Reverse Switch Voltage Too Low	
2073	Shuttle Lever Reverse Switch Voltage Too Low	
2075	Flywheel Speed Sensor Signal Error	
2075	Flywheel Speed Sensor Signal Error	
2076	Flywheel Speed Sensor Open Circuit	
2076	Flywheel Speed Sensor Open Circuit	
2077	Flywheel Speed Sensor - Short Circuit	
2077	Flywheel Speed Sensor - Short Circuit	
2124	Flywheel Speed Sensor Not Calibrated	
2124	Flywheel Speed Sensor Not Calibrated	
2300	19th Gear Solenoid Open Circuit Or Short To Ground	
2300	19th Gear Solenoid Open Circuit Or Short To Ground	
2302	19th Gear Clutch Dump Solenoid Open Circuit Or Short To Ground	
2302	19th Gear Clutch Dump Solenoid Open Circuit Or Short To Ground	
2303	Damper Calibration - Low Error	
2303	Damper Calibration - Low Error	
2304	Damper Calibration - High Error	
2304	Damper Calibration - High Error	
2305	19th Gear Clutch Solenoid Over Voltage	
2305	19th Gear Clutch Solenoid Over Voltage	
2306	19th Gear Clutch Dump Solenoid Over Voltage	
2306	19th Gear Clutch Dump Solenoid Over Voltage	
2308	Reverse not allowed	
2308	Reverse not allowed	

Reference	Description	Controller
2310	TRANSMISSION Powershift Command , Undervoltage , Upshift Switch	
2311	TRANSMISSION Powershift Command , Overvoltage , Upshift Switch	
2312	Downshift switch voltage too low	
2313	Downshift switch voltage too high	
2314	Forward Pressure Switch - Open Circuit Or Short To Ground	
2314	Forward Pressure Switch - Open Circuit Or Short To Ground	
2315	Reverse Pressure Switch - Open Circuit Or Short To Ground	
2315	Reverse Pressure Switch - Open Circuit Or Short To Ground	
2323	Transmission Mid Speed Sensor - Open Circuit	
2323	Transmission Mid Speed Sensor - Open Circuit	
2324	Transmission Mid Speed Sensor - Short To Ground	
2324	Transmission Mid Speed Sensor - Short To Ground	
2325	Mid Speed Sensor And Output Wheel Speed Sensors Swapped	
2325	Mid Speed Sensor And Output Wheel Speed Sensors Swapped	
2326	Engine Flywheel Speed Sensor Swapped With Either Mid or Output Wheel Speed Sensors	
2326	Engine Flywheel Speed Sensor Swapped With Either Mid or Output Wheel Speed Sensors	
2328	No Signal From Transmission Mid Speed Sensor	
2330	Transmission Output Speed Too High For The Selected Gear	
2330	Transmission Output Speed Too High For The Selected Gear	
2331	Clutch Slipping fault	
2331	Clutch Slipping fault	
2334	Pressure Indicated On The Forward Clutch Pressure Switches When The Clutch Solenoids Are Off	
2334	Pressure Indicated On The Forward Clutch Pressure Switches When The Clutch Solenoids Are Off	
2335	Pressure Indicated On The Reverse Clutch Pressure Switch When The Clutch Solenoids Are Off	
2335	Pressure Indicated On The Reverse Clutch Pressure Switch When The Clutch Solenoids Are Off	
2336	ADDITIONAL REDUCERS Creeper , Not engaging	
2337	ADDITIONAL REDUCERS Creeper , Not disengaging	

Reference	Description	Controller
2338	Creeper potentiometer - short circuit to +8V or +12V	
2338	Creeper potentiometer - short circuit to +8V or +12V	
2339	Creeper Potentiometer - Open Circuit Or Short Circuit To Ground	
2339	Creeper Potentiometer - Open Circuit Or Short Circuit To Ground	
2342	Clutch A Solenoid - Open Circuit Or Short Circuit To Ground	
2342	Clutch A Solenoid - Open Circuit Or Short Circuit To Ground	
2343	Clutch B Solenoid - Open Circuit Or Short Circuit To Ground	
2343	Clutch B Solenoid - Open Circuit Or Short Circuit To Ground	
2344	Clutch C Solenoid - Open Circuit Or Short Circuit To ground	
2344	Clutch C Solenoid - Open Circuit Or Short Circuit To ground	
2345	Clutch D Solenoid - Open Circuit Or Short Circuit To Ground	
2345	Clutch D Solenoid - Open Circuit Or Short Circuit To Ground	
2346	Clutch E Solenoid - Open Circuit Or Short Circuit To Ground	
2346	Clutch E Solenoid - Open Circuit Or Short Circuit To Ground	
2347	Low Range Clutch Solenoid - Open Circuit Or Short Circuit To Ground	
2347	Low Range Clutch Solenoid - Open Circuit Or Short Circuit To Ground	
2348	Medium Range Clutch Solenoid - Open Circuit Or Short Circuit To Ground	
2348	Medium Range Clutch Solenoid - Open Circuit Or Short Circuit To Ground	
2349	High Range Clutch Solenoid - Open Circuit Or Short Circuit To Ground	
2349	High Range Clutch Solenoid - Open Circuit Or Short Circuit To Ground	
2350	Reverse Clutch Solenoid - Open Circuit Or Short Circuit To Ground	
2350	Reverse Clutch Solenoid - Open Circuit Or Short Circuit To Ground	
2351	ADDITIONAL REDUCERS Creeper , Open or short circuit , Creeper Solenoid	
2351	ADDITIONAL REDUCERS Creeper , Open or short circuit , Creeper Solenoid	
2352	Clutch A Solenoid - Voltage Too High	
2352	Clutch A Solenoid - Voltage Too High	
2353	Clutch B Solenoid - Voltage Too High	
2353	Clutch B Solenoid - Voltage Too High	
2354	Clutch C Solenoid - Voltage Too High	
2354	Clutch C Solenoid - Voltage Too High	

Reference	Description	Controller
2355	Clutch D Solenoid - Voltage Too High	
2355	Clutch D Solenoid - Voltage Too High	
2356	Clutch E Solenoid - Voltage Too High	
2356	Clutch E Solenoid - Voltage Too High	
2357	Low Range Clutch Solenoid - Voltage Too High	
2357	Low Range Clutch Solenoid - Voltage Too High	
2358	Medium Range Clutch Solenoid - Voltage Too High	
2358	Medium Range Clutch Solenoid - Voltage Too High	
2359	High Range Clutch Solenoid - Voltage Too High	
2359	High Range Clutch Solenoid - Voltage Too High	
2360	Reverse Clutch Solenoid - Voltage Too High	
2360	Reverse Clutch Solenoid - Voltage Too High	
2361	Creeper Solenoid - Voltage Too High	
2361	Creeper Solenoid - Voltage Too High	
2362	Clutch A Not Calibrated	
2362	Clutch A Not Calibrated	
2363	Clutch B Not Calibrated	
2363	Clutch B Not Calibrated	
2364	Clutch C Not Calibrated	
2364	Clutch C Not Calibrated	
2365	Clutch D Not Calibrated	
2365	Clutch D Not Calibrated	
2366	Clutch E Not Calibrated	
2366	Clutch E Not Calibrated	
2367	Low Range Clutch Not Calibrated	
2367	Low Range Clutch Not Calibrated	
2368	Medium Range Clutch Not Calibrated	
2368	Medium Range Clutch Not Calibrated	
2369	High Range Clutch Not Calibrated	
2369	High Range Clutch Not Calibrated	
2370	Reverse Clutch Not Calibrated	
2370	Reverse Clutch Not Calibrated	
2371	Creeper Position Out of Range	
2371	Creeper Position Out of Range	
2372	Creeper Not Calibrated	
2372	Creeper Not Calibrated	
2373	Clutch 19 Not Calibrated	
2373	Clutch 19 Not Calibrated	
2374	Creeper Calibration Error	
2374	Creeper Calibration Error	
2375	Creeper - Cold Oil	
2375	Creeper - Cold Oil	
2376	Fault on 19th Gear Valve	
2376	Fault on 19th Gear Valve	
2377	Fault on 19th Gear Dump Valve	
3001	Foot Throttle Sensor - Signal Not Plausible	

Reference	Description	Controller
3002	Foot Throttle Sensor - Signal Above Range Maximum	
3003	Foot Throttle Sensor - Signal Below Range Minimum	
3010	Air Intake Temperature Sensor - Signal Above Range Maximum	
3010	Air Intake Temperature Sensor - Signal Above Range Maximum	
3011	Air Intake Temperature Sensor - Signal Below Range Minimum	
3011	Air Intake Temperature Sensor - Signal Below Range Minimum	
3028	Oil Pressure Too Low	
3028	Oil Pressure Too Low	
3038	Constant Engine RPM Activate/Select Switch - Short Circuit to Battery	
3047	Main Relay Failure - Short Circuit To Battery	
3047	Main Relay Failure - Short Circuit To Battery	
3048	Main Relay Failure - Short Circuit to Ground	
3048	Main Relay Failure - Short Circuit to Ground	
3088	Crankshaft Sensor - No Signal	
3088	Crankshaft Sensor - No Signal	
3090	Camshaft Sensor - No Signal	
3090	Camshaft Sensor - No Signal	
3091	Camshaft Sensor - Invalid Signal	
3091	Camshaft Sensor - Invalid Signal	
3096	CAN A LINE NO SIGNAL	
3096	CAN A LINE NO SIGNAL	
3107	Fuel Metering Unit - Short Circuit To Battery	
3107	Fuel Metering Unit - Short Circuit To Battery	
3108	Fuel Metering Unit - Short Circuit To Ground	
3108	Fuel Metering Unit - Short Circuit To Ground	
3120	PTO Twist Sensor - Not Plausible	
3121	PTO Twist Sensor - Open Circuit	
3122	PTO Twist Sensor - Short Circuit To Ground	
3123	PTO Twist Sensor - Not Calibrated	
3124	Hand Throttle - Signal Above Range Maximum	
3125	Hand Throttle - Channel 2 Signal Below Range Minimum	
3126	Hand Throttle - Channel 1 Signal Above Range Maximum	
3127	Hand Throttle - Channel 1 Signal Below Range Minimum	
3128	Hand Throttle - Channel Difference Error	
3129	Hand Throttle - Idle Switch Closed Circuit	

Reference	Description	Controller
3130	Hand Throttle - Idle Switch Open Circuit	
3138	Metering Unit - Temperature Too High	
3138	Metering Unit - Temperature Too High	
3141	Fuel Flow Setpoint Too Low	
3141	Fuel Flow Setpoint Too Low	
3142	High Pressure Test - Test Active	
3142	High Pressure Test - Test Active	
3145	Terminal 15 - No Signal	
3145	Terminal 15 - No Signal	
3148	Coolant Temperature Sensor Dynamic Test - Failure	
3148	Coolant Temperature Sensor Dynamic Test - Failure	
3157	ECM Not Detected On CAN Bus	
3158	Invalid ECM Checksum	
3159	Invalid Engine Reference Torque	
3160	Fan Actuator - Short Circuit to Battery	
3160	Fan Actuator - Short Circuit to Battery	
3162	Fan Actuator - Open Load	
3162	Fan Actuator - Open Load	
3163	Fan Actuator - No Load	
3163	Fan Actuator - No Load	
3176	Setpoint Of Metering Unit Not Plausible In Overrun	
3176	Setpoint Of Metering Unit Not Plausible In Overrun	
3177	Engine Overspeed Detected	
3177	Engine Overspeed Detected	
3182	Timeout Of CAN Message RxCCVS	
3182	Timeout Of CAN Message RxCCVS	
3185	Timeout Of CAN Message TF	
3185	Timeout Of CAN Message TF	
3238	Engine Controller Internal SPI Communication Error	
3238	Engine Controller Internal SPI Communication Error	
3239	Engine Controller EEPROM - Read Operation Error	
3239	Engine Controller EEPROM - Read Operation Error	
3240	Engine Controller EEPROM - Write Operation Failure	
3240	Engine Controller EEPROM - Write Operation Failure	
3241	Engine Controller EEPROM - Default Value Used	
3241	Engine Controller EEPROM - Default Value Used	
3249	TPU Monitoring - Time Deviation Between TPU And System Not Plausible	
3249	TPU Monitoring - Time Deviation Between TPU And System Not Plausible	
3250	Dataset - Variant Defect	
3250	Dataset - Variant Defect	

Reference	Description	Controller
3251	Dataset - Requested Variant Could Not Be Set	
3251	Dataset - Requested Variant Could Not Be Set	
3252	Controller Watchdog - SPI Comunication Failure	
3252	Controller Watchdog - SPI Comunication Failure	
3263	CAN C Line No Signal	
3265	Overrun Monitoring	
3265	Overrun Monitoring	
3266	Redundant Engine Speed in Overrun Monitoring	
3266	Redundant Engine Speed in Overrun Monitoring	
3297	Rail Pressure Positive Deviation High And High Fuel Flow Setpoint Value	
3297	Rail Pressure Positive Deviation High And High Fuel Flow Setpoint Value	
3301	Rail Pressure Negative Deviation Too High On Minimum Metering	
3301	Rail Pressure Negative Deviation Too High On Minimum Metering	
3305	Rail Pressure Below Minimum Limit In Controller Mode	
3305	Rail Pressure Below Minimum Limit In Controller Mode	
3309	Rail Pressure Above Maximum Limit In Controlled Mode	
3309	Rail Pressure Above Maximum Limit In Controlled Mode	
3313	Rail Pressure Drop Rate Too High	
3313	Rail Pressure Drop Rate Too High	
3316	Minimum Number Of Injections Not Reached - Stop Engine	
3316	Minimum Number Of Injections Not Reached - Stop Engine	
3334	Timeout Of CAN Message TCS1-PE Torque - When Active	
3334	Timeout Of CAN Message TCS1-PE Torque - When Active	
3335	Timeout Of CAN Message TSC1-PE Torque - When Inactive	
3335	Timeout Of CAN Message TSC1-PE Torque - When Inactive	
3338	Timeout Of CAN Message TSC1-VE Speed - When Inactive	
3338	Timeout Of CAN Message TSC1-VE Speed - When Inactive	
3339	Timeout Of CAN Message TSC1-VE Speed - When Active	
3339	Timeout Of CAN Message TSC1-VE Speed - When Active	
3345	Total Throttle Failure	
3367	Coolant Temperature Test Failure	
3367	Coolant Temperature Test Failure	

Reference	Description	Controller
3368	Torque Limitation Due To OBD Performance Limiter By Legislation	
3368	Torque Limitation Due To OBD Performance Limiter By Legislation	
3369	Torque Reduction Due To Smoke Reduction	
3369	Torque Reduction Due To Smoke Reduction	
3370	Torque Limitation Due To Engine Protection (Against Excessive Torque, Engine Overspeed And Overheat)	
3370	Torque Limitation Due To Engine Protection (Against Excessive Torque, Engine Overspeed And Overheat)	
3375	Constant Engine RPM Increase / Decrease Switch - Open Circuit	
4100	Rear Remote No.1 No Control Message Received	
4100	Rear Remote No.1 No Control Message Received	
4101	Rear Remote No.1 Control Message Not Plausible	
4101	Rear Remote No.1 Control Message Not Plausible	
4102	Rear Remote No.1 EEPROM Error	
4102	Rear Remote No.1 EEPROM Error	
4103	Rear Remote No.1 Switched To Failsafe	
4103	Rear Remote No.1 Switched To Failsafe	
4104	Rear Remote No.1 Under Voltage	
4104	Rear Remote No.1 Under Voltage	
4105	Rear Remote No.1 Over Voltage	
4105	Rear Remote No.1 Over Voltage	
4106	Rear Remote No.1 Spool Movement Too Low	
4106	Rear Remote No.1 Spool Movement Too Low	
4107	Rear Remote No.1 Spool Movement Too High	
4107	Rear Remote No.1 Spool Movement Too High	
4108	Rear Remote No.1 Float Position Not Reached	
4108	Rear Remote No.1 Float Position Not Reached	
4109	Rear Remote No.1 Manually Operated	
4109	Rear Remote No.1 Manually Operated	
4110	Rear Remote No.1 Driver Faulty	
4110	Rear Remote No.1 Driver Faulty	
4111	Rear Remote No.1 Potentiometer Faulty	
4111	Rear Remote No.1 Potentiometer Faulty	

Reference	Description	Controller
4112	Rear Remote No.1 Unable To Reach Neutral	
4112	Rear Remote No.1 Unable To Reach Neutral	
4113	Rear Remote No.1 Spool Not In Neutral At Key On	
4113	Rear Remote No.1 Spool Not In Neutral At Key On	
4114	Rear Remote No.2 No Control Message Received	
4114	Rear Remote No.2 No Control Message Received	
4115	Rear Remote No.2 Control Message Not Plausible	
4115	Rear Remote No.2 Control Message Not Plausible	
4116	Rear Remote No.2 EEPROM Error	
4116	Rear Remote No.2 EEPROM Error	
4117	Rear Remote No.2 Switched To Failsafe	
4117	Rear Remote No.2 Switched To Failsafe	
4118	Rear Remote No.2 Under Voltage	
4118	Rear Remote No.2 Under Voltage	
4119	Rear Remote No.2 Over Voltage	
4119	Rear Remote No.2 Over Voltage	
4120	Rear Remote No.2 Spool Movement Too Low	
4120	Rear Remote No.2 Spool Movement Too Low	
4121	Rear Remote No.2 Spool Movement Too High	
4121	Rear Remote No.2 Spool Movement Too High	
4122	Rear Remote No.2 Float Position Not Reached	
4122	Rear Remote No.2 Float Position Not Reached	
4123	Rear Remote No.2 Manually Operated	
4123	Rear Remote No.2 Manually Operated	
4124	Rear Remote No.2 Driver Faulty	
4124	Rear Remote No.2 Driver Faulty	
4125	Rear Remote No.2 Potentiometer Faulty	
4125	Rear Remote No.2 Potentiometer Faulty	
4126	Rear Remote No.2 Unable To Reach Neutral	
4126	Rear Remote No.2 Unable To Reach Neutral	
4127	Rear Remote No.2 Spool Not In Neutral At Key On.	
4127	Rear Remote No.2 Spool Not In Neutral At Key On.	
4128	Rear Remote No.3 No Control Message Received	

Reference	Description	Controller
4128	Rear Remote No.3 No Control Message Received	
4129	Rear Remote No.3 Control Message Not Plausible	
4129	Rear Remote No.3 Control Message Not Plausible	
4130	Rear Remote No.3 EEPROM Error	
4130	Rear Remote No.3 EEPROM Error	
4131	Rear Remote No.3 Switched To Failsafe	
4131	Rear Remote No.3 Switched To Failsafe	
4132	Rear Remote No.3 Under Voltage	
4132	Rear Remote No.3 Under Voltage	
4133	Rear Remote No.3 Over Voltage	
4133	Rear Remote No.3 Over Voltage	
4134	Rear Remote No.3 Spool Movement Too Low	
4134	Rear Remote No.3 Spool Movement Too Low	
4135	Rear Remote No.3 Spool Movement Too High	
4135	Rear Remote No.3 Spool Movement Too High	
4136	Rear Remote No.3 Float Position Not Reached	
4136	Rear Remote No.3 Float Position Not Reached	
4137	Rear Remote No.3 Manually Operated	
4137	Rear Remote No.3 Manually Operated	
4138	Rear Remote No.3 Driver Faulty	
4138	Rear Remote No.3 Driver Faulty	
4139	Rear Remote No.3 Potentiometer Faulty	
4139	Rear Remote No.3 Potentiometer Faulty	
4140	Rear Remote No.3 Unable To Reach Neutral	
4140	Rear Remote No.3 Unable To Reach Neutral	
4141	Rear Remote No.3 Spool Not In Neutral At Key On	
4141	Rear Remote No.3 Spool Not In Neutral At Key On	
4142	Rear Remote No.4 No Control Message Received	
4142	Rear Remote No.4 No Control Message Received	
4142	Rear Remote No.4 No Control Message Received	
4143	Rear Remote No.4 Control Message Not Plausible	
4143	Rear Remote No.4 Control Message Not Plausible	
4144	Rear Remote No.4 EEPROM Error	
4144	Rear Remote No.4 EEPROM Error	

Reference	Description	Controller
4145	Rear Remote No.4 Switched To Failsafe	
4145	Rear Remote No.4 Switched To Failsafe	
4146	Rear Remote No.4 Under Voltage	
4146	Rear Remote No.4 Under Voltage	
4147	Rear Remote No.4 Over Voltage	
4147	Rear Remote No.4 Over Voltage	
4148	Rear Remote No.4 Spool Movement Too Low	
4148	Rear Remote No.4 Spool Movement Too Low	
4149	Rear Remote No.4 Spool Movement Too High	
4149	Rear Remote No.4 Spool Movement Too High	
4150	Rear Remote No.4 Float Position Not Reached	
4150	Rear Remote No.4 Float Position Not Reached	
4151	Rear Remote No.4 Manually Operated	
4151	Rear Remote No.4 Manually Operated	
4152	Rear Remote No.4 Driver Faulty	
4152	Rear Remote No.4 Driver Faulty	
4153	Rear Remote No.4 Potentiometer Faulty	
4153	Rear Remote No.4 Potentiometer Faulty	
4154	Rear Remote No.4 Unable To Reach Neutral	
4154	Rear Remote No.4 Unable To Reach Neutral	
4155	Rear Remote No.4 Spool Not In Neutral At Key On	
4155	Rear Remote No.4 Spool Not In Neutral At Key On	
4156	Rear Remote No.5 No Control Message received	
4156	Rear Remote No.5 No Control Message received	
4157	Rear Remote No.5 Control Message Not Plausible	
4157	Rear Remote No.5 Control Message Not Plausible	
4158	Rear Remote No.5 EEPROM Error	
4158	Rear Remote No.5 EEPROM Error	
4159	Rear Remote No.5 Switched To Failsafe	
4159	Rear Remote No.5 Switched To Failsafe	
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4160	Rear Remote No.5 Under Voltage	
4161	Rear Remote No.5 Over Voltage	
4161	Rear Remote No.5 Over Voltage	
4162	Rear Remote No.5 Spool Movement Too Low	

Reference	Description	Controller
4162	Rear Remote No.5 Spool Movement Too Low	
4163	Rear Remote No.5 Spool Movement Too High	
4163	Rear Remote No.5 Spool Movement Too High	
4164	Rear Remote No.5 Float Position Not Reached	
4164	Rear Remote No.5 Float Position Not Reached	
4165	Rear Remote No.5 Manually Operated	
4165	Rear Remote No.5 Manually Operated	
4166	Rear Remote No.5 Driver Faulty	
4166	Rear Remote No.5 Driver Faulty	
4167	Rear Remote No.5 Potentiometer Faulty	
4167	Rear Remote No.5 Potentiometer Faulty	
4168	Rear Remote No.5 Unable To Reach Neutral	
4168	Rear Remote No.5 Unable To Reach Neutral	
4169	Rear Remote No.5 Spool Not In Neutral At Key On	
4169	Rear Remote No.5 Spool Not In Neutral At Key On	
4170	Rear EHR Control No.1 Not Calibrated	
4170	Rear EHR Control No.1 Not Calibrated	
4171	EHR CONTROL LEVER NO.1 OPEN CIRCUIT	
4172	EHR CONTROL LEVER NO.1 SHORT CIRCUIT	
4173	Rear EHR Control No.2 Not Calibrated	
4173	Rear EHR Control No.2 Not Calibrated	
4174	EHR CONTROL LEVER NO.2 OPEN CIRCUIT	
4175	EHR CONTROL LEVER NO.2 SHORT CIRCUIT	
4176	TIMER SWITCH NO.1 / NO.2 DISCONNECTED	
4177	Rear EHR Control No.3 Not Calibrated	
4177	Rear EHR Control No.3 Not Calibrated	
4178	EHR CONTROL LEVER NO.3 OPEN CIRCUIT	
4179	EHR CONTROL LEVER NO.3 SHORT CIRCUIT	
4180	Rear EHR Control No.4 Not Calibrated	
4180	Rear EHR Control No.4 Not Calibrated	

Reference	Description	Controller
4181	EHR CONTROL LEVER NO.4 OPEN CIRCUIT	
4182	EHR CONTROL LEVER NO.4 SHORT CIRCUIT	
4183	TIMER SWITCH NO.3 / NO.4 DISCONNECTED	
4190	Rear Remote No.1 No Communications	
4190	Rear Remote No.1 No Communications	
4191	Rear Remote No.2 No Communications	
4191	Rear Remote No.2 No Communications	
4192	Rear Remote No.3 No Communications	
4192	Rear Remote No.3 No Communications	
4193	Rear Remote No.4 No Communications	
4193	Rear Remote No.4 No Communications	
4194	MOTOR MODE NO.1 SWITCH FAULTY	
4195	MOTOR MODE NO.2 SWITCH FAULTY	
4196	MOTOR MODE NO.3 SWITCH FAULTY	
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4218	Rear Remote No.3 - Spool Not Calibrated	
4219	Rear Remote No.4 - Spool Not Calibrated	
4220	Rear Remote No.5 - Spool Not Calibrated	
4300	HITCH Rear hitch , No detects , Top link switch not fitted	
4301	HITCH Rear hitch , No detects , Side link switch not fitted	
4500	Front Remote No.1 - No Control Message Received	
4500	Front Remote No.1 - No Control Message Received	
4501	Front Remote No.1 Control Message Not Plausible	
4501	Front Remote No.1 Control Message Not Plausible	
4502	Front Remote No.1 EEPROM Error	
4502	Front Remote No.1 EEPROM Error	

Reference	Description	Controller
4503	Front Remote No.1 Switched To Failsafe	
4503	Front Remote No.1 Switched To Failsafe	
4504	Front Remote No.1 Under Voltage	
4504	Front Remote No.1 Under Voltage	
4505	Front Remote No.1 Over Voltage	
4505	Front Remote No.1 Over Voltage	
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4507	Front Remote No.1 Spool Movement Too High	
4507	Front Remote No.1 Spool Movement Too High	
4508	Front Remote No.1 Float Position Not Reached	
4508	Front Remote No.1 Float Position Not Reached	
4509	Front Remote No.1 Manually Operated	
4509	Front Remote No.1 Manually Operated	
4510	Front Remote No.1 Driver Faulty	
4510	Front Remote No.1 Driver Faulty	
4511	Front Remote No.1 Potentiometer Faulty	
4511	Front Remote No.1 Potentiometer Faulty	
4512	Front Remote No.1 Unable To Reach Neutral	
4512	Front Remote No.1 Unable To Reach Neutral	
4513	Front Remote No.1 Spool Not In Neutral At Key On	
4513	Front Remote No.1 Spool Not In Neutral At Key On	
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4514	Front Remote No.2 No Control Message Received	
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4515	Front Remote no.2 Control Message Not Plausible	
4516	Front Remote No.2 EEPROM Error	
4516	Front Remote No.2 EEPROM Error	
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4517	Front Remote No.2 Switched To Failsafe	
4518	Front Remote No.2 Under Voltage	
4518	Front Remote No.2 Under Voltage	
4519	Front Remote No.2 Over Voltage	
4519	Front Remote No.2 Over Voltage	
4520	Front Remote No.2 Spool Movement Too Low	

Reference	Description	Controller
4520	Front Remote No.2 Spool Movement Too Low	
4521	Front Remote No.2 Spool Movement Too High	
4521	Front Remote No.2 Spool Movement Too High	
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4522	Front Remote No.2 Float Position Not Reached	
4523	Front Remote No.2 Manually Operated	
4523	Front Remote No.2 Manually Operated	
4524	Front Remote No.2 Driver Faulty	
4524	Front Remote No.2 Driver Faulty	
4525	Front Remote No.2 Potentiometer Faulty	
4525	Front Remote No.2 Potentiometer Faulty	
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4526	Front Remote No.2 Unable To Reach Neutral	
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4527	Front Remote No.2 Spool Not In Neutral At Key On	
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4528	Front Remote No.3 No Control Message Received	
4529	Front Remote No.3 Control Message Not Plausible	
4529	Front Remote No.3 Control Message Not Plausible	
4530	Front Remote No.3 EEPROM Error	
4530	Front Remote No.3 EEPROM Error	
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4531	Front Remote No.3 Switched To Failsafe	
4532	Front Remote No.3 Under Voltage	
4532	Front Remote No.3 Under Voltage	
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4533	Front Remote No.3 Over Voltage	
4534	Front Remote No.3 Spool Movement Too Low	
4534	Front Remote No.3 Spool Movement Too Low	
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4535	Front Remote No.3 Spool Movement Too High	
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4536	Front Remote No.3 Float Position Not Reached	

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4537	Front Remote No.3 Manually Operated	
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4538	Front Remote No.3 Driver Faulty	
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4539	Front Remote No.3 Potentiometer Faulty	
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4542	Front Remote No.4 No Control Message Received	
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4543	Front Remote No.4 Control Message Not Plausible	
4544	Front Remote No.4 EEPROM Error	
4544	Front Remote No.4 EEPROM Error	
4545	Front Remote No.4 Switched To Failsafe	
4545	Front Remote No.4 Switched To Failsafe	
4546	Front Remote No.4 Under Voltage	
4546	Front Remote No.4 Under Voltage	
4547	Front Remote No.4 Over Voltage	
4547	Front Remote No.4 Over Voltage	
4548	Front Remote No.4 Spool Movement Too Low	
4548	Front Remote No.4 Spool Movement Too Low	
4549	Front Remote No.4 Spool Movement Too High	
4549	Front Remote No.4 Spool Movement Too High	
4550	Front Remote No.4 Float Position Not Reached	
4550	Front Remote No.4 Float Position Not Reached	
4551	Front Remote No.4 Manually Operated	
4551	Front Remote No.4 Manually Operated	
4552	Front Remote No.4 Driver Faulty	
4552	Front Remote No.4 Driver Faulty	
4553	Front Remote No.4 Potentiometer Faulty	
4553	Front Remote No.4 Potentiometer Faulty	

Reference	Description	Controller
4554	Front Remote No.4 Unable To Reach Neutral	
4554	Front Remote No.4 Unable To Reach Neutral	
4555	Front Remote No.4 Spool Not In Neutral At Key On	
4555	Front Remote No.4 Spool Not In Neutral At Key On	
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5035	Rear PTO Fender Switch Input Short To 12V+	
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Reference	Description	Controller
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5042	PTO Management Switch - Stuck Closed	
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7024	Steering Angle Sensor Not Calibrated	
7032	Steering Angle Sensor - Signal Too Low	
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7033	No Differential Lock Pressure	
7034	Differential Lock Pressure Switch - Stuck On	
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8033	Front PTO Switch In Cab Normally Closed Open Circuit	
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8037	Front PTO Cab Normally Open Switch Stuck Closed	
8099	Front PTO Option Not Enabled	
8099	Front PTO Option Not Enabled	
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Reference	Description	Controller
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3006	Coolant Temperature Sensor - Signal Not Plausible	EDC
3007	Coolant Temperature Sensor - Signal Above Range	EDC
3007	Coolant Temperature Sensor - Signal Above Range	EDC
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3024	Atmospheric Pressure Sensor - Signal Above Range Maximum	EDC
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3030	Oil Pressure Sensor - Short Circuit To Ground	EDC
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Reference	Description	Controller
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3065	Cylinder 5 - Injector Cable Short Circuit (Low Side To Battery)	EDC
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Reference	Description	Controller
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3076	Cylinder 2 - Unclassifiable Error In Injector	EDC
3077	Cylinder 2 - Injector Cable Short Circuit (Low Side To Battery)	EDC
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SERVICE MANUAL

POWER PRODUCTION



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LUBRICATION SYSTEM B.60.A
PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

STARTING SYSTEM B.80.A
PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

POWER PRODUCTION - B

ENGINE - 10.A

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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POWER PRODUCTION - B

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ENGINE - General specification

GENERAL SPECIFICATIONS	PUMA 165	PUMA 180	PUMA 195	PUMA 210
Engine, type Un-Boosted:	F4DE9684H*J	F4DE9684E*J	F4DE9684D*J	F4DE9684C*J
Engine, type Boosted:	F4DE9684N*J	F4DE9684S*J	F4DE9684L*J	F4DE9684B*J
Engine Emission Level (Tier)	Tier 3			
Number of cylinders	6			
Number of valves per cylinder	4			
Boremm (in.)	104 (4.095)			
Strokemm (in.)	132 (5.1968)			
Total displacementcm3 (in.3)	6728 (411)			
Compression ratio	16.5 : 1			
Dynamic Timing (°BDTC)	3.4	5.5	6.3	6.3
Boosted Data Maximum power (Boost Curve) at **2000 RPM**	**158 kW** (**214.8 Hp**)	**172 kW** (**233.9 Hp**)	**177 kW** (**240.7 Hp**)	**178 kW** (**242.0 Hp**)
Maximum torque @ **1600 RPM**	**874 Nm** (**645 lb ft**)	**938 Nm** (**691.8 lbft**)	**965 Nm** (**711.7 lbft**)	**984 Nm** (**725.8 lbft**)
Unboosted Data Maximum power (Boost Curve) at **2000 RPM**	**132 kW** (**179.5 Hp**)	**147 kW** (**199.9 Hp**)	**156 kW** (**212.1 Hp**)	**164 kW** (**223.0 Hp**)
Maximum torque @ **1400 RPM**	**774 Nm** (**570.9 lbft**)	**844 Nm** (**622.5 lbft**)	**860 Nm** (**634.3 lbft**)	**866 Nm** (**638.7 lbft**)
Rated Speed	**2200 RPM**			
Slow idling speed of engine without load	**650 RPM**			
Fast idling speed of engine without load	**2375 RPM**			
Aspiration	Turbocharged and Air to Air Intercooled			
Turbocharger type	HOLSET			
Lubrication	Forced via lobe pump, pressure relief valve, oil filter			
Oil pressure with engine hot	– at slow idling - **0.7 bar** (**10.1500 psi**) – at fast idling - **4.0 bar** (**58.0000 psi**)			
Cooling system	Fluid–based			
Coolant pump drive:	Via Poly V Belt			
Thermostat:	Thermostat starts to open at **81 °C** (**178 °F**) and is fully open at **96 °C** (**205 °F**)			
Filling – engine sump – engine sump + filter	**15 l** (**4.0 US gal**)			
Cycle	Diesel, 4–stroke			
Fuel system Fuel injection	Turbocharged with Air to Air intercooler Direct			
Valve Timing Fuel system	Refer to **Valve drive - General specification (B.10.A)** Refer to **FUEL AND INJECTION SYSTEM - General specification (B.20.A)**			

ASSEMBLY CLEARANCES – DATA			
Engine		F4DE0684A	F4DE0684B
Type		6 cylinders	
CRANK GEAR AND CYLINDER ASSEMBLY DATA			
Cylinder liners	Ø1	104,0 to 104,024 (4.0945 to 4.1039)	
Cylinder liners:			
outside diameter	Ø2	–	
length	L	–	
Cylinder liners – crankcase seats (interference)		–	
Outside diameter	Ø2	–	
Cylinder liners:			

inside diameter .	Ø2	–
Pistons supplied as spare parts:		–
measurement	X	55,9 (2.2008)
outside diameter	Ø1	103,730 to 103,748 (4.0839 to 4.0846)
seat for pin	Ø2	38,010 to 38,016 (1.4965 to 1.4967)
Piston – cylinder liners		0,252 to 0,294 (0.0099 to 0.0116)
Piston diameter	Ø1	0,5 (0.0197)
Piston location from crankcase	X	0,28 to 0,42 (0.0110 to 0.0165)
Piston pin	Ø3	37,999 to 38,000 (1.4960 to 1.4961)
Piston pin – pin seat		0,011 to 0,016 (0.0004 to 0.0006)
	X1*	2,705 to 2,735 (0.1065 to 0.1077)
Piston ring grooves	X2	2,44 to 2,46 (0.0961 to 0.0969)
	X3	4,03 to 4,05 (0.1587 to 0.1594)
	S1*	2,560 to 2,605 (0.1008 to 0.1026)
Piston rings	S2	2,350 to 2,380 (0.0925 to 0.0937)
	S3	3,970 to 3,990 (0.1563 to 0.1571)
* measured on Ø of 58 mm (**2.2835 in.**) 4 cylinders		
	1	0,100 to 0,175 (0.0039 to 0.0069)
Piston rings – grooves	2	0,040 to 0,900 (0.0016 to 0.0354)
	3	0,020 to 0,065 (0.0008 to 0.0026)
Piston rings		0,5 (0.0197)
Piston ring end opening in cylinder liner:		
	X1	0,3 to 0,4 (0.0118 to 0.0157)
	X2	0,6 to 0,8 (0.0236 to 0.0315)
	X3	0,30 to 0,55 (0.0118 to 0.0217)
Small end bushing seat	Ø1	40,987 to 41,013 (1.6137 to 1.6147)
Connecting rod bearing seat	Ø2	72,987 to 73,013 (2.8735 to 2.8745)
Small end bushing diameter:		
outside	Ø3	43,279 to 43,553 (1.7039 to 1.7147)
inside	Ø4	38,019 to 38,033 (1.4968 to 1.4974)
Connecting rod half–bearings supplied as spares	S	1,955 to 1,968 (0.0770 to 0.0775)
Connecting rod bushing – seat		0,266 to 0,566 (0.0105 to 0.0223)
Piston pin – bushing		0,019 to 0,033 (0.0007 to 0.0013)
Connecting rod half bearings		0,019 to 0,033 (0.0007 to 0.0013)
Measurement	X	–
Maximum error on alignment of connecting rod axes	=	–
Main journals	Ø1	82,990 to 83,001 (3.2673 to 3.2677)
Crankpins	Ø2	68,987 to 69,013 (2.7160 to 2.7170)
Main journal half bearings	S1	2,456 to 2,464 (0.0967 to 0.0970)
Connecting rod half bearings	S2	1,955 to 1,968 (0.0770 to 0.0775)
Main bearings		
no. 1 – 5	Ø3	87,982 to 88,008 (3.4639 to 3.4649)
no. 2 – 3 – 4	Ø4	87,977 to 88,013 (3.4637 to 3.4651)
Half bearings – main journals		
no. 1 – 7		0,041 to 0,119 (0.0016 to 0.0047)
no. 2 – 3 – 4 – 5– 6		0,041 to 0,103 (0.0016 to 0.0041)
Half bearings – crankpins		0,033 to 0,041 (0.0013 to 0.0016)
Main journal half bearings		+ 0,250 (+0.0098); + 0,500
Connecting rod half bearings		(+0.0197)
Main journal for thrust	X1	37,475 to 37,550 (1.4754 to 1.4783)
Main bearing for thrust	X2	25,98 to 26,48 (1.0228 to 1.0425)
Semi–circular thrust washers	X3	37,28 to 37,38 (1.4677 to 1.4717)
Crankshaft thrust		0,068 to 0,410 (0.0027 to 0.0161)
CYLINDER HEAD		
Valve guide bores in the cylinder head	Ø1	7,051 to 7,053 (0.2776 to 0.2777)

	Ø2	–
Valve guide		
	Ø3	–
Valve guide and bores in head		–
Valve guide		–
Valves:		
	Ø4	6,970 to 6,999 (0.2744 to 0.2756)
	å	**60 ° +/- 0,25**
	Ø4	6,970 to 6,999 (0.2744 to 0.2756)
	å	**45 ° +/- 0,25**
Valve stem and relative guide		0,052 to 0,092 (0.0020 to 0.0036)
Bore in head for valve seat:		
Intake	Ø1	34,837 to 34,863 (1.3725 to 1.3726)
Exhaust	Ø1	34,837 to 34,863 (1.3725 to 1.3726)
Valve seat outside diameter; angle of valve seats in cylinder head		
Intake	Ø2	34,917 to 34,931 (1.3747 to 1.3752)
	å	**60 °**
Exhaust	Ø2	34,917 to 34,931 (1.3747 to 1.3752)
	å	**45 °**
Recessing		
Intake	X	0,59 to 1,11 (0.0232 to 0.0437)
Exhaust	X	0,96 to 1,48 (0.0378 to 0.0452)
Between valve seat and head		
Intake		0,054 to 0,094 (0.0021 to 0.0037)
Exhaust		0,054 to 0,094 (0.0021 to 0.0037)
Valve seats		–
Valve spring height:		–
free spring	H	47,75 (1.8799)
under a load of:		
329 N	H1	35,33 (1.3909)
641 N	H2	25,2 (0.9921)
Injector protrusion	X	–
Seats for camshaft bushings no. 1 – 5		59,222 to 59,248 (2.3316 to 2.3326)
Camshaft seats no. 2 – 3 – 4		54,089 ÷ 54,139 (2.1292 to 2.1315)
Camshaft support journals		
1 Þ 5		53,995 to 54,045 (2.1258 to 2.1278)
Camshaft bushing outside diameter:	Ø	59,222 to 59,248 (2.3316 to 2.3326)
Bushing inside diameter:	Ø	54,083 to 54,147 (2.1292 to 2.1318)
Bushings and seats in crankcase		–
Bushings and support journals		0,038 to 0,162 (0.0015 to 0.0064)
Useful cam lift:	H	6,045 (0.2380)
	H	7,582 (0.2985)
Tappet cap seat in crankcase	Ø1	16,000 to 16,030 (0.6299 to 0.6311)
Tappet cap outside diameter:		
	Ø2	15,924 to 15,954 (0.6269 to 0.6281)
	Ø3	15,960 to 15,975 (0.6283 to 0.6289)
Between tappets and seats		0,025 to 0,070 (0.0010 to 0.0028)
Tappets		–
Rocker arm shaft	Ø1	21,965 to 21,977 (0.8648 to 0.8652)
Rocker arms:	Ø2	21,001 to 22,027 (0.8268 to 0.8672)
Between rocker arms and shafts		0,024 to 0,162 (0.0009 to 0.0064)

ENGINE - Torque

PART	TORQUE Nm (lb ft)
Bolts securing connecting rod caps:	Refer to **Connecting rod and piston - Torque (B.10.A)**.
Bolts securing pulley and damper:	Refer to **Crankshaft - Torque (B.10.A)**.
Nut securing fuel injection pump drive. gear:	Refer to **Fuel injection pump - Torque (B.20.A)**
Nut securing compressor gear:	125 ± 19 (92.1953 ± 14.0137)
Bolts securing timing gear:	Refer to **Timing gear - Torque (B.10.A)**.
Unions securing piston lubrication nozzles:	Refer to **Piston lubrication Spray nozzle - Torque (B.60.A)**
Bolts securing timing system casing	Refer to **Rear cover - Torque (B.10.A)**
Bolts securing front cover M10 1.5x30	 24 ± 4 (17.7015 ± 2.9502)
Bolts securing main bearing caps with angle closed M12 1.50 12.9	Refer to **Crankshaft Main bearing - Torque (B.10.A)**.
Screw fixing Ladder Frame: M10 1.5x25	 43 ± 5 (31.7152 ± 3.6878)
Bolts securing lifting brackets: M12 1.75x25 M10	 7 ± 12 (5.1629 ± 8.8507) 43 ± 5 (31.7152 ± 3.6878)
Bolts securing cooler	Refer to **Oil cooler - Torque (B.60.A)**
Bolts securing valve cover	Refer to **Valve cover - Torque (B.10.A)**.
Engine Vent Fastener (Ccv) M8 1.25x45 M8 1.25x35	 24 ± 4 (17.7015 ± 2.9502) 24 ± 4 (17.7015 ± 2.9502)
Bolts securing oil sump ♦	Refer to **Oil pan - Torque (B.60.A)**
Bolts / Plugs On Head **1/2 in** Nptf **3/4 in** Nptf **1/4 in** Nptf	 24 ± 4 (17.7015 ± 2.9502) 36 ± 5 (26.5522 ± 3.6878) 12 ± 2 (8.8507 ± 1.4751)
Bolts securing cylinder head ♦	Refer to **Cylinder head - Torque (B.10.A)**.
Bolts securing heater grille: M6	 10 ± 2 (7.3756 ± 1.4751)
Bolts securing intake manifold: M8 1.25x25 M8 1.25x60	 25 ± 5 (18.4391 ± 3.6878) 25 ± 5 (18.4391 ± 3.6878)
Bolts securing exhaust manifold on head	Refer to **Exhaust manifold - Torque (B.40.A)**.
Bolts securing flywheel	Refer to **Flywheel - Torque (B.10.A)**.
Bolts securing camshaft thrust plate:	Refer to **Valve drive Camshaft - Torque (B.10.A)**.
Bolts securing camshaft gear: M8 1.25x20 9.8 Flg	 36 ± 4 (26.5522 ± 2.9502)
Bolts securing rocker arms:	Refer to **Rocker assembly Rocker arm - Torque (B.10.A)**.
Bolts securing rocker arm adjusters: 3/8 24 Unf Hex Nut	 24 ± 4 (17.7015 ± 2.9502)
Bolts securing rocker arm casing:	24 ± 4 (17.7015 ± 2.9502)
Bolts securing phonic wheel: M12 1.25 10.9 Flg Hex 1st phase 2nd phase	 50 ± 5 (36.8781 ± 3.6878) + **90 °** +/- **5 °**
Fuel manifold retaining nuts	Refer to **Fuel injector Fuel Manifold - Torque (B.20.A)**.
Fuel connector fastener on Common Rail side	20 ± 2 (14.7512 ± 1.4751)

PART	TORQUE Nm (lb ft)
Common Rail fastener	
M8 1.25x10 9.8 Flg Hex	24 ± 4 (17.7015 ± 2.9502)
M8 1.25x50 9.8 Flg Hex	24 ± 4 (17.7015 ± 2.9502)
M8 1.25x90 9.8 Flg Hex	24 ± 4 (17.7015 ± 2.9502)
Fastener for high-pressure pipes from Common Rail to cylinder head	
M14 1.5	20 ± 2 (14.7512 ± 1.4751)
Fastener for fuel filter mounting on crankcase	
M12 1.75x25 9.8 Fig Hex	77 ± 8 (56.7923 ± 5.9005)
Turbine / exhaust manifold fastener	Refer to **Turbocharger - Torque (B.30.A)**.
Oil delivery/return pipe fastener	
M12 1.5	35 ± 5 (25.8147 ± 3.6878)
Oil dipstick pipe fastener:	24 ± 4 (17.7015 ± 2.9502)
Bolts securing oil pump:	Refer to **Oil pump - Torque (B.60.A)**
Main oil delivery bolts (plugs)	
M10 — 1	6 ± 1 (4.4254 ± 0.7376)
M14 — 1.5	11 ± 2 (8.1132 ± 1.4751)
Oil cooler / oil filter assembly fastener:	24 ± 4 (17.7015 ± 2.9502)
Coolant pump / crankcase fastener:	
M8 1.25x25 8.8 Hex 1st phase	24 ± 4 (17.7015 ± 2.9502)
2nd phase	43 ± 6 (31.7152 ± 4.4254)
Tightener fastener	
M10 1.5x60 9.8 Fig	-
Fan mounting fastener	
M10	33 ± 5 (24.3395 ± 3.6878)
Fan pulley fastener	-
Fan spacer or accessory pulley fastener (when required)	
M6	10 ± 2 (7.3756 ± 1.4751)
M10	43 ± 6 (31.7152 ± 4.4254)
M12	77 ± 12 (56.7923 ± 8.8507)
Alternator fastener	
M8 1.25x30 9.8 Fig Hex	24 ± 4 (17.7015 ± 2.9502)
M12 1.75x120 10.9 Fig Hex	43 ± 6 (31.7152 ± 4.4254)
M12 Nut 1.75 G Fig Hex	24 ± 4 (17.7015 ± 2.9502)
M10 1.5x25 9.8 Fig Hex	-
M10 1.5x40 9.8 Fig Hex	-
M10 Nut 1.5 9 Fig Hex	-
M16 1.5 Hex	-
Stud bolts for mounting fuel pump:	
M8	12 ± 2 (8.8507 ± 1.4751)
Bolts securing injection pump:	
M8 1.5	24 ± 4 (17.7015 ± 2.9502)
Tightening nut fixing injection pump gear	
M18 1.5	105 ± 5 (77.4440 ± 3.6878)
Fastener for fittings from injection pump to Common Rail:	
M12 1.5	20 ± 2 (14.7512 ± 1.4751)
Bolts securing injectors: Electronic Engine	Refer to **Fuel injector Electro injector - Torque (B.20.A)**.
Bolts securing injector connectors:	Refer to **Electrical control - Torque (B.20.A)**.
Oil pressure regulator sensor fastener:	8 ± 2 (5.9005 ± 1.4751)
Camshaft speed sensor fastener in gearbox:	
M6	8 ± 2 (5.9005 ± 1.4751)
Crankshaft speed sensor fastener on front cover	
M6	8 ± 2 (5.9005 ± 1.4751)
Temperature sensor fastener on cylinder head:	

PART	TORQUE Nm (lb ft)
M14 1.5x12 Hex	20 ± 3 (14.7512 ± 2.2127)
Air temperature sensor fastener on intake manifold: M6 1x20	3 ± 1 (2.2127 ± 0.7376)
Air pressure and temperature sensor fastener on intake manifold: M5	3 ± 1 (2.2127 ± 0.7376)
Fuel pressure sensor fastener:	35 ± 5 (25.8147 ± 3.6878)
Fuel temperature sensor fastener: M14 1.5x12 Hex	20 ± 3 (14.7512 ± 2.2127)
Gear fastener on air compressor: **5/8 in**18 Unf	125 ± 19 (92.1953 ± 14.0137)
Air compressor fastener on crankcase: M12 Nut	81 ± 12 (59.7425 ± 8.8507)

♦ Lubricate with engine oil before assembly

ENGINE - Special tools

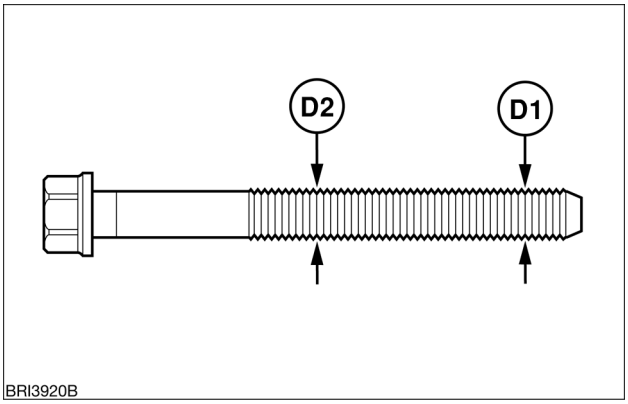
No. TOOL	NAME
380000979	Puller for engine injection pump union gear
380000665	Tool to extract crankshaft front seal
380000663	Tool to extract crankshaft rear seal
380001099	Injector extractor
380000666	Crankshaft front seal installer
380000664	Crankshaft rear seal installer
380000988	Flywheel locking adaptor plate (to be used with **380000732**)
380000732	Engine turning tool (to be used with **380000988**)
380000667	Drift for camshaft bushing disassembly and reassembly
380000158	Torque screwdriver for injector solenoid valve connector nut setting
380001003	Connecting Rod Check Gauge
380000301	Engine stand (revolving)
380001298	Engine stand to Cylinder block brackets
380001073	Engine lifting brackets

ENGINE - Dimension - Stretch Bolt Check for reuse.

NOTE: *This check is required to be carried out prior to reusing the following stretch bolts:*

Cylinder Head (Refer to ***Cylinder head - Install (B.10.A)***
Rocker Post (Refer to ***Rocker assembly Rocker arm - Torque (B.10.A)****).*
Main Bearing (Refer to ***Crankshaft Main bearing - Torque (B.10.A)****).*
Connecting Rod (Refer to ***Connecting rod and piston - Torque (B.10.A)****).*

Before reusing the retaining stretch bolts, make two (2) measurements, using a micrometer, on the tread outer diameter at points D1 and D2. The two points measured should be as close as reasonably possible to the two ends of the bolts threaded section.



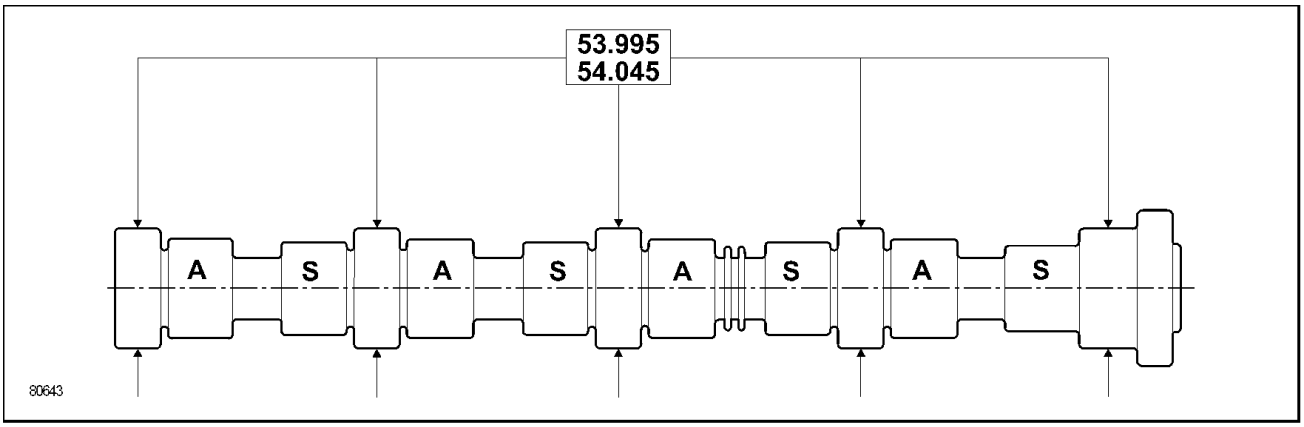
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If D1-D2< **0,1 mm** (**0.0039 in**), the bolt can be reused.

If D1-D2> **0,1 mm** (**0.0039 in**), the bolt must be renewed.

Valve drive Camshaft - Dimension

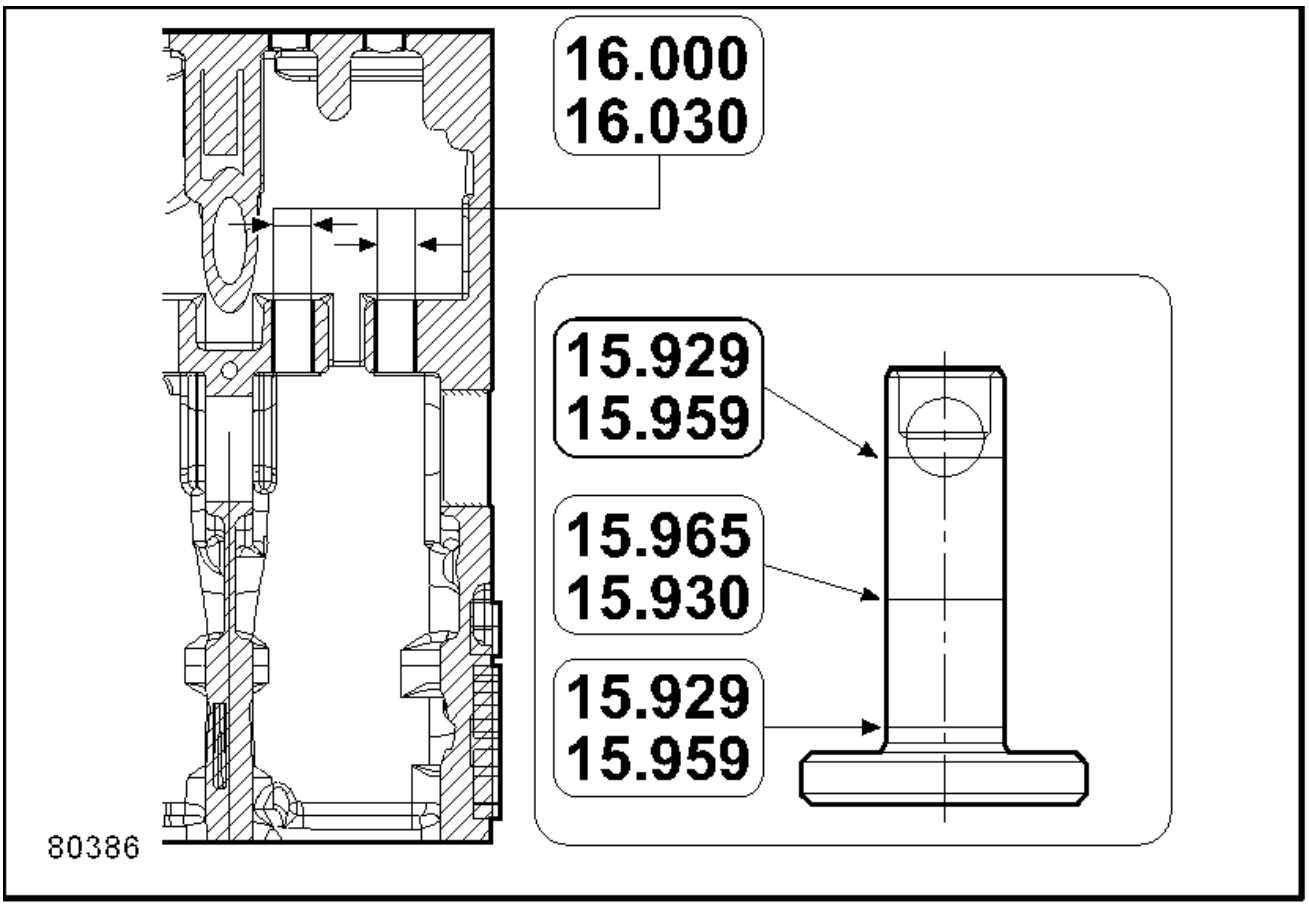
Camshaft Data



80643 1

The data given refers to the normal pin diameter. Refer to Cylinder block - Dimension (B.10.A) and Valve drive Camshaft - Measure (B.10.A)).

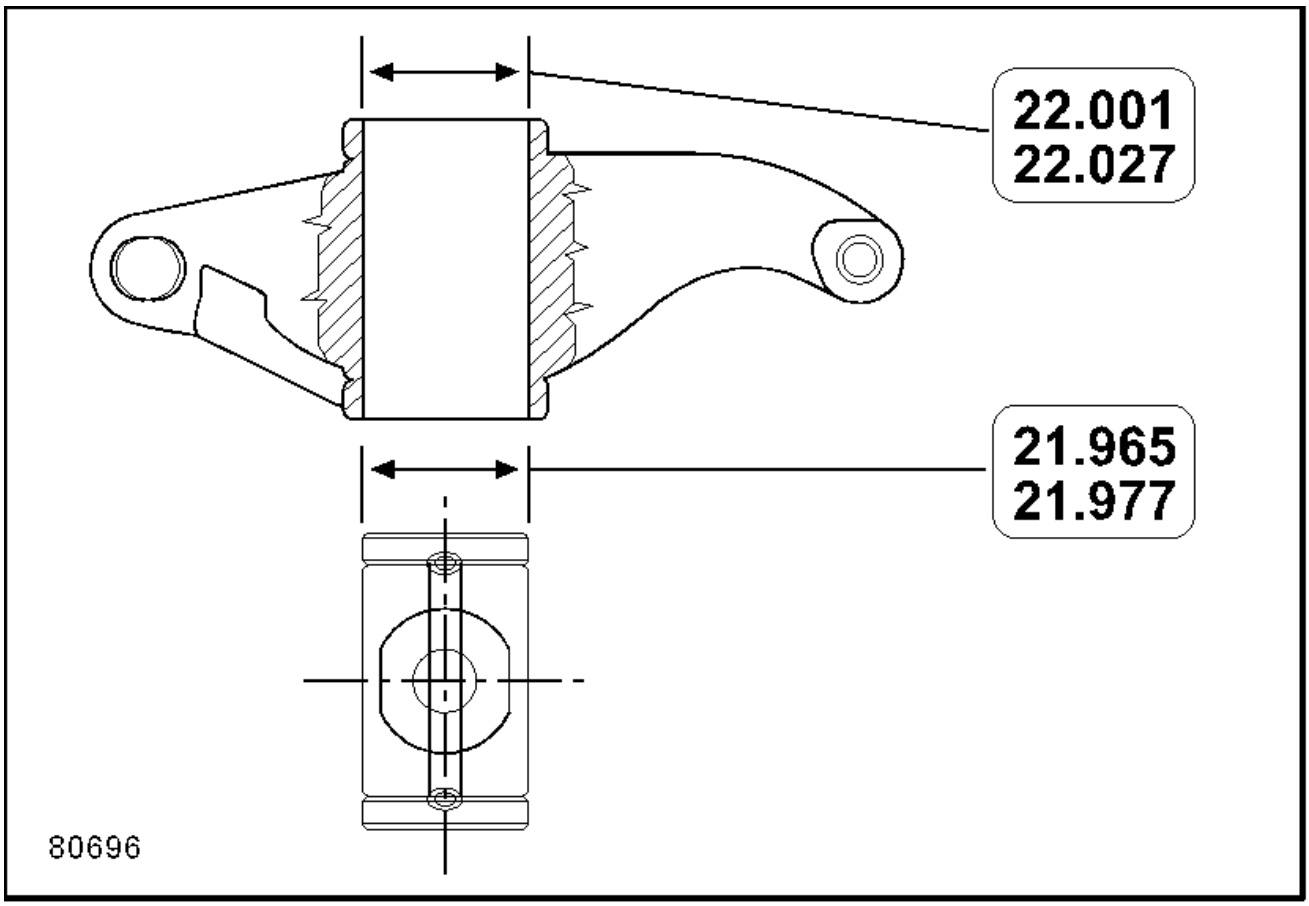
Camshaft Tappet - Dimension



80386_208 1

Tappet data. (Refer to ENGINE - General specification (B.10.A)

Rocker assembly Shaft - Dimension



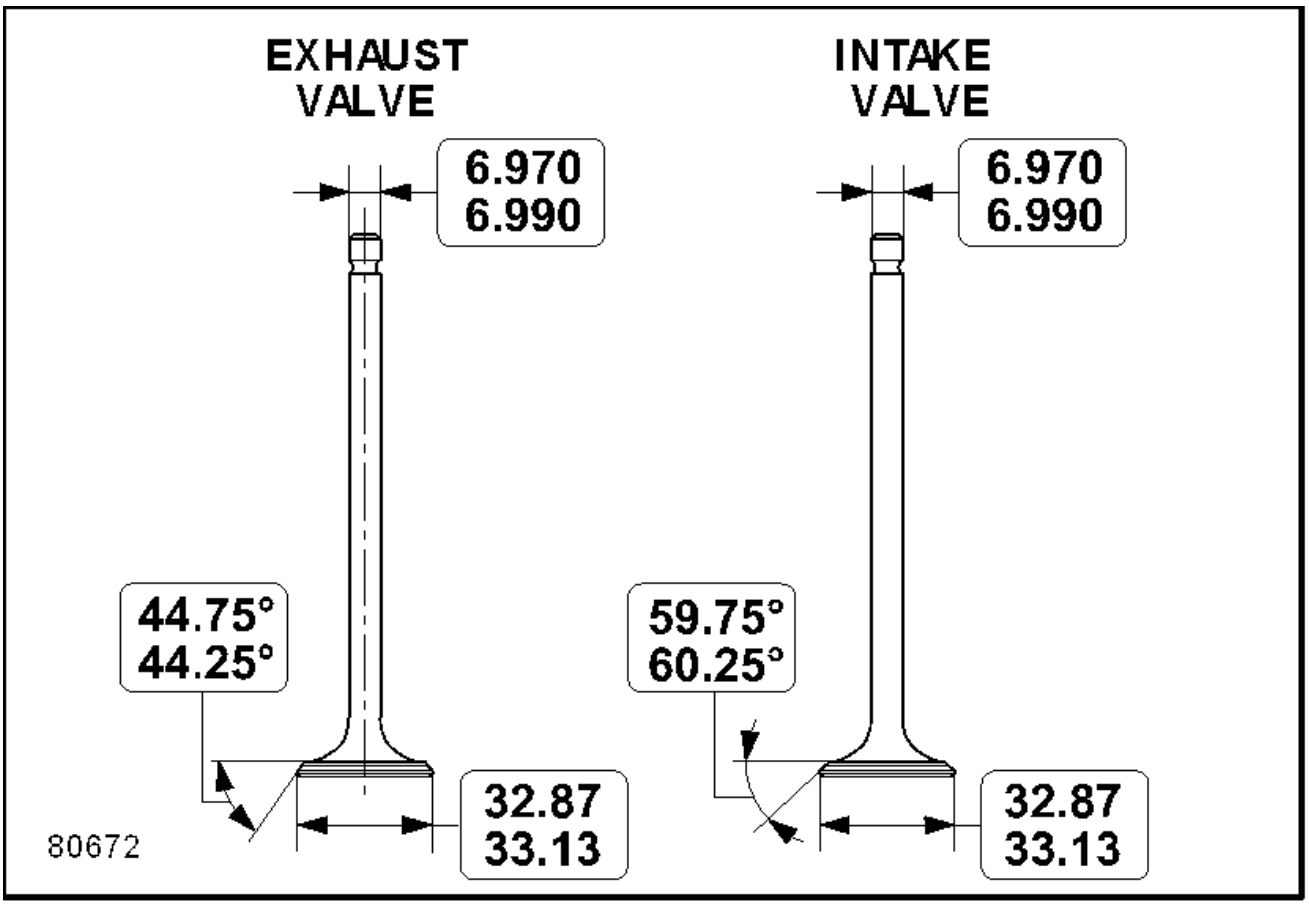
80696_102 1

Rocker Arm and Spindle data.

Rocker assembly Rocker arm - Dimension

NOTE: *Refer to* ***Rocker assembly Shaft - Dimension (B.10.A)****).*

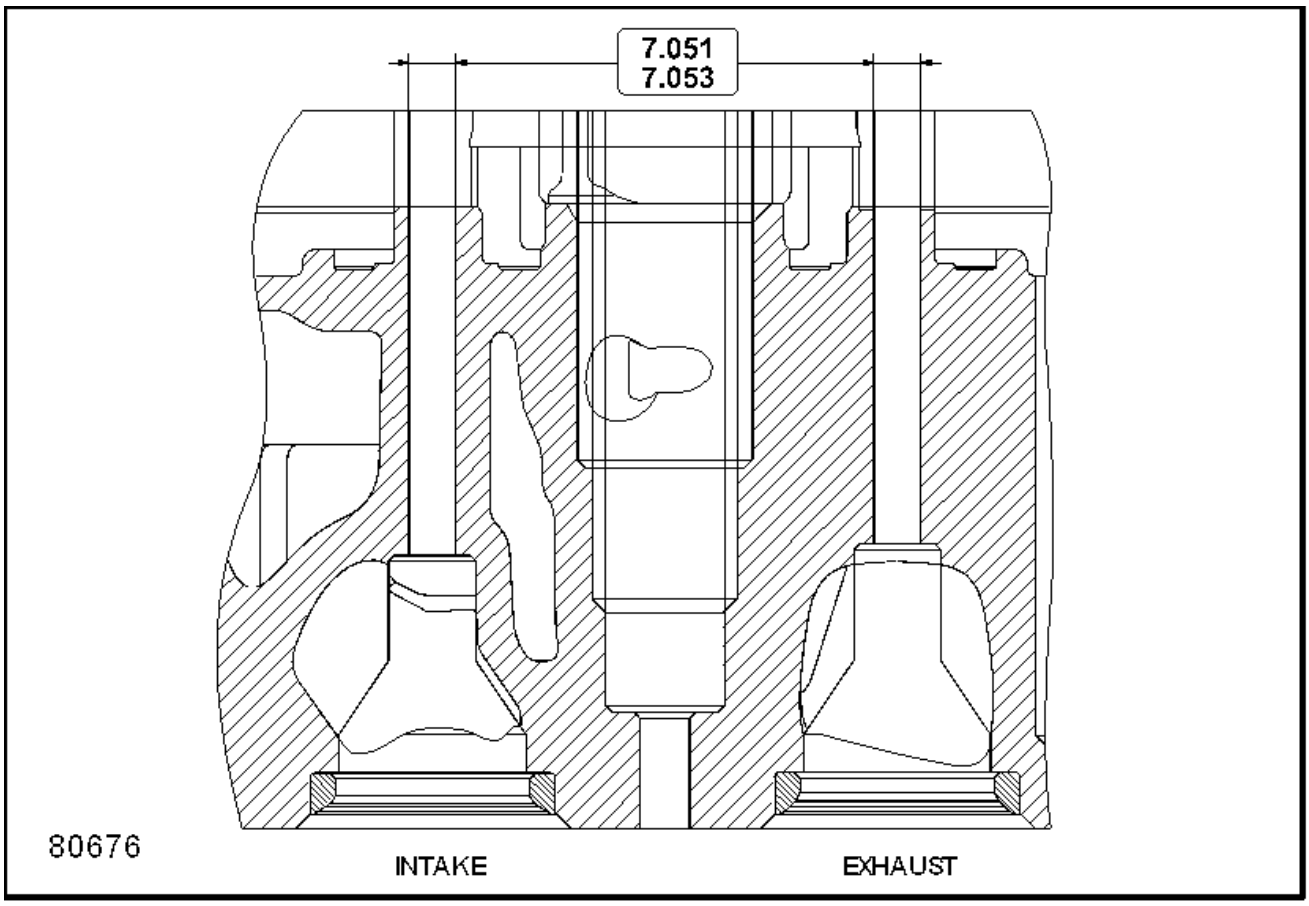
Valve assembly Valve - Dimension



80672 1

Intake and Exhaust Valve Data.

Valve drive Valve guide - Dimension



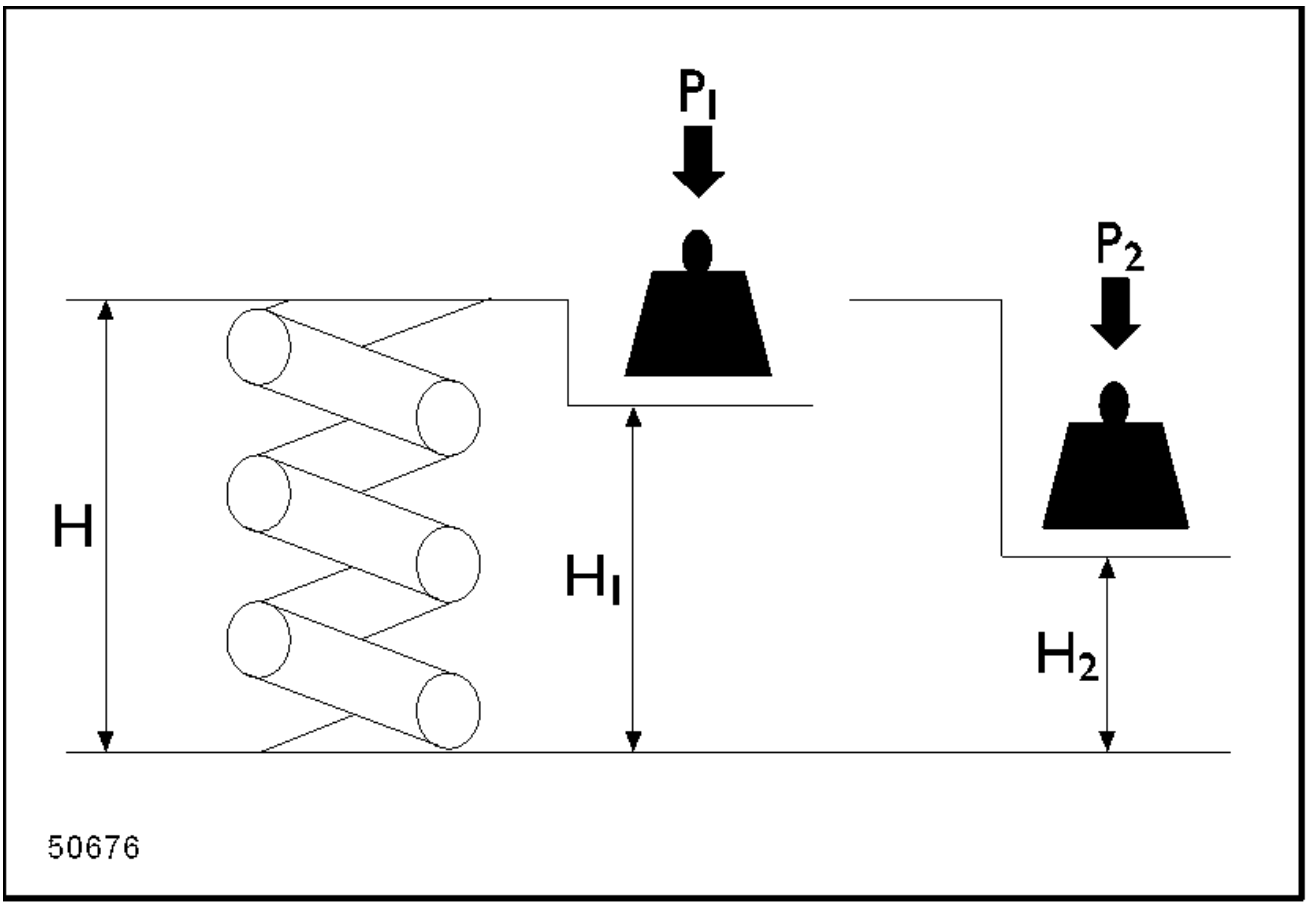
80676_98 1

Valve Guide data. (Refer to Valve drive Valve guide - Measure (B.10.A)).

Valve assembly Spring - Dimension

Valve Springs

DATA FOR CHECKING THE INTAKE AND EXHAUST VALVE SPRINGS
Before assembly, check the valve spring flexibility. Compare the elastic deformation and load data with those of the new springs.



50676_197 1

For H/H1/H2 dimensions, refer to Valve assembly Spring - General specification (B.10.A) or ENGINE - General specification (B.10.A).

Rocker assembly Rocker arm - Torque

Part	TORQUE Nm (lb ft)
Bolts for securing rocker arms M8 x 1,25 x 53	**35 Nm +/- 5 Nm** (**26 lb ft +/- 4 lb ft**)

Valve drive Camshaft - Torque Thrust Plate Bolts

Part	TORQUE Nm (lb ft)
Bolts for securing Camshaft Thrust Plate M8 x 1,25 x 16	**25 Nm +/- 5 Nm** (**18 lb ft +/- 4 lb ft**)

Valve assembly Spring - General specification

Part Description		Dimensions
Valve spring height:		–
free spring	H	**47.75 mm** (**1.880 in**)
under a load of:		
329 N	H1	35,33 (1.3909)
641 N	H2	25,2 (0.9921)

Camshaft Tappet - General specification Clearance.

ATTENTION: *With TIER 3 engines with internal EGR (Exhaust Gas Recirculation) standard valve lash setting procedure will lead to wrong valve clearances and serious engine damage.*

Each cylinder must be checked by putting engine to TDC firing for that cylinder and setting both valve clearances on that cylinder ONLY.
NO SHORT CUTS INVOLVING THE SETTING OF VALVES ON ONE CYLINDER WHILST ENGINES AT TDC OF ANOTHER CYLINDER ARE ALLOWED!

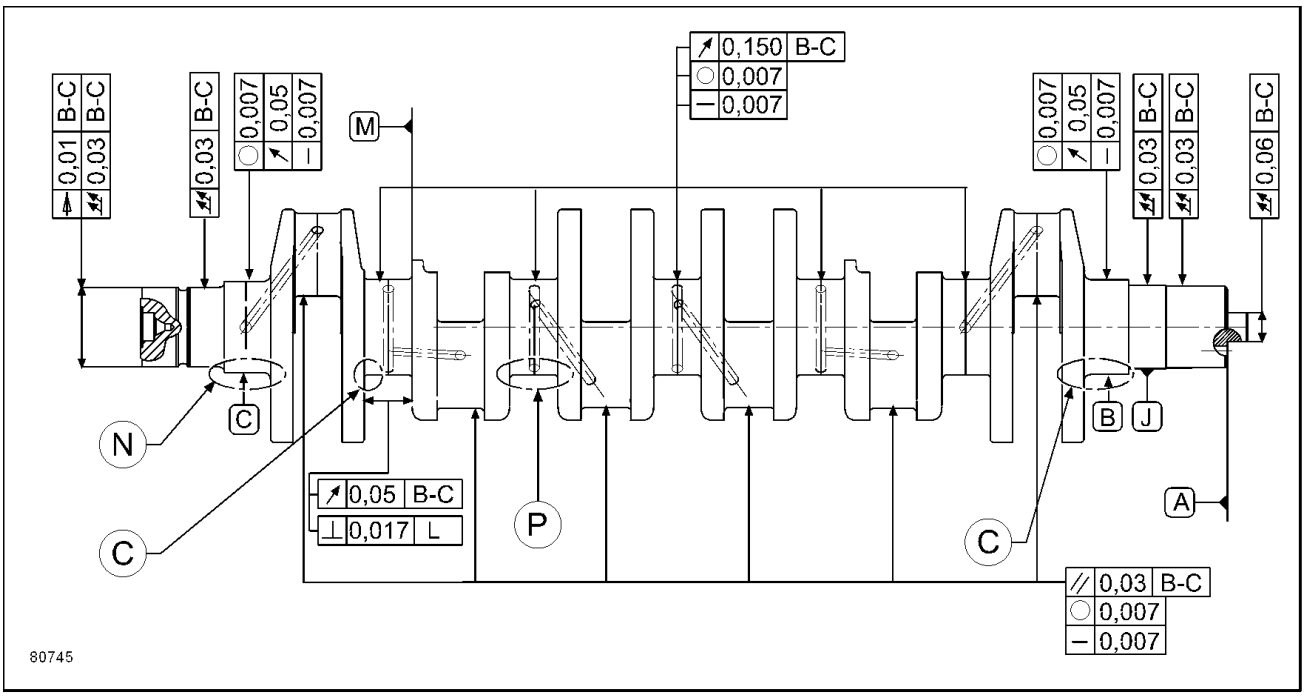
Refer to **Camshaft Tappet - Clearance (B.10.A)**

Tappet Clearance for 4v engines	Dimension
Intake valves	**0.25 mm +/- 0.05**
Exhaust valves	**0.50 mm +/- 0.05**

Valve drive - General specification Valve Timing

Description	
Inlet Start before TDC	**14 °**
Inlet End after BDC	**20 °**
Exhaust Start before BDC	**61 °**
Exhaust End after TDC	**20 °**
Valve Clearance (Engine Cold)	Refer to **Camshaft Tappet - Clearance (B.10.A)**
Inlet	**0.25 mm +/- 0.05**
Exhaust	**0.50 mm +/- 0.05**

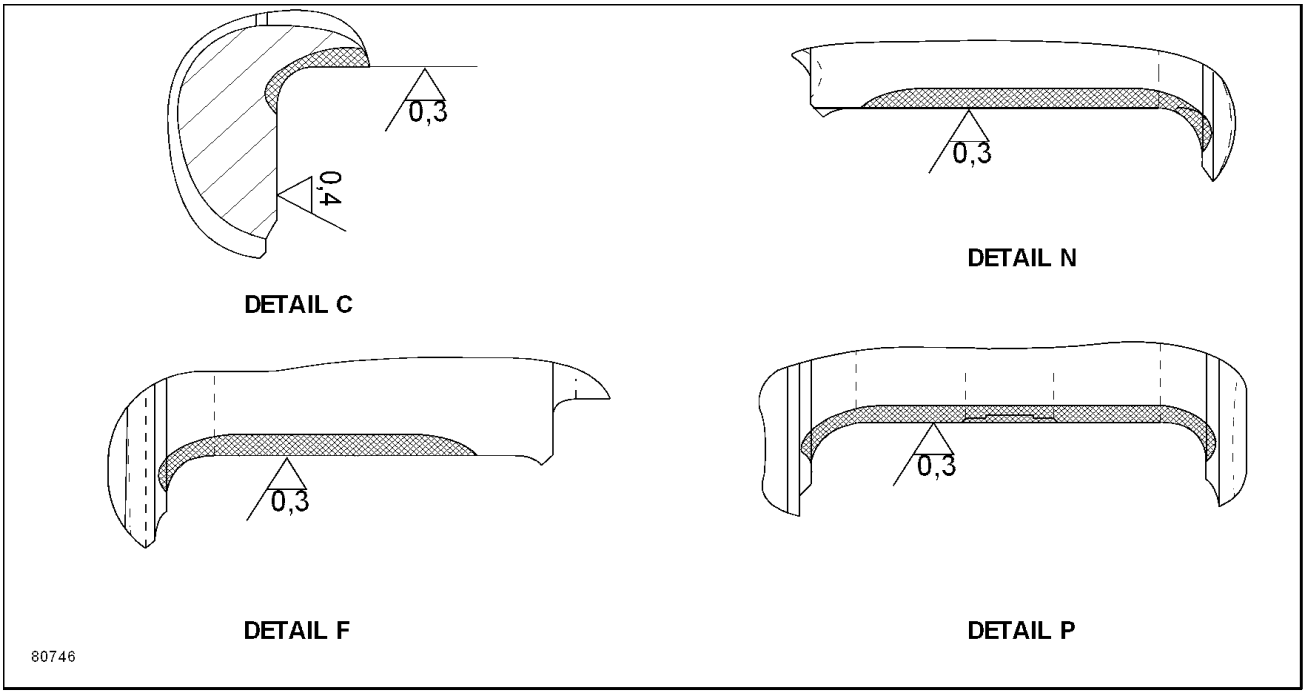
Crankshaft - Dimension



80745_211 1

MAIN CRANKSHAFT TOLERANCES

TOLERANCES	CHARACTERISTIC SUBJECT OF TOLERANCE	GRAPHIC SYMBOL
SHAPE	Circularity	○
	Cylindricity	/○/
ORIENTATION	Parallelism	//
	Perpendicularity	⊥
	Straightness	—
POSITION	Concentricity or coaxiality	◎
OSCILLATION	Circular oscillation	↗
	Total oscillation	↗↗
	Taper	⌯▷
CLASS OF IMPORTANCE ASSIGNED TO PRODUCT CHARACTERISTICS	GRAPHIC SYMBOL	
CRITICAL	●	
IMPORTANT	◐	
SECONDARY	△	



80746_212 2

Refer to Crankshaft - Measure (B.10.A).

Crankshaft Main bearing - Torque

Part	TORQUE Nm (lb ft)
Torque main bearing cap bolts as a pair incrementally	Refer to **Crankshaft Main bearing - Assemble (B.10.A)**
Step 1. Tighten both bolts to initial torque setting.	**50 Nm +/- 6 Nm** (**37 lb ft +/- 4 lb ft**)
Step 2. Tighten both bolts to torque setting.	**80 Nm +/- 6 Nm** (**59 lb ft +/- 4 lb ft**)
Step 3. Torque/Angle bolts	**90 ° +/- 5 °**

IMPORTANT: *Rotate crankshaft after setting to ensure free rotation.*

Crankshaft - Torque - Damper Flywheel Assembly to Crankshaft bolts.

Part	TORQUE Nm (lb ft)
Step 1. Tighten both bolts to initial torque setting.	**50 Nm +/- 6 Nm** (**37 lb ft +/- 4 lb ft**)
Step 2. Torque/Angle bolts	**90 ° +/- 5 °**

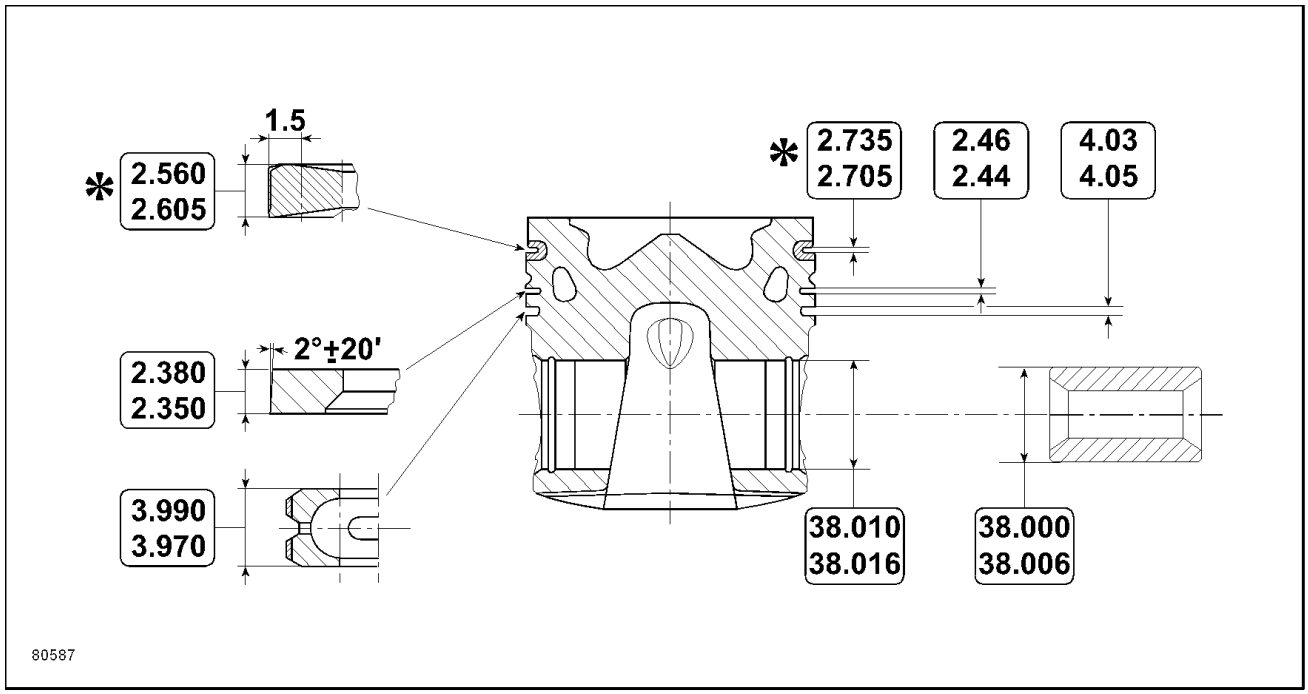
Timing gear - Torque

Part	TORQUE Nm (lb ft)
Bolts securing timing gear	**36 Nm +/- 4 Nm** (**27 lb ft +/- 3 lb ft**)

Connecting rod and piston - Torque

Part	TORQUE Nm (lb ft)
Bolts securing connecting rod caps M10 x 1,25 x 52	Refer to **Connecting rod and piston - Install (B.10.A)**
Step 1. Tighten bolts to initial torque settings.	**30 Nm +/- 5 Nm** (**22 lb ft +/- 4 lb ft**)
Step 2. Tighten bolts to the torque of	**50 Nm +/- 5 Nm** (**37 lb ft +/- 4 lb ft**)
Step 3. Torque/Angle bolts	**60 ° +/- 5 °**

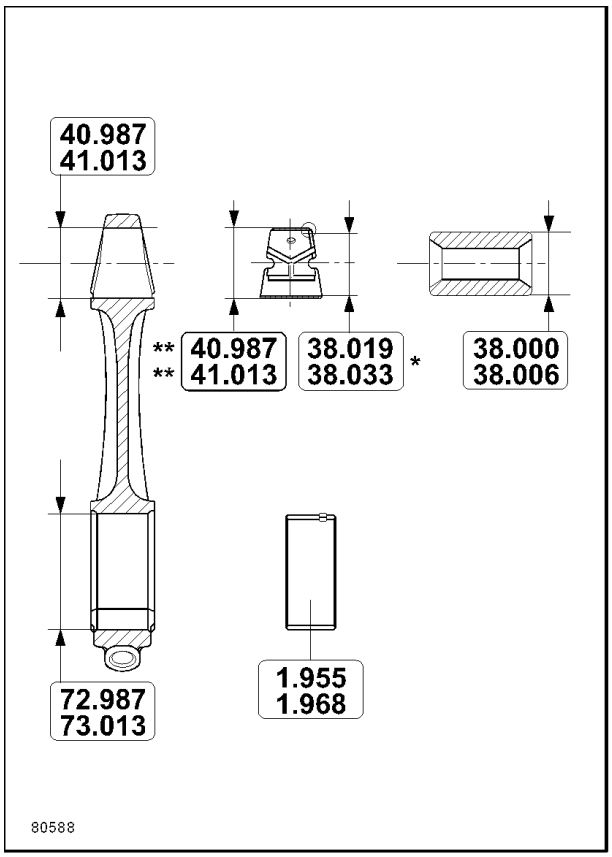
Connecting rod and piston Piston - Dimension



80587_218 1

Mondial Piston, Pin and Ring Data
*** Measurement obtained on a diameter of 92 mm (3.6220 in)**

Connecting rod and piston Connecting rod - Dimension



80588_219 1

CONNECTING ROD, PISTON PIN BUSHING AND HALF BEARING DATA

- * Inside diameter to be measured after installing in the small end and regrinding with a reamer.
  ** Cannot be measured free.

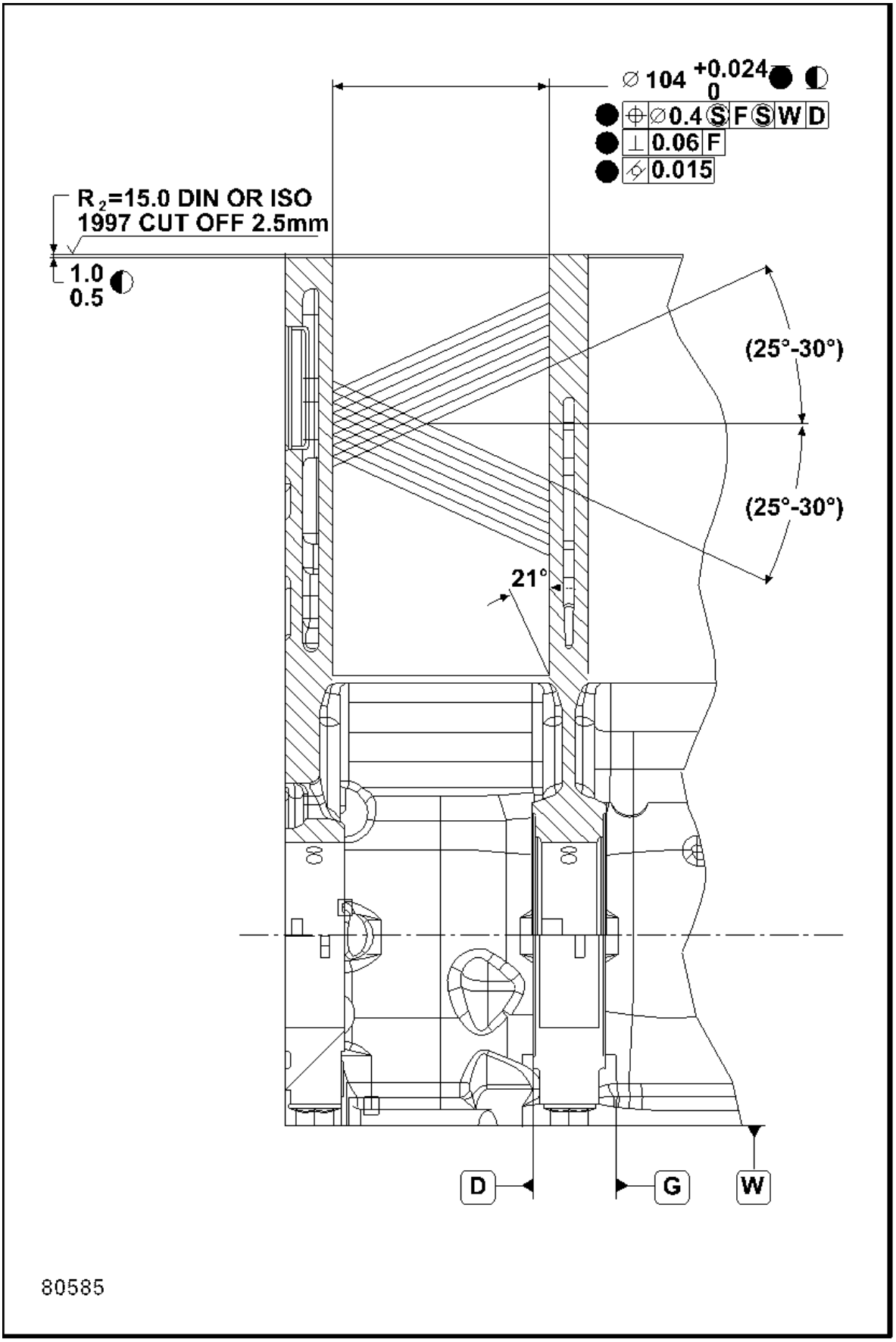
  NOTE: *The connecting rod - connecting rod cap mating surfaces are knurled for a better coupling. It is therefore recommended not to remove the knurling. The rods are manufactured using a fracture breaking technique making each rod and cap unique and having only one way of installation. Refer to* ***Connecting rod and piston - Measure (B.10.A)****.*

Flywheel - Torque

PART	TORQUE
Bolts flywheel to crankshaft M12 x 1.25 x 32. 1st Stage.	**30 Nm +/- 4Nm** (**22 lb ft +/- 3lb ft**)
2nd Stage	+ 60°+/-5°

Cylinder block - Dimension

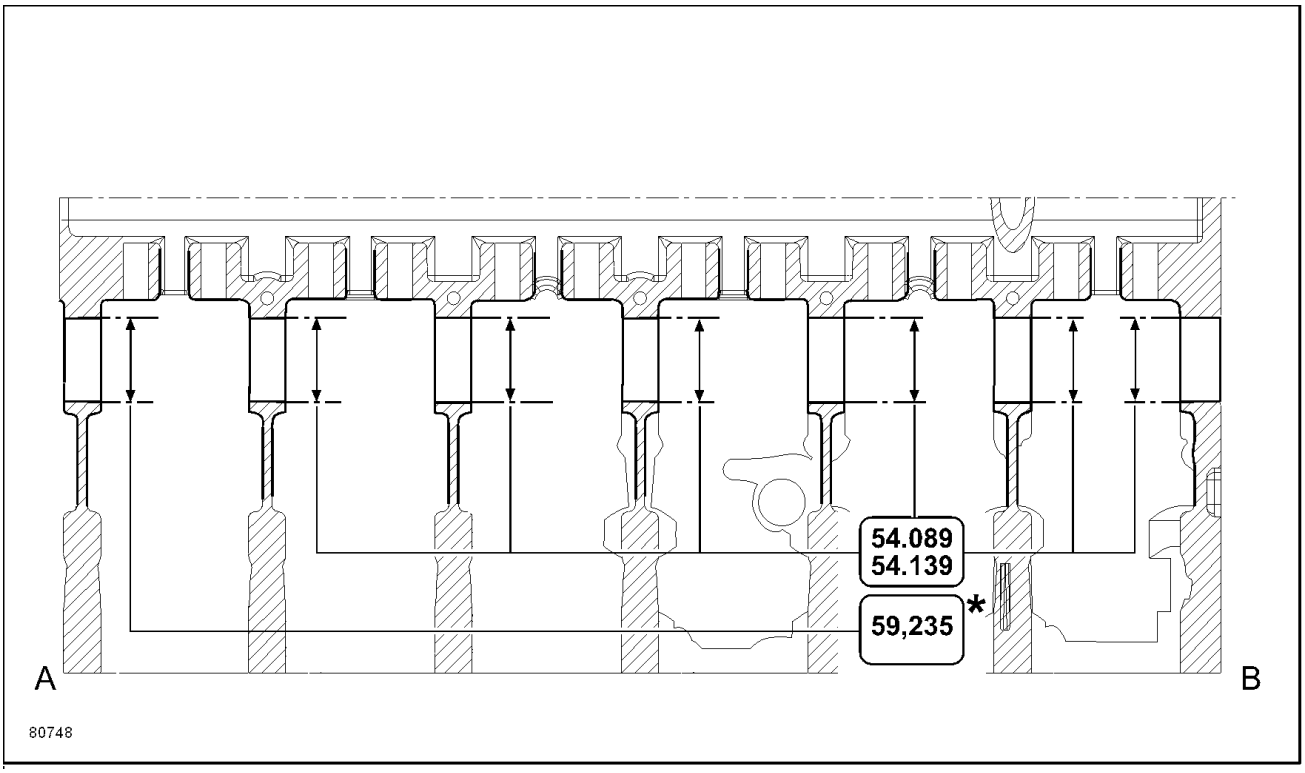
Cylinder Block Bores Data.



80585_287 1
876280095 C 18/08/2009

Refer to Cylinder block - Measure (B.10.A).

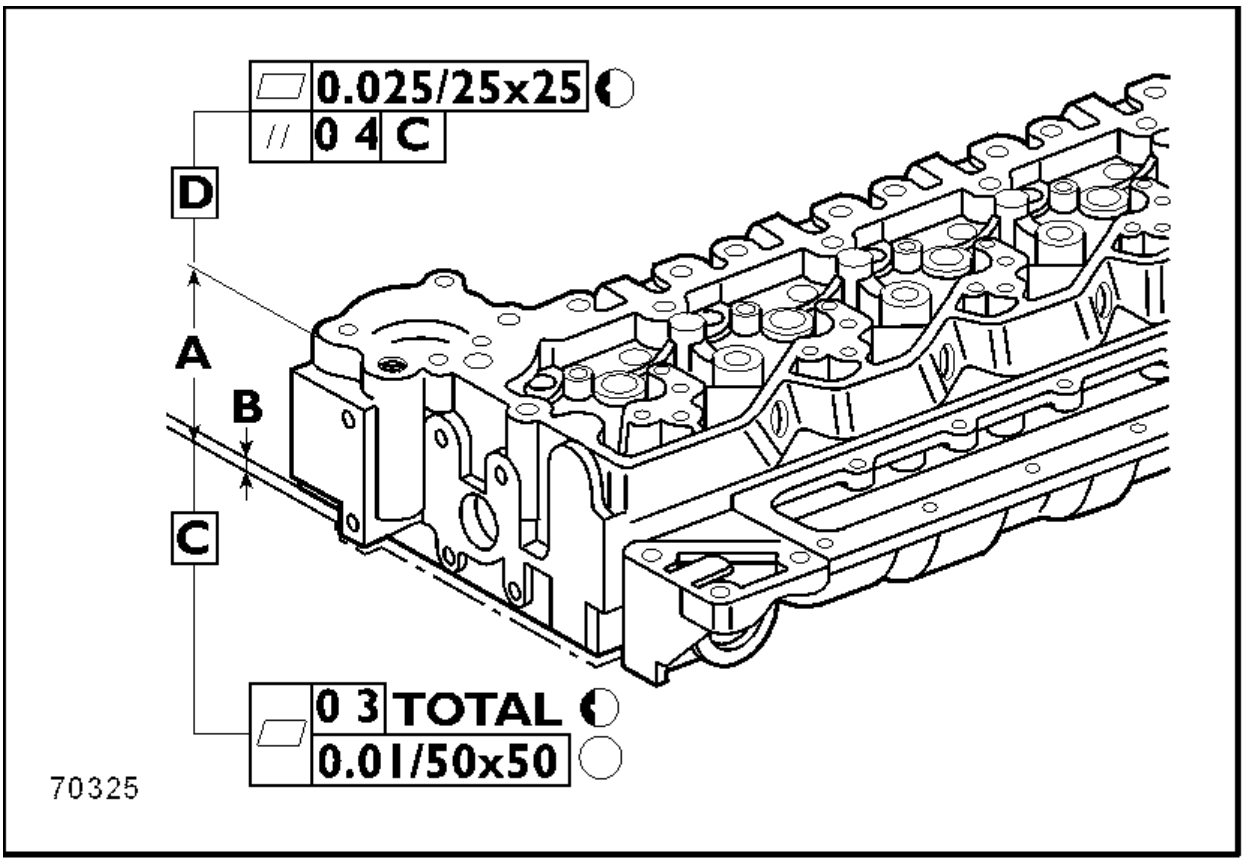
Camshaft Bushing and Relevant Seat Data.



80748 2

For Camshaft data, refer to Valve drive Camshaft - Dimension (B.10.A).

Cylinder head - Dimension



70325_97 1

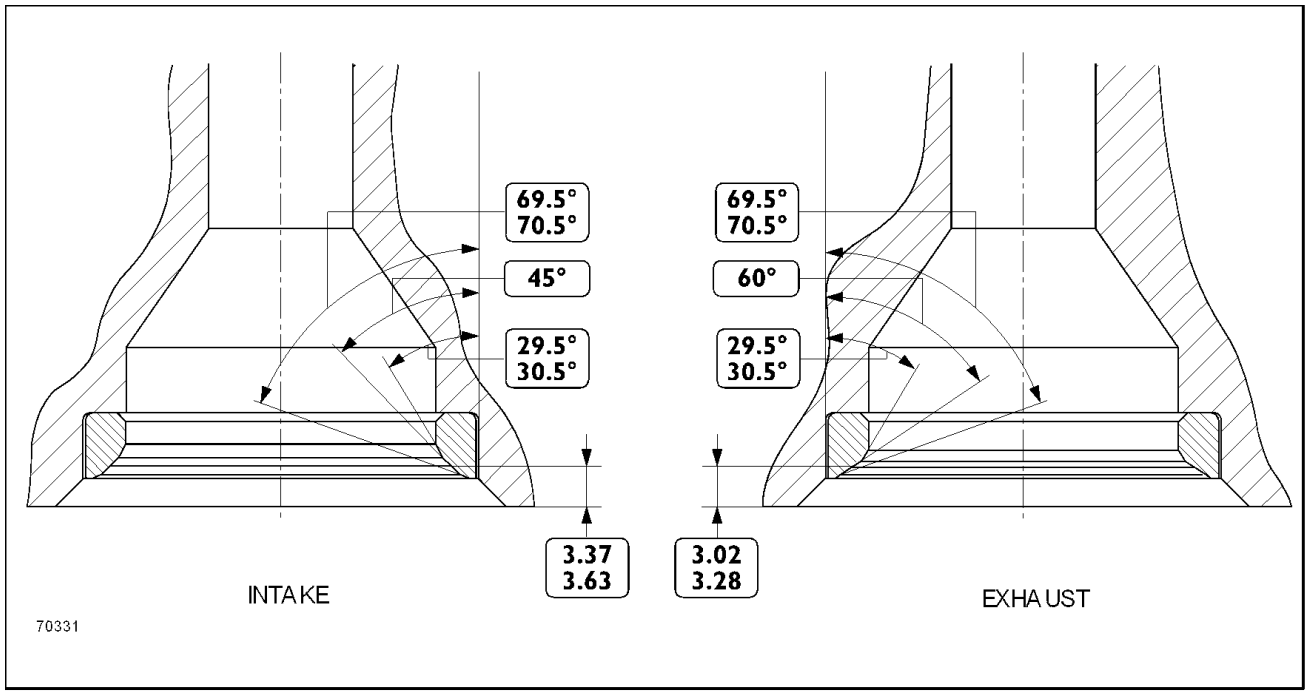
Cylinder Head mating surface check.

The dimension **(A)** should be **105 mm** (**4.1339 in**) ± **0.25 mm** (**0.0098 in**)
Maximum metal removal should not exceed dimension **(B)** by **1 mm** (**0.0394 in**)

NOTE: *After grinding check valve seating. Regrind the valve seats if required to obtain the specified value.*

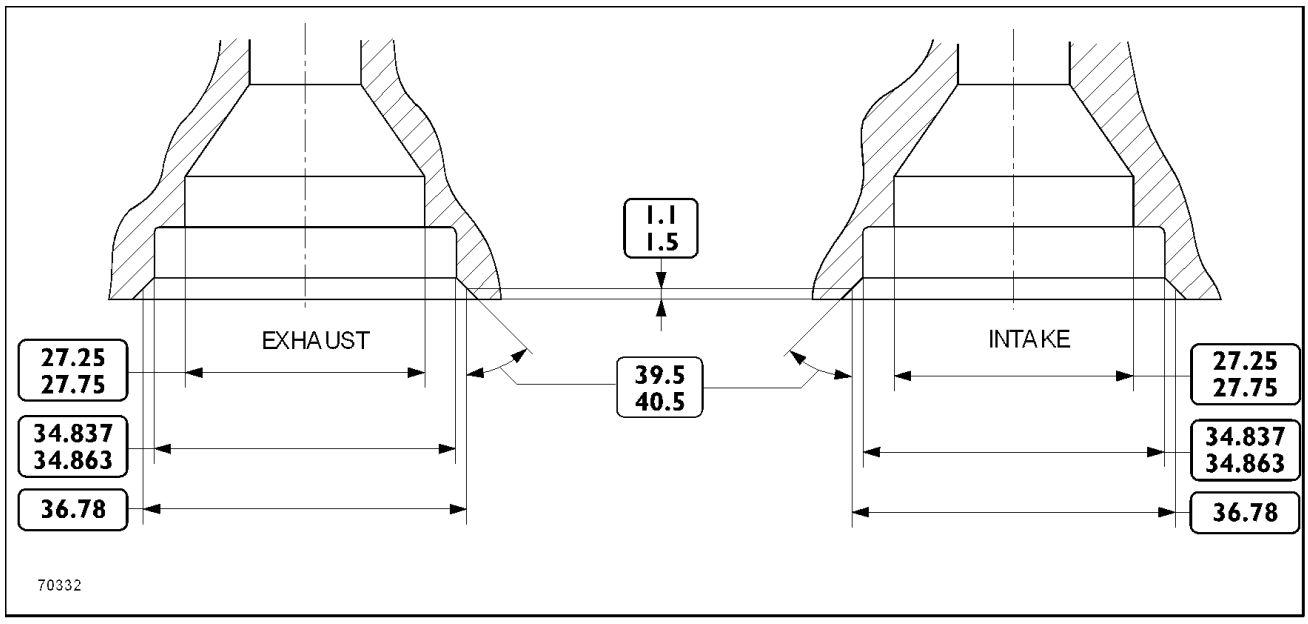
Cylinder head Valve seat - Dimension

Valve Seat Data



70331_100 1

Cylinder Head Seat Data



70332_101 2

Cylinder head - Torque

Part	TORQUE Nm (lb ft)
Bolts securing cylinder head. INSTALL LONGER BOLTS (**150 mm**), TO THE MIDDLE TWO (2) ROWS OF BOLT HOLES.	

Part	TORQUE Nm (lb ft)
Step 1. Tighten all bolts to initial torque settings and in the correct tightening sequence. (Refer to **Cylinder head - Tighten (B.10.A)**.	Bolt size M12 x 1,75 x 130 **35 Nm +/- 5 Nm** (**26 lb ft +/- 4 lb ft**) Bolt size M12 x 1,75 x 150 **55 Nm +/- 5 Nm** (**41 lb ft +/- 4 lb ft**)
Step 2.	+ **90 ° +/- 5 °**
Step 3.	+ **90 ° +/- 5 °**

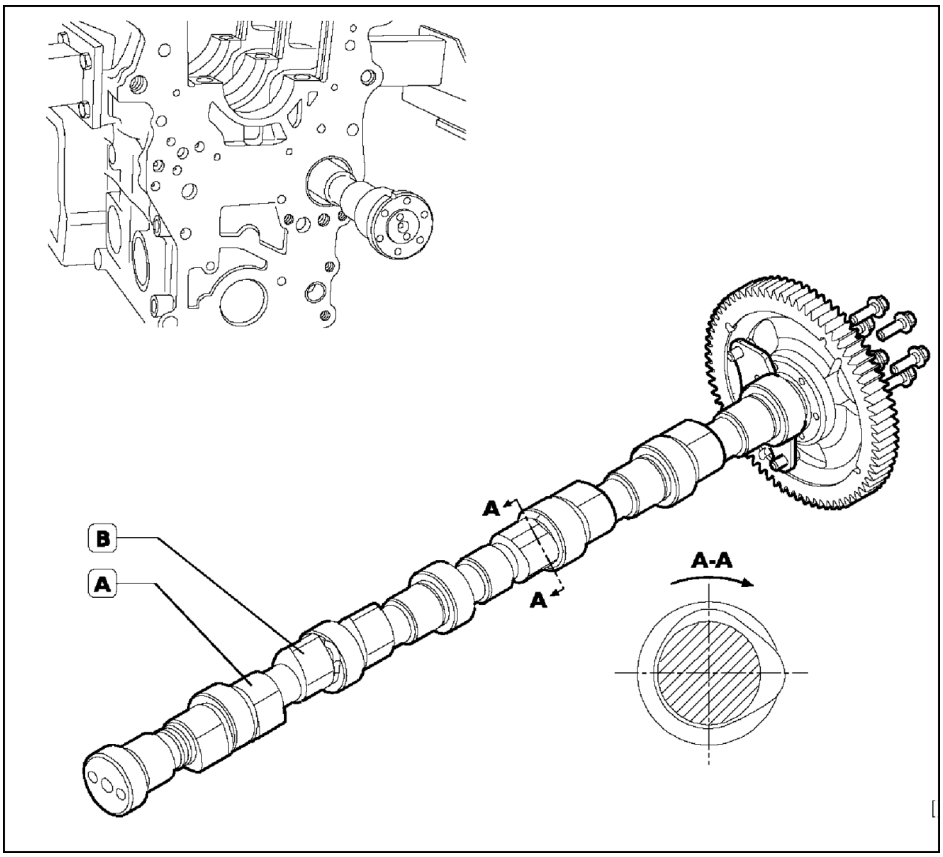
Valve cover - Torque

Part	TORQUE Nm (lb ft)
Nuts securing valve cover M8. Refer to **Valve cover - Tighten (B.10.A)**	**24 Nm +/- 4 Nm** (**18 lb ft +/- 3 lb ft**)

Rear cover - Torque

PART	TORQUE Nm (lb ft)
Bolts securing timing system casing Refer to **Rear cover - Install (B.10.A)**	
M8 1.25x40	**24 Nm± 4 Nm**(**17.7015 lbft ± 2.9502 lbft**)
M10 1.5x30	**47 Nm± 5 Nm**(**34.6654 lbft ± 3.6878 lbft**)

Valve drive Camshaft - Static description



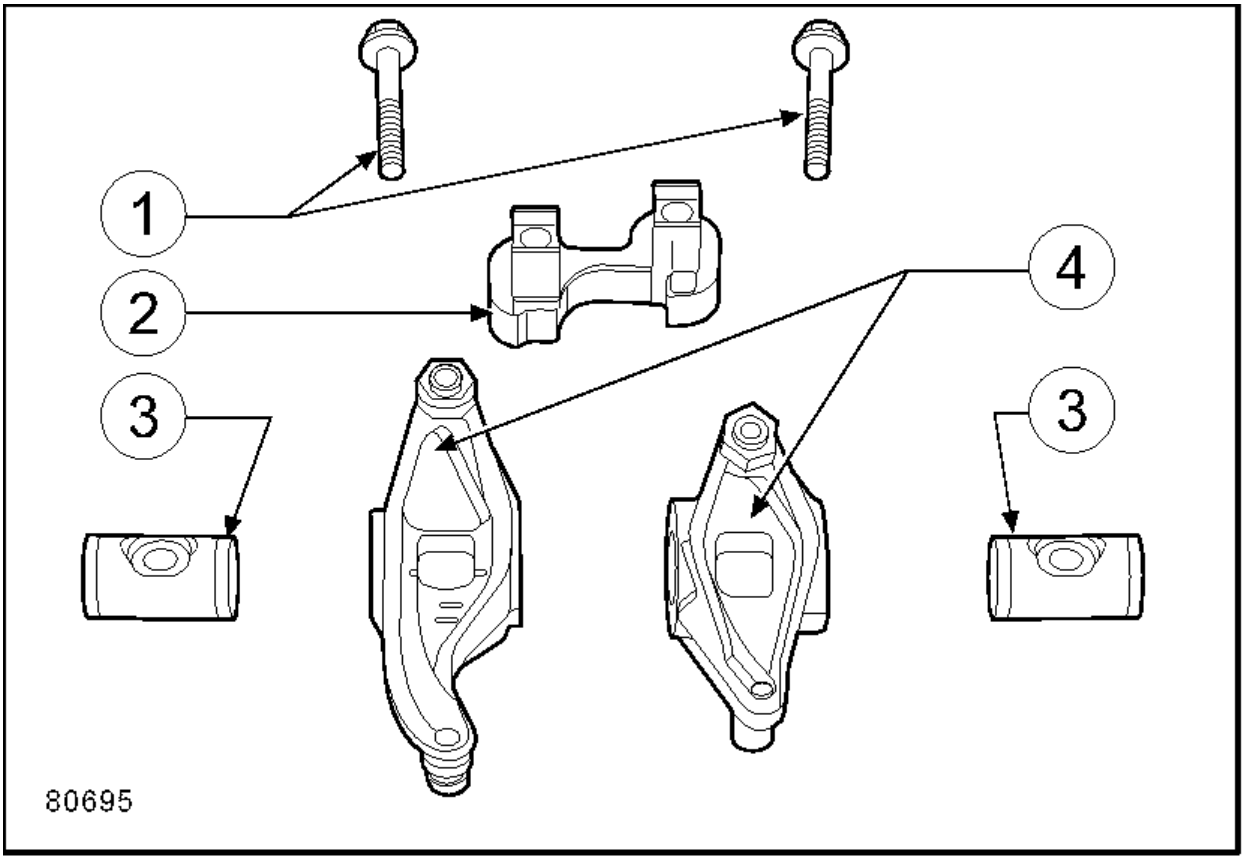
BAIL07APH368GMA 1

(A) - Intake (B) - Exhaust

Internal exhaust gas recirculation is employed to return some exhaust gas back into the combustion chamber to reduce exhaust emissions. An extra lobe on the cam shaft enables exhaust gas recirculation via the exhaust valve during the intake cycle by keeping the exhaust valve open for a short while. The exhaust gases are partially redirected into the cylinders in order to reduce the maximum combustion temperature values which are responsible for the production of nitrogen oxide (NOx), and this reduces the emissions reaching the atmosphere.

Valve drive Rocker assembly - Component identification

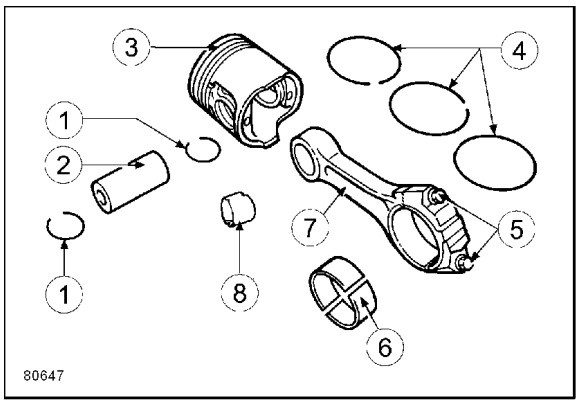
Component Parts of Rocker Arm Assembly



80695 1

Item number	Part Description
1.	Bolts
2.	Support
3.	Spindles (Refer to **Rocker assembly Shaft - Dimension (B.10.A)**).
4.	Rocker arms (Refer to **Rocker assembly Shaft - Dimension (B.10.A)**).

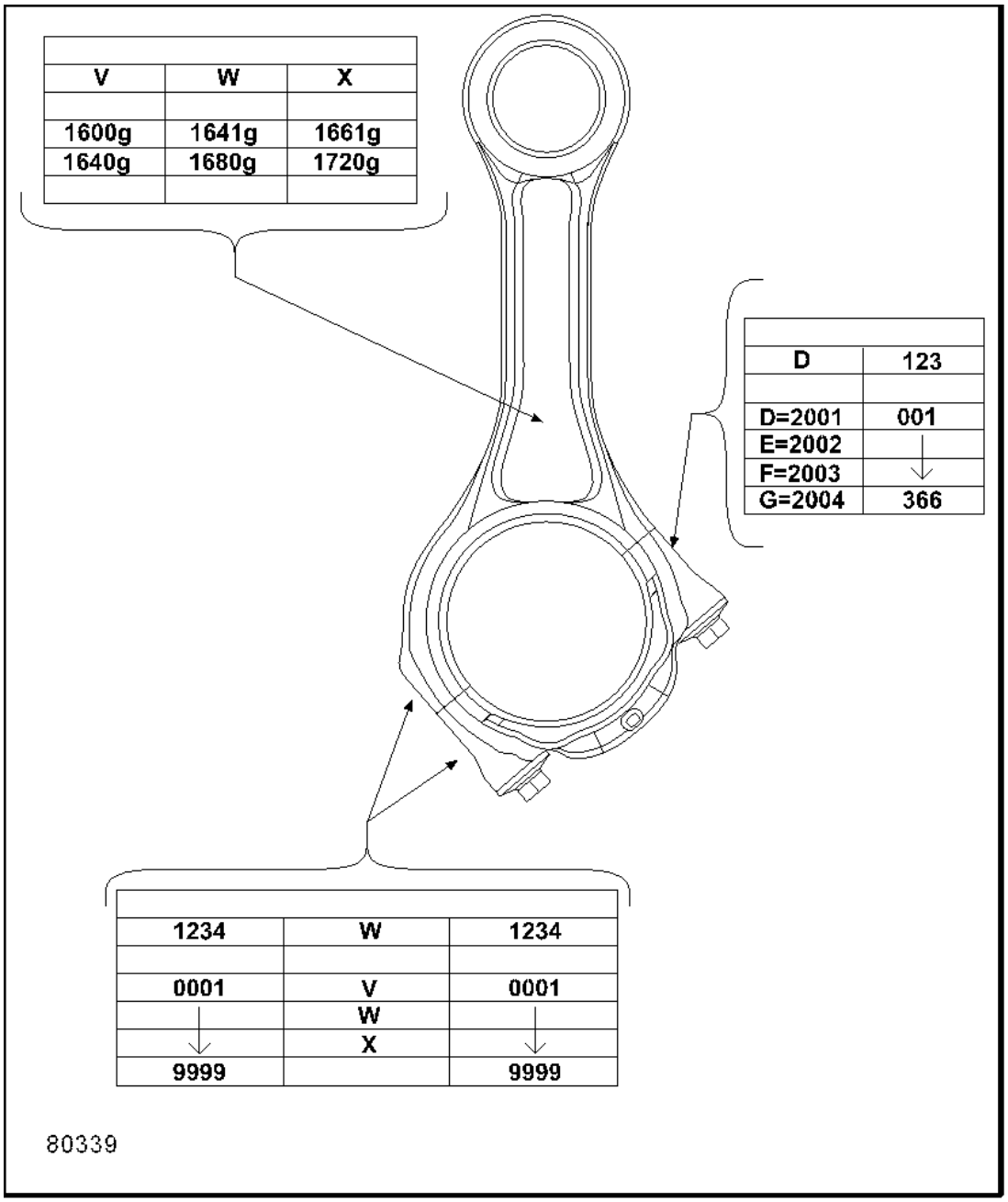
Connecting rod and piston - Exploded view



80647 1

1. Retaining rings
2. Pin
3. Piston
4. Piston rings
5. Bolts
6. Half bearings
7. Connecting rod
8. Bushing

Connecting rod and piston Connecting rod - Component identification



80339 1

Each connecting rod is marked: -
On the body and cap with a number indicating their coupling and the cylinder in which it is mounted. In the event of replacement, number the new rod with the same number as the replaced connecting rod. -
On the body of the connecting rod with a letter indicating the weight class of the connecting rod mounted in production:
V, 1600 to 1640 g (3.5274 to 3.6156 lb) (marked in yellow)
W, 1641 to 1680 g (3.6178 to 3.7038 lb) (marked in green)
X, 1681 to 1720 g (3.7060 to 3.7920 lb) (marked in blue)

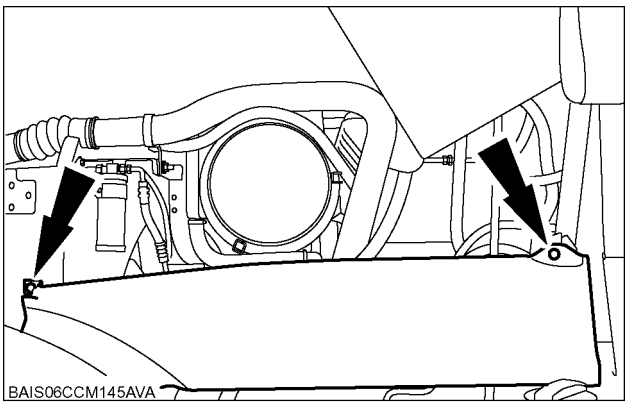
ENGINE - Disconnect

Prior operation:
Drain the engine coolant system. For additional information, refer to **ENGINE COOLANT SYSTEM - Drain fluid (B.50.A)**.
Prior operation:
Disconnect the battery ground (earth) lead. For additional information, refer to **Battery - Disconnect (A.30.A)**.

All Tractors

1. Remove the engine side panels.

NOTE: *Repeat the operation on both sides of the tractor.*

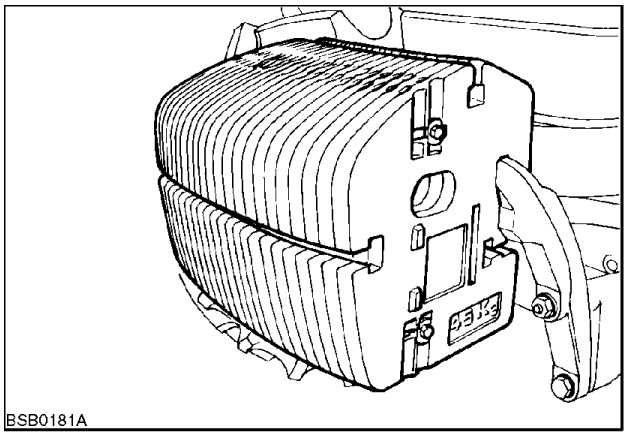


BAIS06CCM145AVA 1

2. Using a suitable sling, connect the front weights to a hoist and remove the front weights (if fitted).

⚠ WARNING ⚠
Suitcase weights are extremely heavy. To prevent injury, always use an adequate lifting device to install or remove front end or rear end weights.

M417

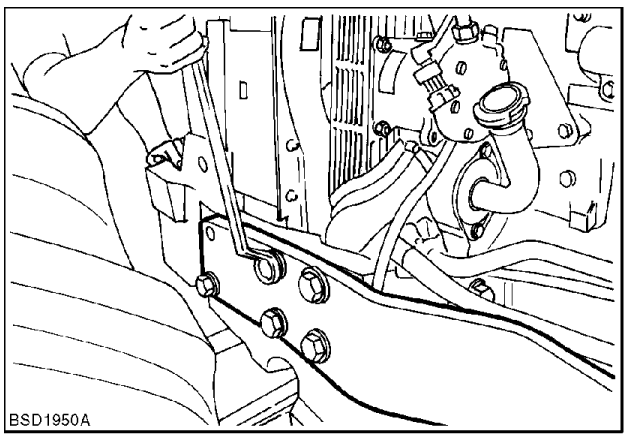


BSB0181A 2

3. Remove the engine side rails (if fitted).

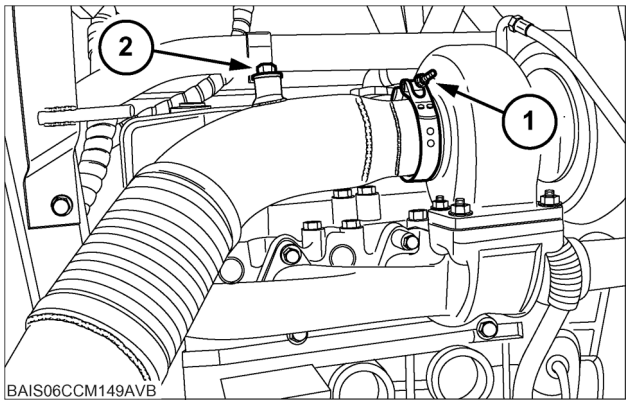
⚠ WARNING ⚠
Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012



BSD1950A 3

4. Loosen the exhaust clamp **(1)** and detach the air cleaner aspirator pipe bracket **(2)**.



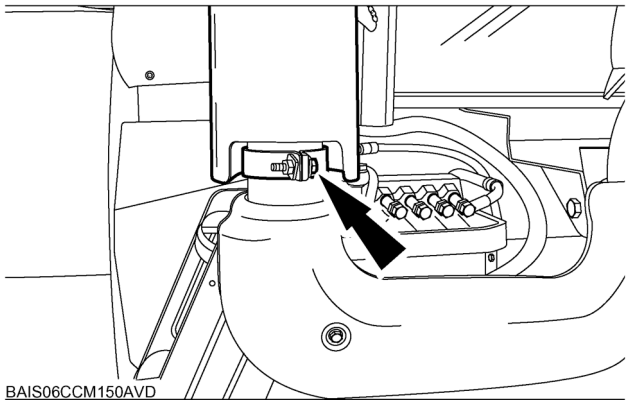
BAIS06CCM149AVB 4

5. Loosen the exhaust clamp and remove the exhaust muffler.

⚠ WARNING ⚠

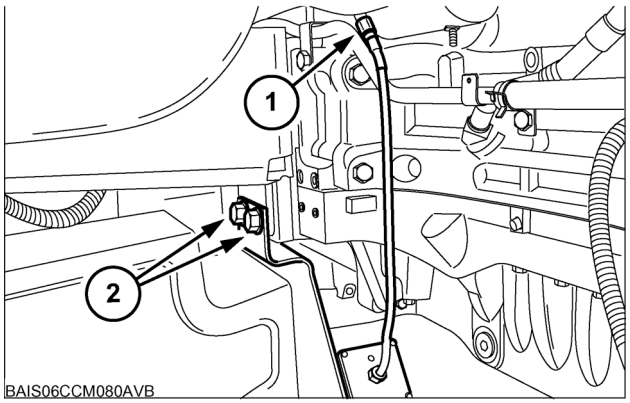
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



BAIS06CCM150AVD 5

6. Disconnect the radar electrical connector **(1)** and remove the radar **(2)**.



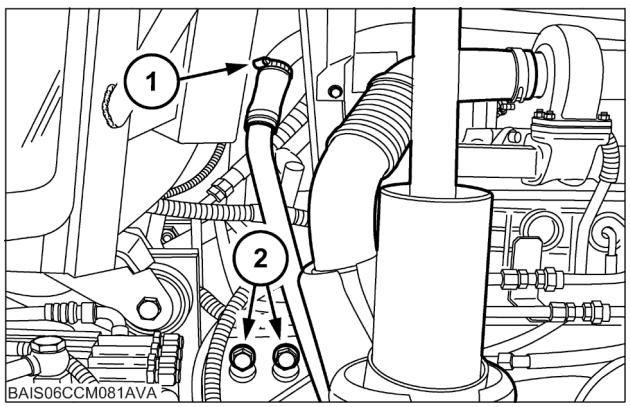
BAIS06CCM080AVB 6

7. Disconnect the air cleaner aspirator pipe **(1)**. Loosen the exhaust retaining bolts **(2)** and remove the exhaust.

⚠ WARNING ⚠

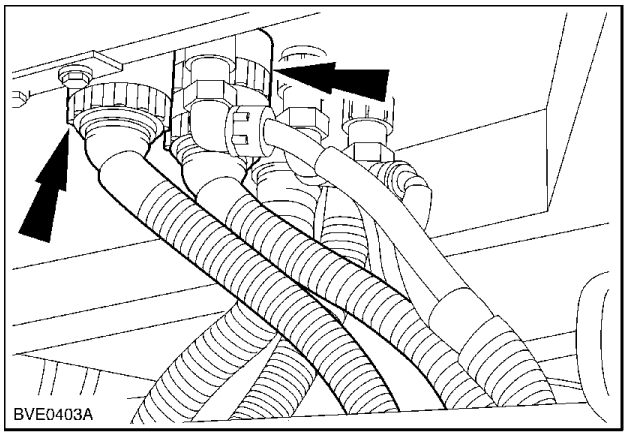
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



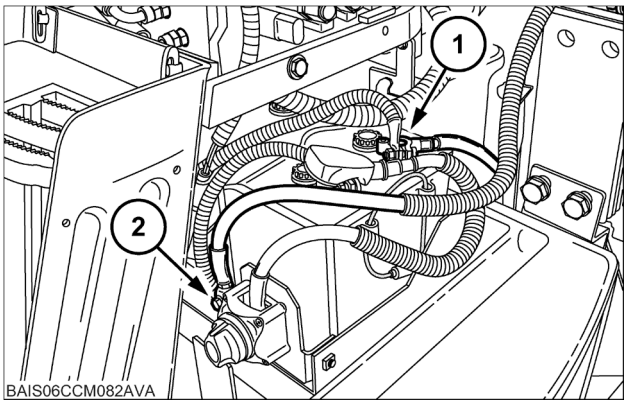
BAIS06CCM081AVA 7

8. Disconnect the engine harness electrical connectors.



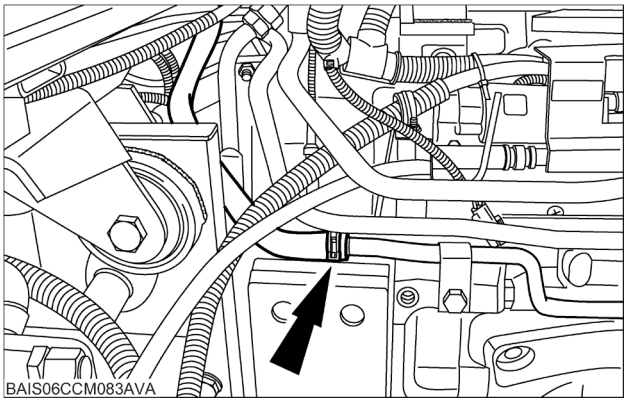
BVE0403A 8

9. Disconnect the battery negative (earth) lead **(1)** and the positive lead **(2)**.



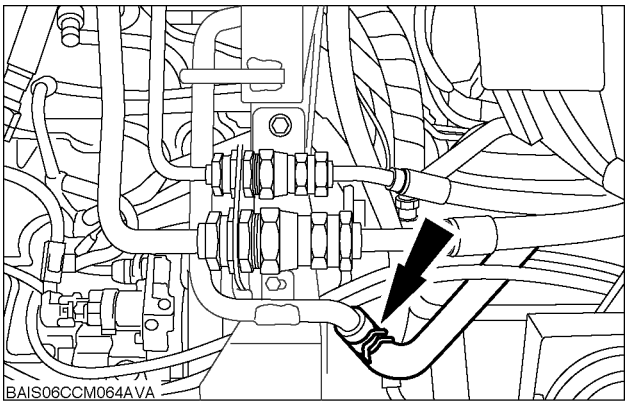
BAIS06CCM082AVA 9

10. Disconnect the cab heater to radiator coolant hose.



BAIS06CCM083AVA 10

11. Disconnect the cab heater hose.

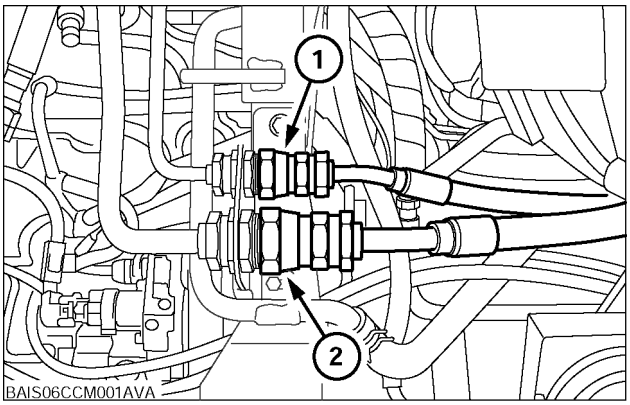


BAIS06CCM064AVA 11

Tractors with Air Conditioning

12. Disconnect the air conditioning high pressure **(1)** and low pressure **(2)** hoses.

NOTE: *There is no need to discharge the air conditioning connectors as the unions are self sealing.*

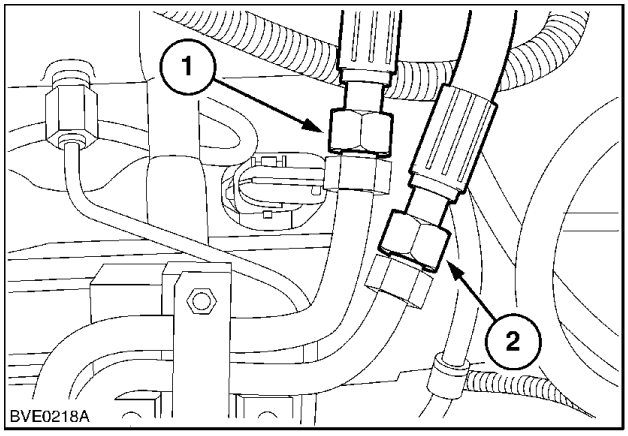


BAIS06CCM001AVA 12

All Tractors

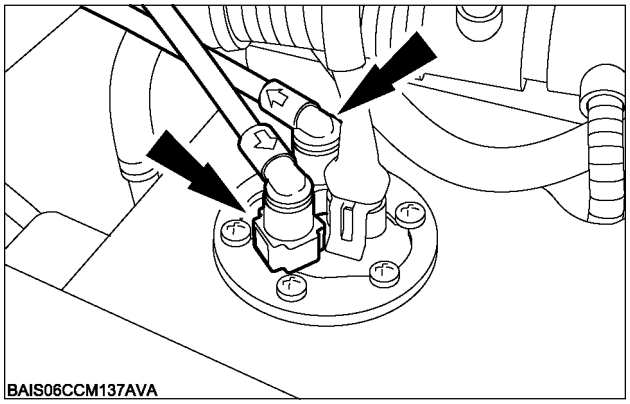
13. Disconnect the steering cylinder oil supply hoses **(1)** and **(2)**.

NOTE: *Make a note of the position of the hoses to aid installation.*



BVE0218A 13

14. Disconnect the fuel supply and return lines .



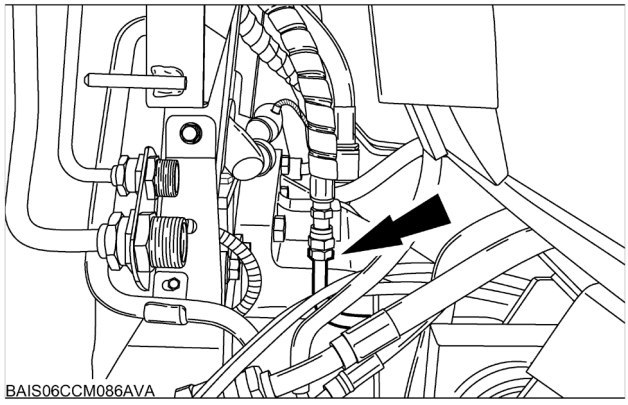
BAIS06CCM137AVA 14

15. Disconnect the power brake valve supply hose.

⚠ CAUTION ⚠

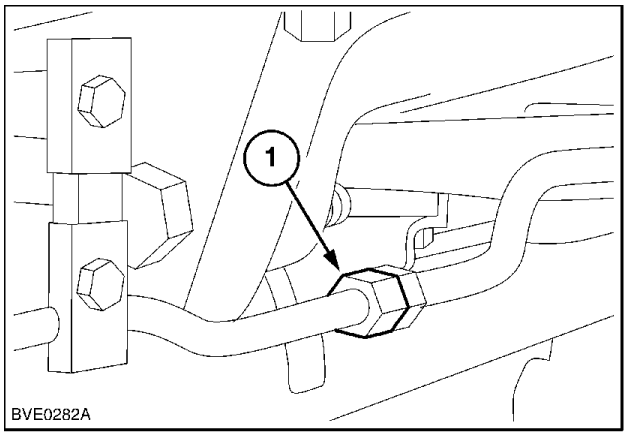
The brake accumulator can have a maximum charge pressure of 850 psi. Check for pressure in the accumulator. Remove the pressure in the accumulator before accumulator line is disconnected. Apply the brakes with the pedal approximately 40 times when the engine is off. Loosen the special fitting for removing air from the brakes and push on the brake pedal. If oil flow does not flow from the special fitting, the accumulator is not charged.

M670



BAIS06CCM086AVA 15

16. Disconnect the differential lock supply hose **(1)**.

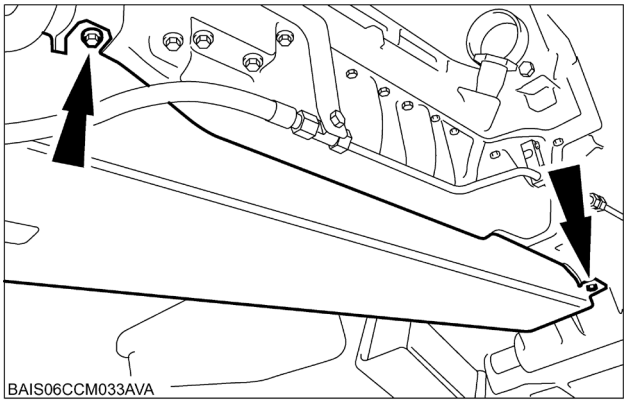


BVE0282A 16

Tractors with SuperSteer™ front axle

17. Remove the four-wheel drive shaft guard retaining bolts.

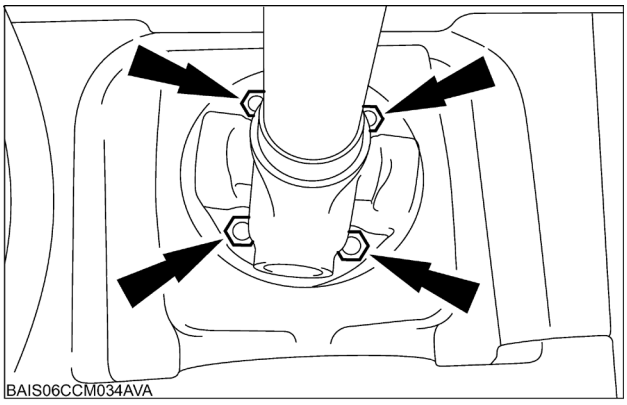
NOTE: *Repeat the operation on both sides of the tractor.*



BAIS06CCM033AVA 17

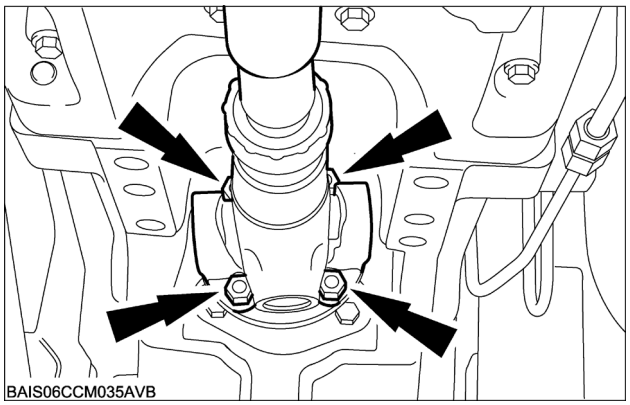
18. Remove the four-wheel drive shaft guard.
19. Remove the four-wheel drive shaft front retaining bolts.

NOTE: *Support the four-wheel drive shaft.*



BAIS06CCM034AVA 18

20. Remove the four-wheel drive shaft.

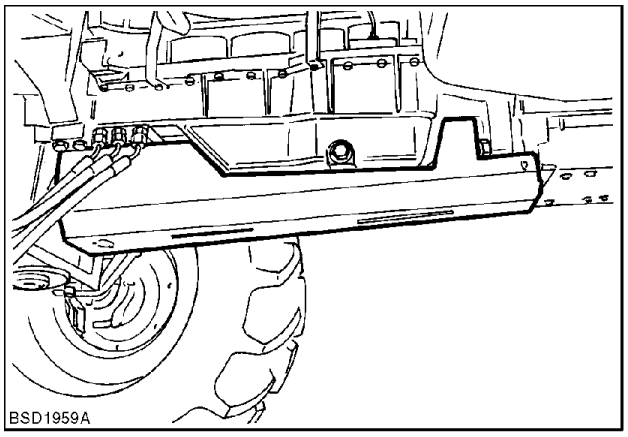


BAIS06CCM035AVB 19

Tractors with Standard Front Axle

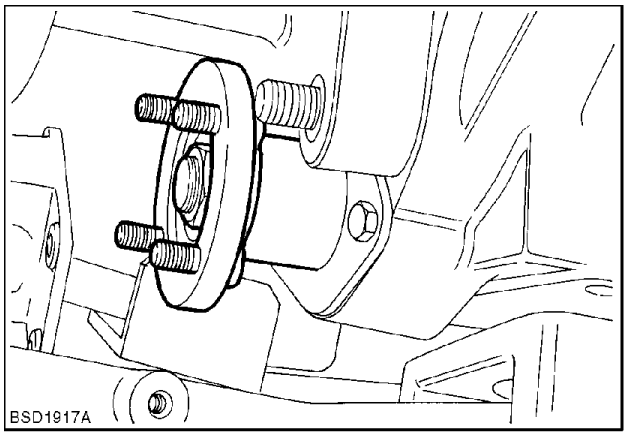
21. Remove front wheel drive propshaft guard and propshaft

NOTE: *The type of driveshaft fitted is dependant on type of axle installed*



BSD1959A 20

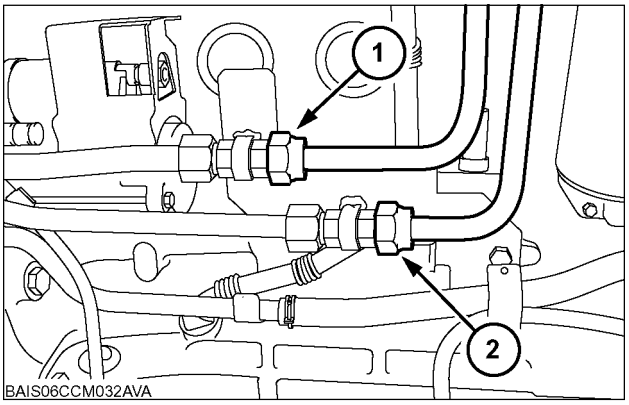
22. Remove driveshaft flange, where fitted.



BSD1917A 21

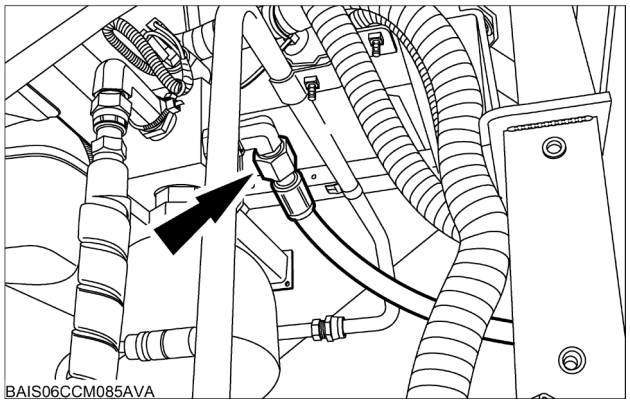
All Tractors

23. Disconnect the transmission oil cooler pipes **(1)** and **(2)**.



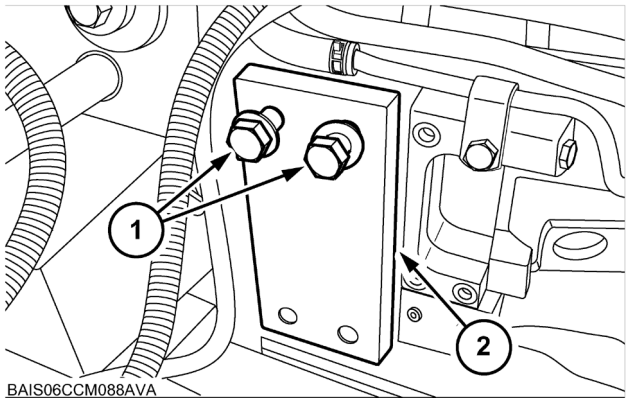
BAIS06CCM032AVA 22

24. Disconnect the power brake master cylinder supply hose.



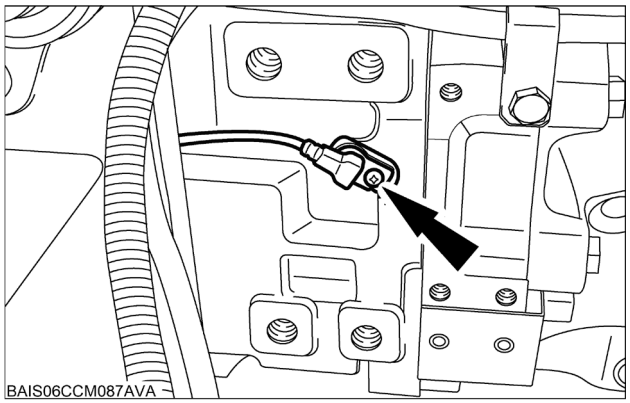
BAIS06CCM085AVA 23

25. Remove the retaining bolts **(1)** and remove the spacer **(2)**.

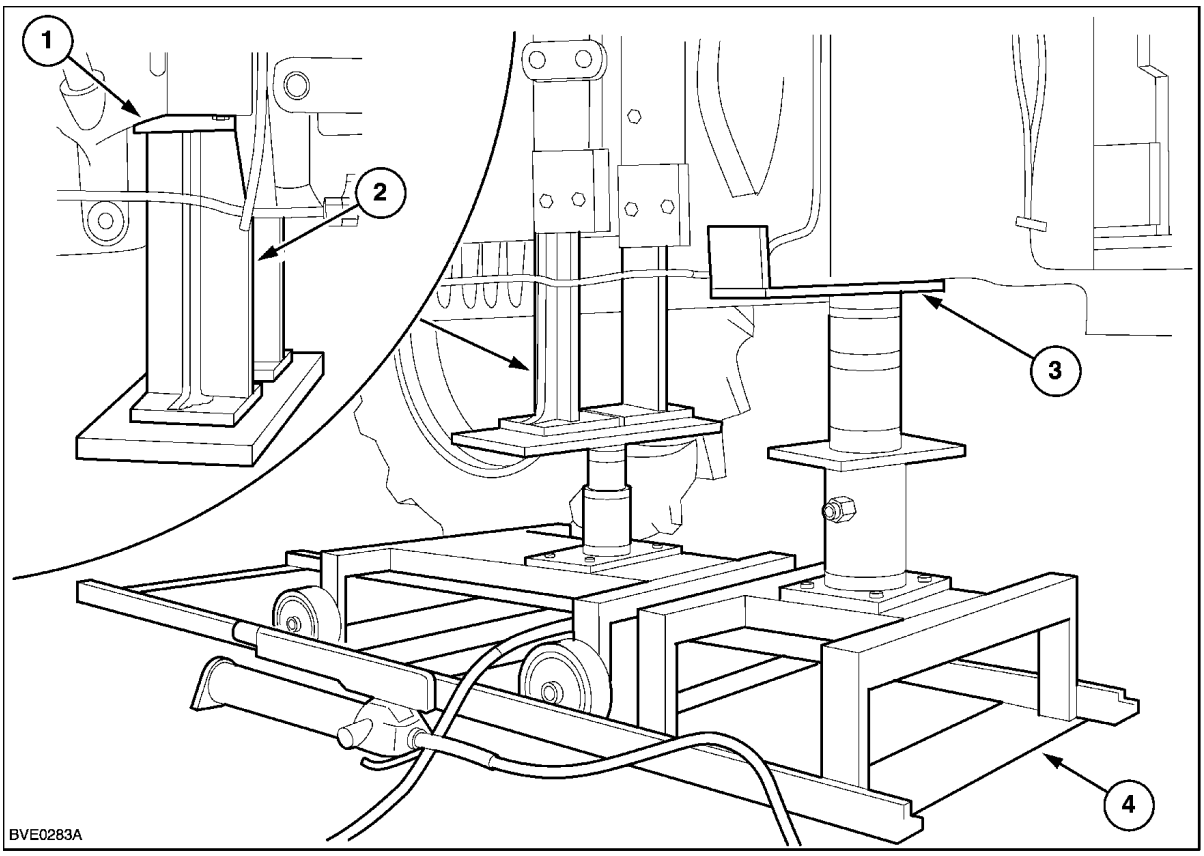


BAIS06CCM088AVA 24

26. Remove the flywheel speed sensor.

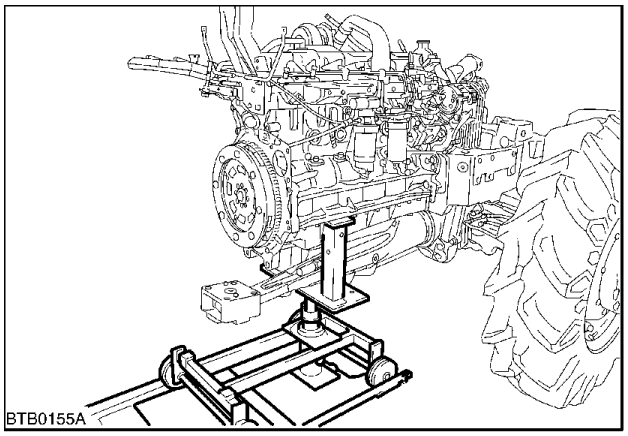


BAIS06CCM087AVA 25



BVE0283A 26

27. Position the tractor splitting kit **(4) 380000569** underneath the tractor.
28. Use the supports **(3)**, in the splitting kit to support the transmission on the splitting stand.
29. Remove the engine to transmission lower retaining bolts.
30. Remove two rear oil pan retaining bolts from the left hand side. Repeat this step for the right hand side.
31. Install the adaptor plate **(1)** 380000844 and the engine support brackets **(2)** 380000500 between the engine and the wheeled splitting trolley.
32. Check that all necessary hoses tubes and connectors have been disconnected. It may be necessary to disconnect additional items due to other optional equipment that has been installed on the tractor.
    Re check that engine and transmission are safely supported on the splitting stand then remove engine to transmission buckle up bolts.
    Carefully wheel the front support and engine assembly from the transmission.

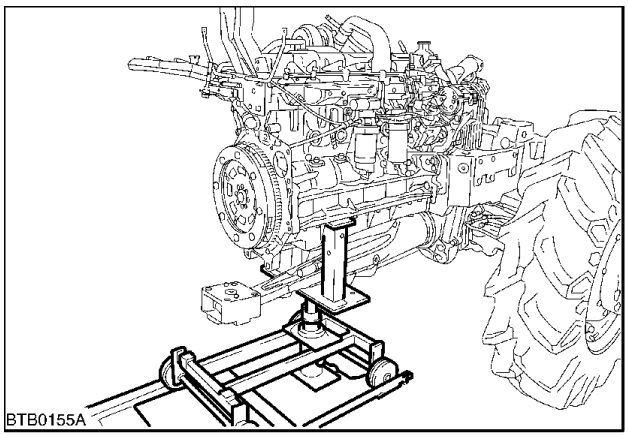


BTB0155A 27

ENGINE - Connect

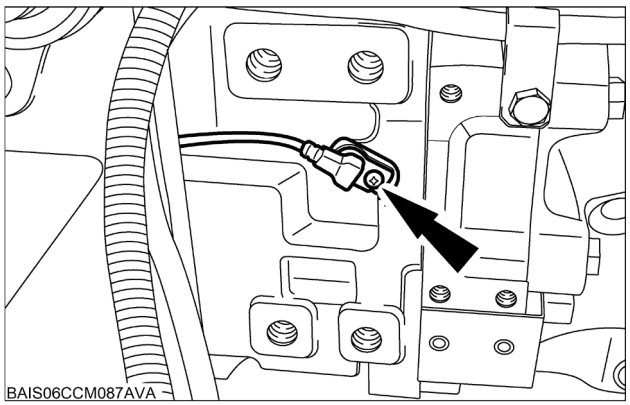
All Tractors

1. Align the front support and engine assembly to the transmission and install the engine to transmission retaining bolts.
   Tighten to **285-315 Nm** (**210-232 lb ft**).
   Remove the tractor splitting kit.



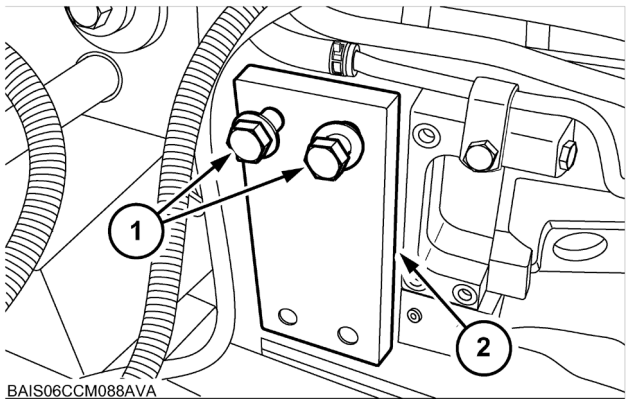
BTB0155A 1

2. Install the flywheel speed sensor.



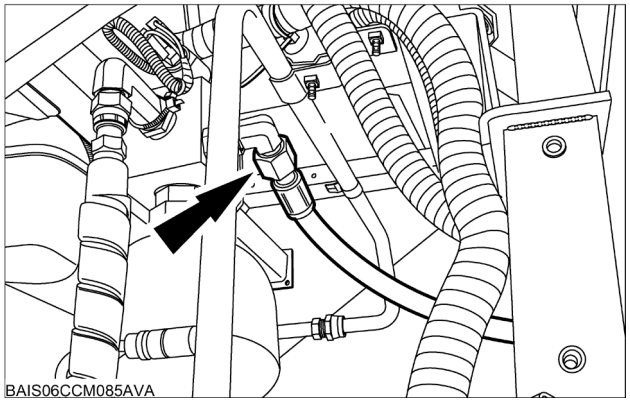
BAIS06CCM087AVA 2

3. Install the spacer **(2)** and install the retaining bolts **(1)**.



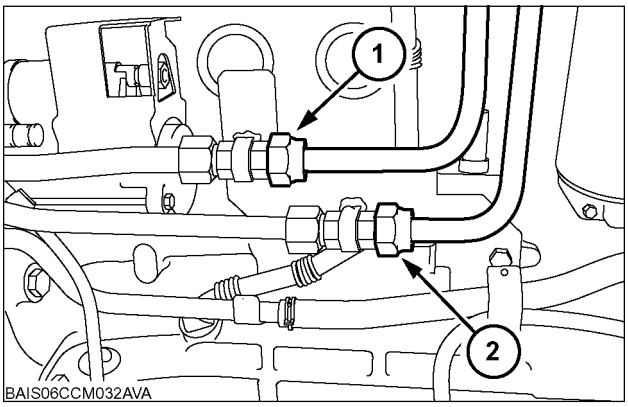
BAIS06CCM088AVA 3

4. Connect the power brake master cylinder supply hose.



BAIS06CCM085AVA 4

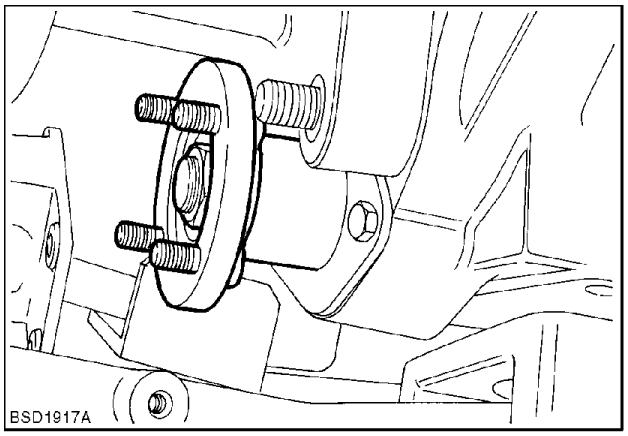
5. Connect the transmission oil cooler pipes **(1)** and **(2)**.



BAIS06CCM032AVA 5

Tractors with Standard Front Axle

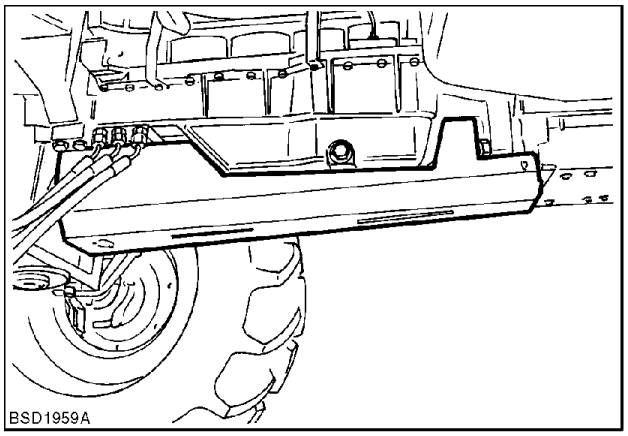
6. Install driveshaft flange, where fitted.



BSD1917A 6

7. Install front wheel drive propshaft guard and propshaft

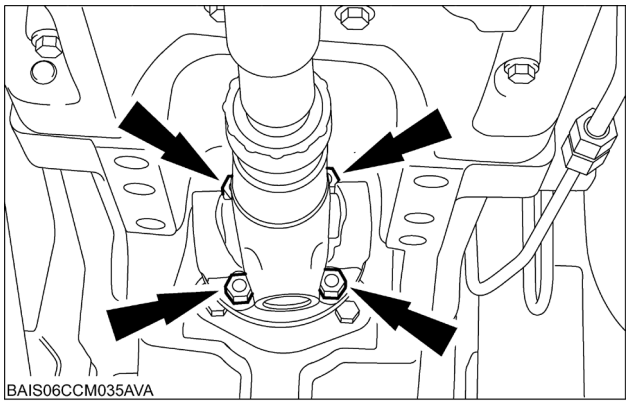
NOTE: *The type of driveshaft fitted is dependant on type of axle installed*



BSD1959A 7

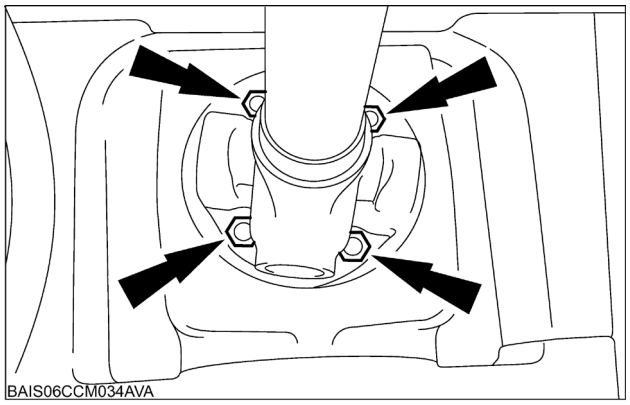
Tractors with SuperSteer™ front axle

8. Install the four-wheel drive shaft rear retaining nuts. Tighten to **65 - 86 Nm** (**48 - 63 lbft**).



BAIS06CCM035AVA 8

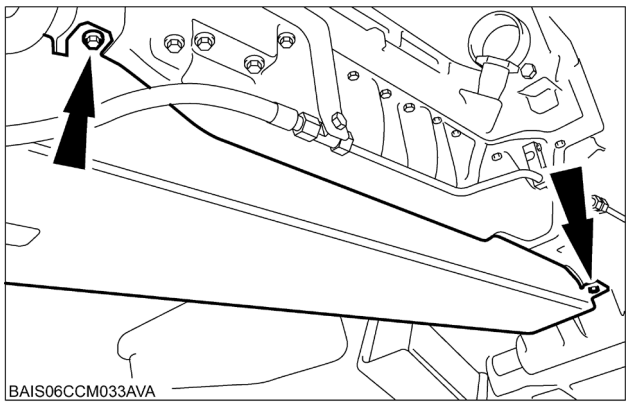
9. Install the four-wheel drive shaft front retaining nuts. Tighten to **65 - 86 Nm** (**48 - 63 lbft**).



BAIS06CCM034AVA 9

10. Install the four-wheel drive shaft guard.
11. Install the four-wheel drive shaft guard retaining bolts.

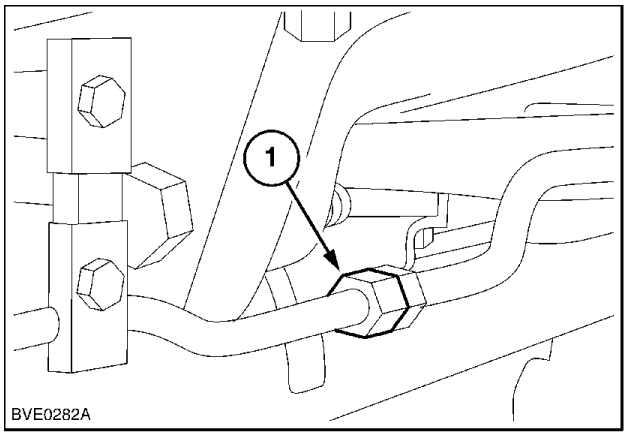
NOTE: *Repeat the operation on both sides of the tractor.*



BAIS06CCM033AVA 10

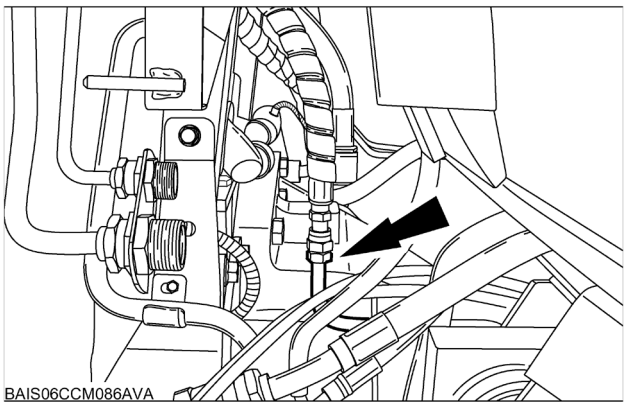
All Tractors

12. Connect the differential lock supply hose **(1)**.



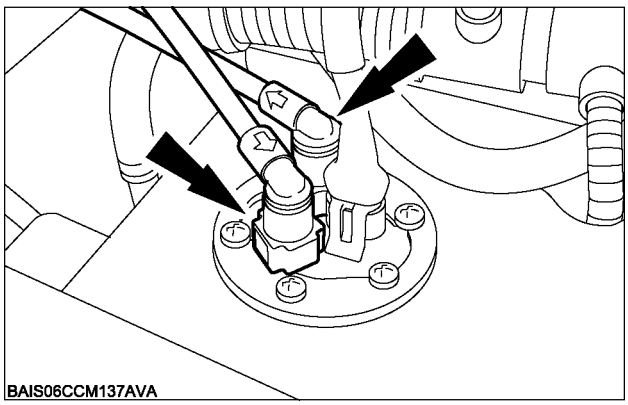
BVE0282A 11

13. Connect the power brake valve supply hose.



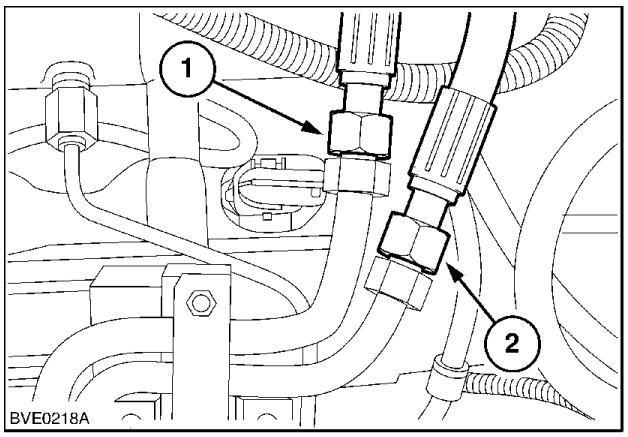
BAIS06CCM086AVA 12

14. Connect the fuel supply and return lines .



BAIS06CCM137AVA 13

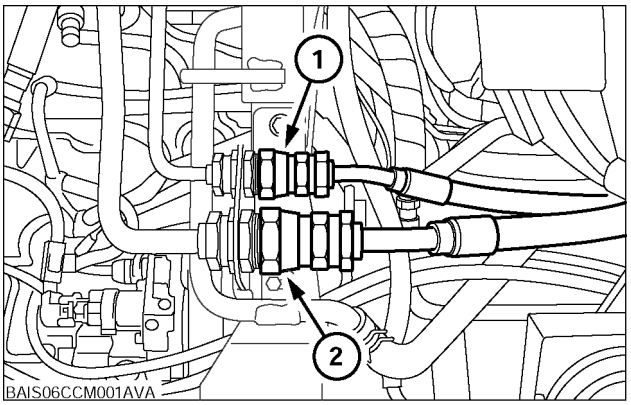
15. Connect the steering cylinder oil supply hoses **(1)** and **(2)**.



BVE0218A 14

Tractors with Air Conditioning

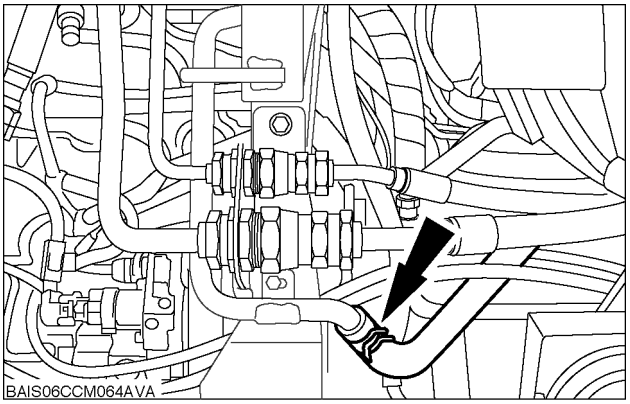
16. Connect the air conditioning high pressure **(1)** and low pressure **(2)** hoses.



BAIS06CCM001AVA 15

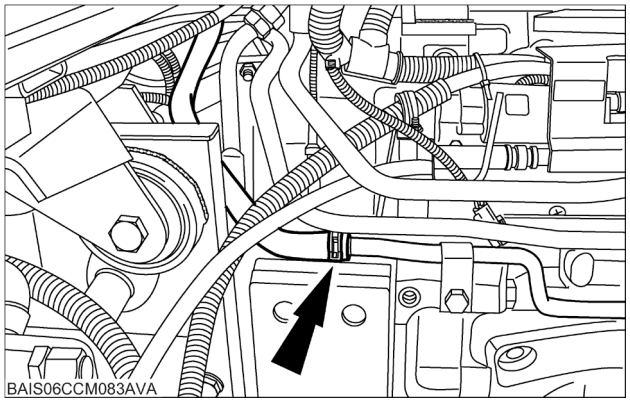
All Tractors

17. Connect the cab heater hose.



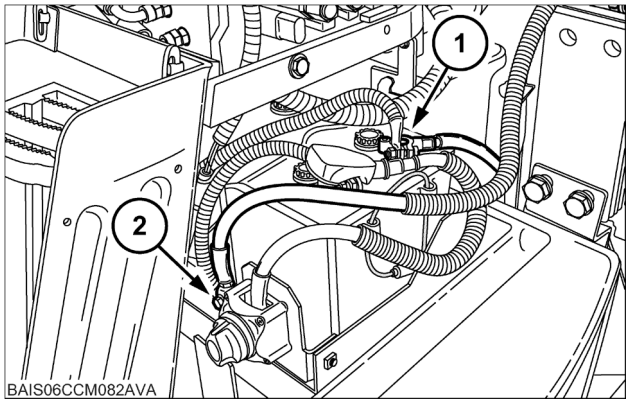
BAIS06CCM064AVA 16

18. Connect the cab heater to radiator hose.



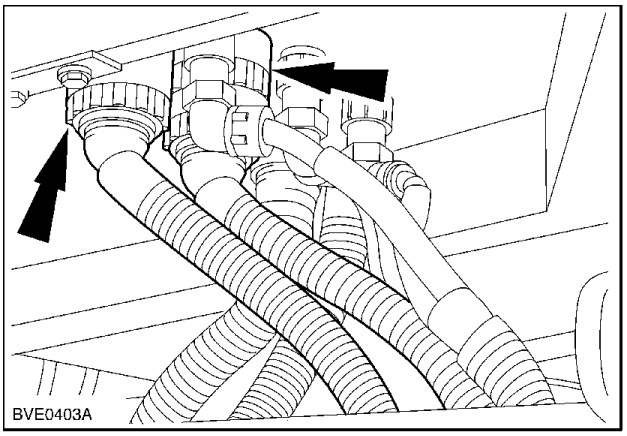
BAIS06CCM083AVA 17

19. Connect the battery positive lead **(2)** and negative (earth) lead **(1)**.



BAIS06CCM082AVA 18

20. Connect the engine harness electrical connectors.



BVE0403A 19

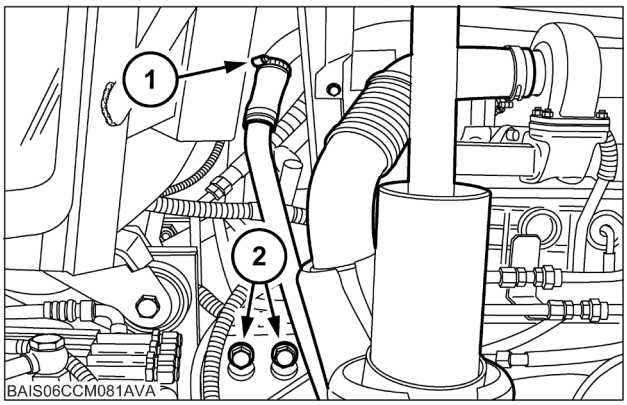
21. Install the exhaust and connect the air cleaner aspirator pipe **(1)**.

    Tighten the exhaust retaining bolts **(2)** to **xx Nm** (**xx lb ft**).

⚠ WARNING ⚠

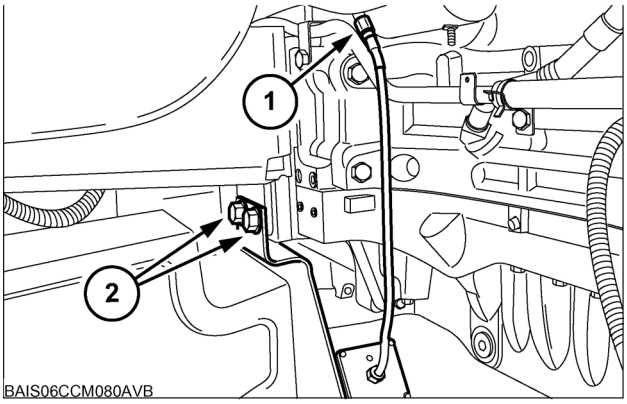
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



BAIS06CCM081AVA 20

22. Install the radar **(2)** and connect the radar electrical connector **(1)**.



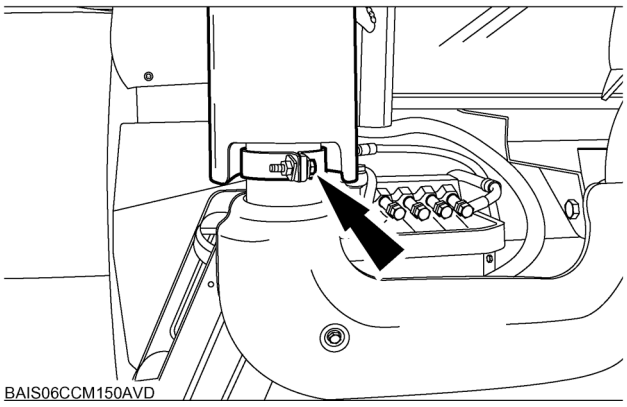
BAIS06CCM080AVB 21

23. Install the exhaust muffler and tighten the exhaust clamp.

⚠ WARNING ⚠

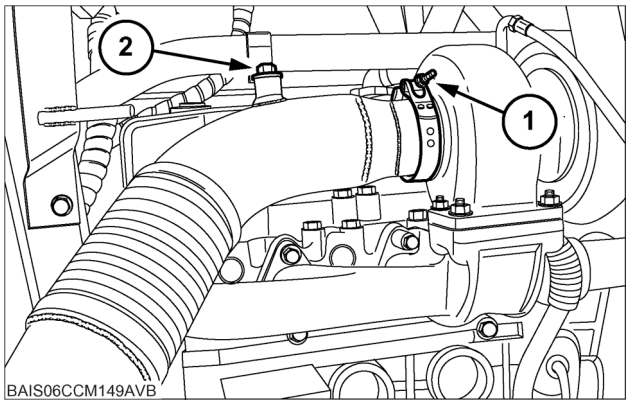
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



BAIS06CCM150AVD 22

24. Tighten the exhaust clamp **(1)** and connect the air cleaner aspirator pipe bracket **(2)**.



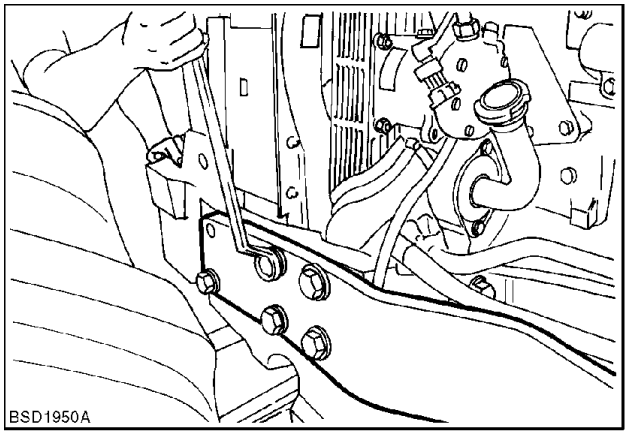
BAIS06CCM149AVB 23

25. Install the engine side rails (if equipped). Tighten to **800 Nm** (**590 lb ft**).

⚠ WARNING ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012



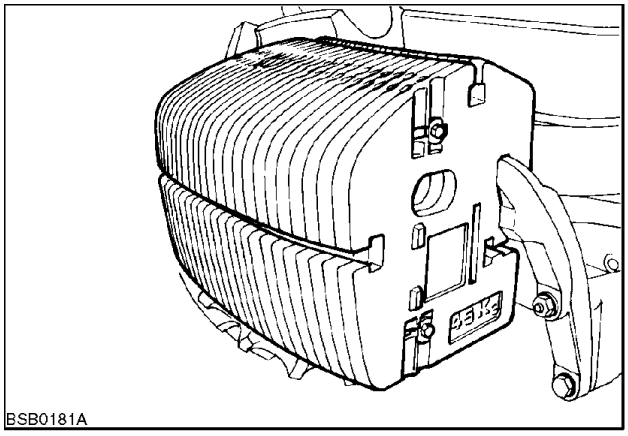
BSD1950A 24

26. Using a suitable sling, connect the front weights to a hoist and install the front weights (if fitted).

⚠ WARNING ⚠

Suitcase weights are extremely heavy. To prevent injury, always use an adequate lifting device to install or remove front end or rear end weights.

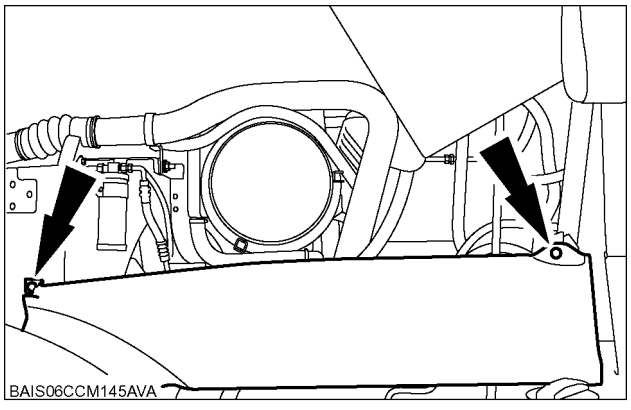
M417



BSB0181A 25

27. Install the engine side panels.

NOTE: *Repeat the operation on both sides of the tractor.*



BAIS06CCM145AVA 26

Next operation:

Connect the battery ground (earth) lead. For further information refer to **Battery - Connect (A.30.A)**.
Next operation:
Refill the engine coolant system. For further information refer to **ENGINE COOLANT SYSTEM - Filling (B.50.A)**.

ENGINE - Remove

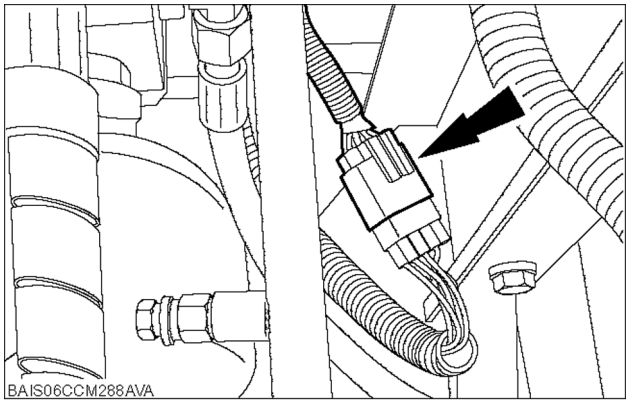
Prior operation:
Separate the front axle and front support from the engine (refer to **Front - Remove (E.10.B)**.

⚠ **DANGER** ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

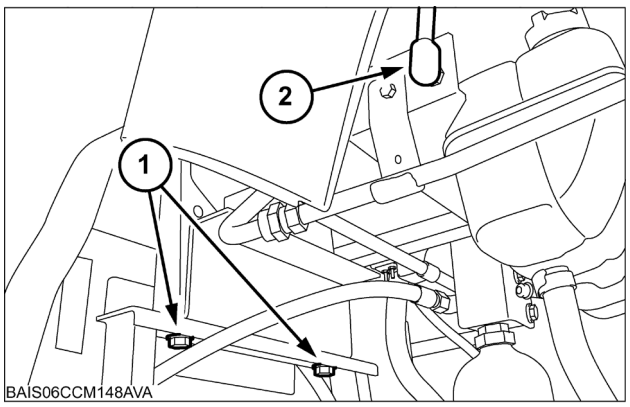
B012

1. Disconnect the lighting harness electrical connector.



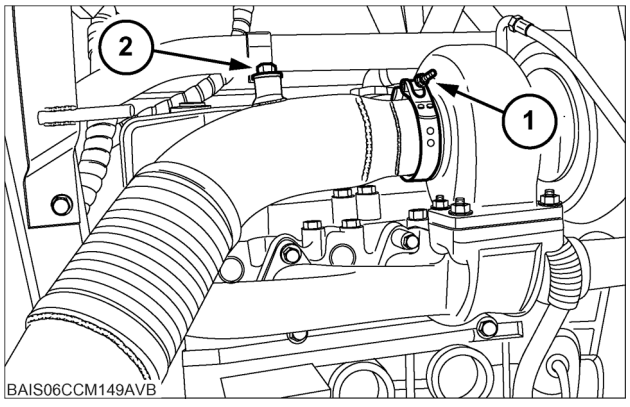
BAIS06CCM288AVA 1

2. Remove the hood retaining bolts **(1)**.
Disconnect the strut **(2)**and repeat for the left-hand side of the hood.
Remove the engine hood.



BAIS06CCM148AVA 2

3. Remove the exhaust clamp **(1)** and detach the air cleaner aspirator pipe bracket **(2)**.



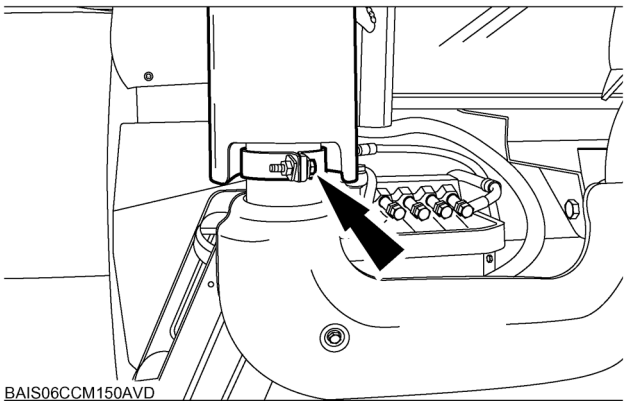
BAIS06CCM149AVB 3

4. Remove the exhaust muffler.

⚠ WARNING ⚠

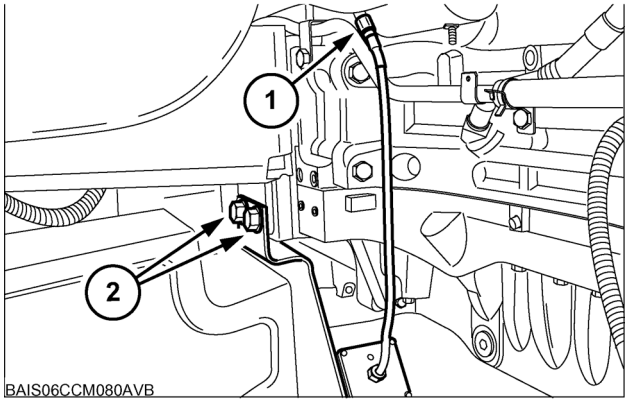
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



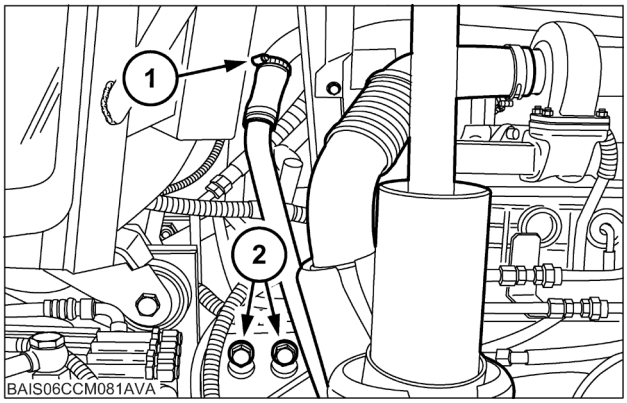
BAIS06CCM150AVD 4

5. Disconnect the radar electrical connector **(1)**. Remove the radar **(2)**.



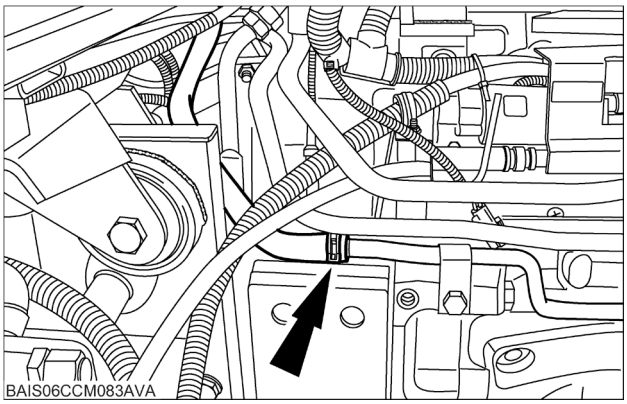
BAIS06CCM080AVB 5

6. Disconnect the air cleaner aspirator pipe **(1)**. Loosen the exhaust retaining bolts **(2)** and remove the exhaust.



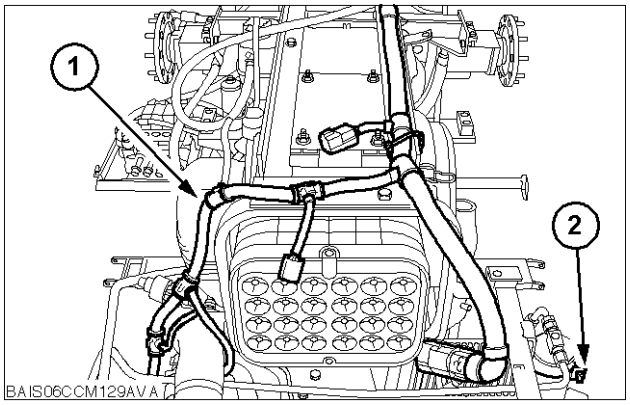
BAIS06CCM081AVA 6

7. Disconnect the cab heater to radiator coolant hose.



BAIS06CCM083AVA 7

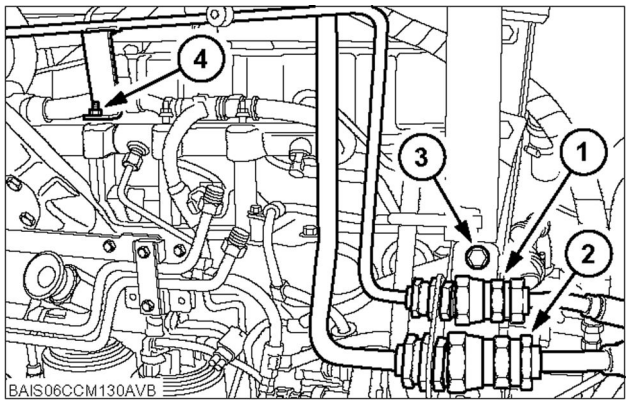
8. Detach the wiring harness from the air cleaner mounting frame **(1)**.
   Detach the filter drier from the air cleaner mounting frame **(2)**.



BAIS06CCM129AVA 8

9. Disconnect the air conditioning high pressure **(1)** and low pressure **(2)** hoses.
   Remove the retaining bolt **(3)** and high pressure hose clamp **(4)**.

NOTE: *There is no need to discharge the air conditioning system as the unions are self sealing.*



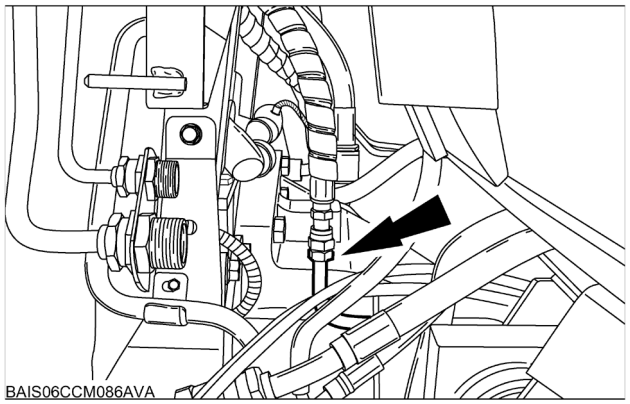
BAIS06CCM130AVB 9

10. Disconnect the power brake hose.

⚠ CAUTION ⚠

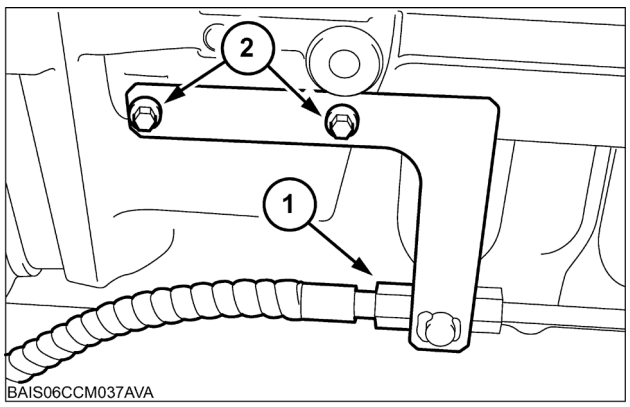
The brake accumulator can have a maximum charge pressure of 850 psi. Check for pressure in the accumulator. Remove the pressure in the accumulator before accumulator line is disconnected. Apply the brakes with the pedal approximately 40 times when the engine is off. Loosen the special fitting for removing air from the brakes and push on the brake pedal. If oil flow does not flow from the special fitting, the accumulator is not charged.

M670



BAIS06CCM086AVA 10

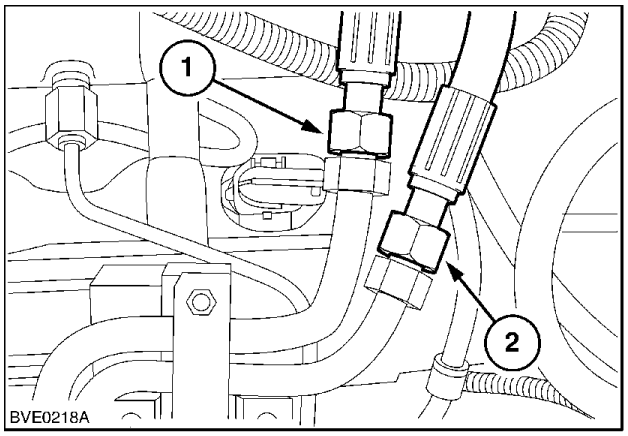
11. Disconnect the differential lock supply hose **(1)** and detach the bracket **(2)**.



BAIS06CCM037AVA 11

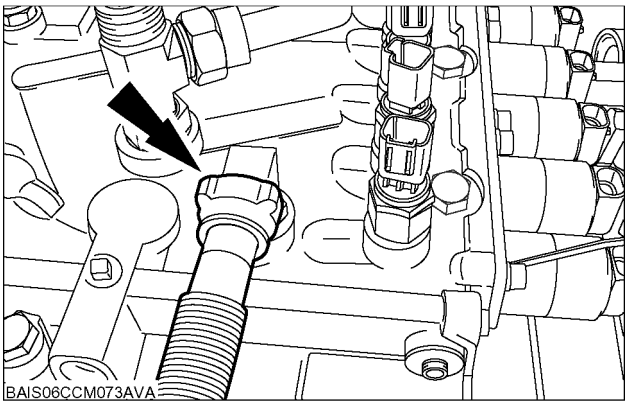
12. Disconnect the steering cylinder supply hoses **(1)** and **(2)**.

NOTE: *Note the position of the steering cylinder oil supply hoses.*



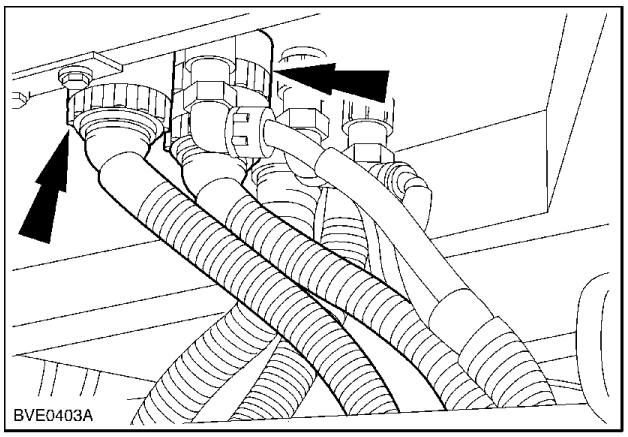
BVE0218A 12

13. Disconnect the power brake vent hose.



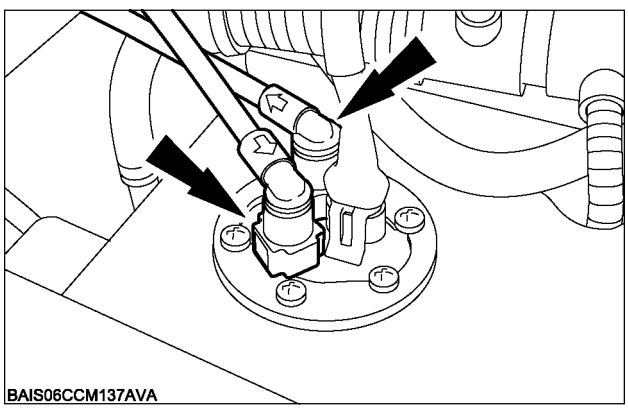
BAIS06CCM073AVA 13

14. Disconnect the engine harness electrical connectors.



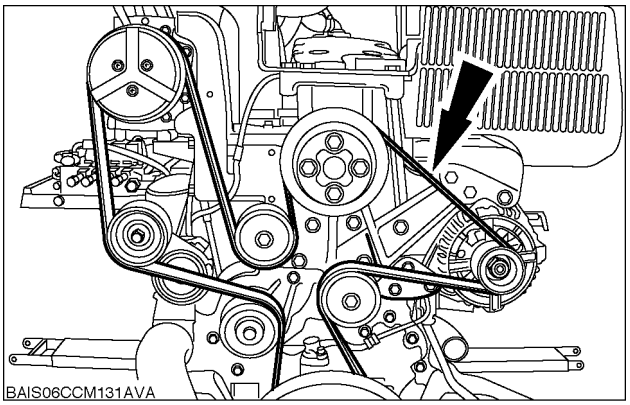
BVE0403A_37 14

15. Disconnect fuel supply and return lines.



BAIS06CCM137AVA 15

16. Remove accessory drive belt.

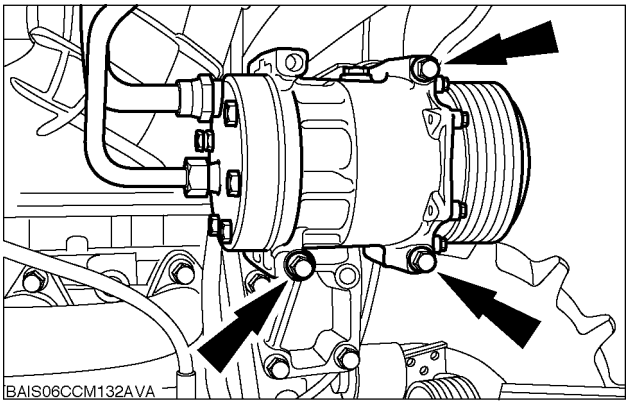


BAIS06CCM131AVA 16

17. Remove the air conditioning compressor, condenser receiver dryer and pipe work from the engine as a complete assembly without disconnecting the pipe work.

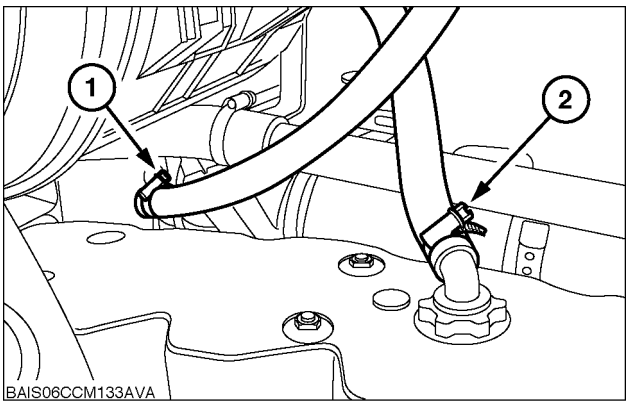
IMPORTANT: *If it is not possible to remove the air conditioning components as a complete assembly, the air conditioning system must be evacuated (refer to the climate control section).*

NOTE: *It is an offence to vent the air conditioning system into the atmosphere.*



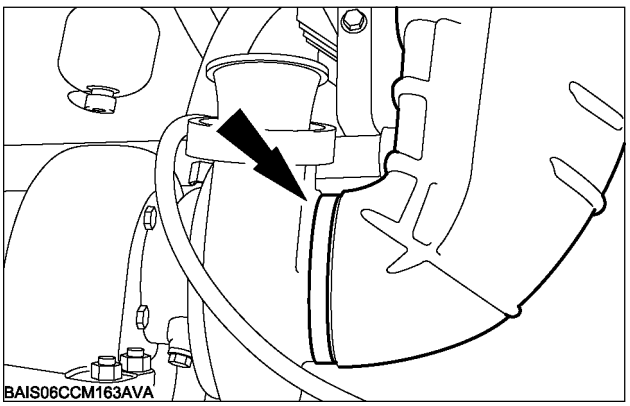
BAIS06CCM132AVA 17

18. Disconnect the expansion pipe **(1)**, and the engine breather pipe **(2)** .



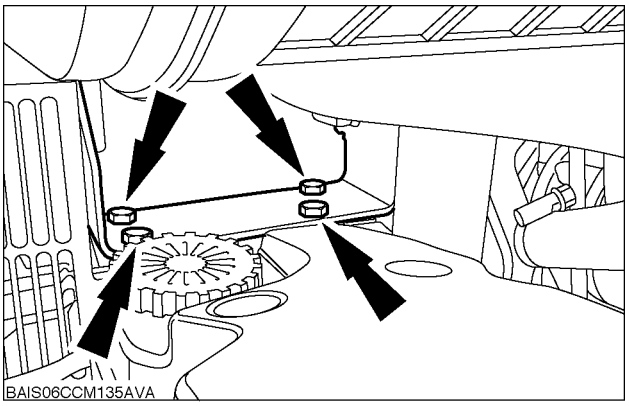
BAIS06CCM133AVA 18

19. Disconnect the air cleaner outlet hose from the turbo.



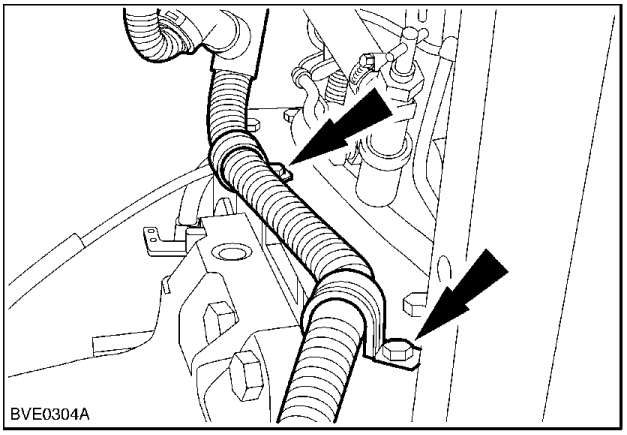
BAIS06CCM163AVA 19

20. Remove the air cleaner mounting frame front retaining bolts.



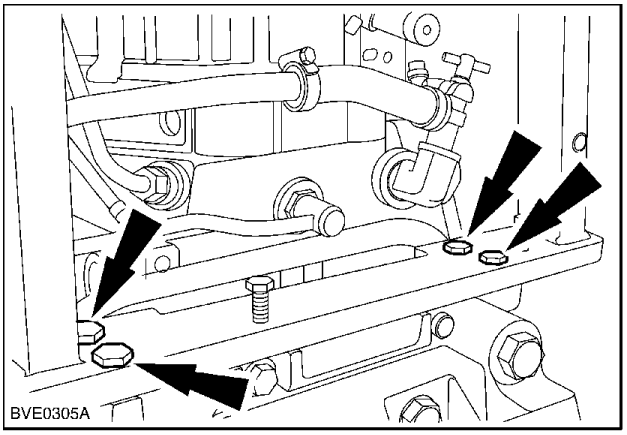
BAIS06CCM135AVA 20

21. Remove the engine harness clamp retaining bolts and reposition the engine harness on top of the engine.



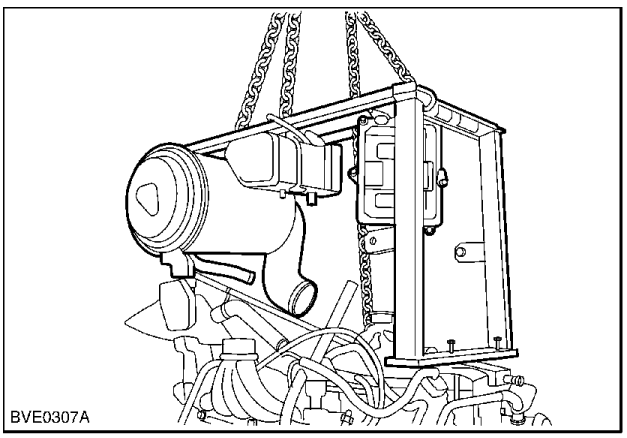
BVE0304A 21

22. Remove the air cleaner mounting frame rear retaining bolts.



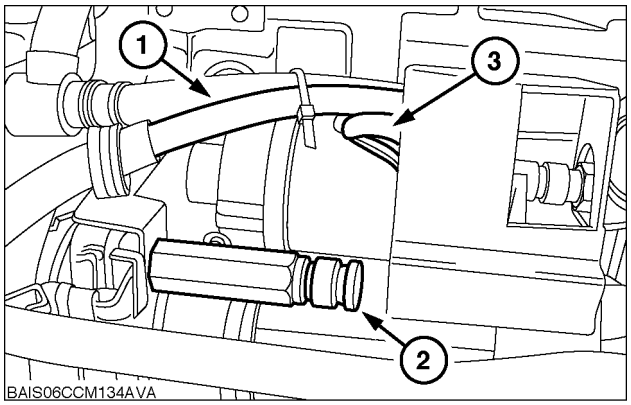
BVE0305A 22

23. Using a suitable chain, connect the air cleaner mounting frame to a hoist and remove the air cleaner mounting frame.



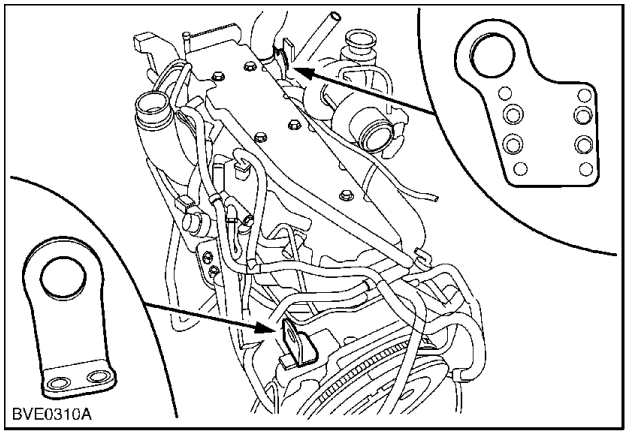
BVE0307A 23

24. Remove the starter motor positive **(1)** and negative **(2)**cables, and electrical connector. **(3)**.



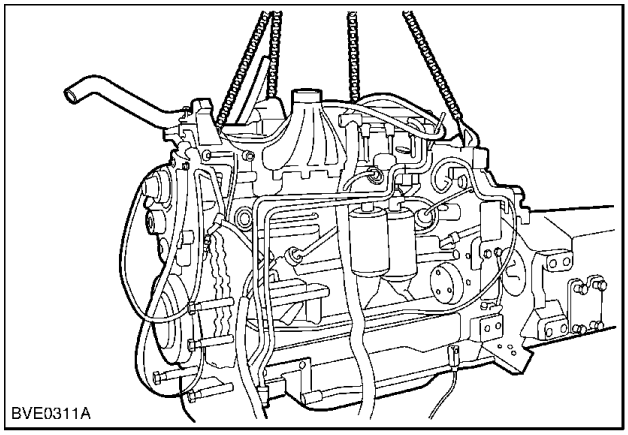
BAIS06CCM134AVA 24

25. Install lifting brackets to the engine.



BVE0310A 25

26. Using a suitable chain, connect the engine to a hoist.
27. Remove the engine to transmission retaining bolts and remove the engine.



BVE0311A 26

ENGINE - Install

Prior operation:
ENGINE - Remove (B.10.A).

⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

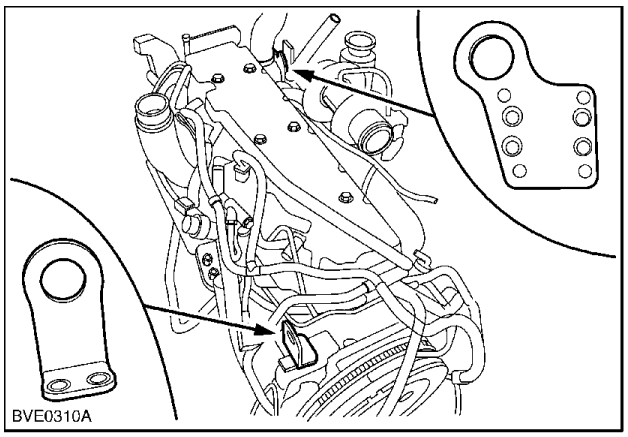
B012

⚠ WARNING ⚠

Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

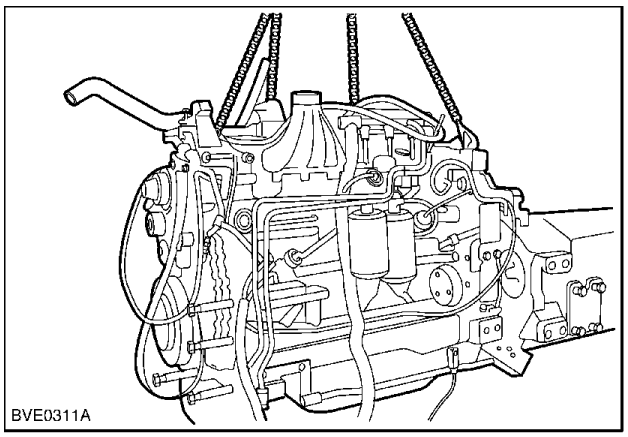
B020

1. Install lifting brackets to the engine.



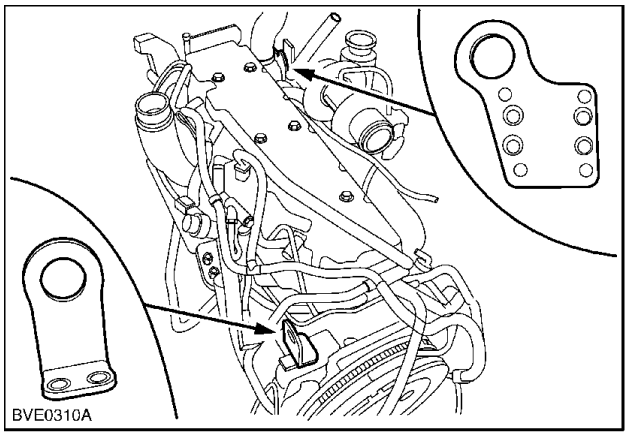
BVE0310A 1

2. Using a suitable chain, connect the engine to a hoist.
3. Align the engine to the transmission and install the engine to transmission retaining bolts.



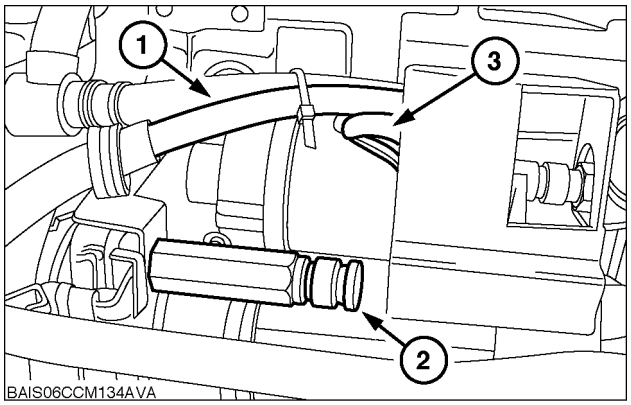
BVE0311A 2

4. Remove lifting brackets from the engine.



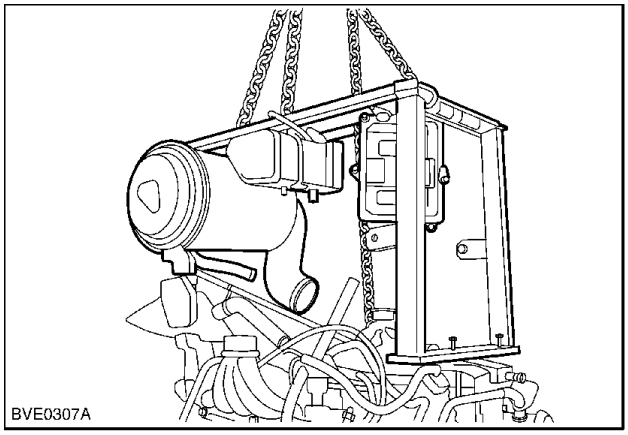
BVE0310A 3

5. Connect the starter motor positive **(1)** and negative **(2)**cables, and electrical connector **(3)**.



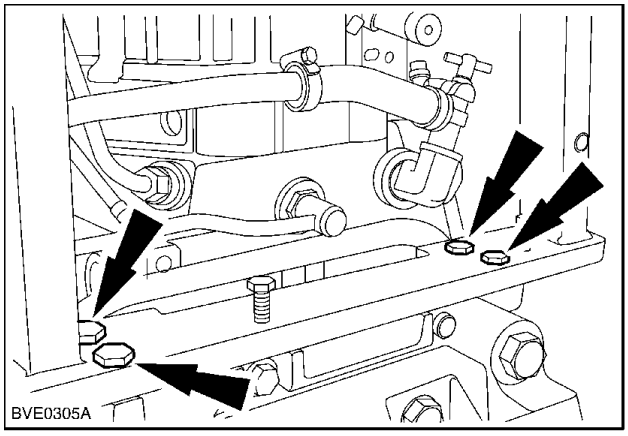
BAIS06CCM134AVA 4

6. Using a suitable chain, connect the air cleaner mounting frame to a hoist and install the air cleaner mounting frame.



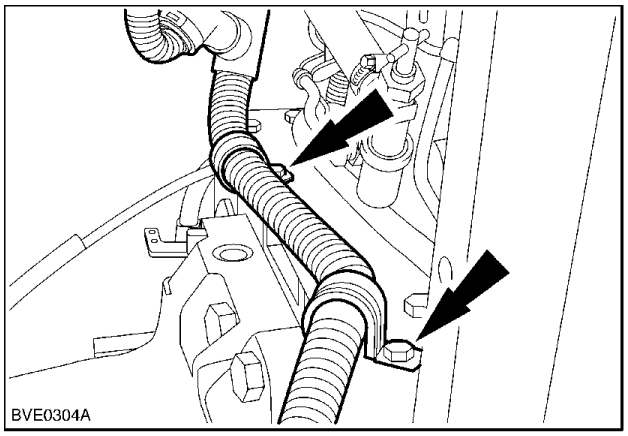
BVE0307A 5

7. Install the air cleaner mounting frame rear retaining bolts.



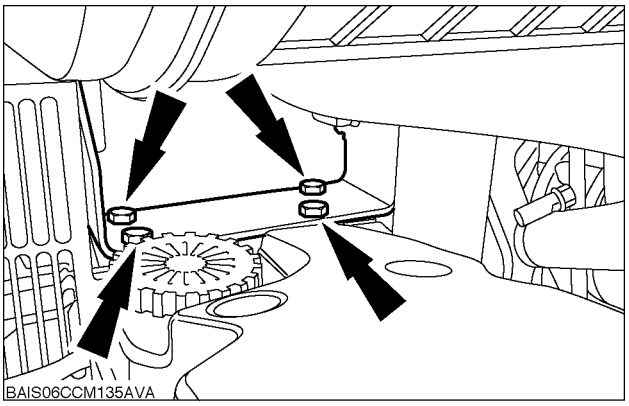
BVE0305A 6

8. Reposition the engine harness, install the harness clamp retaining bolts.



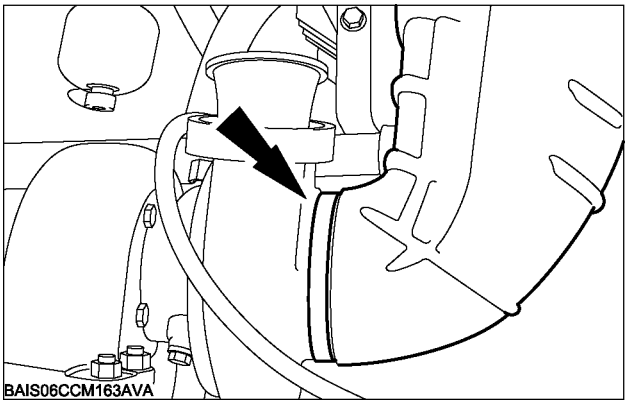
BVE0304A 7

9. Install the air cleaner mounting frame front retaining bolts.



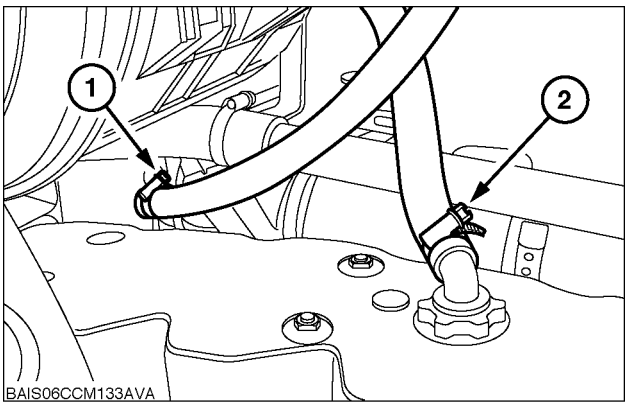
BAIS06CCM135AVA 8

10. Connect the air cleaner outlet hose to the turbo.



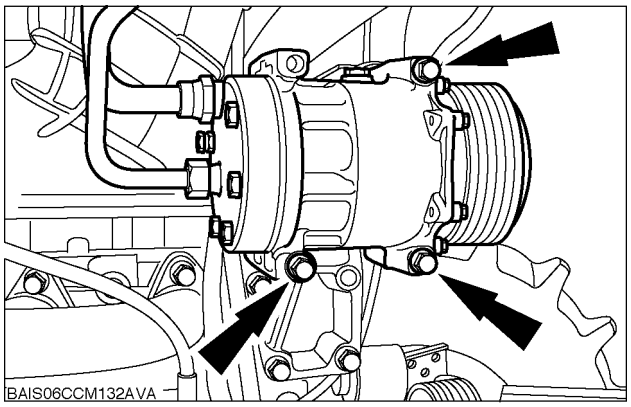
BAIS06CCM163AVA 9

11. Connect the expansion pipe **(1)**, and the engine breather pipe **(2)**.



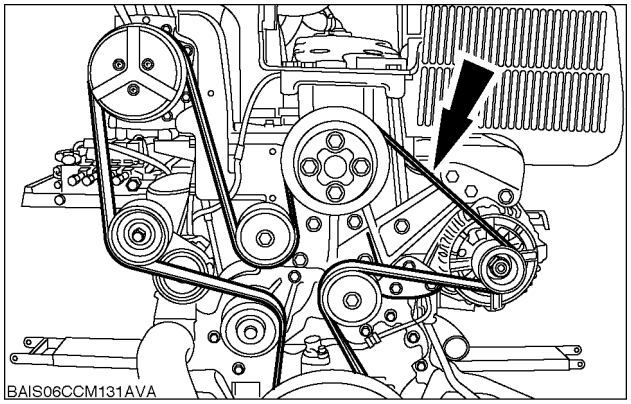
BAIS06CCM133AVA 10

12. Install the air conditioning compressor, condenser receiver dryer and pipe work to the engine as a complete assembly without disconnecting the pipe work.



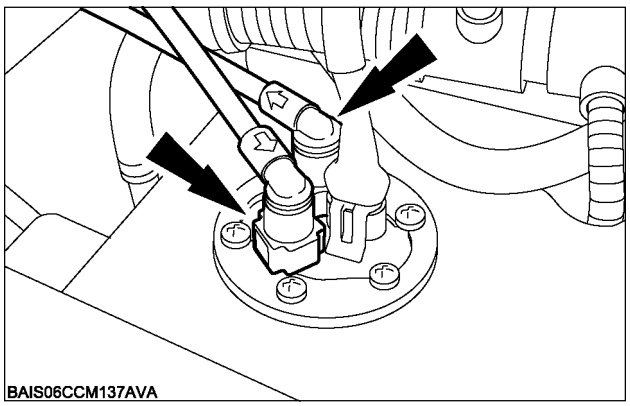
BAIS06CCM132AVA 11

13. Install accessory drive belt.



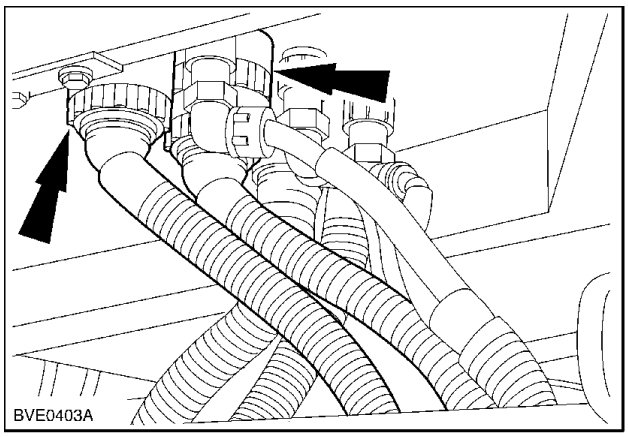
BAIS06CCM131AVA 12

14. Connect fuel supply and return lines.



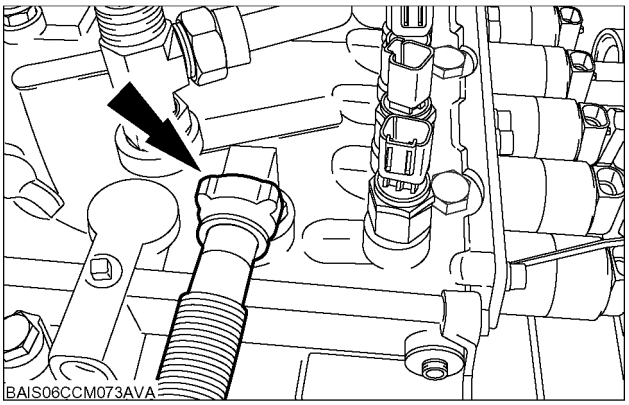
BAIS06CCM137AVA 13

15. Connect the engine harness electrical connectors.



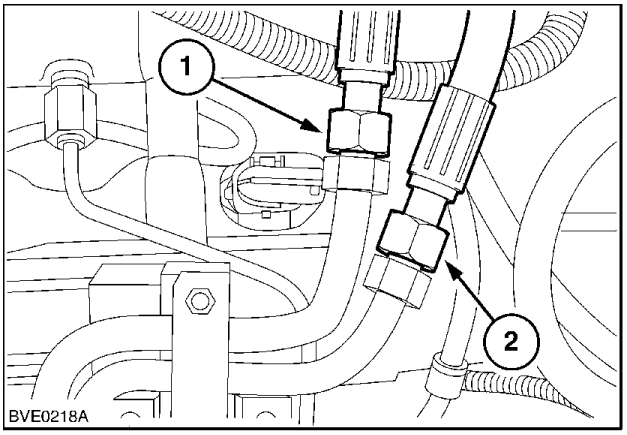
BVE0403A_37 14

16. Connect the power brake vent hose.



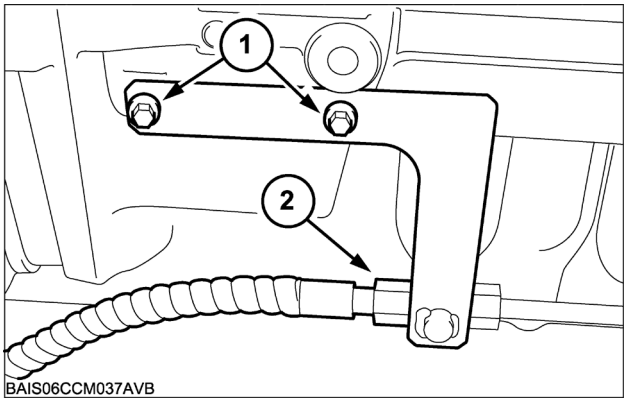
BAIS06CCM073AVA 15

17. Connect the steering cylinder supply hoses **(1)** and **(2)**.



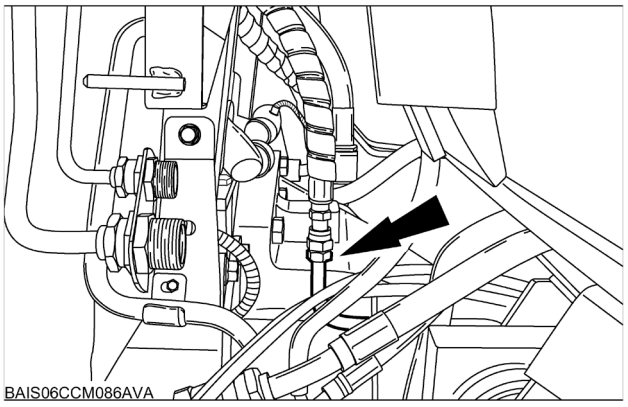
BVE0218A 16

18. Install the differential lock supply hose bracket **(1)** and connect the hose **(2)**.



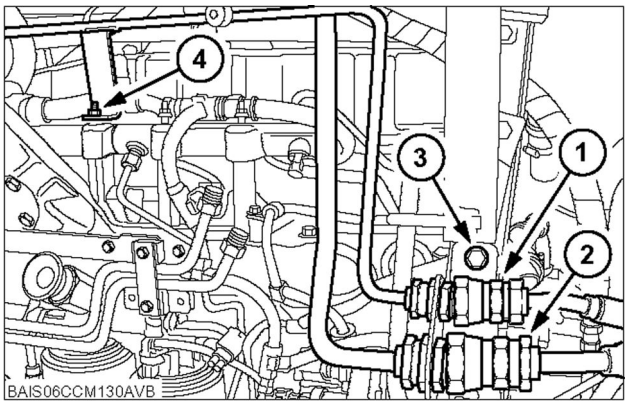
BAIS06CCM037AVB 17

19. Connect the power brake hose.



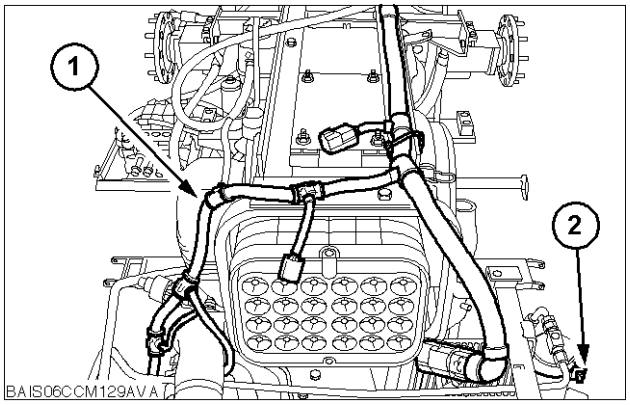
BAIS06CCM086AVA 18

20. Connect the air conditioning high pressure hose clamp **(1)** install the retaining bolt **(2)**.
Connect the high pressure **(3)** and low pressure **(4)** air conditioning hoses.



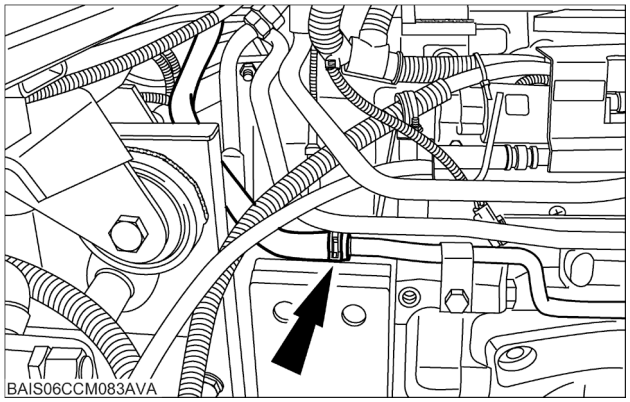
BAIS06CCM130AVB 19

21. Attach the wiring harness to the air cleaner mounting frame **(1)**.
Attach the filter drier to the air cleaner mounting frame **(2)**.



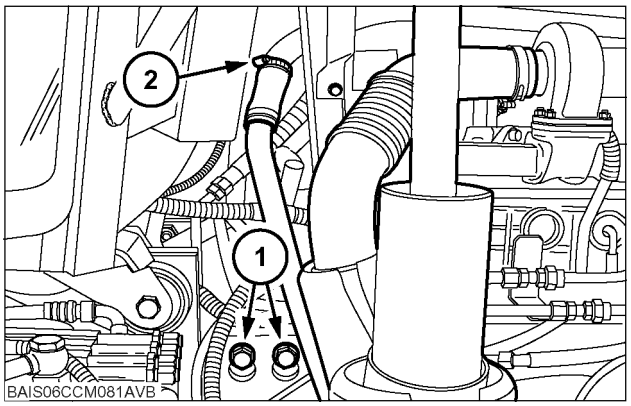
BAIS06CCM129AVA 20

22. Connect the cab heater to radiator coolant hose.



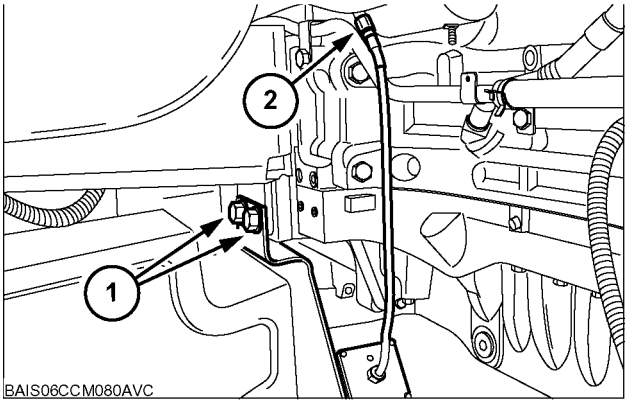
BAIS06CCM083AVA 21

23. Install the exhaust manifold and tighten the retaining bolts **(1)**.
Connect the air cleaner aspirator pipe **(2)**.



BAIS06CCM081AVB 22

24. Install the radar **(1)**.
Connect the radar electrical connector **(2)**.



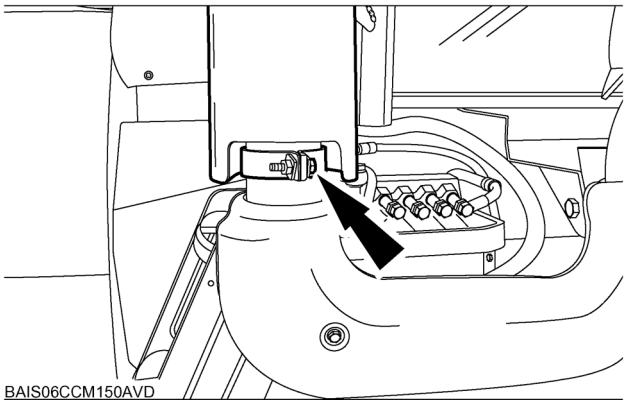
BAIS06CCM080AVC 23

25. Install the exhaust muffler.

⚠ WARNING ⚠

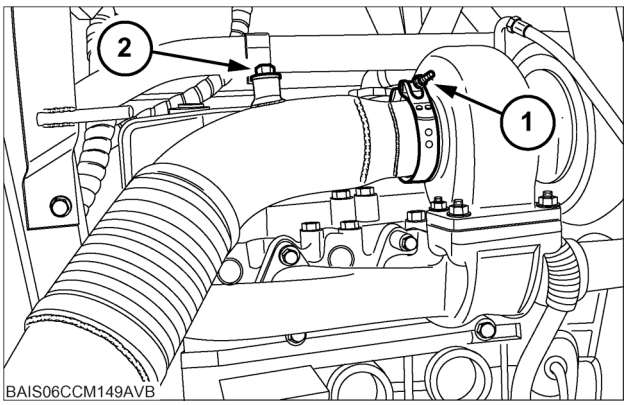
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



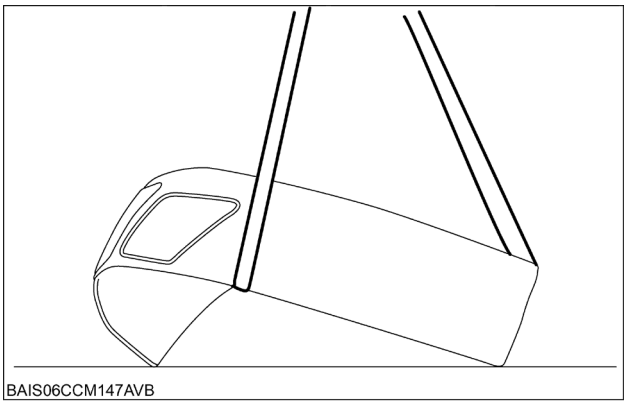
BAIS06CCM150AVD 24

26. Attach the exhaust clamp **(1)** and attach the air cleaner aspirator pipe bracket **(2)**.



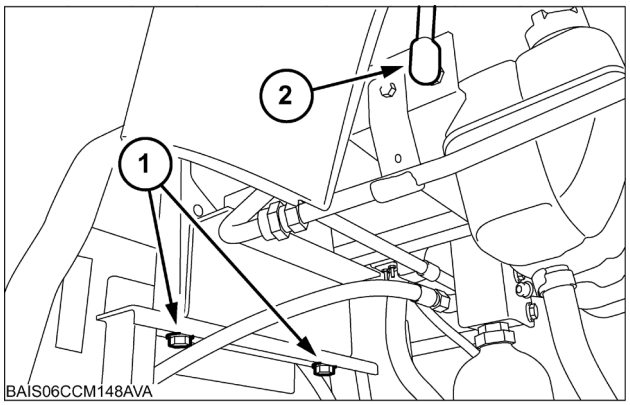
BAIS06CCM149AVB 25

27. Connect the engine hood to a hoist using a suitable nylon cable.
Install the engine hood.



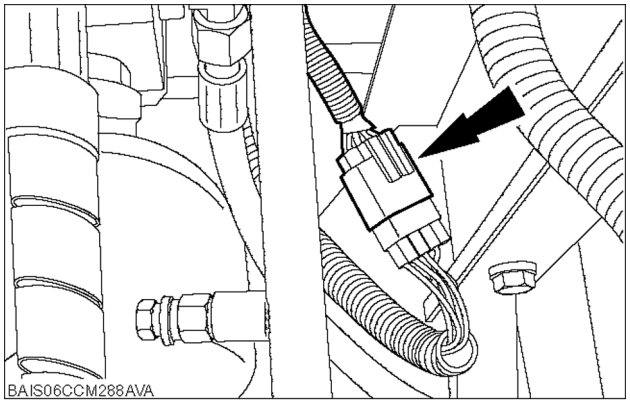
BAIS06CCM147AVB 26

28. Install the hood retaining bolts **(1)**.
Connect the strut **(2)** and repeat for the left-hand side of the hood.



BAIS06CCM148AVA 27

29. Connect the lighting harness electrical connector.



BAIS06CCM288AVA 28

Next operation:
Install the front axle and front support to the engine refer to **Front - Install (E.10.B)**.

ENGINE - Disassemble

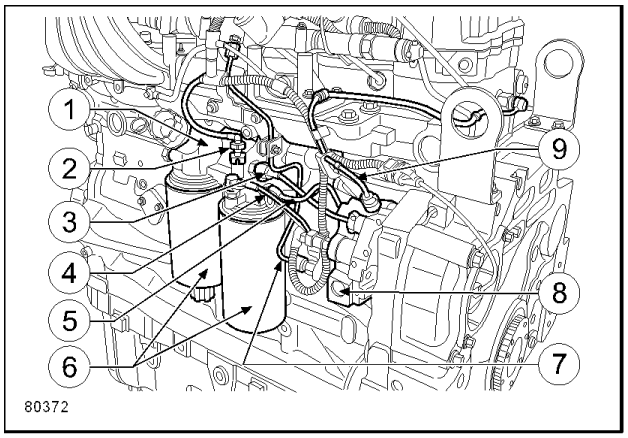
Prior operation:
ENGINE - Remove (B.10.A)

1. Some of the operations described in this section can be carried out directly with the engine fitted on the vehicle, depending on access to the engine bay and on the version.

NOTE: *The operations for removing the engine, as those for overhaul, must be performed by skilled personnel using specific tools.*

Operations for preparing the engine for assembly on the rotating stand.

2. To be able to fit the brackets **380001298**(for fixing the engine to the overhaul stand, **380000301**) to the crankcase, it is necessary to work from the left–hand side of the engine:
   Remove the fuel filters **(6)** from the mounting **(1)**;
   Disconnect the electrical connection **(2)** from the mounting **(1)** and the one to the heater (again located on the filter mounting);
   Disconnect the fuel pipes **(3)** - **(4)** - **(5)** from the mounting **(1)**;
   Remove the bracket supporting the mounting **(1)** from the crankcase.

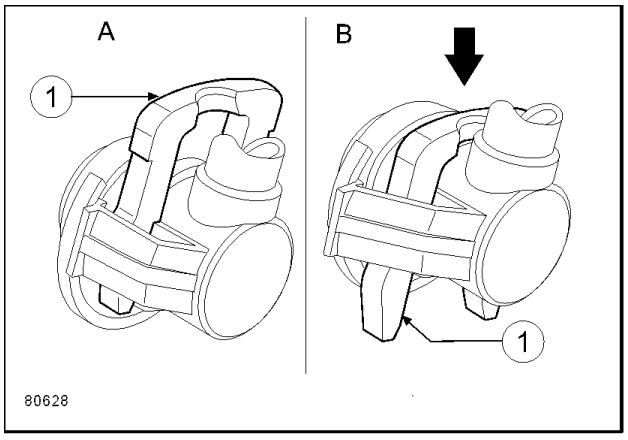


80372 1

NOTE: *To disconnect the fuel pipes **(3) — (4) — (5)**, Figure **1** from the relevant fittings, you need to press the clip **(1)** as shown in Figure **(B)**.*
*After disconnecting the piping, put the clip **(1)** back in its locking position Figure **(A)** to prevent it getting buckled.*

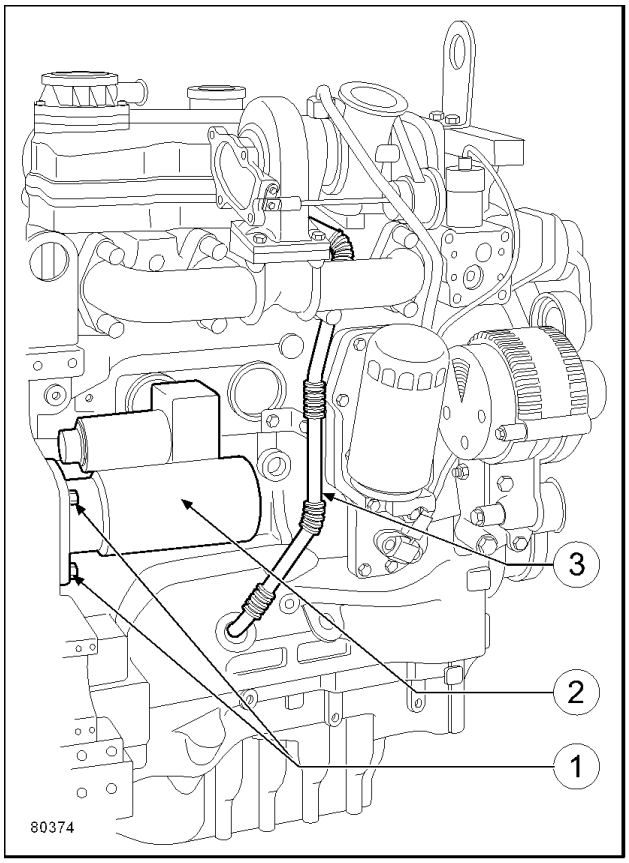
3. Disconnect the high-pressure fuel pipe (**(7)**, Figure **1**) from the rail choke tube and from the high-pressure pump **(8)** and remove it from the crankcase by taking out the bracket.
   Disconnect the pipe **(9)** from the high-pressure pump **(8)**.

NOTE: *Depending on the high pressure in the piping from the high-pressure pump to the rail and from here to the electro-injectors, never:*
- disconnect the pipes with the engine running,
- reuse disconnected pipes.



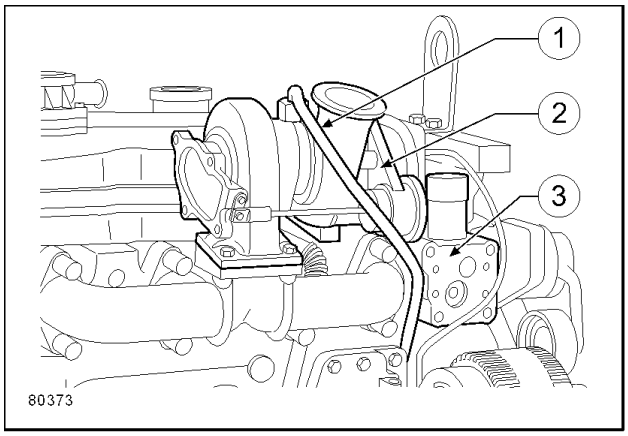
80628 2

4. Remove the oil filler pipe **(3)**.
Unscrew the fixing screws **(1)** and remove the starter motor **(2)** from its seat.



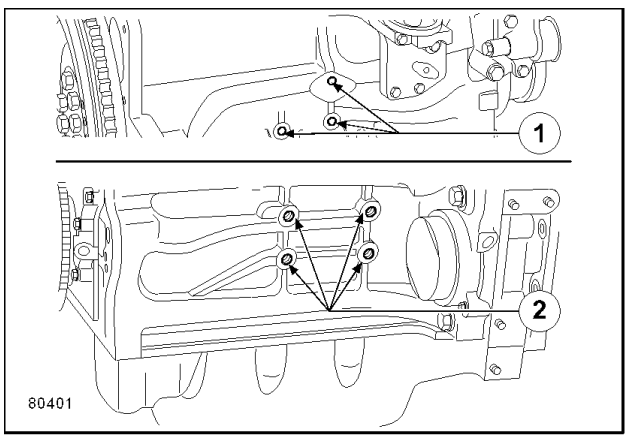
80374 3

5. Working from the right-hand side of the engine, disconnect the lubricating pipe **(1)** from the top of the cooler to the turbo-blower **(2)**.
Remove the thermostat body **(3)** together with the seal.

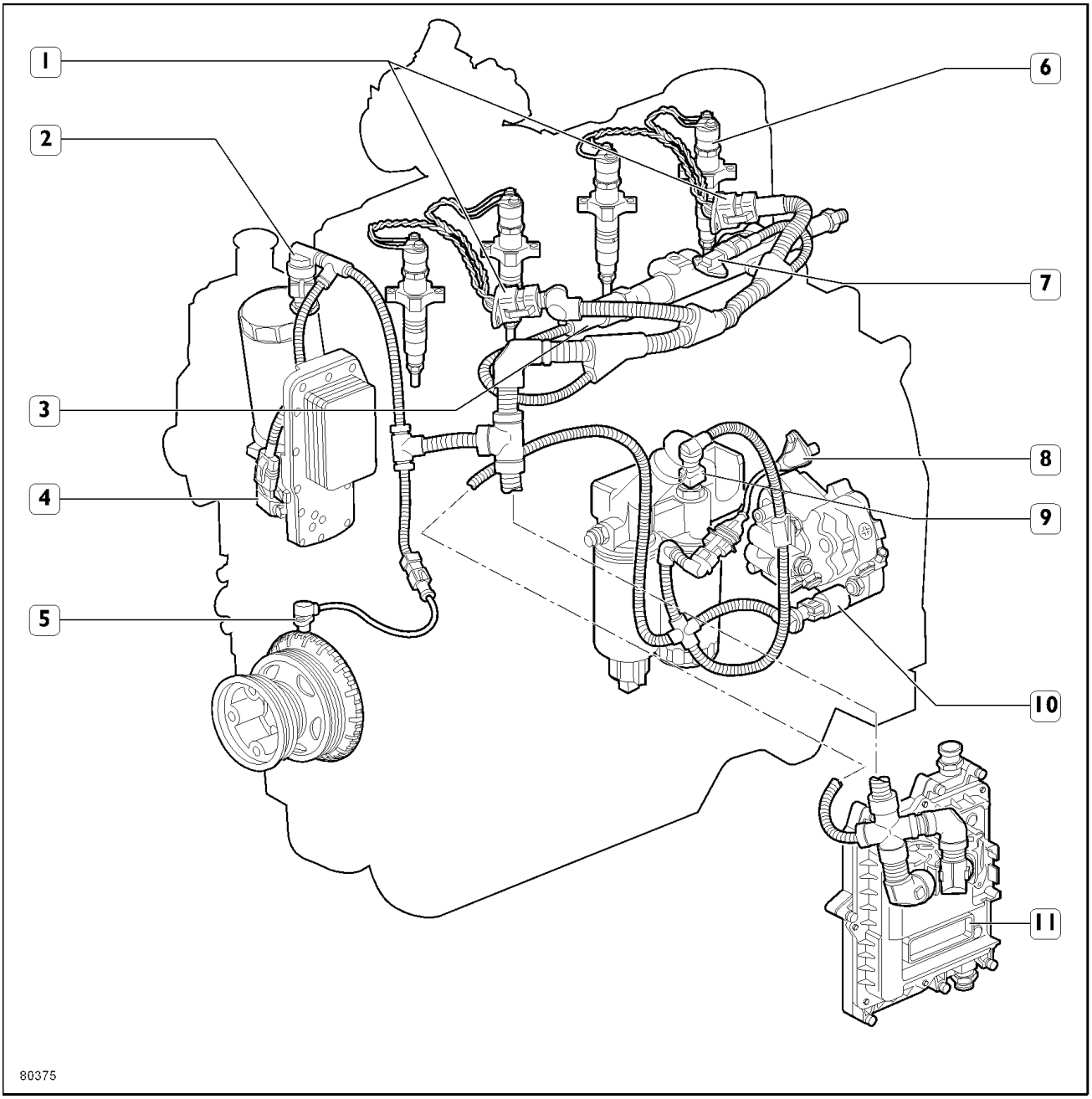


80373 4

6. Fit brackets **380001298**into the holes **(1)** and **(2)** in the crankcase on both sides and, using these brackets, secure the engine to the rotating stand **380000301**. Drain off the engine oil by removing the plug from the sump.



80401 5



80375 6

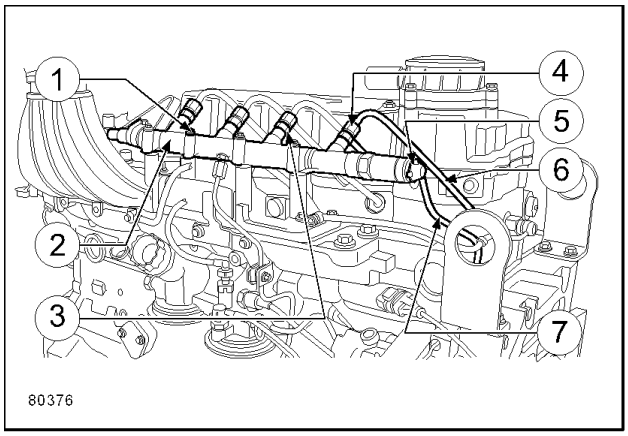
REMOVING COMPONENTS OF THE APPLICATION

1 Connection for electro-injectors
2 Engine coolant temperature sensor
3 Fuel pressure sensor cable
4 Engine oil pressure and temperature sensor
5 Crankshaft sensor
6 Electro-injector
7 Air pressure temperature sensor
8 Timing system phase sensor
9 Fuel temperature sensor
10 Pressure regulator wiring
11 EDC16 control unit

7. Disconnect the engine cable from the connectors: (**(1)**, figure **6**) electro–injector wiring **(6)**; **(7)** air pressure/temperature sensor; **(3)** fuel pressure sensor; **(11)** control unit; **(10)** high– pressure pump sensor; **(8)** timing system phase sensor; **(2)** engine coolant temperature sensor on thermostat; **(5)** engine speed sensor.
   Take off the clamps fastening it to the crankcase and remove it completely.

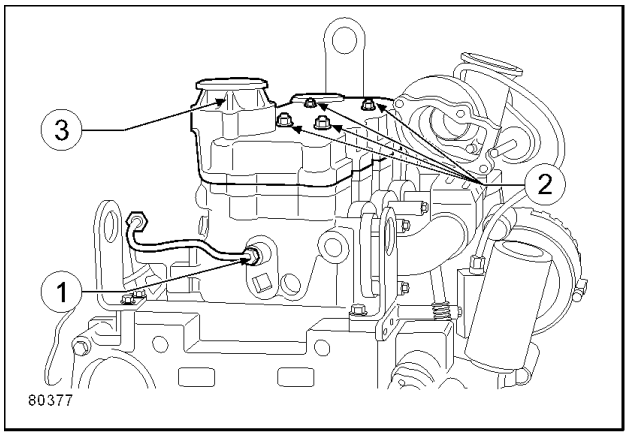
8. Disconnect the following from the rail **(2)**: fuel pipe **(7)**. Disconnect the fuel pipes **(5)** from the rail **(2)** and from the manifolds **(6)** for the electro-injectors.
Remove the screws **(1)** and detach the rail **(2)**.

NOTE: *When locking the fittings (4) securing the pipes (6) to the rail (2), using an appropriate wrench, you must prevent the flow limiters, if fitted, (3) from turning.*



80376 7

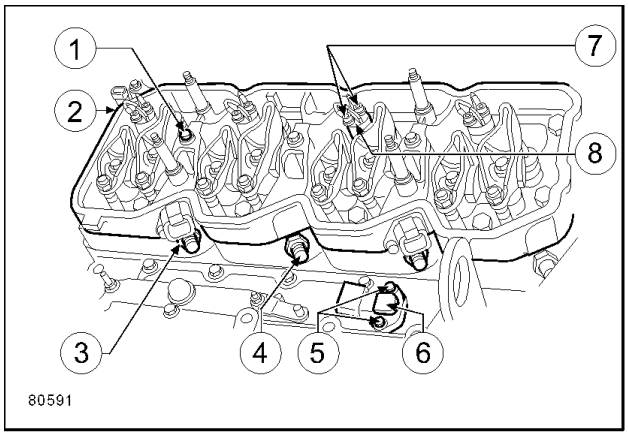
9. Disconnect the piping from the fuel return pressure limiter **(1)**..
Undo the nuts **(2)** and take off the tappet cover **(3)**.



80377 8

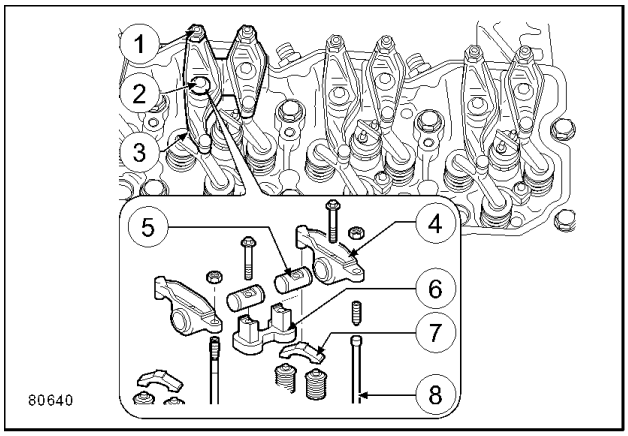
10. Remove the nuts **(7)** and disconnect the electric cables from the electro–injectors **(8)**.
Take out the screws **(1)** and remove the electro –injector wiring mounting **(2)** together with its seal.
Take out the screws **(5)**, remove the air temperature/ pressure sensor **(6)**.
Remove the nuts **(3)** and extract the fuel manifolds **(4)**.

NOTE: *Once removed, the fuel manifolds (4) must not be reused; they must be replaced with new ones.*



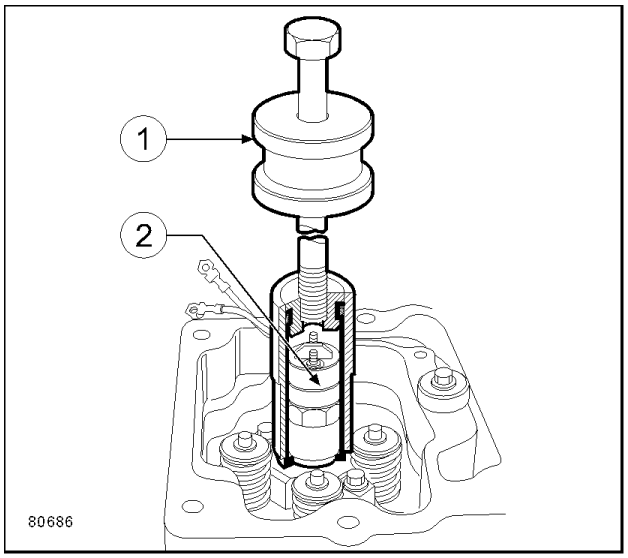
80591 9

11. Loosen the tappet adjuster fixing nuts **(1)** and unscrew the adjusters.
Take out the screws **(2)**, remove the rocker-arm assembly **(3)** comprising the mounting **(6)**, rocker arms **(4)** and spindles **(5)** then remove the bridges **(7)** from the valves.
Remove the rods **(8)**.



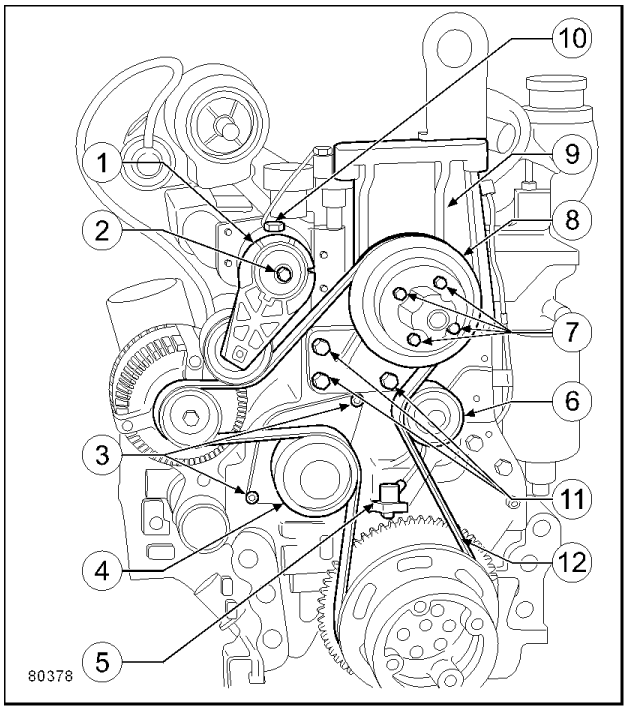
80640 10

12. Take out the screws securing the electro-injectors and, using tool **380001099 (1)**, extract the electro-injectors **(2)** from the cylinder head.



80686 11

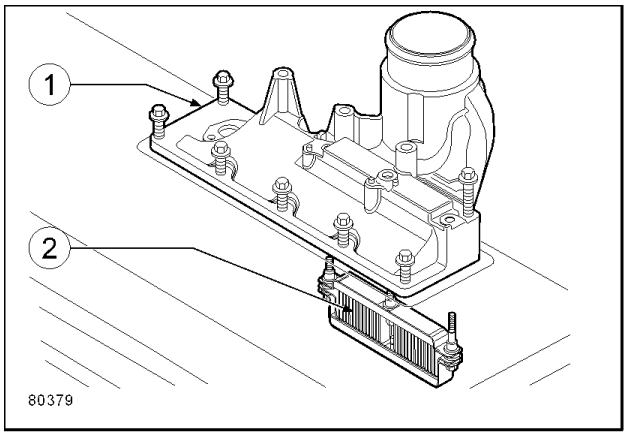
13. Working on the tightener **(1)**, extract the belt **(12)** from the pulleys of the alternator, coolant pump and snub pulleys.
Unscrew the bolt **(2)** and remove the tightener;
Remove the snub pulley **(6)**, unscrew the bolts **(7)** and remove the pulley **(8)** from the mounting beneath.
Unscrew the bolts **(10)** and remove the tightener mounting.
Unscrew the bolts **(11)** and remove the mounting **(9)** from the crankcase.
Unscrew the bolts **(3)** and remove the coolant pump **(4)**.
Unscrew the bolt and remove the engine speed sensor **(5)**



80378 12

14. Procedure to remove the turbocharger, refer to **Turbocharger - Remove (B.30.A)**.

15. From the opposite side, unscrew the bolts securing the intake manifold **(1)** and remove it together with the air heater **(2)** for cold starts.

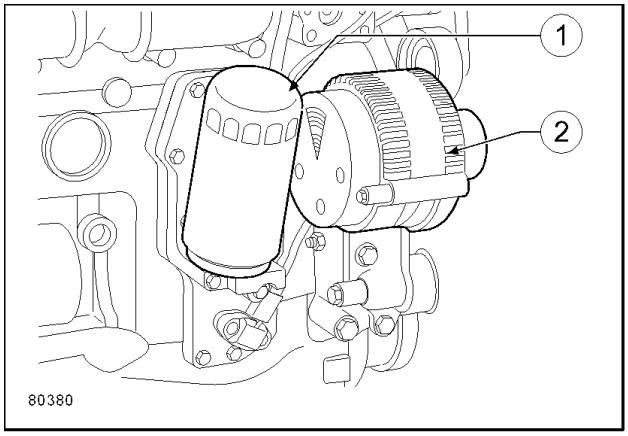


80379 13

Cylinder Head Removal

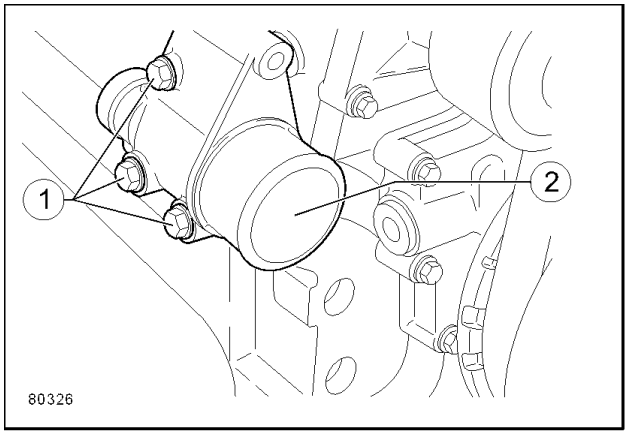
16. Refer to **Cylinder head - Remove (B.10.A)**.

17. Remove the oil filter **(1)**.
Unscrew the retaining bolts and remove the alternator **(2)**.



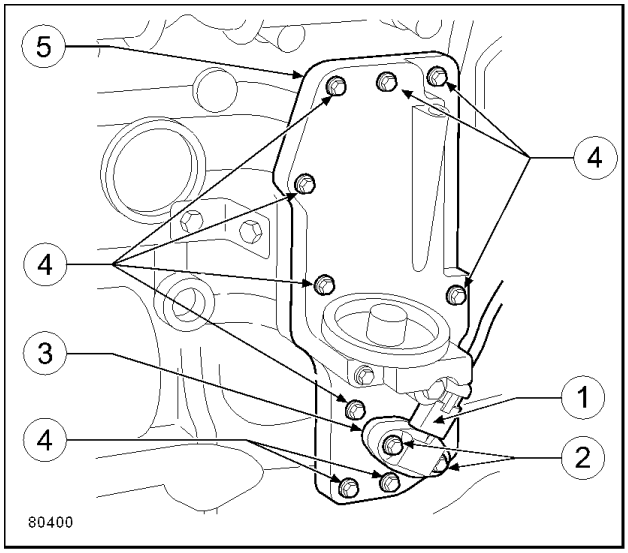
80380 14

18. Unscrew the retaining bolts **(1)** and remove the pipe fitting **(2)**.



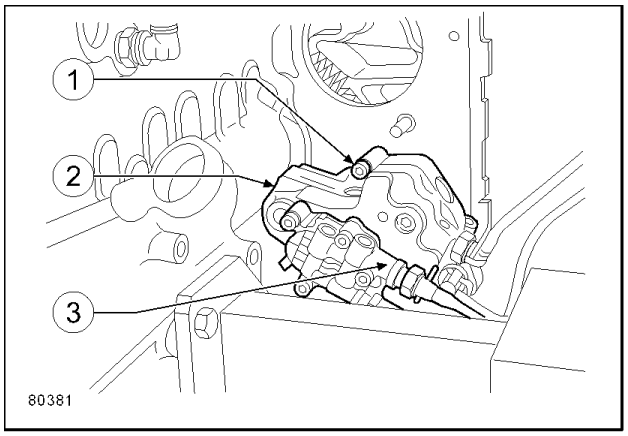
80326 15

19. Disconnect the connector **(1)** from the oil pressure –temperature sensor.
Unscrew the bolts **(2)** and remove the oil pressure –temperature sensor **(3)**.
Unscrew the bolts **(4)** and remove the oil filter mounting **(5)** from the crankcase together with its seals.
Remove the cooler from its seat.



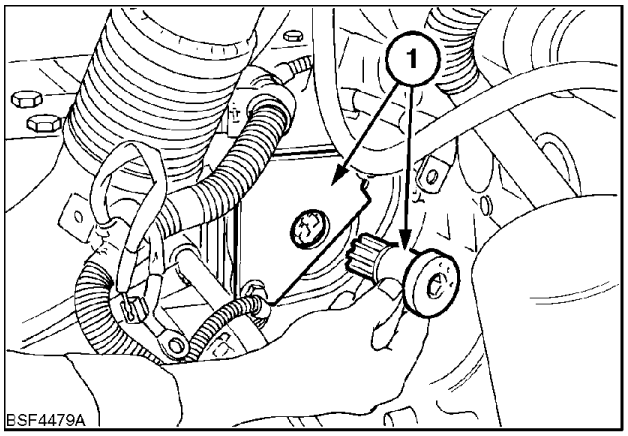
80400 16

20. Remove the nuts **(1)** and detach the high-pressure pump **(2)** together with the feed pump **(3)**.



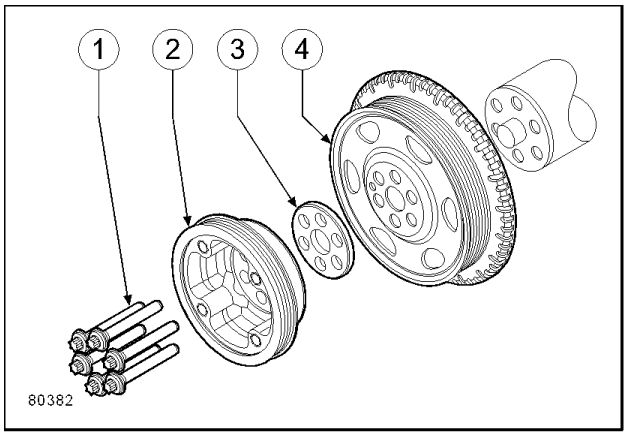
80381 17

21. Install the engine turning tool **380000732**/locking tool, **380000988**, **(1)**,
Loosen the screws fixing the flywheel to the crankshaft.



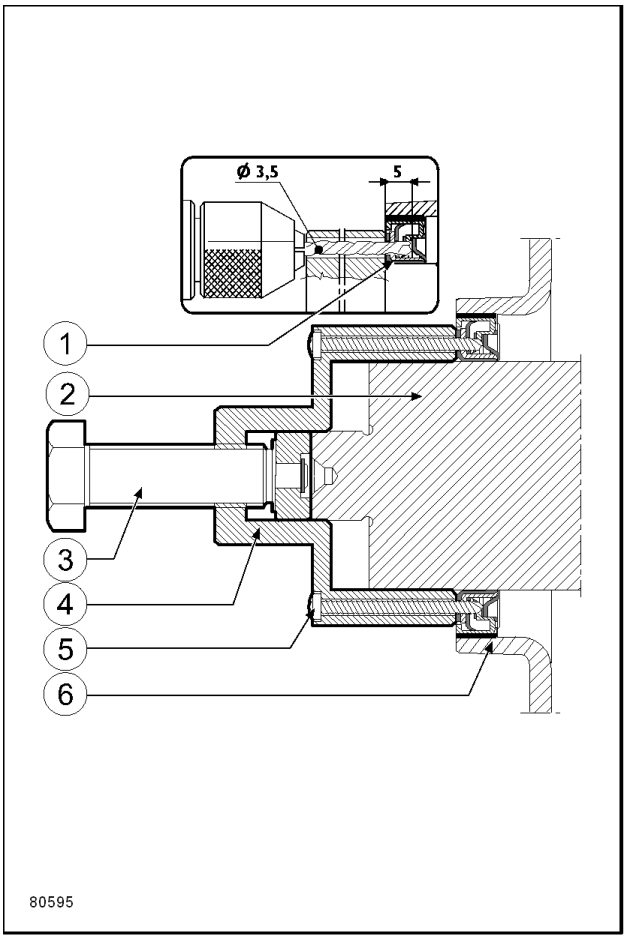
BSF4479A 18

22. Unscrew the bolts **(1)**, remove the pulley **(2)**, spacer **(3)** and pulley **(4)**.
The engine flywheel locking tool can help with disassembly of the damper flywheel **(2)** fitted on the pulley **(4)**.



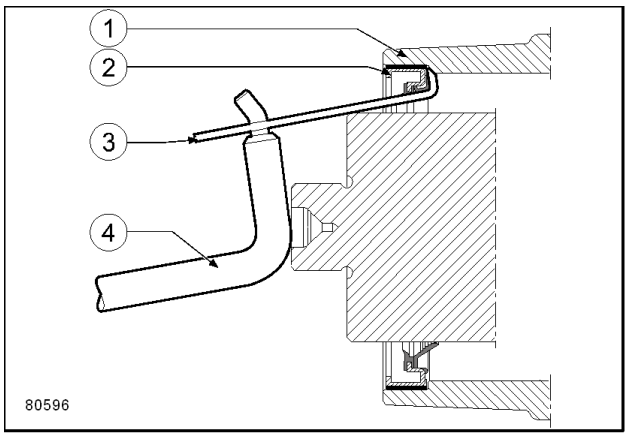
80382 19

23. Extract the front cover shaft seal. Apply tool **380000665 (4)** on the front tang **(2)** of the crankshaft. Perforate the inner seal **(1)** with a drill bit (Æ**3.5 mm** (**0.0138 in**.)) through the tool's guide holes, for a depth of **5 mm** (**0.1969 in**.).
Secure the tool to the seal by screwing down the 6 screws supplied. Extract the seal **(1)** by screwing down the screw **(3)**.



80595 20

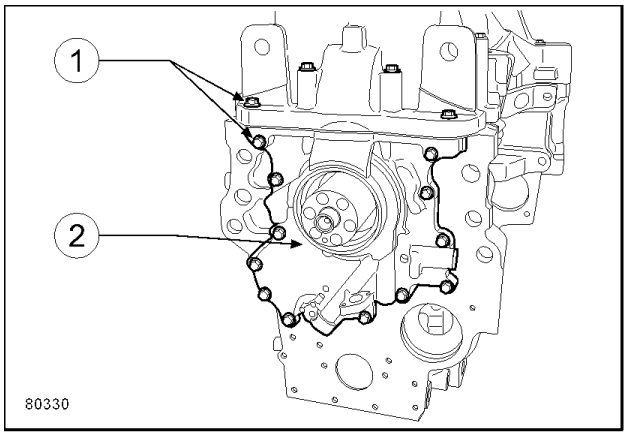
24. Use a suitable hooked device **(3)** with the aid of the lever **(4)** extract the outer seal **(2)** from the front cover **(1)**.



80596 21

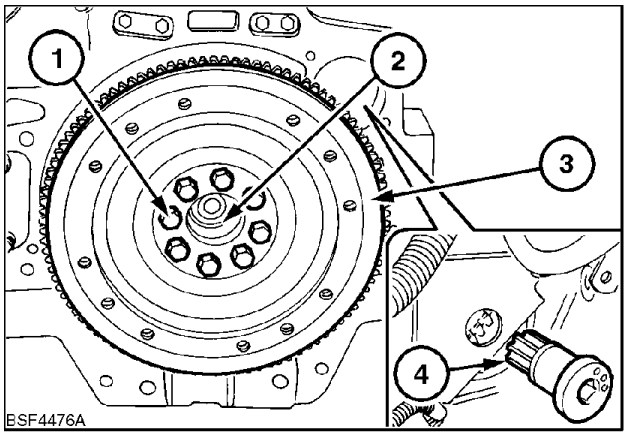
25. Take out the screws **(1)** and remove the oil pump **(2)**.

NOTE: *Note down the assembly position of the screws (1) as they have different lengths.*



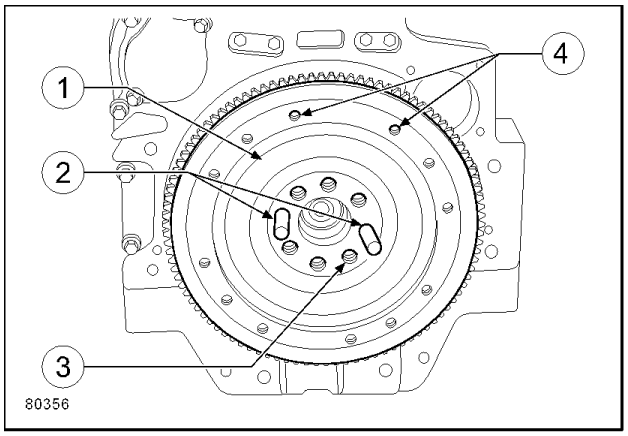
80330 22

26. Remove two opposing screws **(1)** where the extraction pins are to go in (see following figure).
Unscrew the remaining screws securing the flywheel **(3)** from the crankshaft **(2)**.
Remove the tool locking the flywheel **(4)**.



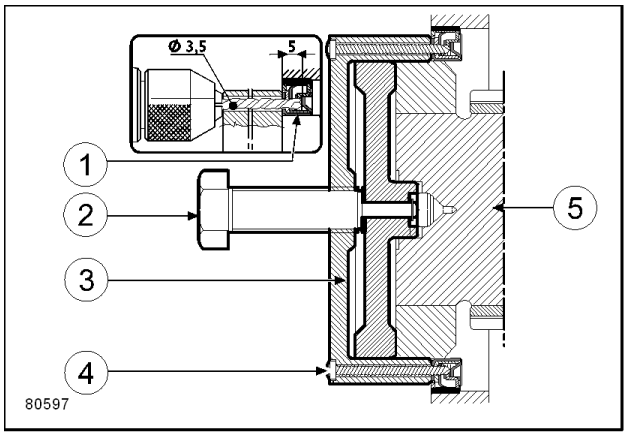
BSF4476A_114 23

27. Screw two screws of suitable length into the holes **(4)** to sling the flywheel with a lift.
Using the two guide pins **(2)** previously screwed into the holes of the crankshaft **(3)**, guide the extraction of the engine flywheel **(1)** with the aid of a lift.



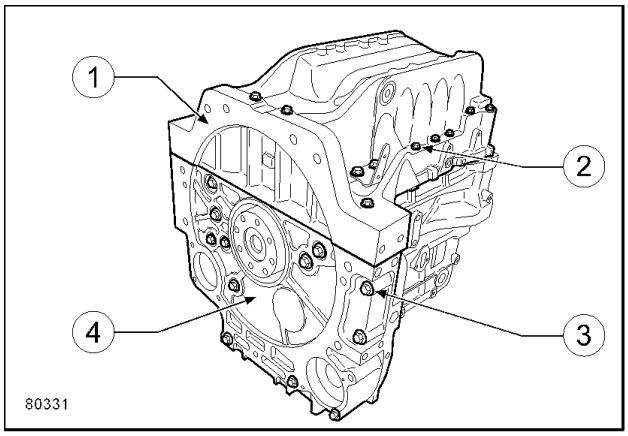
80356_115 24

28. Extract the seal, applying tool **380000663 (3)** onto the rear tang **(5)** of the crankshaft.
Perforate the inner seal with a drill bit (Æ **3.5 mm** (**0.0138 in**.)) through the tool's guide holes, for a depth of **5 mm** (**0.1969 in**.).
Secure the tool **380000663 (3)** to the seal **(1)** by screwing down the 6 screws supplied **(4)**. Extract the seal **(1)** by screwing down the screw **(2)**.
Use a suitable hooked device with the aid of the lever extract the outer seal from the front cover.



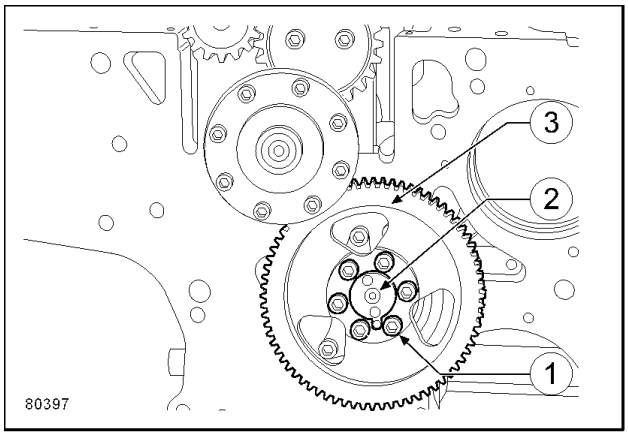
80597 25

29. Turn the engine over.
Take out the screws **(2)** and remove the oil sump **(1)**.
Disconnect the high–pressure pump phase sensor.
Unscrew te bolt **(3)** and remove the timing gear box **(4)** from the crankcase.



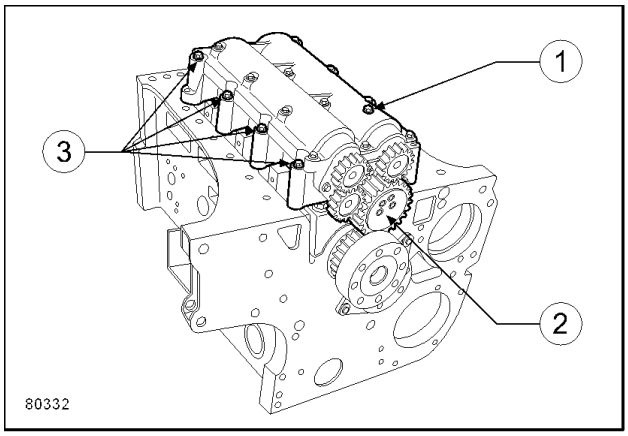
80331 26

30. Take out the screws **(1)** and remove the gear **(3)** from the camshaft **(2)**.

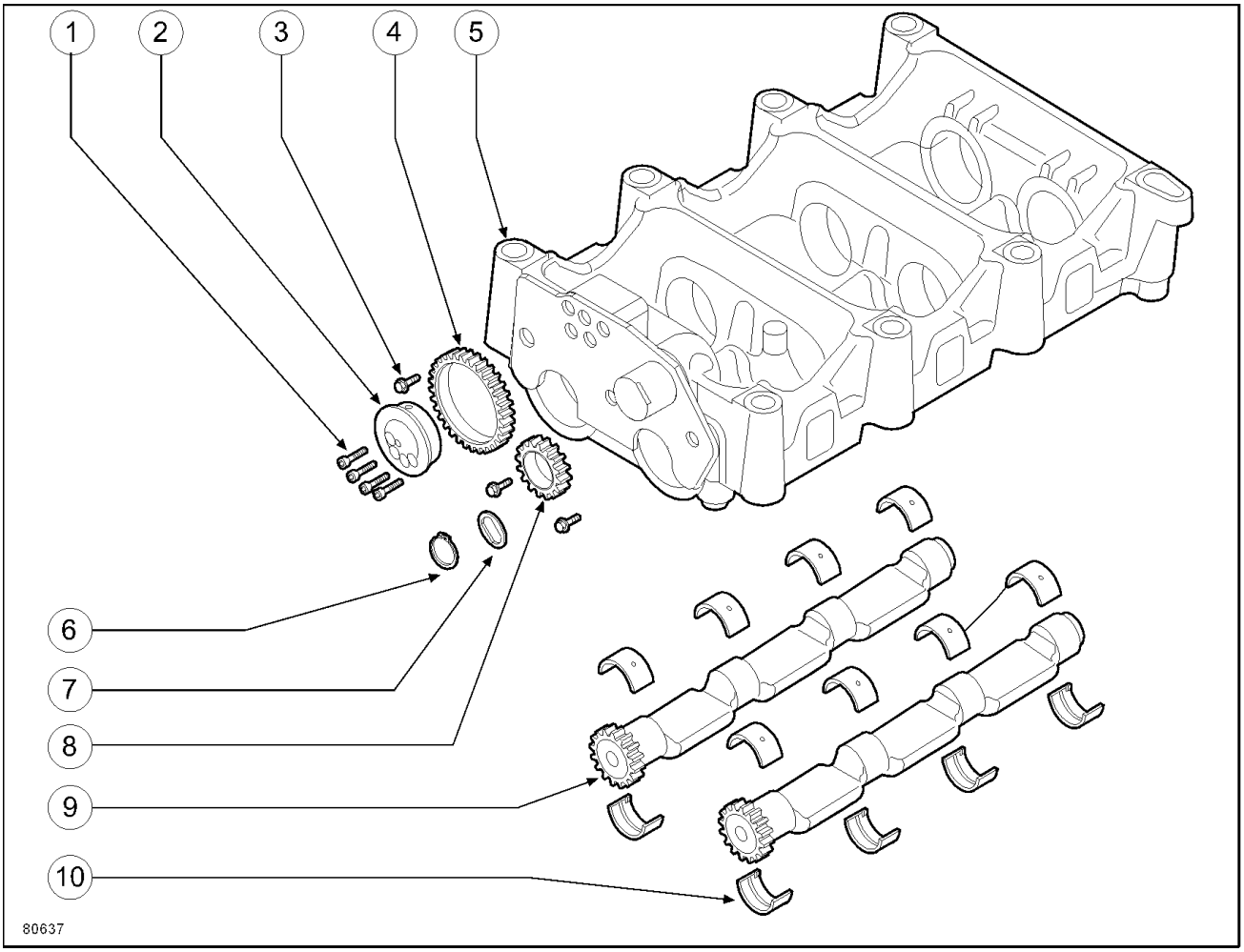


80397 27

31. Using the pin **(1)**, lock the additional counterweights **(2)** at the T.D.C.
Unscrew the retaining bolts **(3)** and remove the additional counterweights **(2)**.



80332 28



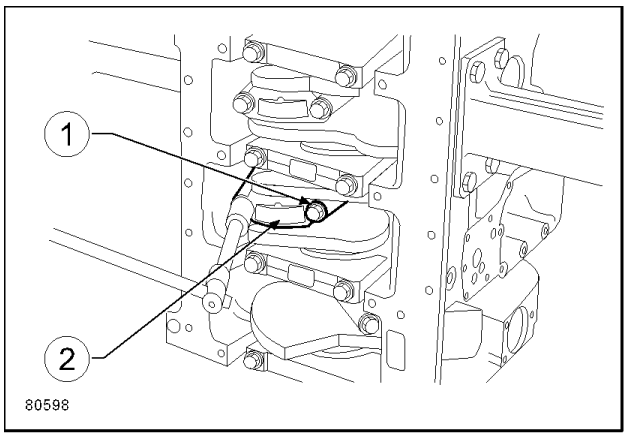
80637 29

ROTATING COUNTERWEIGHT COMPONENTS

1 Retaining bolts
2 Mounting
3 Retaining bolts
4 Gear
5 Balancing weight
6 O-ring
7 Ring
8 Gear
9 Counter-shaft
10 Half bearings

32. Take out the screws **(1)** securing the connecting rod caps **(2)** and remove them.

NOTE: *Mark the caps to ensure that they are refitted to the original rod in the original position.*

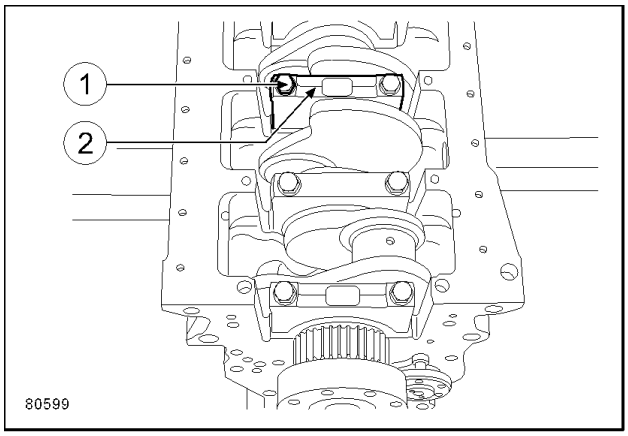


80598 30

33. Extract the pistons together with the connecting rods from the top of the crankcase.

NOTE: *Keep the half bearings in their respective housings since, if they are used, they must be mounted in the position found upon disassembly.*

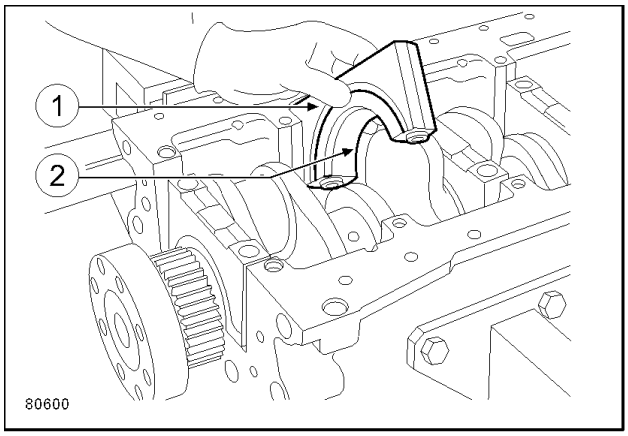
34. Take out the screws **(1)** and remove the main bearing caps **(2)**.



80599 31

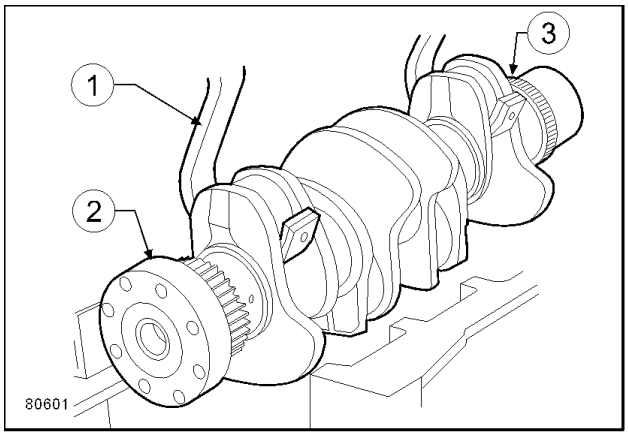
35. The penultimate main bearing cap **(1)** and the related mounting have the half bearing **(2)** equipped with a shoulder.

NOTE: *Note down the assembly position of the top and bottom half bearings since, if they are reused, they must be mounted in the position found upon disassembly.*



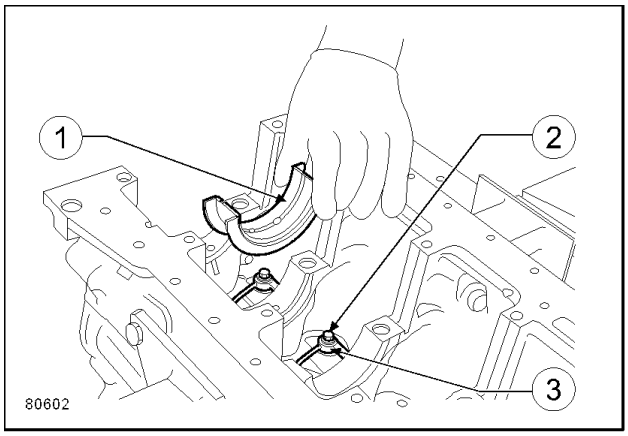
80600_116 32

36. Using suitable lifting hooks **(1)** lift and remove the crankshaft **(2)** from the cylinder block.



80601 33

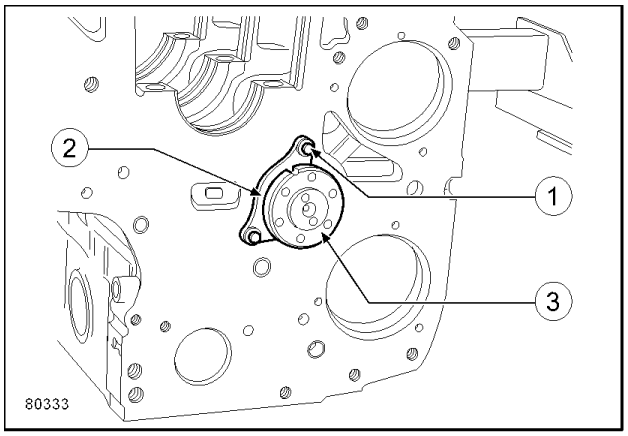
37. Remove the main half bearings **(1)**; take out the screws **(2)** and remove the oil nozzles **(3)**.



80602 34

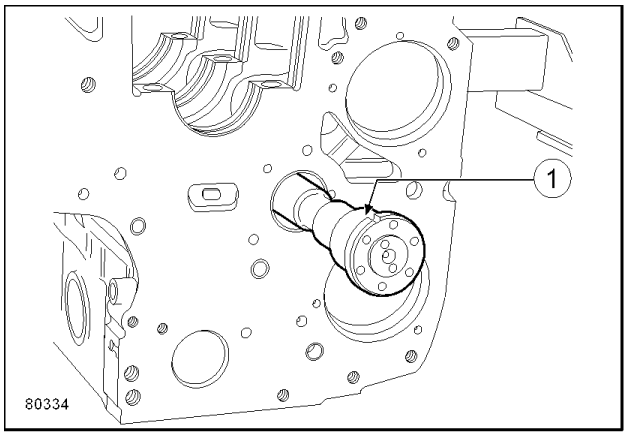
38. Take out the screws **(1)** and remove the plate **(2)** retaining the camshaft **(3)**.

NOTE: *Note down the assembly position of the plate (2).*



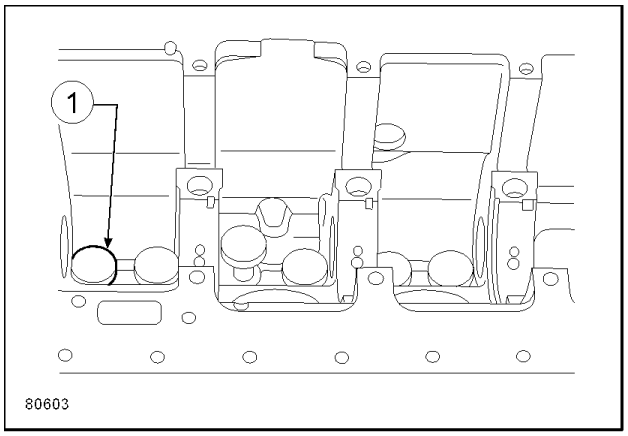
80333 35

39. Carefully extract the camshaft **(1)** from the crankcase.



80334 36

40. Extract the tappets **(1)** from the crankcase.



80603 37

Valve drive Valve guide - Measure

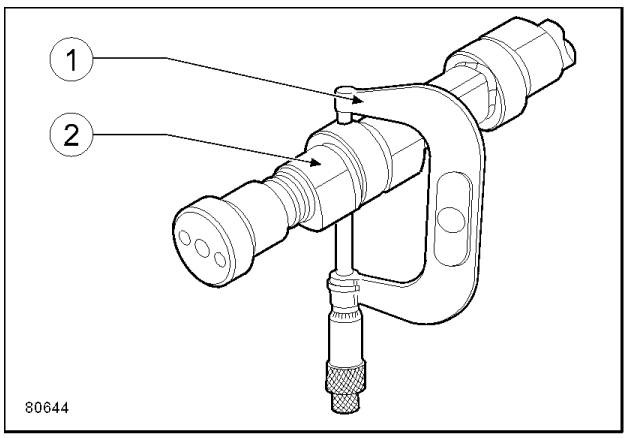
VALVE GUIDES

1. Using a bore gauge, measure the inside diameter of the valve guides; it must be as indicated in the figure **Valve drive Valve guide - Dimension (B.10.A)**).

Valve drive Camshaft - Measure

NOTE: *The support journal surfaces on the shaft and cams must be finely honed; if there are any signs of seizing or scoring, replace the camshaft and relevant bushings.*

1. Check the diameter of the supporting pins of the camshaft **(2)** with the micrometer **(1)** on two perpendicular axis. (Refer to **Valve drive Camshaft - Dimension (B.10.A)**, and **Cylinder block - Overhaul (B.10.A)**.



80644_164 1

Camshaft Lobe - Check

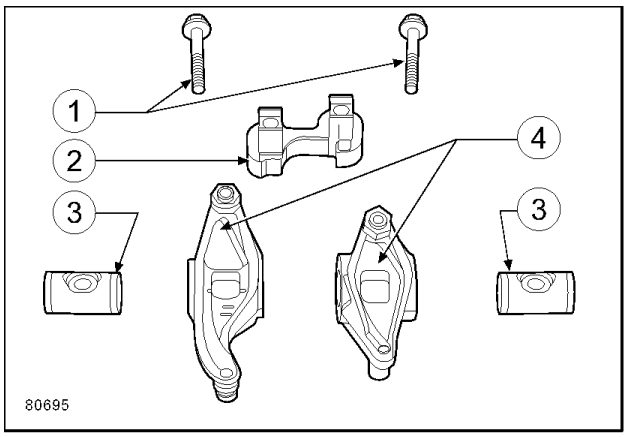
Checking Cam Lift

1. Set the shaft on tailstocks and, using a dial gauge with a **1/100 mm** scale placed on the central support, check that the alignment error is no greater than **0.04 mm** (**0.0016 in**); change the shaft if it is. In addition, check the cam lift: it must be **6.045 mm** (**0.2380 in**) for the exhaust cams and **7.582 mm** (**0.2985 in**) for the intake ones; change the shaft if the measurements are any different. (Refer to **Valve drive Camshaft - Dimension (B.10.A)** and **Valve drive Camshaft - Measure (B.10.A)**

Rocker assembly Rocker arm - Check

Component Parts of Rocker Arm Assembly

1. 1. Bolts securing rocker arms
   2. Rocker support
   3. Rocker spindles
   4. Rocker arms



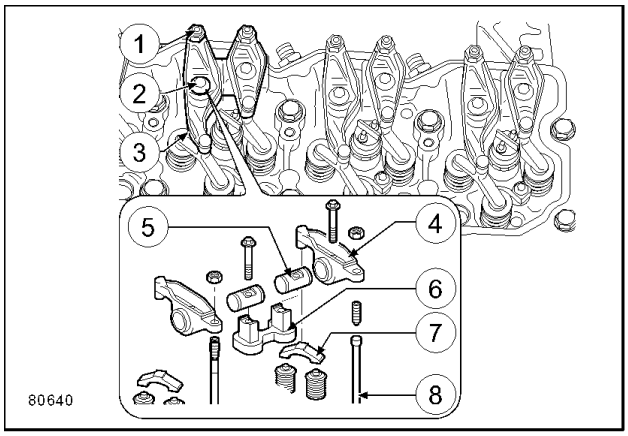
80695 1

2. Check the mating surfaces of the rocker spindle/rocker arm to ensure that there are no signs of damage or excessive wear. Replace if necessary. Refer to **Rocker assembly Shaft - Dimension (B.10.A)**.

Valve drive Rocker assembly - Disassemble

Prior operation:
Valve cover - Remove (B.10.A)

1. Loosen the tappet adjuster fixing nuts **(1)** and unscrew the adjusters.
   Take out the screws **(2)**, remove the rocker-arm assembly **(3)** comprising the mounting **(6)**, rocker arms **(4)** and spindles **(5)** then remove the bridges **(7)** from the valves.
   Remove the rods **(8)**.



80640 1

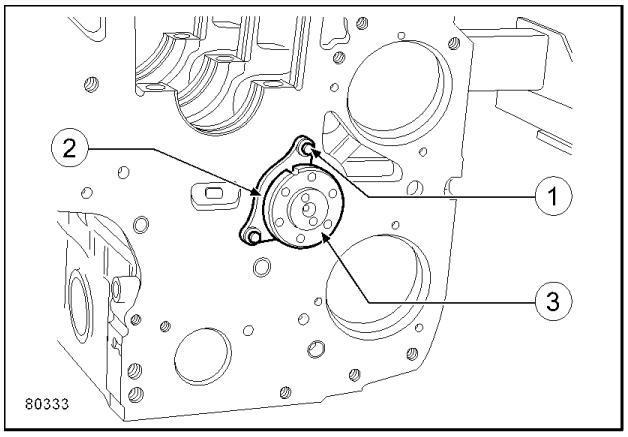
Next operation:
Fuel injector Electro injector - Remove (B.20.A).

Valve drive Camshaft - Remove

Prior operation:
Camshaft Gear - Remove (B.10.A), **Crankshaft Main bearing - Remove (B.10.A)**.

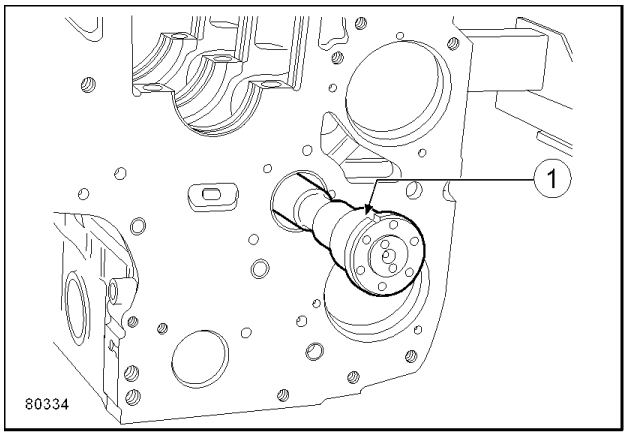
1. Take out the screws **(1)** and remove the plate **(2)** retaining the camshaft **(3)**.

NOTE: *Note down the assembly position of the plate (2).*



80333 1

2. Carefully extract the camshaft **(1)** from the crankcase.



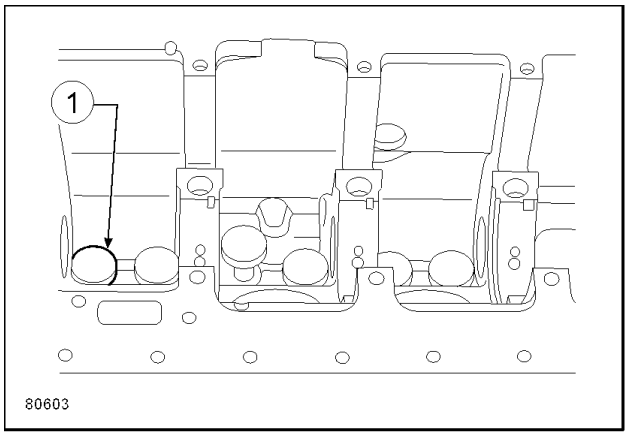
80334 2

Next operation:
Camshaft Tappet - Remove (B.10.A).

Camshaft Tappet - Remove

Prior operation:
Valve drive Camshaft - Remove (B.10.A)

1. Extract the tappets **(1)** from the crankcase.



80603 1

2. Check tappets for wear, refer to **Camshaft Tappet - Dimension (B.10.A)**

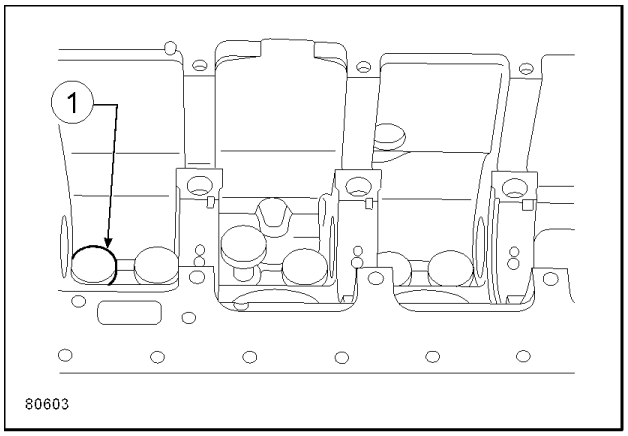
Next operation:
Camshaft Tappet - Install (B.10.A)

Camshaft Tappet - Install

Prior operation:
Camshaft Tappet - Remove (B.10.A)

1. Lubricate the tappets and tappet bores with new engine oil **CASE AKCELA NO. 1 ENGINE OIL SAE 15W-40** and insert into their seats in the crankcase. Lubricate follower cam face with new engine oil **CASE AKCELA NO. 1 ENGINE OIL SAE 15W-40**

NOTE: *Ensure that the tappets are fully seated, free to rotate and be free to fall under their own weight into the seat.*



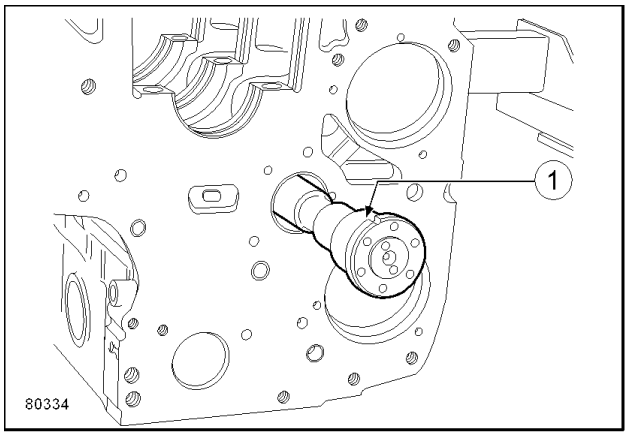
80603 1

Next operation:
Valve drive Camshaft - Install (B.10.A)

Valve drive Camshaft - Install

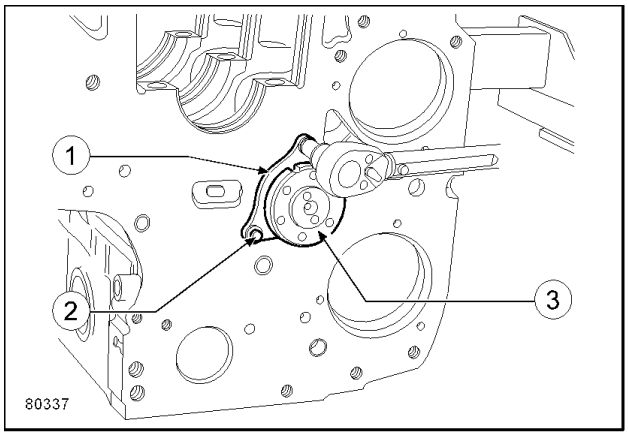
Prior operation:
Camshaft Tappet - Install (B.10.A)

1. Lubricate the bushings, bearing journals and camshaft lobes , with new engine oil, **CASE AKCELA NO. 1 ENGINE OIL SAE 15W-40** and install the camshaft **(1)** taking care that, during this process, the bushing or the supporting seats do not get damaged.



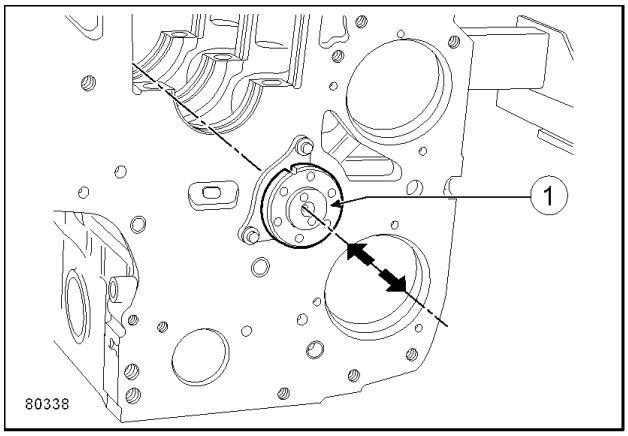
80334_117 1

2. Position the plate **(1)** retaining the camshaft **(3)** with the slot facing towards the top of the crankcase and the punchmark facing the operator. Tighten the screws **(2)** to the prescribed torque, refer to **Valve drive Camshaft - Torque (B.10.A)**.



80337 2

3. Using a Dial Test indicator and a suitable lever, check the end float of the camshaft **(1)**.
Locate the dial indicator to the end of the camshaft, using the lever, apply light pressure to move the camshaft one way. Set the dial indicator to "zero", apply light pressure in the opposite direction with the lever. The reading must be **0.23 mm +/- 0.13** (**0.0091 in +/- 0.0051**.).

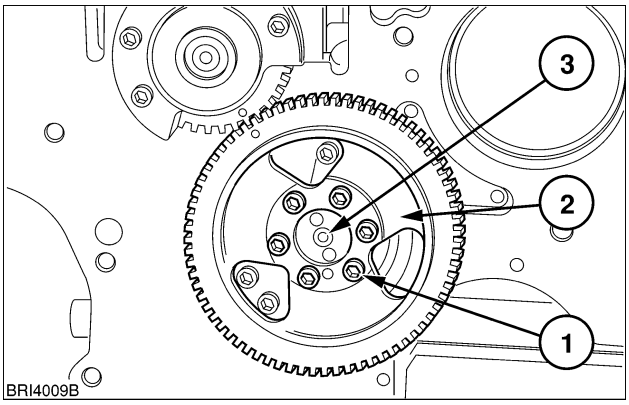


80338 3

Next operation:
Crankshaft - Measure (B.10.A) Crankshaft - Install (B.10.A)

Camshaft Gear - Remove

1. Remove screws **(1)** and remove the gear **(2)** from the camshaft **(3)**.



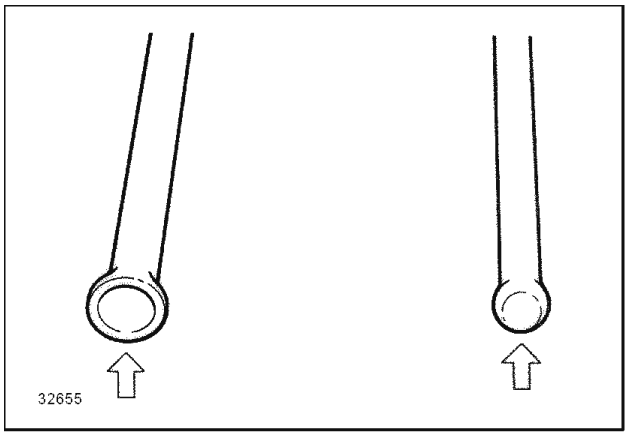
BAIL06CCM067ASA 1

Next operation:
Timing gear - Timing adjust (B.10.A).

Camshaft Push rod - Visual inspection

Prior operation:
Valve drive Rocker assembly - Disassemble (B.10.A)

1. Before assembly, check the rocker-arm control rods: They must have no deformation.
   There should be no signs of seizure or wear on the contact surfaces on the ball seats, rocker arm adjuster screw and tappets (as indicated), if there are, then they require to be renewed.
   The intake and exhaust valve control rods are identical and can therefore be interchanged



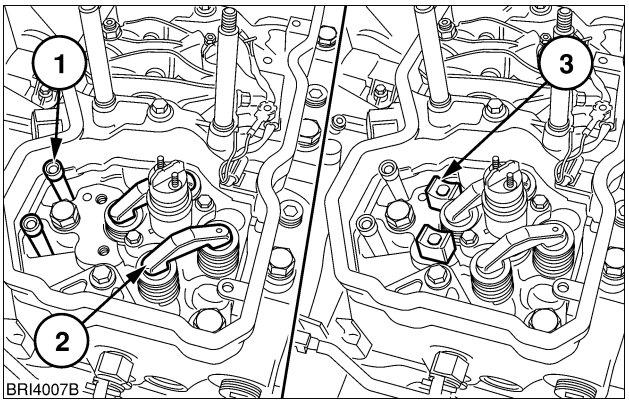
32655 1

Next operation:
Valve drive Rocker assembly - Install (B.10.A)

Valve drive Rocker assembly - Install

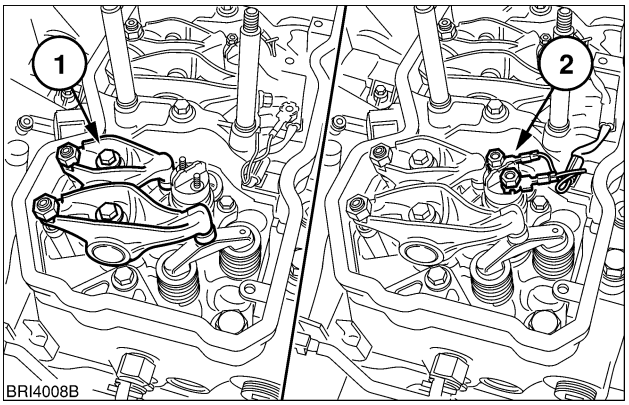
Prior operation:
Camshaft Push rod - Visual inspection (B.10.A).

1. Insert pushrods **(1)** into engine and lubricate the pushrod sockets/cups with new engine oil **CASE AKCELA NO. 1 ENGINE OIL SAE 15W-40** .



BAIL06CCM093ASA 1

2. Position the bridges **(2)** on the valves with the reference marks/dimples facing the exhaust manifold.
3. Position rocker arm supports **(3)**.
4. Ensuring that the tappet adjusters on the rocker arms are unscrewed, mount the rocker arm assemblies, complete with spindles, into the rocker arm supports, securing into position with the retaining bolts **(1)** to the required torque. Refer to **Rocker assembly Rocker arm - Torque (B.10.A)**.



BAIL06CCM094ASA 2

5. Set tappet clearance, refer to **Camshaft Tappet - Clearance (B.10.A)**.
6. Connect the electric cables **(2)** to the electro injectors and using special tool **380000158** tighten the retaining nuts to the required torque. Refer to **Electrical control - Torque (B.20.A)**.

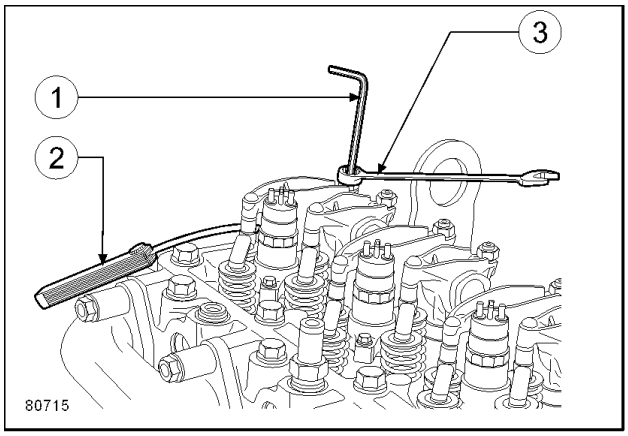
Next operation:
Camshaft Tappet - Clearance (B.10.A).

Camshaft Tappet - Clearance 4 Valve Engines

ATTENTION: *With TIER 3 engines with internal EGR (Exhaust Gas Recirculation) standard valve lash setting procedure will lead to wrong valve clearances and serious engine damage.*
Each cylinder must be checked by putting engine to TDC firing for that cylinder and setting both valve clearances on that cylinder ONLY.
NO SHORT CUTS INVOLVING THE SETTING OF VALVES ON ONE CYLINDER WHILST ENGINES AT TDC OF ANOTHER CYLINDER ARE ALLOWED!

Prior operation:
Valve drive Rocker assembly - Install (B.10.A).

1. Adjust clearance between the rockers and valves with the using an Allen key wrench **(1)**, box wrench **(3)** and feeler gauge **(2)**. Refer to **Camshaft Tappet - General specification (B.10.A)**.

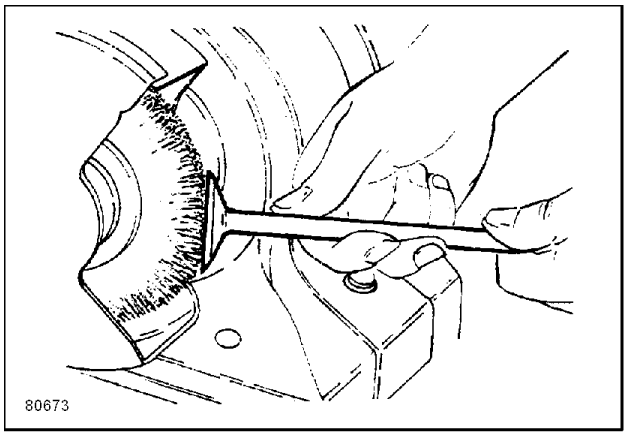


80715 1

Next operation:
Valve cover - Install (B.10.A)

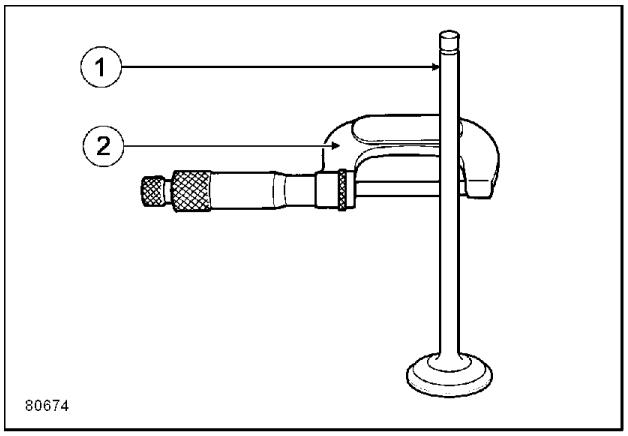
Valve drive Valve assembly - Check Decarbonising and Checking.

1. Decarbonizing, checking and grinding valves
   Remove all carbon deposits from the valves using a wire brush.
   Check that the valves show no signs of seizure, cracking or burning.
   If necessary, regrind the valve seats, removing as little material as possible.



80673 1

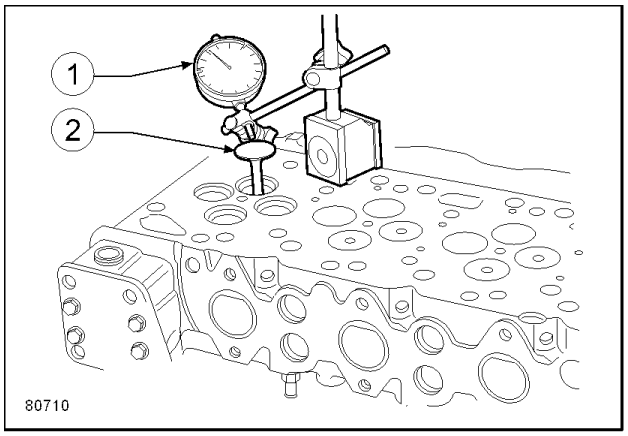
2. Using a micrometer **(2)**, measure the valve stem **(1)**: it must be **6.970 - 6.990 mm** (**0.2744 - 0.2752 in**)). For further dimensions, refer to **Valve assembly Valve - Dimension (B.10.A)**.



80674 2

Checking the clearance between the valve stem, guide and valve centring.

3. The checks are made with a dial gauge **(1)** with a magnetic base, positioned as illustrated. The assembly clearance is **0.052 - 0.092 mm** (**0.0020 - 0.0036 in**.).
   Making the valve **(2)** turn, check that the centring error is no greater than **0.03 mm** (**0.0012 in**).

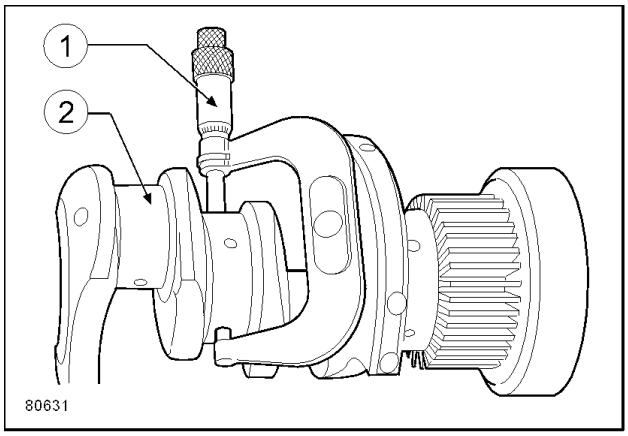


80710 3

Crankshaft - Measure

1. Main and connecting rod journal dimensions
   If any sign of seizure, scoring or ovality is found on the main journals or crankpins, they must be re-ground. Before reconditioning the pins **(2)**, use a micrometer **(1)** to measure the pins of the shaft to define the diameter to which the pins must be reduced.

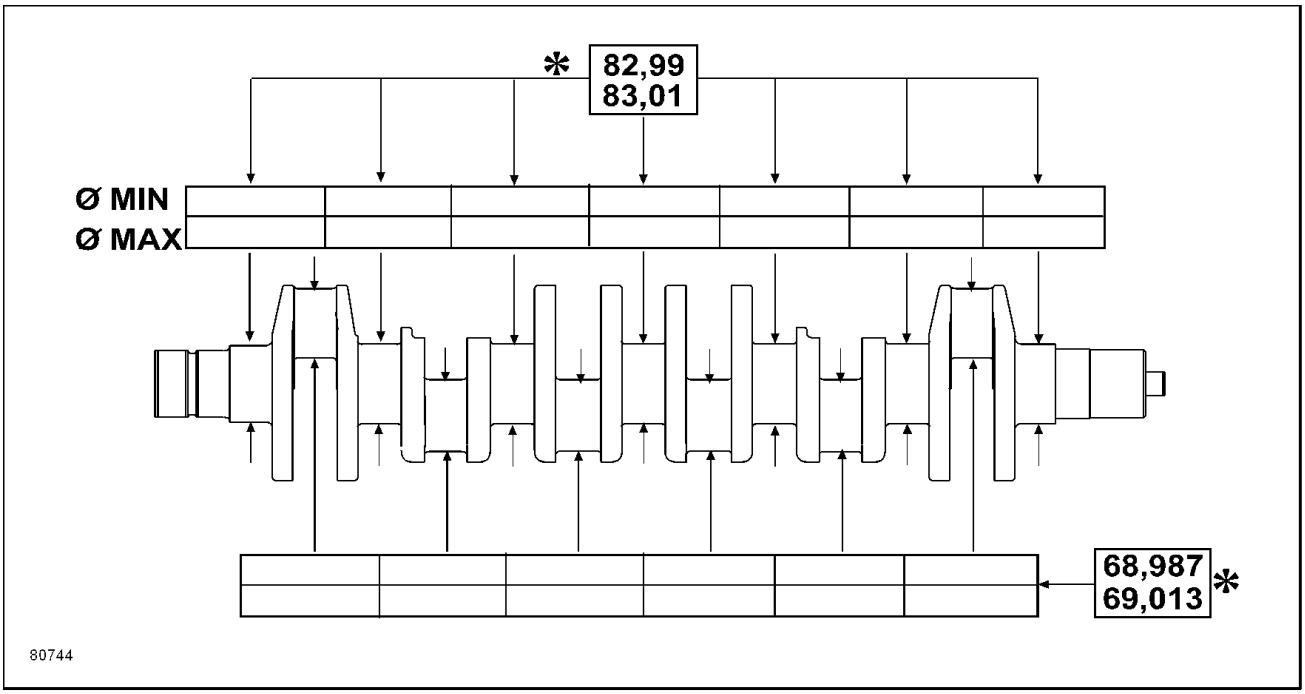
NOTE: *It is advisable to note the values on a chart shown in the following figure.*



80631_209 1

2. The undersize classes are: **0.250 - 0.500 mm** (**0.0098 - 0.0197 in**.)

NOTE: *The main journals and crankpins must always be reconditioned to the same undersize class. After undersizing, mark the main journal and the crankpin with a stamp on the side of the crank No. 1.*



80744_210 2

NOTE THE CRANKSHAFT MAIN JOURNAL AND CRANKPIN MEASUREMENTS ON THE TABLE
*** Nominal value**

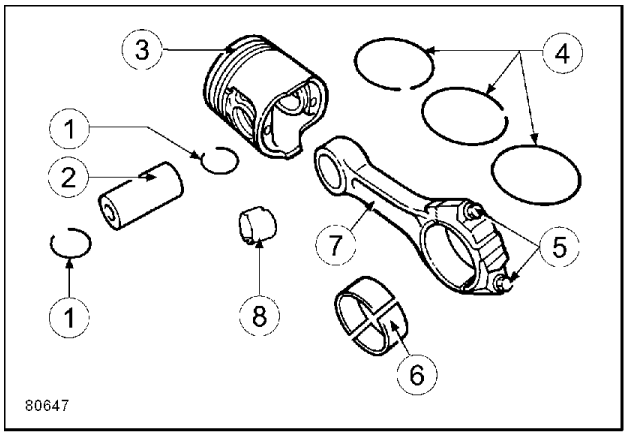
Refer to **Crankshaft - Dimension (B.10.A)**.

Connecting rod and piston - Measure

NOTE: *For dimensions of Piston and/or Connecting rod, refer to and* ***Connecting rod and piston Piston - Dimension (B.10.A)*** *and* ***Connecting rod and piston Connecting rod - Dimension (B.10.A)***

NOTE: *The pistons are supplied as spare parts oversized by 0.5 mm (0.0197 in.).*

1. Connecting rod-piston component parts
   1. Retaining rings - 2. Pin - 3. Piston - 4. Piston rings - 5. Screws - 6. Half bearings - 7. Connecting rod - 8. Bushing



80647_217 1

Connecting Rods

2. CONNECTING ROD, PISTON PIN BUSHING AND HALF BEARING DATA
   *Inside diameter to be measured after installing in the small end and regrinding with a reamer.
   ** Cannot be measured free. Refer to **Connecting rod and piston Connecting rod - Dimension (B.10.A)**

NOTE: *The connecting rod - connecting rod cap mating surfaces are knurled for a better coupling. It is therefore recommended not to remove the knurling. The rods are manufactured using a fracture breaking technique making each rod and cap unique and having only one way of installation.*

3. Connecting rods are supplied as spare parts in class W and marked in green*.
   Removing material is not permissible.

NOTE: *Each connecting rod is marked:*
- On the body and cap with a number indicating their coupling and the cylinder in which it is mounted. In the event of replacement, number the new rod with the same number as the replaced connecting rod.
- On the body of the connecting rod with a letter indicating the weight class of the connecting rod mounted in production: (Refer to ***Connecting rod and piston Connecting rod - Component identification (B.10.A)***
-- V, 1600 to 1640 (3.5274 to 3.6156 lb) (marked in yellow);
--V, 1641 to 1680 (3.6178 to 3.7038 lb) (marked in green);
-- V, 1681 to 1720 (3.7060 to 3.7920 lb) (marked in blue);

Bushings

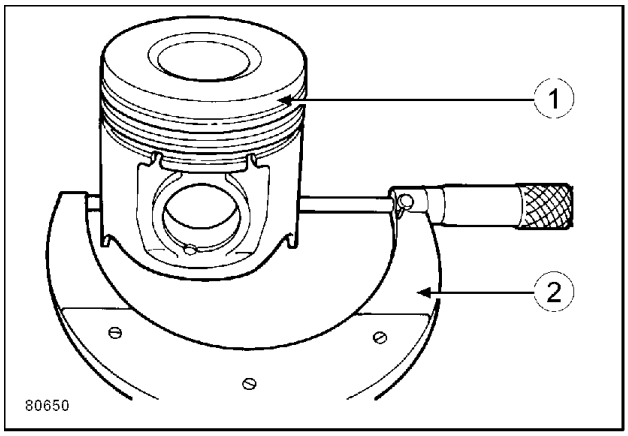
4. Check that the bushing in the small end has not come loose and shows no sign of scoring or seizure. If this is not so, change it.

5. Disassembly and assembly are performed with a suitable drift.
   When driving in, make sure that the oilways in the bushing and small end coincide. Using a boring machine, regrind the bushing to obtain the prescribed diameter.

Pistons - Measuring the Piston Diameter

6. Measuring the piston **(1)** diameter using a micrometer **(2)** to determine the assembly clearance.

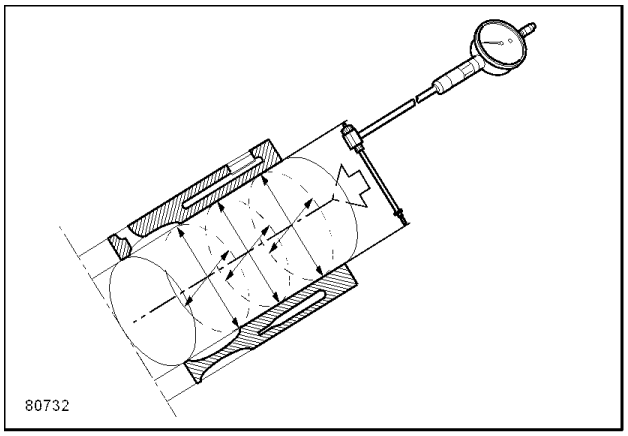
NOTE: *The diameter must be measured at a distance of 12 mm (0.4724 in.) from the base of the piston skirt.*



80650 2

Cylinder block - Measure

1. Measurements must be taken for each single cylinder at three different heights on the liner and on two orthogonal faces: one parallel to the longitudinal axis of the engine and the other perpendicular; maximum wear is generally found on this face in correspondence with the first measurement.
   If ovality, taper or general wear is noted, bore and recondition the cylinder liners. The cylinder liners must be reground in relation to the diameter of the pistons supplied as spare parts oversized by **0.5 mm** (**0.0197 in**) over the nominal value and to the prescribed assembly clearance. (Refer to **Cylinder block - Dimension (B.10.A)** and **Cylinder block - Overhaul (B.10.A)**).



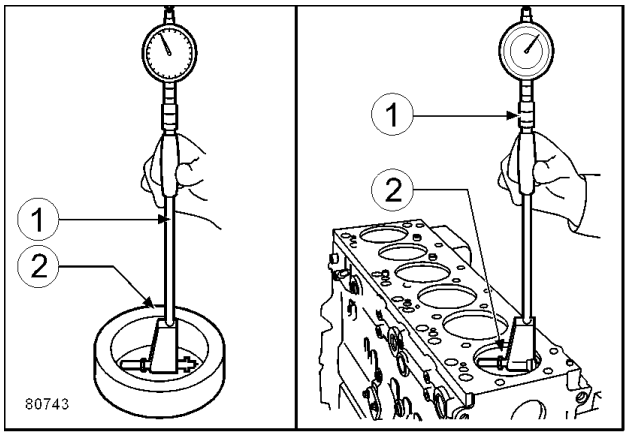
80732_206 1

Next operation:
Crankshaft - Measure (B.10.A)

Cylinder block - Overhaul

Prior operation:

1. After disassembling the engine, thoroughly clean the cylinder-crankcase assembly. Use the appropriate rings for transporting the cylinder assembly.
   Carefully check the crankcase is not cracked.
   Check the condition of the plugs. If they are rusty or if there is the slightest doubt about their seal, change them.
   Examine the surfaces of the cylinder liners; they should show no sign of enlargement, scoring, ovality, taper or excessive wear.
   To check the internal diameter of the cylinder liners for ovality, taper and wear, use a bore gauge **(1)**, fitted with a dial gauge zero-set on the ring gauge **(2)** of the diameter of the cylinder liner. (Refer to **Cylinder block - Measure (B.10.A)**).



80744 1

NOTE: *If regrinding, all the liners must have the same oversize (0.5 mm (0.0197 in.)).*

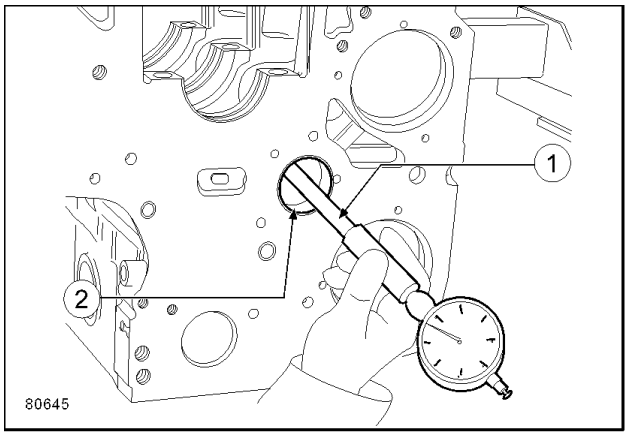
NOTE: *If the ring gauge is not available, use a micrometer.*

2. Check the main bearing seats, proceeding as follows:
   – fit the main bearing caps on the supports without bearings;
   – tighten the retaining bolts to the prescribed torque; (refer to **ENGINE - Torque (B.10.A)**)
   – using an appropriate dial gauge for interiors, check that the diameter of the seats is as prescribed. (refer to **ENGINE - General specification (B.10.A)**)
   If the measurement is any greater, change the crankcase.

   Cylinder head mating surface check
   After having located any deformed areas, level off the mating surface using a grinding machine.
   The flatness error must be no greater than **0.075 mm** (**0.0030 in**). Check the condition of the cylinder block plugs **(1)**; if they are rusty or if there is the slightest doubt about their seal, change them.

BUSHINGS

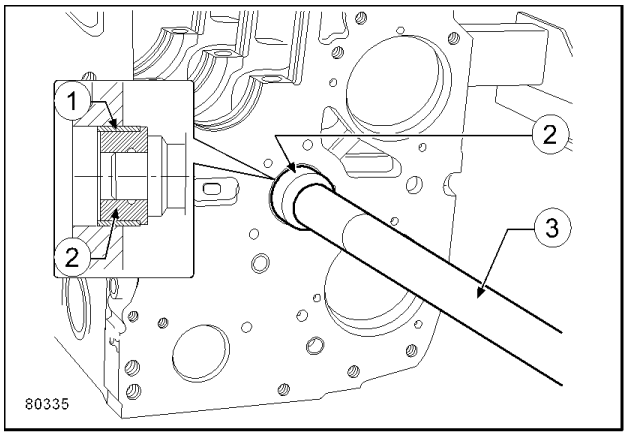
3. The camshaft bushings **(2)** must be forced into their respective seats.
   The internal surfaces must show no sign of seizure or wear.
   Using the bore meter **(1)**, measure the diameter of the front and rear bushings **(2)** and of the intermediate seats for the camshaft. (refer to **Cylinder block - Dimension (B.10.A) Valve drive Camshaft - Measure (B.10.A)** and **ENGINE - General specification (B.10.A)**)
   Measurements must be made at two perpendicular points.



80645 2

4. To change the front bushing **(1)**, use **380000667** for disassembly and assembly.

NOTE: *Upon assembly, the bushing (1) must be directed so that the lubrication holes coincide with the holes in the seats in the crankcase.*

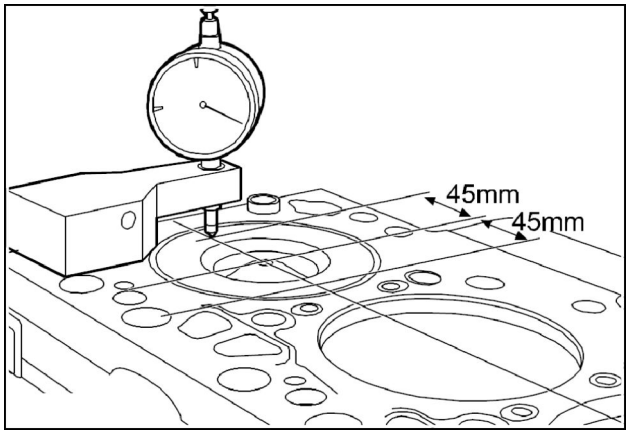


80335 3

Cylinder head - Install

NOTE: *Before each assembly, always check that the threads of the holes and bolts show no signs of wear or traces of dirt.*

1. Prior to the fitting of the cylinder head to the crankcase, measurements are required to be taken to determine the correct thickness of head gasket required.
   The gasket is available in 2 thicknesses, **1.25 mm** (**0.049 in**) gasket type A and **1.15 mm** (**0.045 in**) gasket type B, select the correct one depending on the piston protrusion dimension.

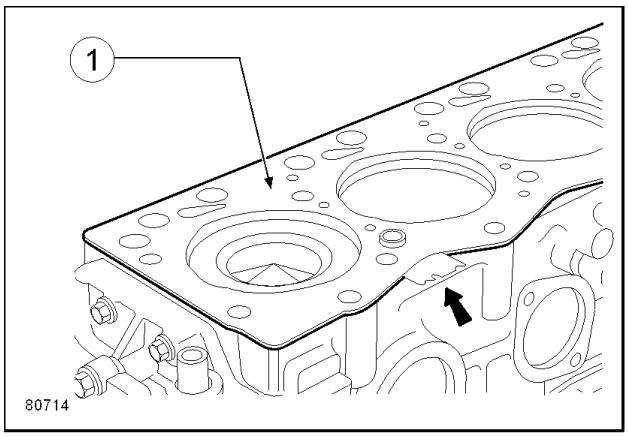


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NOTE: *Ensure that the mating surfaces of the cylinder head and crankcase are clean.*
It is recommended to keep the gasket in its wrapping until the head is to be fitted on.

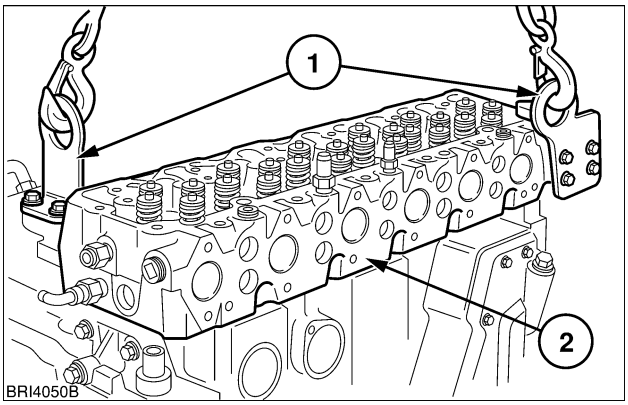
2. Using the dial gauge, Special Tool number **380000228 (1)**, fitted with base, Special Tool number **380000364 (2)**, check the protrusion of the pistons **(3)**, at T.D.C. from the cylinder block face.
3. For each piston, at a distance of **45 mm** (**1.77 in**) from the centre of the piston, measure the protrusions S1 and S2 from the top face of the crankcase and then calculate the mean:
   S cyl1 = S1+S2 / 2
   Repeat this operation for pistons 2, 3, 4, 5, & 6 and calculate the mean value.
   S = S cyl1 + S cyl2 + S cyl3 + S cyl4 + S cyl5 + S cyl6 / 6
   If S is > **0.40 mm** (**0.015 in**) use the gasket type A.
   If S is < **0.40 mm** (**0.015 in**) use gasket type B.
4. Position the gasket **(1)** on the crankcase, ensuring that the word "TOP" **(1)** is facing the cylinder head.

NOTE: *Do not grease the gasket.*



80714_203 2

5. With the head gasket positioned on the crankcase, place the cylinder head **(2)** onto it, slung with the brackets, Special Tool number **380001073 (1)**.



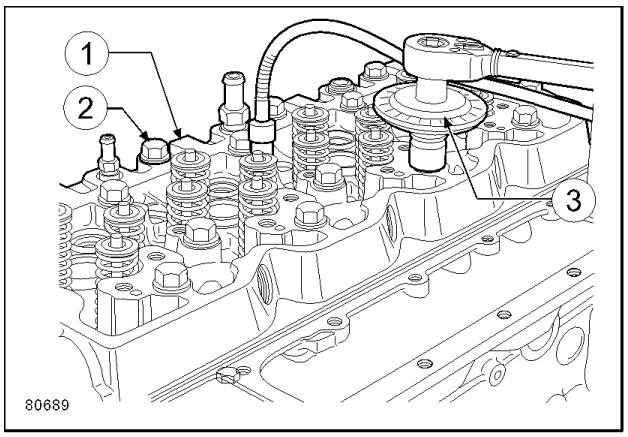
BAIL06CCM059ASA 3

6. Before reusing cylinder head retaining bolts, refer to **ENGINE - Dimension (B.10.A)**.

7. Insert cylinder head retaining bolt and tighten in sequence to specified torques, refer to **Cylinder head - Torque (B.10.A)** and **Cylinder head - Tighten (B.10.A)**.

NOTE: *Angle closing is performed using a suitable angle gauge on the wrench (3).*

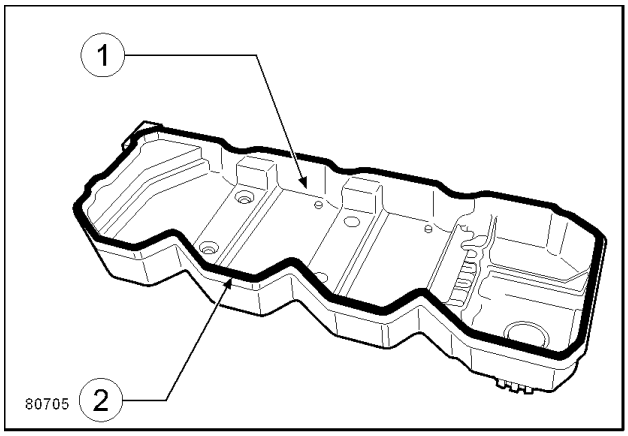
NOTE: *Before each assembly, always check that the threads of the holes and bolts show no signs of wear or traces of dirt.*



80689_91 4

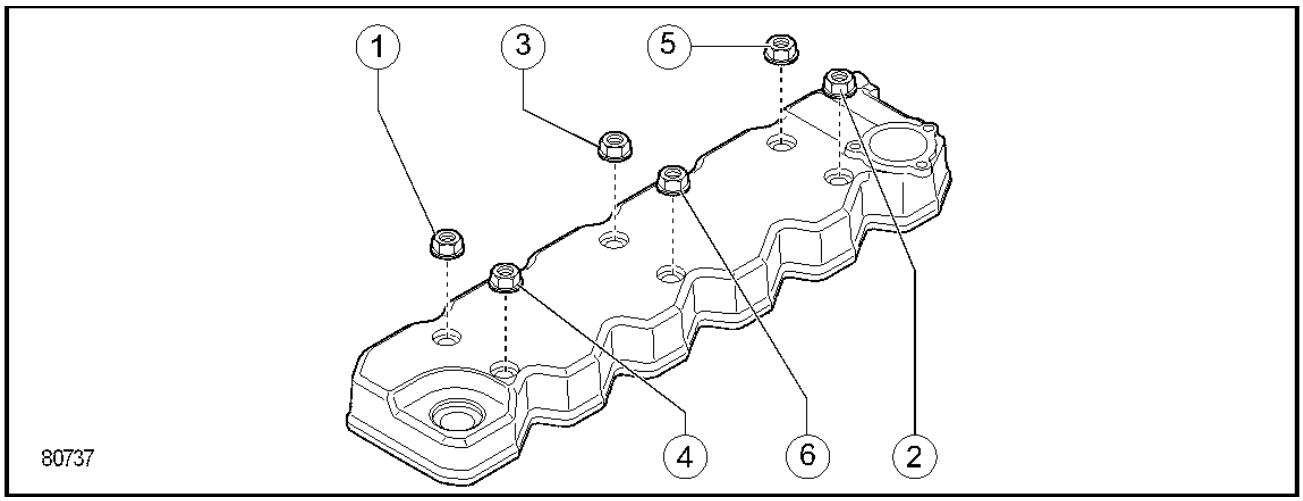
Valve cover - Install

1. Install a new gasket **(2)** on the rocker cover **(1)**.



80705 1

2. Locate the cover over the protruding studs . Screw on the nuts and tighten to **25 Nm +/- 5 Nm** (**18.44 lbft +/- 3.70 lbft**). Refer to Figure **2** for tightening sequence.



80737 2

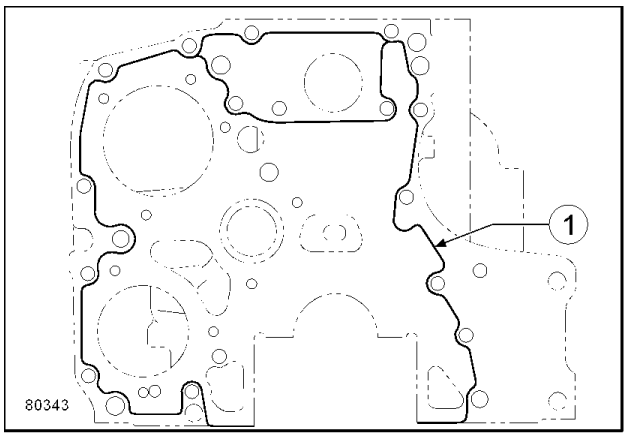
Rear cover - Install

Prior operation:
Timing gear - Timing adjust (B.10.A)

DIAGRAM OF ZONE FOR APPLYING LOCTITE 5205 SEALANT ON THE GEAR COVER

1. Carefully clean the timing gear cover and the crankcase.

NOTE: *Cleaning the surface to seal is both necessary and unavoidable in order to obtain an effective seal.*
Apply LOCTITE 5205 sealant onto the casing to form a bead (1) with a diameter of a few mm.
It must be uniform (no lumps), with no air bubbles, thin areas or breaks.
Any flaws must be corrected in as short a time as possible.
Avoid using excess material to seal the joint. Too much sealant would tend to come out on both sides of the joint and clog the lubricant passageways.
After applying the sealant, the joints require immediate assembly (10 — 20 minutes).

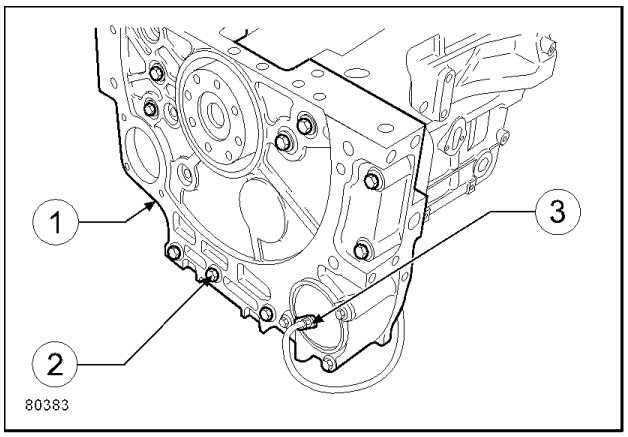


80343 1

TIGHTENING SEQUENCE FOR GEAR COVER BOLTS

2. Refit the cover **(1)** to the crankcase.
   Screw down the retaining bolts **(2)** in the position found during disassembly and tighten the bolts to the specified torque wrench settings, refer to **Rear cover - Torque (B.10.A)**.
   Refit the phase sensor **(3)** of the high-pressure pump.

NOTE: *Before each assembly, always check that the threads of the holes and bolts show no signs of wear or traces of dirt.*



80383 2

Next operation:
Water pump - Install (B.50.A)

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POWER PRODUCTION - B

FUEL AND INJECTION SYSTEM - 20.A

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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FUEL AND INJECTION SYSTEM - General specification

Description	
Fuel System	High Pressure, Common Rail
Injection	Bosch Control Unit EDC16C39
Nozzles	Electro-Injectors
Injection Firing order	1 - 5 - 3 - 6 - 2 - 4
Injection Pressure	**300 - 1800 bar** (**4350.0 - 26100.0 psi**)

Fuel injection pump - Torque Drive gear retaining nut

Description	
Nut retaining fuel pump drive gear	**100 Nm +/- 5** (**73.8 lbft +/- 4**)
Gear backlash	**0.076 - 0.368 mm**

Fuel injector Electro injector - Torque

Part	TORQUE Nm (lb ft)
Torque electro-injector retaining bolts.	
Step 1. Tighten both bolts to torque setting.	**3.5 Nm** (**2.6 lb ft**)
Step 2. Tighten both bolts to angle setting.	+ **75 ° +/- 5°**.

Fuel injector Fuel Manifold - Torque

Part	TORQUE Nm (lb ft)
Step 1. Tighten fuel manifold retaining nuts to torque setting.	**50 Nm +/- 5Nm** (**37 lb ft +/- 4 lb.ft.**).

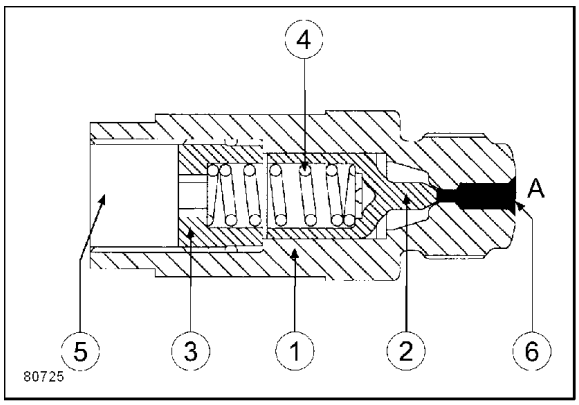
Electrical control - Torque

Part	Torque
Screws connecting injector connectors	**1.5 Nm** (**1.11 lb ft**)± **0.25 Nm** (**0.18 lb ft**).

Relief valve - Sectional view

Pressure Relief Valve on High Pressure Common Rail

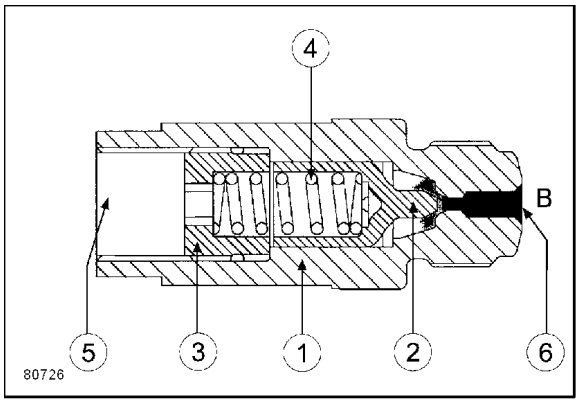
The pressure relief valve on the rail is used to protect the system components if there is too great an increase in the pressure in the high-pressure system.
When the rail pressure reaches **1800 bar** (**26100.00 psi**) , the valve trips to make the fuel flow off and lower the pressure within safe limits. The pressure is mechanically adjusted in the rail to approximately **800 bar** (**11602.9600 psi**).
In this way, the valve lets the engine operate for extended periods at limited performance, preventing the fuel from overheating and protecting the outlet piping.
If this valve trips, the control unit turns off the control of the pressure regulator . The valve will supply the maximum delivery to the rail.



80725 1

(A) Normally, the tapered end of the plunger keeps the outlet to the tank closed.

1. Body
2. Plunger
3. Stop
4. Spring
5. Outlet to tank
6. Seat on rail



80726 2

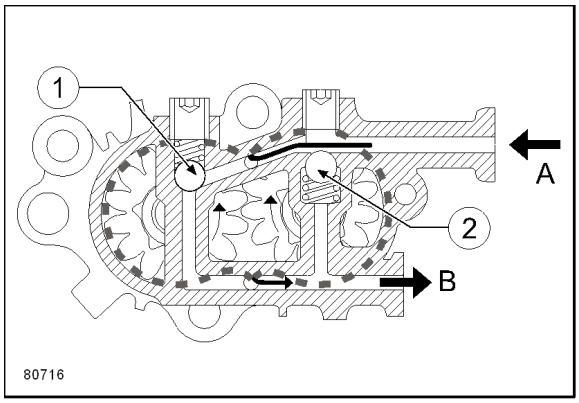
(B) If the pressure of **1800 bar** (**26100.00 psi**) of the fuel in the rail is exceeded, the plunger is shifted and the excess pressure is discharged into the tank.

Fuel injection pump - Dynamic description Fuel Supply Gear Pump.

The gear pump, mounted on the rear of the high-pressure pump, has the function of feeding the pump. It is governed by the shaft of the high-pressure pump.

Normal operating condition (Figure 1)

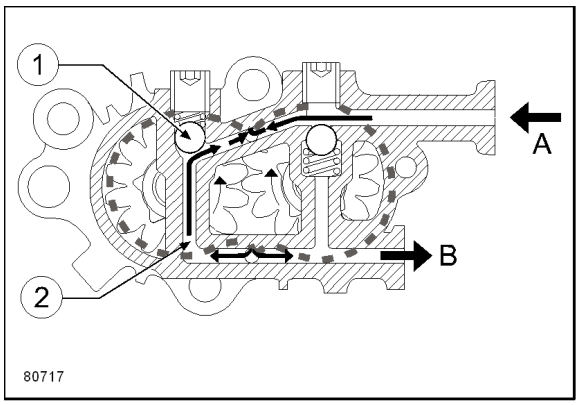
(A) Fuel inlet from the tank, **(B)** fuel outlet to the filter, **(1)** and **(2)**-By-pass valves in closed position.



80716 1

Condition of overpressure at outlet Figure 2)

The by-pass valve **(1)** trips when overpressure is generated at the outlet **(B)**. The pressure, overcoming the elastic resistance of the spring of the valve **(1)**, sets the outlet in communication with the inlet through the duct **(2)**.

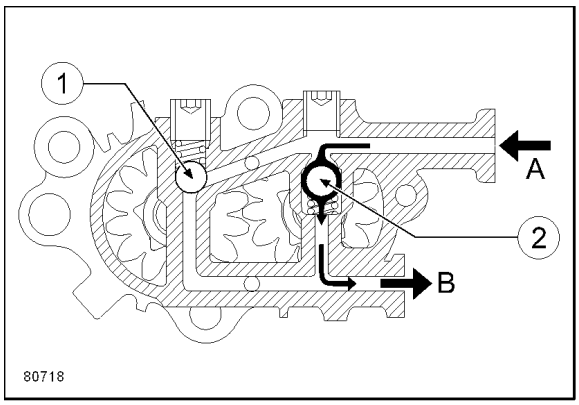


80717 2

Bleed conditions Figure 3)

The by-pass valve **(2)** trips when, with the engine switched off, you want to fill the feed system through the priming pump. In this situation, the by-pass valve **(1)** stays shut and the by-pass valve **(2)** opens due to the effect of the inlet pressure and the fuel flows out via outlet **(B)** .

NOTE: *The mechanical fuel supply pump cannot be replaced on its own; therefore it must not be removed from the high-pressure pump.*



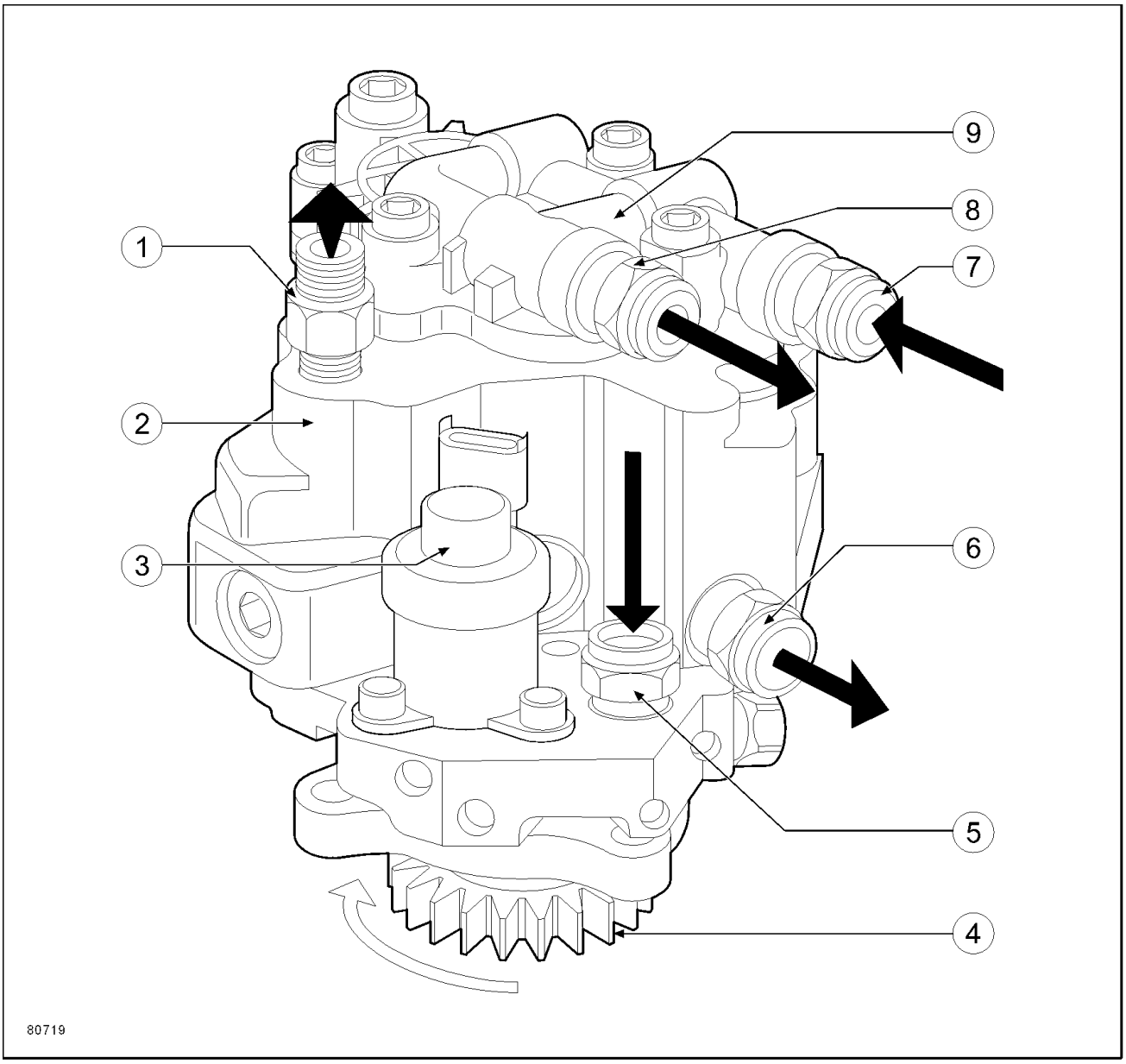
80718 3

For an overview of the High Pressure Pump CP3, refer to **Fuel injection pump - Overview (B.20.A)**.

Fuel injection pump - Overview High Pressure Pump CP3

For information on Fuel Supply Gear Pump, refer to **Fuel injection pump - Dynamic description (B.20.A)**. This pump with 3 radial pumping elements governed by the timing gear does not need timing. The mechanical fuel supply pump governed by the shaft of the high-pressure pump is mounted on the back of the pump.

NOTE: *The high-pressure / fuel supply pump assembly cannot be overhauled and therefore it must not be removed and the retaining bolts must not be tampered with. The only permissible action is to change the drive gear.*

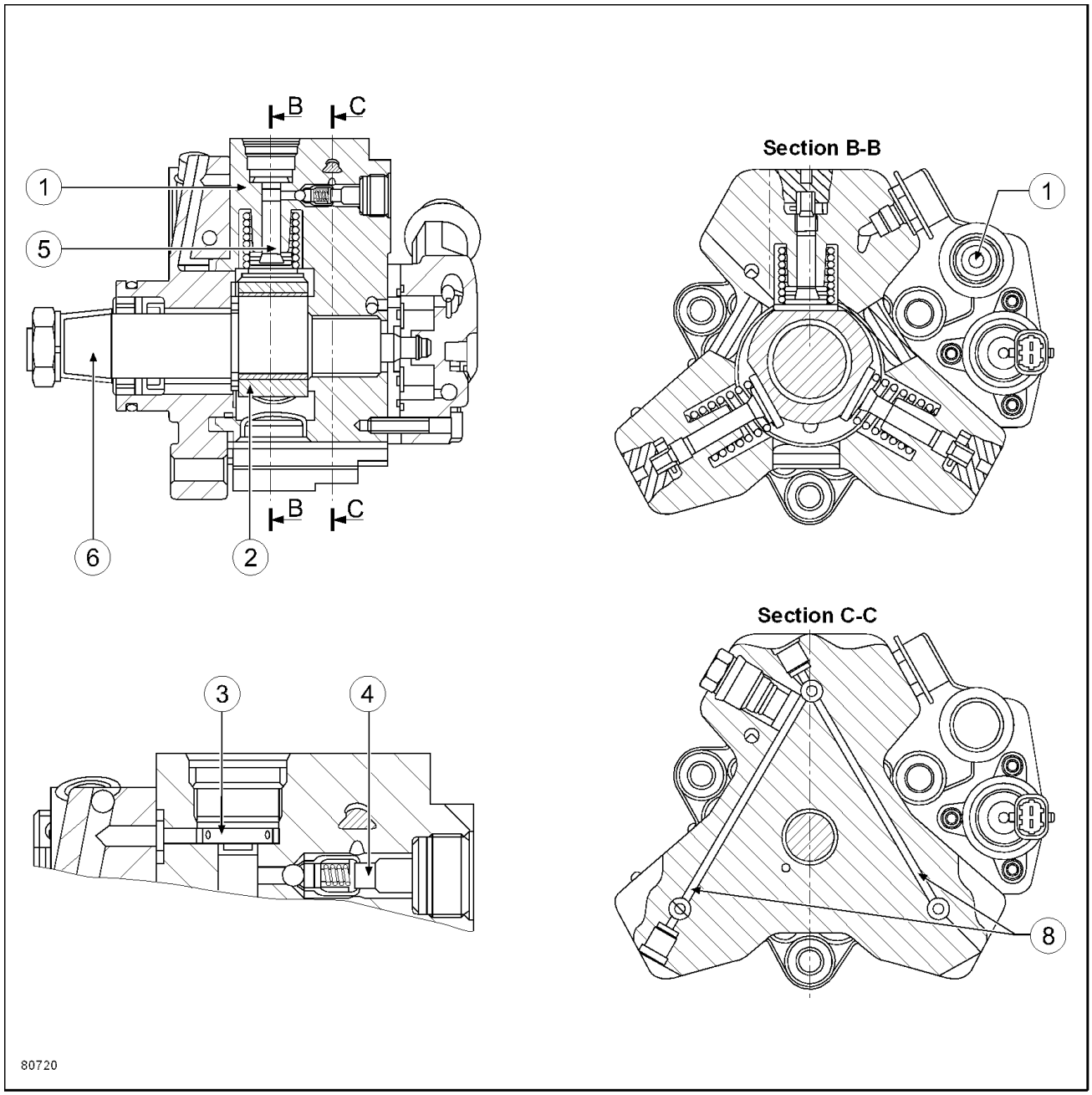


80719 1

1 Fuel outlet fitting to rail
2 High-pressure pump
3 Pressure regulator
4 Drive gear
5 Fuel filter inlet fitting from filter
6 Fuel outlet fitting to filter mounting
7 Fuel inlet fitting from the cooler of the pack
8 Fuel outlet fitting from the mechanical pump to the filter
9 Mechanical supply pump.

NOTE: *For sectional internal structure of High Pressure Pump, refer to* ***Fuel injection pump - Sectional view (B.20.A)****.*

Fuel injection pump - Sectional view High Pressure Pump Internal Structure



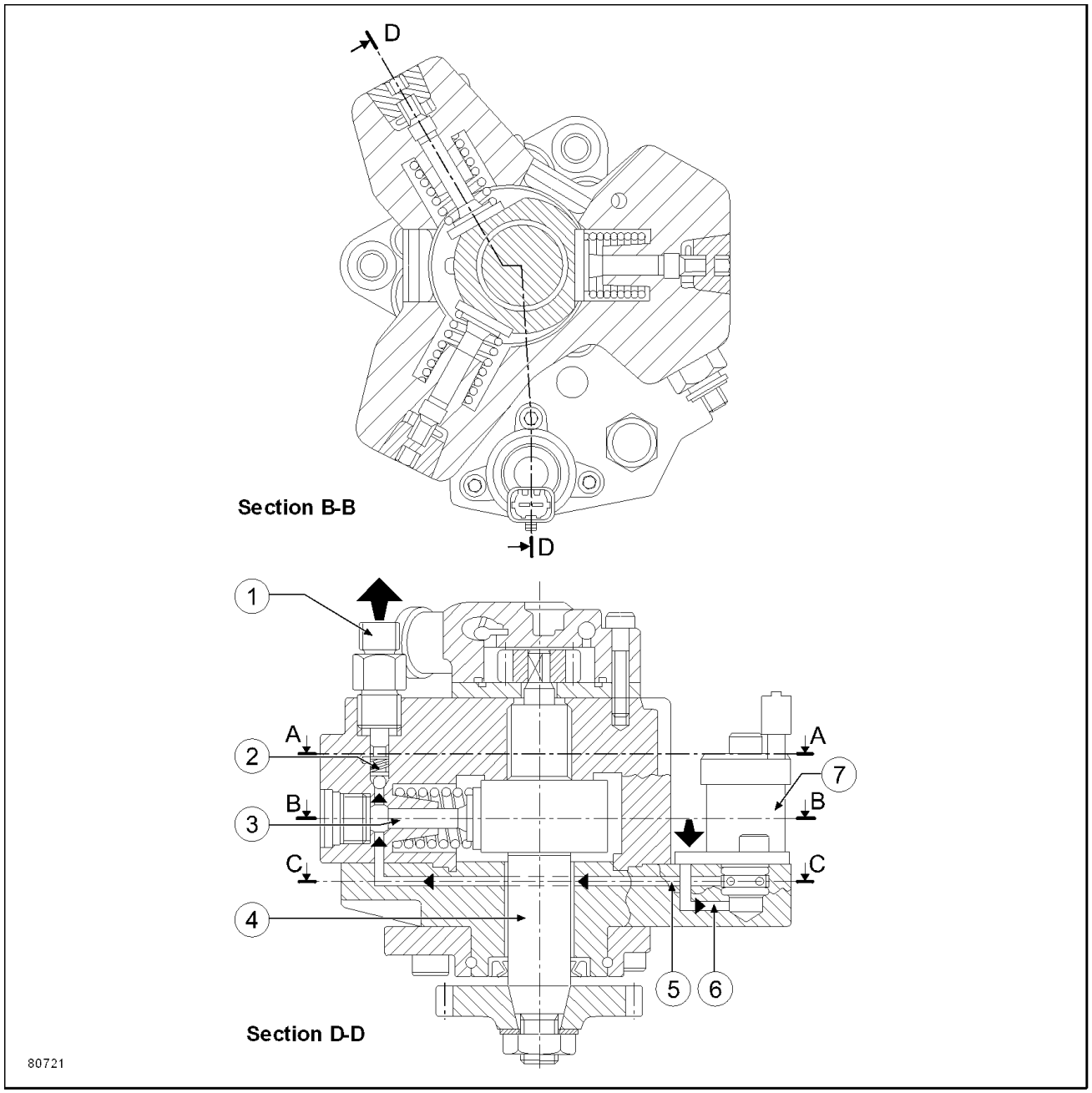
80720 1

1 Cylinder
2 Three-lobe element
3 Inlet cap valve
4 Delivery ball valve
5 Piston
6 Pump shaft
7 Low pressure fuel inlet
8 Fuel channels to supply pumping elements

Each pumping assembly comprises:

- a piston **(5)** operated by a three-lobe element **(2)** floating on the pump shaft **(6)**. Since the element **(2)** floats on a misaligned portion of the shaft **(6)**, when the shaft rotates it does not turn with it, but is only moved in a circular fashion on a wider radius, with the result of operating the three pumping elements alternately;
- an inlet cap valve **(3)**;
- a delivery ball valve **(4)**.

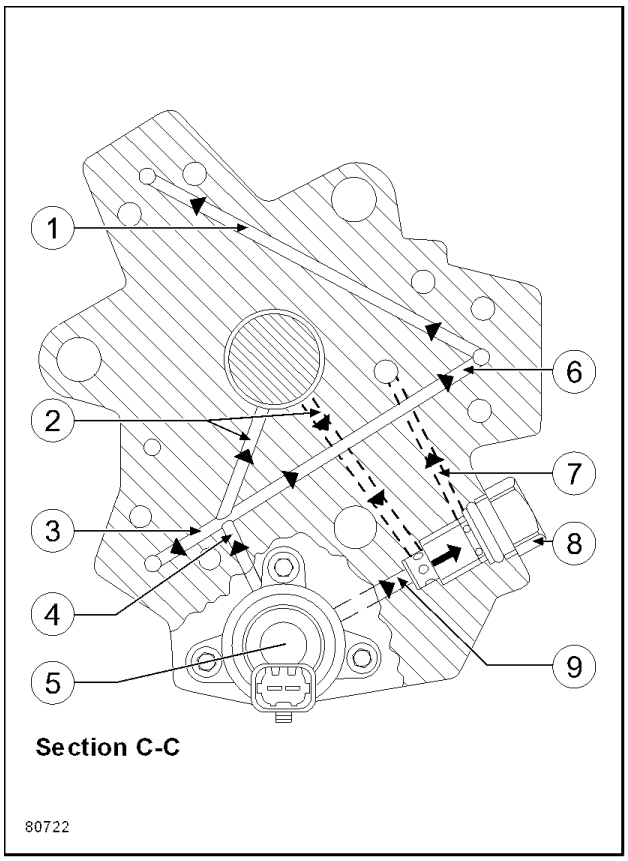
Operating principle



80721 2

1 Fuel outlet fitting to rail
2 Delivery valve to rail
3 Pumping element
4 Pump shaft
5 Pumping element supply pipe
6 Pressure regulator supply pipe
7 Pressure regulator

The pumping element **(3)** is oriented on the cam on the pump shaft **(4)**. In the inlet phase, the pumping element is fed through the supply pipe **(5)**. The amount of fuel to send to the pumping element is established by the pressure regulator **(7)**. The pressure regulator, on the base of the PWM control received from the control unit, chokes the flow of fuel to the pumping element. During the compression phase of the pumping element, the fuel, on reaching such a pressure as to open the delivery valve to the common rail **(2)**, supplies it through the outlet **(1)**.



80722 3

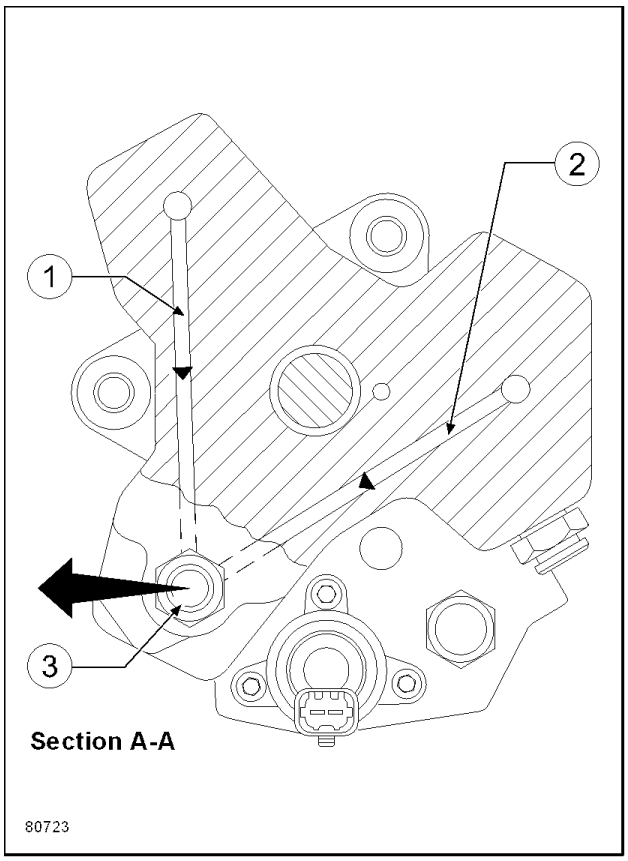
1. Inlet to the pumping element
2. Pump lubrication pipes
3. Inlet to the pumping element
4. Main pumping element supply pipe
5. Pressure regulator
6. Inlet to the pumping element
7. Regulator outlet pipe
8. **5 bar** (**72.5185 psi**) relief valve
9. Fuel outlet from regulator inlet

The low-pressure fuel lines in the pump are shown; the main supply pipe of the pumping elements **(4)**, the supply pipes of the pumping elements **(1)** - **(3)**- **(6)**, the pipes used to lubricate the pump **(2)**, the pressure regulator **(5)**, the **5 bar** (**72.5185 psi**) relief valve **(8)** and the fuel outlet **(7)** are shown.

The pump shaft is lubricated by the fuel through the delivery and return pipes **(2)**.

The pressure regulator **(5)** determines the amount of fuel with which to supply the pumping elements; the excess fuel flows out through the pipe **(9)**.

The **5 bar** (**72.5185 psi**) relief valve, besides acting as a manifold for the fuel outlets, has the function of keeping the pressure constant at the regulator inlet at **5 bar**(**72.5185 psi**).



80723 4

1. Fuel outlet pipe
2. Fuel outlet pipe
3. Fuel outlet from the pump with the high-pressure pipe fitting for the common rail.

The flow of fuel at high pressure through the pumping element outlet pipes is shown.

Operation

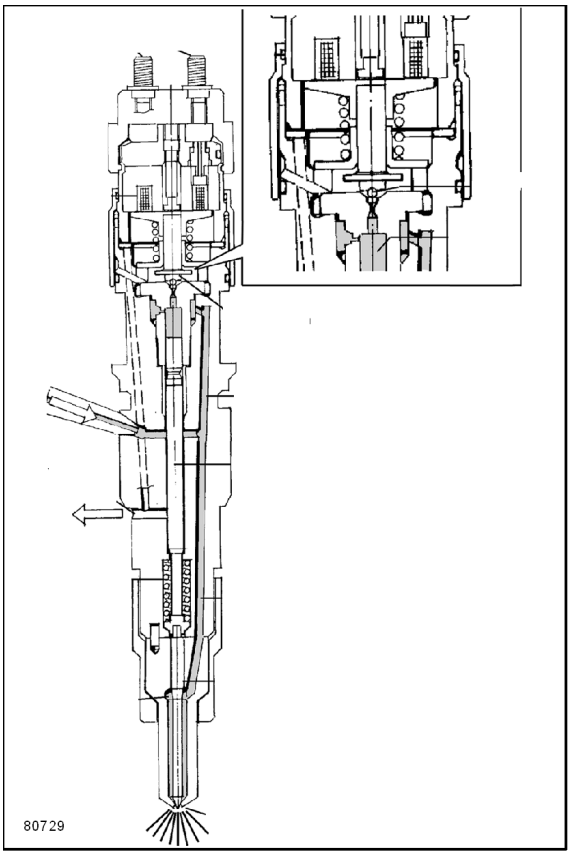
The cylinder is filled through the inlet cap valve only if the supply pressure is able to open the delivery valves on the pumping elements (approximately **2 bar** (**29.0074 psi**)).
The amount of fuel feeding the high-pressure pump is metered by the pressure regulator, located on the low-pressure system. The pressure regulator is governed by the EDC 7 control unit via a PWM signal.
When fuel is sent to the pumping element, the relevant piston is moving downwards (intake stroke). When the piston stroke reverses, the intake valve closes and the fuel left in the pumping element chamber, not being able to get out, is compressed above the level of the supply pressure in the rail.
The pressure generated in this way causes the exhaust valve to open and the compressed fuel reaches the high-pressure circuit.
The pumping element compresses the fuel to reach the top dead centre (delivery stroke). The pressure then decreases until the exhaust valve closes.
The plunger of the pumping element goes back towards the bottom dead centre and the remaining fuel decompresses.
When the pressure in the chamber of the pumping element becomes less than the supply pressure, the intake valve opens again and the cycle is repeated.
The delivery valves must always be free to move, with no debris or oxidation.
The delivery pressure to the rail is modulated between **250 - 1350 bar** (**3625.9250 - 19579.9950 psi**) by the electronic control unit via the solenoid valve of the pressure regulator.
The pump is lubricated and cooled by the fuel itself.
The time for removing - installing the radial jet pump on the engine is considerably shorter than for conventional injection pumps as it does not need timing.
If disassembling - reassembling the piping between the fuel filter and the high-pressure pump, make sure your hands and the components are clean.

Fuel injector Electro injector - Sectional view

The construction of the injector is similar to that of conventional ones, except that there are no needle return springs. The electro-injector can be considered to comprise two parts:

- actuator - nozzle composed of a pressure rod, needle and nozzle;
- control solenoid valve composed of coil and pilot valve.

The solenoid valve controls the lift of the needle of the nozzle.

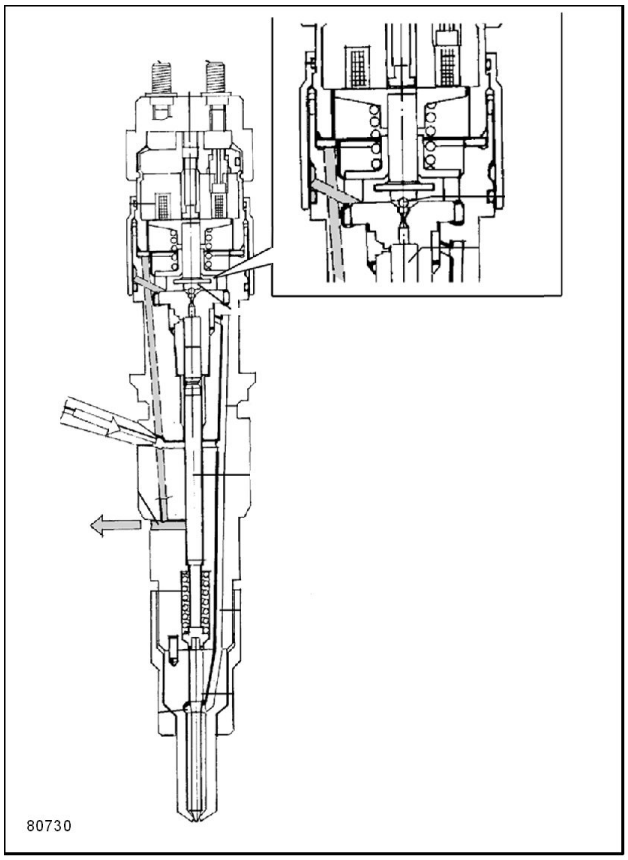


80729 1

Fuel injector Electro injector - Dynamic description

Injection Start

When the coil is energized, it causes the shutter to move upwards. The fuel of the control volume flows out towards the backflow pipe, causing a drop in pressure in the control volume. At the same time, the pressure of the fuel in the pressure chamber causes the needle to rise, with fuel getting injected into the cylinder as a result.



80730 1

Injection End

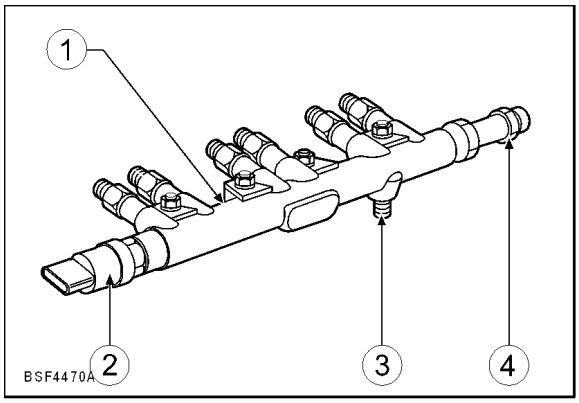
When the coil is de-energized, the shutter goes back into its closed position to form such a balance of forces as to make the needle go back into its closed position and end injection.

NOTE: *The electro-injector cannot be overhauled and therefore must not be removed.*

High pressure common rail Common rail - Overview

Rail (Pressure Accumulator)

The rail volume is smaller to permit fast pressurization when starting, at slow idling and when there are high flow rates. However, its volume is sufficient to minimize the phenomena caused by the injectors opening and closing and the pump working at high pressure. This function is helped further by a calibrated orifice downstream from the high-pressure pump.
Screwed onto the rail there is a fuel pressure sensor **(3)**. The signal sent from this sensor to the electronic control unit is feedback on the basis of which the level of pressure in the rail is checked and, if necessary, corrected.



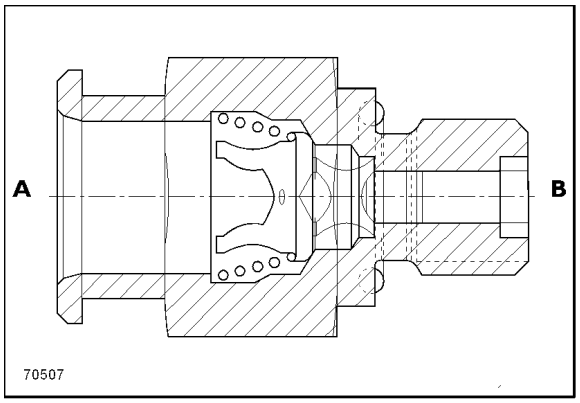
BSF4470A 1

1. Rail
2. Fuel inlet from the high-pressure pump
3. Pressure sensor
3. Pressure sensor

Regulator valve Injection return - Static description

Fuel Return Pressure Limiter

Housed on the back of the cylinder head, it governs the pressure of the fuel returning from the injectors at a pressure of between **1.3 - 2 bar** (**18.8548 - 29.0074 psi**). By ensuring this pressure for the return fuel, no fuel vapours form in the electro-injectors, optimizing the spray of fuel and its combustion.



70507 1

A. To the tank

B. From the electro-injectors

Fuel tank - Remove

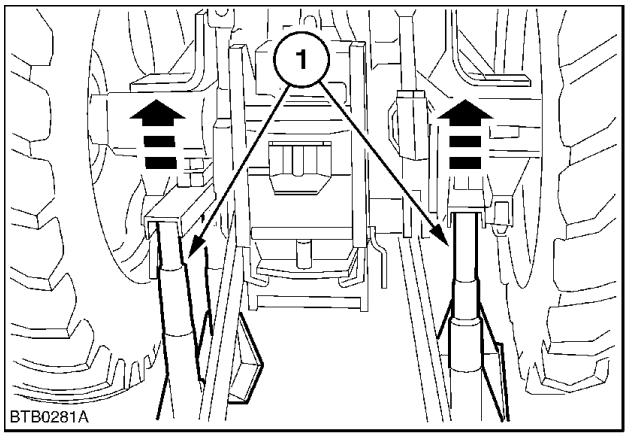
Prior operation:
Remove the battery, for additional information refer to **Battery - Remove (A.30.A)**.

1. Drain the fuel tank into a suitably sized fuel container.

NOTE: *It is recommended that the fuel tank is drained prior to removal from the tractor. Drainage points are provided.*

2. Raise the rear of the tractor and place two suitable axle stands **(1)** under the final drive cases.

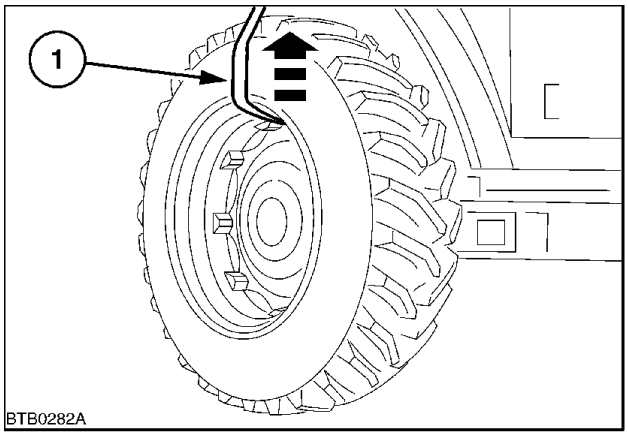
NOTE: *If required, detach the lift rods from the lower links.*



BTB0281A 1

3. Using a suitable sling **(1)**, connect the rear right-hand wheel to a hoist and remove the rear right-hand wheel.

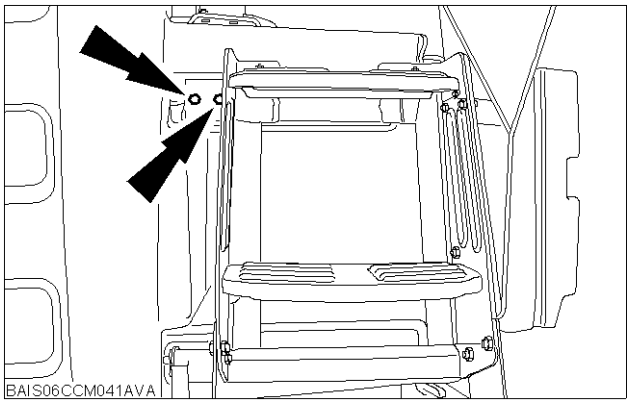
NOTE: *Repeat this step for the rear left-hand wheel.*



BTB0282A 2

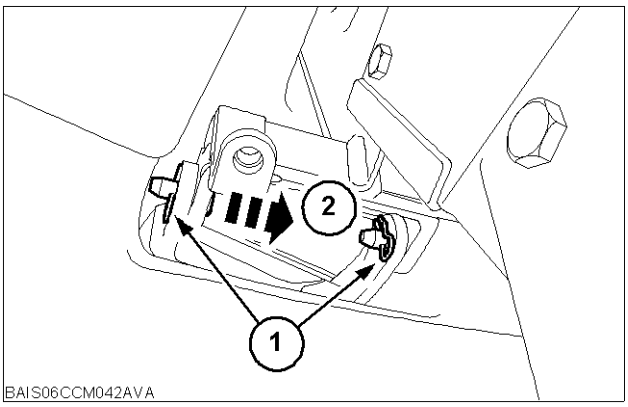
Left-hand Side Fuel Tank

4. Remove the left-hand side steps upper retaining bolts.



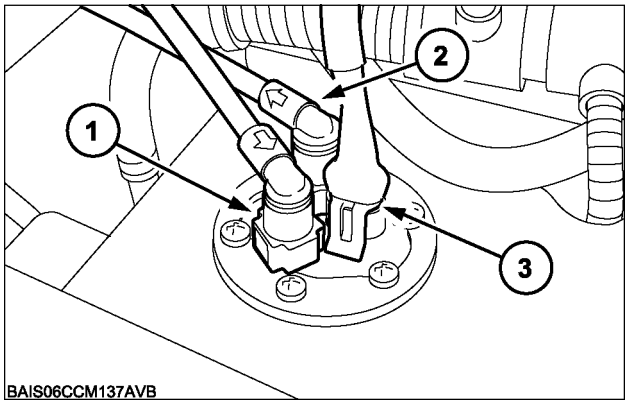
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5. Remove the R-clips **(1)** and remove the left-hand side steps **(2)**.



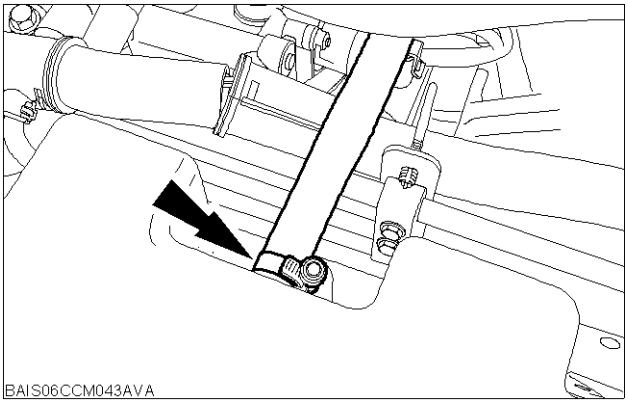
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6. Disconnect the fuel tank return line **(1)**, fuel tank supply line **(2)** and the fuel tank sender unit electrical connector **(3)**.



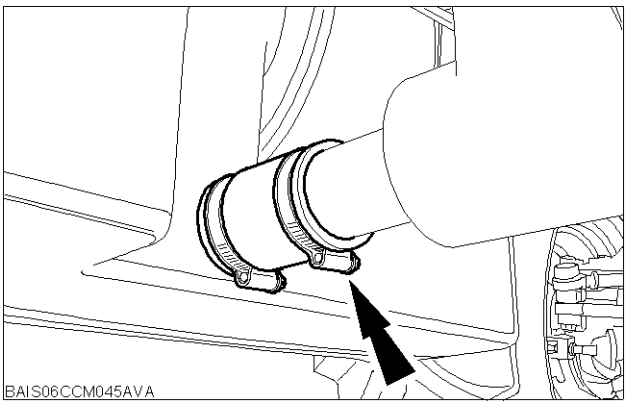
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7. Disconnect the fuel tank breather hose.



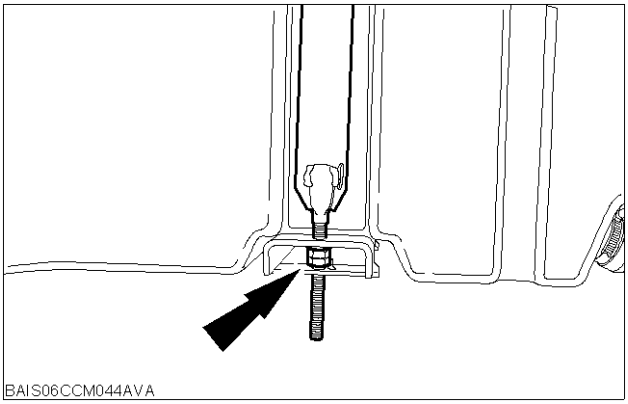
BAIS06CCM043AVA 6

8. Disconnect the fuel tank balance pipe



BAIS06CCM045AVA 7

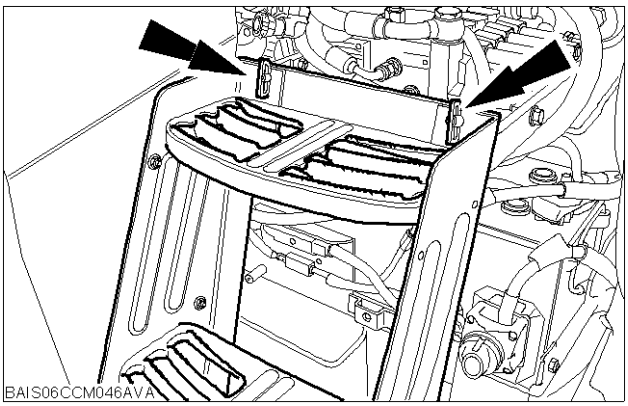
9. Remove the fuel tank retaining strap and with the aid of an assistant or trolley jack remove the left-hand side fuel tank.



BAIS06CCM044AVA 8

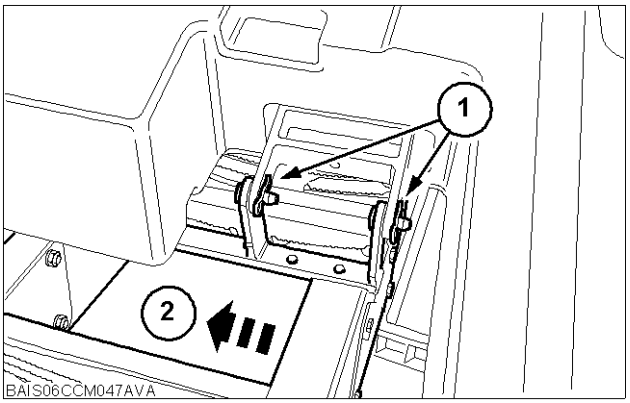
Right-hand Side Fuel Tank

10. Release the retaining clips and position the right-hand side steps to the lower position.



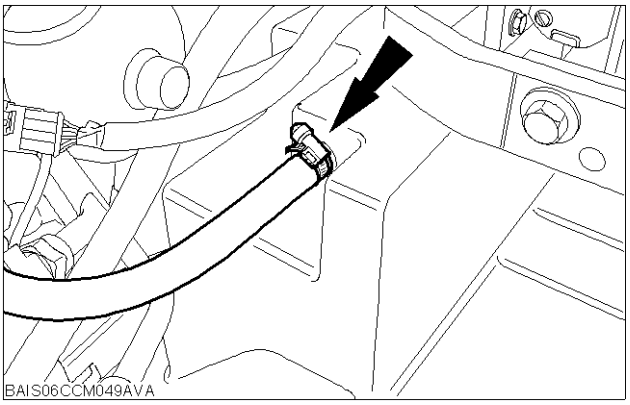
BAIS06CCM046AVA 9

11. Remove the R-clips **(1)** and remove the right-hand side steps **(2)**.



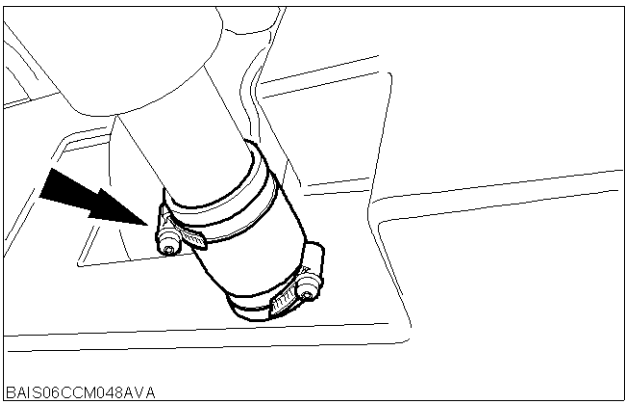
BAIS06CCM047AVA 10

12. Disconnect the fuel tank breather hose.



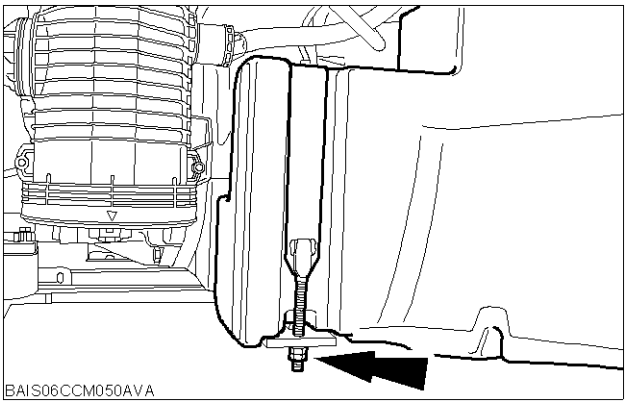
BAIS06CCM049AVA 11

13. Disconnect the fuel tank balance pipe.



BAIS06CCM048AVA 12

14. Remove the fuel tank retaining strap and with the aid of an assistant or trolley jack remove the right-hand side fuel tank.

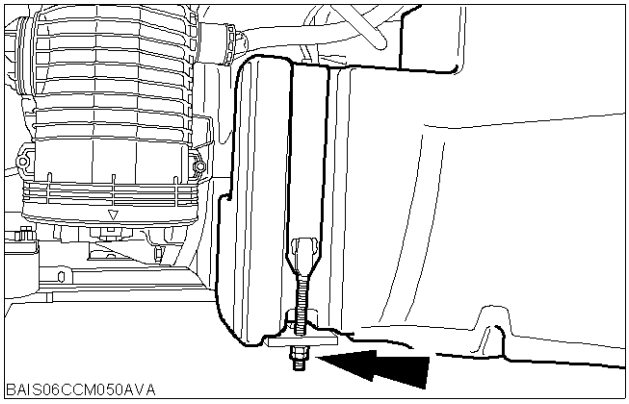


BAIS06CCM050AVA 13

Fuel tank - Install

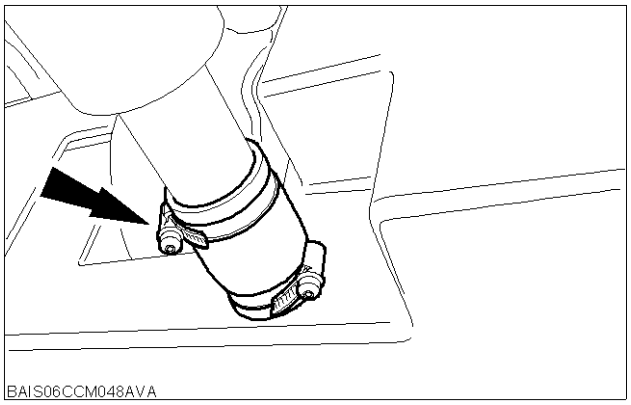
Right-hand Side Fuel Tank

1. Install the right-hand side fuel tank and install the fuel tank retaining strap.



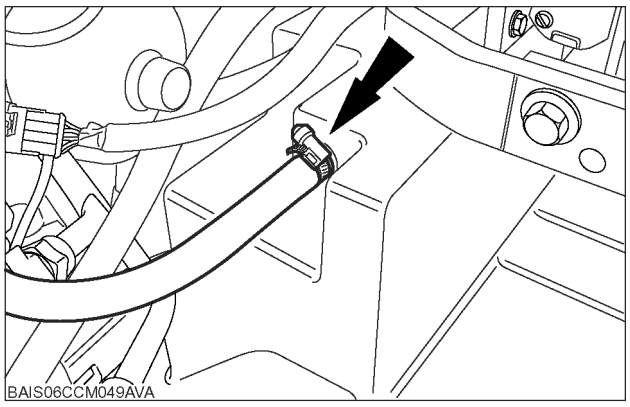
BAIS06CCM050AVA 1

2. Connect the fuel tank balance pipe



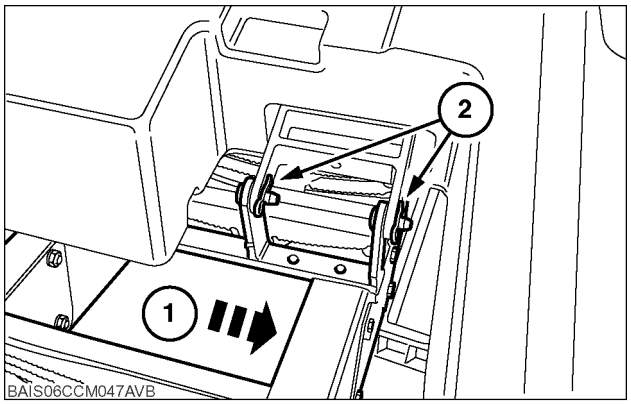
BAIS06CCM048AVA 2

3. Connect the fuel tank breather hose.



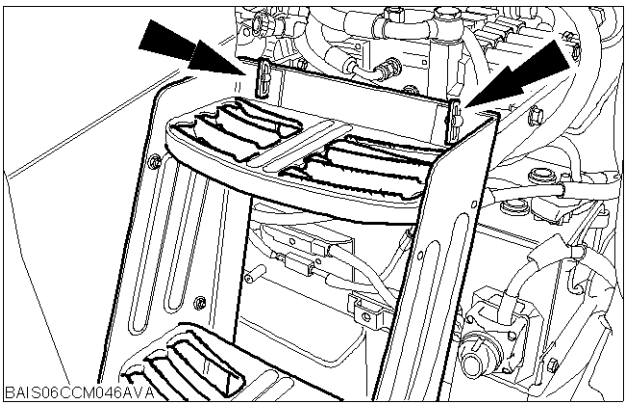
BAIS06CCM049AVA 3

4. Install the right-hand side steps **(1)** and install the R-clips **(2)**.



BAIS06CCM047AVB 4

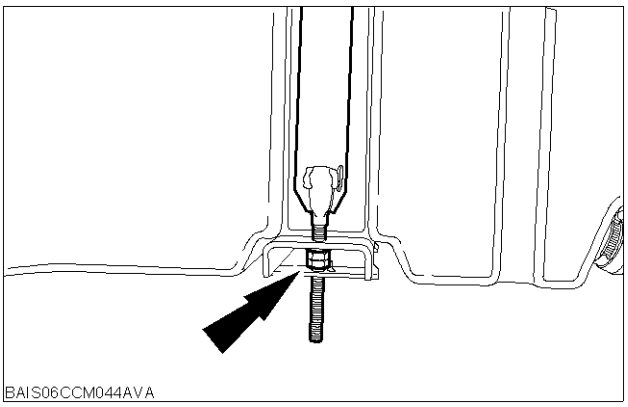
5. Position the right-hand side steps to the upper position and secure the retaining clips.



BAIS06CCM046AVA 5

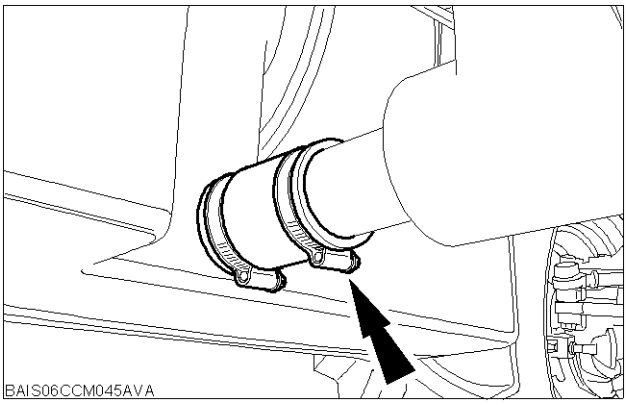
Left-hand Side Fuel Tank

6. Install the left-hand side fuel tank and install the fuel tank retaining strap.



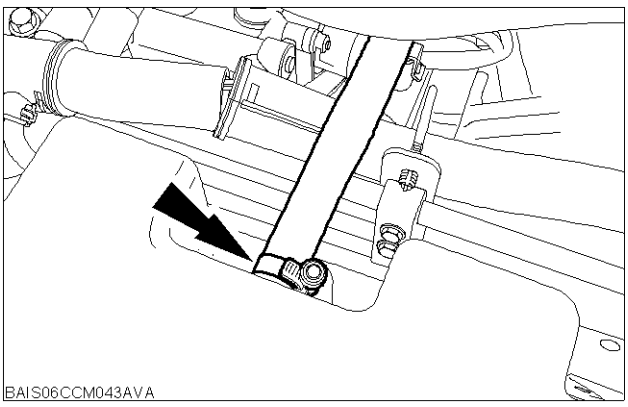
BAIS06CCM044AVA 6

7. Connect the fuel tank balance pipe.



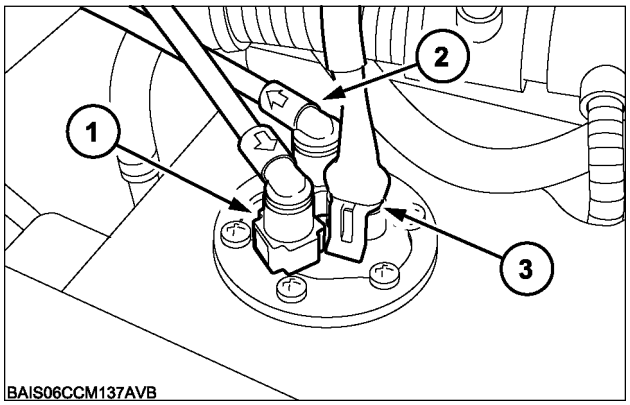
BAIS06CCM045AVA 7

8. Connect the fuel tank breather hose.



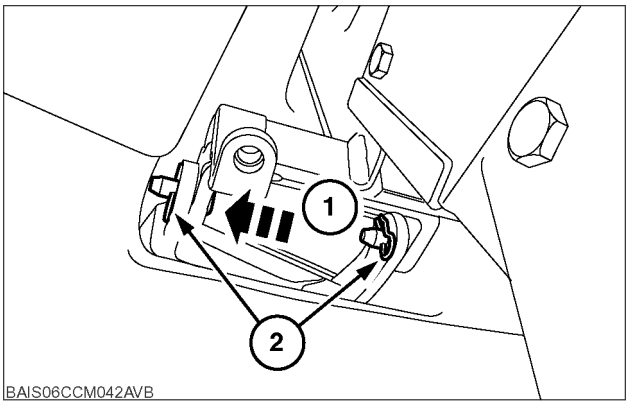
BAIS06CCM043AVA 8

9. Connect the fuel tank return line **(1)**, fuel tank supply line **(2)** and the fuel tank sender unit electrical connector **(3)**.



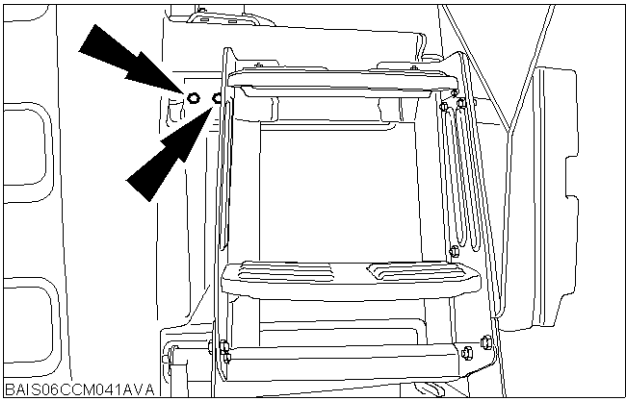
BAIS06CCM137AVB 9

10. Install the left-hand side steps **(1)** and install the R-clips **(2)**.



BAIS06CCM042AVB 10

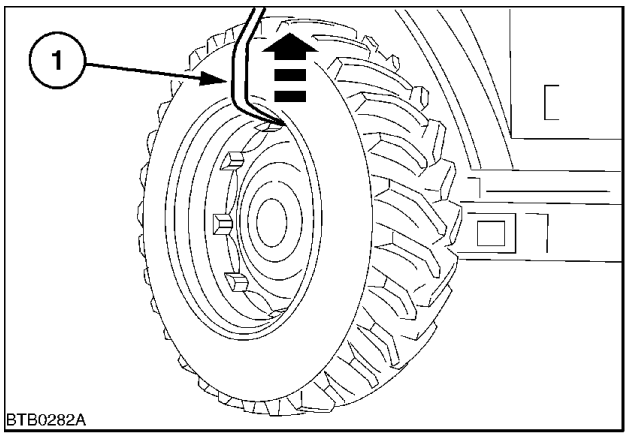
11. Install the left-hand side steps upper retaining bolts.



BAIS06CCM041AVA 11

12. Using a suitable sling **(1)**, connect the rear right-hand wheel to a hoist and install the rear right-hand wheel. For correct torque refer to **Rear wheel - Torque (D.50.C)**.

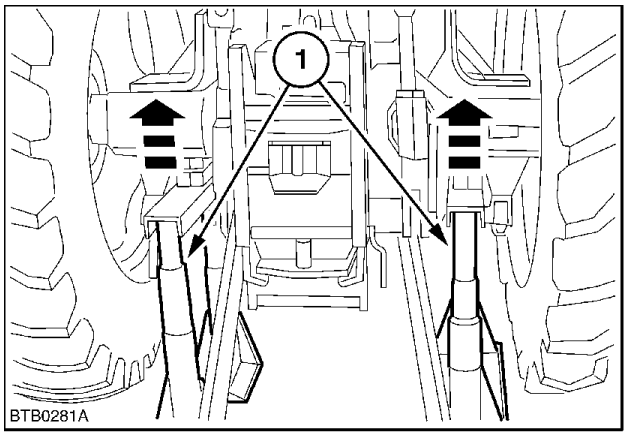
NOTE: *Repeat this step for the rear left-hand wheel.*



BTB0282A 12

13. Raise the rear of the tractor and remove the axle stands **(1)**.

NOTE: *If required, attach the lift rods to the lower links.*



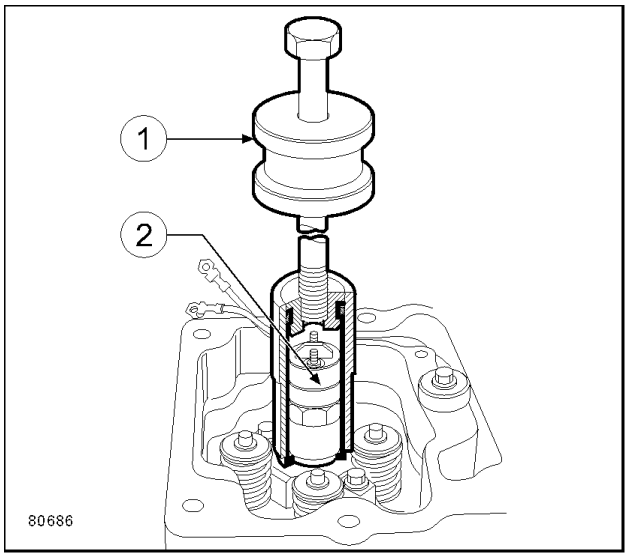
BTB0281A 13

Next operation:
Install the battery, for additional information refer to **Battery - Install (A.30.A)**.

Fuel injector Electro injector - Remove

Prior operation:
Valve drive Rocker assembly - Disassemble (B.10.A)

1. Remove the screws securing the electro-injectors and using tool **380001099 (1)**, extract the electro-injectors **(2)** from the cylinder head.



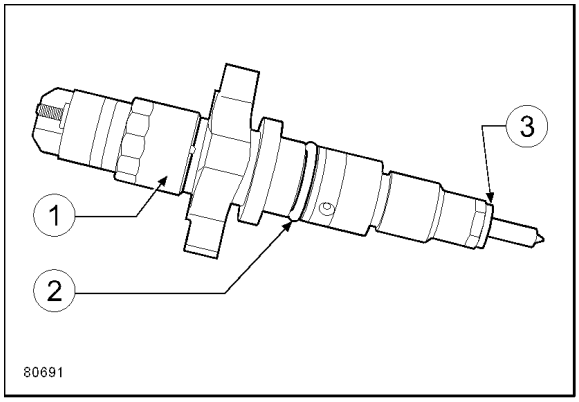
80686 1

Next operation:
Fuel injector Electro injector - Overhaul (B.20.A)

Fuel injector Electro injector - Overhaul

Prior operation:
Fuel injector Electro injector - Remove (B.20.A)

1. On the electro-injector **(1)**, mount a new seal **(2)**, lubricated with petroleum jelly and a new washer **(3)**.

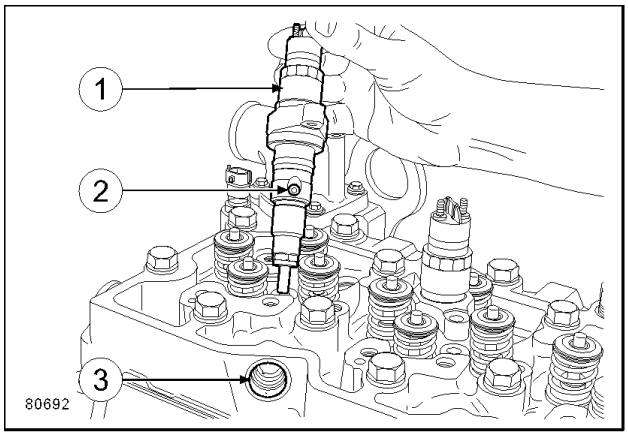


80691 1

Next operation:
Fuel injector Electro injector - Install (B.20.A).

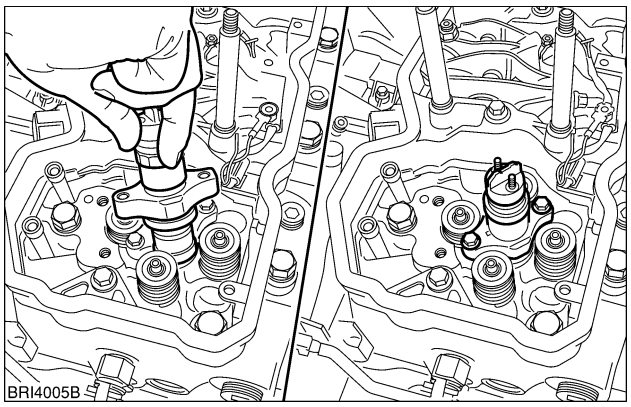
Fuel injector Electro injector - Install

1. Fit the electro-injectors **(1)** in the seats on the cylinder head, directed so that the fuel inlet orifice **(2)** faces the fuel manifold seat side **(3)**.



80692 1

2. Insert electro-injector firmly into the seat of the cylinder head.
   Screw down the electro-injector retaining bolts without tightening them.



BAIL06CCM068ASA 2

Next operation:
Fuel injector Fuel Manifold - Install (B.20.A)

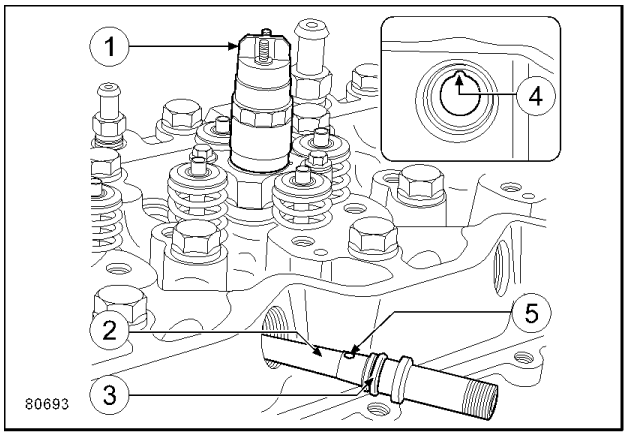
Fuel injector Fuel Manifold - Install

Prior operation:
Fuel injector Electro injector - Install (B.20.A).

1. Mount a new seal **(3)**, lubricated with petroleum jelly, on the fuel manifold **(2)** and insert it into the cylinder head seat so that the positioning ball **(5)** coincides with the relevant housing **(4)**.
   Screw down the electro-injector retaining bolts without locking them.

NOTE: *Once removed, the fuel manifolds **(2)** must not be reused; they MUST be replaced with new ones.*

NOTE: *During this operation, manoeuvre the electro-injector **(1)** so that its fuel inlet orifice correctly receives the manifold **(2)**,*



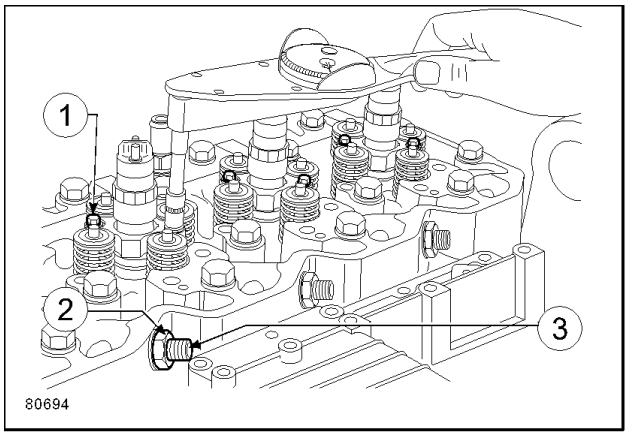
80693 1

Next operation:
Fuel injector Fuel Manifold - Tighten (B.20.A).

Fuel injector Electro injector - Tighten

Prior operation:
Fuel injector Fuel Manifold - Install (B.20.A), **Fuel injector Electro injector - Install (B.20.A)**.

1. Using a torque wrench, gradually and alternately tighten the electro-injector retaining bolts **(1)** to a torque of **Fuel injector Electro injector - Torque (B.20.A)**.



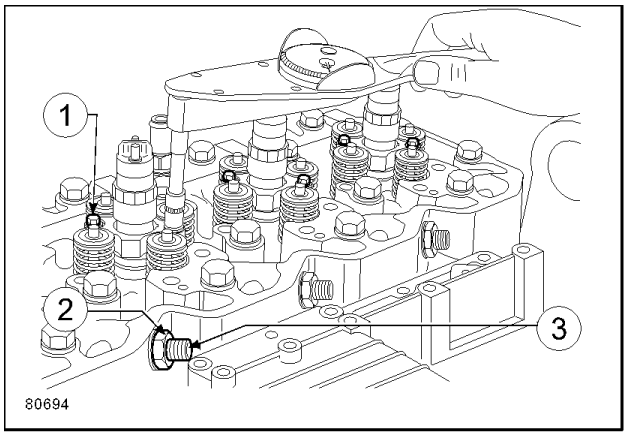
80694 1

Next operation:
Valve drive Rocker assembly - Install (B.10.A)

Fuel injector Fuel Manifold - Tighten

Prior operation:
Fuel injector Fuel Manifold - Install (B.20.A), **Fuel injector Electro injector - Install (B.20.A)**.

1. Tighten the fuel manifold **(3)** retaining nuts **(2)** to a torque of **Fuel injector Fuel Manifold - Torque (B.20.A)**.

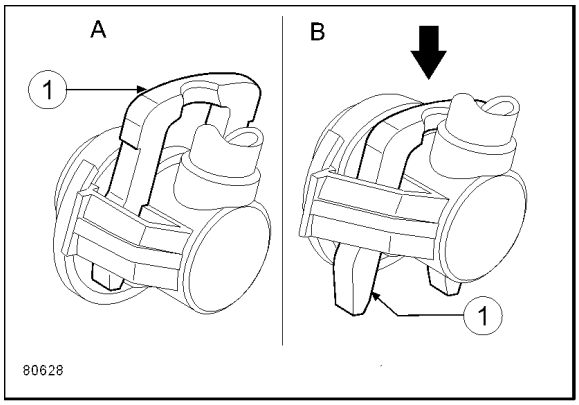


80694 1

Next operation:
Valve drive Rocker assembly - Install (B.10.A)

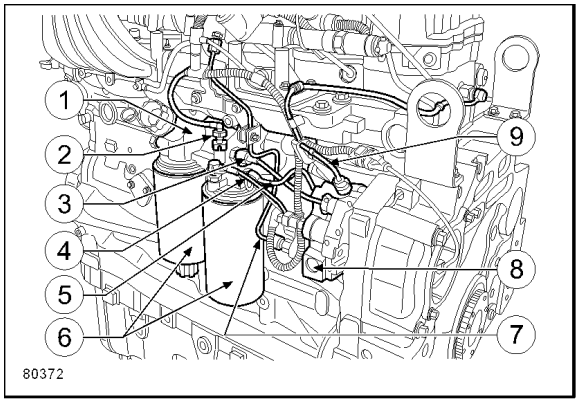
Fuel line - Disconnect

NOTE: *To disconnect the fuel pipes* ***(3) — (4) — (5)****, Figure from the relevant fittings, you need to press the clip* ***(1)*** *as shown in Figure* ***(B)****.*
After disconnecting the piping, put the clip ***(1)*** *back in its locking position Figure* ***(A)*** *to prevent it getting buckled.*



80628 1

1. Disconnect the fuel pipes **(3)** - **(4)** - **(5)** from the mounting **(1)**;
   Remove the bracket supporting the mounting **(1)** from the crankcase.



80372 2

2. Disconnect the high-pressure fuel pipe (**(7)**, Figure) from the rail choke tube and from the high-pressure pump **(8)** and remove it from the crankcase by taking out the bracket.
   Disconnect the pipe **(9)** from the high-pressure pump **(8)**.

NOTE: *Depending on the high pressure in the piping from the high-pressure pump to the rail and from here to the electro-injectors, never:*
- disconnect the pipes with the engine running,
- reuse disconnected pipes.

⚠ WARNING ⚠

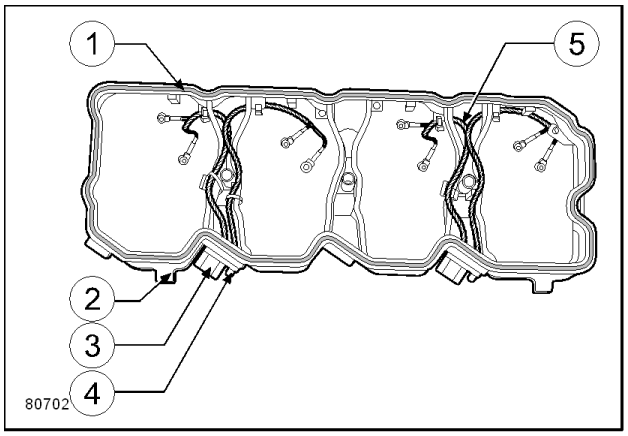
Do not open the high-pressure fuel system or loosen any fittings with the engine running. Engine operation causes high fuel pressure. High-pressure fuel spray can cause serious injury or death.

M1002

Electrical control - Check

1. Check the condition of the electric cables **(5)** and change them if they are damaged, cutting the clamps fastening them to the support **(2)** and taking out the screws **(4)** securing it with the connectors **(3)**.
   Fit a new gasket **(1)** onto the support **(2)**.

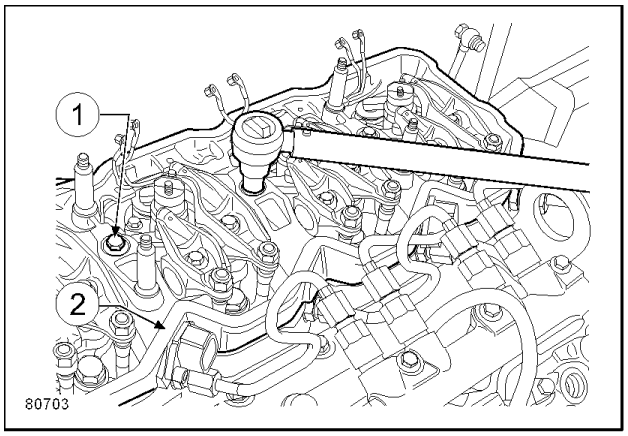
NOTE: *(4 Cylinder shown for illustration purposes)*



80702 1

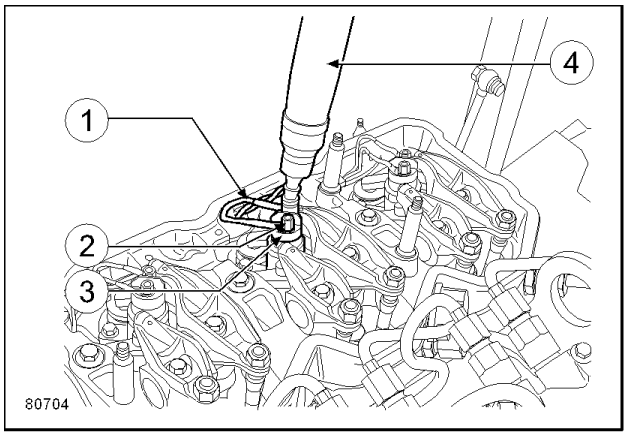
2. Mount the wiring support **(2)**, screw down the bolts **(1)** and tighten them to the prescribed torque.

NOTE: *Before each assembly, always check that the threads of the holes and bolts show no signs of wear or traces of dirt.*



80703 2

3. Connect the electric cables **(1)** to the electro-injectors **(3)** and using the torque wrench **380000158** tighten the retaining nuts **(2)** to the prescribed torque.



80704 3

Next operation:
Valve cover - Install (B.10.A)

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POWER PRODUCTION - B

FUEL AND INJECTION SYSTEM - 20.A

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Electrical control - Torque 7
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Fuel injection pump - Dynamic description Fuel Supply Gear Pump. 9
Fuel injection pump - Overview High Pressure Pump CP3 11
Fuel injection pump - Sectional view High Pressure Pump Internal Structure 12
Fuel injection pump - Torque Drive gear retaining nut 5
Fuel injector Electro injector - Dynamic description 17
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Fuel injector Electro injector - Overhaul 29
Fuel injector Electro injector - Remove 28
Fuel injector Electro injector - Sectional view 16
Fuel injector Electro injector - Tighten 32
Fuel injector Electro injector - Torque 6
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POWER PRODUCTION - B

AIR INTAKE SYSTEM - 30.A

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

Contents

POWER PRODUCTION - B

AIR INTAKE SYSTEM - 30.A

TECHNICAL DATA
Turbocharger
Torque 3

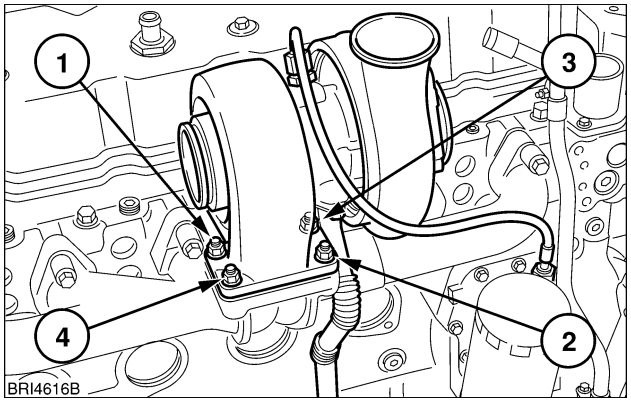
SERVICE
Turbocharger
Tighten - Sequence. 4
Remove 5
Install 6

Turbocharger - Torque

Part	TORQUE Nm (lb ft)
Turbocharger/exhaust manifold retaining nuts M8 x 1,25	**20 - 30 Nm** (**14.75 - 22.13 lbft**)

Turbocharger - Tighten - Sequence.

1. Tightening sequence for turbocharger retaining nuts.



BAIL07CCM261ASA 1

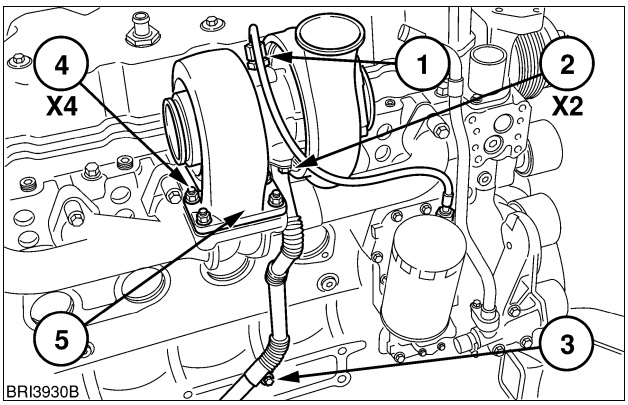
For the required torque settings, refer to Turbocharger - Torque (B.30.A)

Turbocharger - Remove

Prior operation:
Battery - Disconnect (A.30.A) Air cleaner - Remove (B.30.A) Silencer - Remove (B.40.A)

Procedure to remove the turbocharger:

1. Unscrew and remove the flexible lubrication piping **(1)** of the turbocharger **(5)** .
2. Unscrew and remove bolt **(3)** retaining lubrication return pipe to crankcase.
3. Unscrew and remove turbocharger to exhaust manifold retaining nuts **(4)** and lubrication pipe securing bolts **(2)**.
4. Supporting the turbocharger, lift from exhaust manifold and remove gasket.



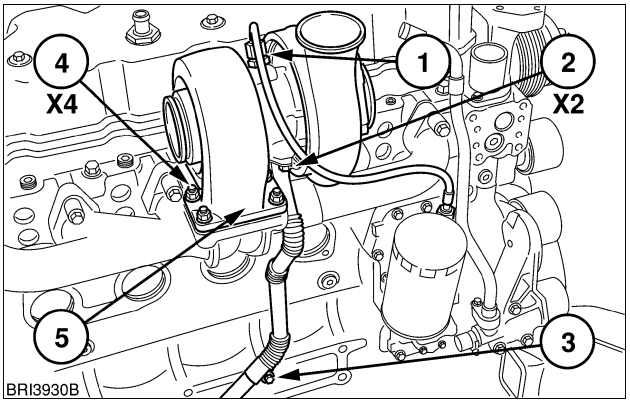
BAIL06CCM058ASA 1

Next operation:
Exhaust manifold - Remove (B.40.A), **Turbocharger - Install (B.30.A)**.

Turbocharger - Install

Prior operation:
Turbocharger - Remove (B.30.A), **Exhaust manifold - Install (B.40.A)**

1. Prior to installation of turbocharger **(5)** to exhaust manifold, position new turbocharger to exhaust manifold gasket.
2. Connect lubrication oil return pipe to underside of turbocharger, securing into position with bolts (x 2) **(2)**.
3. Position turbocharger and retain with securing nuts **(4)** (x 4) to the specified torque. Refer to **Turbocharger - Torque (B.30.A)** and **Turbocharger - Tighten (B.30.A)**.
4. Connect lubrication oil return pipe into crankcase and retain into position with clamp and bolt **(3)**.
5. Connect the flexible lubrication oil pipe **(1)** from the oil filter/cooler



BAIL06CCM058ASA 1

Next operation:
Silencer - Install (B.40.A)

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POWER PRODUCTION - B

AIR INTAKE SYSTEM - 30.A

Turbocharger - Install 6
Turbocharger - Remove 5
Turbocharger - Tighten - Sequence. 4
Turbocharger - Torque 3

POWER PRODUCTION - B

EXHAUST SYSTEM - 40.A

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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POWER PRODUCTION - B

EXHAUST SYSTEM - 40.A

TECHNICAL DATA
Exhaust manifold
Torque 3

FUNCTIONAL DATA
Engine brake
Static description 4
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

SERVICE
Silencer
Remove 6
Install 7
Exhaust manifold
Tighten - Sequence. 9
Remove 10
Install 11

Exhaust manifold - Torque

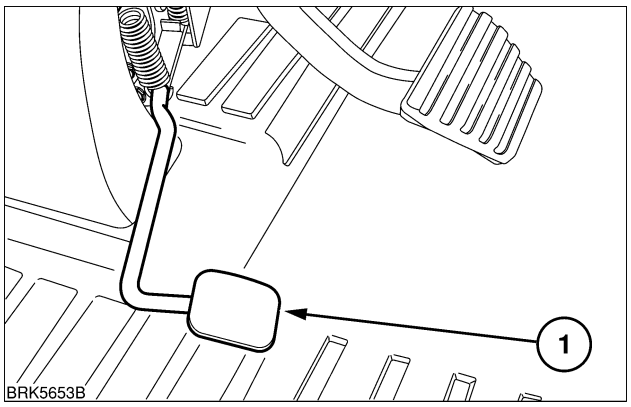
Part	TORQUE Nm (lb ft)
Bolts securing exhaust manifold on head. M10 x 1,50 x 65	**53 Nm +/- 5 Nm** (**39.1 lb ft +/- 4 lb ft**)

Engine brake - Static description

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

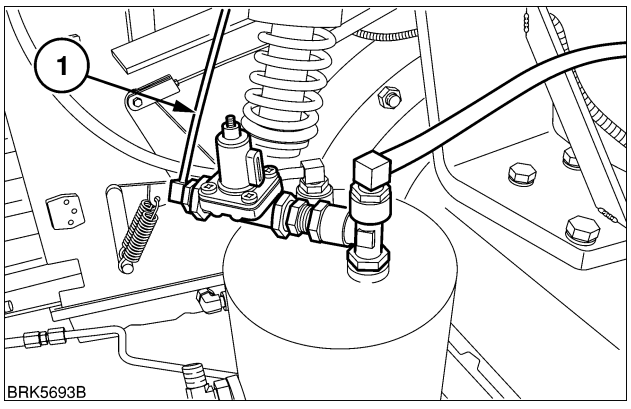
The function of the exhaust brake is to increase the engines natural braking effect. This is achieved by restricting the flow in the exhaust system. An air operated exhaust brake valve closes a butterfly valve which is situated in the exhaust pipe between the engine manifold and the silencer. When the valve is closed the fuel supply to the combustion chamber is also cut off. Pressure builds up as the air is pushed into the closed off manifold. The air pressure increases until it is able to overcome the force of the exhaust valve springs and force its way back into the cylinder. Maximum working pressure is the pressure required to overcome the exhaust valve springs and force its way back into the cylinder. The piston is working against this air pressure on every compression and exhaust stroke. When the system is at working pressure sufficient new air is drawn in through the inlet valve to replenish any air lost through leakage.

The exhaust brake is operated by depressing the pedal **(1)** located on left hand side on the floor of the cab. When the pedal is depressed a brake switch is operated and a **12 V** signal is sent to the engine processor which determines whether conditions are met which will allow the exhaust brake valve to be activated.



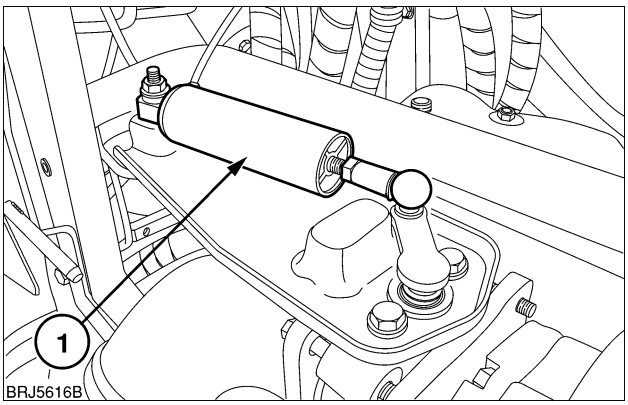
BAIL08CVT040ASA 1

The engine processor determines that the engine speed is is greater than **1000 - 1200 RPM** and then sends a **12 V** signal to the pneumatic directional valve **(1)** and shuts off the fuel to the injectors . The lower speed limit is to prevent the engine stalling.



BAIL08CVT024ASA 2

The compressed air from the air brake reservoir is passed by the directional pneumatic valve to a pneumatic cylinder **(1)** (Figure **3**) on the exhaust brake valve assembly that shuts a butterfly valve which restricts the gas flow from the engine. This is an on/off device, not a proportional system. The valve has a bypass hole in it of 14 mm diameter. This has been developed to limit the pressure developed in the engine to **2 bar** (**29 psi**) at engine maximum speed (high idle). If the operator allows the steepness of the slope and the gear selected to drive the engine above the maximum speed, a visual warning is displayed. There is a pressure protection valve at the start of the supply line at the air brake reservoir. This only allows the air to pass to the exhaust brake system if the brake system has working pressure. This is to prevent the exhaust brake system bleeding all the air out of the air brake system..

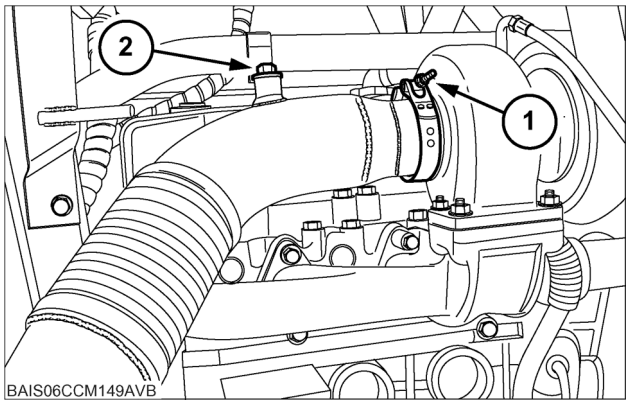


BAIL08CVT015ASA 3

NOTE: *The exhaust brake is cancelled when engine speed goes below* ***1200 RPM*** *and the throttles are inoperable when the exhaust brake pedal is pressed. They only become active again when it is released*

Silencer - Remove

1. Remove the exhaust clamp **(1)** and detach the air cleaner aspirator pipe bracket **(2)**.



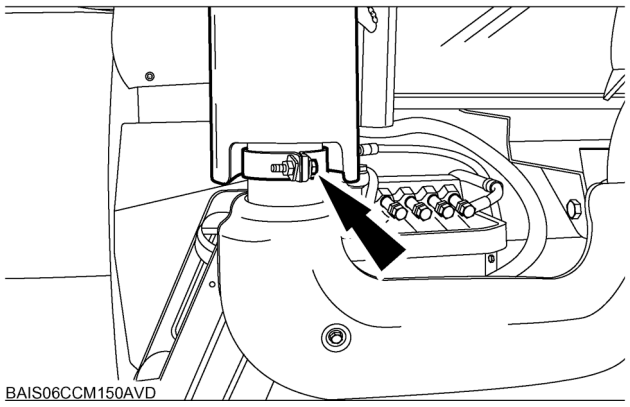
BAIS06CCM149AVB 1

2. Remove exhaust shield. Remove the exhaust muffler.

⚠ WARNING ⚠

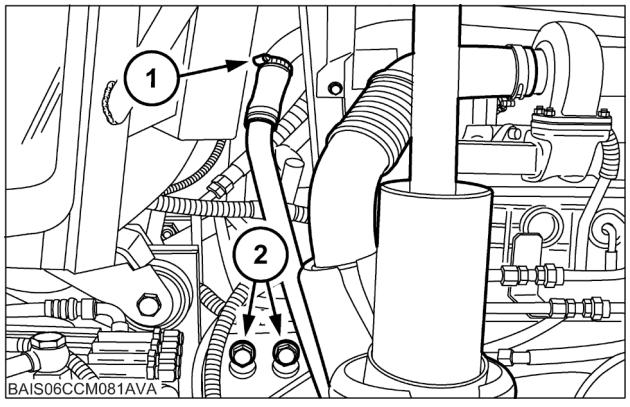
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



BAIS06CCM150AVD 2

3. Disconnect the air cleaner aspirator pipe **(1)**. Loosen the exhaust retaining bolts **(2)** and remove the exhaust.



BAIS06CCM081AVA 3

Next operation:
Turbocharger - Remove (B.30.A)

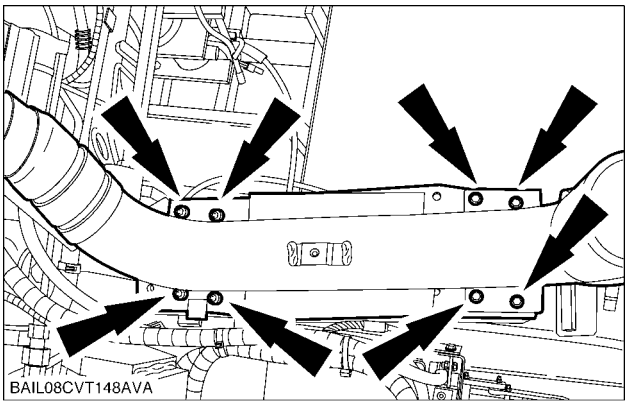
Silencer - Install

1. Attach the exhaust to the support and tighten the retaining bolts.

⚠ WARNING ⚠

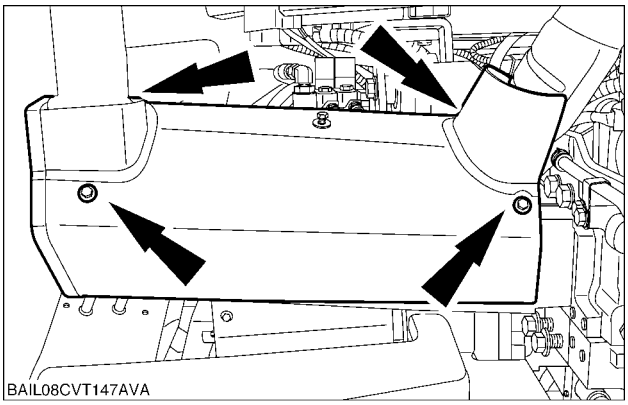
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



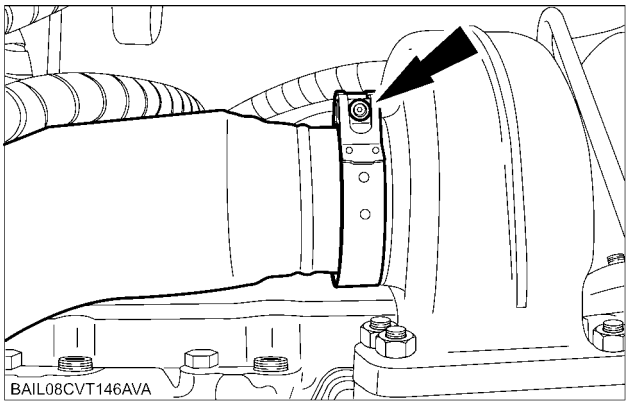
BAIL08CVT148AVA 1

2. Install the exhaust heat shield .



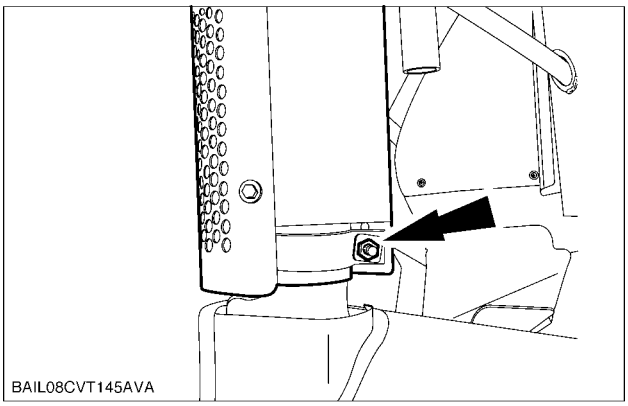
BAIL08CVT147AVA 2

3. Attach the exhaust pipe to the turbocharger and tighten clamp.



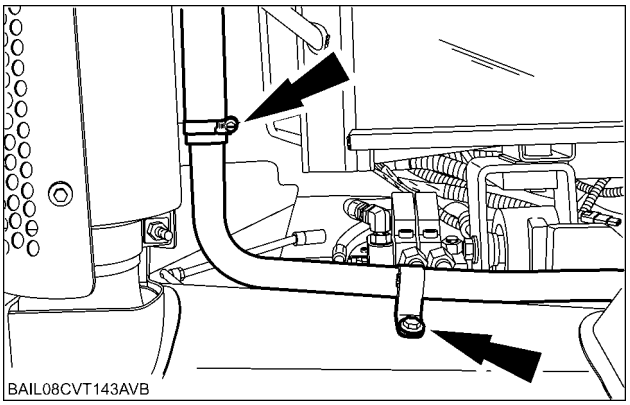
BAIL08CVT146AVA 3

4. Install the muffler pipe and tighten clamp.



BAIL08CVT145AVA 4

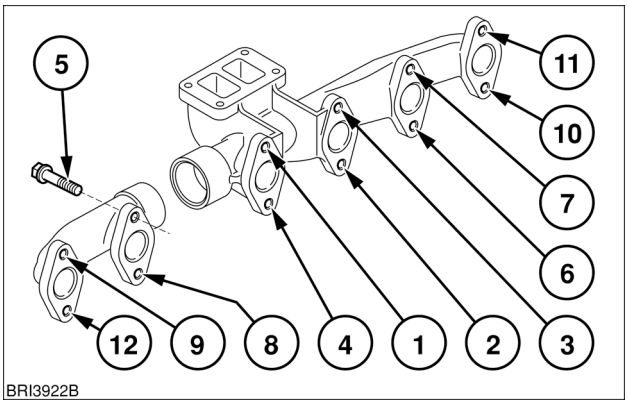
5. Reattach the air filter aspirator pipe.



BAIL08CVT143AVB 5

Exhaust manifold - Tighten - Sequence.

1. Tightening sequence for exhaust manifold bolts.
   For the required torque settings, refer to **Exhaust manifold - Torque (B.40.A)**

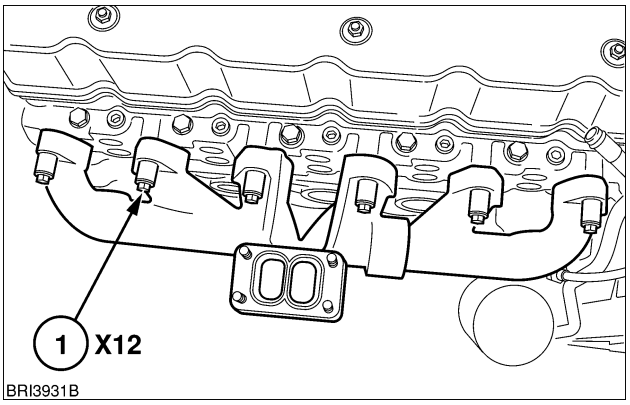


bail06ccm029asa 1

Exhaust manifold - Remove

Prior operation:
Turbocharger - Remove (B.30.A)

1. Unscrew the retaining bolts (x 12) and remove the exhaust manifold .



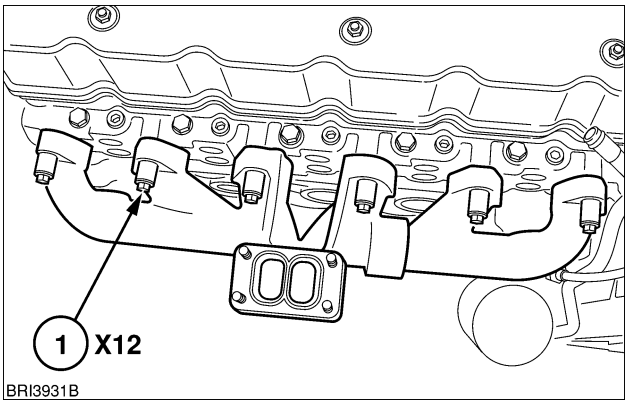
BAIL06CCM055ASA 1

Next operation:
Air intake manifold - Remove (B.30.A)

Exhaust manifold - Install

Prior operation:
Exhaust manifold - Remove (B.40.A)

1. Mount the exhaust manifold, complete with new gasket, tightening the retaining bolts to the specified torque. Refer to **Exhaust manifold - Torque (B.40.A)**.



BAIL06CCM055ASA 1

Next operation:
Turbocharger - Install (B.30.A)

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POWER PRODUCTION - B

ENGINE COOLANT SYSTEM - 50.A

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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- Fan and drive
  - Belt tensioner - Torque 6
  - Idler pulley - Torque 6
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Coolant temperature - Install 37

Thermostat - Torque

Housing Retaining Bolts

Description	Torque
Thermostat housing retaining bolts M6 x 1.0 x 20	**10 Nm +/- 2 Nm** (**7.4 lbft +/- 1.5 lbft**)

Water pump - Torque

PART	TORQUE
Bolts securing coolant pump M8 x 1.25 x 25	**25 Nm +/- 5 Nm** (**18 lb ft +/- 4 lb.ft**)

Fan and drive Belt tensioner - Torque

Description	Torque
Spring loaded automatic drive belt tensioner bolt M10 x 1.5 x 80	**43 Nm +/- 5 Nm** (**31.7 lbft +/- 4 lbft**)
Pulley mounting bolt M12 x 35	**60 Nm +/- 10 Nm** (**44.3 lbft +/- 7 lbft**)

Fan and drive Idler pulley - Torque

Description	Torque
Idler pulley retaining bolt M10 x 1.5 x 75	**70 Nm +/- 5 Nm** (**51.6 lbft +/- 4 lbft**)

Fan and drive Viscous drive - Torque

Description	Torque
Fan blade to viscous coupling M8 x 1.25 x 16	**20 - 24 Nm** (**14.8 - 17.7 lbft**)
Viscous coupling to mounting pulley	**90 - 112 Nm** (**66.4 - 82.6 lbft**)

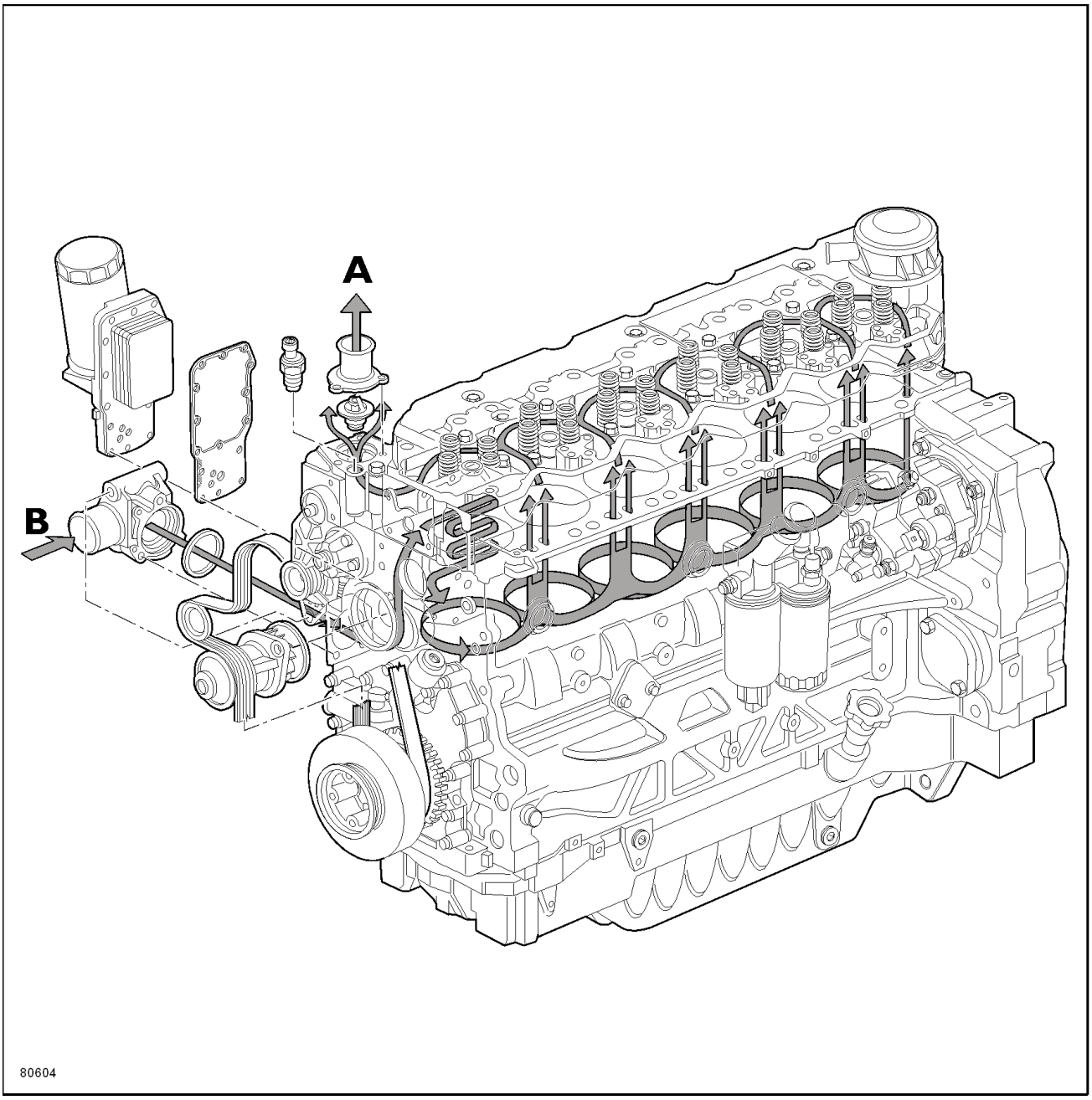
Sensing system Coolant temperature - Torque - Sensor

Description	Torque
Engine coolant temperature sensor	**12 - 20 Nm** (**8.9 - 14.8 lbft**)

ENGINE COOLANT SYSTEM - Static description

The forced circulation, closed-circuit engine cooling system is composed of the following components:

- Expansion tank: .
- Radiator, dissipates the heat taken by the coolant from the engine. .
- Vistronic fan, increases the radiator’s dissipating capacity:
- A lubricating oil cooler: .
- A centrifugal coolant pump housed at the front of the crankcase.
- A thermostat governing coolant circulation.
- The circuit may also extend to the compressor if the version includes it.

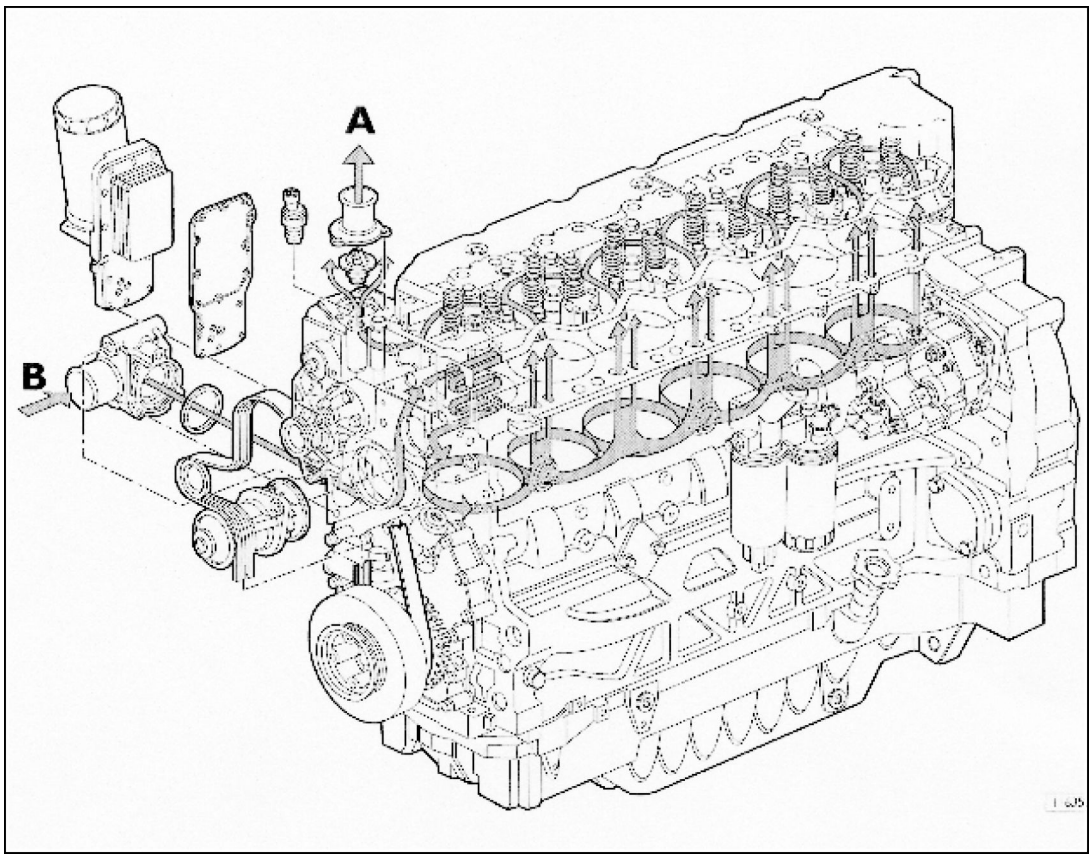


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COOLING SYSTEM DIAGRAM

A = TO THE RADIATOR
B = FROM THE RADIATOR

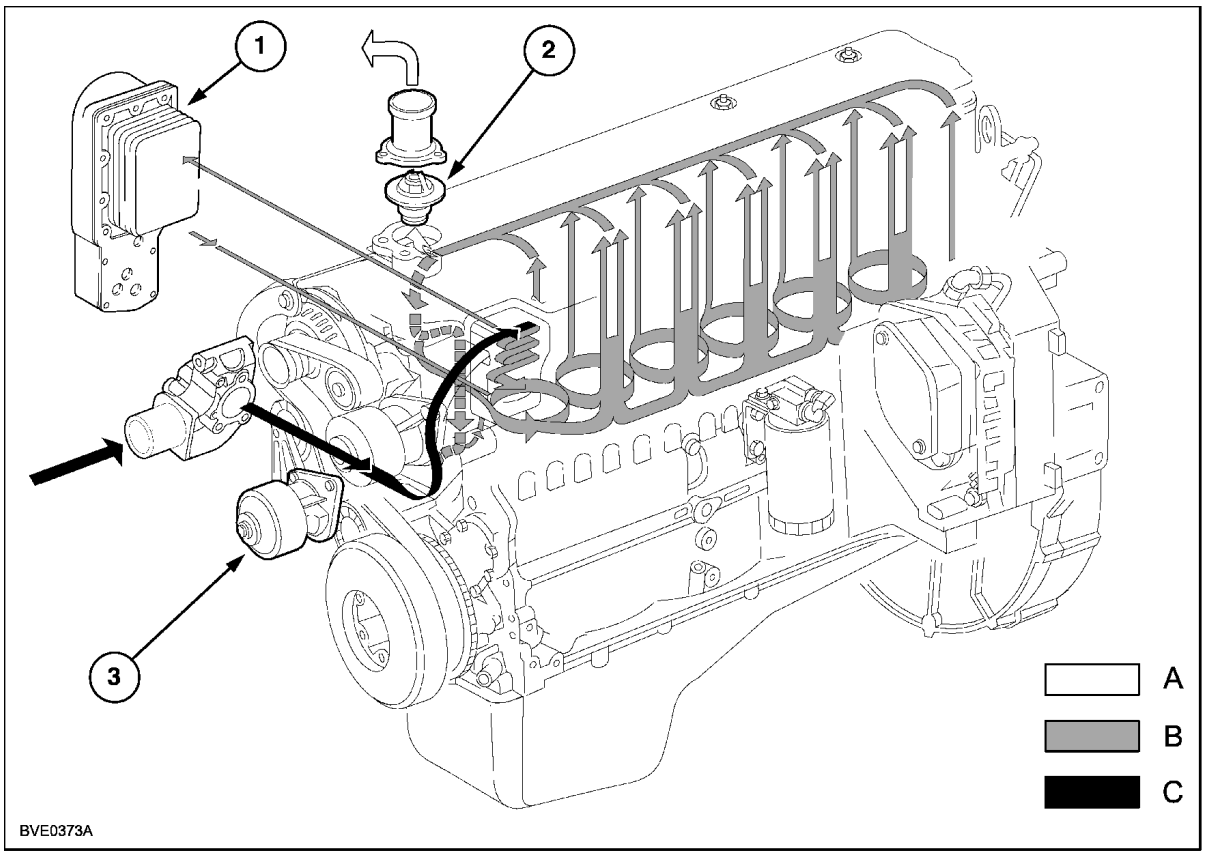
ENGINE COOLANT SYSTEM - Overview



BAIL07CCM266AMA 1

A Coolant flow from the thermostat
B Coolant flow to the coolant pump

ENGINE COOLANT SYSTEM - Dynamic description



BVE0373A 1

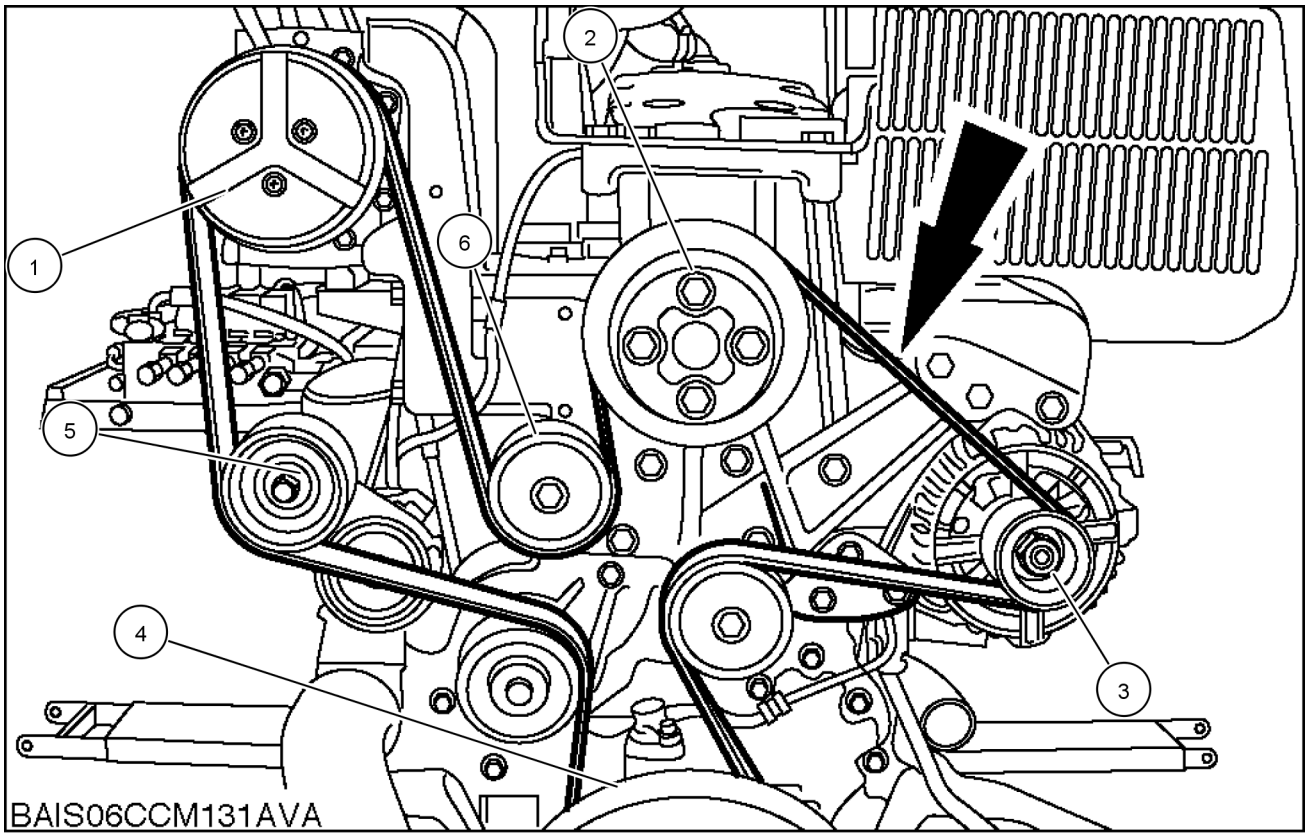
A Coolant flow from the thermostat
B Coolant flow circulating in the engine
C Coolant flow to the coolant pump

The engine cooling system is a closed circuit forced circulation type composed of the following components:

- Heat exchanger **(1)** to cool lubrication oil.
- Thermostat **(2)** controlling coolant circulation.
- Centrifugal coolant pump **(3)** to circulate the coolant.

The coolant is drawn from the bottom of the radiator by the coolant pump **(3)** which passes the coolant to the cylinder block. The coolant then flows through cored galleries to cool the cylinder walls.
Galleries in the cylinder head gasket allow coolant to flow from the cylinder block into the cylinder head. Cored galleries also direct the coolant to the fuel injector nozzle locations before entering the thermostat housing.
Dependent upon coolant temperature, coolant either re-enters the coolant pump or is circulated through the radiator for cooling.

ENGINE COOLANT SYSTEM - Static description



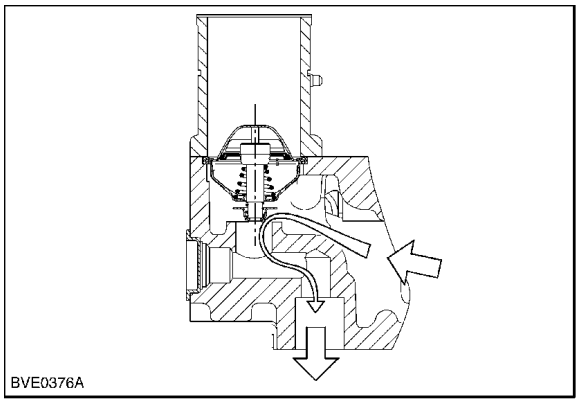
BAIS06CCM131AVA 1

1. Air conditioning compressor
2. Fan mounting pulley
3. Alternator
4. Crankshaft pulley
5. Air conditioning belt tensioner
6. Coolant pump

The function of the coolant pump **(6)** mounted at the front of the engine is to maintain a continuous flow of coolant around the coolant system (Refer to **ENGINE COOLANT SYSTEM - Overview (B.50.A)**. This is essential to ensure correct engine coolant temperature. The Coolant pump is driven by the poly-v belt from the crankshaft pulley **(4)** and the tension is maintained by the spring loaded automatic fan belt tensioner **(5)**.

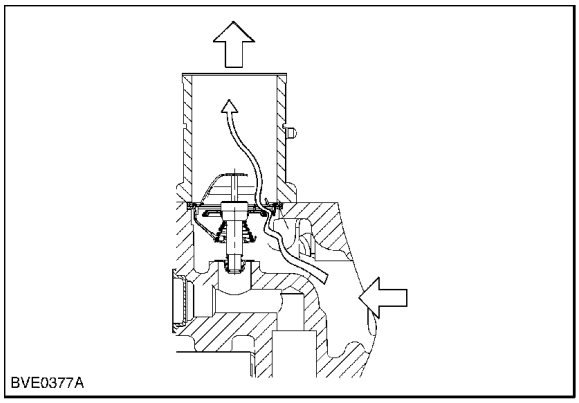
Thermostat - Dynamic description

When the thermostat is closed, a recirculating bypass gallery allows the coolant to recirculate from the cylinder head to the block, to allow faster engine coolant warm-up.



BVE0376A 1

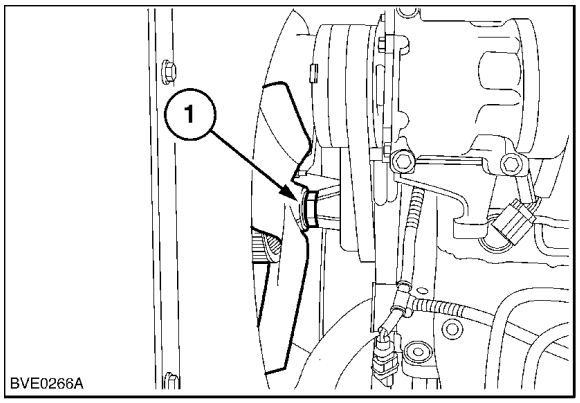
When the coolant has reached normal operating temperature, the thermostat will open and allow coolant to be drawn through the radiator by the coolant pump. Cooled coolant then returns to the engine.



BVE0377A 2

Radiator - Dynamic description

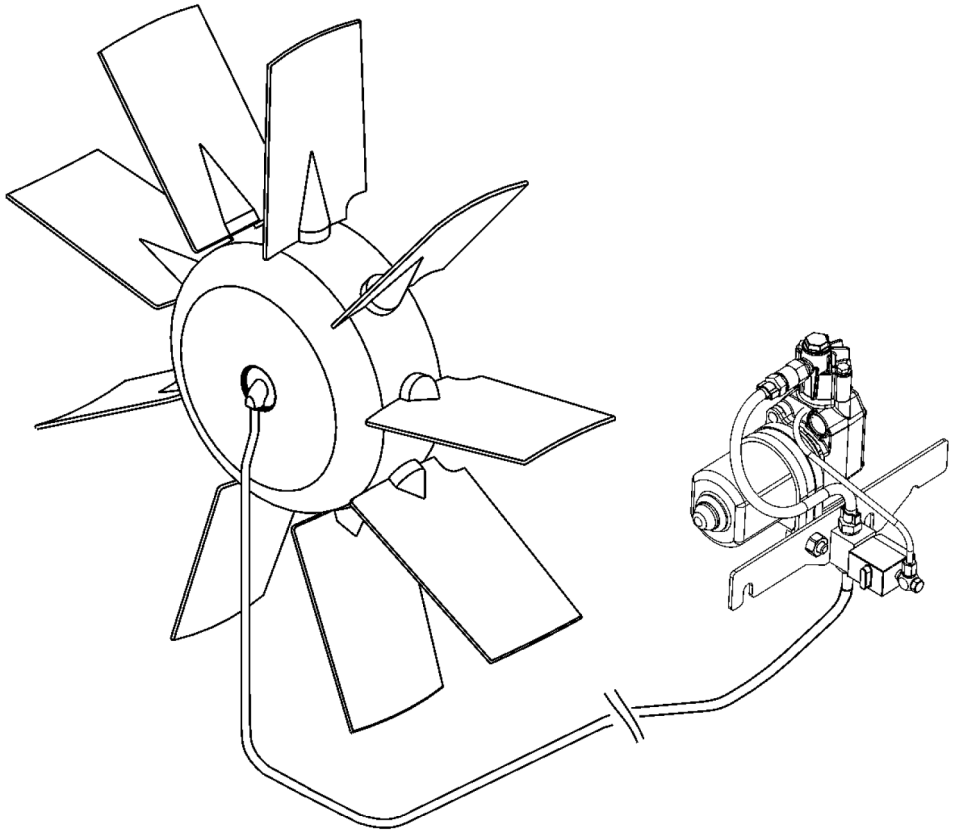
Cooling occurs as the coolant passes down through the radiator cores which are exposed to the cooling system. Air is drawn through the radiator fins by a viscous fan **(1)** situated between the radiator and the engine block.



BVE0266A 1

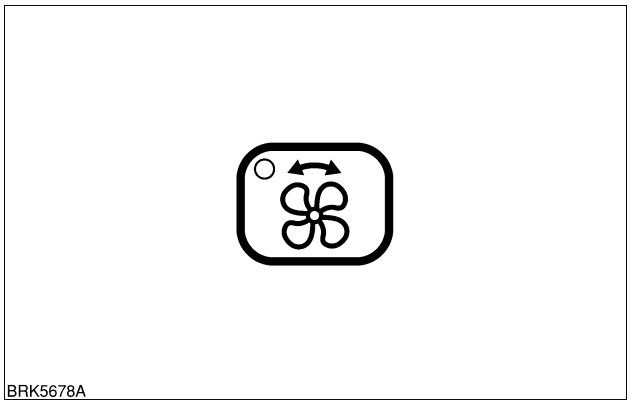
Fan reversing system - Static description Reversible fan

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]



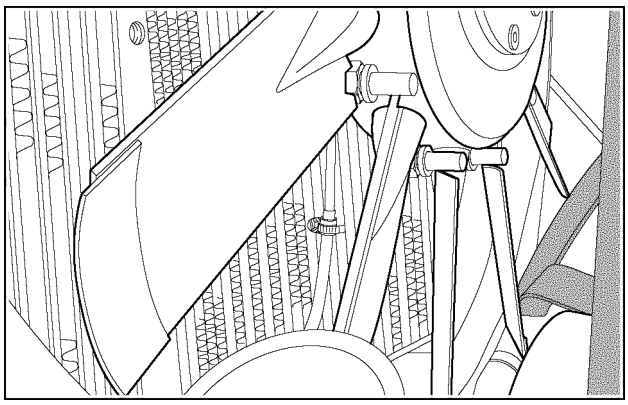
SS05N282 1

The reversible fan aids clearance of the grille and ensures optimum cooling performance. The fan has 9 blades which are connected to a piston, which in turn is connected to a solenoid. The working of the fan is similar to that of a normal fan until the reversible fan mode is operated by the switch located on the control panel.



BAIL08CVT023ASA 2

In the reversible fan mode, the blades rotate **180 °**. This leads to a change in the direction of flow of air and it starts to blow in the opposite (Outer) direction. The complete cycle takes about 30 seconds to complete (including the five seconds to reverse the blades). The reversible fan can be stopped at any time during the cycle by pressing the switch again, otherwise at end of the cycle the blades return to their original position.



RCPH07CCH216AAB 3

The fan blades rotate using an eccentric linkage housed within the central fan hub. A set of springs ensures the blades return to the normal operating position.
The fan blades are also automatically adjusted thermostatically by the thermo-elements. These thermo-elements have a piston which expands and contracts depending on the temperature.

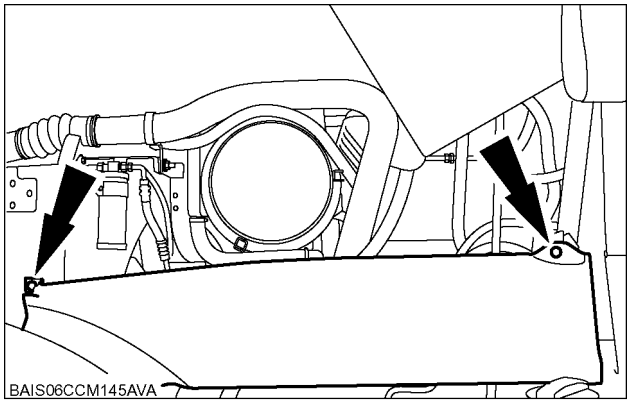
ENGINE COOLANT SYSTEM - Drain fluid

⚠ WARNING ⚠

The engine coolant system operates under pressure which is controlled by the radiator pressure cap. It is dangerous to remove the pressure cap while the system is hot. When cool, use a thick cloth and turn the cap slowly to the first stop and allow the pressure to escape before fully removing the cap. Coolant should be kept off the skin. Adhere to the precautions outlined on the antifreeze and inhibitor containers, where used.

B097

1. Open the engine hood and remove the left-hand side engine side panel.



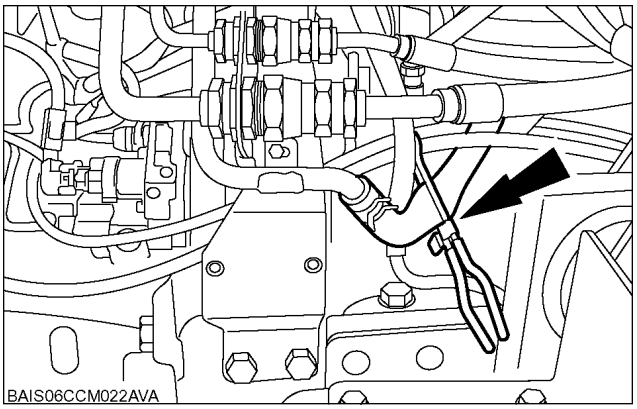
BAIS06CCM145AVA 1

2. Clamp the cab heater hose.

⚠ WARNING ⚠

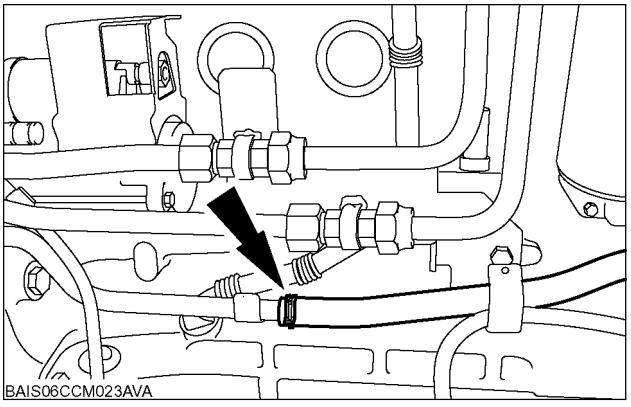
Do not allow antifreeze to contact skin. Adhere to instructions detailed on antifreeze container.

B024



BAIS06CCM022AVA 2

3. Place a suitable container under the tractor. Detach the cab coolant hose and drain the coolant.



BAIS06CCM023AVA 3

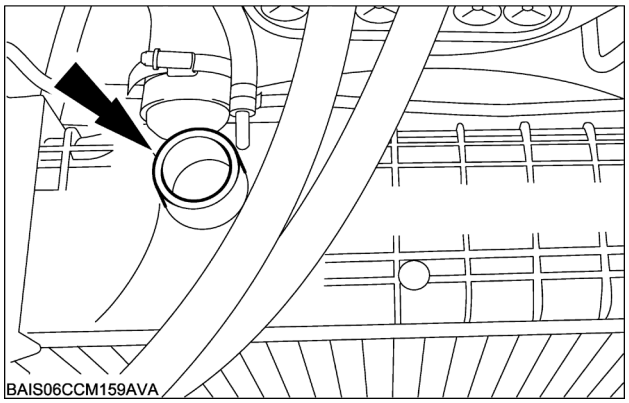
4. Remove the expansion tank cap.
5. Connect the coolant hose when the coolant system has finished draining.
6. Remove the clamp from the cab heater hose.

Next operation:
ENGINE COOLANT SYSTEM - Filling (B.50.A).

ENGINE COOLANT SYSTEM - Filling

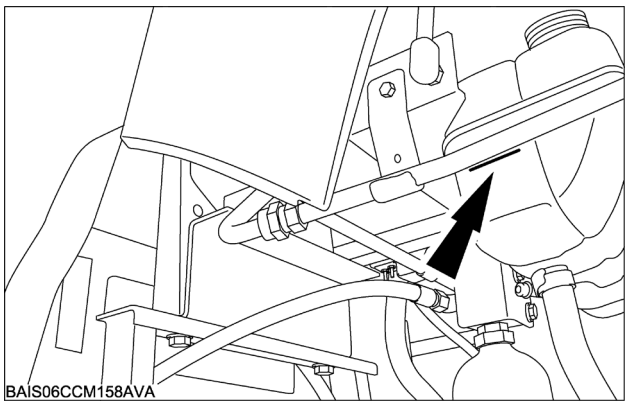
Prior operation:
ENGINE COOLANT SYSTEM - Drain fluid (B.50.A).

1. Ensure the correct grade and quantity of antifreeze is added to the water. Recommended coolant mixture is 50% water to 50% anti freeze to specification **CASE AKCELA PREMIUM ANTI-FREEZE (MS 1710) AMBRA AGRIFLU**.
2. Refill the cooling system through the radiator cap until completely full and replace radiator cap.



BAIS06CCM159AVB 1

3. Refill the expansion tank to the COLD FILL mark.

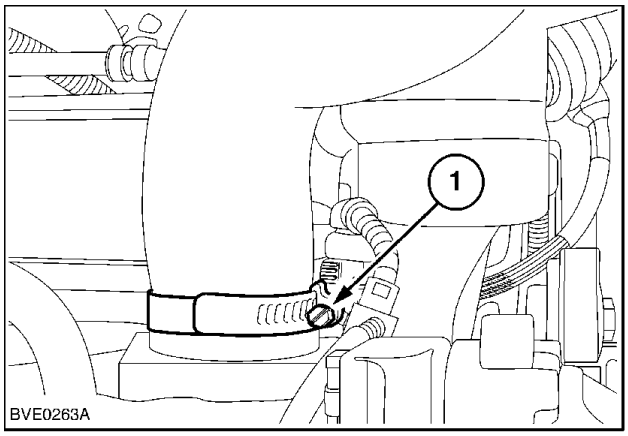


BAIS06CCM158AVA 2

4. Start the engine and run until normal operating temperature is reached. Check for leaks, allow to cool and re-check the coolant level.

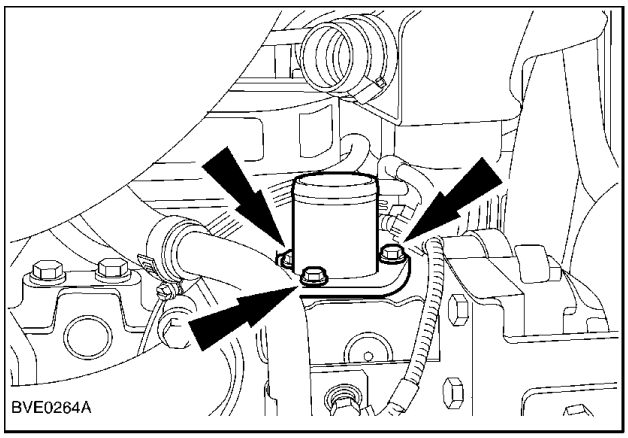
Thermostat - Remove

1. Loosen the hose clamp **(1)** and disconnect the coolant hose from the thermostat housing.



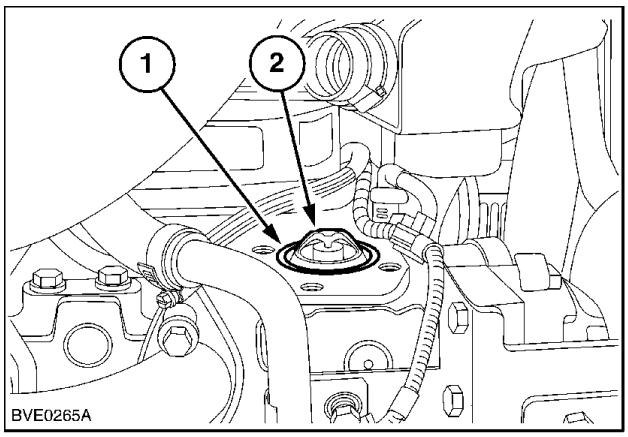
BVE0263A 1

2. Remove the thermostat housing from the cylinder block.



BVE0264A 2

3. Remove the thermostat seal **(1)** and the thermostat **(2)**.



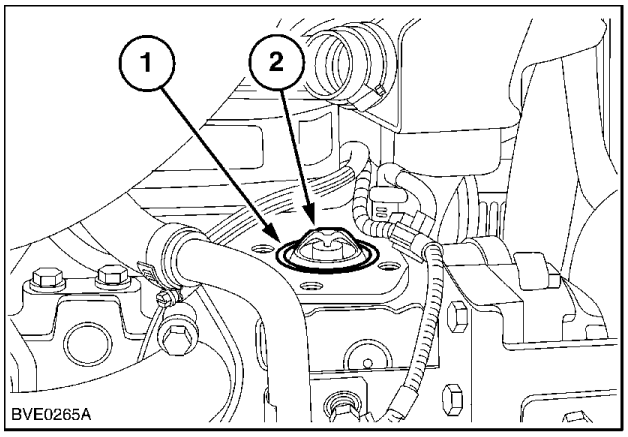
BVE0265A 3

Next operation:
Thermostat - Install (B.50.A).

Thermostat - Install

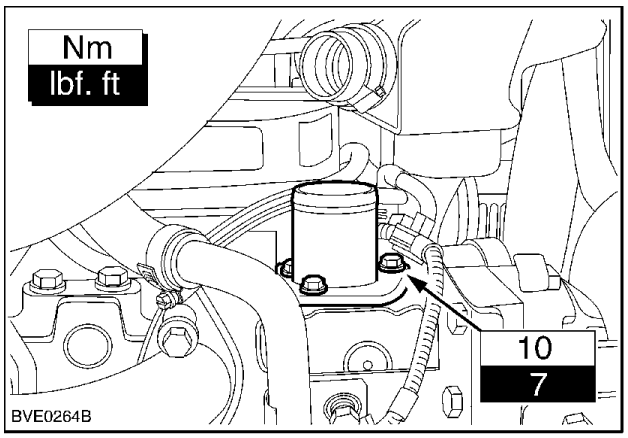
Prior operation:
Thermostat - Remove (B.50.A), **Thermostat - Test (B.50.A)**.

1. Make sure the mating surfaces are clean
   Install the thermostat **(2)** and a new thermostat seal **(1)**.



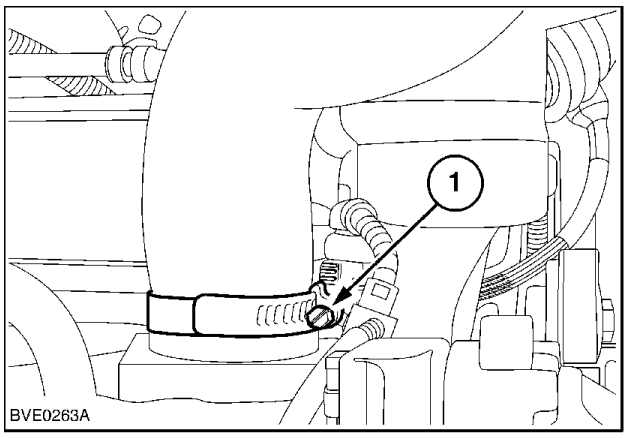
BVE0265A 1

2. Install the thermostat housing to the cylinder block. Tighten the retaining bolts to the specified torque value. Refer to **Thermostat - Torque (B.50.A)**.



BVE0264B 2

3. Connect the coolant hose to the thermostat housing and tighten the hose clamp **(1)**.



BVE0263A_69 3

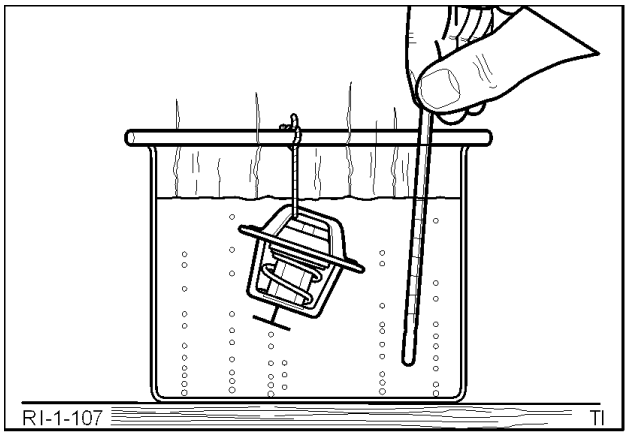
Thermostat - Test

Prior operation:
Thermostat - Remove (B.50.A).

1. Place the thermostat in a container of water, and raise the temperature to **212 °F** (**100 °C**). If the thermostat fails to open when hot, or fails to close properly when cooled, it must be replaced.

NOTE: *A faulty thermostat may cause the engine to operate at a too hot or too cold operating temperature. If the thermostat is not replaced, this could result in damage to the engine or impaired engine performance.*

IMPORTANT: *Do not operate an engine without a thermostat.*



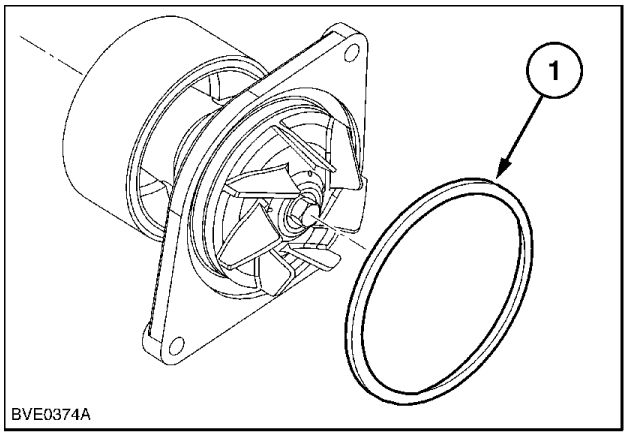
RI-1-107 1

Next operation:
Thermostat - Install (B.50.A).

Water pump - Install

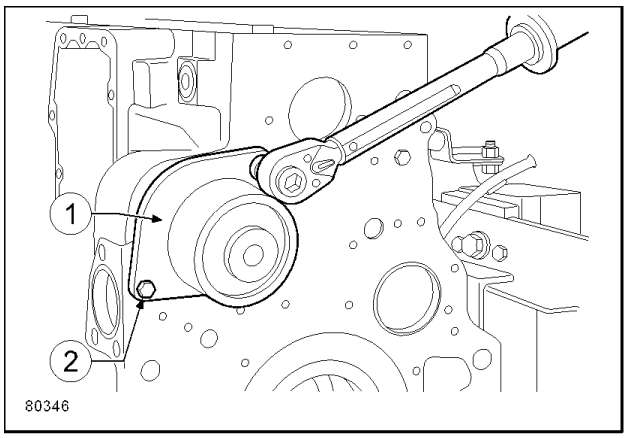
Prior operation:
Water pump - Remove (B.50.A).

1. Make sure the mating surfaces are clean.
   Replace the seal **(1)** and lubricate with clean engine oil. **CASE AKCELA NO. 1 ENGINE OIL SAE 15W-40** .



BVE0374A 1

2. Mount the coolant pump **(1)**; screw down the bolts **(2)** and tighten them to the prescribed torque, refer to **Water pump - Torque (B.50.A)**.



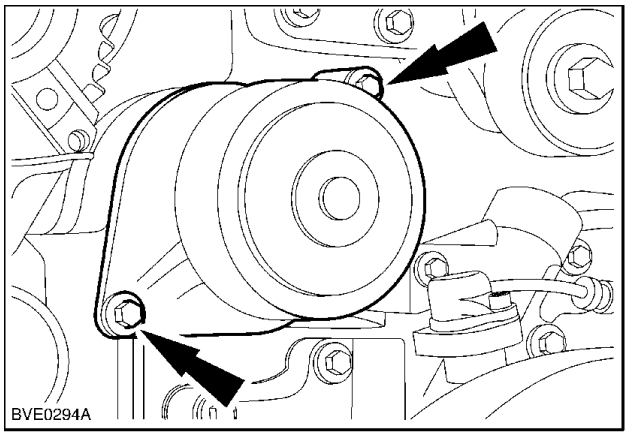
80346 2

Next operation:
ENGINE COOLANT SYSTEM - Filling (B.50.A).

Water pump - Remove

Prior operation:
ENGINE COOLANT SYSTEM - Drain fluid (B.50.A). **Fan and drive Belt - Remove (B.50.A)**

1. Undo the coolant pump retaining bolts and remove the coolant pump.



BVE0294A 1

Next operation:
Water pump - Install (B.50.A).

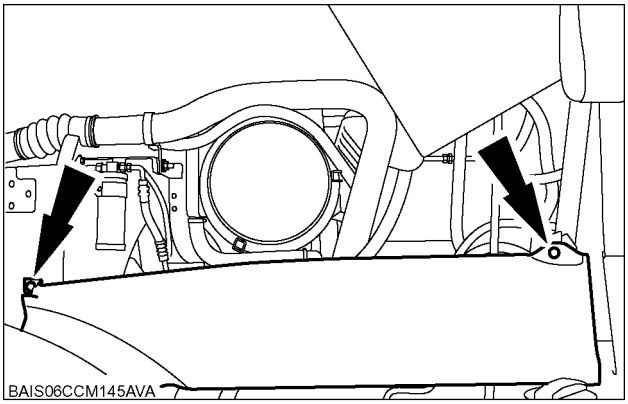
Radiator - Remove

Prior operation:
Drain the engine coolant system, for additional information refer to **ENGINE COOLANT SYSTEM - Drain fluid (B.50.A)**).

All Tractors

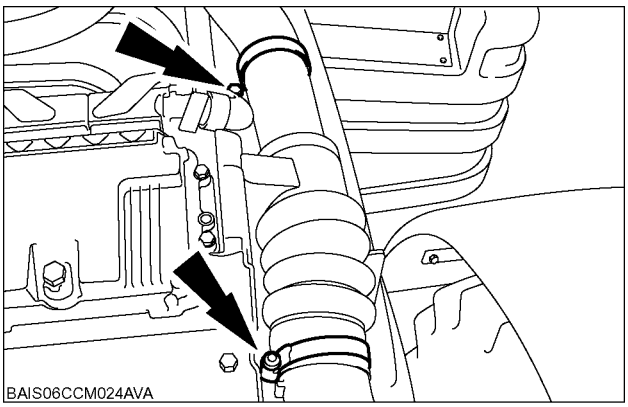
1. Remove the engine side panel.

NOTE: *Repeat this step for both sides of the tractor.*



BAIS06CCM145AVA 1

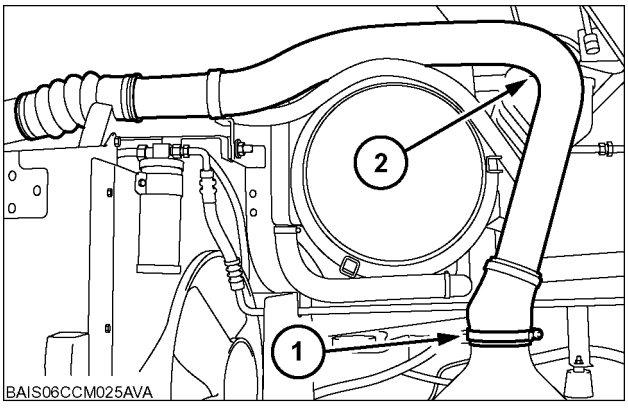
2. Loosen the hose clamp and detach the retaining bracket.



BAIS06CCM024AVA 2

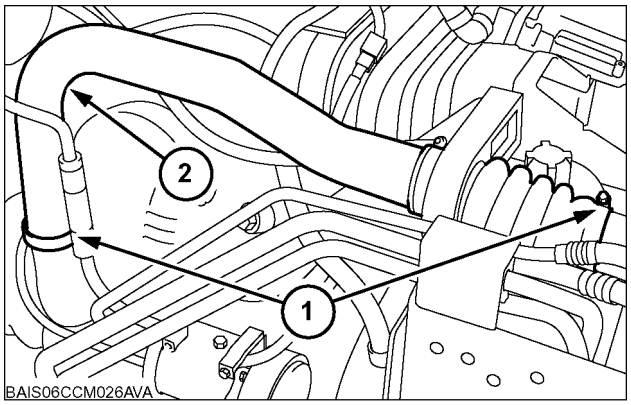
3. Loosen the hose clamp **(1)** and remove the engine air cooler outlet pipe **(2)**.

NOTE: *Remove and discard the cable ties.*



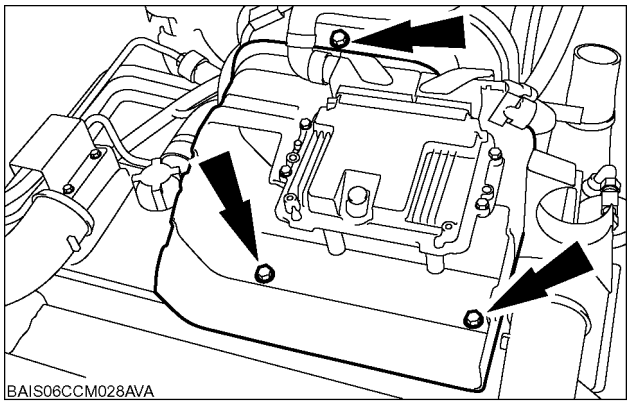
BAIS06CCM025AVA 3

4. Loosen the hose clamps **(1)** and remove the engine air cooler inlet pipe **(2)**.



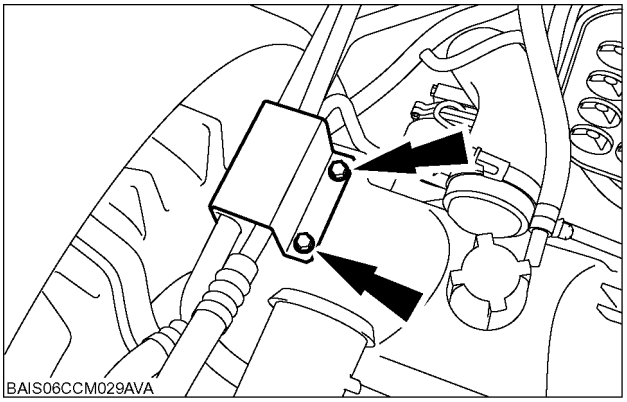
BAIS06CCM026AVA 4

5. Detach the engine air cleaner intake duct and position to one side.



BAIS06CCM028AVA 5

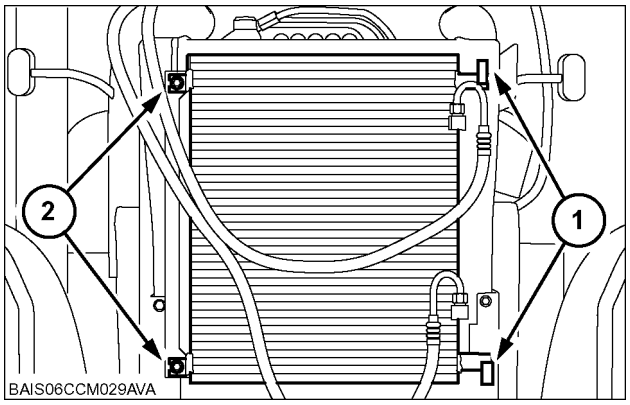
6. Remove the transmission oil cooler/engine air cooler pipe retaining clamp.



BAIS06CCM029AVA 6

Tractors with Air Conditioning

7. Release the retaining clips **(1)**. Detach the air conditioning condenser **(2)** and position it to one side.

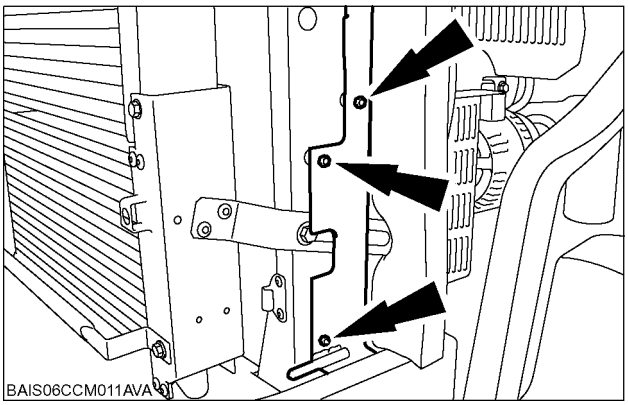


BAIS06CCM030AVA 7

All Tractors

8. Remove the side guard support bracket.

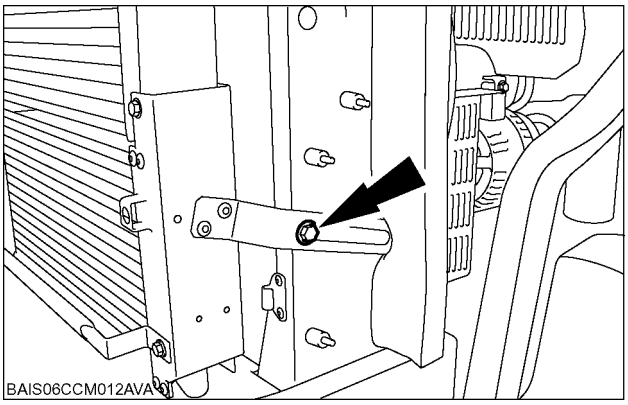
NOTE: *Repeat this step for both sides of the tractor.*



BAIS06CCM011AVA 8

9. Remove the transmission oil cooler/engine air cooler retaining bolt.

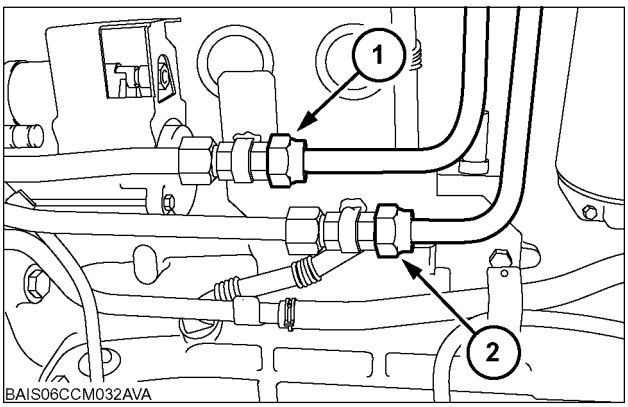
NOTE: *Repeat this step for both sides of the tractor.*



BAIS06CCM012AVA 9

10. Disconnect the transmission oil cooler inlet **(1)** and the outlet **(2)** pipes.

NOTE: *Install suitable blanking plugs.*



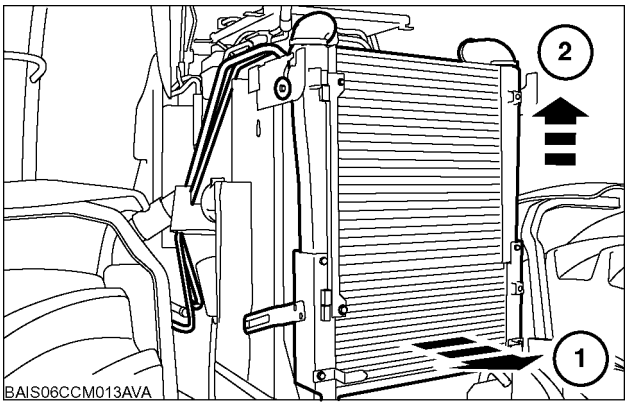
BAIS06CCM032AVA 10

11. Pull the lower part of the transmission oil cooler/engine air cooler assembly forward **(1)**, slide the assembly upwards **(2)** and remove from the tractor.

⚠ WARNING ⚠

The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

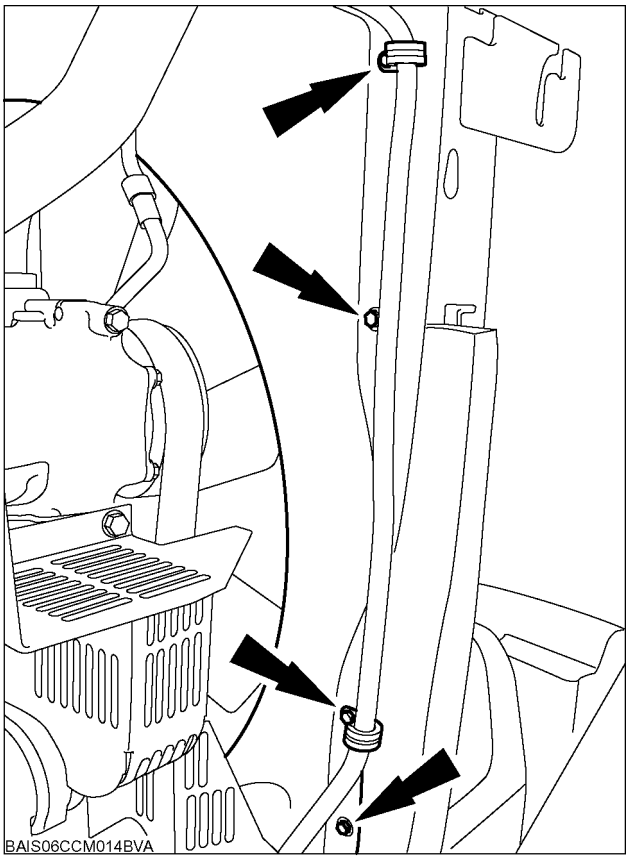
M944



BAIS06CCM013AVA 11

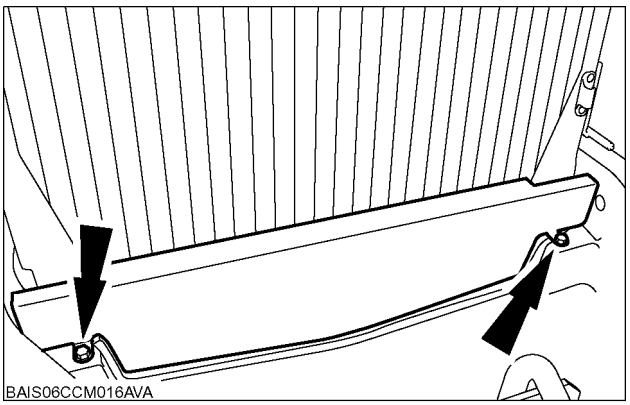
12. Remove the fan shroud retaining bolts.

NOTE: *Repeat this step for both sides of the tractor.*



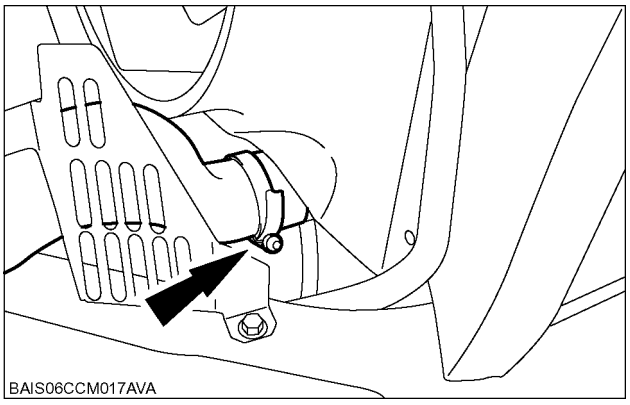
BAIS06CCM014BVA 12

13. Remove the radiator baffle plate.



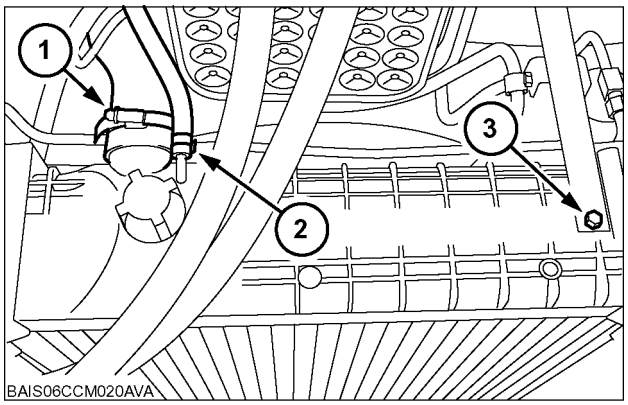
BAIS06CCM016AVA 13

14. Disconnect the radiator lower hose.



BAIS06CCM017AVA 14

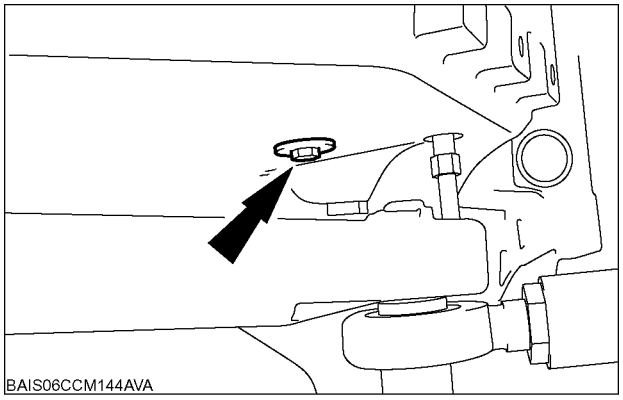
15. Disconnect the radiator top hose **(1)**, expansion hose **(2)** and the radiator support bracket **(3)**.



BAIS06CCM020AVA 15

16. Remove the radiator retaining bolts.

NOTE: *Repeat this step for both sides of the tractor.*



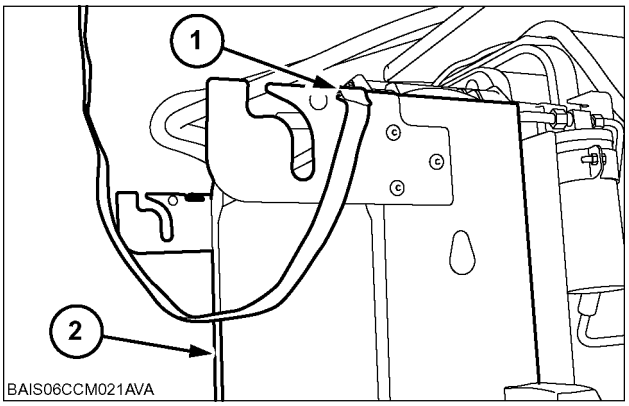
BAIS06CCM144AVA 16

17. Detach the hood check strap **(1)** and remove the radiator assembly **(2)**.

⚠ WARNING ⚠

The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



BAIS06CCM021AVA 17

Next operation:
Radiator - Install (B.50.A).

Radiator - Install

Prior operation:
Radiator - Remove (B.50.A).

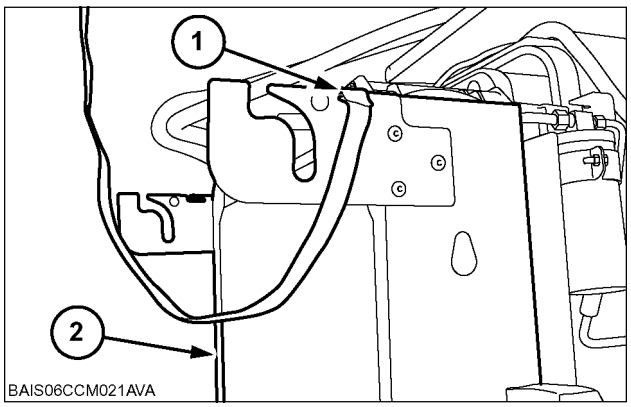
All Tractors

1. Install the radiator assembly **(2)** and install the hood check strap **(1)**.

⚠ WARNING ⚠

The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

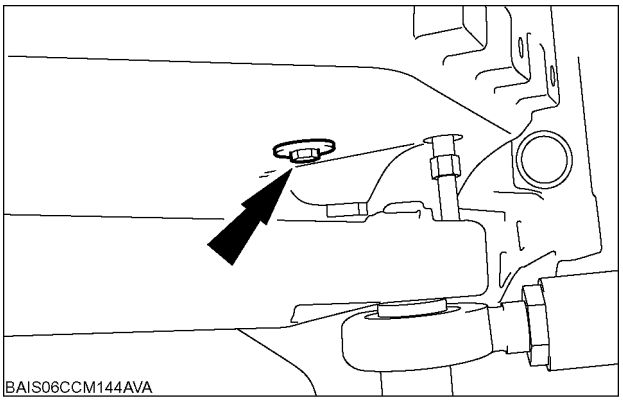
M944



BAIS06CCM021AVA 1

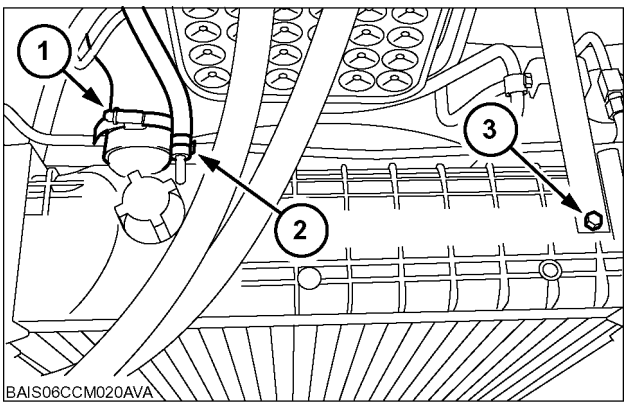
2. Install the radiator retaining bolts.
Tighten to **32 Nm** (**24 lb ft**).

NOTE: *Repeat this step for both sides of the tractor.*



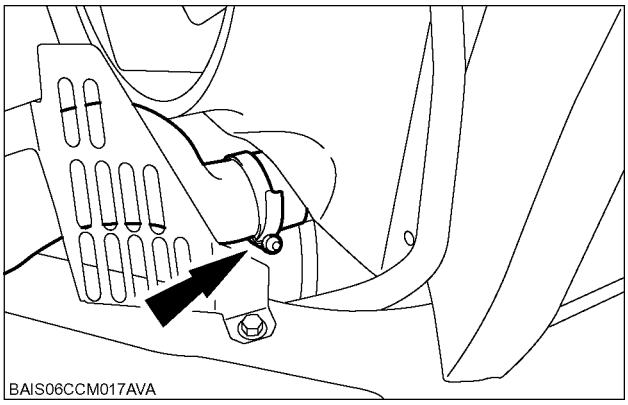
BAIS06CCM144AVA 2

3. Connect the radiator top hose **(1)**, expansion hose **(2)** and the radiator support bracket **(3)**.



BAIS06CCM020AVA 3

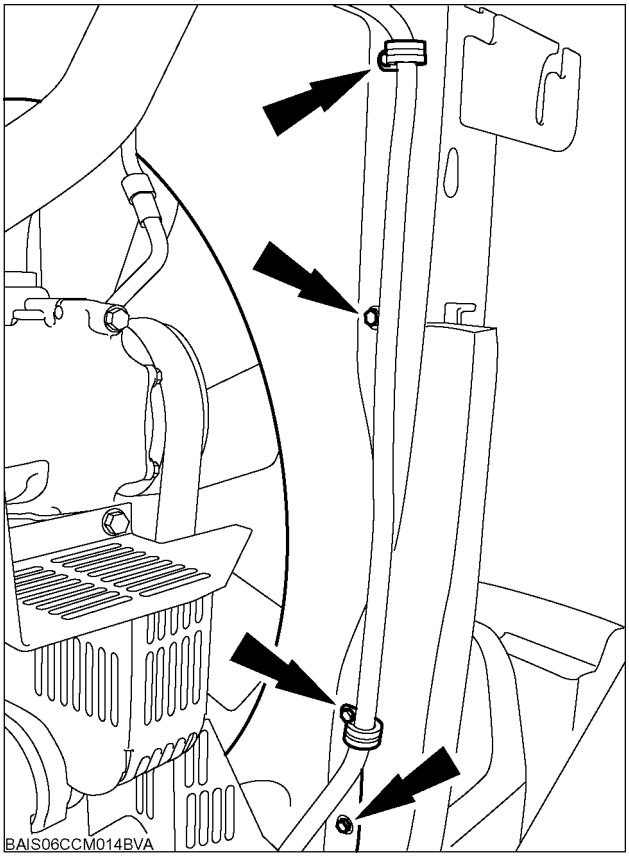
4. Connect the radiator lower hose.



BAIS06CCM017AVA 4

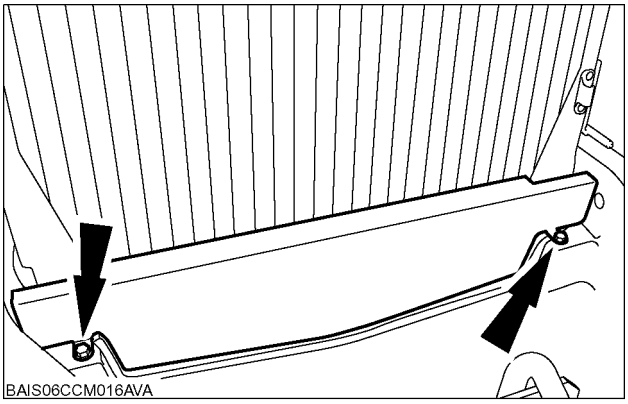
5. Install the fan shroud retaining bolts.

NOTE: *Repeat this step for both sides of the tractor.*



BAIS06CCM014BVA 5

6. Install the radiator baffle plate.



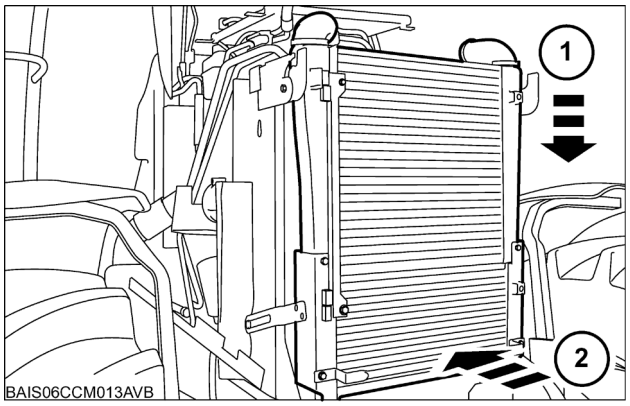
BAIS06CCM016AVA 6

7. Position the transmission oil cooler/engine air cooler assembly to the tractor, slide the assembly downwards into the upper retaining brackets **(1)** and push the lower part of the assembly rearwards **(2)**.

⚠ WARNING ⚠

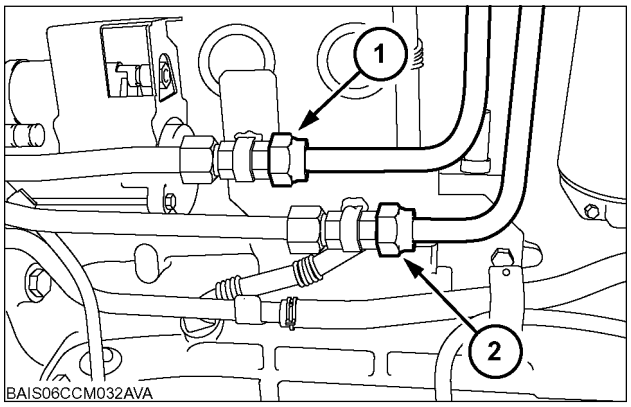
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



BAIS06CCM013AVB 7

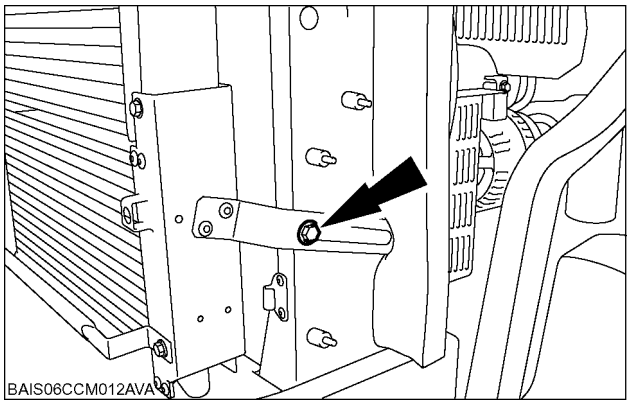
8. Connect the transmission oil cooler inlet **(1)** and the outlet **(2)** pipes.



BAIS06CCM032AVA 8

9. Install the transmission oil cooler/engine air cooler retaining bolt.

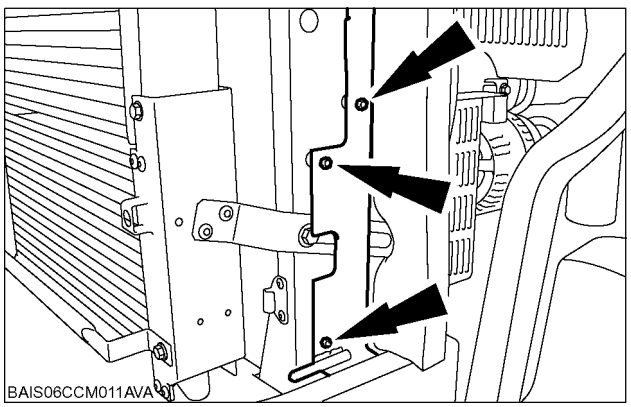
NOTE: *Repeat this step for both sides of the tractor.*



BAIS06CCM012AVA 9

10. Install the side guard support bracket.

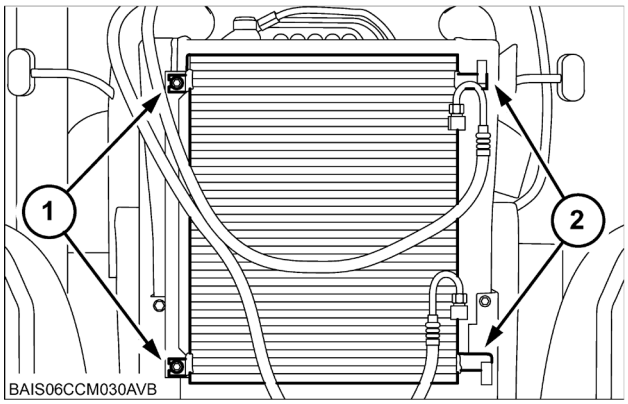
NOTE: *Repeat this step for both sides of the tractor.*



BAIS06CCM011AVA 10

Tractors with Air Conditioning

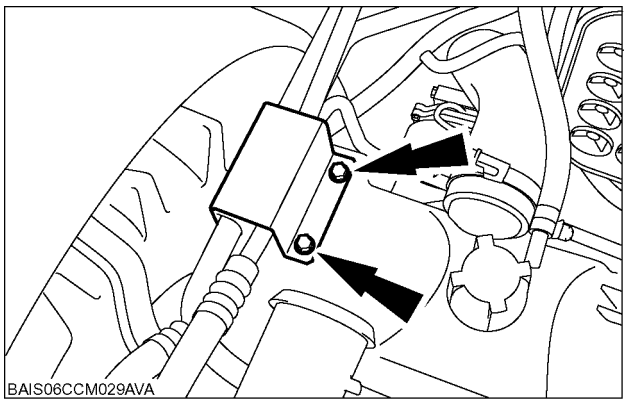
11. Install the air conditioning condenser to the tractor, install the retaining bolts **(1)** and retaining clips **(2)**.



BAIS06CCM030AVB 11

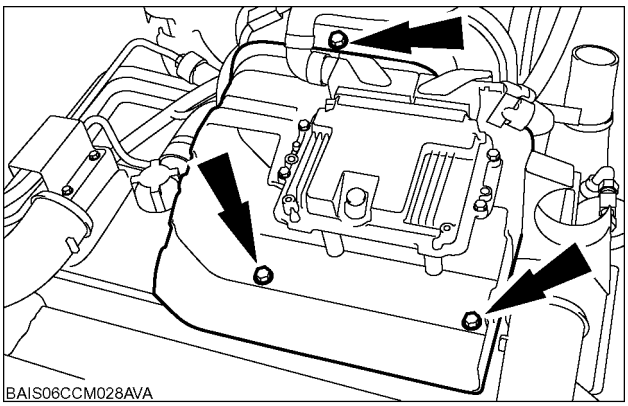
All Tractors

12. Install the transmission oil cooler/engine air cooler pipe retaining clamp.



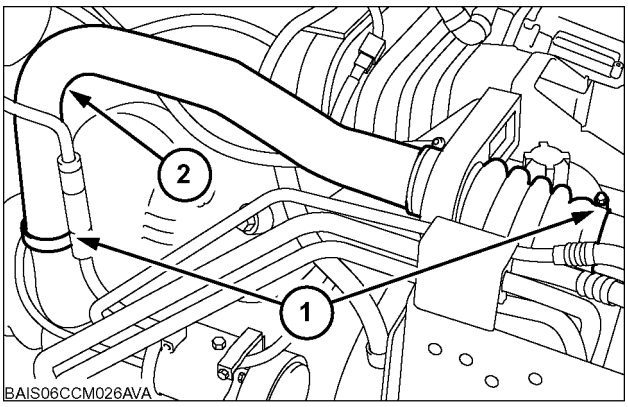
BAIS06CCM029AVA 12

13. Install the engine air cleaner intake duct.



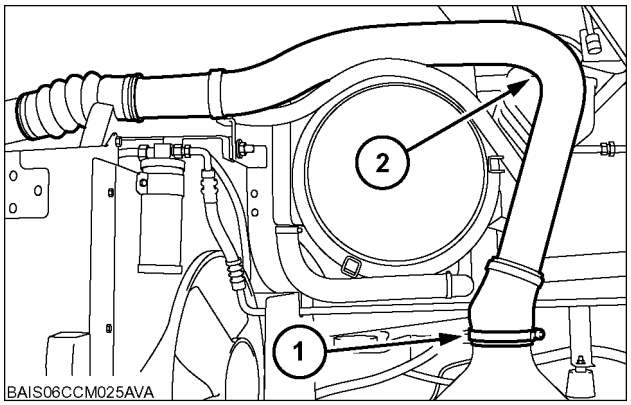
BAIS06CCM028AVA 13

14. Install the engine air cooler inlet pipe **(2)** and tighten the hose clamps **(1)**.



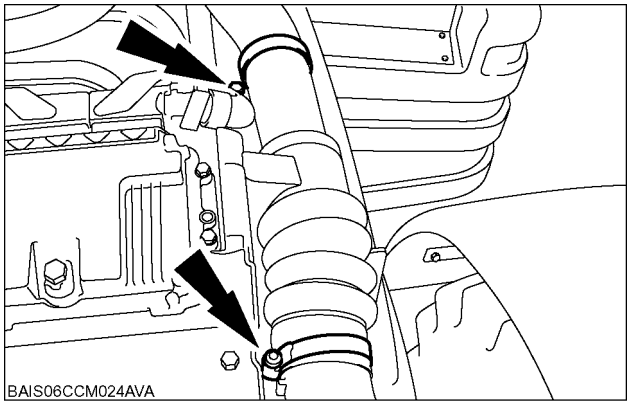
BAIS06CCM026AVA 14

15. Install the engine air cooler outlet pipe **(2)** and tighten the hose clamp **(1)**.



BAIS06CCM025AVA 15

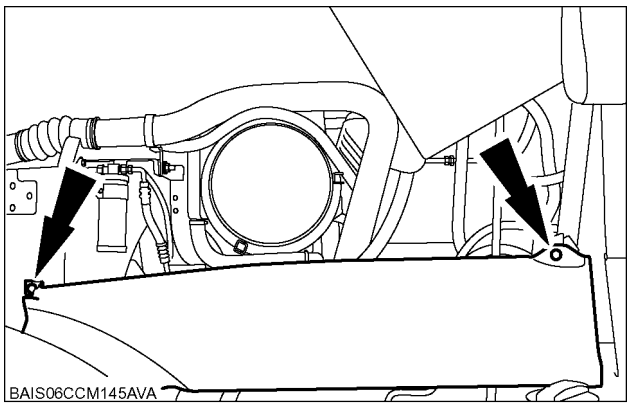
16. Install the retaining bracket and tighten the hose clamp.



BAIS06CCM024AVA 16

17. Install the engine side panel.

NOTE: *Repeat this step for both sides of the tractor.*

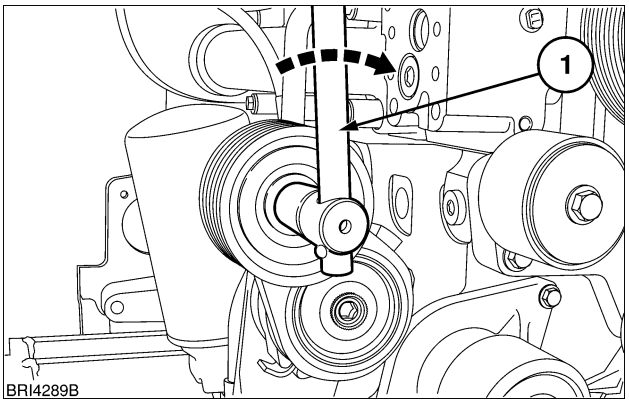


BAIS06CCM145AVA 17

Next operation:
Fill the engine coolant system, for additional information refer to **ENGINE COOLANT SYSTEM - Filling (B.50.A)**.

Fan and drive Belt - Remove

1. Attach a **15 mm**. socket and bar **(1)** to the automatic drive belt tensioner arm. Rotate clockwise and remove the drive belt from the pulleys.
   Carefully feed the drive belt between the cooling fan and the radiator shroud.



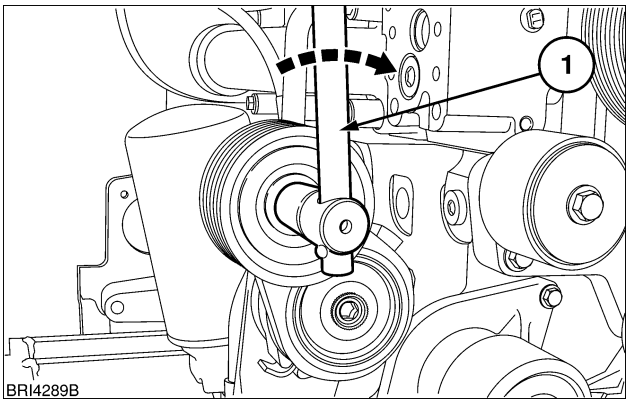
BAIL06CCM247ASA 1

Next operation:
Fan and drive Belt - Install (B.50.A).

Fan and drive Belt - Install

Prior operation:
Fan and drive Belt - Remove (B.50.A).

1. Carefully feed the drive belt between the cooling fan and the radiator shroud.
   Attach a **15 mm**. socket and bar **(1)** to the automatic drive belt tensioner arm. Rotate clockwise and refit the drive belt onto the pulleys.
   Once the belt is in position, rotate the socket and bar anti clockwise until the tensioner takes up all of the play in the belt and the socket and bar can safely be removed. The belt should now be correctly tensioned.



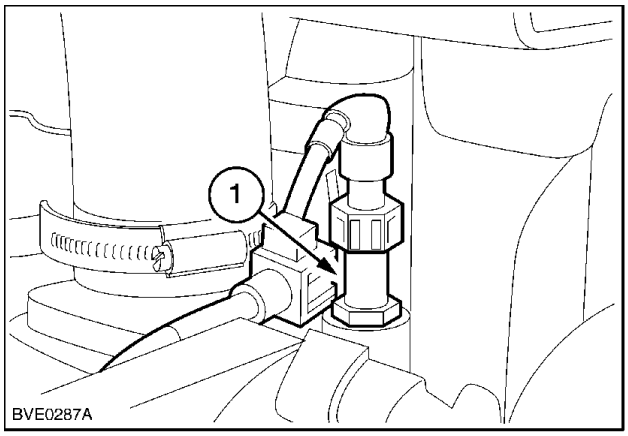
BAIL06CCM247ASA 1

Fan and drive Belt tensioner - Install

1. Install the drive belt tensioner assembly retaining bolt **(1)** and tighten to the specified torque value. Refer to **Fan and drive Belt tensioner - Torque (B.50.A)**.

Sensing system Coolant temperature - Remove

1. Disconnect the coolant temperature sensor electrical connector and remove the coolant temperature sensor **(1)**.



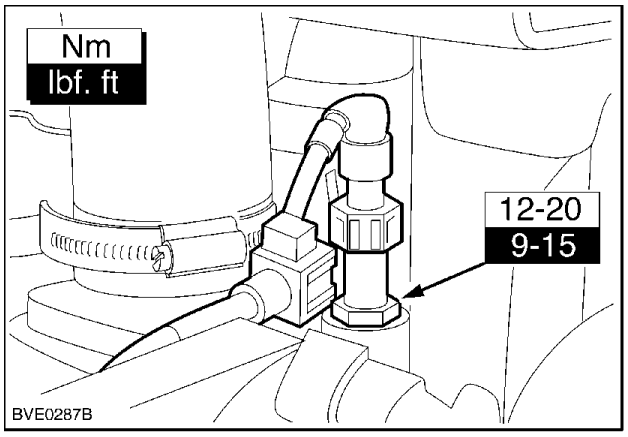
BVE0287A 1

Next operation:
Sensing system Coolant temperature - Install (B.50.A).

Sensing system Coolant temperature - Install

Prior operation:
Sensing system Coolant temperature - Remove (B.50.A).

1. Apply sealant to the threaded portion of the new coolant temperature sensor body and tighten the coolant temperature sensor to the specified torque value. Refer to **Sensing system Coolant temperature - Torque (B.50.A)**.



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LUBRICATION SYSTEM - 60.A

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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Oil pump - Torque

PART	TORQUE
Bolts securing oil pump to engine block M8 x 1.25 x 35 (x 13) M8 x 1.25 x 50 (x 2)	**25 Nm +/- 5 Nm** (**18.4 lbft +/- 4 lbft**)

Oil pan - Torque

Part	TORQUE
Bolts securing oil pan.	Refer to **Oil pan - Tighten (B.60.A)**
M10 x 1,5 x 45 bolts	**50 Nm +/- 5 Nm** (**37 lb ft +/- 4 lb ft**)
M10 x 1,5 x 90 bolts	**70 Nm +/- 5 Nm** (**52 lb ft +/- 4 lb ft**)
M10 x 1,5 x 125 bolts	**70 Nm +/- 5 Nm** (**52 lb ft +/- 4 lb ft**)
M10 x 1,5 x 190 bolts	**70 Nm +/- 5 Nm** (**52 lb ft +/- 4 lb ft**)

Piston lubrication Spray nozzle - Torque

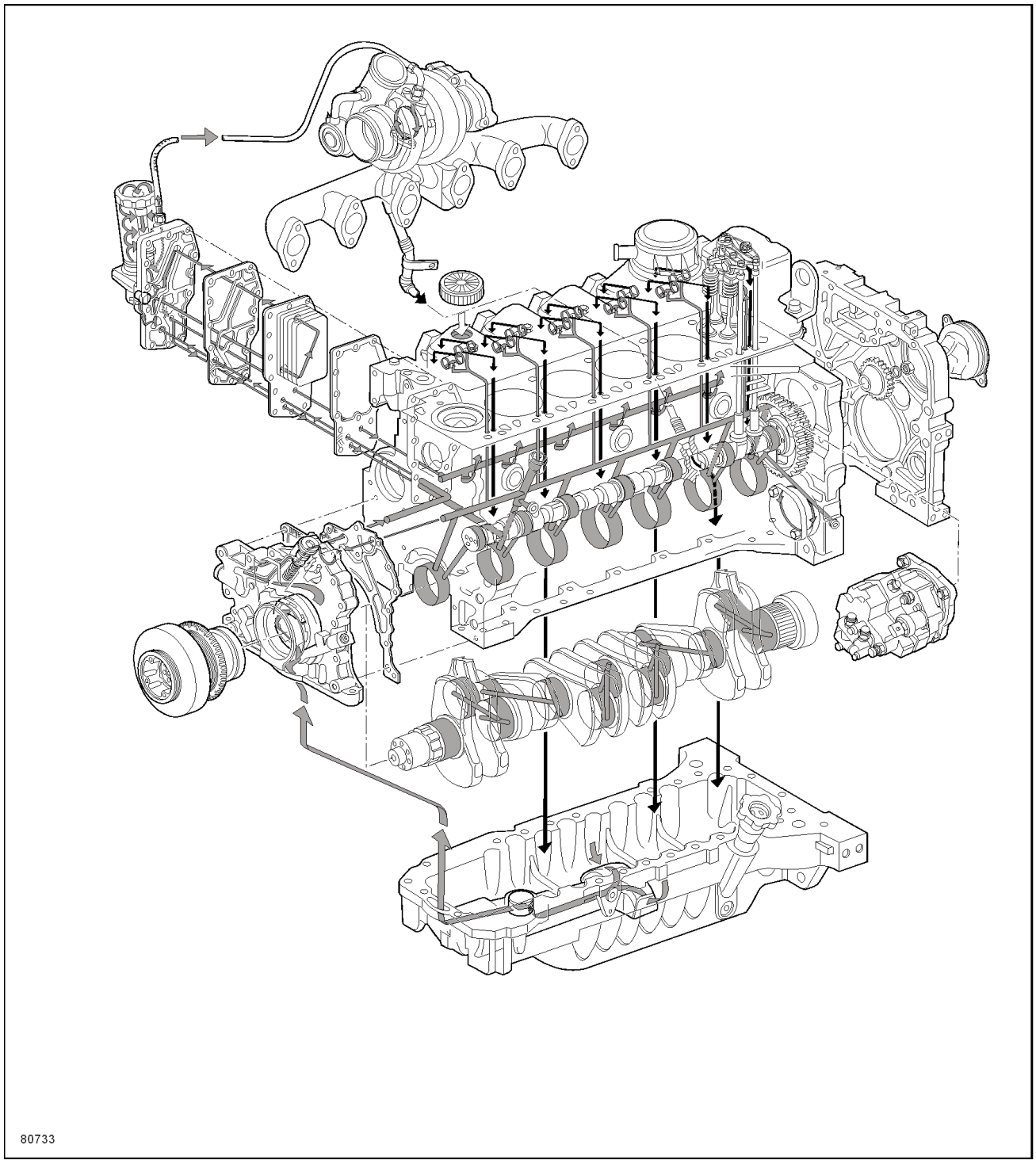
Part	TORQUE
Bolts for securing "J" Jets into engine block M10 x 1,25 x 10	**15 Nm +/- 3 Nm** (**11 lb ft +/- 2 lb ft**)

Oil cooler - Torque

Part	TORQUE Nm
Bolts for securing oil cooler to engine block.	Refer to **Oil cooler - Tighten (B.60.A)**
M8 x 1,25 x 35	**25 Nm +/- 5 Nm** (**18 lb ft +/- 4 lb ft**)
M8 x 1,25 x 100	**25 Nm +/- 5 Nm** (**18 lb ft +/- 4 lb ft**)

LUBRICATION SYSTEM - Static description

Forced-circulation lubrication is accomplished by the oil pump, housed at the front of the crankcase.
The lubricating oil is sent from the oil sump to the crankshaft, camshaft and valve control.
Lubrication also includes the cooler, turbo-blower and compressor for the compressed air system if there is one.
All these components often change according to use and will therefore be covered under the specific heading.



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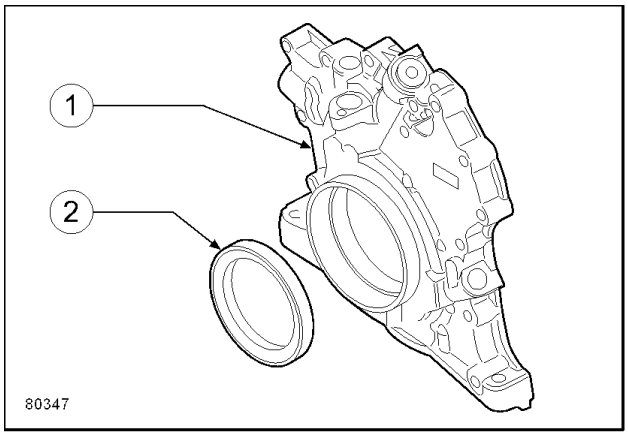
Pressurized oil

Oil under gravity

Oil pump - Install

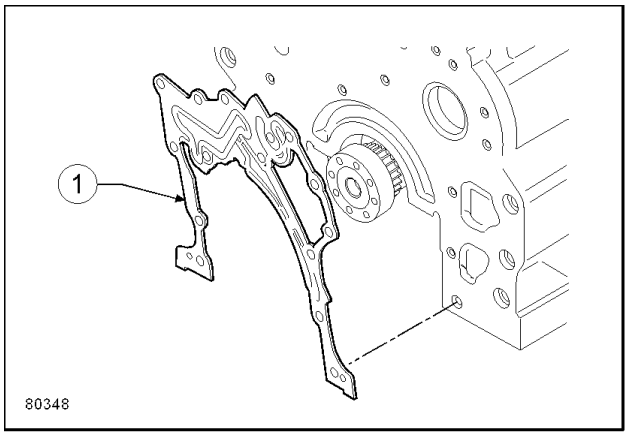
Prior operation:
Crankshaft Front seal - Remove (B.10.A), **Oil pump - Remove (B.60.A)**, **Water pump - Install (B.50.A)**.

1. If not already removed, remove the seal **(2)** from the front cover **(1)**.
   Carefully clean the mating surface.



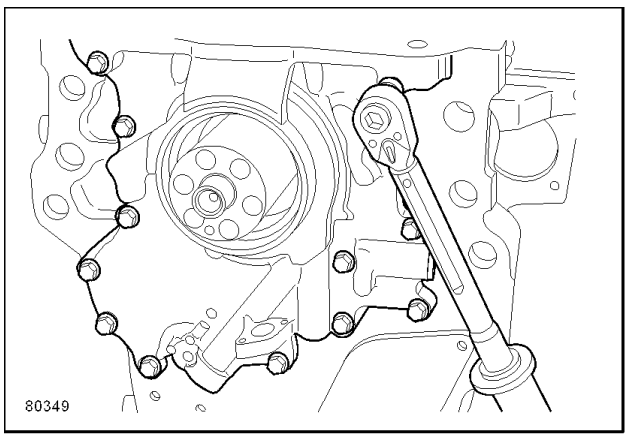
80347 1

2. Carefully clean the contact surface on the engine block and position the gasket **(1)** on the crankcase.



80348 2

3. Mount the oil pump **(2)** on the engine block and screw down the bolts, tightening them to the prescribed torque, refer to **Oil pump - Torque (B.60.A)**.



80349 3

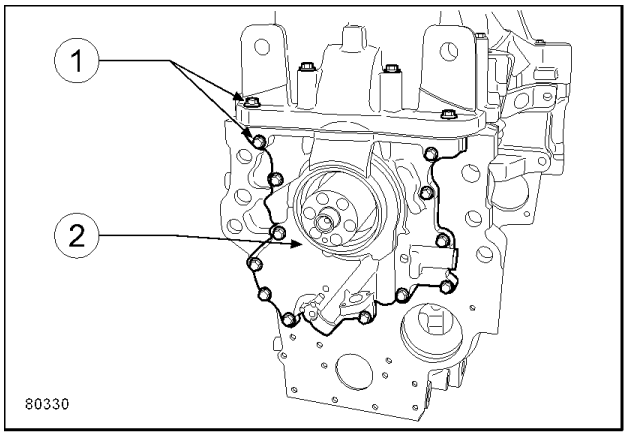
Next operation:
Crankshaft Front seal - Install (B.10.A).

Oil pump - Remove

Prior operation:
Crankshaft Front seal - Remove (B.10.A).

1. Take out the screws **(1)** and remove the oil pump **(2)**.

NOTE: *Note down the assembly position of the screws (1) as they have different lengths.*

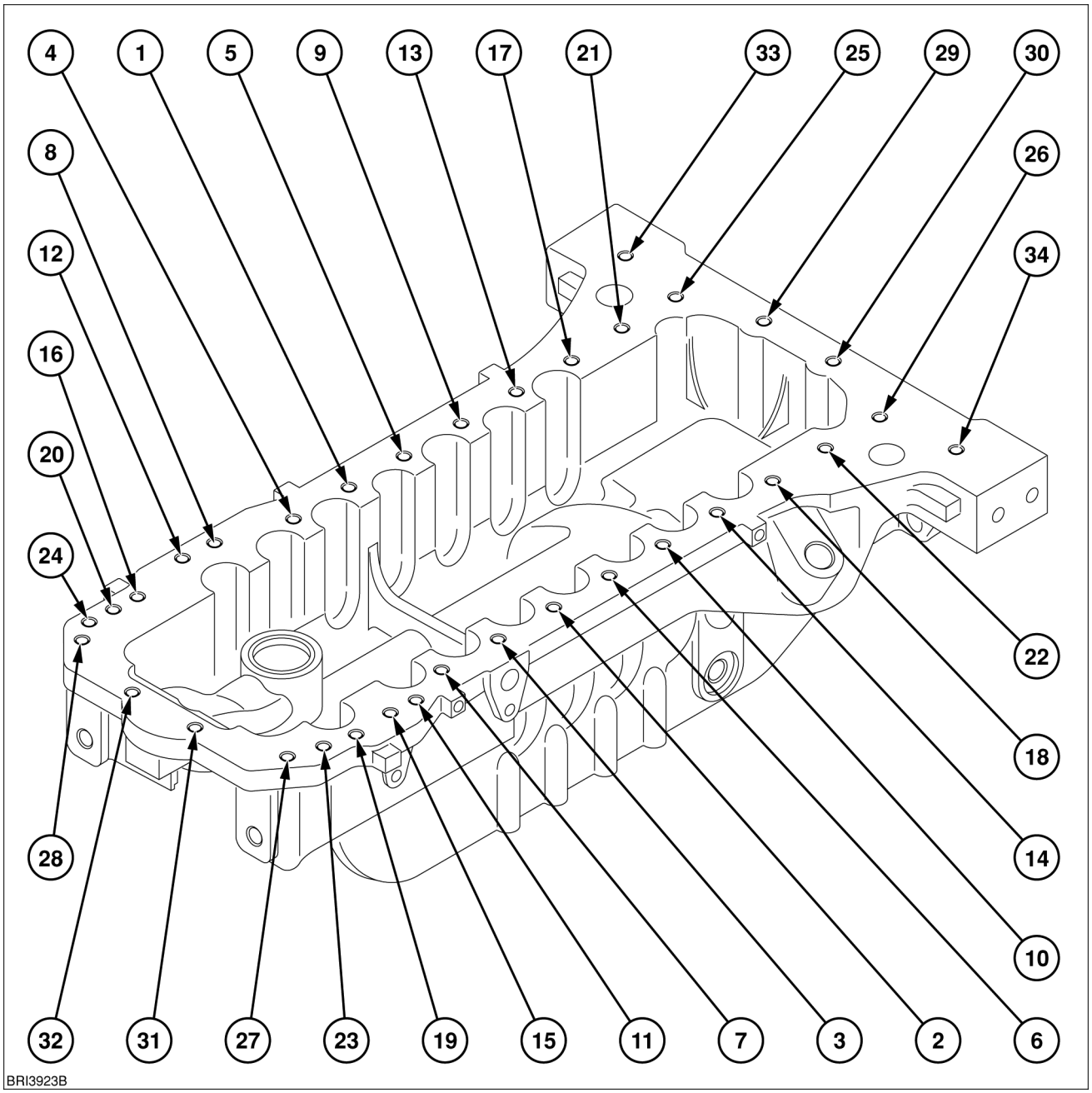


80330 1

Next operation:
Oil pump - Install (B.60.A), **Flywheel - Remove (B.10.A)**.

Oil pan - Tighten - Sequence.

1. Tightening sequence for oil pan bolts.

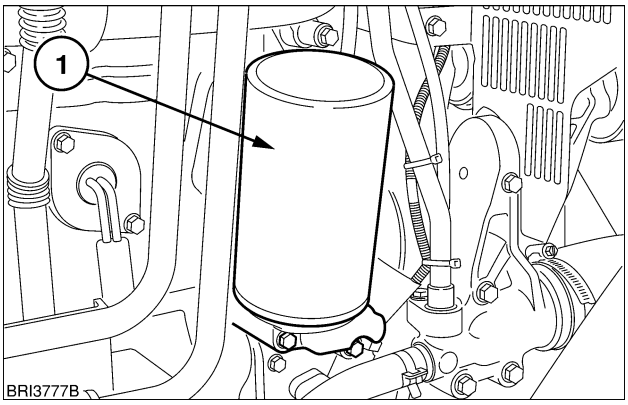


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For required torque settings, refer to Oil pan - Torque (B.60.A).

Oil filter - Remove

1. Remove the oil filter **(1)** by unscrewing the filter assembly using a suitable tool.

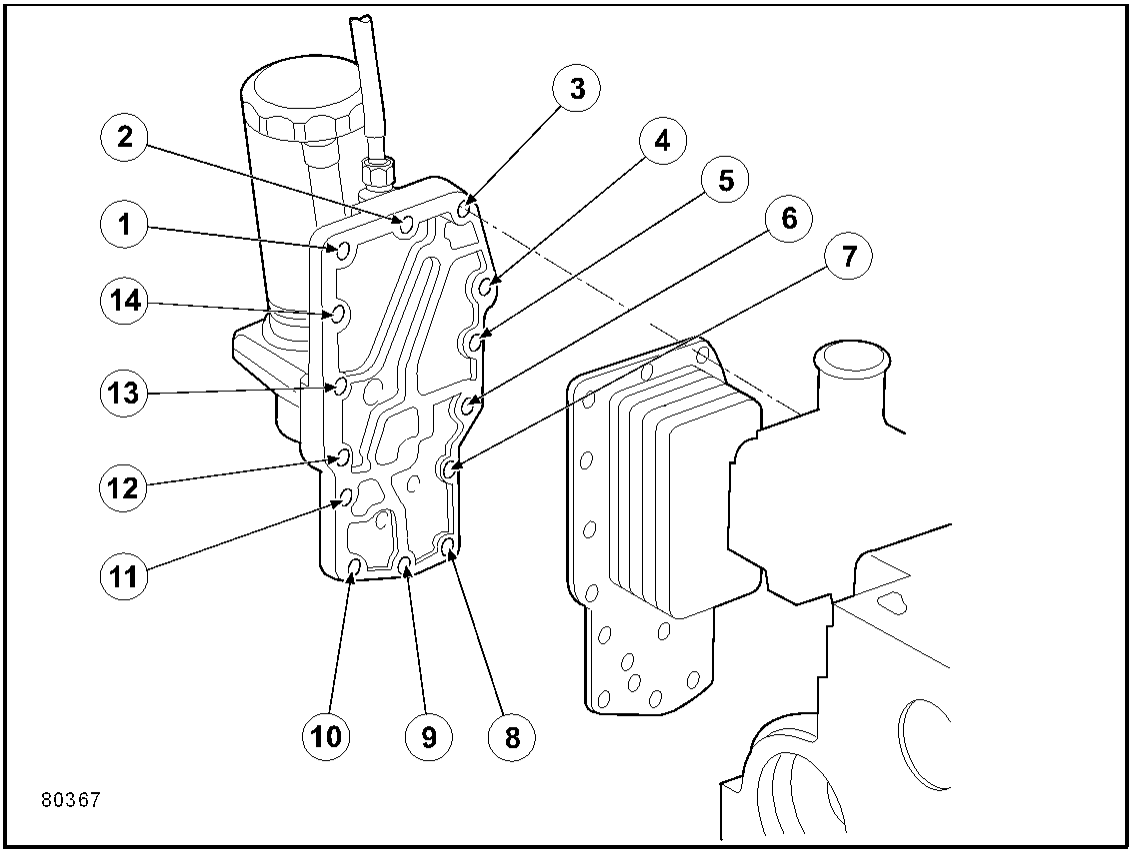


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Next operation:
Oil cooler - Remove (B.60.A)

Oil cooler - Tighten - Sequence.

1. Tightening sequence for oil cooler bolts.



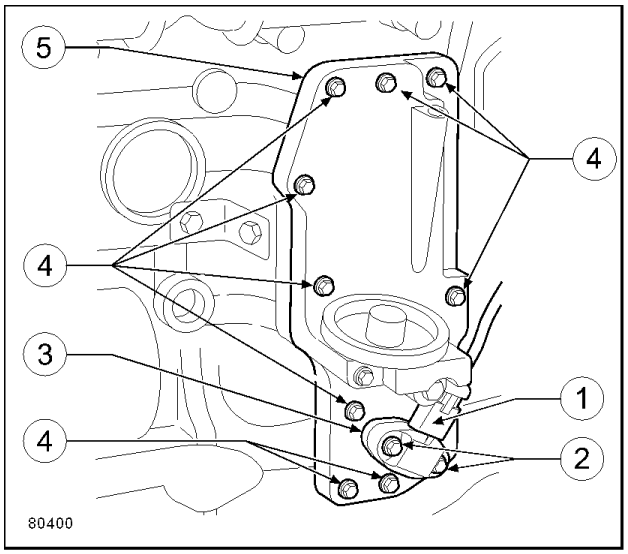
80367_89 1

For the required torque settings, refer to Oil cooler - Torque (B.60.A).

Oil cooler - Remove

Prior operation:
Oil filter - Remove (B.60.A)

1. Disconnect the connector **(1)** from the oil pressure - temperature sensor.
   Unscrew the bolts **(2)** and remove the oil pressure - temperature sensor **(3)**.
   Unscrew the bolts **(4)** and remove the oil filter mounting **(5)** from the crankcase together with its seals.
   Remove the cooler from its seat.



80400 1

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POWER PRODUCTION - B

STARTING SYSTEM - 80.A

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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Remove 8
Install 9

Engine starter - General specification

	Starter Type - Iskra Gear Starter
Rated Voltage	**12 V**
Rated Power	**4.2 Kw**
Direction of rotation	Clockwise
Maximum No Load Current Draw at **11.5 volts** and **4000 rev/min**.	**120 amps**

Engine starter - Torque

Description	Torque
Starter Motor mounting bolts M10 x 1.50 x 35mm	**43 Nm +/- 5** (**31.7 lbft +/- 4**)

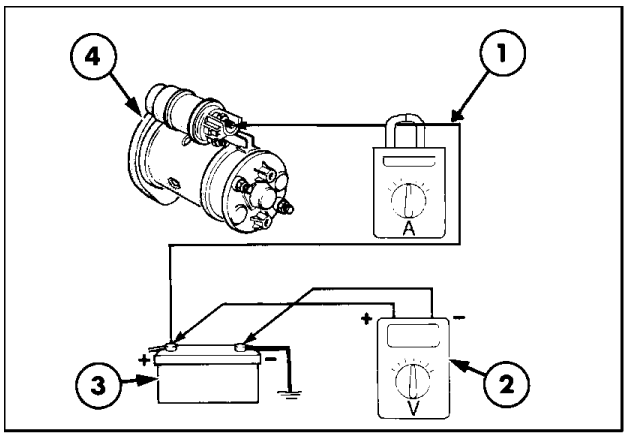
Engine starter - Test

1. For easier and rapid diagnosis and for most conclusive test results, it is recommended that a battery-starter tester (high rate discharge tester) incorporating a **0 - 20 V** voltmeter and a **0 - 1000 A** ammeter be used to diagnose starting system problems.
   When using test equipment follow the manufacturers recommended test procedures. If test equipment is not available the following test procedure, using a standard **0 - 20 V** voltmeter and **0 - 1000 A** ammeter can be used to determine the correct operation of the starter without removing it from the engine.
   Before testing :
   Check that the battery is fully charged.
   Check the complete starting system wiring circuit for frayed or broken wires or loose terminal connections.
   Check the engine is not seized.

Engine starter - Electrical test Starter Motor Circuit Current Draw

Starter Motor Circuit Current Draw

1. Attach a suitable clamp meter, **(1)**, with a **0 - 1000 A** range, over the battery positive cable.
   Connect the voltmeter **(2)** positive lead to the battery positive terminal and the voltmeter negative lead to the battery negative terminal.
   To prevent engine start up during cranking remove the engine processor fuse, Fuse 33, refer to, **Fuse and relay box - General specification (A.30.A)**.
   Crank the engine while observing the voltmeter and ammeter readings. The voltage should remain steady at around **10 - 12 V** with between **250 - 400 A** being drawn.



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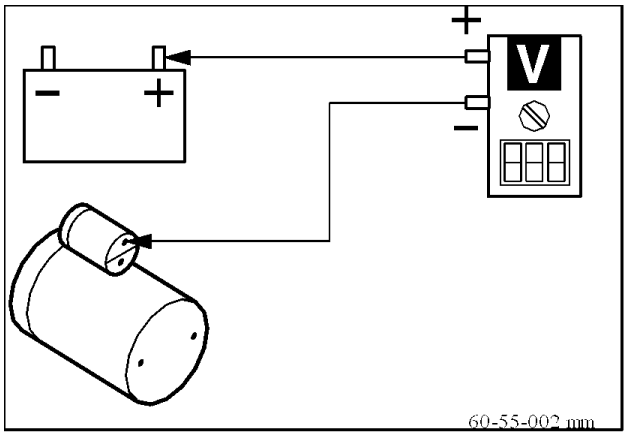
2. If the current draw is within specification the starting motor **(4)** is functioning correctly. If the voltage drops during the test proceed to 'Starting System Circuit Resistance'.
3. If the current draw is greater than specified, check the circuit as outlined below. If the starting system circuit tests are satisfactory the starting motor is defective and must be replaced or renewed.
4. If the current draw is less than specified, the starting motor is defective and must be replaced or renewed..

   If there is an excessive current draw the circuit should be checked by recording voltage drops across the individual components in the circuit

IMPORTANT: *Disconnect the fuel injection pump fuel shut off solenoid wire.*

Battery Positive Cable :

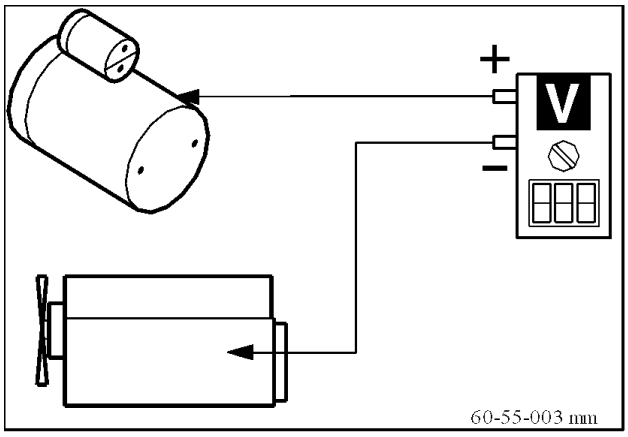
5. Connect the voltmeter positive lead to the battery positive terminal.
   Connect the voltmeter negative lead to the starting motor solenoid battery terminal.
   Crank the engine while observing the voltmeter reading. If the voltage exceeds **0.2 V**, check and tighten the cable connections. Recheck the voltage, if still excessive install a new cable.



60-55-002 2

Starting Motor Ground Connections :

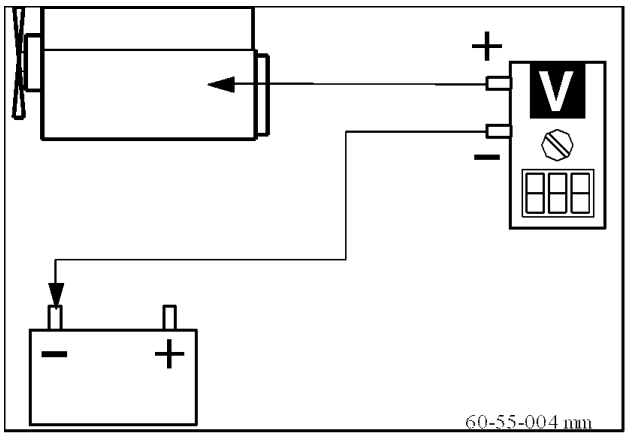
6. Connect the voltmeter positive lead to the starting motor frame.
   Connect the voltmeter negative lead to the engine block.
   Crank the engine while observing the voltmeter reading. If the voltmeter reading exceeds **0.2 V** check the ground connections between the starting motor flange and the rear engine plate.



60-55-003 3

Battery Ground Cable :

7. Connect the voltmeter positive lead to the engine block.
   Connect the voltmeter negative lead to the battery negative terminal.
   Crank the engine while observing the voltmeter reading. If the reading exceeds **0.2 V**, check and tighten the ground cable connections. Recheck the voltage, if it is still excessive install a new ground cable.



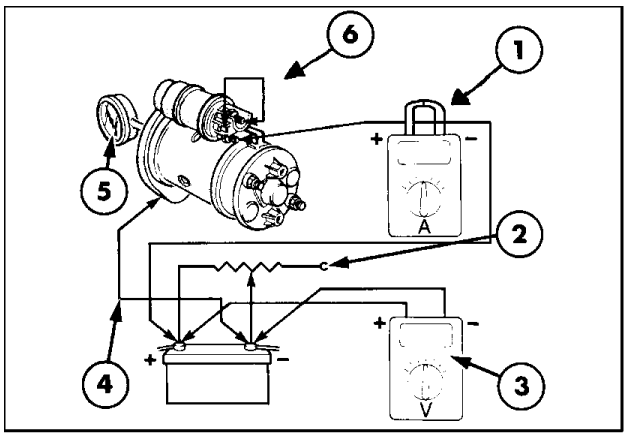
60-55-004 4

Engine starter - Electrical test Starter Motor No Load Bench Test.

Prior operation:
Engine starter - Remove (B.80.A).

Starting Motor No-Load Test:

1. Secure the starting motor in a vice equipped with soft jaws.
   Connect the battery negative cable **(4)** to the starting motor mounting flange.
   Connect a voltmeter **(3)** positive lead to the battery positive terminal, the voltmeter negative lead to the battery negative terminal.
   Connect the battery positive cable to the starting motor terminal and attach a suitable clamp meter **(1)**, over the cable.
   Connect a short jumper lead **(6)** between the solenoid battery and solenoid switch terminals.
   Hold a hand tachometer **(5)** on the end of the armature shaft. Set the starting motor by adjusting the carbon pile **(2)** to give **11.7 V**. When the armature rotates above **4000 RPM**. the maximum current draw should not exceed **150 A**.
   If the starting motor does not perform to specification, renew or replace starter motor.



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NOTE: *A fully charged battery and a battery starter tester (high rate discharge tester) with a carbon pile (variable load resistor) should be used to perform this test.*

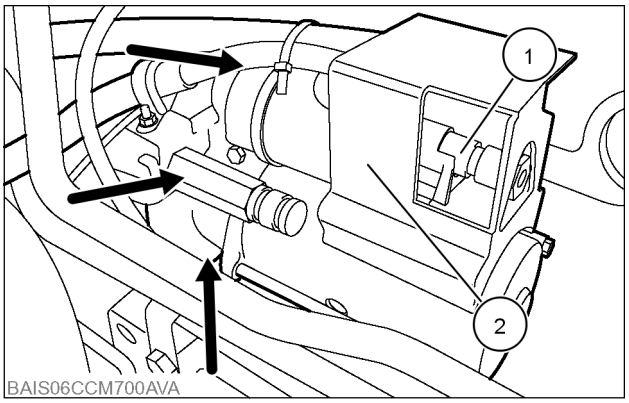
NOTE: *Connecting the jumper lead will cause the starter to operate.*

Drive Pinion Assembly

2. Check the operation of the roller clutch. The pinion should rotate clockwise only. If the pinion is stuck or rotates in both directions, or if the pinion teeth are damaged, renew or replace starter motor assembly.
   If damaged pinion teeth are evident, check the flywheel ring gear teeth as described in **Flywheel - Install (B.10.A)**.

Engine starter - Remove

1. Disconnect the battery ground (negative) cable from the battery, refer to, **Battery - Disconnect (A.30.A)**. Undo the 'positive clamp' brass stud, **(1)** located within the red protective cover **(2)** and remove the protective cover from the solenoid assembly. Disconnect the positive cables to the solenoid and the solenoid coil feed wire.
   Remove the three starting motor mounting bolts and remove the starting motor from the engine.

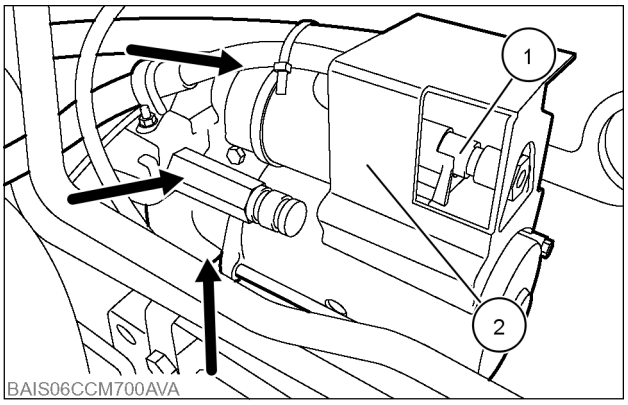


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Engine starter - Install

ATTENTION: *Ensure that the mating faces of the starter motor and starter motor housing are clean and free from debris.*

1. Mount the starter motor into the starter motor housing and secure into position with the starter motor mounting bolts.
2. Torque starter motor mounting bolts to recommended specification. Refer to **Engine starter - Torque (B.80.A)**.
3. Reconnect the solenoid feed wire and solenoid positive supply wire. Refit the protective cover **(2)** and install the 'positve clamp' brass stud **(1)**.



BAIS06CCM700AVA 1

4. Reconnect the battery, refer to **Battery - Connect (A.30.A)**.

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SERVICE - Technical Publications & Tools



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SERVICE MANUAL

POWER TRAIN



PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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POWER TRAIN - C

TRANSMISSION Powershift - 20.E

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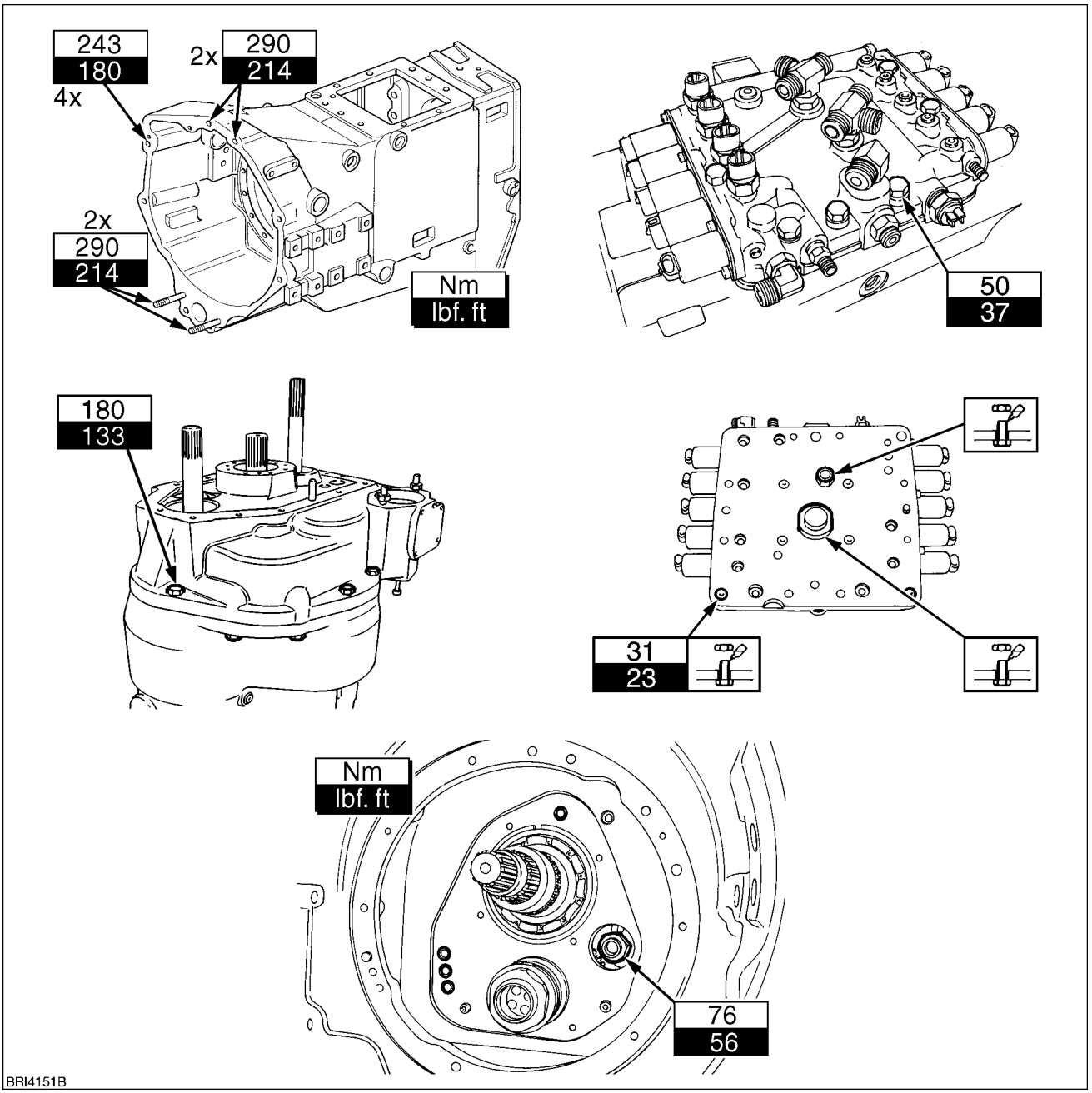
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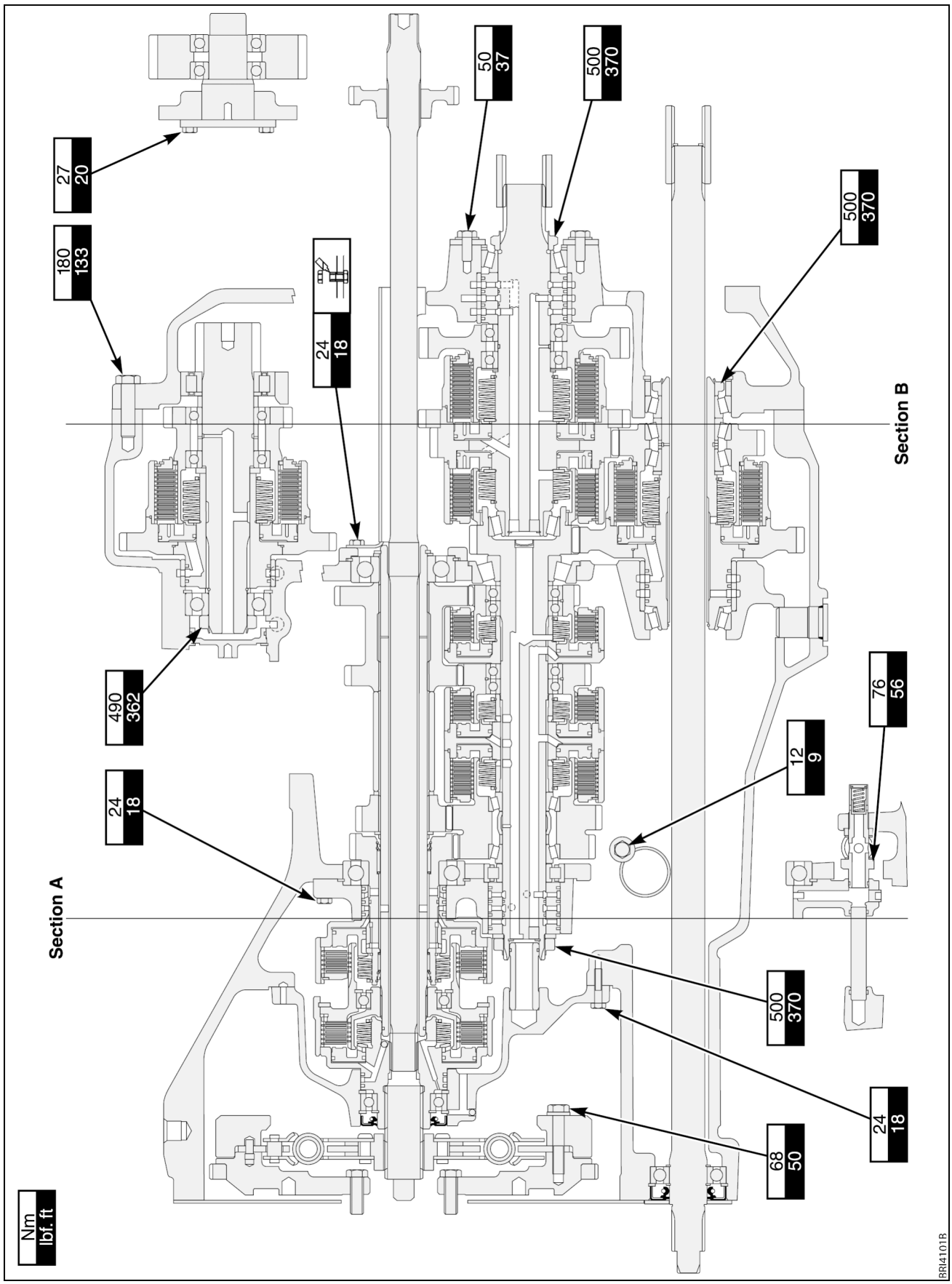
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TRANSMISSION Powershift - Torque

		Tightening Torques	
		lbf.ft	NM
Bolts, transmission housing to rear axle housing	M14	150	**200 Nm**
Bolts, transmission housing to rear axle housing	M16	220	**295 Nm**



BRI4151B 1


Nm
lbf. ft
27 20
180 133
24 18
50 37
500 370
500 370
490 362
24 18
Section A
Section B
12 9
76 56
500 370
24 18
68 50
RRI4101R

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TRANSMISSION Powershift - Special tools

⚠ **CAUTION** ⚠

The operations described in this section can only be carried out with the ESSENTIAL tools indicated by an (X). To work safely and efficiently and obtain the best results, it is also necessary to use the recommended specific tools listed below and certain other tools, which are to be made according to the drawings included in this manual.

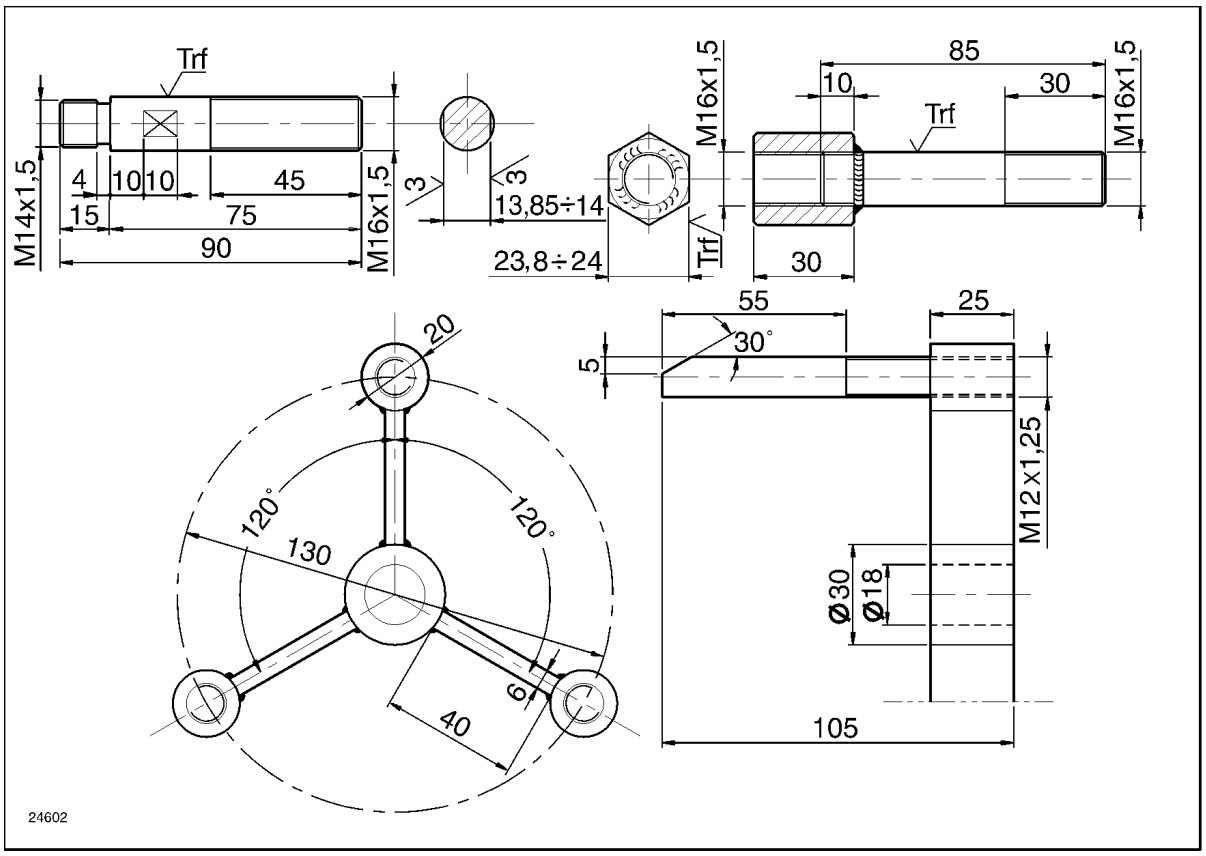
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List of special tools necessary to carry out the different operations described in this Section:

Description	Tool Number
Overhaul rotary stand.	**380000301**
Quick Release Coupler	**380000543** *
Range input and output shaft end play test tool (use with 380000568 or 50018)	**380000458**
Output shaft spanner (**65 mm**).	**380000459**
Clutch spring compressor.	**380000291**
Diagnostic Switch	**380000488** (X)
Limp Home Harness	**380000489**
Range input and output shaft bearing adjustment tool.	**380000568**
Tractor Splitting Kit.	**380000569**
Transmission end casing lifting hook 3 off).	**380000495**
Medium clutch shaft adaptor (for lifting and endfloat adjustment)	**380000496**
Medium and 'C' clutch hub bearing setting tool	**380000497** X)
Manifold bush removal tool	**380000498**
Transmission overhaul brackets (use with stand tool no. **380000301**).	**380000499**
Lifting Brackets (set of two)	**380000403**
Puller	**380000546**
Slide hammer.	**380000549**
Clutch air test adaptor	**380000449**
Clutch air test adaptor	**380000450**
Clutch air test adaptor	**380000451**
Pressure test kit	**380000240**
Adaptor 1/8 npt	**380000544** *
Hose	**380000545** *
40 bar pressure gauge	**380000552** *
7/16 unf male quick release adaptor	**380000492**
Adaptor m10 x 1.0 7/16 unf female	**380000493**
Adaptor m10 banjo x 7/16unf female	380000572#
Adaptor m14 banjo x m14 x 1.5p female	380000579#
* part of kit **380000240**	
#part of kit 380000599	

* part of kit
#part of kit

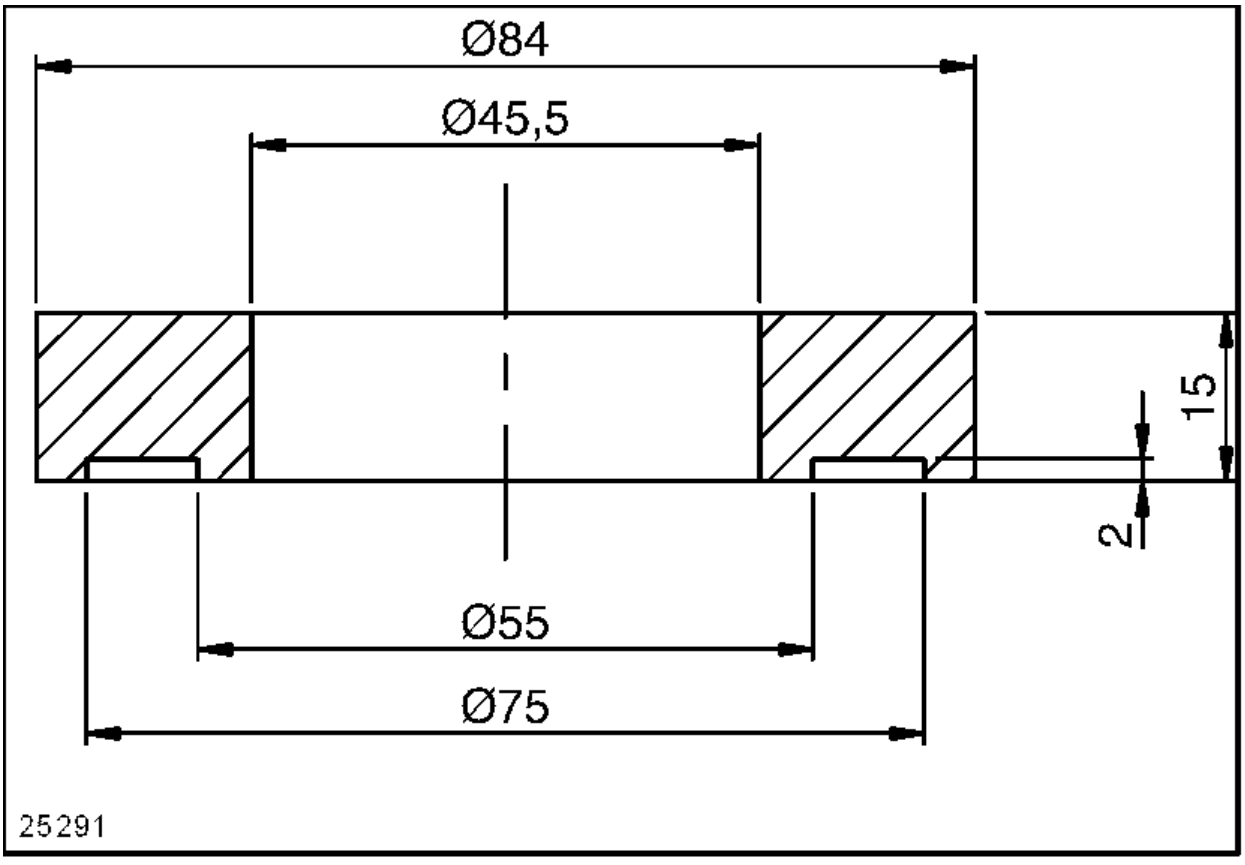
Tool to be fabricated for range input and output shaft bearing adjustment (Mark tool with no. 50018 - Dimensions in mm). Fabricate tool using Aq 42 material.



24602_713 1

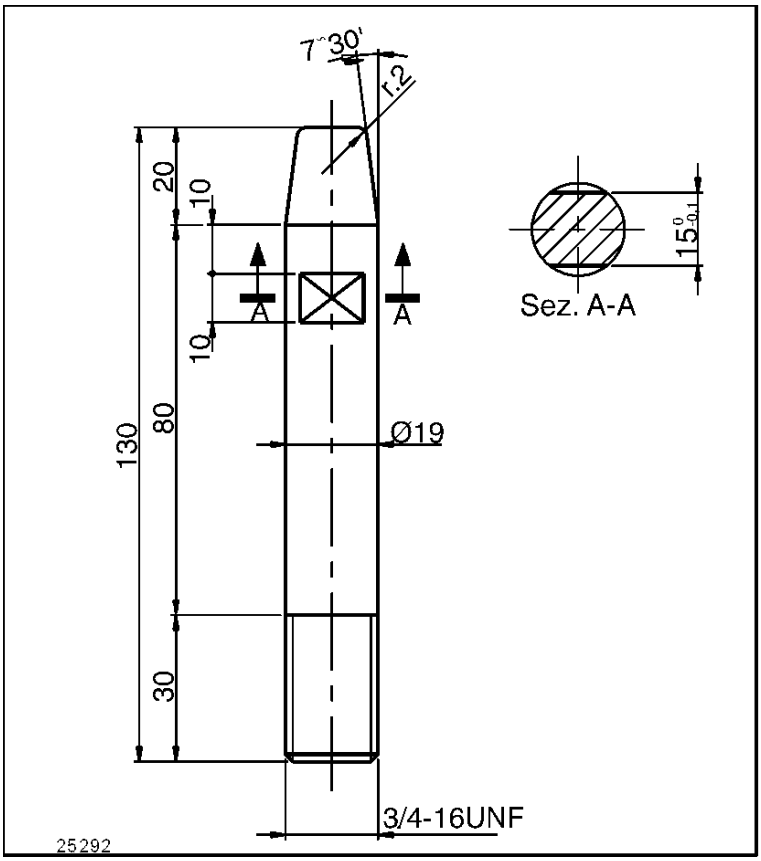
NOTE: *Dealer made tool 50018 can also be purchased as Tool Number* ***380000568***

Tool to be fabricated for input and output shaft bearing assembly (Mark tool with no. 50108 - Dimensions in mm). Fabricate tool using UNI C40 material.



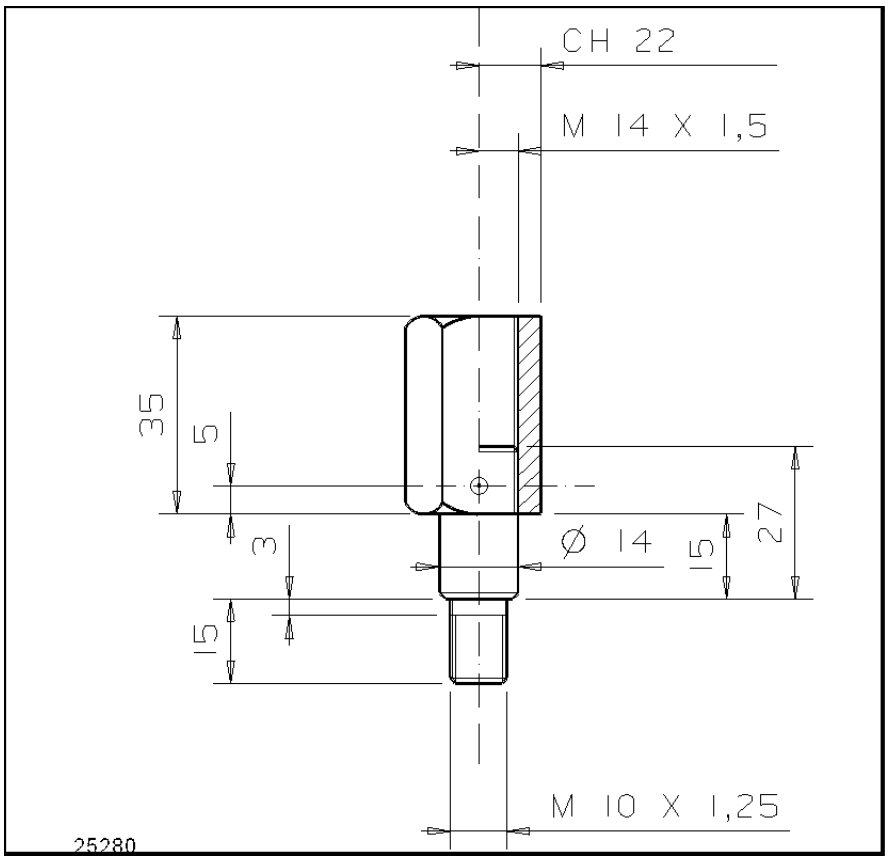
25291_714 2

Alignment pins to be fabricated for engine and speed clutch/transmission housing removal/installation (Mark tool with no. 50117 - Dimensions in mm).
Fabricate tool using UNI C40 material.



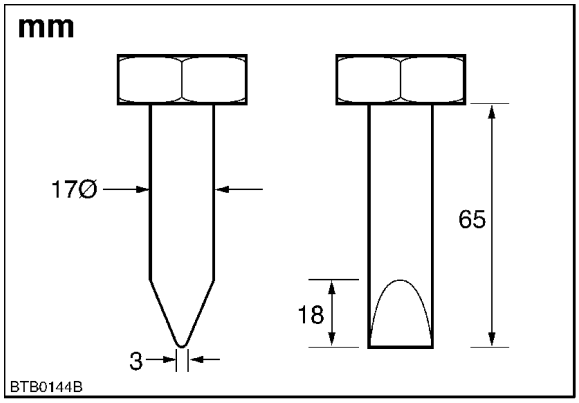
25292_715 3

Adapter to be fabricated for reverse idler gear pin removal (Mark tool with no. 50143 - Dimensions in mm).
Fabricate tool using UNI C40 material.



25280_716 4

Transmission Locking Tool (Manufacture locally)



BTB0144B_717 5

TRANSMISSION Powershift - General specification

Transmission **40 Km/h**	18 forward and 6 reverse gears, controlled by nine hydraulically engaged clutches via processor driven PWM valves.
50 Km/h	As per **40 Km/h** with additional clutch located in rear axle centre housing enabling a 19th gear direct drive from engine flywheel via PTO input shaft.
Gear type	helical toothed, constant mesh
Rear to Front Axle ratio	1.343
Speed shift controls	by two buttons located on the control lever
Transmission lubrication	Supplied from steering priority valve, return side of steering motor and supplementary valve on charge pressure circuit
Number of driven discs-Clutch A	5
- Thickness of driven discs - Clutch A mm	2.65 - 2.75

Number of drive discs - Clutch A		5
- Thickness of drive discs - Clutch A	mm	1.80 - 2.00
Multi-pack clutch A thickness under a load of **163 kg** (**1600 N**)	mm	23.5 - 23.7
Number of Belleville springs - Clutch A		7
- Free spring length - Clutch A	mm	32
- Compressed spring length under a load of **215 kg** (**2108 N**)	mm	23
Number of driven discs-Clutch B		5
- Thickness of driven discs - Clutch B	mm	2.65 - 2.75
Number of drive discs - Clutch B		5
- Thickness of drive discs - Clutch B	mm	1.80 - 2.00
Multi-pack clutch B thickness under a load of **163 kg** (**1600 N**)	mm	23.5 - 23.7
Number of Belleville springs - Clutch B		7
- Free spring length - Clutch B	mm	32
- Compressed spring length under a load of **215 kg** (**2108 N**)	mm	23

SPECIFICATIONS

continued

Number of driven discs-Clutch C		8
- Thickness of driven discs - Clutch C	mm	2.70 - 2.80
Number of drive discs - Clutch C		8
- Thickness of drive discs - Clutch C	mm	1.5-1.7
Multi-pack clutch C thickness under a load of **163 kg** (**1600 N**)	mm	26.2 - 26.4
Number of Belleville springs - Clutch C		8
- Free spring length - Clutch C	mm	54.7
- Compressed spring length under a load of **182 kg** (**1784 N**)	mm	46
Number of driven discs-Clutches D-E		6
- Thickness of driven discs - Clutches D-E	mm	2.70 - 2.80
Number of drive discs - Clutches D-E		6
- Thickness of drive discs - Clutches D-E	mm	1.5-1.7
Multi-pack clutches D-E thickness under a load of **163 kg** (**1600 N**)	mm	26.2 - 26.4
Number of Belleville springs - Clutches D-E		6
- Free spring length - Clutches D-E	mm	4.1
- Compressed spring length under a load of **182 kg** (**1784 N**)	mm	3.22
Number of driven discs-Fast Clutch		10
- Thickness of driven discs - Fast Clutch	mm	2.70 - 2.80
Number of drive discs - Fast Clutch		10
- Thickness of drive discs - Fast Clutch	mm	1.5-1.7
Multi-pack Fast clutch thickness under a load of **163 kg** (**1600 N**)	mm	42.9-43.1
Number of Belleville springs - Fast Clutch		8
- Free spring length - Fast Clutch	mm	38.4
- Compressed spring length under a load of **4820 N**	mm	24.4
Number of driven discs - Slow Clutch		14
- Thickness of driven discs - Slow Clutch	mm	2.70 - 2.80
Number of drive discs - Slow Clutch		14
- Thickness of drive discs - Slow Clutch	mm	1.5-1.7
Multi-pack Slow clutch thickness under a load of **163 kg** (**1600 N**)	mm	55.9-56.1
Number of Belleville springs - Slow Clutch		12
- Free spring length - Slow Clutch	mm	57.6
- Compressed spring length under a load of **4820 N**	mm	36.6

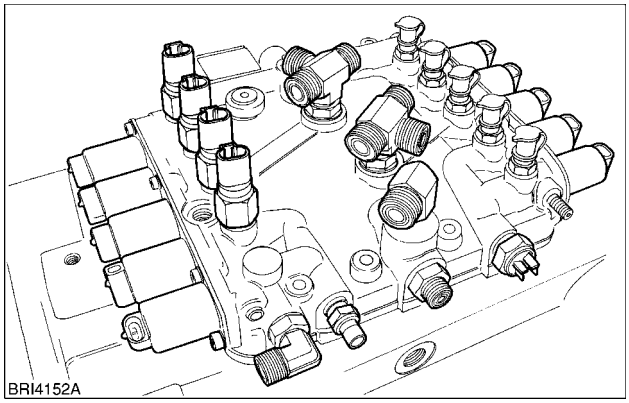
Number of driven discs - Clutches Medium & Reverse		12
- Thickness of driven discs - Clutches Medium & Reverse	mm	2.70 - 2.80
Number of drive discs - Clutches Medium & Reverse		12
- Thickness of drive discs - Clutches Medium & Reverse	mm	1.5-1.7
Multi-pack clutches Medium & Reverse thickness under a load of **163 kg** (**1600 N**)	mm	51.5-51.7
Number of Belleville springs - Clutches Medium & Reverse		12
- Free spring length - Clutches Medium & Reverse	mm	57.6
- Compressed spring length under a load of 4820	mm	36.6
PTO drive shaft **(7)** diameter at the bushing	mm	31.950 - 31.975
Press-fit bush inner diameter	mm	31.990 - 32.085 (°)
PTO drive shaft to bushes clearance	mm	0.015 - 0.135
Medium Clutch Bearing Shims (rolling resistance adjustment)	mm	**8.900 - 9.650 in** 0.025 steps
'C' Clutch Bearing Shims (rolling resistance adjustment)		**9.800 - 10.700 in** 0.025 steps
Upper speed shaft assembly shims	mm	**3.80 - 4.80 in** 0.05 steps
Output shaft and Medium clutch assembly endfloat shims	mm	**1.50 - 3.40 in** 0.05 steps
Transmission output shaft thrust washer mm	mm	3.95 - 4.00

SPECIFICATIONS - CREEPER GEARS (refer to - **ADDITIONAL REDUCERS Creeper - General specification (C.30.C)**

TRANSMISSION Powershift - Static description

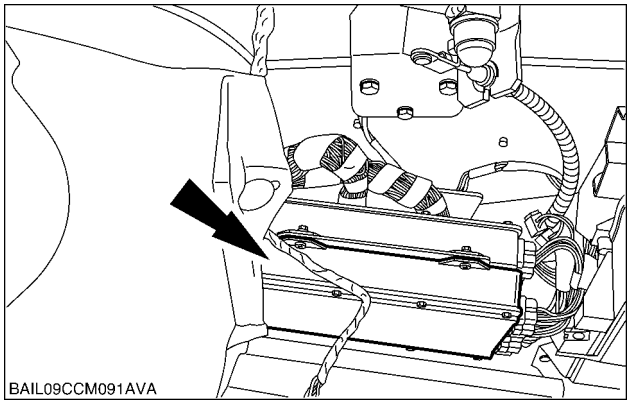
The Powershift transmission installed is available in 30, 40 and 50 Km/h variants.
The 30 and 40 Km/h variants comprise of 9 multiplate clutches providing 18 forward and 6 reverse gears located in the transmission housing. The 30 Km/h version is controlled electronically to prevent the engagement of the 18th speed.
The 50 Km/h transmission has an additional 19th gear (**50 Km/h**) clutch located in the rear axle centre housing and driven directly by the PTO input shaft from the engine flywheel.
The internal clutch arrangement is identical on all variants. An optional 10 forward and 6 reverse ratios are also available using the creeper gear option.Refer to : **TRANSMISSION Powershift - Sectional view (C.20.E)**
TRANSMISSION Powershift - Logical diagram (C.20.E)

Each clutch within the transmission is controlled by a PWM (Pulse Width Modulated) solenoid valve located in the hydraulic top cover. The identification of each solenoid valve is shown on Figure **7**



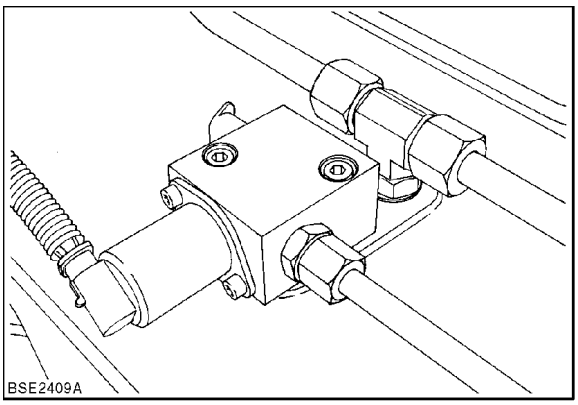
BRI4152AA 1

Engagement of the PWM Valves is controlled by the RT module **(1)** located within the cab trim behind the operators seat..



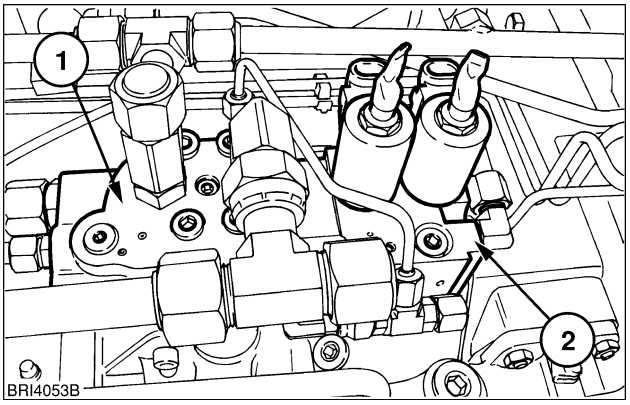
BAIL09CCM091AVA 2

Oil to energise the 19th gear **50 Km/h** clutch is directed from the **50 Km/h** PWM valve in the transmission top cover through an On/Off solenoid operated control valve mounted on top of the rear axle to the clutch. As a safety feature the **50 Km/h** 19th gear clutch can not be engaged unless power is supplied to both the 19th clutch PWM valve and the On/Off solenoid. When the On/Off solenoid is not energised all oil in the clutch piston is open to reservoir thereby allowing the clutch to disengage drive.



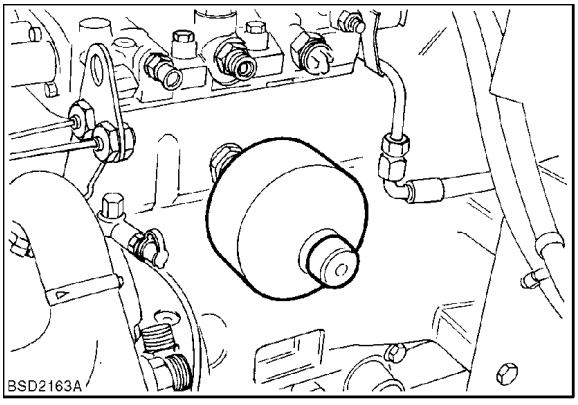
BSE2409A_119 3

Oil pressure to engage the clutches is supplied from the low pressure regulating valve **(1)** located in the valve block above the main hydraulic pump, which maintains the pressure at **23 bar**.



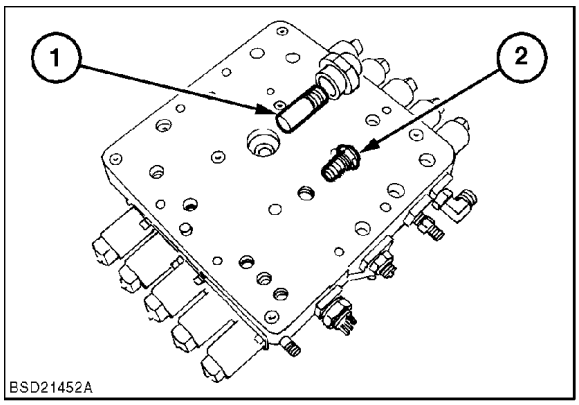
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The low pressure system also incorporates a hydraulic accumulator, located on the right hand side of the transmission. The accumulator provides instant additional oil to fill possible voids when transmission shifts involving multiple clutches are performed.

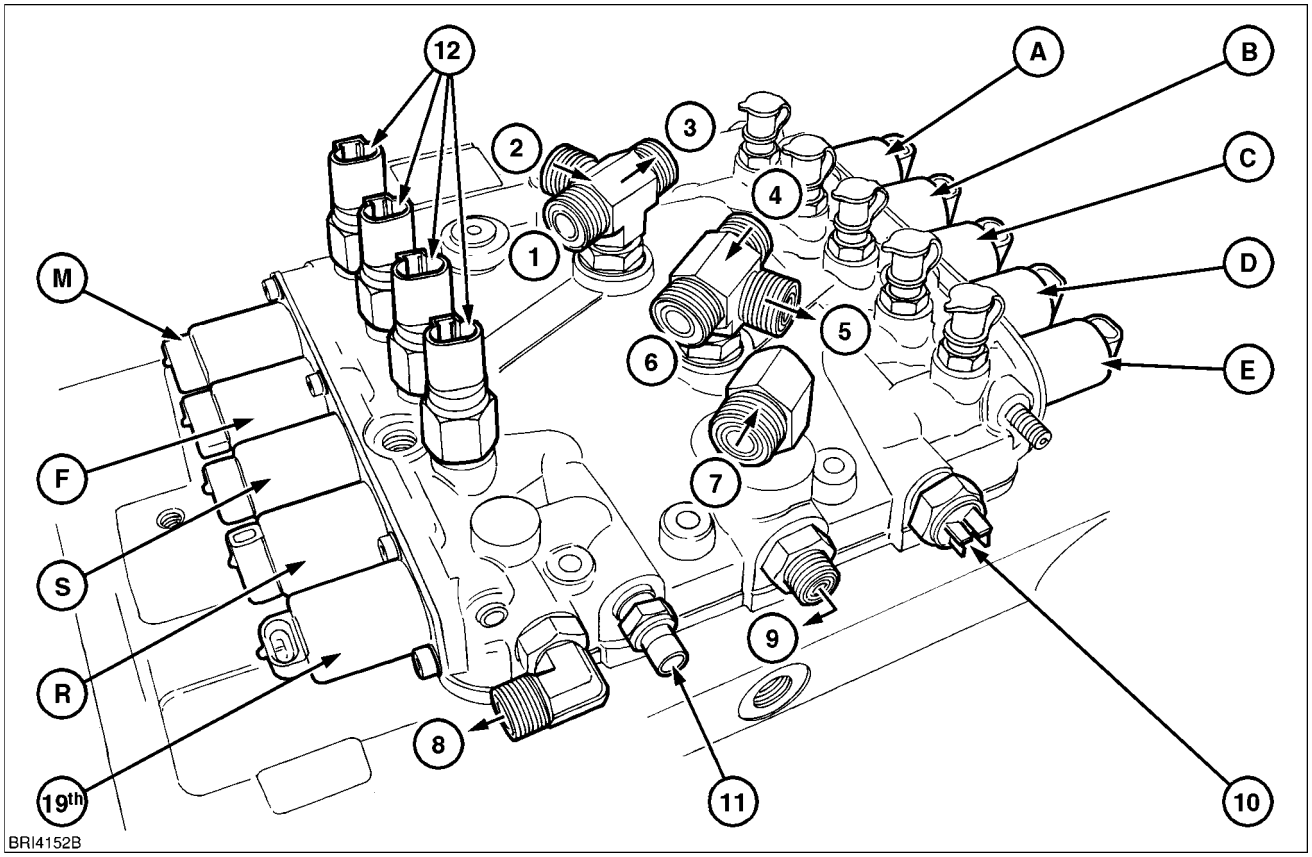


BSD2163A_121 5

Transmission lubrication oil is supplied from the lubrication circuit fed from the steering priority valve, return side of steering motor and supplementary valve on the charge pressure circuit and is controlled to a maximum pressure of **7 bar** by the lubrication relief valve **(2)**.
An oil cooler by-pass valve **(1)**, located in the transmission top cover, ensures that excessive oil pressure, generated at cold start up, or if the cooler becomes blocked, bypasses the cooler until the oil warms up and the pressure drops.



BSD21452A_122 6

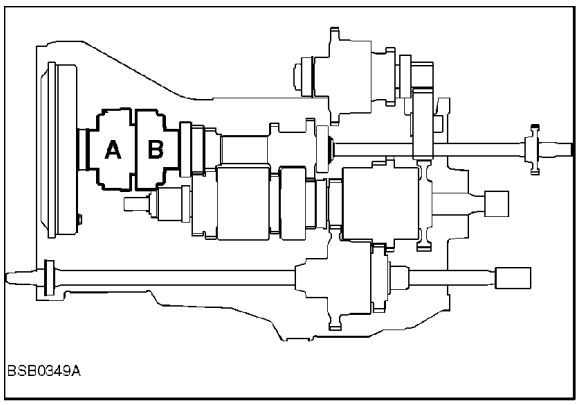


BRI4152B 7

Transmission Top Cover

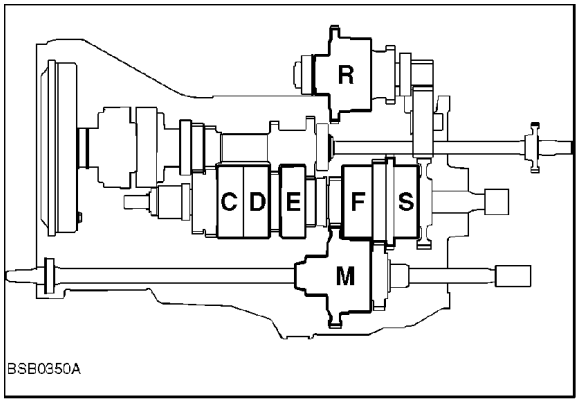
1.	From steering pump flow divider (lubrication oil)	7.	Low pressure feed for transmission
2.	Return from steering motor	8.	Feed to 19th gear dump solenoid
3.	To oil cooler	9.	Low pressure supply to brake booster circuit
4.	Return from oil cooler	10.	Low pressure oil - low pressure warning switch
5.	Supplementary lubrication oil from charge circuit	11.	Transmission oil temperature sensor
6	To lubrication circuit		
A.	Transmission Clutch A solenoid	D.	Transmission Clutch D solenoid
B.	Transmission Clutch B solenoid	E.	Transmission Clutch E solenoid
C.	Transmission Clutch C solenoid		
M	Medium Range clutch solenoid	R	Reverse range clutch solenoid
F	High range clutch solenoid	19	19th gear clutch solenoid (**50 Km/h**)
S	Low range clutch solenoid		

The transmission clutches can be broken down into groups as follows:
A and B clutches - Located at the front of the transmission providing high ratio and low ratio output.



BSB0349A_19 8

C, D and E clutches - Located in the central part of the transmission each provide a single speed. Using either the A or B clutch with any of the C, D and E clutches provides six speeds:
F (fast), S (slow), M (medium) and R (reverse) clutches, located at the rear of the transmission provide a further 3 forward ranges and 1 reverse range, enabling the transmission to provide 18 forward and 6 reverse ratios.

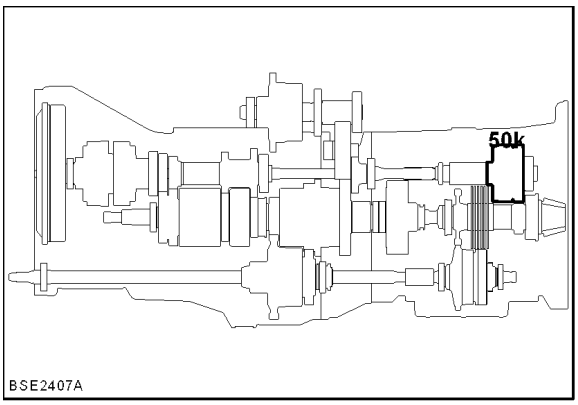


BSB0350A_20 9

RANGE SPEED	S	M	F	R
AC	1	7	13	R1
BC	2	8	14	R2
AD	3	9	15	R3
BD	4	10	16	R4
AE	5	11	17	R5
BE	6	12	18	R6

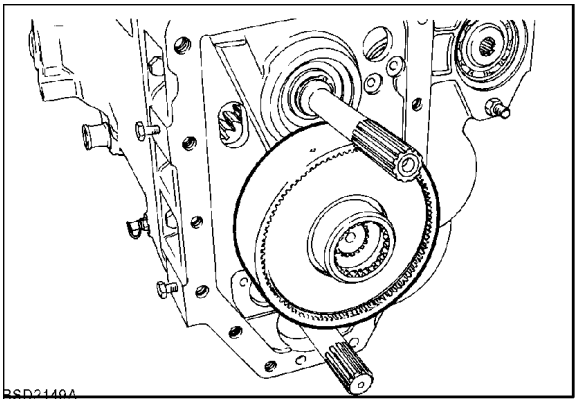
The above chart identifies which groups of clutches are energised for each gear selected in speeds 1 to 18 and the chart shown on **TRANSMISSION Powershift - Logical diagram (C.20.E)**, illustrates the powerflow for each gear.

The optional **50 Km/h** 19th clutch in the rear axle housing is used solely to provide the 19th gear ratio.
When 19th gear is selected no other clutches are energised and drive is direct from the engine flywheel through the PTO input shaft.



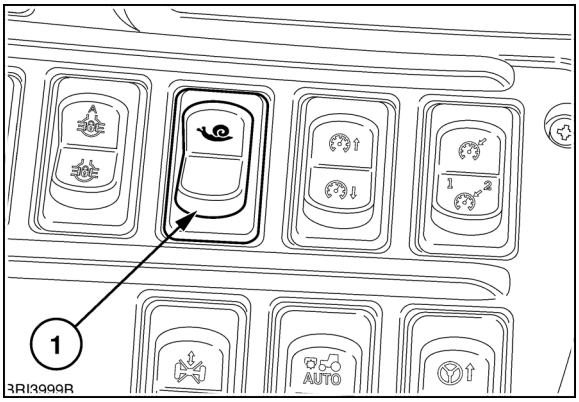
BSE2407A_124 10

The creeper option provides drive through the creeper epicylic gears for further reduced speeds in forward gears 1 to 10 and all 6 reverse gears.
When the tractor is equipped with the creeper option the creeper epicyclic assembly is located on the rear of the housing.



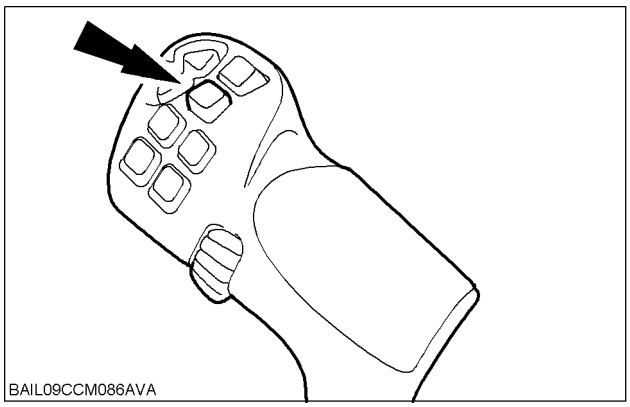
BSD2149A_125 11

Creeper is engaged by depressing the lower part of the selector switch **(1)** while the engine is running, the transmission lever is in neutral and the footbrakes are applied.
To disengage creeper gears, repeat the above procedure and depress the selector switch again.



BRI3999B 12

The creeper gears are selected using the following procedure. Downshift to 1st gear and, with the engine running, depress and hold the clutch and brake pedals. Depress and hold the downshift button until the transmission shifts to 10th gear in the creeper range.

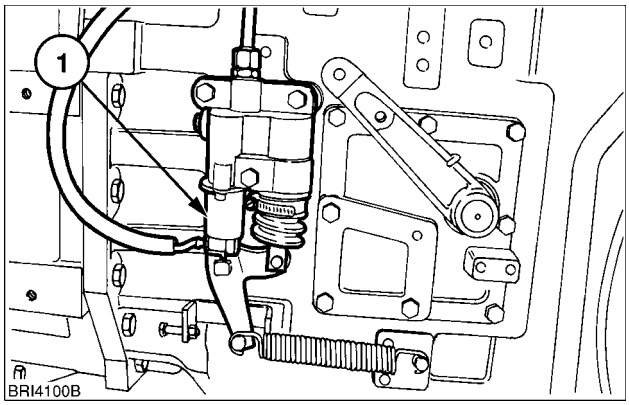


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The symbol for the creeper speeds will appear in the transmission display.

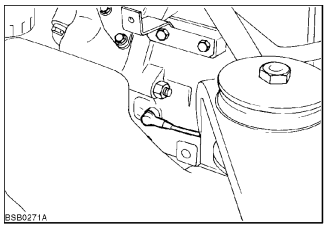
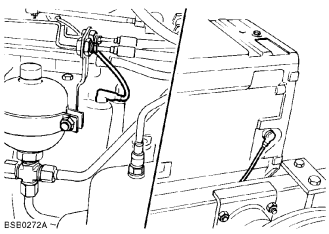
Release the downshift button and the clutch and brake pedals. The appropriate creeper speed can now be selected using the upshift and downshift buttons. To re-engage the standard gear ratios, upshift to 10th creeper speed and depress/hold the clutch and brake pedals. Hold down the transmission upshift button until 1st gear is engaged, the creeper symbol will disappear from the display.

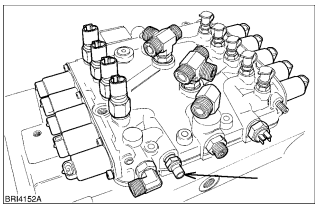
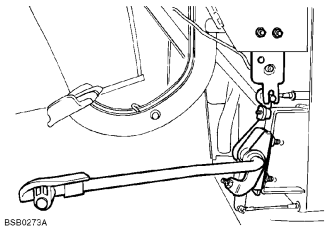
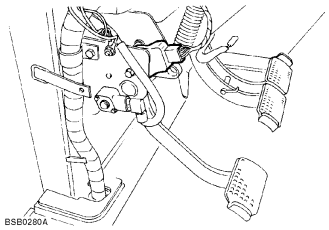
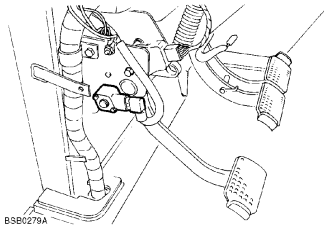
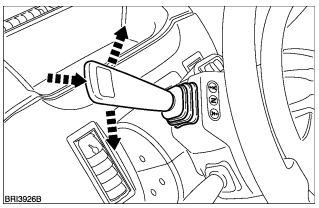
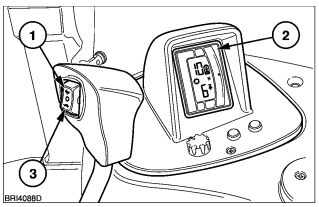
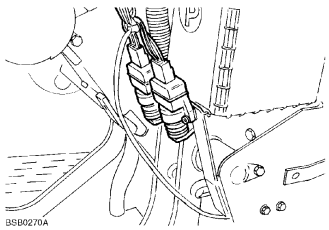
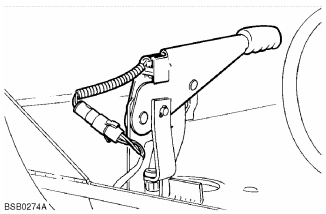
When the creeper is activated the solenoid **(1)** on the left hand side of the tractor is energised allowing low pressure oil to operate the engagement piston and actuate the mechanical linkage. When the solenoid is de-energised the low pressure oil in the piston is open to reservoir and the spring loaded linkage disengages.

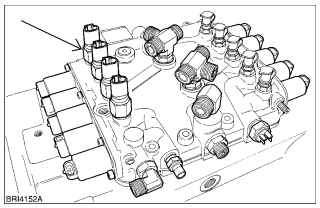
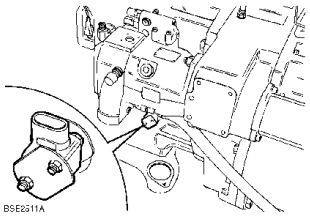
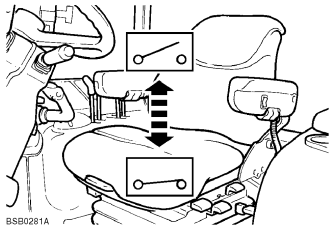
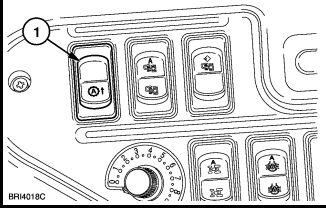


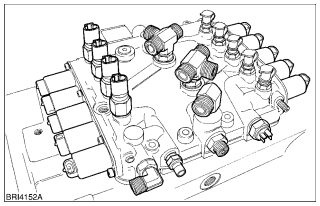
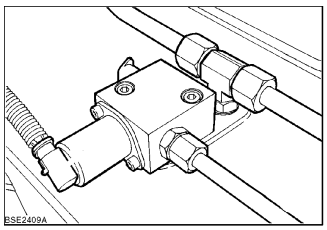
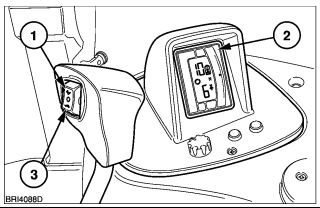
BRI4100B 14

The engagement of the clutches is controlled by inputs from various sensors and switches:-

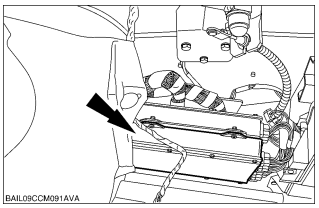
INPUT SENSORS		
DESCRIPTION	FUNCTION	LOCATION
Engine Torque/RPM Sensor	Measures engine speed and torque by means of flywheel damper spring deflection. Depending on the torque being transmitted will assist in determining when a gear shift will occur	
Transmission Output speed and Mid-speed sensors	Measures transmission output speed and speed of the transmission at the input to the range section. The speeds are compared to assist in determining clutch engagement times	

Transmission oil temperature sensor	Measures temperature of the oil to provide compensation for hot/cold oil conditions.	
Foot throttle assembly potentiometer and idle speed switch	Submits inputs to the Engine Control Module on throttle position and fault codes.	
Clutch pedal disconnect switch	Disengages power to range clutches (fast/slow/med/rev and 19 gear **50 Km/h**) PWM valves, thereby disengaging drive.	
Clutch pedal potentiometer	Provides operator controlled engagement of the feathering (range) clutches.	
Shuttle lever	Provides information to the processor,via switches, for forward, reverse and neutral transmission drive selection.	
Gear shift switches	Allows the operator to shift ratios via push buttons switches sending a signal to the processor.	
Footbrake switches	Informs the processor of when the brakes are being applied to assist in ratio shifts during auto function operation.	
Handbrake switch	To be applied during calibration, error code if not applied. Tractor will drive if handbrake applied but audible alarm sounds.	

Pressure switches for fast/slow/med/rev clutches	These monitor for possible stuck valves. If pressure is indicated in more than one circuit drive will be shut down and an associated error code will be displayed.	
Creeper engaged potentiometer	Informs the processor when creeper has been engaged, preventing selection of certain higher ratios.	
Seat switch	Seat switch must be operated, ie, operator seated, before the processor allows engagement of forward or reverse drive. (Note, a faulty switch can be over ridden by the clutch pedal). Also prohibits start-up and transmission calibration if not engaged.	
Auto Function Select Switch	Sends a signal to the processor to select the auto shift functions	

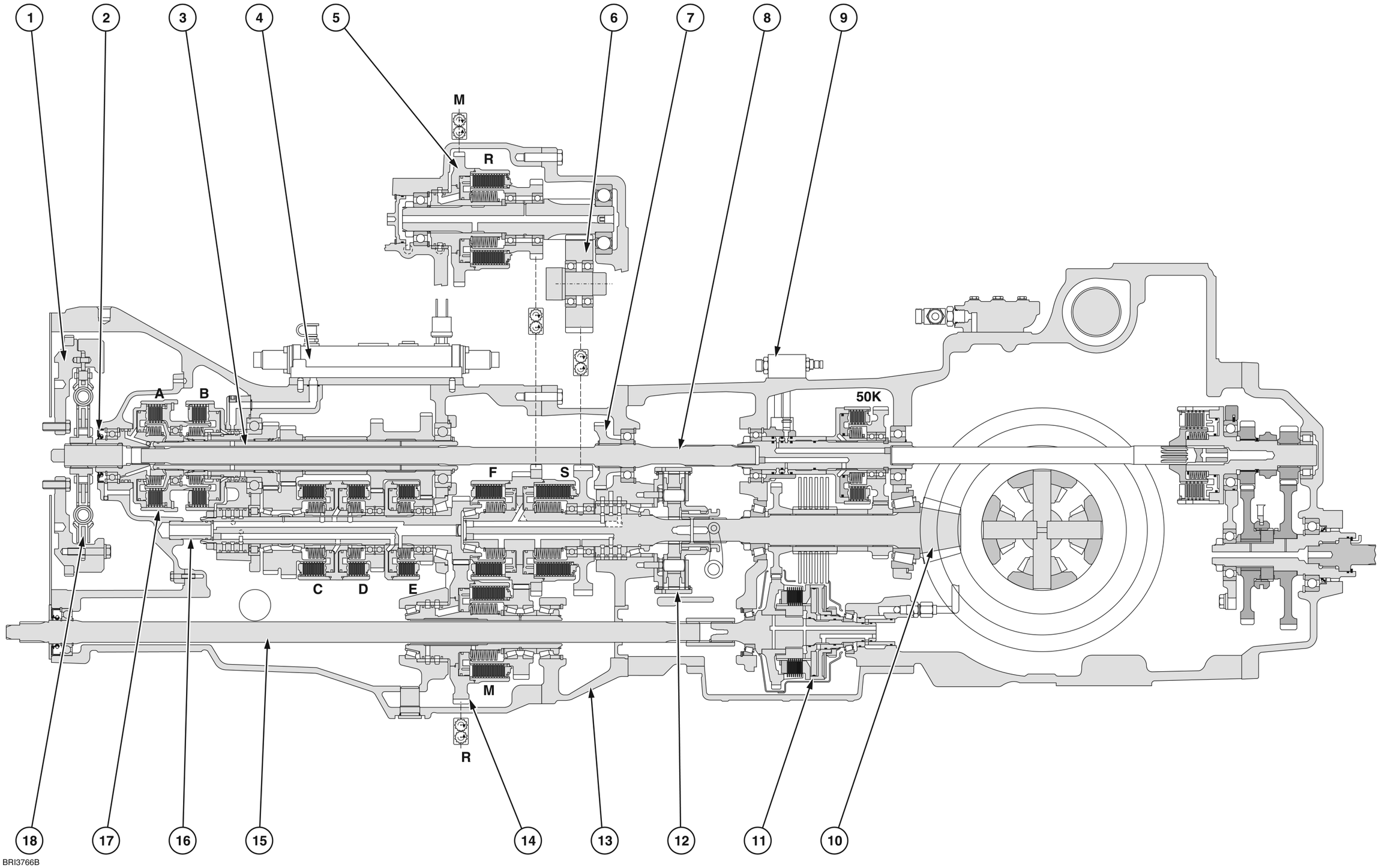
OUTPUT DEVICES		
DESCRIPTION	FUNCTION	LOCATION
Clutch PWM valves, A,B,C,D,E and fast/slow/med/rev/ **19 - 50 Km/h**	Controls oil to the clutches to engage/disengage the clutches via a signal from the processor.	
19th clutch On/Off Dump Solenoid	Returns 19th clutch oil to reservoir disengaging drive through the clutch when the **19 - 50 Km/h** PWM valve is not energised.	
Gear Display Unit	Provides operator information as to which ratios are selected and pre-selected, whether auto mode is selected and error code information.	

CONTROL DEVICE -		
DESCRIPTION	FUNCTION	LOCATION

MICRO PROCESSOR	The transmission is controlled by the RT module, located within the cab trim behind the operators seat. The processor has 6, connectors and in addition to controlling the transmission also controls the electronic hydraulic lift system, the rear PTO, 4WD, differential locks and some engine control. The processor has an inbuilt diagnostic facility which can interpret a number of system faults and display an error code on the gear display unit. A full description of error codes and fault finding can be found later in this Chapter.	

TRANSMISSION Powershift - Sectional view

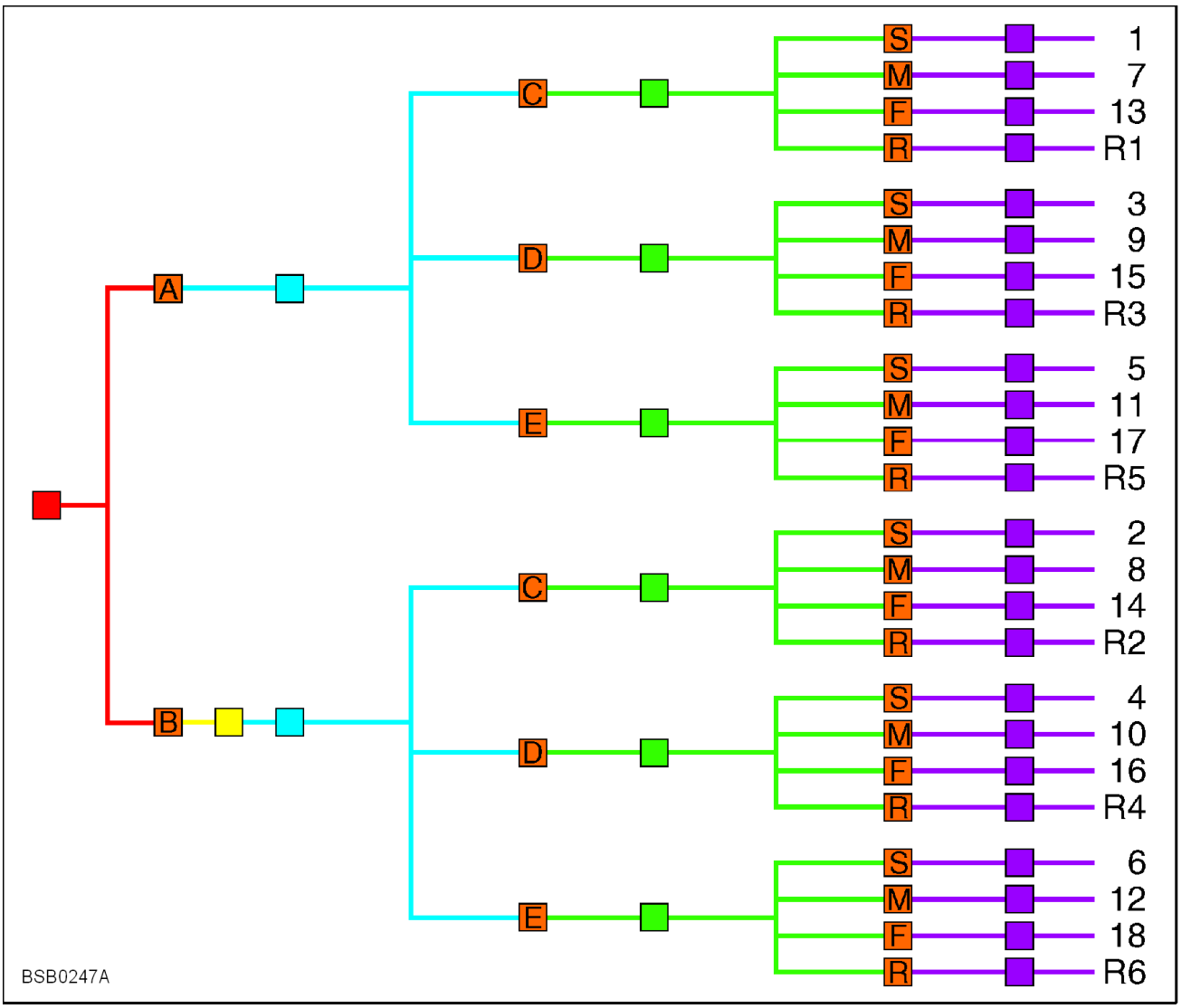
1.	Flywheel	A	A Clutch
2.	Input Shaft Seal	B	B Clutch
3.	Top Shaft Adjustment Shim	C	C Clutch
4.	Transmission Top Cover and PWM Valves	D	D Clutch
5.	Reverse Clutch Driven Gear (meshes with medium clutch driven gear)	E	E Clutch
6.	Slow Speed Idler Gear	F	Fast Range Clutch
7.	Pump Drive Gear	S	Slow Range Clutch
8.	Transmission/PTO Input Shaft	M	Medium Range Clutch
9.	**50 Kph** Clutch Control Valve	R	Reverse **(R)** Clutch
10.	Rear Axle Pinion	**50 Km/h**	**50 Kph** 19th Gear Clutch
11.	Front Wheel Drive Clutch		
12.	Creeper Gear		
13.	Transmission extension housing		
14.	Medium Clutch Driven Gear (meshes with reverse clutch driven gear)		
15.	Front Wheel Drive Shaft		
16.	Lube Oil Transfer Tube		
17.	Clutch Housing Cover		
18.	Flywheel to Transmission Damper		



BRI3766B

BRI3766B 1

TRANSMISSION Powershift - Logical diagram

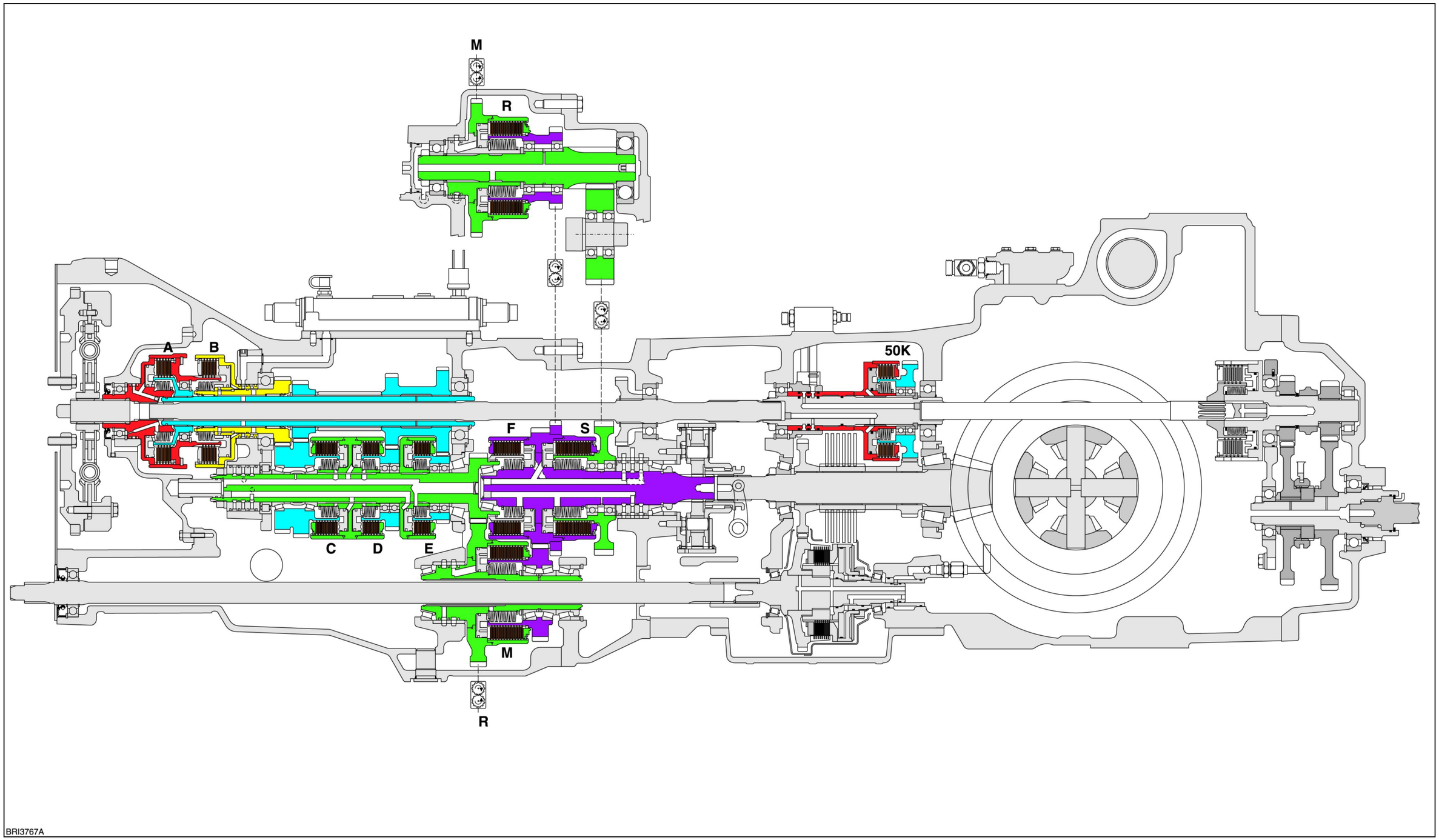


BSB0247A 1

Full Powershift Transmission Power Flows

	Transmission Output Drive		Drive after A or B clutch
	Clutch pack engaged		Drive from B clutch when B engaged
	Drive out of C,D or E clutch, depending on ratio selected		Drive in from Engine

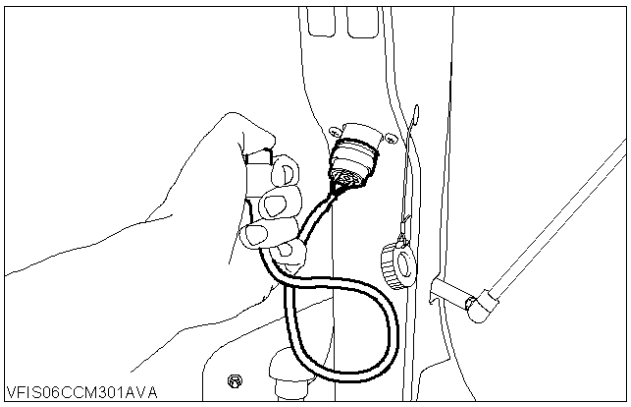
A = Clutch A
B = Clutch B
C = Clutch C
D = Clutch D
E = Clutch E
F = Fast Range Clutch
S = Slow Range Clutch
M = Medium Range Clutch
R = Reverse Range Clutch



BRI3767A 2

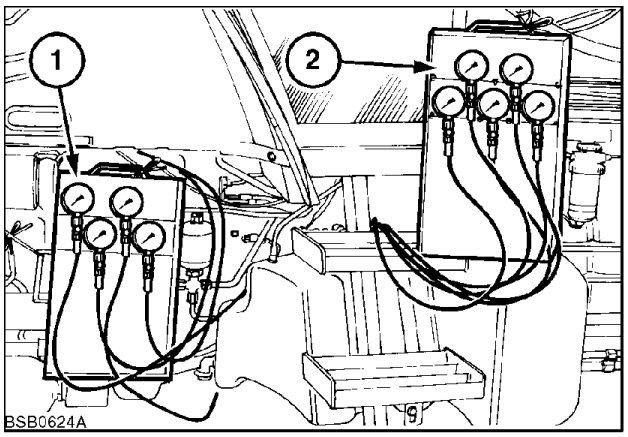
TRANSMISSION Powershift - Pressure test

1. Transmission couplings A, B, C, D, E, F1, F2, F3 and R
   These contain:
   F1 = Gear group L
   F2 = Gear group M
   F3 = Gear group H



VFIS06CCM301AVA 1

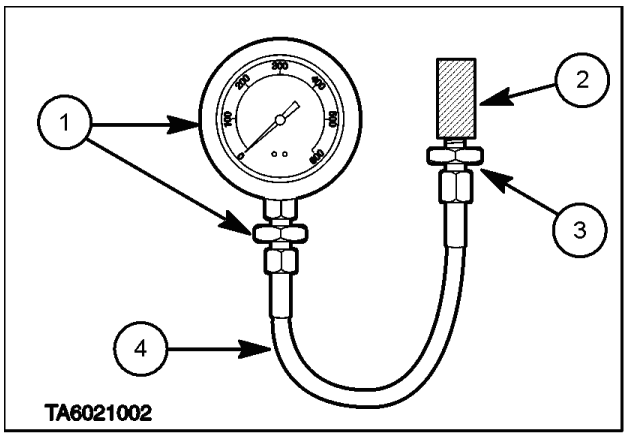
2. Prepare the tractor for the pressure test:
   (iii) Start the engine and let the tractor run in until the transmission oil has warmed up to at least **65 °C** (**145 °F**).
   (i) Make sure that the handbrake is fully applied.
   (ii) Connect the Diagnostics switch, special tool **380000843 (1)**, to the tractor's Diagnostics plug (Figure **1**).



BSB0624A_743 2

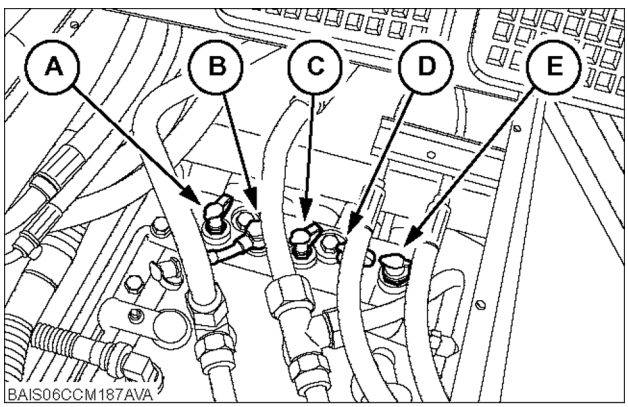
3. Connect suitable pressure gauge (**0 - 40 bar**, **0 - 600 lbf.in2**) with the appropriate fast couplings - ten of them, if available - to the individual pressure testing connections.

   1. Pressure gauge **380000552**
   2. Fast coupling adapter **380000543**
   3. Hose **380000545**
   4. Adapter (if needed) **380000544**



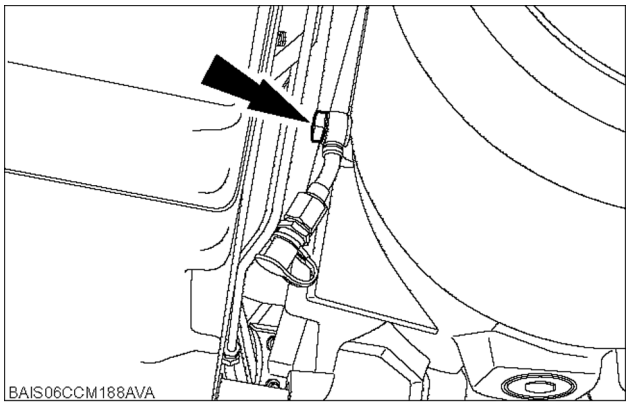
TA6021002_753 3

4. The test connections for couplings A, B, C, D and E are in the slide valve housing of the transmission control.
   If no fast couplings are fitted, unscrew the threaded connections of the test connections and screw the adapter 380000578 and the fast coupling sleeve **380000492** into the test connections A, C, D and E]. Because of its restricted accessibility, screw in ring hose nipple 380000579 , adapter 380000578 and quick coupling sleeve **380000492** into the test connector of coupling B.



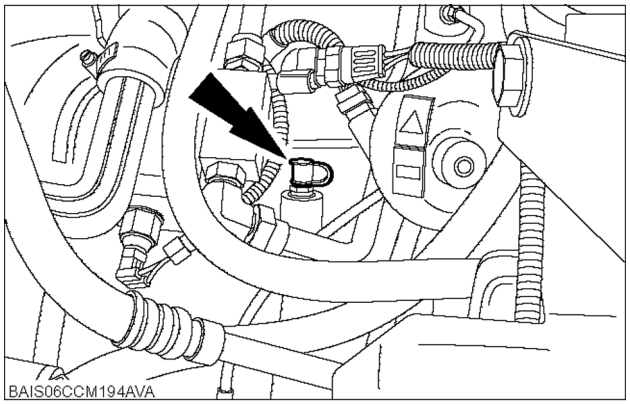
BAIS06CCM187AVA 4

5. The test connector of gear group M is positioned on the left-hand side of the transmission.
For easier access in some tractors the quick coupling sleeve must be removed and adapter 380000579 must be attached. Insert the quick coupling sleeve in the adapter again. Connect the pressure gauge **380000552 0 - 40 bar** (**0 - 600 lbf.in2**) with hose **380000545** and quick coupling **380000543** .



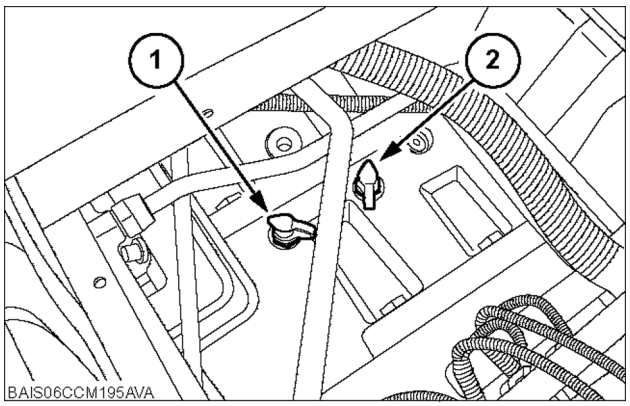
BAIS06CCM188AVA 5

6. The test connector for the reverse group is positioned on the right-hand side of the transmission.



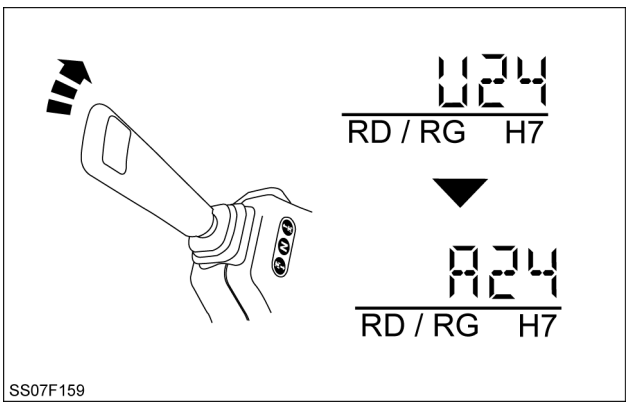
BAIS06CCM194AVA 6

7. The test connector of gear group L **(1)** and the test connector of gear group H **(2)** are positioned on the top of the transmission.



BAIS06CCM195AVA 7

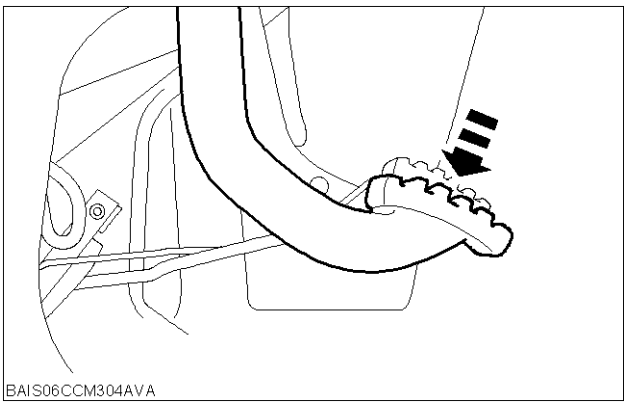
8. Start the engine and call up H7 channel 4, see **Control module - Configure (A.50.A)**. Depress the clutch pedal and switch the shuttle lever control to Forwards. Release the clutch pedal. 'A24' is displayed on the instrument cluster. This indicates that there is power to the solenoid valve of coupling A.



SS07F159 8

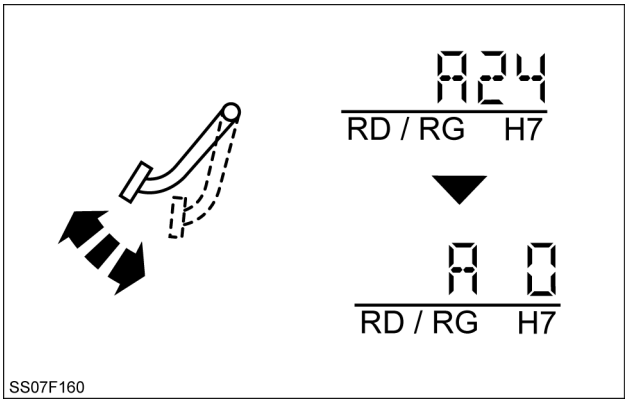
9. To switch on the solenoid valve, press and hold the downshift button. The pressure gauge must display **22±1 bar** (**319±15 lbf/in2**).

NOTE: *Before switching the solenoid valve on, depress the clutch pedal. After switching on, release the pedal slowly; do not use the clutch roughly.*



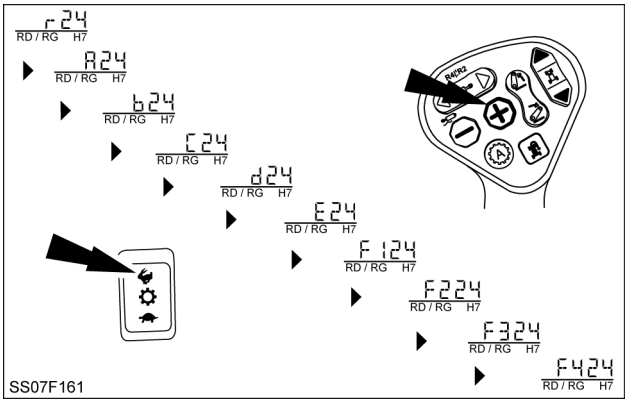
BAIS06CCM304AVA 9

10. The pressure can be modulated with the clutch pedal. If the clutch pedal is correctly calibrated, when the pedal is depressed, the two numbers change and display a value between 0 and 20 to indicate the approximate pressure. If the pedal is not depressed, '24' is displayed for maximum pressure. If the pedal is depressed less than 30 % of its travel, then the pressure is zero.



SS07F160 10

11. To select other couplings, press the upshift button and then the downshift button several times to switch the relevant solenoid valve on.
When all pressure gauges show low values, there is probably a fault in the low pressure oil circuit, see **PRIMARY HYDRAULIC POWER SYSTEM - Pressure test (A.10.A)**.



SS07F161 11

TRANSMISSION Powershift - Calibrate

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

NOTE: *The calibration is controlled by the electronic control unit. To prevent the tractor from rolling away inadvertently, do not park the tractor in the vicinity of obstacles, apply the parking brake and chock the front and rear wheels. Before undertaking any work, ensure that the ground speed display is on zero.*

NOTE: *Before calibrating the clutch, the transmission oil must have warmed up to the stipulated temperature; this can be checked by means of the H9 menu.*
The full powershift transmission should calibrated, when the transmission oil temperature is as follows: ***60 - 105 °C***

NOTE: *Make sure that the air conditioning system (where fitted) is switched off and all electrohydraulic units are deactivated.*

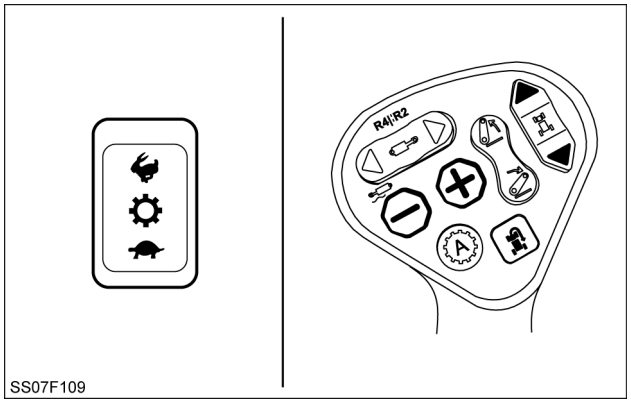
NOTE: *If a four-digit number beginning with "2" is displayed at any time during the calibration procedure, this is a standard error code. The fault condition must first be remedied, before the calibration can be performed.*

1. There are two methods to enter the transmission calibration mode:
   - Quick call-up
   - Call-up via the HH menu

Quick call-up

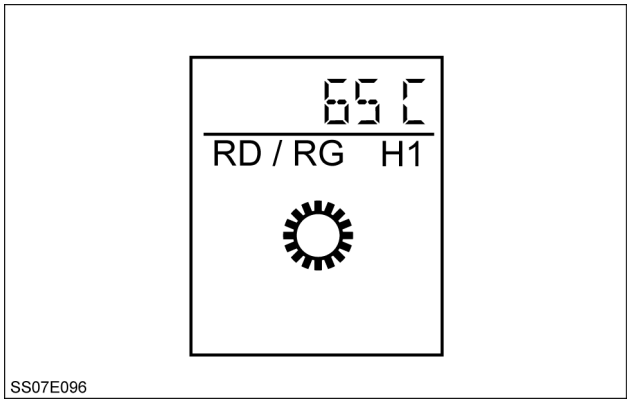
2. With the PUMA standard:
   During the engine start, press the upshift button and then within 3 seconds press the downshift button.

   With the PUMA Multicontroller:
   Press and hold the upshift and downshift button (+/-) together during the engine start.



SS07F109 1

3. The system to be calibrated is displayed on the ICU2 instrument cluster and the transmission oil temperature is displayed in the upper section of the display.

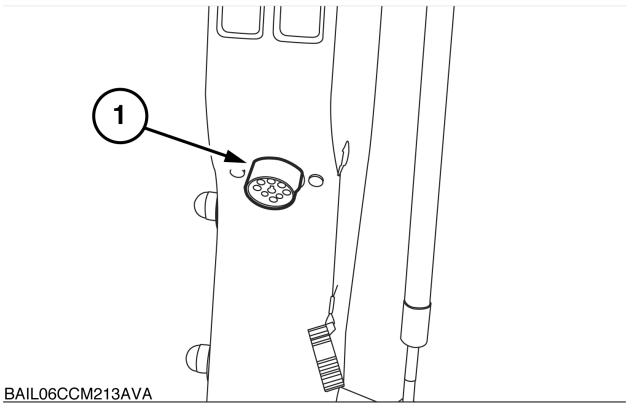


SS07E096 2

4. Go to step 7.

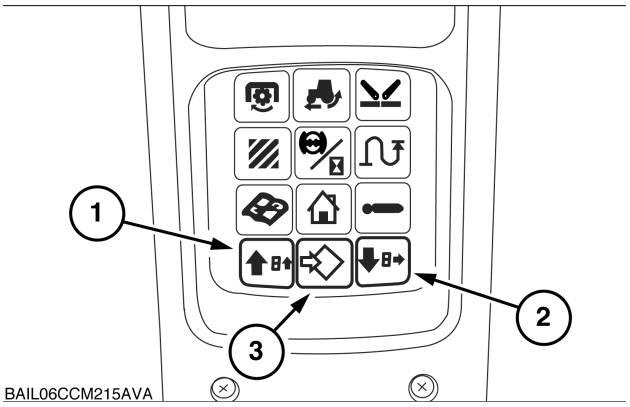
Call-up via the HH menu

5. Connect the Diagnostics plug **380000843** to the Diagnostics socket.

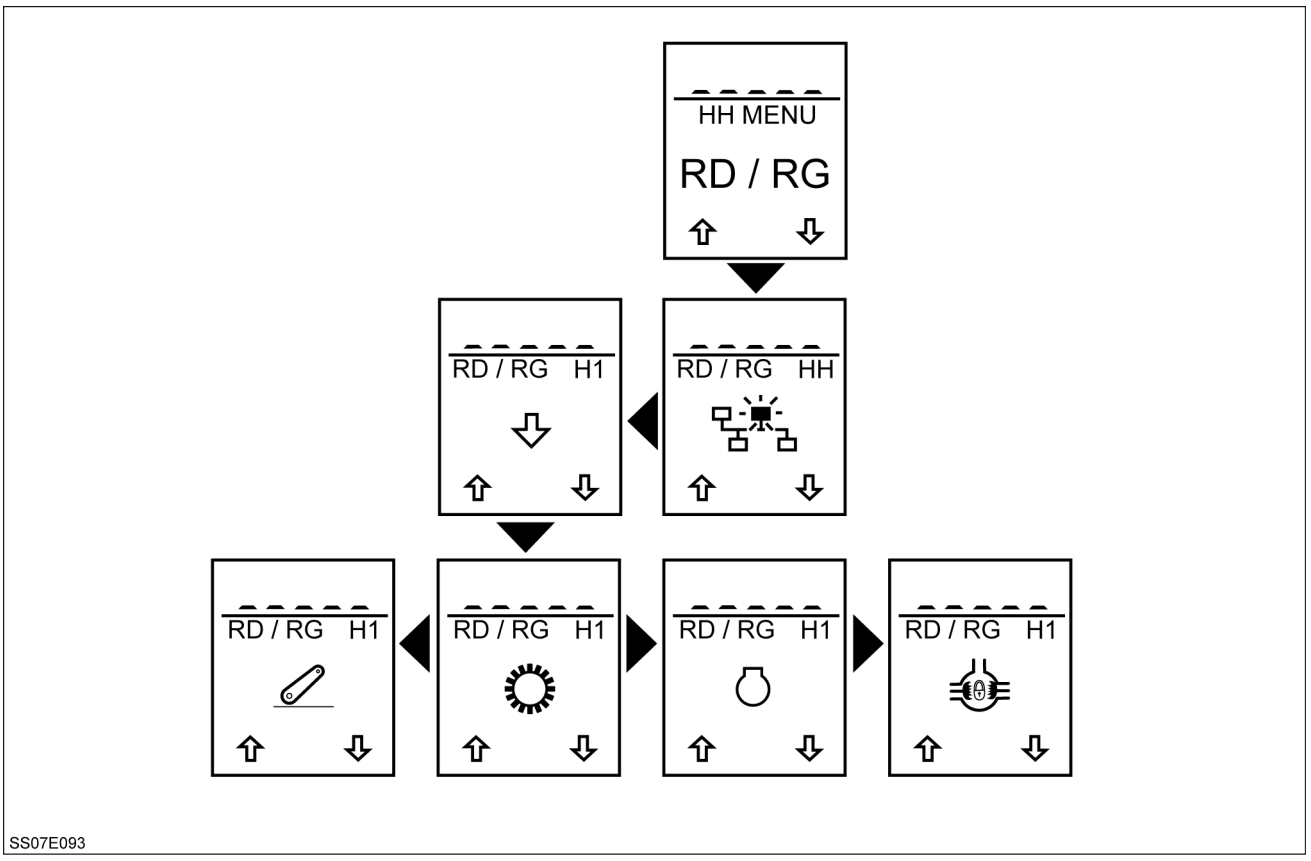


BAIL06CCM213AVA 3

6. Use the "Up" **(1)** button, "Down" **(2)** button and the Menu button **(3)** on the ICU2 to scroll through the HH menu until the Option H1 and the transmission symbol appear on the RD/RG control unit.
The transmission oil temperature is displayed on the upper section of the display.



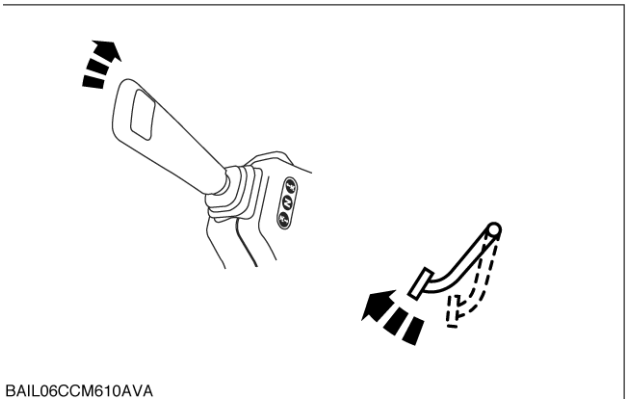
BAIL06CCM215AVA 4



SS07E093 5

7. The engine speed is set to **1200 RPM**.

8. Move the shuttle lever to the Forward position and release the clutch pedal.

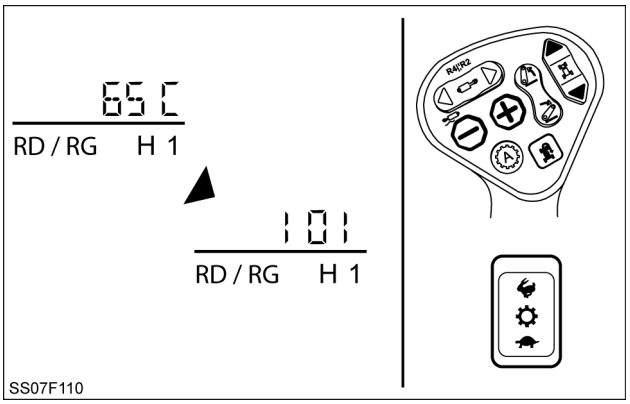


BAIL06CCM610AVA 6

9. On the upper section of the display the transmission oil temperature is displayed. Pressing the upshift or downshift button switches the display to the flywheel torque calibration value.

NOTE: *If the error code "U19" is displayed, the calibration is not possible, as the transmission oil temperature is not high enough.*

NOTE: *If the preparation for the calibration was not carried out correctly, then a U error code is displayed and the process must be repeated. See the list of the U codes in* ***Control module - Fault code index (A.50.A)****.*

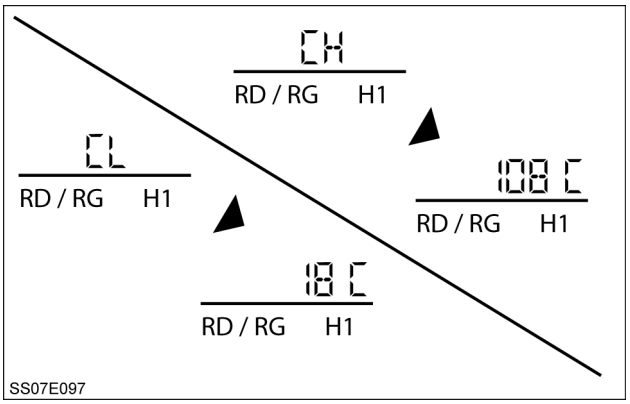


SS07F110 7

10. Depressing the upshift or downshift buttons again will change the display back to the transmission oil temperature.

11. If "CL" (**10 - 60 °C**) or "CH" (**105 °C**) is displayed, after 4 seconds the display will return to the transmission oil temperature. The tractor may be operated until the correct oil temperature is obtained.

NOTE: *If it is not practical to wait for the change in the oil temperature, you can press the upshift or downshift button, while "CL" or "CH" is displayed. The display then shows the letter "A" and the calibration can be continued.*



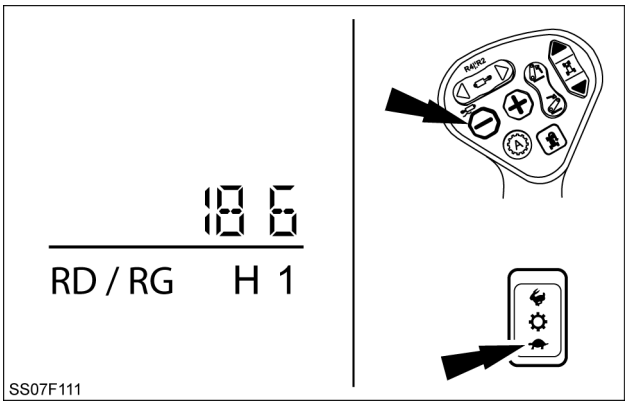
SS07E097 8

12. There are two procedures to calibrate the transmission:
    - Individual clutch calibration.
    - Automatic clutch calibration.

Individual clutch calibration

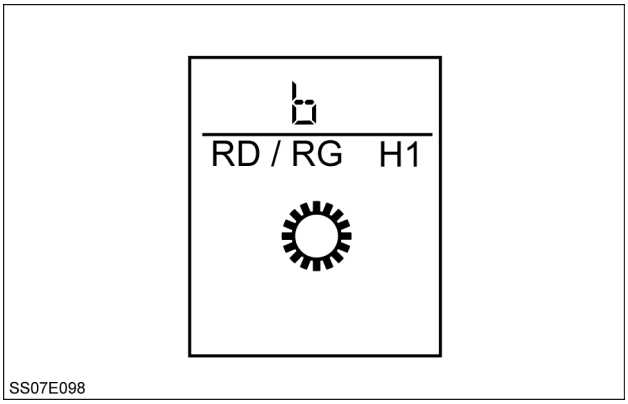
13. Set the engine speed to **1200 RPM**.

14. Press and hold the downshift button to calibrate clutch A. During the calibration, the calibration value is displayed on the upper section of the display
When the calibration of clutch A is completed, the upper section of the display alternately displays "A" and the calibration value.



SS07F111 9

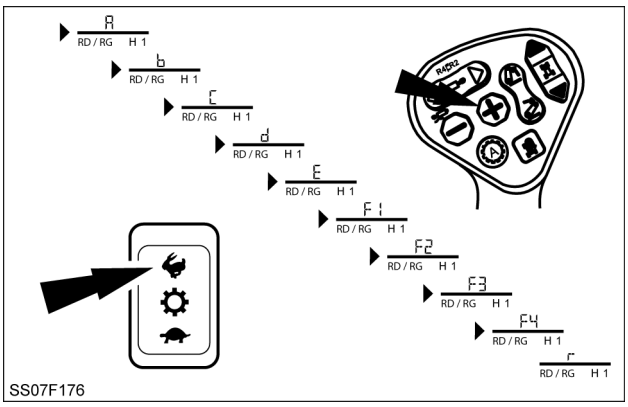
15. Release the downshift button. The display now displays the letter "B" to report that clutch B is ready for calibration.



SS07E098 10

16. The steps described above are also to be carried out for the clutches "B", "C", "D", "E", "F1", "F2", "F3" "F4" and "R". After the calibration of clutch R, release the downshift button. The display then displays the letter "A".

17. Repeatedly pressing the upshift button switches through the individual clutches. This means a certain clutch can be selected, if it needs to be calibrated several times.

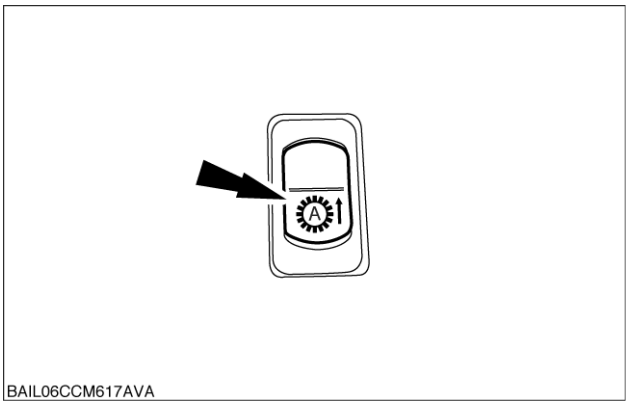


SS07F176 11

Automatic clutch calibration

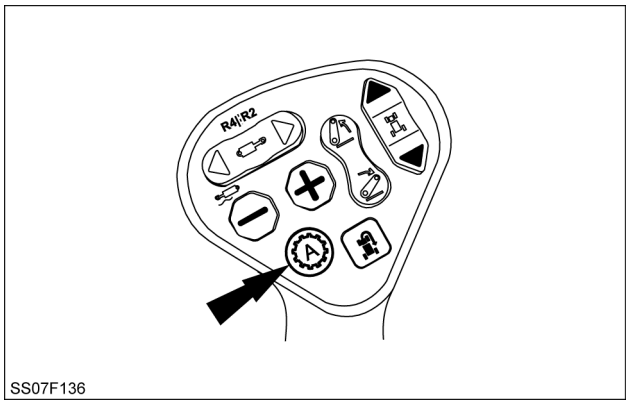
18. Call up the calibration menu. (See step 1 - 11)
Press the upshift button until "dt" appears on the display.

19. Press the Automatic function switch and the automatic calibration then starts.



BAIL06CCM617AVA 12

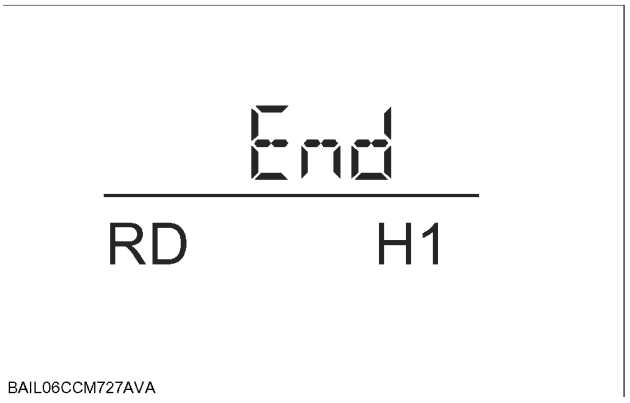
Automatic function switch on the PUMA Multicontroller.



SS07F136 13

NOTE: *For vehicles not fitted with an Automatic function switch, press and hold the "Down" button for two seconds.*

20. On the upper section of the display "End" is displayed, when the process is completed and all clutches are calibrated.



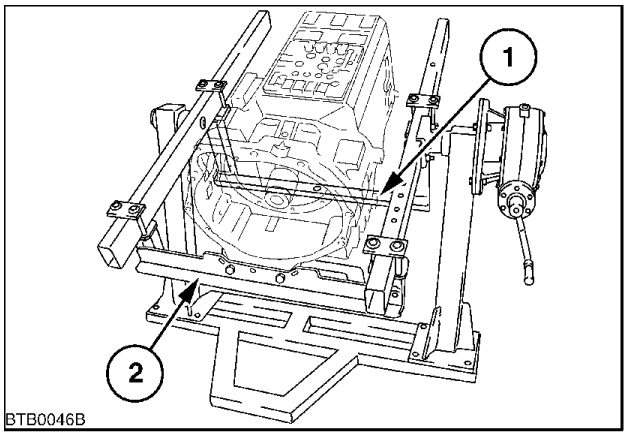
BAIL06CCM727AVA 14

21. Switch the starter switch to OFF to store the calibration values.

NOTE: *If a fault occurs during calibration, a U code is displayed and the process must be repeated. See the list of the U codes in* ***Control module - Fault code index (A.50.A)****.*

TRANSMISSION Powershift - Disassemble

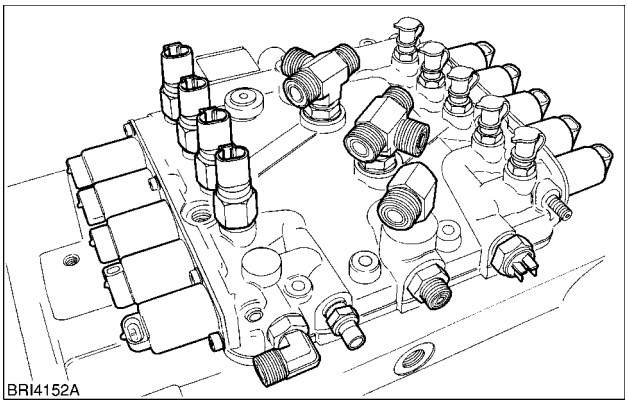
1. Fix the transmission housing on the rotary stand tool no. **380000301** using front **(1)** and rear **(2)** brackets, tools no **380000499** and the locating pin supplied with brackets, which locates in transmission drain plug.



BTB0046B 1

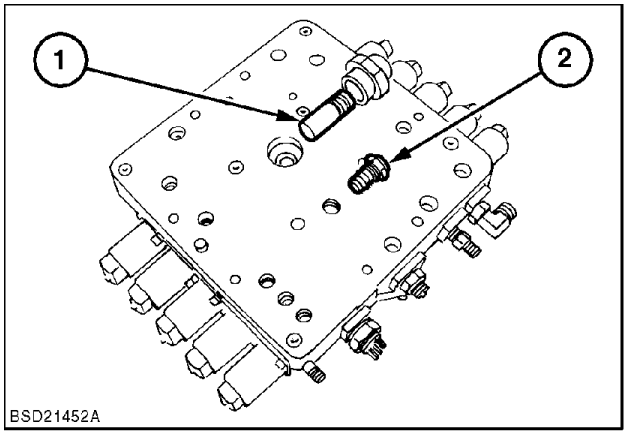
2. Transmission Top Cover-Overhaul
   Remove the transmission top cover

NOTE: *Where it is only necessary to overhaul the transmission top cover, access to the cover can be obtained through the cab floor panel.*



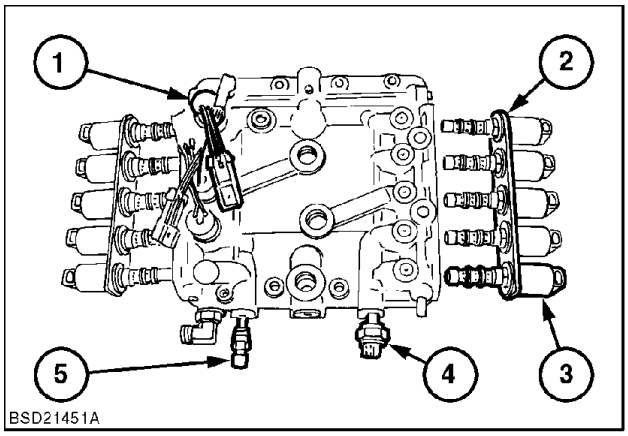
BRI4152AA 2

3. Remove oil cooler by-pass valve **(1)** and lubrication relief valve **(2)**.



BSD21452A_765 3

4. To remove pulse width modulating valves remove retaining plate and withdraw valves from casting.
   1. Pressure Switches
   2. Retaining Plate
   3. Pulse Width Modulating Valves
   4. Pressure Switch
   5. Temperature Switch



BSD21451A 4

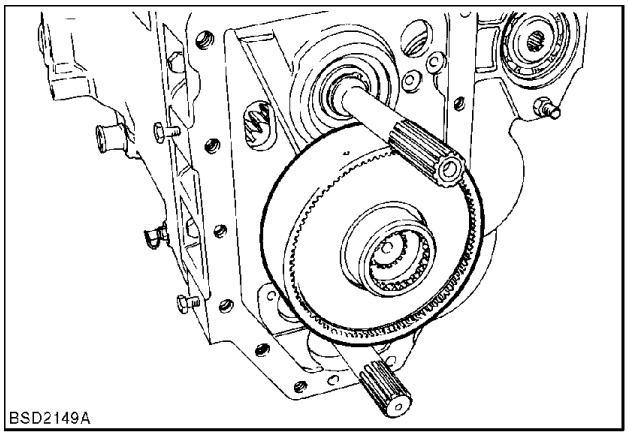
5. Transmission Components
   Disassembly-Reassembly
   Where fitted, remove creeper gear assembly.

NOTE: *On* ***50 kph*** *transmissions the 19th clutch is located in the rear axle assembly. To remove and overhaul this clutch refer to* ***ADDITIONAL REDUCERS Overdrive - Overhaul (C.30.D)****.*

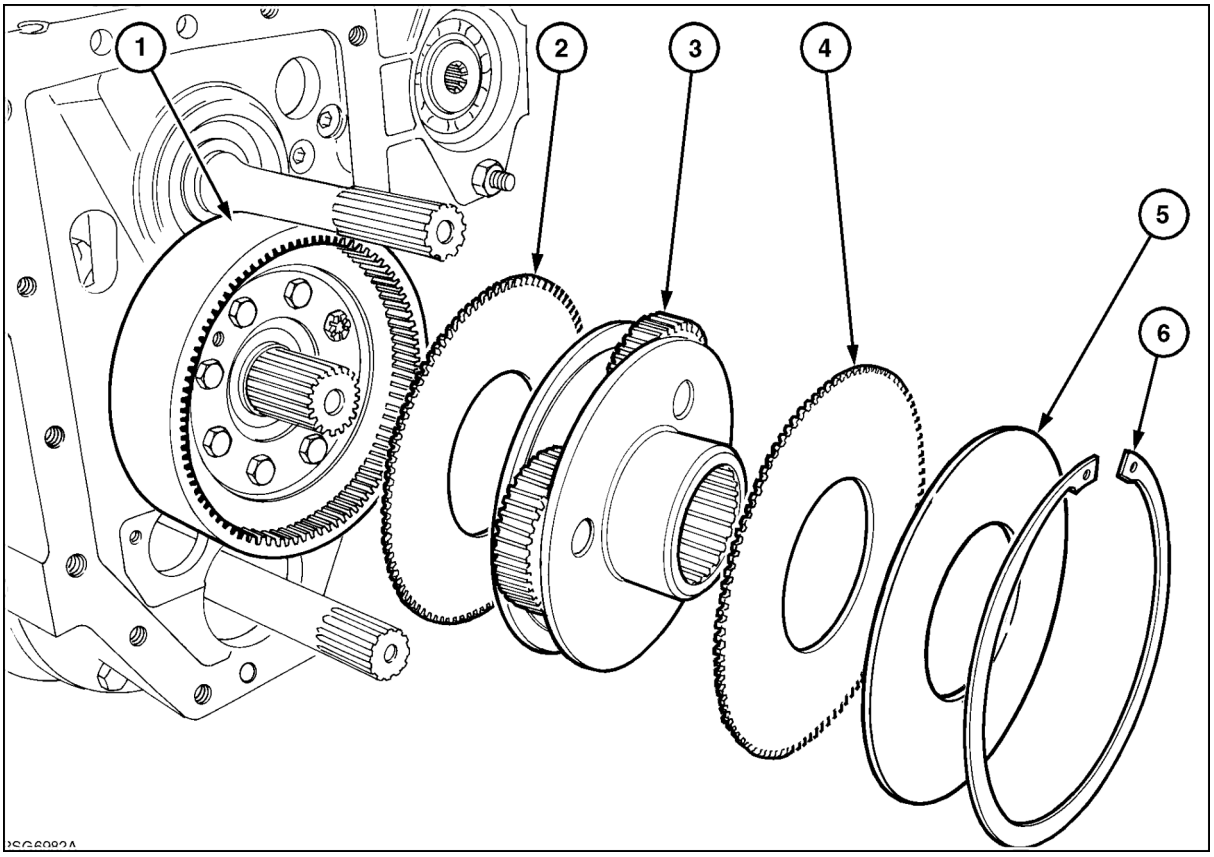
⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

B026



BSD2149A_766 5

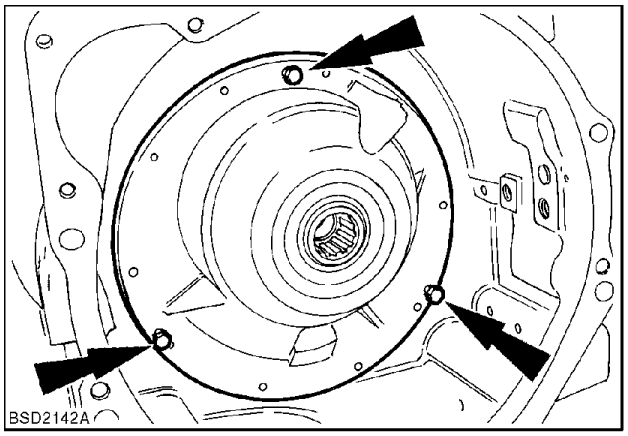


bsg6982a 6

Creeper Gear

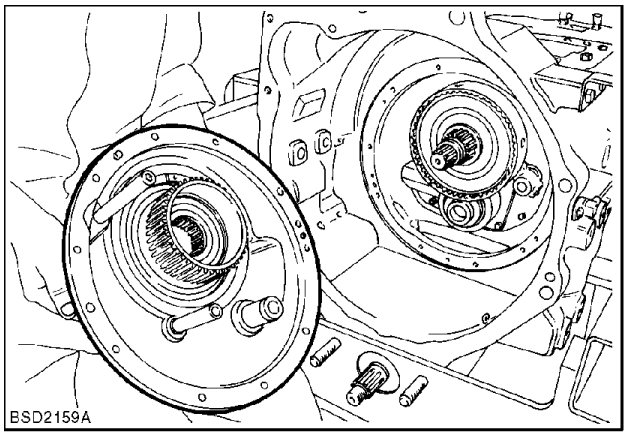
1. Housing
2. Splined Disc
3. Epicyclic Gear
4. Splined Disc
5. Plate
6. Circlip

6. Remove A/B clutch housing securing bolts and using jacking holes provided pull housing from transmission casing.



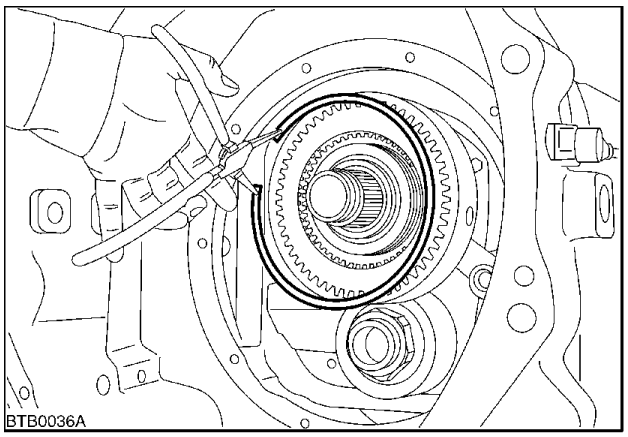
BSD2142A 7

7. Removing housing from transmission.



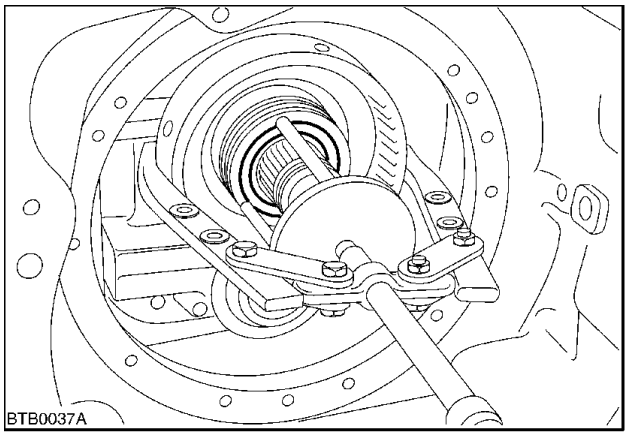
BSD2159A 8

8. Remove the circlip retaining the B clutch, clutch plates and remove the plates from the housing.



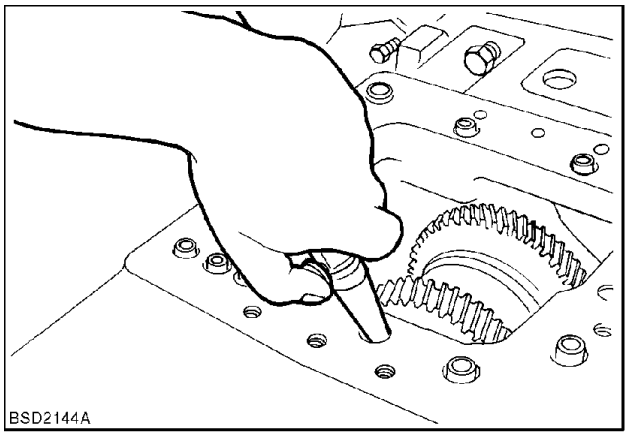
BTB0036A_767 9

9. Using special tool **380000291** compress the belleville washers. Remove circlip and washers from the clutch housing.



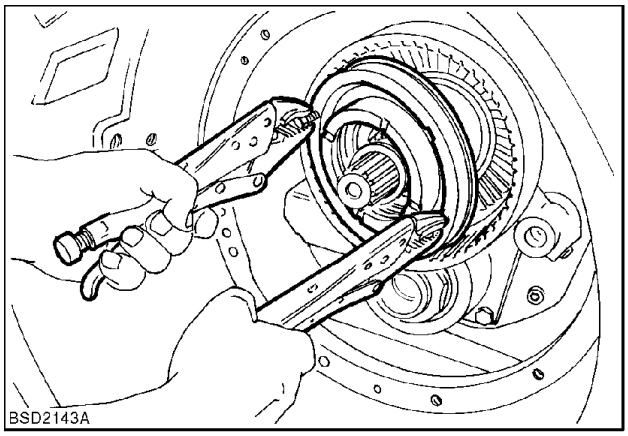
BTB0037A 10

10. Using either compressed air blown through the 'B' clutch port on top of the transmission.



BSD2144A 11

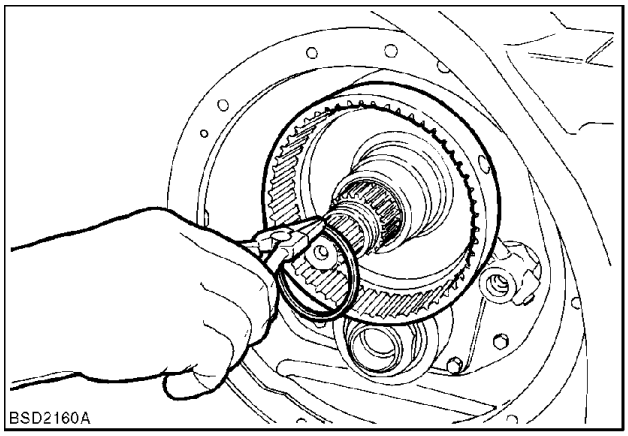
11. or
116 Using two M5 screws placed in piston, withdraw piston assembly.



BSD2143A 12

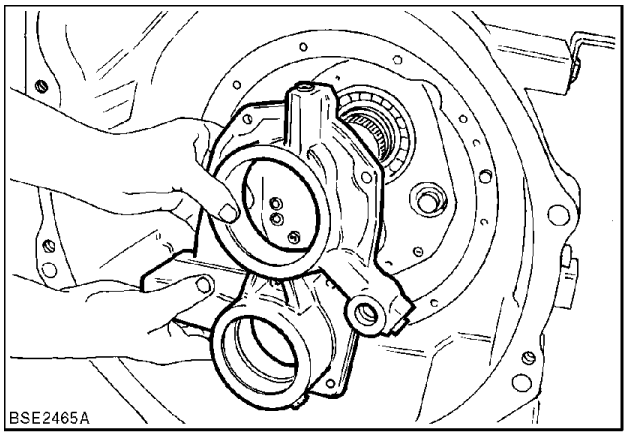
12. Remove circlip and clutch housing.

NOTE: *Before removing the 'B' clutch housing check for excessive movement and wear at the rear of the housing.*



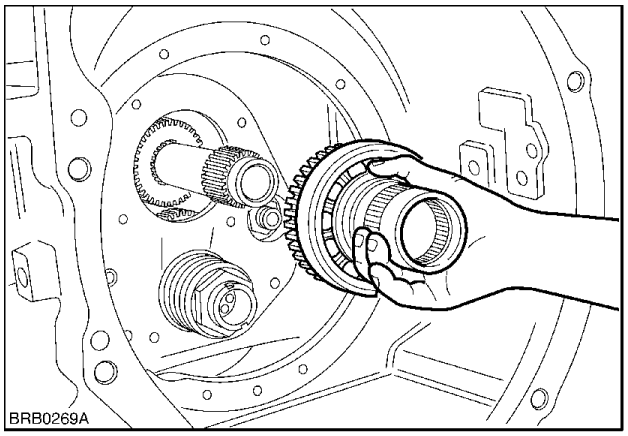
BSD2160A 13

13. Remove the oil manifold.



BSE2465A 14

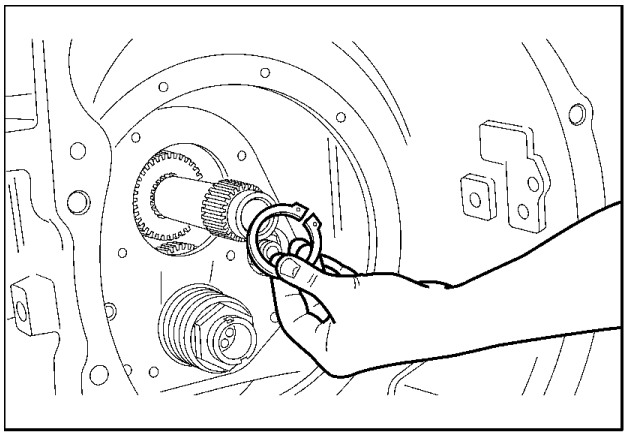
14. Remove section upper front shaft.



BRB0269A_768 15

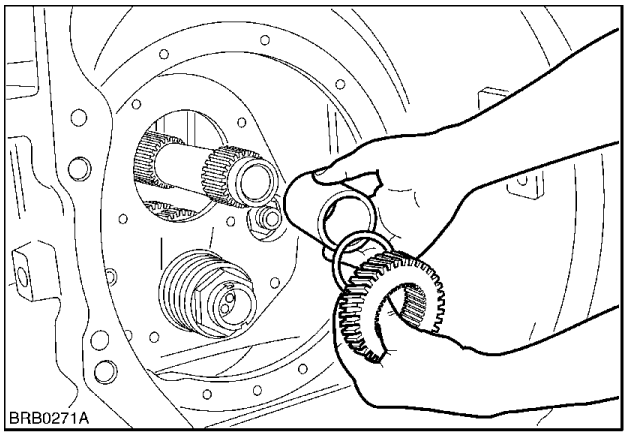
15. Remove the circlip from the front end of the upper speed shaft.

NOTE: *Check the circlip for wear. Excessive wear may cause the upper shaft endfloat to be higher than specified. Refer to* ***TRANSMISSION Powershift - Adjust (C.20.E)***



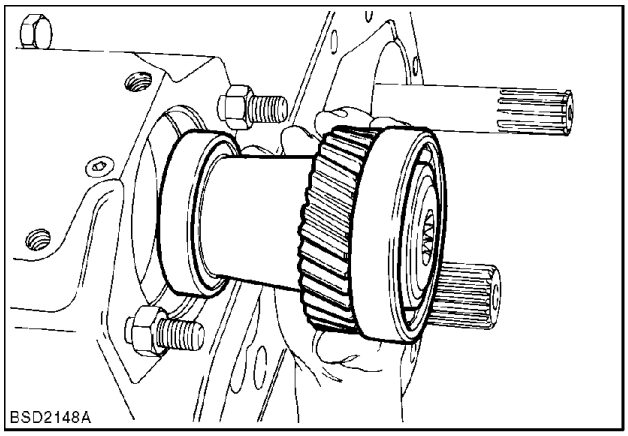
1b0o2004105150 16

16. Remove the gear, shim and spacer from the upper speed shaft.



BRB0271A 17

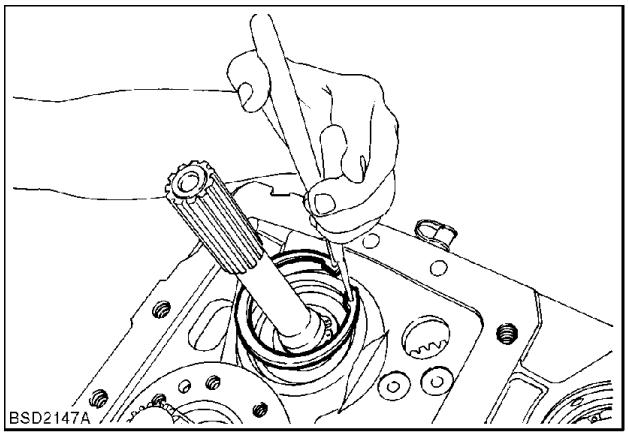
17. Remove pump drive gear.



BSD2148A 18

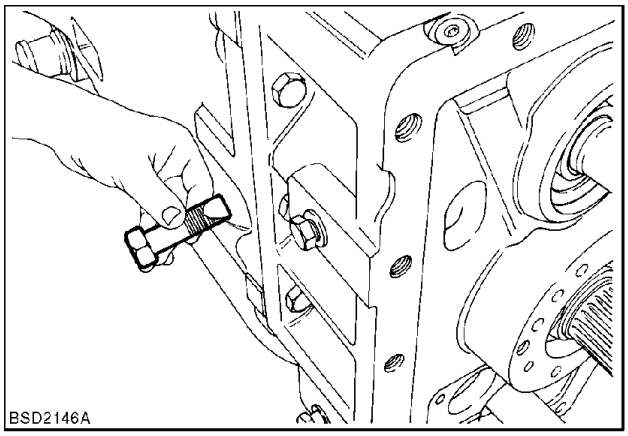
18. Remove PTO shaft retaining ring.

NOTE: *It is not possible to remove PTO shaft until after the transmission rear housing has been separated from the transmission.*



BSD2147A 19

19. Remove transmission output speed sensor and install dealer made transmission locking tool, refer to special tools on **TRANSMISSION Powershift - Special tools (C.20.E)**, to lock the fast slow clutch assembly.

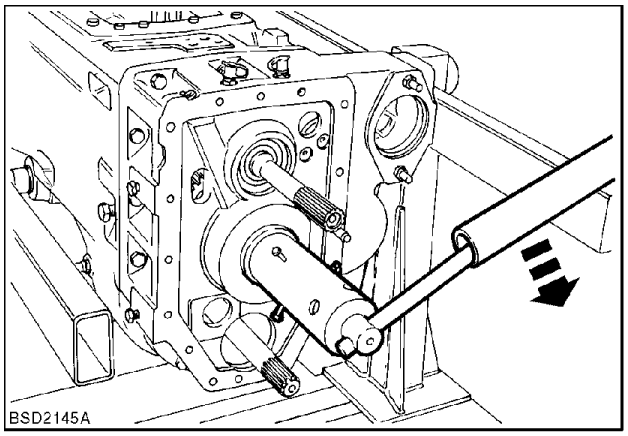


BSD2146A 20

20. Remove the shim pack, retaining plate and bolts if not previously removed with the creeper assembly.

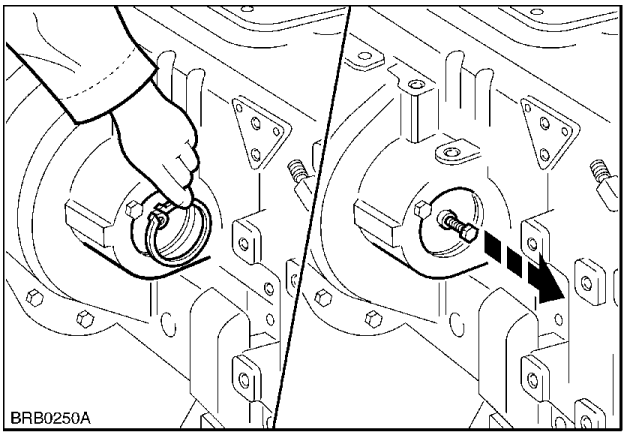
21. Unlock tabs on output shaft nut and using **65 mm** socket Tool number **380000459** remove nut.

NOTE: *The nut has a left hand thread.*



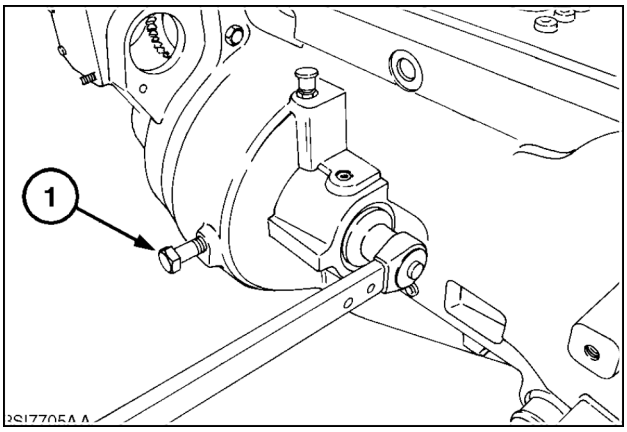
BSD2145A 21

22. Remove reverse clutch circlip from end cap and remove the cap using an M10x **1.5 mm** coarse threaded bolt screwed into the end of it.



BRB0250A_769 22

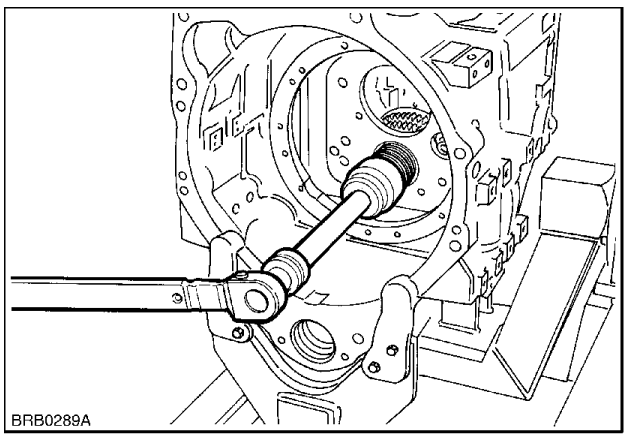
23. Remove transmission medium speed sensor and install dealer made transmission locking tool **(1)**, to lock the reverse clutch housing.
Use **55 mm** socket to unscrew the shaft retaining nut.



BSI7705AA 23

24. Ensure the transmission is still locked and using a **60 mm** socket unscrew nut on front end of lower speed shaft.

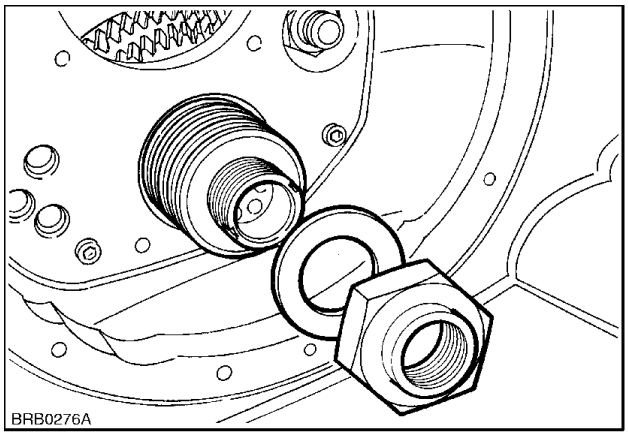
NOTE: *It is not necessary to loosen this nut if this section of the transmission does not require disassembly.*



BRB0289A_771 24

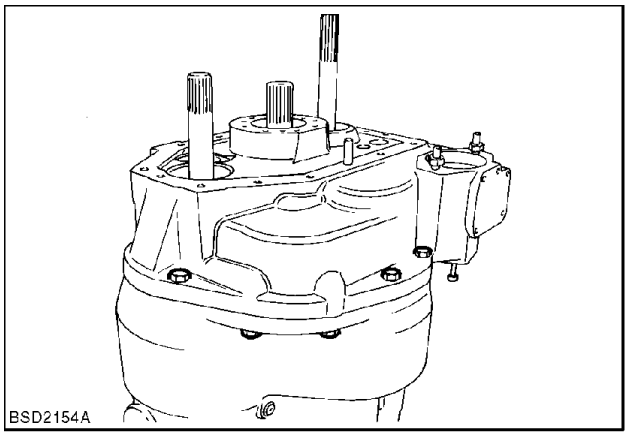
25. Remove the belleville washer, clutch manifold, the 2 O-rings from the end of the shaft and the shaft support bearing.

NOTE: *After removing the components refit the nut onto the thread to prevent the bearing from falling out.*



BRB0276A 25

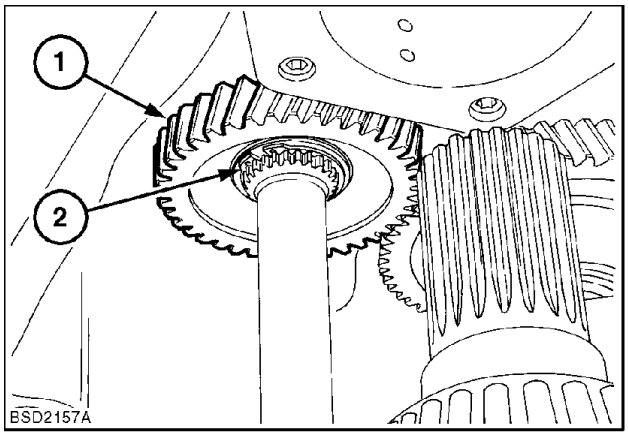
26. Turn transmission on end and remove transmission rear housing retaining bolts



BSD2154A 26

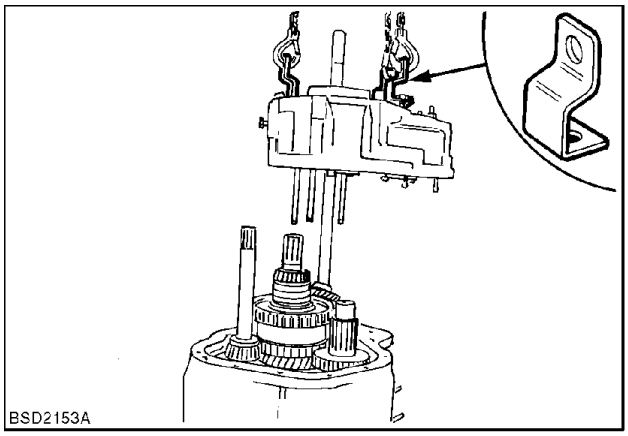
27. Attach lifting brackets tool number **380000495** to transmission rear housing, Figure **28** and using overhead hoist raise housing from transmission to gain access to driven gear.
Support driven gear **(1)** on PTO input shaft and remove circlip **(2)**.

NOTE: *This does not need to be removed if only the main transmission is being worked on.*



BSD2157A 27

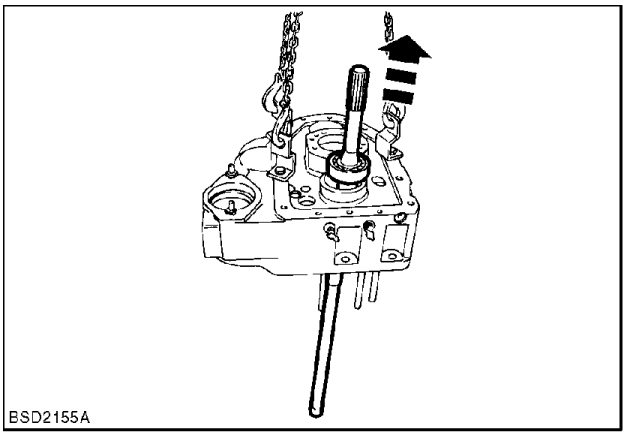
28. Lift rear housing from transmission.



BSD2153A 28

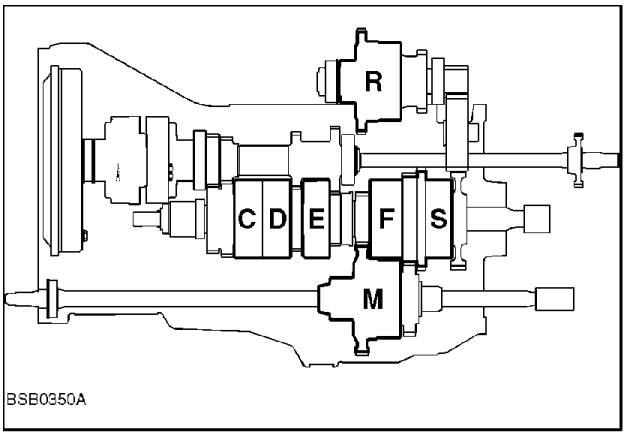
29. Remove PTO input shaft.

NOTE: *This does not need to be removed if only the main transmission is being worked on.*



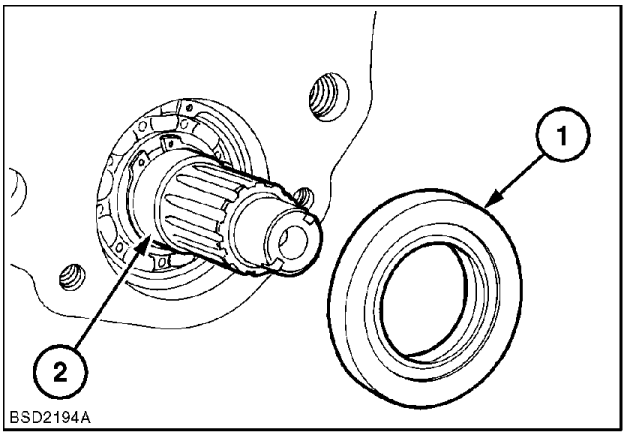
BSD2155A 29

30. Transmission Clutch Assemblies Removal
Removal of transmission clutches A thru M as follows.



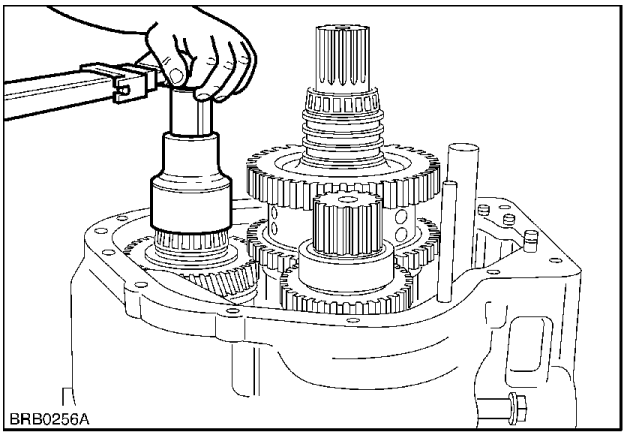
BSB0350A_772 30

31. Remove four wheel drive shaft cassette seal **(1)** located in front of transmission.
Remove the outer retaining circlip **(2)**. The four wheel drive shaft can then be removed from the front.



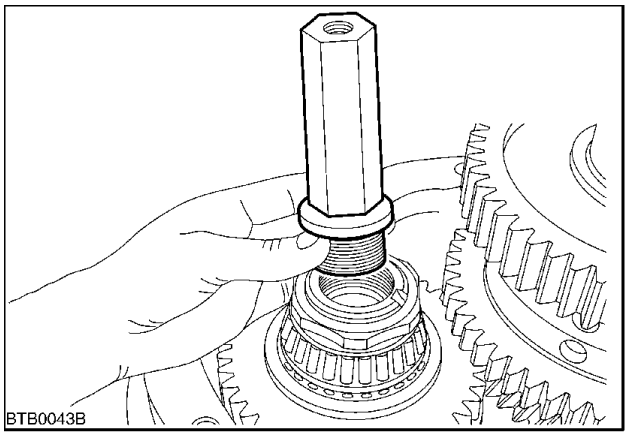
BSD2194A 31

32. Install the gear locking tool through the reverse speed sensor hole. Unlock the tabs on the nut at the rear end of the Medium range shaft and loosen the nut using a **70 mm** socket.



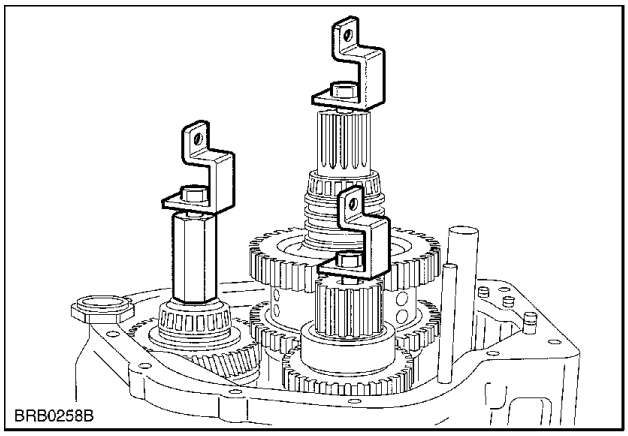
BRB0256A_773 32

33. Install the lifting adaptor tool, **380000496** , into the medium clutch assembly.



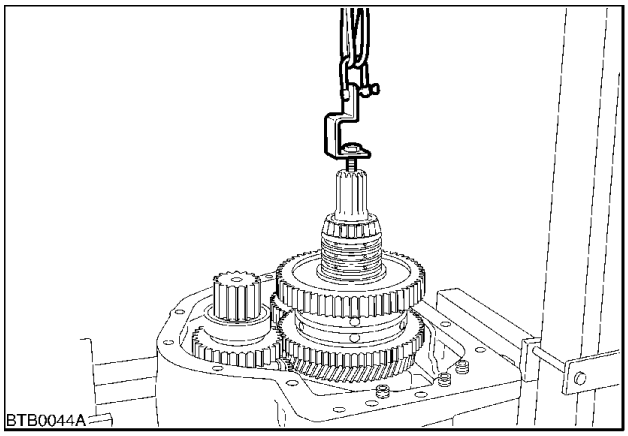
BTB0043B 33

34. Fit the special lifting hooks **380000495** to the end of the 3 range shafts, using M14x1.5 bolts to secure.



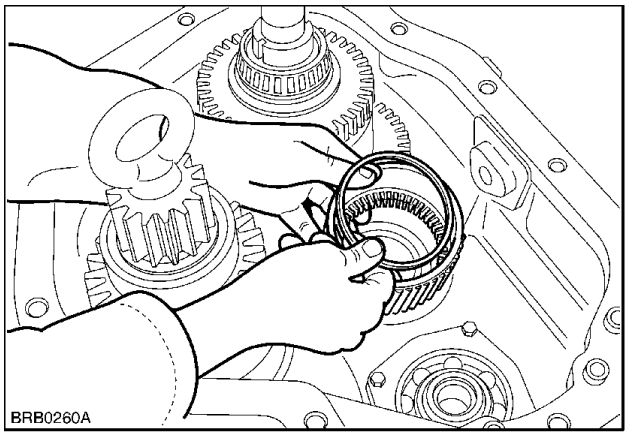
BRB0258B_774 34

35. Remove Fast / Slow shaft assembly.



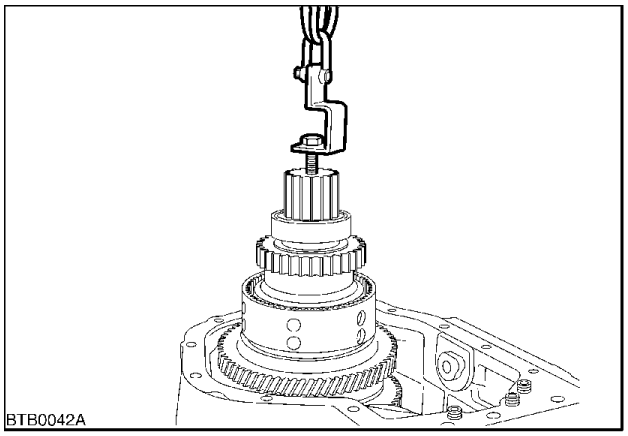
BTB0044A_775 35

36. Remove the circlip from the fast clutch hub and remove the hub.



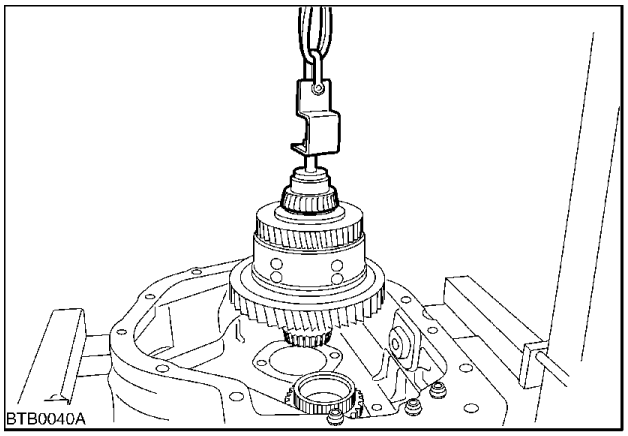
BRB0260A_776 36

37. Remove the reverse shaft assembly.



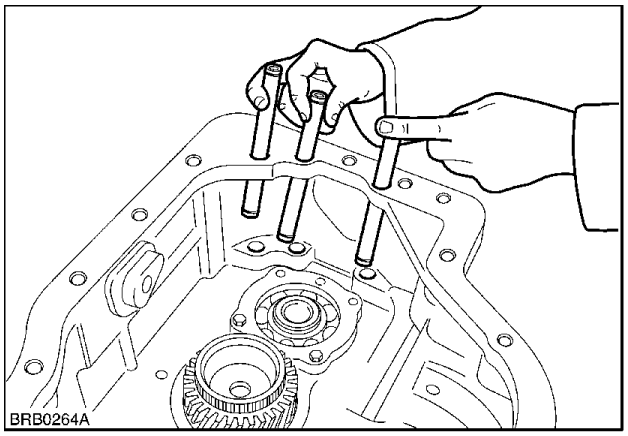
BTB0042A_777 37

38. Remove the Medium range shaft assembly.



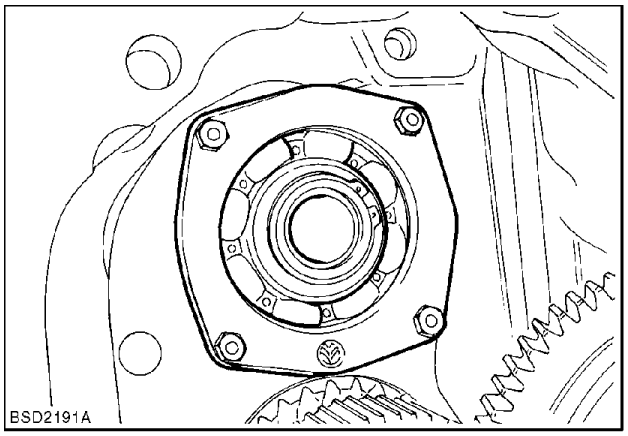
BTB0040A_778 38

39. Remove the oil supply pipes for Fast and Slow clutches and the lubrication pipe.



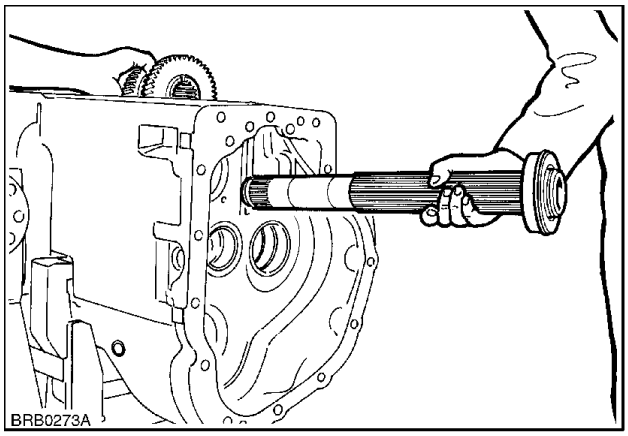
BRB0264A_779 39

40. Remove transmission upper speed shaft bearing retainer.



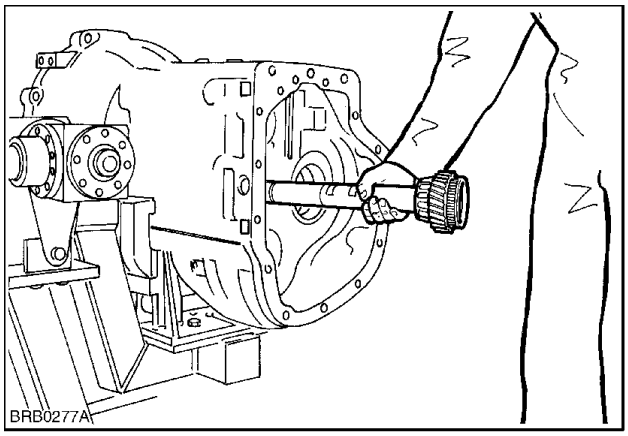
BSD2191A 40

41. Knock the upper speed shaft out from the front of the transmission and remove from the rear. Lift the cluster gear out from the top of the transmission.



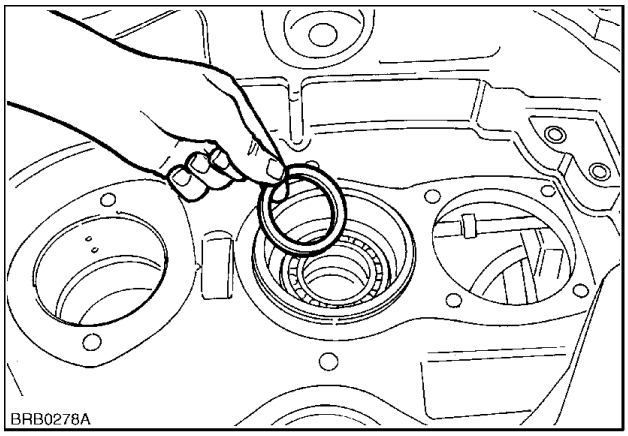
BRB0273A_780 41

42. Remover the large nut and withdraw the lower shaft from the rear of the transmission.



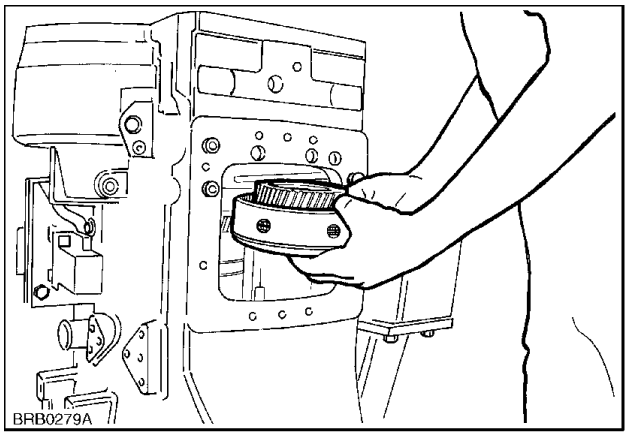
BRB0277A_781 42

43. Rotate the transmission to position the rear uppermost and remove the washer from the lower shaft support.



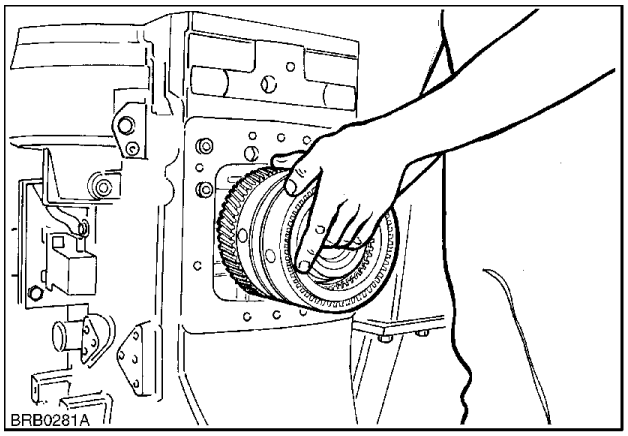
BRB0278A_782 43

44. Remove the “E" clutch pack



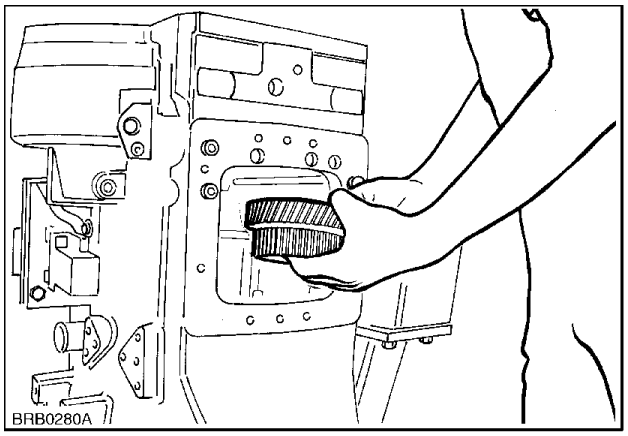
BRB0279A 44

45. Remove the “C/D" clutch assembly and remove the clutch bearing shim and spacer.



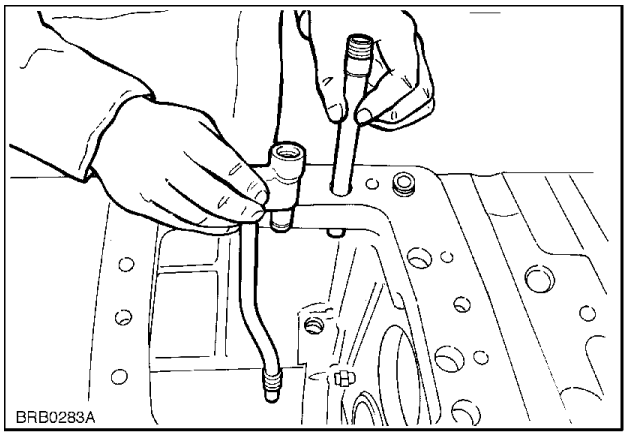
BRB0281A 45

46. Remove the “D” clutch output hub and gear.



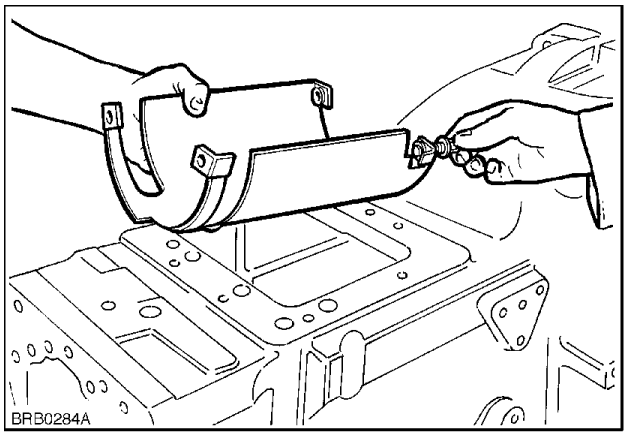
BRB0280A_783 46

47. Remove the lubrication pipes and T piece.



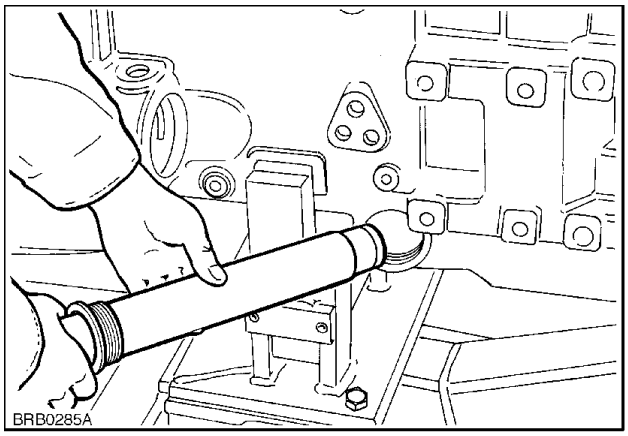
BRB0283A_784 47

48. Remove the lower oil baffle plate.



BRB0284A_785 48

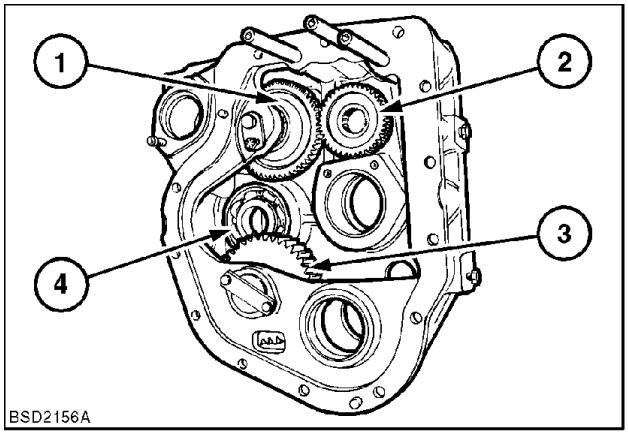
49. Remove the fuel tank cross–over tube retaining bolt on the right hand side of the transmission and remove the tube.



BRB0285A_786 49

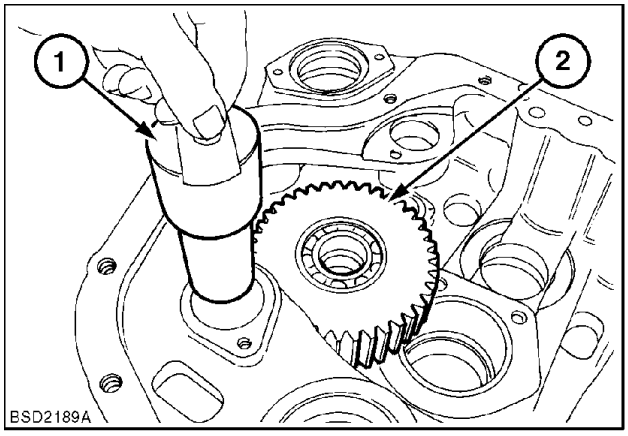
TRANSMISSION REAR HOUSING

50. Disassembly
    1. Pump Idler Gear
    2. Driving Gear
    3. Slow Range Driven Gear
    4. Reverse Clutch Support Bearing



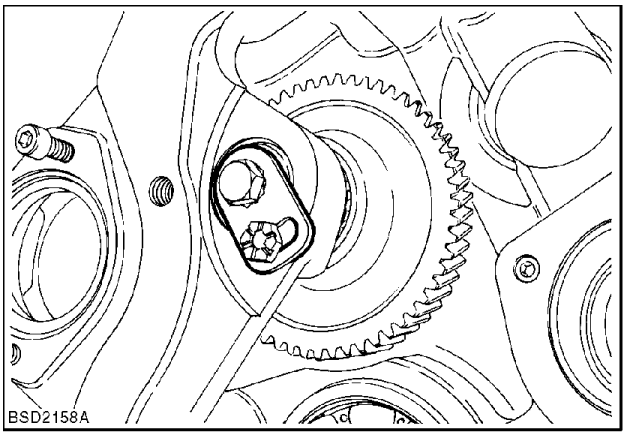
BSD2156A 50

51. Slow Range Driven Gear
    Using M12x1.25 bolt remove shaft **(1)** and withdraw gear **(2)**.
    Replace bearings where necessary.



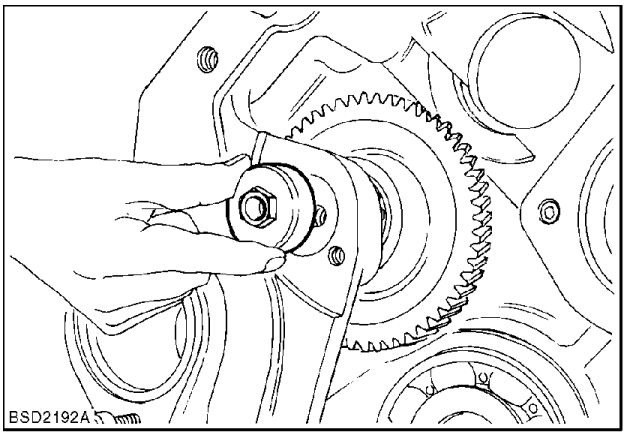
BSD2189A 51

52. Pump Idler Gear
Remove locking plate.



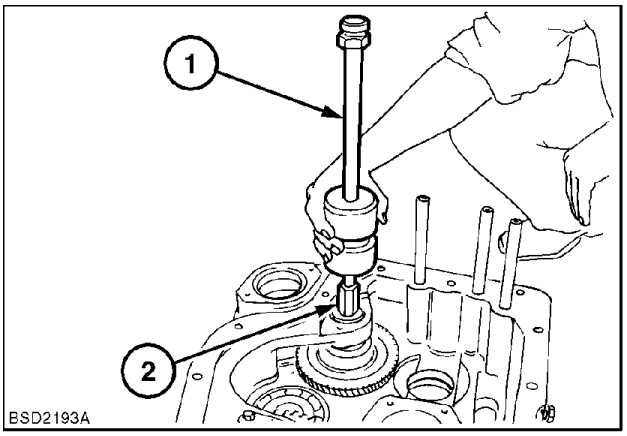
BSD2158A 52

53. Remove bearing adjuster.

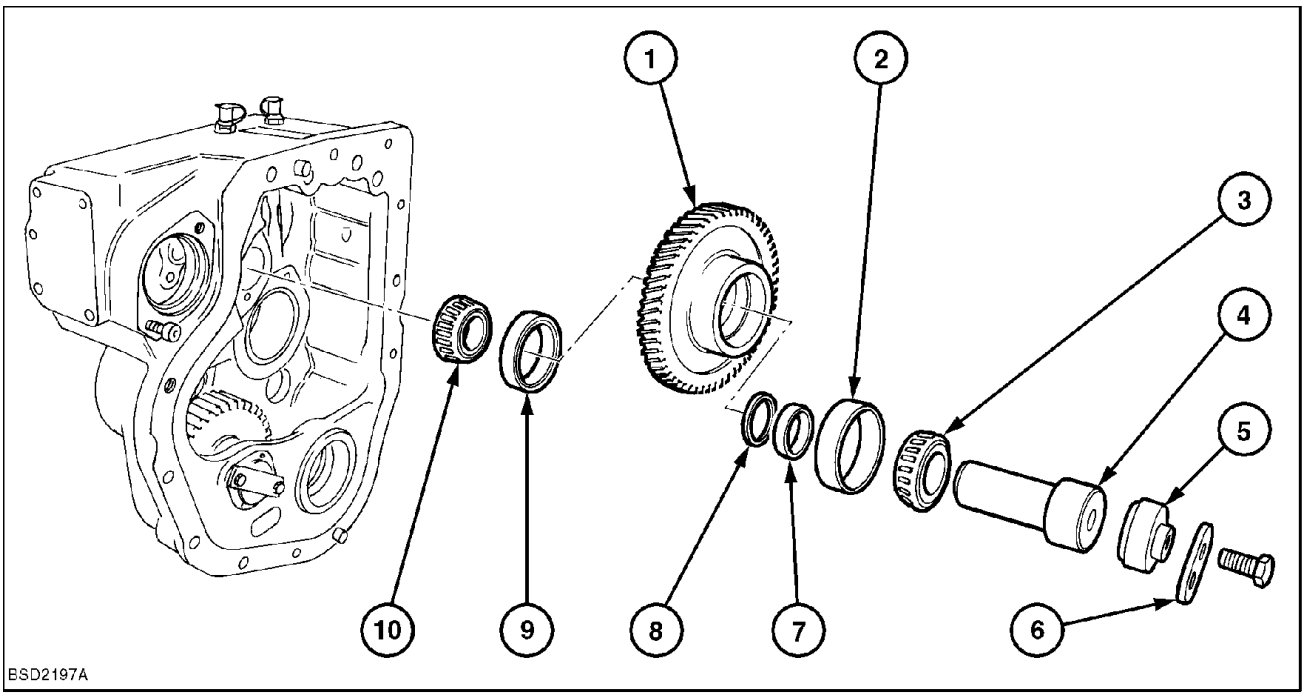


BSD2192A 53

54. Remove shaft using slide hammer **(1)** and M12 x 1.25 extractor.



BSD2193A 54



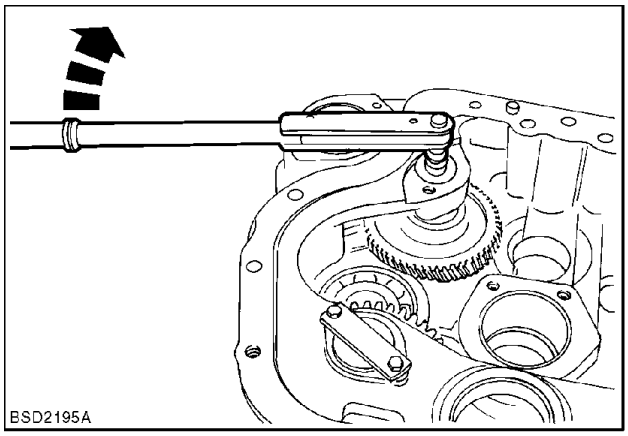
BSD2197A 55

Pump Drive Gear Assembly

1 Pump Drive Gear
2 Bearing Cup
3 Bearing
4 Shaft
5 Bearing Adjuster
6 Locking Plate
7 Spacer
8 Spacer (Shim)
9 Bearing Cup
10 Bearing

Pump Drive Gear Installation

55. Reassemble components, including original shim and tighten adjuster to **30 Nm**.
Check gear turns freely with a torque of **0.1-0.2 Nm**.
Change shim thickness if necessary.
Lock adjuster in position with locking plate.



BSD2195A 56

TRANSMISSION Powershift - Adjust

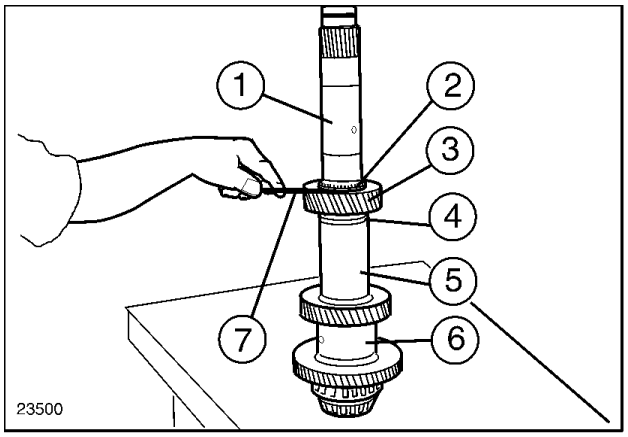
⚠ WARNING ⚠

Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

B020

Transmission Upper Speed Shaft End Float Adjustment

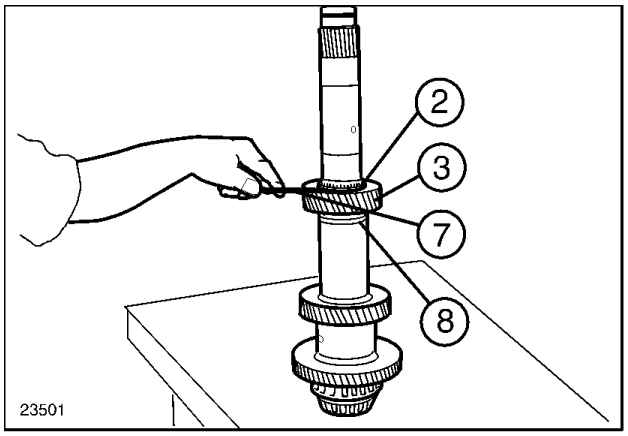
1. Proceed as follows:
   Place the transmission input shaft **(1)** on a bench, slide on the gear **(6)**, spacer **(5)**, a **3.5 mm** test shim **(4)**, gear **(3)**. Lock the assembly with a circlip **(2)**.
   Settle the assembly. Using a feeler gauge **(7)**, measure the end play between the circlip **(2)** and gear **(3)**.
   Shim to be installed is given by the measured dimension plus the test shim minus the specified end play.
   Example:
   Gauge reading:= **0.90 mm**
   Test shim:= **3.50 mm**
   Specified end play= **0 - 0.15 mm**
   Shim **(8)** to be installed: = 0.90 + 3.50 - 0.10 = **4.30 mm**.



23500_95 1

NOTE: *Available adjust shims are detailed on* ***TRANSMISSION Powershift - General specification (C.20.E)****.*

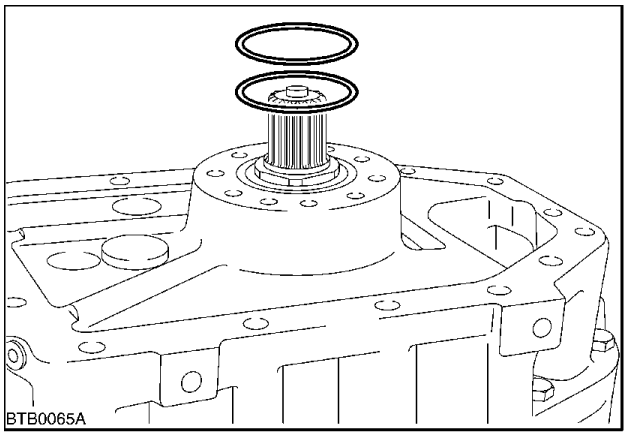
2. Remove circlip **(2)**, withdraw the gear **(3)** and test shim **(4)**. Add shim **(8)** as previously found, gear **(3)** and lock the assembly with the circlip **(2)**.
   Settle the assembly. Using a feeler gauge **(7)** check that end play is to specification.



23501_96 2

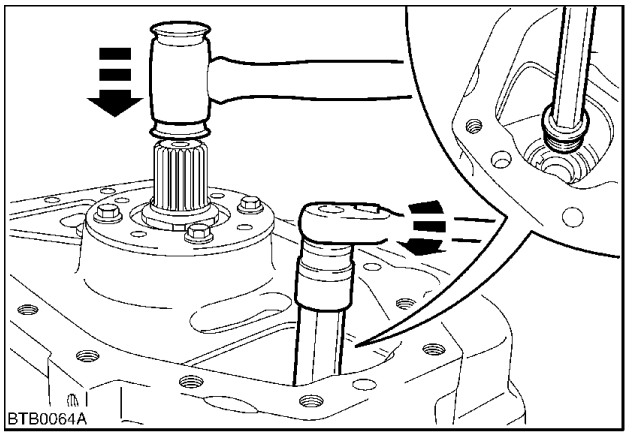
Output Shaft (fast/slow) End Float Adjustment

3. Insert test shims until they are flush with the machined face of the casing. Measure the test shim pack (Sp). Install end plate and tighten bolts to the specified torque, ensuring that the belleville washers have their outer edge against the end plate.



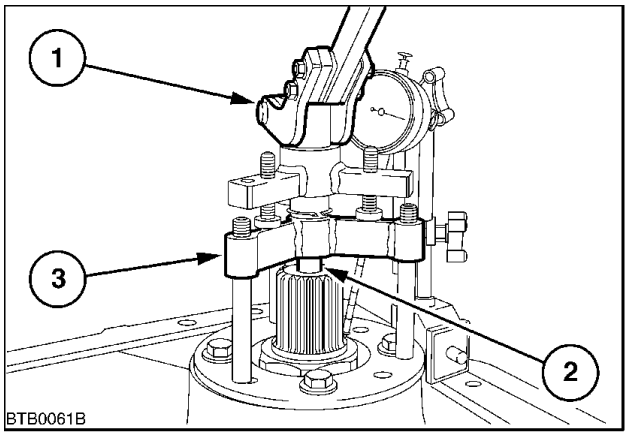
BTB0065A 3

4. Rotate the transmission several times using the special tool in the end of the Medium range shaft. Between turns tap the end of the output shaft with a rubber faced hammer to ensure the shaft is fully settled in the transmission.



BTB0064A 4

5. Install the special tool, **380000568 (3)**, over the output shaft, with the double ended threaded bar **(2)**, screwed into the output shaft. Attach the lever assembly, tool **380000458 (1)**, to the threaded bar. Position a suitable DTI gauge onto the end housing with the stylus on the face of the output shaft nut. Ensure the operating arm of the DTI is as vertical as possible and zero the gauge.
Lift the output shaft using special tool **380000458** . The DTI reading should be between **0.04 - 0.09 mm** which is the endfloat on the shaft.



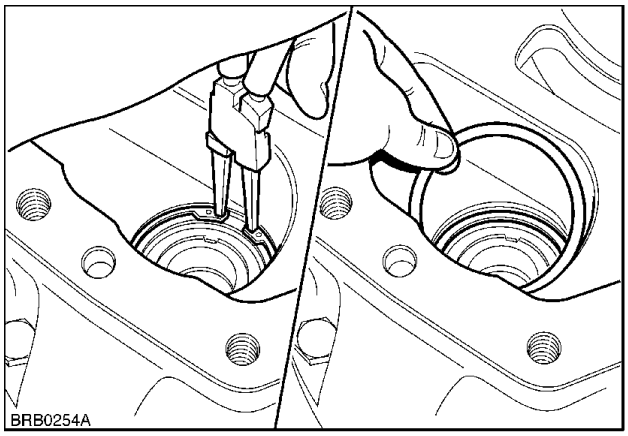
BTB0061B 5

6. Calculate the shim required:-
S1 = H + Sp - (**0.065 mm**)
Where:
S1 = Final shim size
Sp = Test/initial shim
H = DTI travel reading
0.065 mm = Mid range of endfloat specification

7. Recheck endfloat until within specification. Torque end plate bolts to **35 Nm** (**26 lbf.ft**).

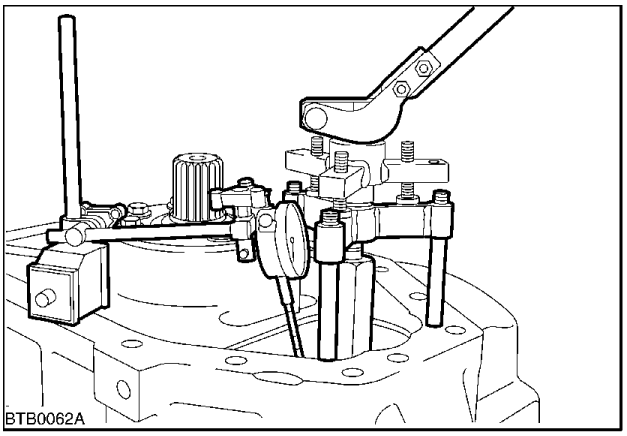
Medium Range Shaft End Float Adjustment

8. Install test shims and circlip on rear end of the Medium range shaft. Measure the test shim pack (Sp).
Rotate the transmission several times using the special tool in the end of the Medium range shaft. Between turns tap the end of the special tool in the medium range shaft with a rubber faced hammer to ensure the shaft is fully settled in the transmission.



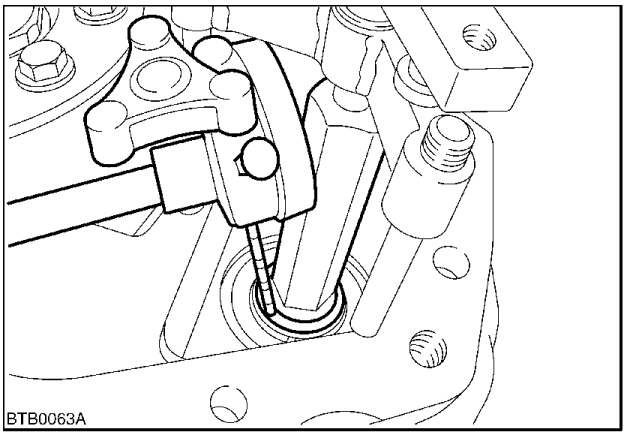
BRB0254A 6

9. Install the special tool, **380000568** over the special tool installed in the medium range shaft, with the double ended threaded bar screwed into the medium shaft tool. Attach the lever assembly, tool **380000458** , to the threaded bar. Position a suitable DTI gauge onto the end housing with the stylus on the lower face of the tool installed into the medium range shaft. Ensure the operating arm of the DTI is as vertical as possible and zero the gauge.



BTB0062A 7

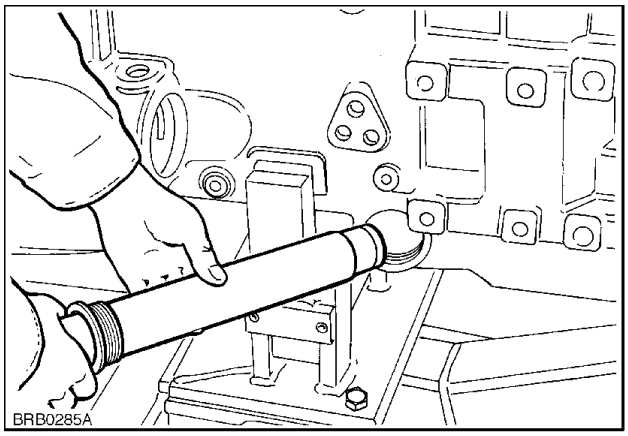
10. Lift the medium range shaft using special tool **380000458** . The DTI reading should be between **0.04 - 0.09 mm** which is the endfloat on the shaft.
Calculate the shim required:-
S1 = H + Sp - (**0.065 mm**)
Where:
S1 = Final shim size
Sp = Test/initial shim
H = DTI travel reading
0.065 mm = Mid range of endfloat specification
Recheck endfloat until within specification.



BTB0063A 8

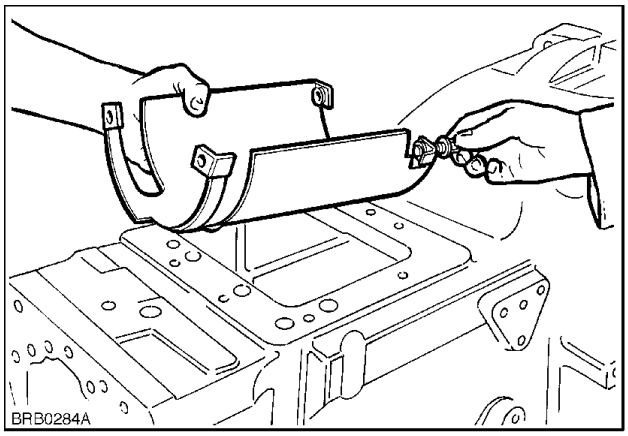
TRANSMISSION Powershift - Assemble

1. Apply petroleum jelly to the contact surfaces between the fuel cross pipe and the transmission casing and install the pipe from the right side of the transmission. Secure with the retaining bolt.



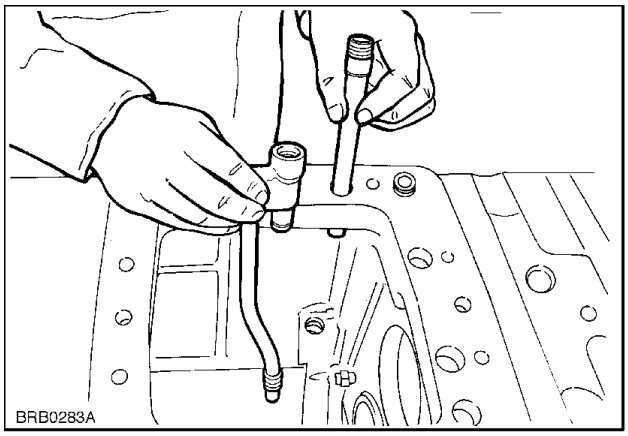
BRB0285A_801 1

2. Install the lower splash plate with the 4 Allen key bolts and spacers using Loctite 242 thread lock and seal adhesive on the bolts.



BRB0284A_802 2

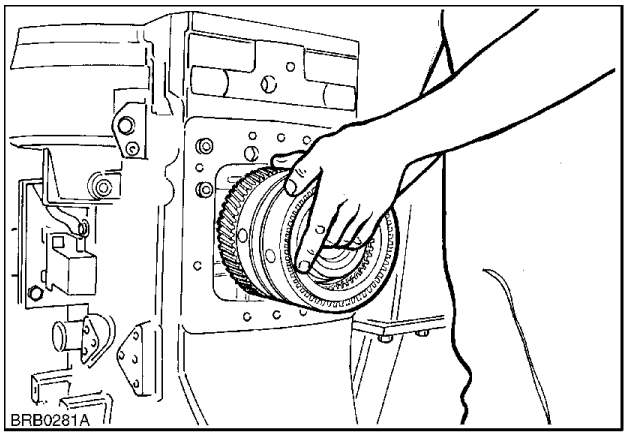
3. Replace the lubrication pipes.



BRB0283A_784 3

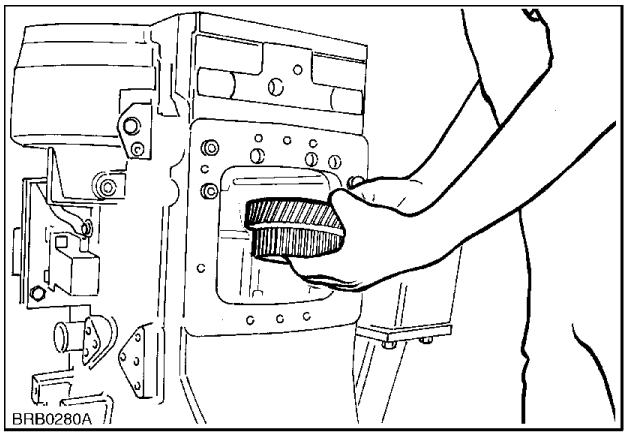
4. Rotate the transmission so that rear is uppermost. With the front bearing shim and spacer removed, install the C/D clutch assembly (including “C" clutch gear cluster) into the transmission ensuring that the oilway alignment marking on the clutch is visible.

NOTE: *Prior to installation of the C/D clutch assembly it is necessary to check that the taper bearing rolling resistance is within specification, as described in* ***Clutch and gear - Overhaul (C.20.E)****.*



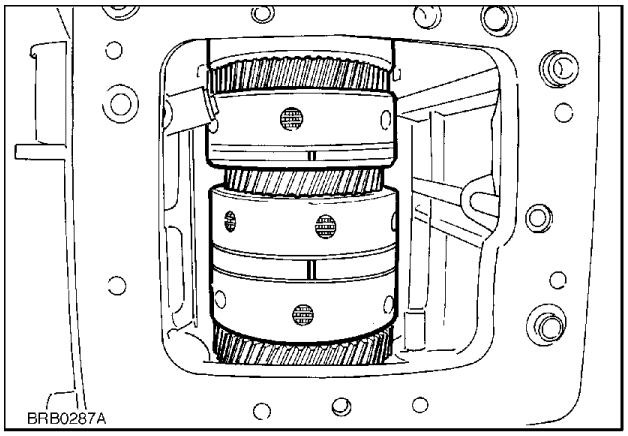
BRB0281A_803 4

5. Install the “D" clutch output hub and gear.



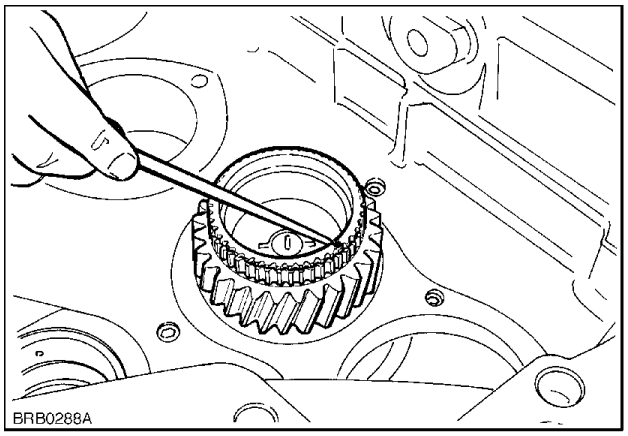
BRB0280A_783 5

6. Install the “E" clutch pack ensuring that the oilway marking is in line with those on the C/D clutch assembly.



BRB0287A_804 6

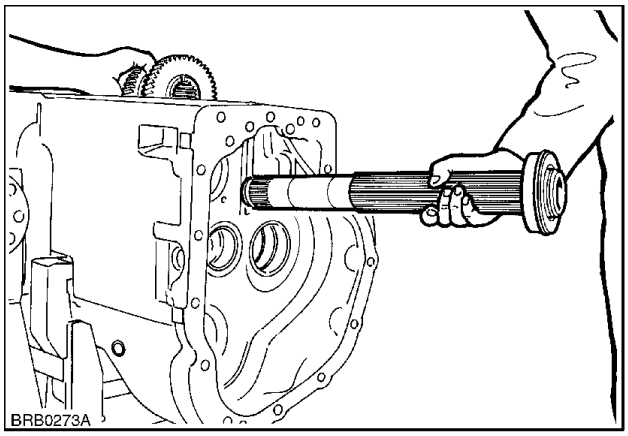
7. Carefully push the lower speed shaft down through the clutch packs ensuring that the marking hole is in line with the markings on the clutch packs.



BRB0288A_805 7

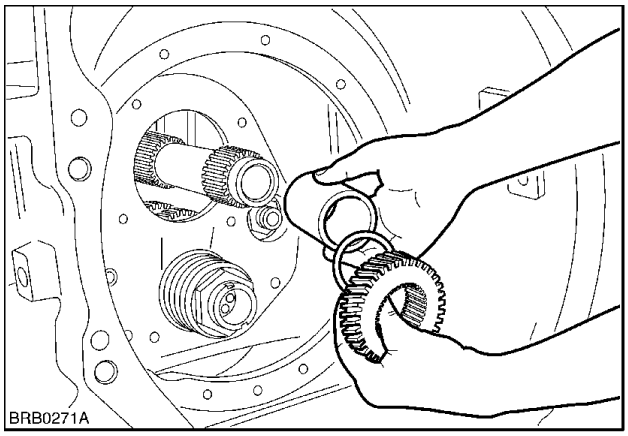
8. Rotate the transmission to the horizontal position and install the upper speed shaft from the rear of the transmission, pushing it through the gear cluster which is inserted through the top of the transmission.

NOTE: *Prior to installation of the upper shaft it is necessary to check that the upper shaft end float is within specification, as described on* ***TRANSMISSION Powershift - Adjust (C.20.E)****.*



BRB0273A_806 8

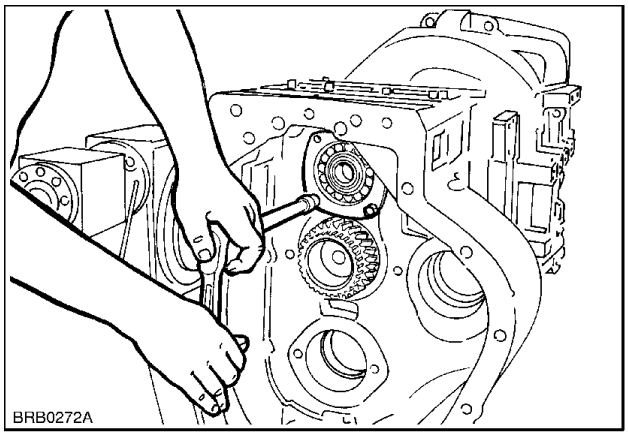
9. Install the spacer, shims and gear and retain with the circlip, through the front of the transmission.



BRB0271A_807 9

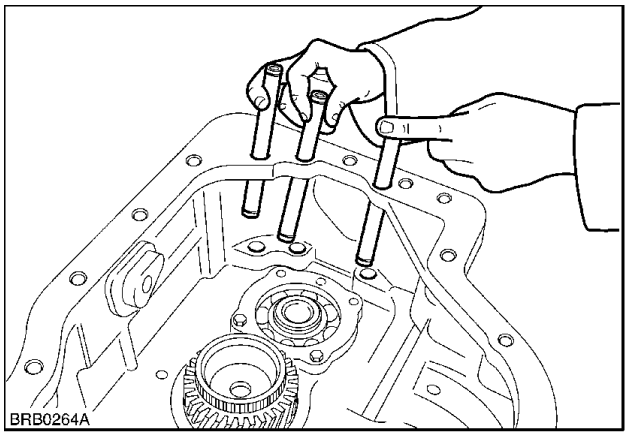
10. Install the upper speed shaft bearing retaining plate, at the rear of the transmission., instal the 4 retaining bolts and tighten to **23 Nm** (**17.0 lbft**).

NOTE: *Use Loctite 242 thread lock and seal adhesive on the bolts.*



BRB0272A_808 10

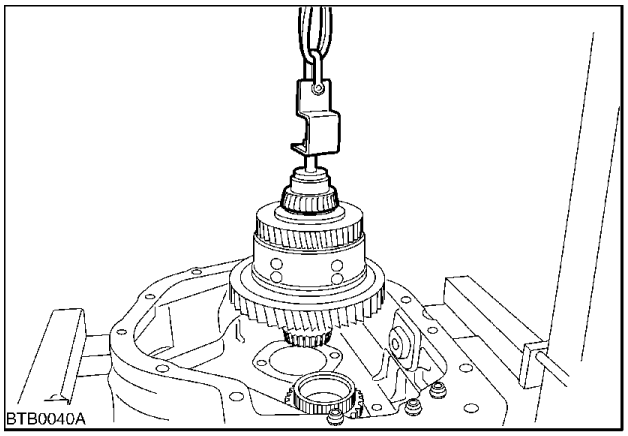
11. Rotate the transmission to the vertical position and install the oil supply pipes for Fast & Slow clutches and lubrication pipe.



BRB0264A_809 11

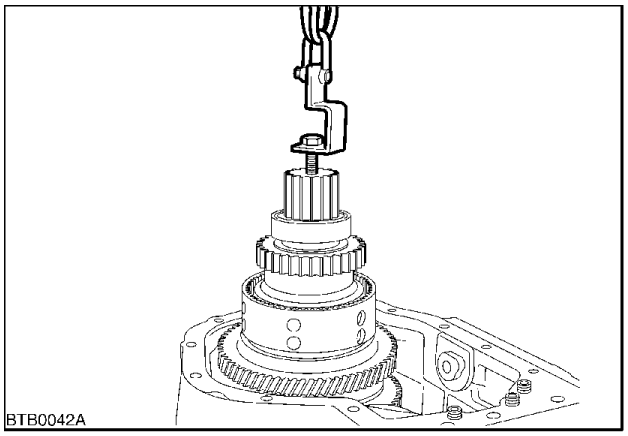
12. Install Medium range shaft assembly

NOTE: *Prior to installation of the medium clutch assembly it is necessary to check that the taper bearing rolling resistance is within specification, as described in* ***Clutch and gear - Overhaul (C.20.E)***



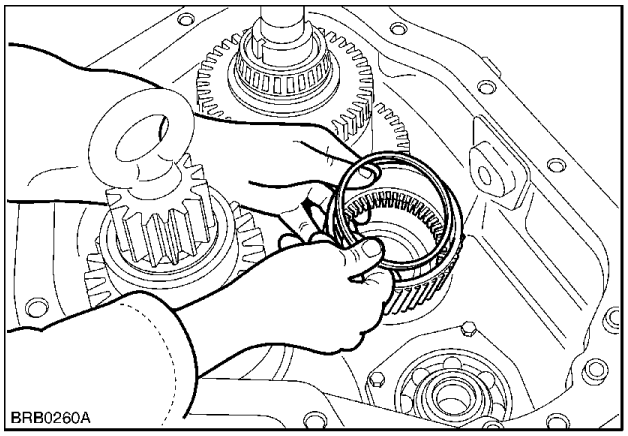
BTB0040A_810 12

13. Install Reverse shaft assembly.



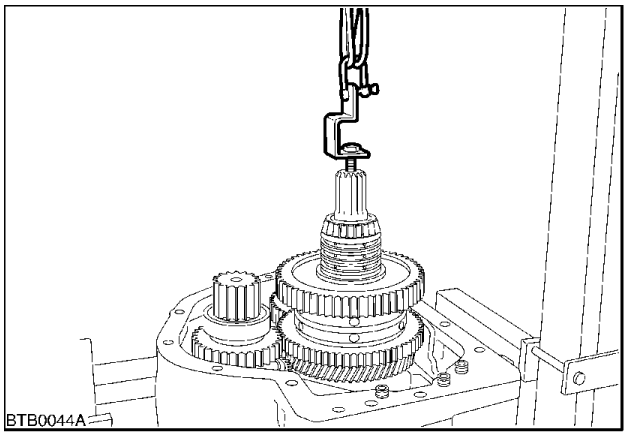
BTB0042A_811 13

14. Install Fast clutch hub and refit circlip.



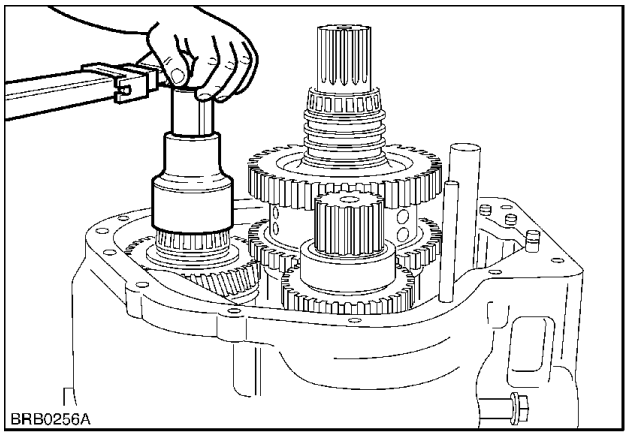
BRB0260A_812 14

15. Install Fast / Slow shaft assembly and remove the lifting eyes from the three shafts.



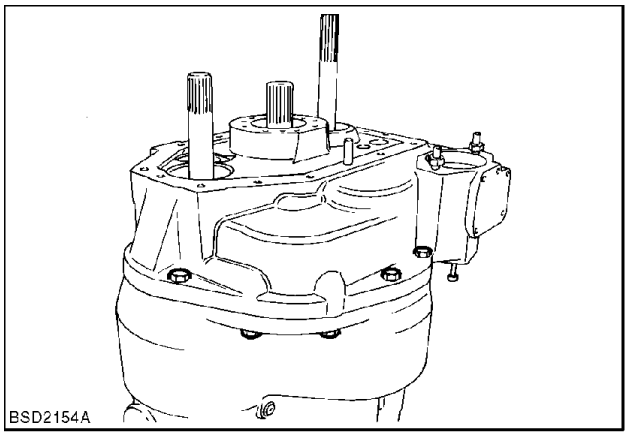
BTB0044A 15

16. Lock the transmission with the special locking tool located in the mid speed sensor hole. Replace the nut at the rear end of the Medium range shaft and tighten to **467 - 515 Nm** using a **70 mm** socket. Lock tabs on nut.



BRB0256A 16

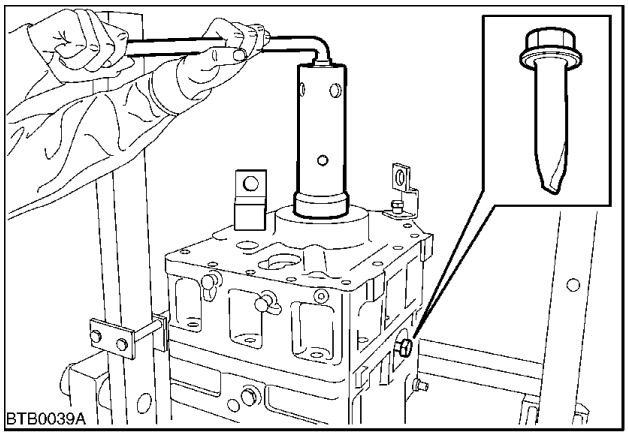
17. Clean mating faces of end case and transmission case and apply Loctite 574 sealant . Use petroleum jelly to hold the clutch manifold slip rings in position and using guide dowels, lower the end case into position. Tighten end case bolts to **200 Nm** (**147.5 lbft**).



BSD2154A_813 17

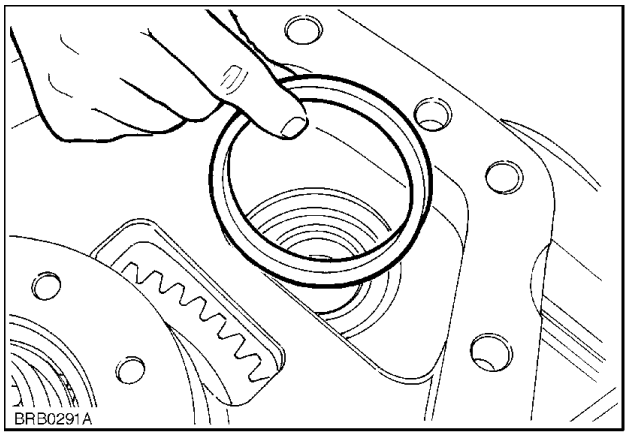
18. Install Fast/Slow end bearing race and replace the Fast / Slow range shaft end nut and tighten to **500 Nm** (**368.8 lbft**), using either special tool No. **380000459** or a **65 mm** socket. Use the special locking tool in the medium speed sensor hole.

NOTE: *The nut has a left hand thread.*



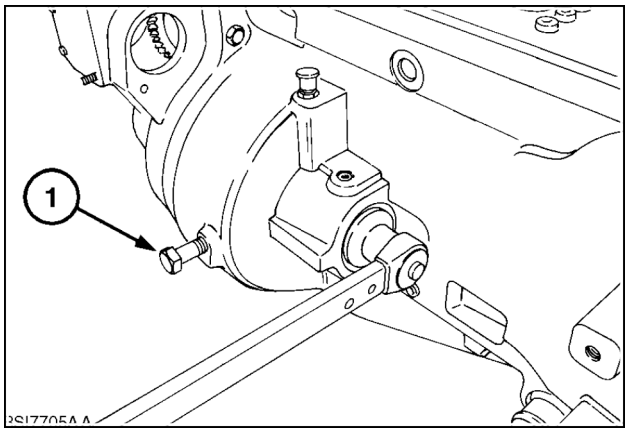
BTB0039A_814 18

19. Install Medium range end bearing race and spacer.



BRB0291A_815 19

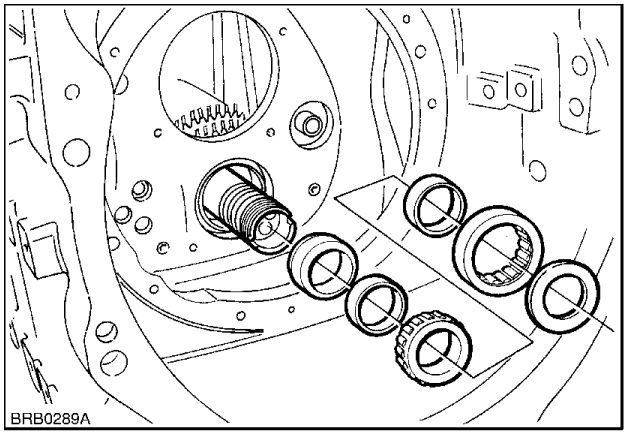
20. Lock the transmission with the special locking tool located in the reverse speed sensor hole.



BSI7705AA 20

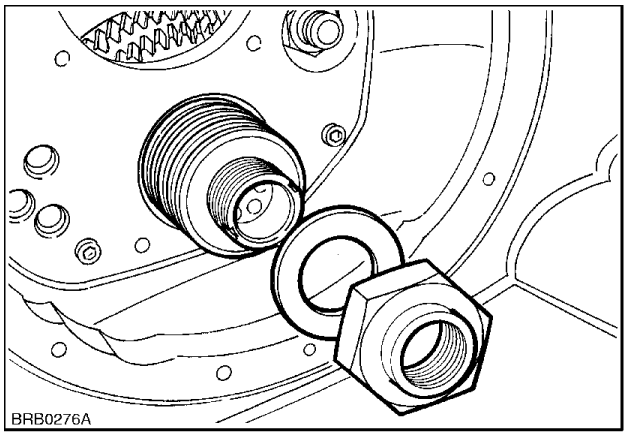
21. Install spacer, shims and bearing in C clutch gear cluster and fit shaft support bearing ensuring inner race is fitted first followed by outer race. Fit the washer with the chamfer facing towards the manifold.

NOTE: *Take care not to damage the brown plastic bearing ring when refitting.*



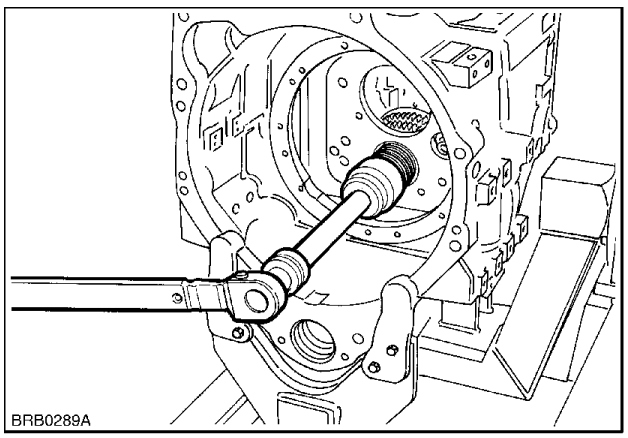
BRB0289A_817 21

22. Replace the 2 O-rings on the end of the lower speed shaft and apply petroleum jelly to the shaft.
Push the manifold back onto the shaft, gently tapping with a rubber faced hammer if necessary. Replace the belleville washer ensuring the outer edge is in contact with the manifold and inner edge in contact with the nut.



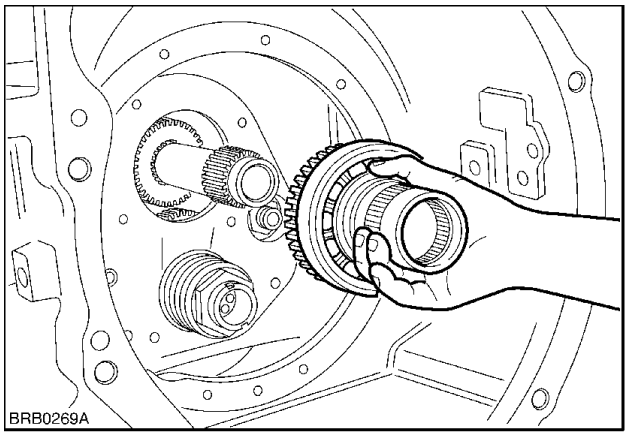
BRB0276A_818 22

23. Replace the nut and tighten to **467 - 515 Nm** using a **60 mm** socket. Form tabs on nut to prevent loosening. Remove special locking tool.



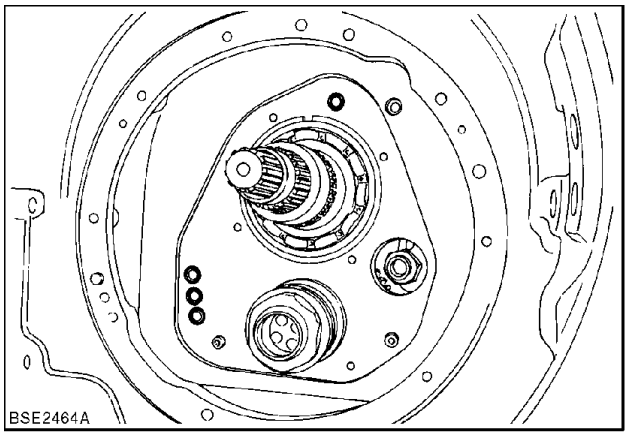
BRB0289A_819 23

24. Install speed section upper front shaft.



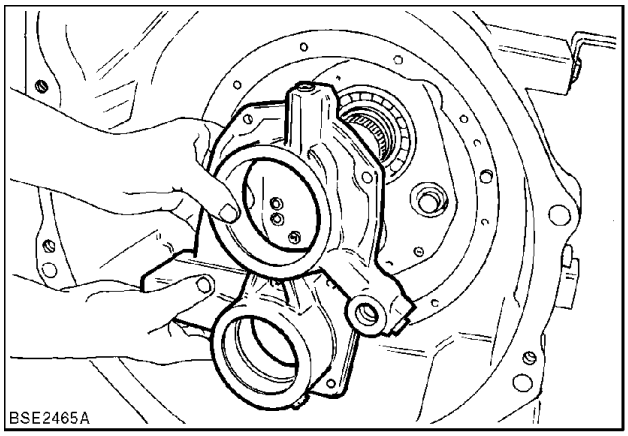
BRB0269A_820 24

25. Install 4 x oil supply “O" rings.



BSE2464A 25

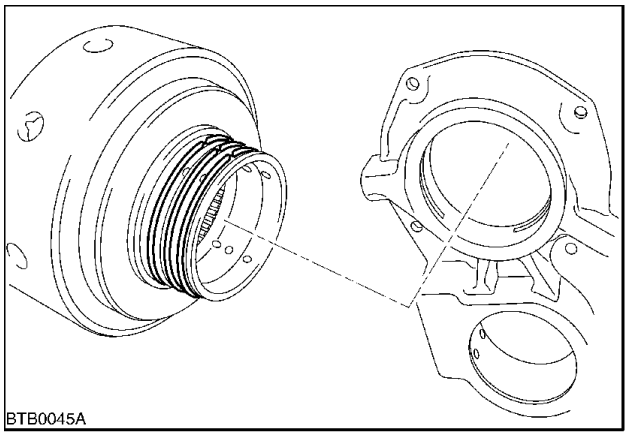
26. Install manifold and tighten the manifold bolts to **24 Nm** (**17.7 lbft**).



BSE2465A_821 26

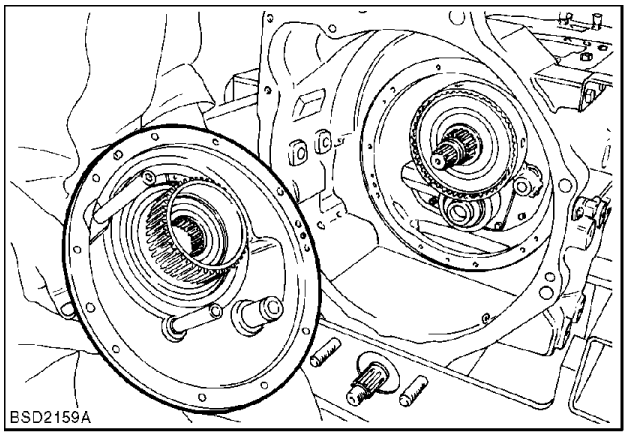
27. Install B clutch housing ensuring that the slip ring joints are in line with each other and that petroleum jelly is applied to help hold them in position. Install the friction and drive plates.

NOTE: *To avoid damaging the slip rings, the joints should be lined up with the area of the manifold where there is no oil gallery before the clutch is pushed into position.*



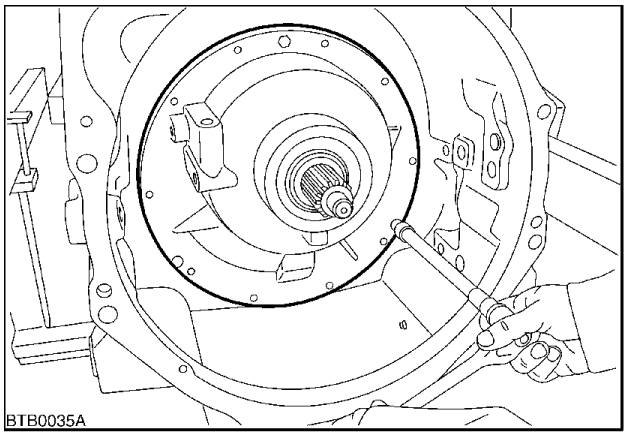
BTB0045A 27

28. Clean the mating faces of the A/B clutch housing and apply Loctite 574 sealant . Install the oil transfer tubes into the A anb B clutch housing.



BSD2159A_822 28

29. Install the A/B clutch housing and tighten the bolts to **24 Nm** (**17.7 lbft**).

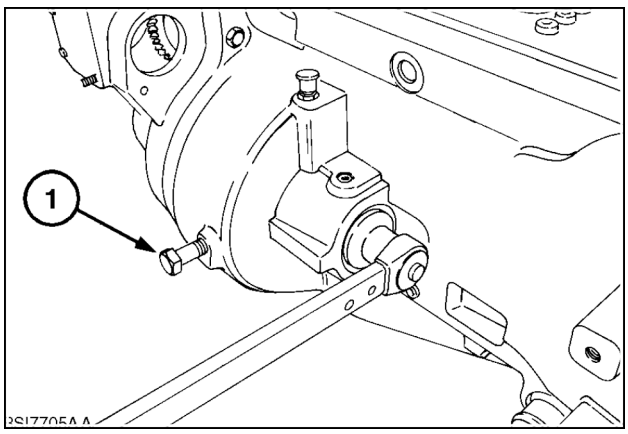


BTB0035A 29

30. At this stage it is recommended to perform a leakage test on the clutch packs, refer to **Clutch and gear - Test (C.20.E)**.

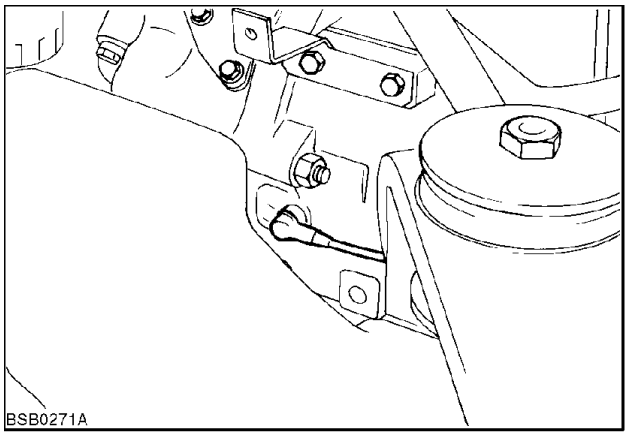
31. Perform the output shaft and medium range shaft end float adjustments, refer to **TRANSMISSION Powershift - Adjust (C.20.E)**

32. After the end float adjustments have been completed, rotate the transmission into the horizontal position. Insert a suitable tool through the speed sensor orifice to lock the Reverse shaft. Tighten Reverse shaft end nut to **467 - 515 Nm** using a **55 mm** socket. Lock tabs on the nut. Install Reverse clutch assembly end cap and fit circlip.



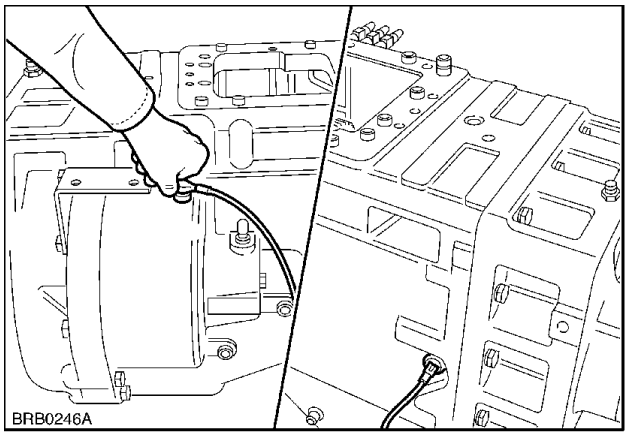
BSI7705AA 30

33. Install engine torque sensor.



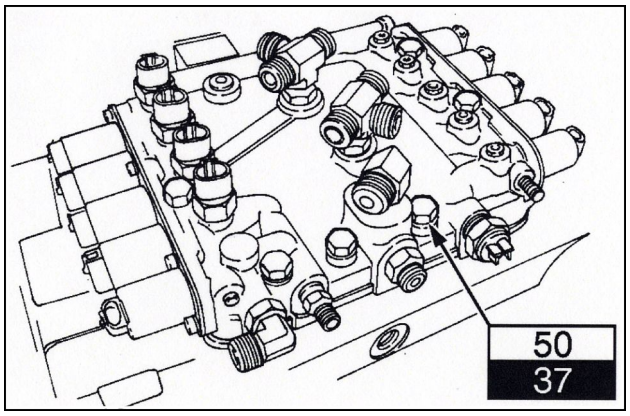
BSB0271A_827 31

34. Install 2 x speed sensors



BRB0246A 32

35. Apply Loctite 574 flexible gasket sealant to mounting face of top cover. Install cover and torque bolts **50 Nm** (**36.9 lbft**) **50 Nm**



FR_001A 33

TRANSMISSION Powershift - Calibrate

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

NOTE: *The calibration is controlled by the electronic control unit. To prevent the tractor from rolling away inadvertently, do not park the tractor in the vicinity of obstacles, apply the parking brake and chock the front and rear wheels. Before undertaking any work, ensure that the ground speed display is on zero.*

NOTE: *Before calibrating the clutch, the transmission oil must be warmed up to the stipulated temperature, this can be checked by use of the H9 menu.*
The full powershift transmission should calibrated, when the transmission oil temperature is as follows: ***60 - 105 °C***

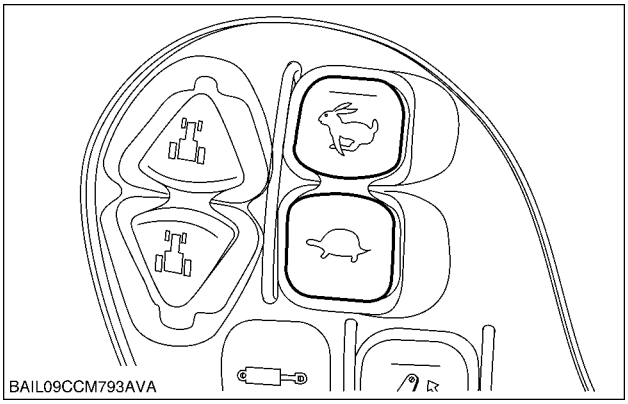
NOTE: *Make sure that the air conditioning system (where fitted) is switched off and all electrohydraulic units are deactivated.*

NOTE: *If a four-digit number beginning with "2" is displayed at any time during the calibration procedure, this is a standard error code. The fault condition must first be remedied, before the calibration can be performed.*

1. There are two methods to enter the transmission calibration mode:
   - Quick call-up
   - Call-up via the HH menu

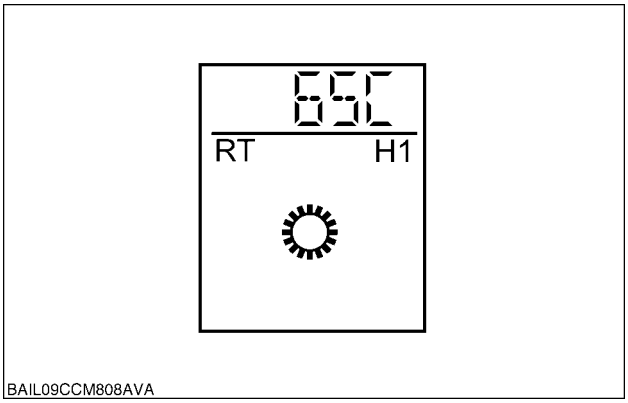
Quick call-up

2. During the engine start, press the upshift button and then within 3 seconds press the downshift button.



BAIL09CCM793AVA 1

3. The system to be calibrated is displayed on the ICU3 instrument cluster and the transmission oil temperature is displayed in the upper section of the display.

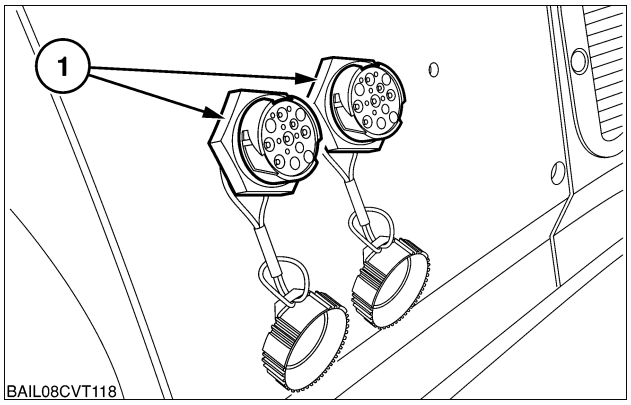


BAIL09CCM808AVA 2

4. Go to step 7.

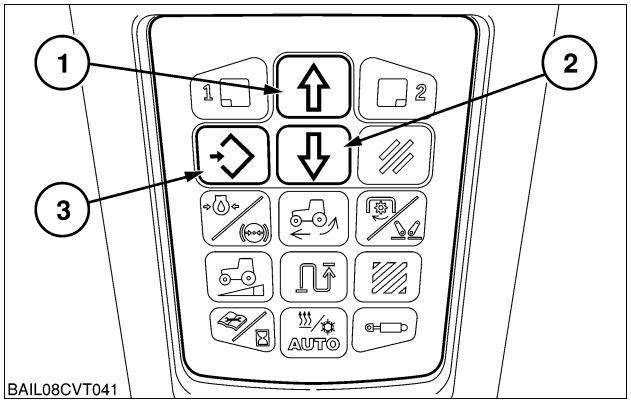
Call-up via the HH menu

5. Connect the Diagnostics plug **380000843** to the Diagnostics socket.

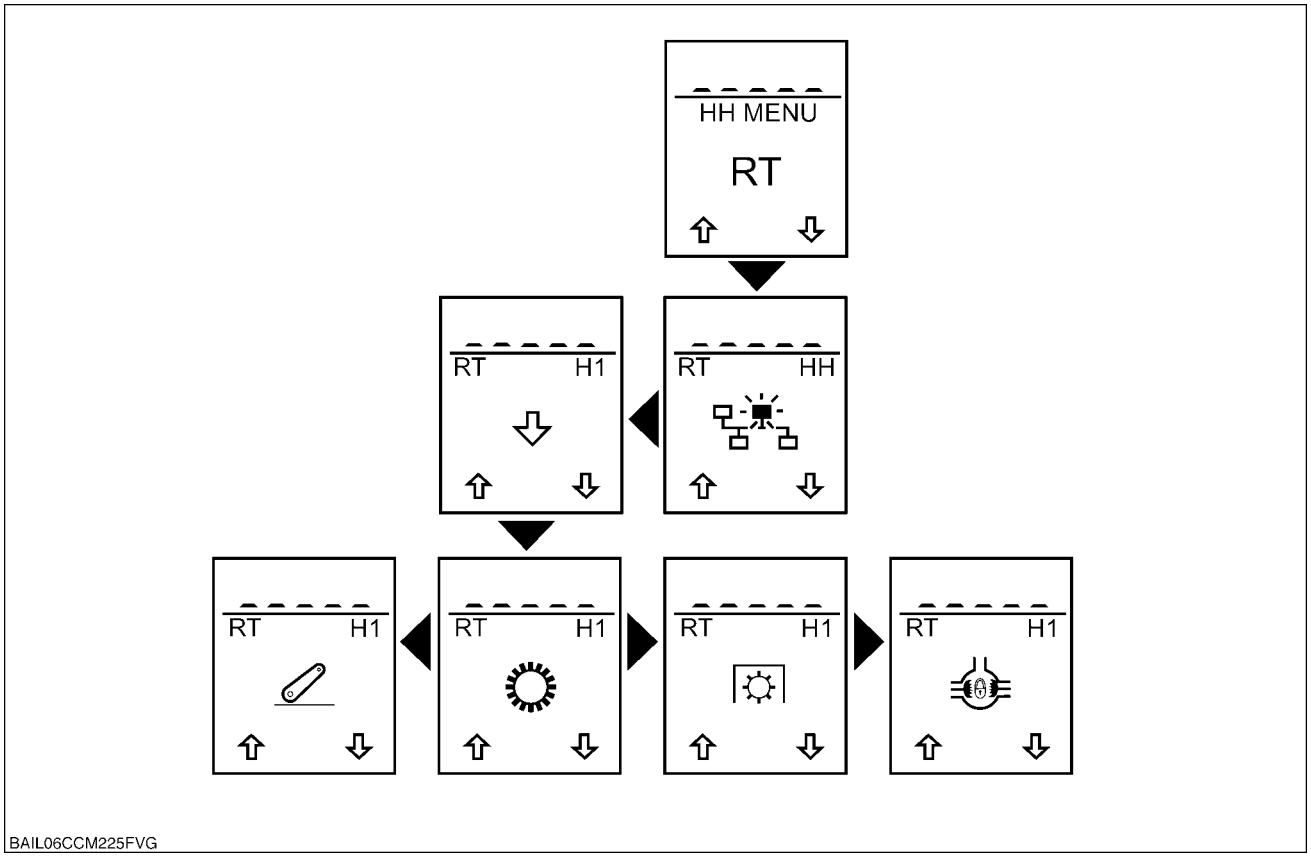


BAIL08CVT118A 3

6. Use the "Up" **(1)** button, "Down" **(2)** button and the Menu button **(3)** on the ICU3 to scroll through the HH menu until the Option H1 and the transmission symbol appear on the RT control unit.
The transmission oil temperature is displayed on the upper section of the display.



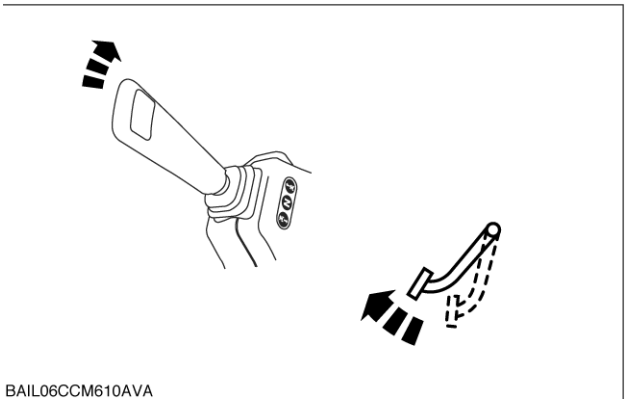
BAIL08CVT041 4



BAIL06CCM225FVG 5

7. The engine speed is set to **1200 RPM**.

8. Move the shuttle lever to the Forward position and release the clutch pedal.

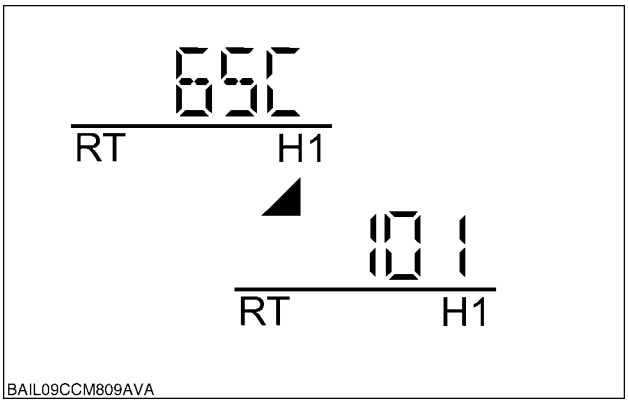


BAIL06CCM610AVA 6

9. On the upper section of the display the transmission oil temperature is displayed. Pressing the upshift or downshift button switches the display to the flywheel torque calibration value.

NOTE: *If the error code "U19" is displayed, the calibration is not possible, as the transmission oil temperature is not high enough.*

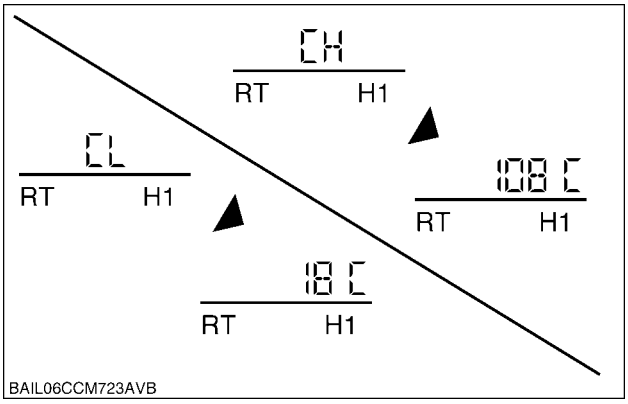
NOTE: *If the preparation for the calibration was not carried out correctly, then a U error code is displayed and the process must be repeated. See the list of the U codes in* ***ELECTRONIC SYSTEM - Fault code index (A.50.A)****.*



BAIL09CCM809AVA 7

10. Depressing the upshift or downshift buttons again will change the display back to the transmission oil temperature.
11. If "CL" (**10 - 60 °C**) or "CH" (**105 °C**) is displayed, after 4 seconds the display will return to the transmission oil temperature. The tractor may be operated until the correct oil temperature is obtained.

NOTE: *If it is not practical to wait for the change in the oil temperature, you can press the upshift or downshift button, while "CL" or "CH" is displayed. The display then shows the letter "dt" and the calibration can be continued.*

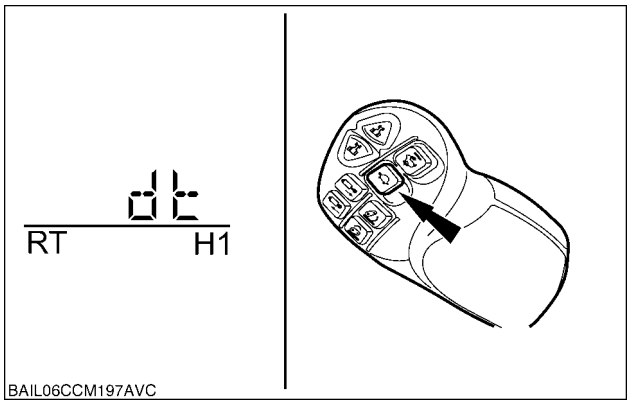


BAIL06CCM723AVC 8

12. There are two procedures to calibrate the transmission:
    - Individual clutch calibration.
    - Automatic clutch calibration.

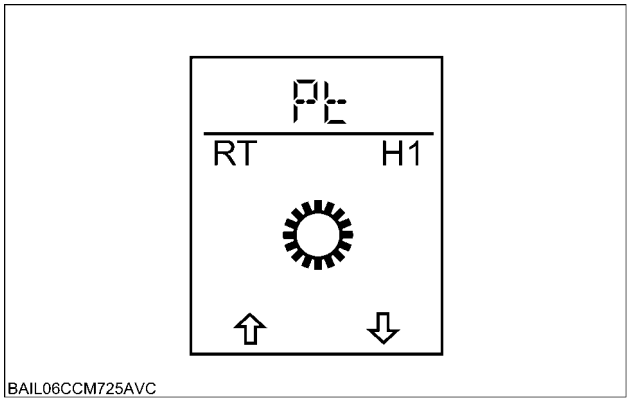
Individual clutch and sensor calibration

13. Press and hold the downshift button to calibrate the flywheel twist sensor "dt". During the calibration, the calibration value is displayed on the upper section of the display
When the calibration of the flywheel twist sensor is completed, the upper section of the display alternately displays "dt" and the calibration value.



BAIL06CCM197AVC 9

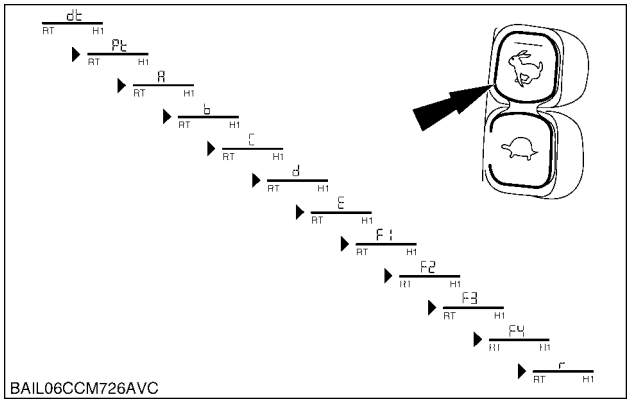
14. Release the downshift button. The display now displays the letters "Pt" to report the PTO twist sensor is ready for calibration.



BAIL06CCM725AVC 10

15. The steps described above are also to be carried out for the clutches "A", "B", "C", "D", "E", "F1", "F2", "F3" "F4" and "R". After the calibration of clutch R, release the downshift button. The display then displays the letters "dt".

16. Repeatedly pressing the upshift button switches through the individual clutches and sensors. This means a certain clutch or sensor can be selected, if it needs to be calibrated several times.



BAIL06CCM726AVC 11

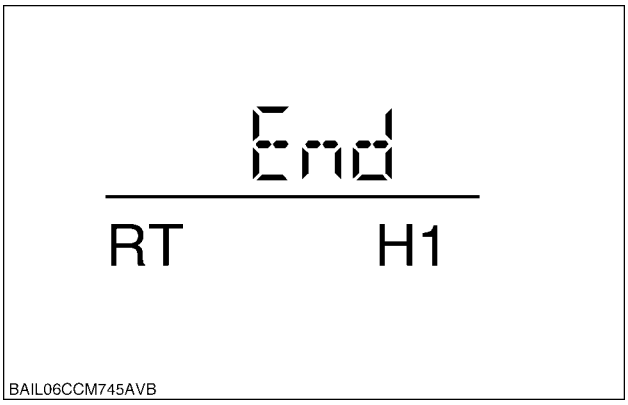
Automatic clutch and sensor calibration

17. Call up the calibration menu. (See step 1 - 11)
Press the upshift button until "dt" appears on the display.

18. Press the Automatic function switch and the automatic calibration then starts.

NOTE: *For vehicles not fitted with an Automatic function switch, press and hold the "Down" button for two seconds.*

19. On the upper section of the display "End" is displayed, when the process is completed and all clutches are calibrated.



BAIL06CCM745AVB 12

20. Switch the starter switch to OFF to store the calibration values.

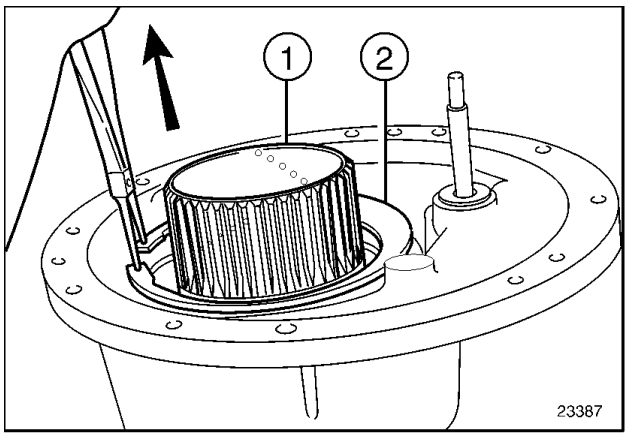
NOTE: *If a fault occurs during calibration, a U code is displayed and the process must be repeated. See the list of the U codes in* ***ELECTRONIC SYSTEM - Fault code index (A.50.A)****.*

Clutch and gear - Overhaul

Prior operation:
Refer to **TRANSMISSION Powershift - Disassemble (C.20.E)**.

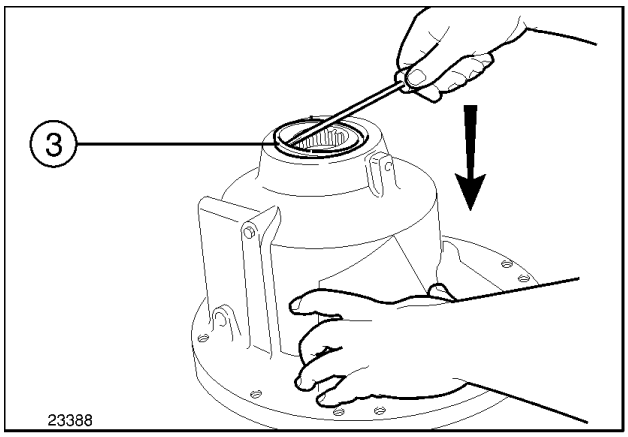
CLUTCH 'A'

1. Remove the retaining ring **(1)**, the bearing inner lock ring and retrieve the hubs of the clutches A and B along with the bearing and clutch A discs and centering springs.



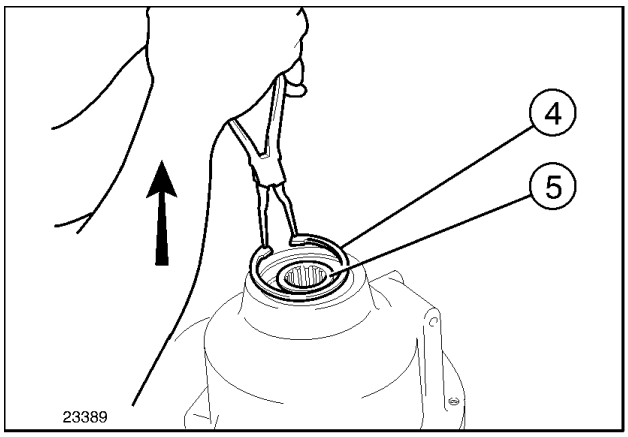
23387_794 1

2. Remove seal **(3)**.



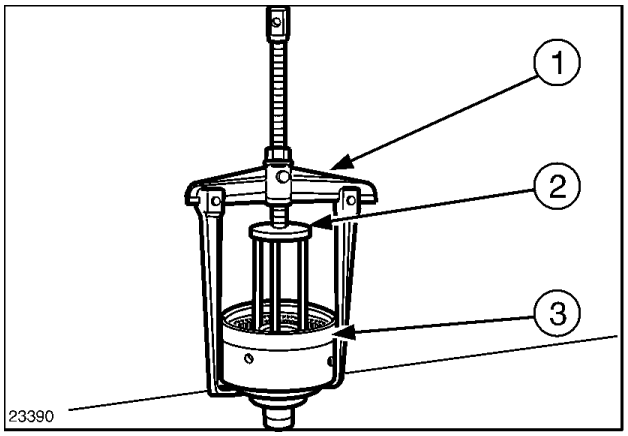
23388_98 2

3. Remove the inner **(5)** circlip from the outside of clutch A, withdraw clutch A from the cover. Remove the outer circlip **(4)**to retrieve the bearing.



23389_99 3

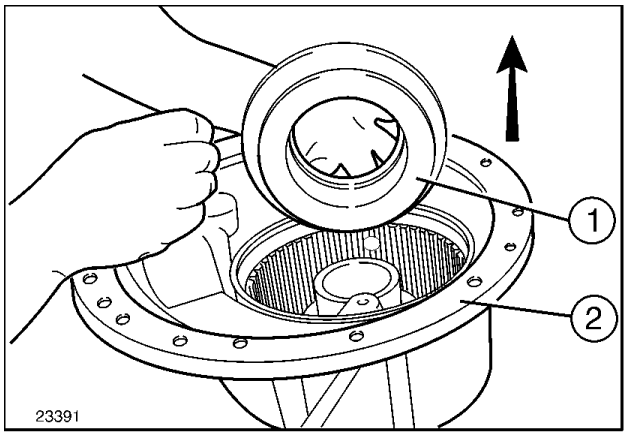
4. Position tool no. **380000291 (2)** and puller tool no. **380000546 (1)** having a length of **300 mm** and complete with extraction brackets no. 292655 having a length of **300 mm** on clutch A **(5)**, turn the tool bolt to compress the clutch release Belleville springs and remove the retaining ring. Disassemble tool no. **380000291 (2)** and puller **(1)** and retrieve Belleville springs.



23390_795 4

5. Place the clutch A housing on the cover **(2)**, blow compressed air into the control oil inlet hole and remove the piston **(1)**.
   The piston seals should be carefully removed using a small screwdriver. Install new seals onto the piston, using fingers only. To install the piston, apply a generous coating of petroleum jelly to the piston seals and housing bore and using a suitable adaptor over the piston, press the piston into the housing. Ensure that the piston remains square to the housing bore during installation.

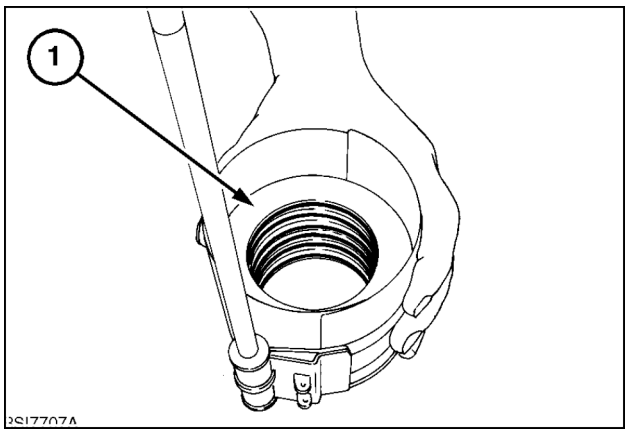
NOTE: *It is recommended that the outer piston seals are compressed after installation onto the piston using suitable shim steel and a jubilee clip and then placed in a freezer overnight prior to installing into the clutch housing.*



23391_101 5

Belleville spring installation

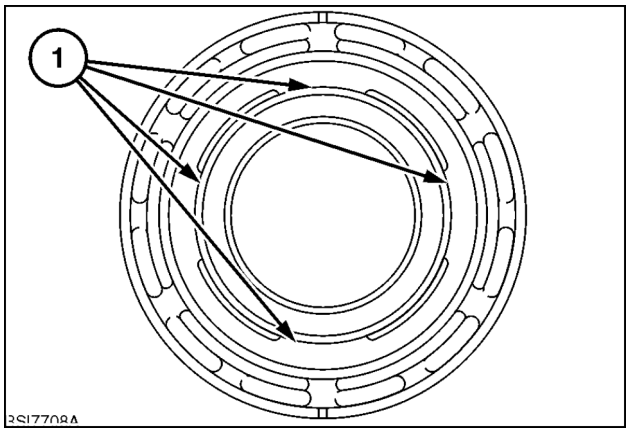
6. Stack the Belleville springs on a flat surface.
7. Slide over a suitable piston ring compression tool and tighten the tool to align the springs, **(1)**.



BSI7707A 6

8. Where fitted, the Belleville washer mounting rings must be seated on all four mounting lands, **(1)**. When fitted, the mounting ring should just be able to rotate relative to the piston. This is to ensure the force from the springs act concentrically on the clutch piston.

NOTE: *The reverse clutch has a specific mounting ring. The ring must be fitted with the lubrication grooves facing the Belleville springs.*

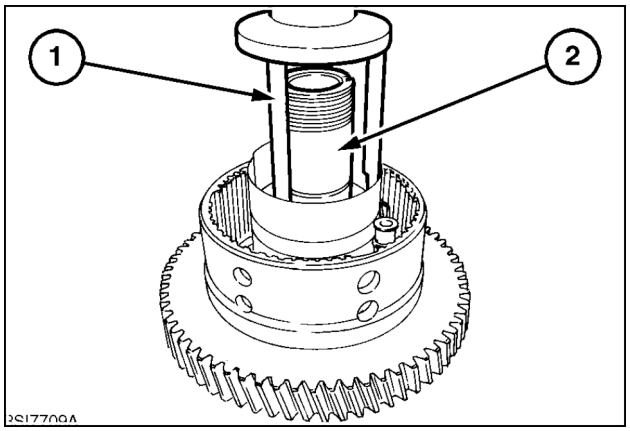


BSI7708A 7

9. Place belleville spring stack complete with compression tool over the shaft **(2)**.
10. Using special tool **380000291 (1)** , compress the springs and fit the retaining ring and snap ring.

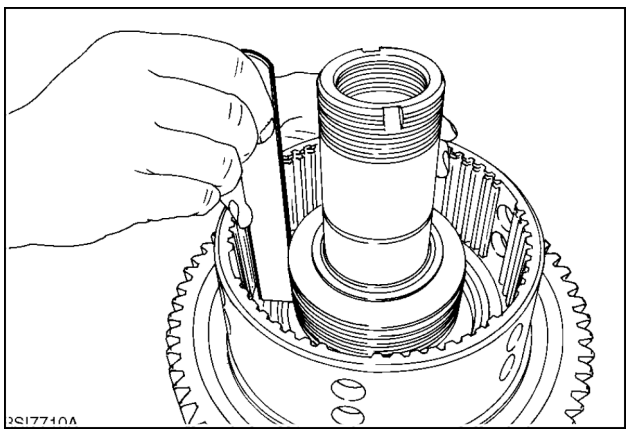
NOTE: *An extension is required when performing this procedure on the slow clutch.*

11. Release the piston ring compression tool.
12. Carefully release the compression on the Belleville springs.



BSI7709A 8

13. Using a suitable straight edge check the alignment of the Belleville springs on three sides.

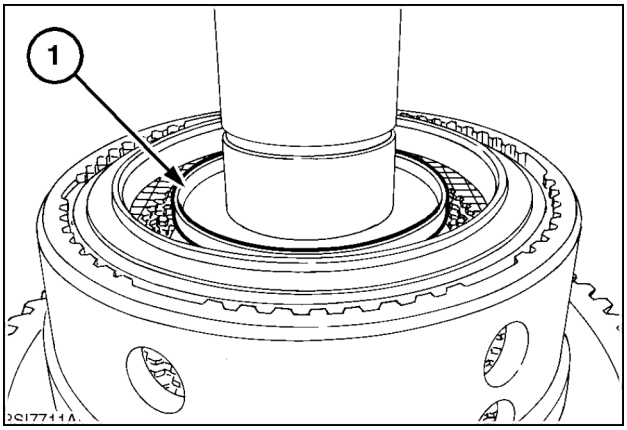


BSI7710A 9

14. If it is necessary to reinstall the D/E clutch shaft bearings Reference **(5 and 7) 18**. Ensure that the bearings are fitted with the recess groove located on the outer edge against the snap ring, **(6) 18**.

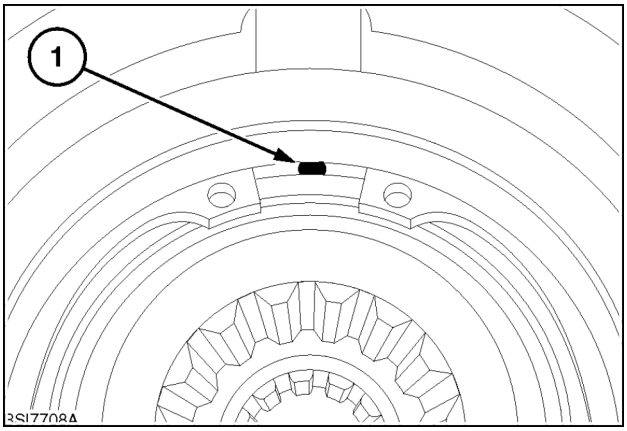
15. When measuring the end float on the Fast/Slow and medium output shafts, using special tool **380000458**, a suitable tube may be added to the handle to aid leverage. Whilst doing this tap the output shaft with a soft faced mallet to ensure that the full end float is measured.

16. Ensure that when reassembling the medium clutch the lubrication shield **(1)**, is orientated with the lip facing away from the clutch pack.

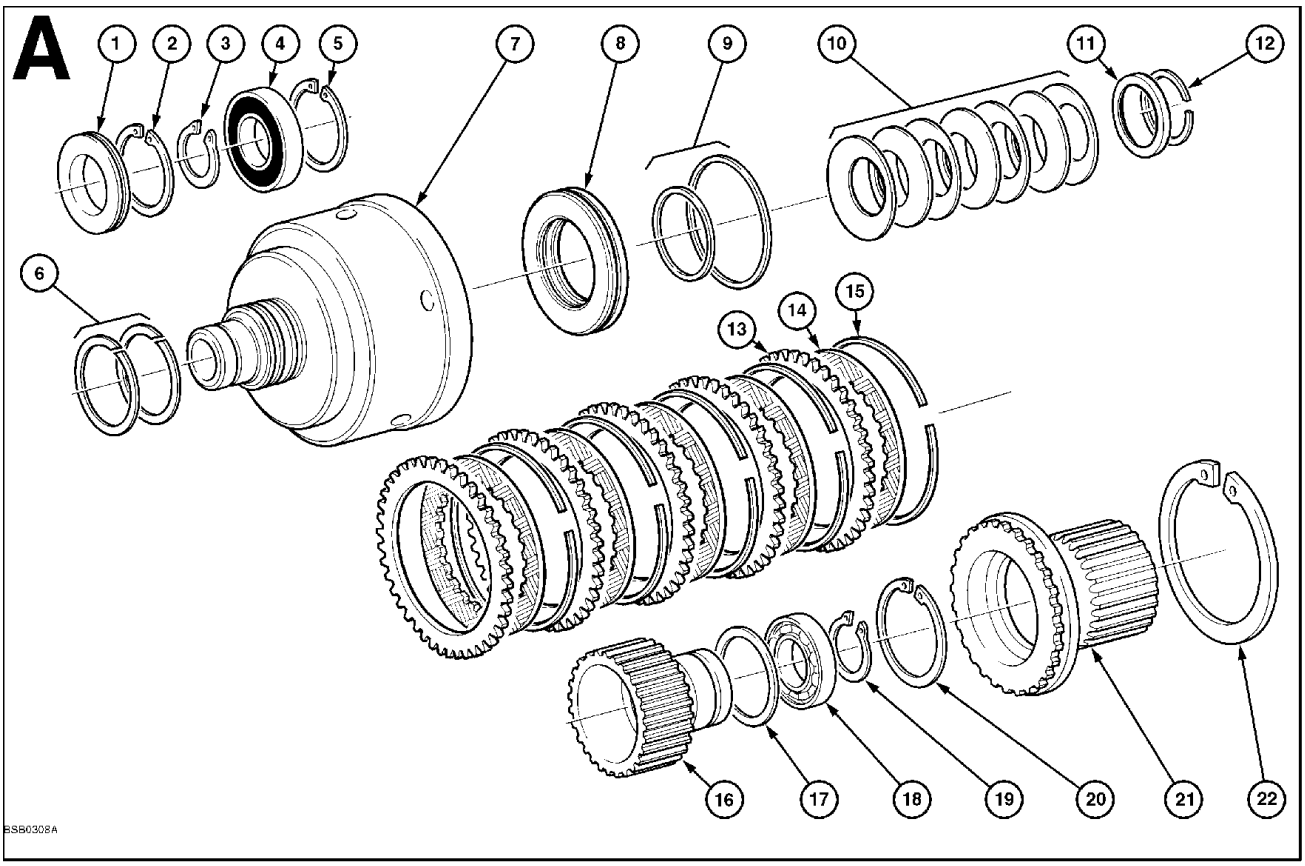


BSI7711A 10

17. When reassembling Clutch A into the cover ensure that the outer circlip does not interfere with the lubrication oil drain hole, **(1)**.



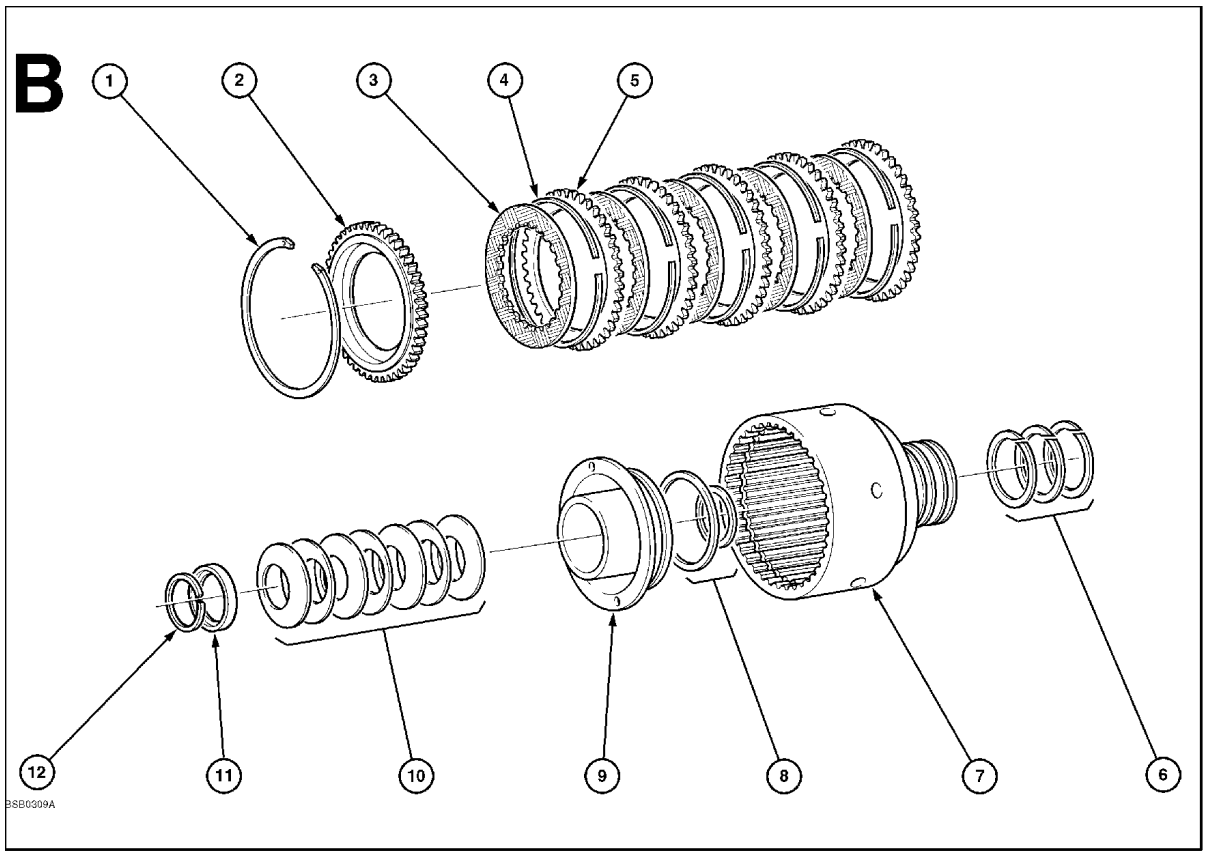
BSI7712A 11



BSB0308A 12

Clutch 'A' Assembly

1 Seal
2 Bearing Outer Circlip
3 Housing Shaft Circlip
4 Bearing
5 Bearing Inner Circlip
6 Sealing Rings
7 Clutch Housing
8 Piston
9 Piston, Inner and Outer Seals
10 Dished Washers, 7 off
11 Circlip Cup
12 Circlip
13 Steel Drive Plate, 5 off
14 Friction Plate, 5 off
15 Plate separator spring, 5 off
16 Hub
17 Washer
18 Bearing
19 Circlip
20 Circlip
21 Hub
22 Circlip

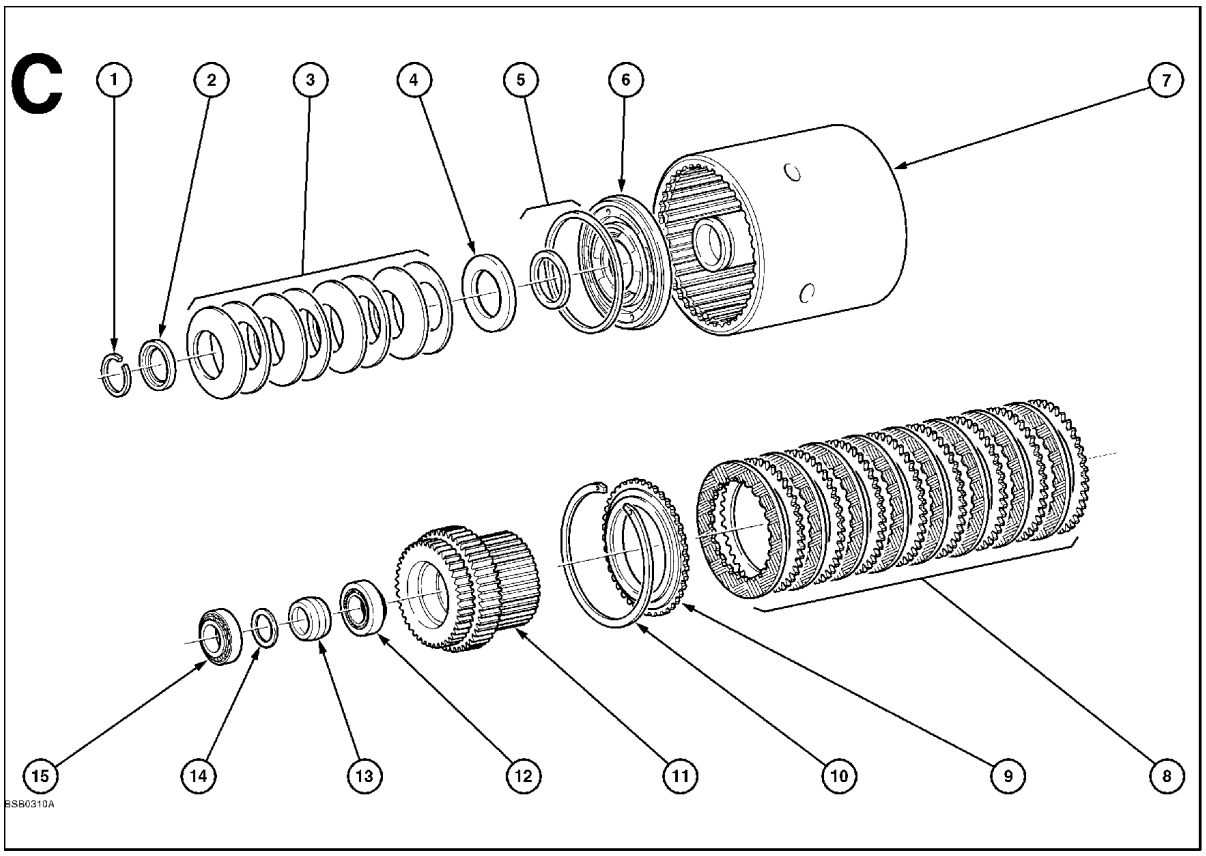


BSB0309A 13

Clutch 'B' Assembly

1 Circlip
2 End Drive Plate
3 Friction Plate, 5 off
4 Plate Separator Spring, 5 off
5 Steel Drive Plate, 5 off
6 Sealing Rings
7 Housing
8 Piston, Inner and Outer Seals
9 Piston
10 Dished Washers, 7 off
11 Circlip Cup
12 Circlip

18. Note: Piston seal replacement and the procedure for disassembling and reassembling the multi plate clutches is the same for each clutch. Refer to the clutch 'A' disassembly and the exploded view of the relevant clutch.



BSB0310A 14

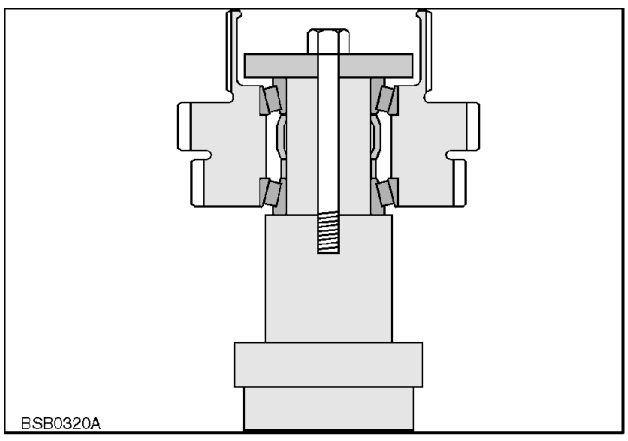
Clutch 'C' Assembly

1 Circlip
2 Circlip Cup
3 Dished Washers, 8 off
4 Flat Washer
5 Piston, Inner and Outer Seals
6 Piston
7 Housing
8 Clutch Plates, 8 off each
9 End Plate
10 Circlip
11 Hub
12 Bearing
13 Spacer
14 Bearing pre-load Shim
15 Bearing

19. Note: Piston seal replacement and the procedure for disassembling and reassembling the multi plate clutches is the same for each clutch. Refer to the clutch 'A' disassembly and the exploded view of the relevant clutch.

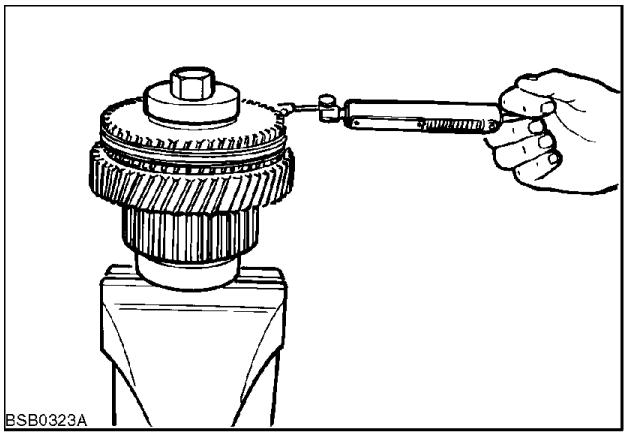
Clutch 'C' Hub Taper Bearing Adjustment

20. Assemble the 'C' clutch hub to the special tool, **380000497** , complete with bearings, spacer and original shim. Tighten the bolt of the special tool to **140 Nm**.

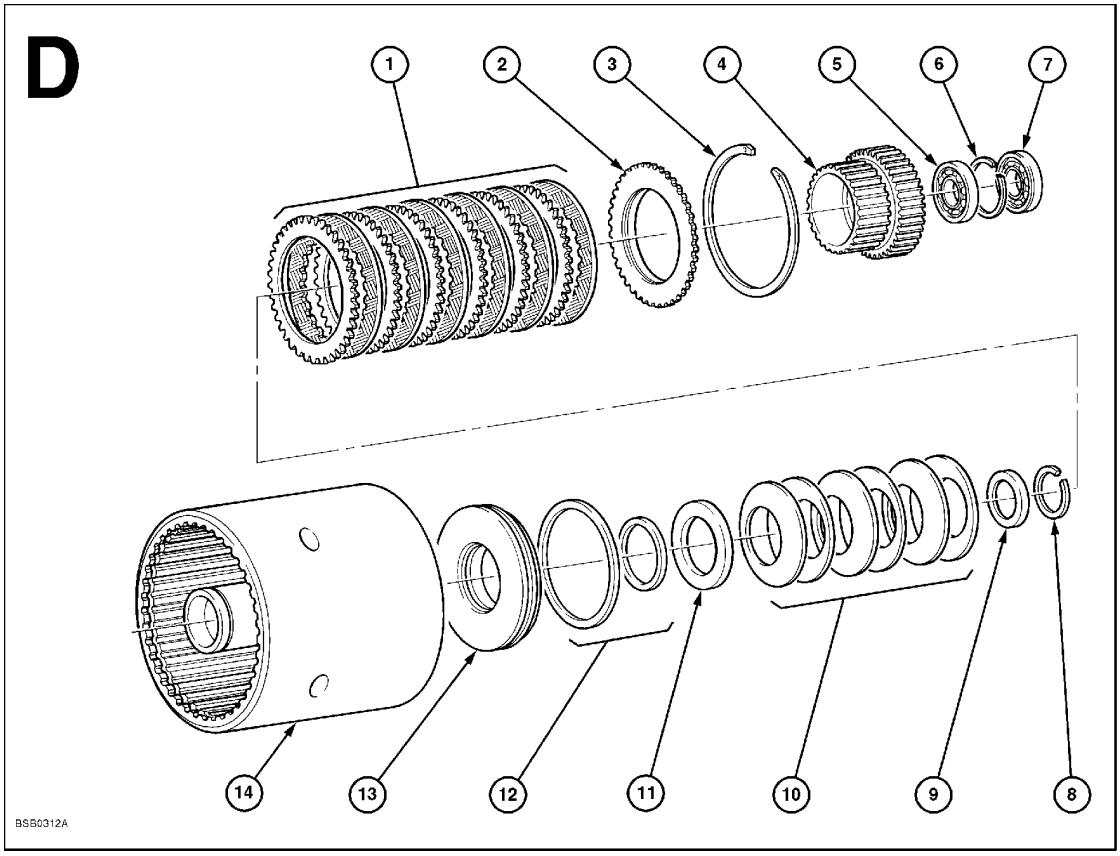


BSB0320A_796 15

21. Wrap a length of string around the smaller of the two gears and attach to a suitable spring balance. Measure the rolling resistance of the bearings during rotation, not at the point where rotation begins.
The rolling resistance should equate to **0.5 - 0.8 Kg** on the spring balance. If outside the specification install a thinner shim to increase the resistance or install a thicker shim to reduce the resistance.



BSB0323A_797 16



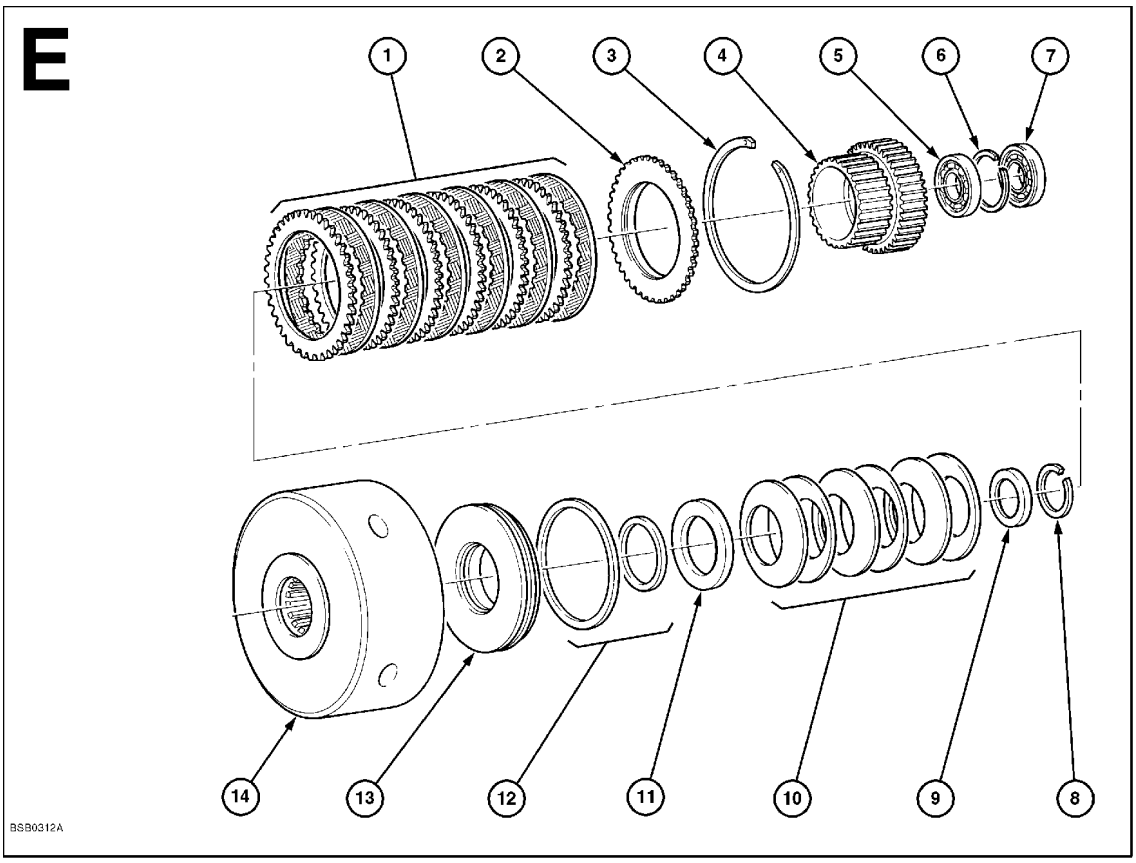
BSB0312A_798 17

Clutch 'D' Assembly

1 Clutch Plates, 6 off each
2 End Plate
3 Circlip
4 Hub
5 Bearing
6 Circlip
7 Bearing
8 Circlip
9 Circlip Cup
10 Dished Washers, 6 off
11 Flat Washer
12 Piston, Inner and Outer Seals
13 Piston
14 Housing

22. The bearing, item **(7)**, can only be installed one way as there is a groove to locate the circlip, item **(6)**.

NOTE: *Piston seal replacement and the procedure for disassembling and reassembling the multi plate clutches is the same for each clutch. Refer to the clutch 'A' disassembly and the exploded view of the relevant clutch.*



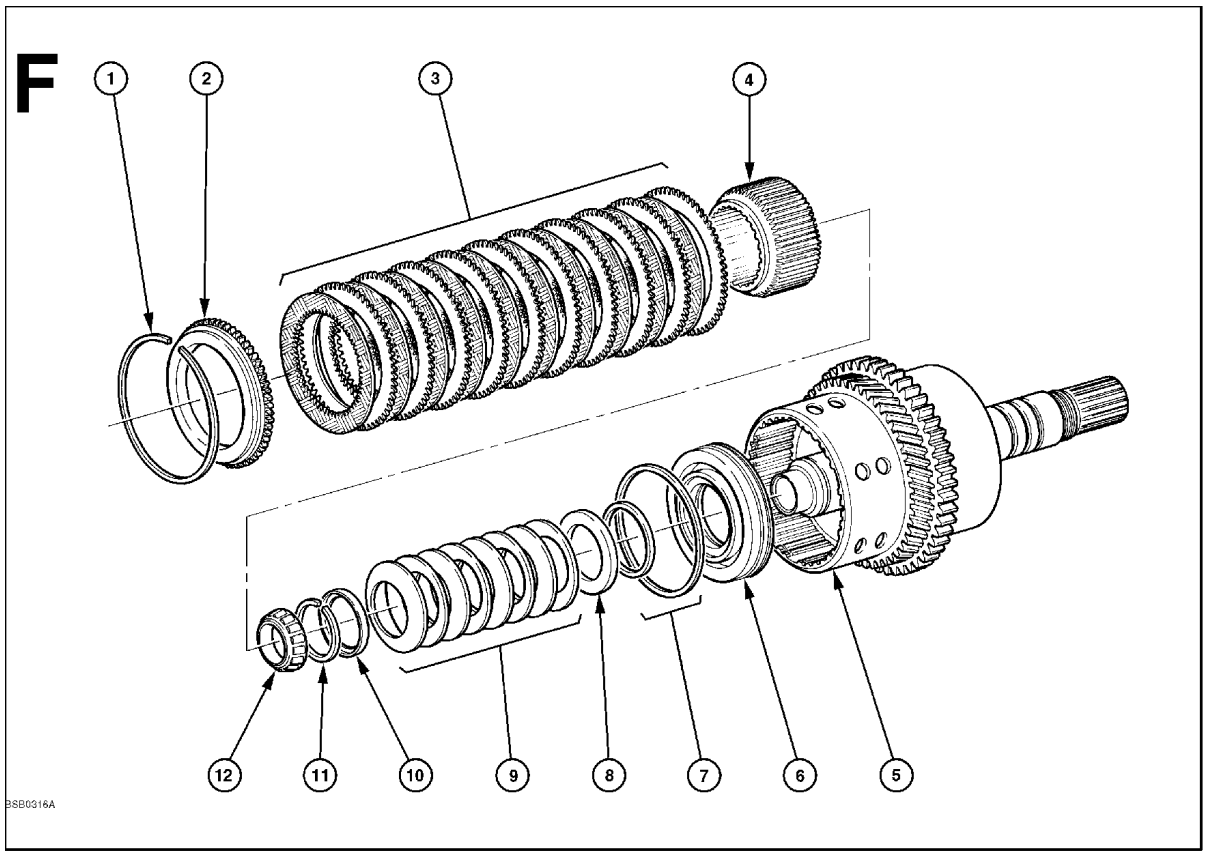
BSB0312A_799 18

Clutch 'E' Assembly

1 Clutch Plates, 6 off each
2 End Plate
3 Circlip
4 Hub
5 Bearing
6 Circlip
7 Bearing
8 Circlip
9 Circlip Cup
10 Dished Washers, 6 off
11 Flat Washer
12 Piston, Inner and Outer Seals
13 Piston
14 Housing

23. The bearing, item **(7)**, can only be installed one way as there is a groove to locate the circlip, item **(6)**.

NOTE: *Piston seal replacement and the procedure for disassembling and reassembling the multi plate clutches is the same for each clutch. Refer to the clutch 'A' disassembly and the exploded view of the relevant clutch.*



BSB0316A_800 19

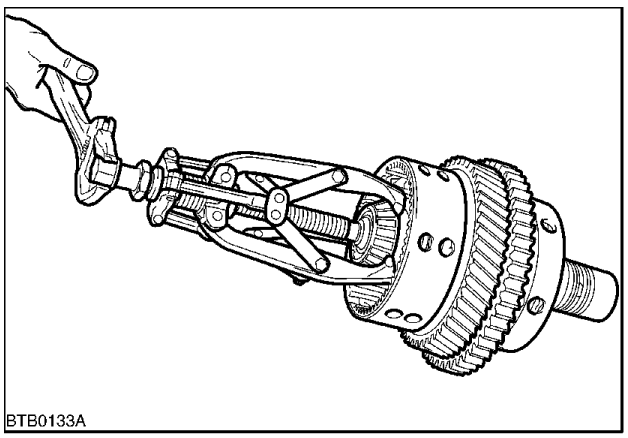
Fast (F3) Clutch Assembly

1 Circlip
2 End Plate
3 Clutch Plates
4 Hub (retained to top shaft)
5 Housing
6 Piston
7 Piston, Inner and Outer Seals
8 Flat Washer
9 Dished Washers, 8 off
10 Circlip Cup
11 Circlip
12 Bearing

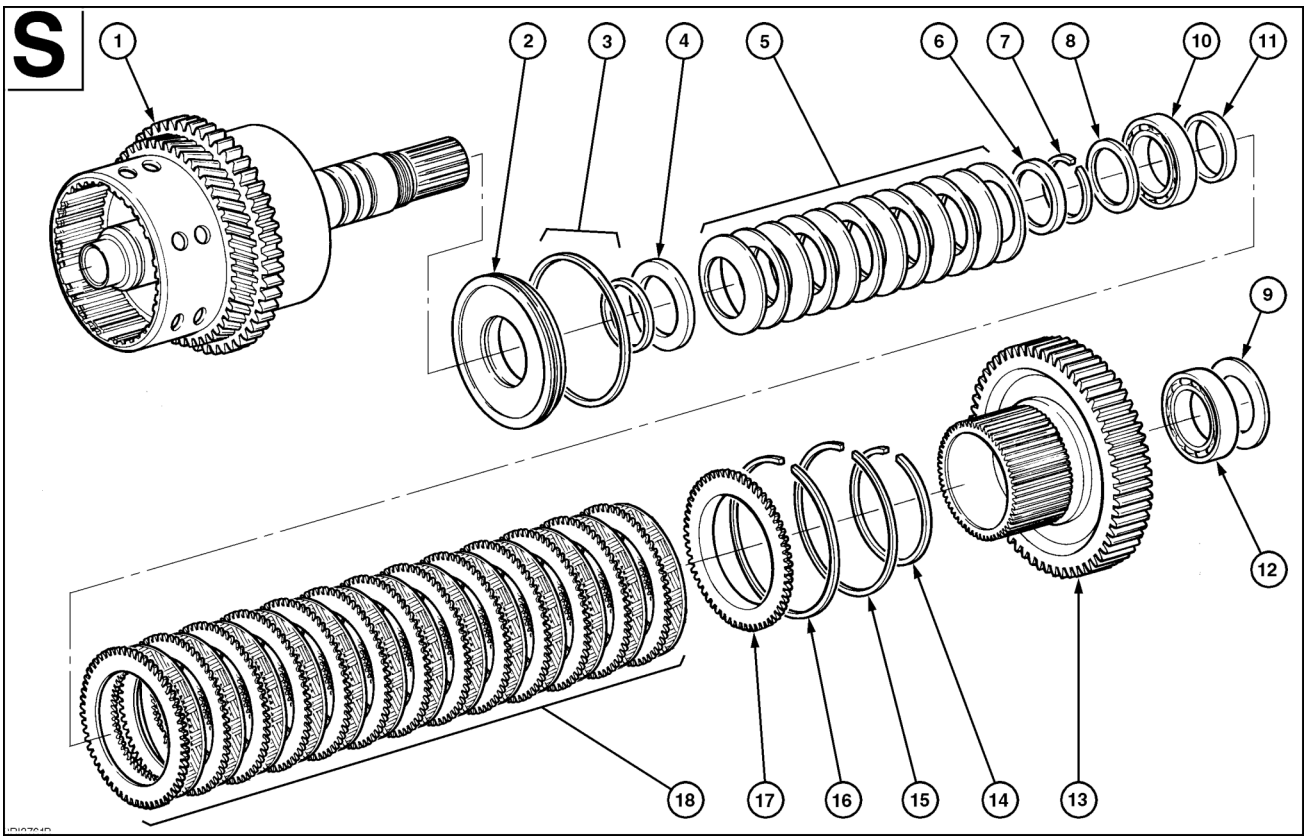
24. Note: Piston seal replacement and the procedure for disassembling and reassembling the multi plate clutches is the same for each clutch. Refer to the clutch 'A' disassembly and the exploded view of the relevant clutch.

End Bearing (item 12) Removal

25. In order to remove the dished washers and piston it is necessary to remove the end bearing.



BTB0133A 20

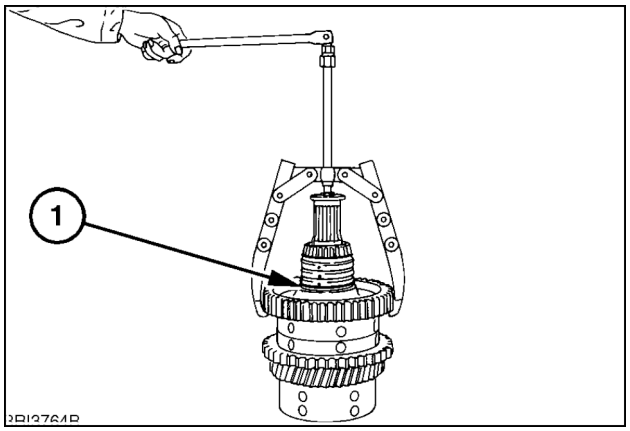


BRI3761B 21

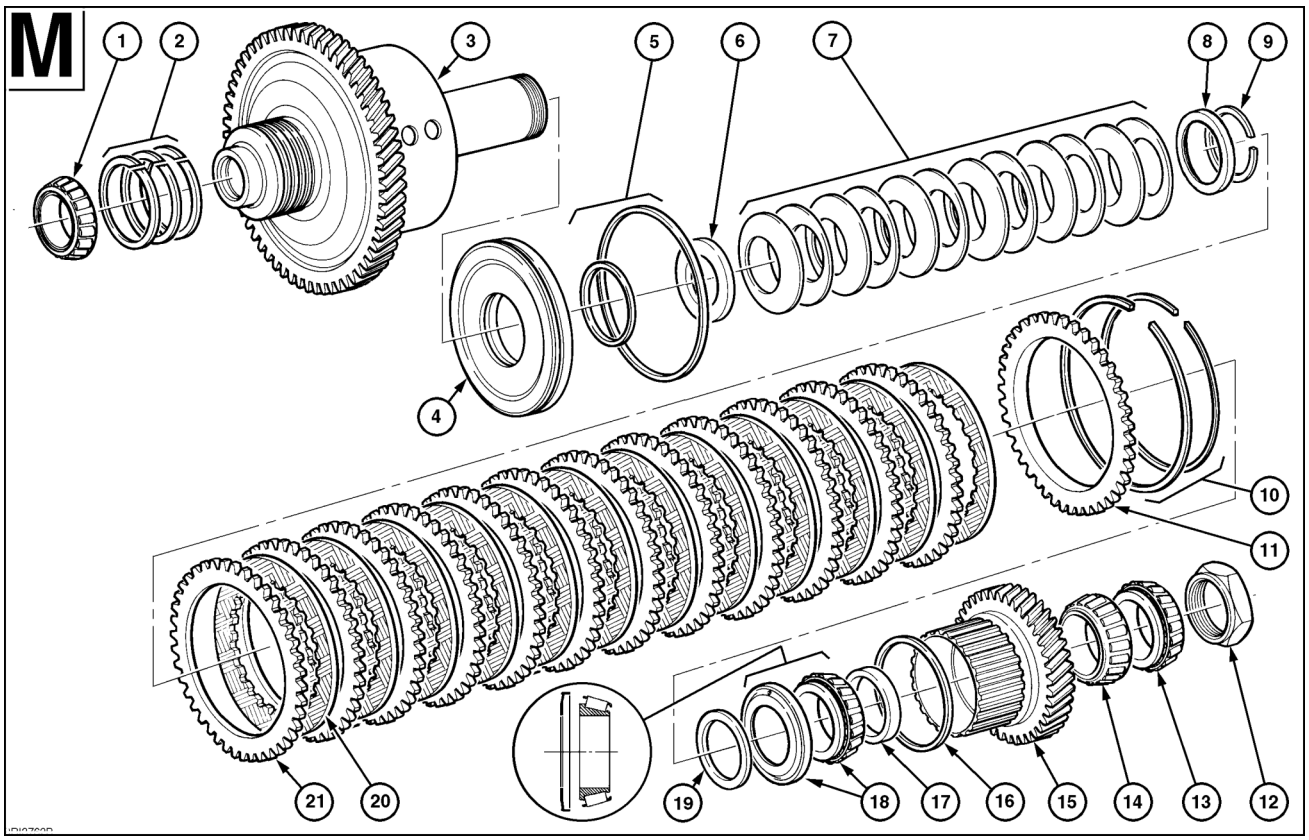
26. Note: Piston seal replacement and the procedure for disassembling and reassembling the multi plate clutches is the same for each clutch. Refer to the clutch 'A' disassembly and the exploded view of the relevant clutch.

End Bearing (item 10) Removal

27. In order to remove the dished washers and piston it is necessary to remove the end bearing.



BRI3764B 22

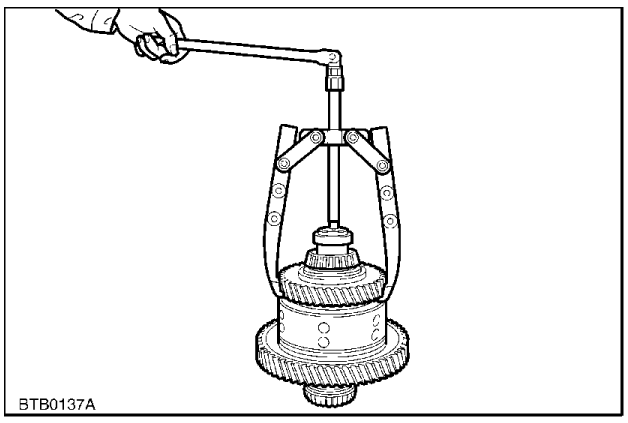


BRI3762B 23

28. Note: Piston seal replacement and the procedure for disassembling and reassembling the multi plate clutches is the same for each clutch. Refer to the clutch 'A' disassembly and the exploded view of the relevant clutch.

End Bearing (item 13) Removal

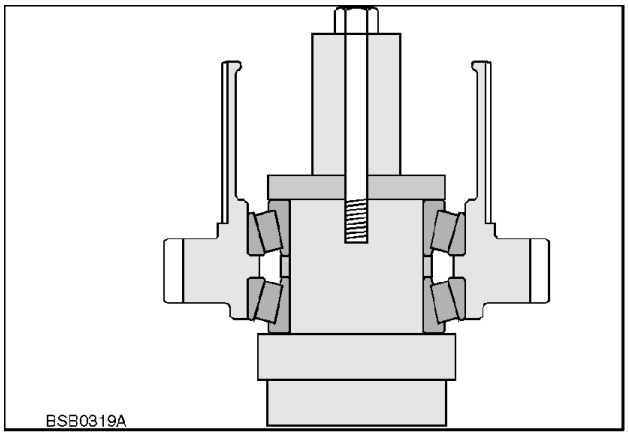
29. In order to remove the dished washers and piston it is necessary to remove the end bearing.



BTB0137A 24

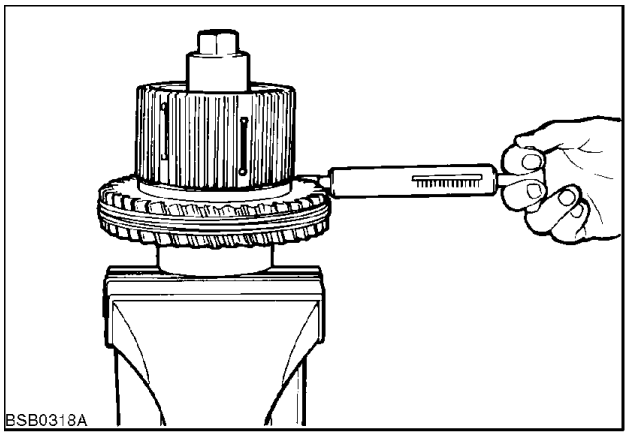
Medium Clutch Hub Taper Bearing Adjustment

30. Assemble the Medium clutch hub to the special tool, No. **380000497**, complete with bearings, spacer and original shim. Tighten the bolt of the special tool to **140 Nm**.

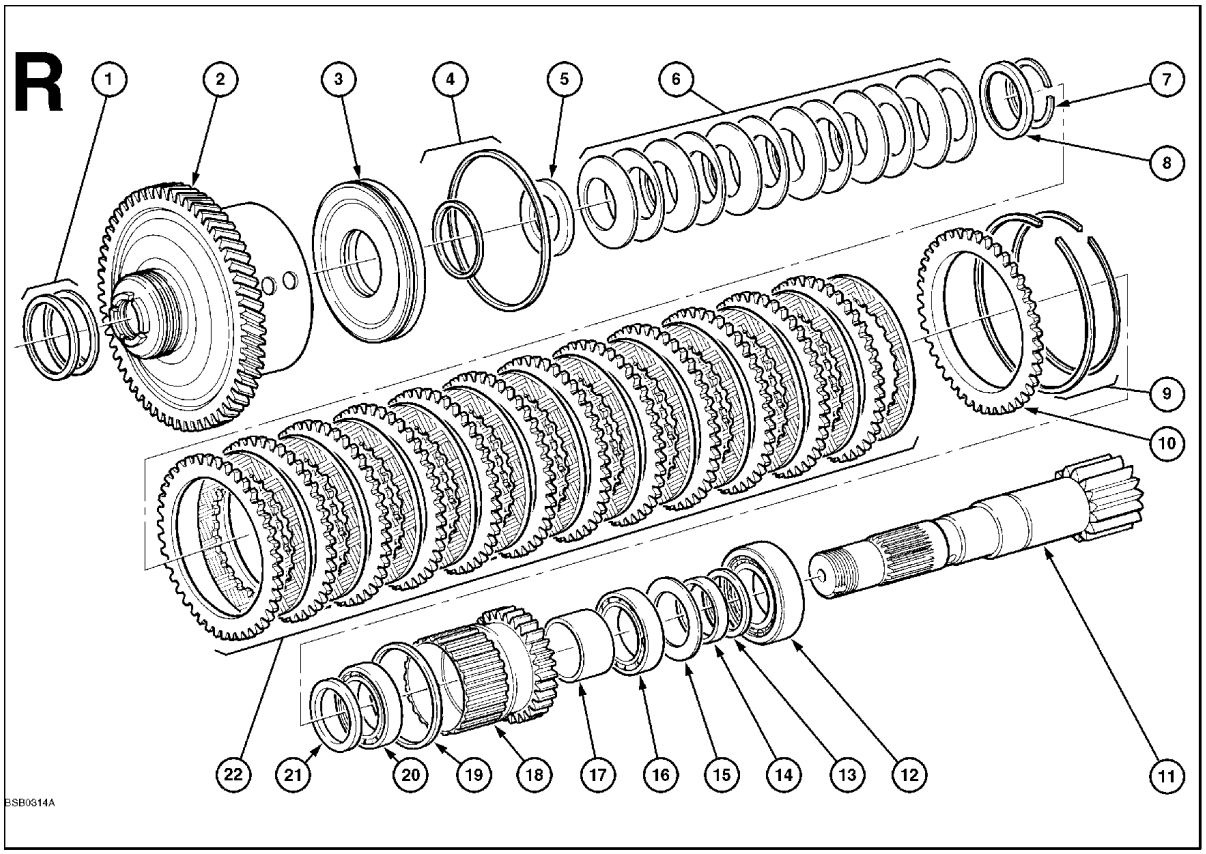


BSB0319A 25

31. Wrap a length of string around the gear and attach to a suitable spring balance. Measure the rolling resistance of the bearings during rotation, not at the point where rotation begins.
The rolling resistance should equate to **0.7 - 1.2 Kg** on the spring balance. If outside the specification install a thinner shim to increase the resistance or install a thicker shim to reduce the resistance.



BSB0318A 26



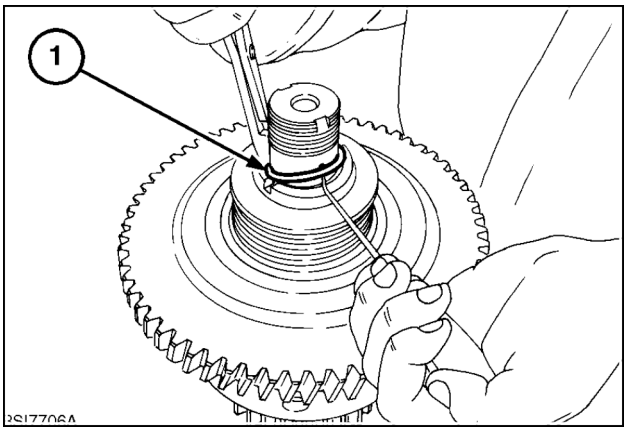
BSB0314A 27

Reverse Clutch Assembly

1 Sealing Rings
2 Housing
3 Piston
4 Piston, Inner and Outer Seals
5 Flat Washer
6 Dished Washers, 12 off
7 Circlip
8 Circlip Cup
9 End Plate Circlips
10 End Plate
11 Shaft
12 Bearing
13 Chamfered Washer (Chamfer towards hub)
14 Spacer
15 Oil Baffle Washer
16 Bearing
17 Spacer
18 Hub
19 Seal
20 Bearing
21 Washer
22 Clutch Plates, 12 off each

32. During the disassembly of the reverse clutch it is necessary to remove the circlip from the end of the shaft. **(1)**.

NOTE: *Piston seal replacement and the procedure for disassembling and reassembling the multi plate clutches is the same for each clutch. Refer to the clutch 'A' disassembly and the exploded view of the relevant clutch.*



BSI7706A 28

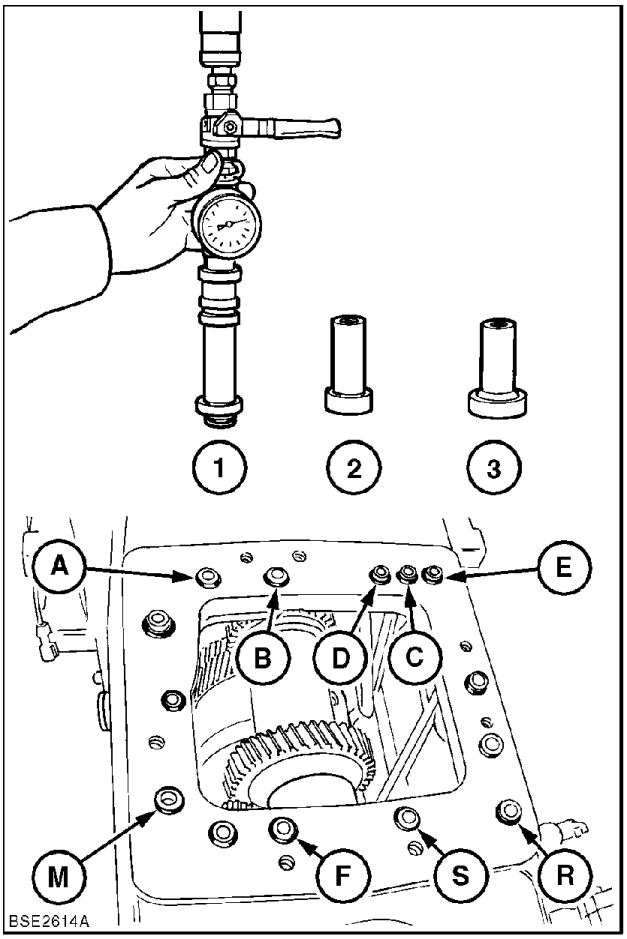
Next operation:
Refer to **TRANSMISSION Powershift - Assemble (C.20.E)**.

Clutch and gear - Test

Prior operation:
Refer to **TRANSMISSION Powershift - Assemble (C.20.E)**.

1. At this stage it is advisable to test the clutch packs using compressed air.
   Install “O" rings in galleries, Figure **1**
   Use appropriate pressure test adaptor connected to an air line with On/Off tap and pressure gauge to test each clutch.
   (1) **380000449** to test clutches A, B, F and S
   (2) **380000450** to test clutches C, D and E
   (3) **380000451** to test clutches M and R
   To test the clutches ensure the tap is closed. Firmly locate the adaptor on the gallery of the clutch to be tested.
   Quickly open and close the valve and observe the drop off in pressure on the gauge and listen to the escaping air.
   A good clutch will see a smooth and continuous drop off of pressure on the gauge. A clutch with poor sealing will show an immediate drop in pressure when the air is turned off and the sound of escaping air will also be heard.

NOTE: *It is important when performing this test that an air-tight seal is maintained between the test port and the pressure test adaptor. If the rubber seal on the end of the adaptor is worn it should be replaced before performing the test.*



BSE2614A 1

Housing - Remove

Prior operation:
Disconnect the transmission housing from the rear axle, for further information refer to **Housing - Disconnect (C.20.E)**

⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012

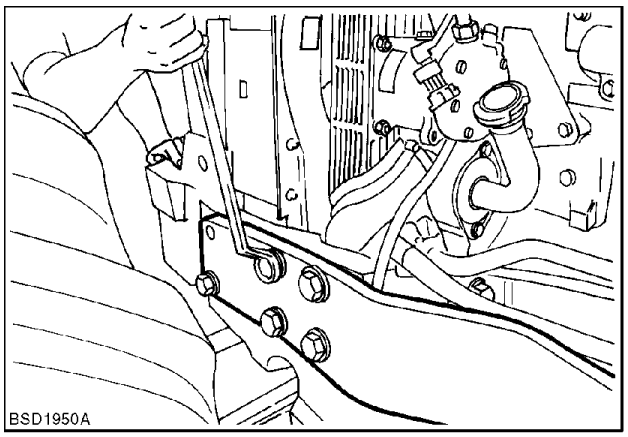
All Tractors

1. Using a suitable sling, connect the front weights to a hoist and remove the front weights (if fitted).
2. Remove the engine side rails (if fitted).

⚠ WARNING ⚠

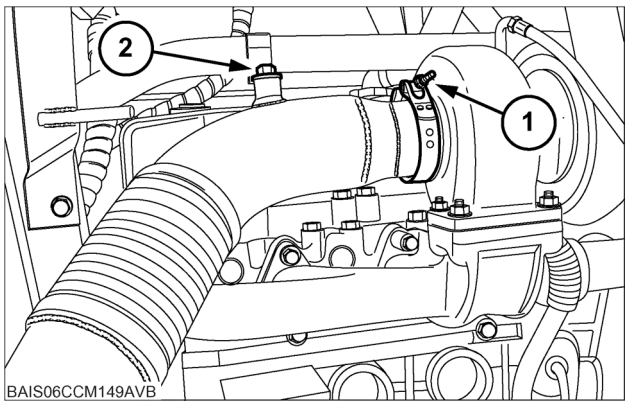
Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012



BSD1950A 1

3. Loosen the exhaust clamp **(1)** and detach the air cleaner aspirator pipe bracket **(2)**.



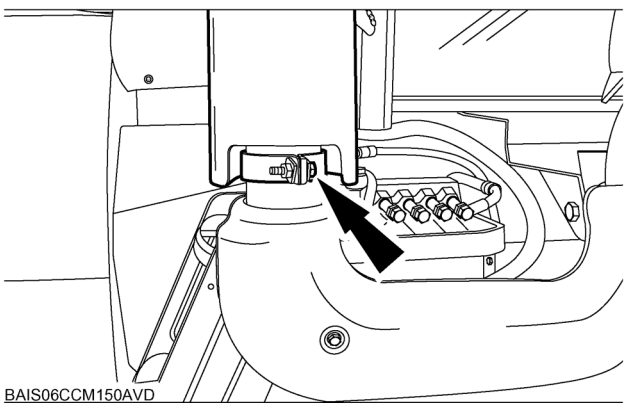
BAIS06CCM149AVB 2

4. Loosen the exhaust clamp and remove the exhaust muffler.

⚠ WARNING ⚠

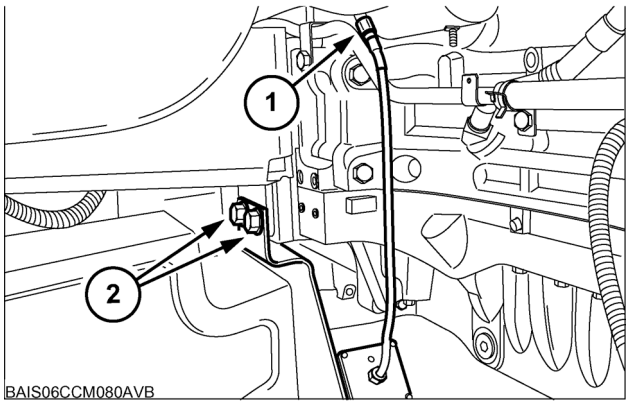
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



BAIS06CCM150AVD 3

5. Disconnect the radar electrical connector **(1)** and remove the radar **(2)**.



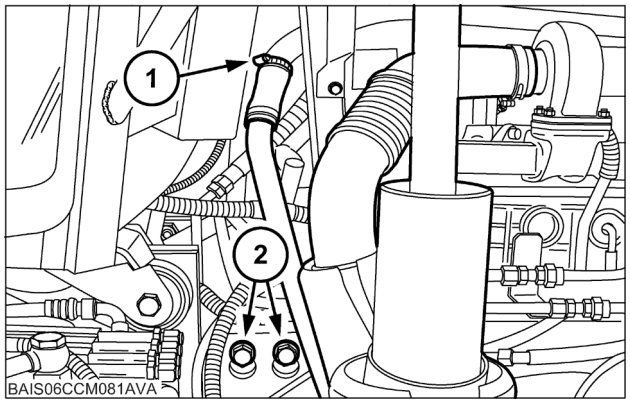
BAIS06CCM080AVB 4

6. Disconnect air cleaner aspirator pipe **(1)**.
Loosen the exhaust retaining bolts **(2)** and remove the exhaust.

⚠ WARNING ⚠

The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



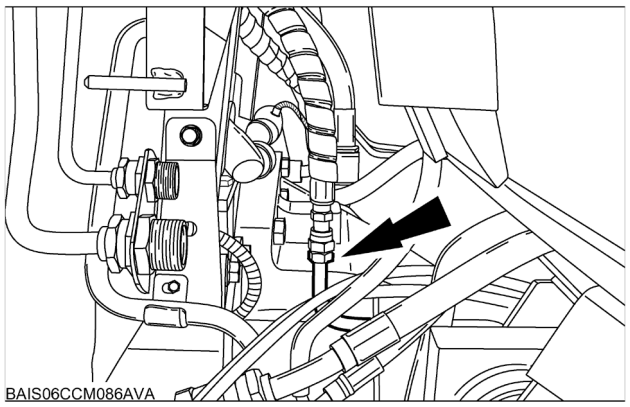
BAIS06CCM081AVA 5

7. Disconnect the power brake valve supply hose.

⚠ CAUTION ⚠

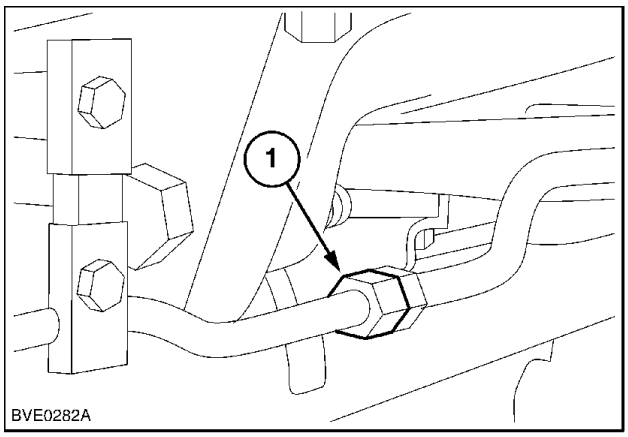
The brake accumulator can have a maximum charge pressure of 850 psi. Check for pressure in the accumulator. Remove the pressure in the accumulator before accumulator line is disconnected. Apply the brakes with the pedal approximately 40 times when the engine is off. Loosen the special fitting for removing air from the brakes and push on the brake pedal. If oil flow does not flow from the special fitting, the accumulator is not charged.

M670



BAIS06CCM086AVA 6

8. Disconnect the differential lock supply hose **(1)**.

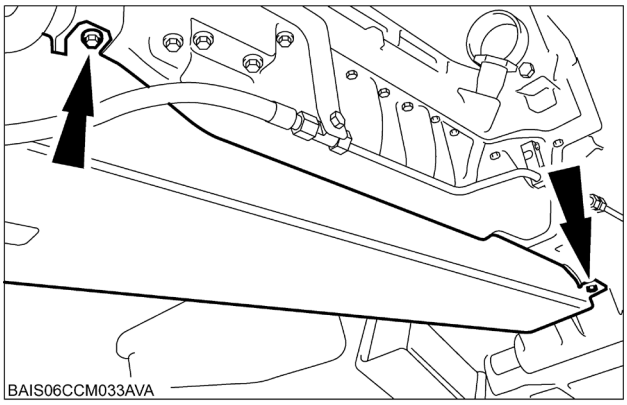


BVE0282A 7

Tractors with SuperSteer™ front axle

9. Remove the four-wheel drive shaft guard retaining bolts.

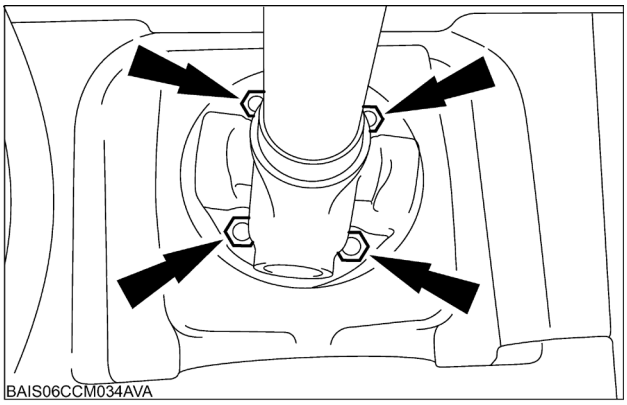
NOTE: *Repeat the operation on both sides of the tractor.*



BAIS06CCM033AVA 8

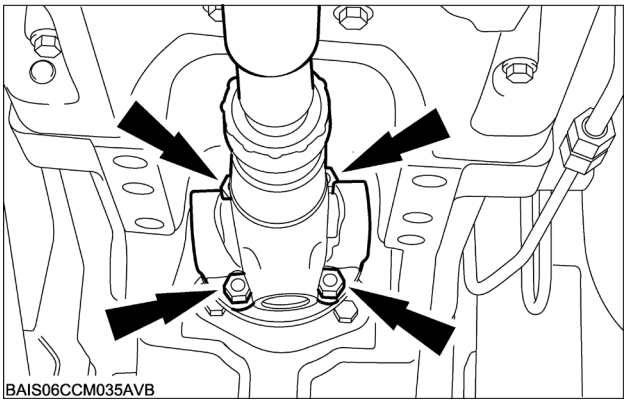
10. Remove the four-wheel drive shaft guard.
11. Remove the four-wheel drive shaft front retaining nuts.

NOTE: *Support the four-wheel drive shaft.*



BAIS06CCM034AVA 9

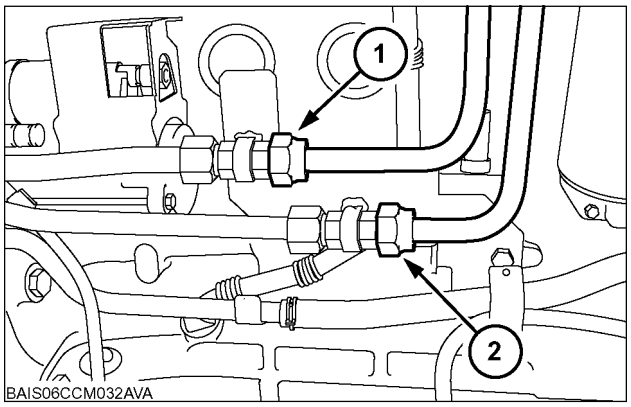
12. Remove the four-wheel drive shaft.



BAIS06CCM035AVB 10

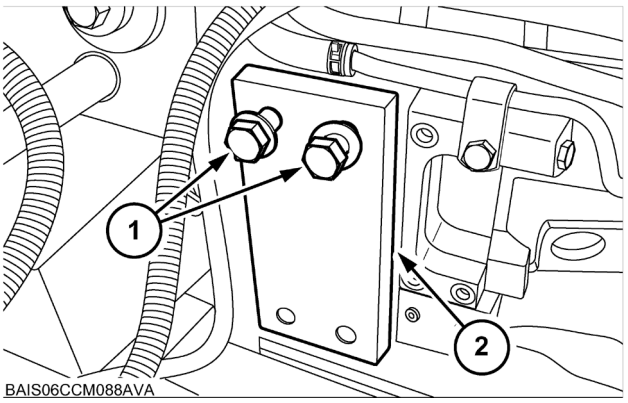
All Tractors

13. Disconnect the transmission oil cooler pipes **(1)** and **(2)**.



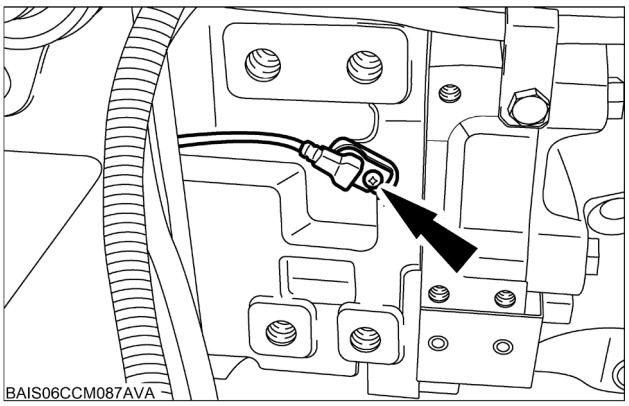
BAIS06CCM032AVA 11

14. Remove the retaining bolts **(1)** and remove the spacer **(2)**.

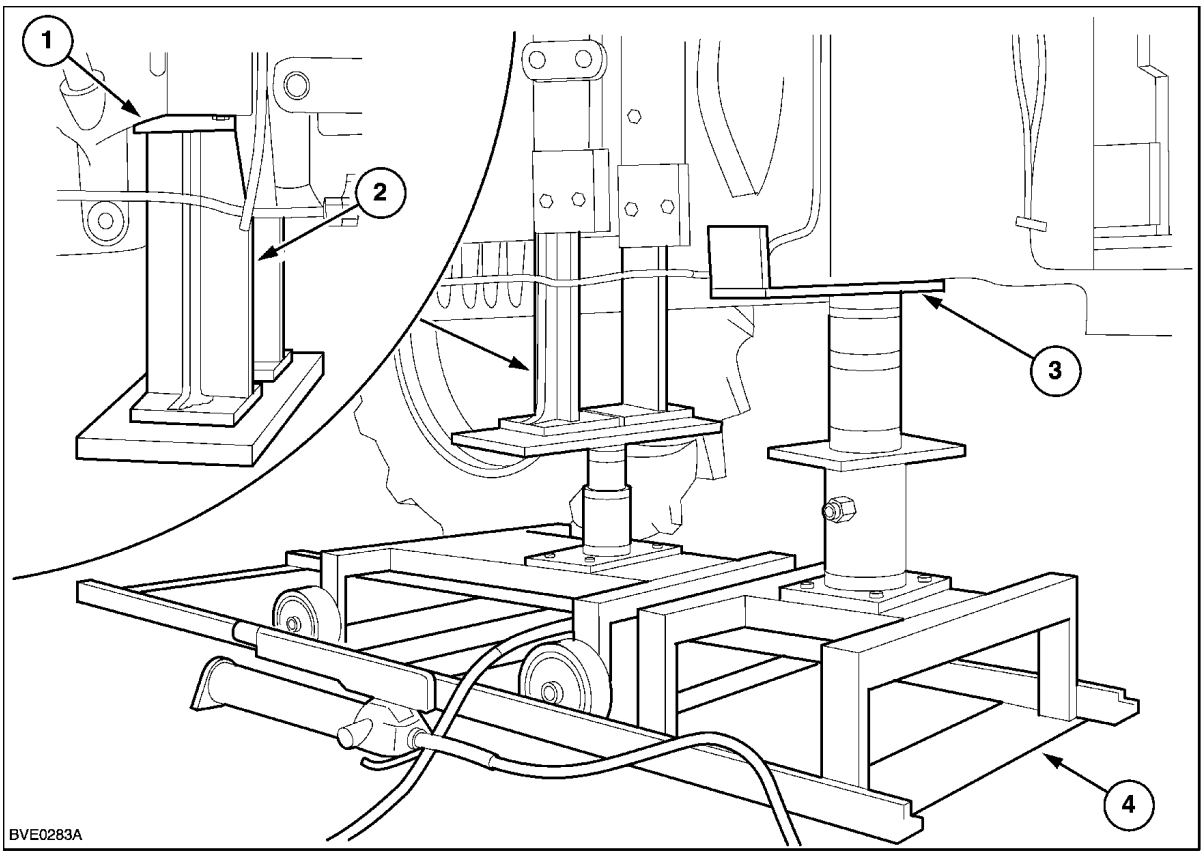


BAIS06CCM088AVA 12

15. Remove the flywheel speed sensor.

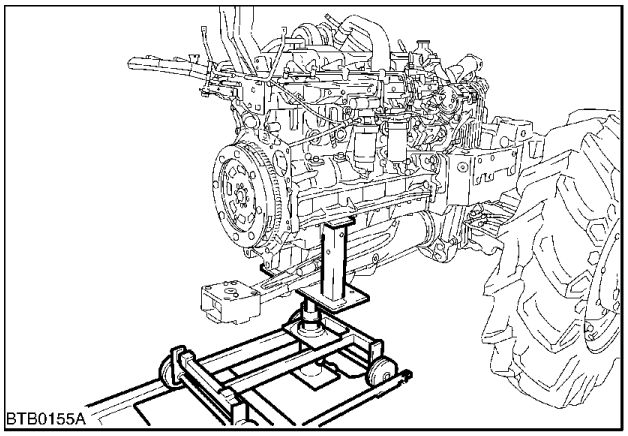


BAIS06CCM087AVA 13



BVE0283A 14

16. Position the tractor splitting kit **(4) 297471** underneath the tractor.
17. Use the supports **(3)**, in the splitting kit to support the transmission on the splitting stand.
18. Remove the engine to transmission lower retaining bolts.
19. Remove two rear oil pan retaining bolts from the left hand side. Repeat this step for the right hand side.
20. Install the adaptor plate **(1)** 380000844 and the engine support brackets **(2)** 380000500 between the engine and the wheeled splitting trolley.
21. Check that all necessary hoses tubes and connectors have been disconnected. It may be necessary to disconnect additional items due to other optional equipment that has been installed on the tractor.
    Re check that engine and transmission are safely supported on the splitting stand then remove engine to transmission buckle up bolts.
    Carefully wheel the front support and engine assembly from the transmission.



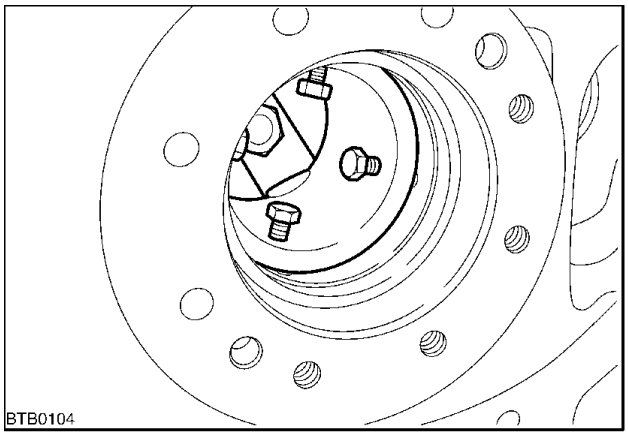
BTB0155A 15

Housing - Assemble

NOTE: *Due to the tightness of the bushes it is recommended that the bush is cooled for approximately one hour in a suitable cooling device, (a domestic fridge/freezer will suffice). If the special tool is installed onto the bush and placed into the fridge with the bush this will also aid installation.*

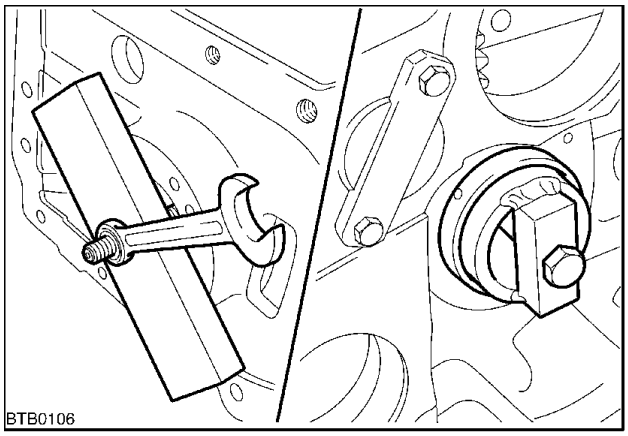
Oil Manifold Bush

1. Position the bush and tool correctly in the housing. Gently tap the tool to ensure the bush is square in the housing.



BTB0104_790 1

2. Locate the bolt through the front of the tool, with the flat bar across the casing at the rear. Tighten the nut to pull the bush into the housing, Figure **2**. The bush is correctly installed when it contacts the raised lip in the housing.



BTB0106_791 2

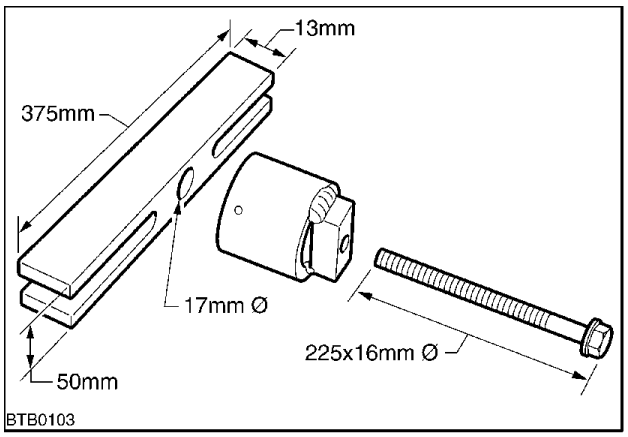
Housing - Disassemble

Prior operation:
Refer to **TRANSMISSION Powershift - Disassemble (C.20.E)**.

Oil Manifold Bush

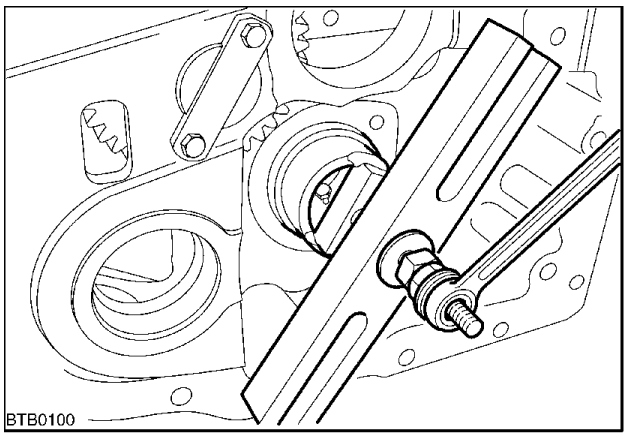
1. The procedure for removal and installation of the medium clutch, reverse clutch or fast/slow clutch oil manifold bushes is very similar and should be performed as follows.

NOTE: *The bushes are extremely tight, only use the special tool to attempt removal/installation. Attempting to drift the bushes out or in will result in damage to either bush or casing.*



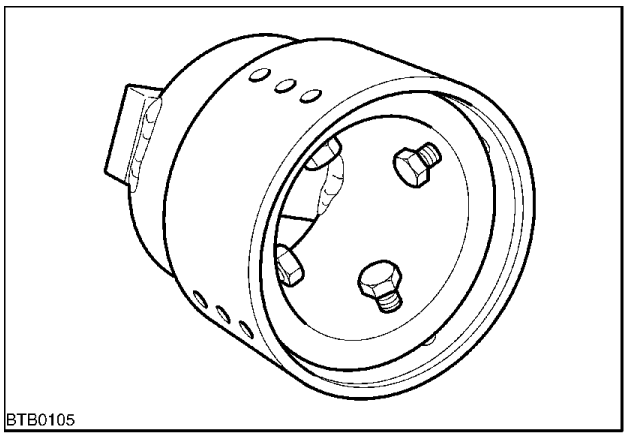
BTB0103_787 1

2. Install Special tool, number, **380000498** , into the bush to be removed and locate the four bolts into the oilway holes.
Fabricate a suitable flat metal bar, approximately **13 mm** thick x **375 mm** long with a **17 mm** hole through the centre and obtain a **16 mm**, 8.8 graded bolt approximately **225 mm** long with two suitable flat washers.



BTB0100_788 2

3. Install the bolt through the rear of the tool and position the flat bar over the bolt and across the casing as shown in Figure **2**.
Install and tighten the nut gradually to withdraw the bush from the casing.



BTB0105_789 3

Next operation:
Refer to **TRANSMISSION Powershift - Assemble (C.20.E)**.

Housing - Disconnect

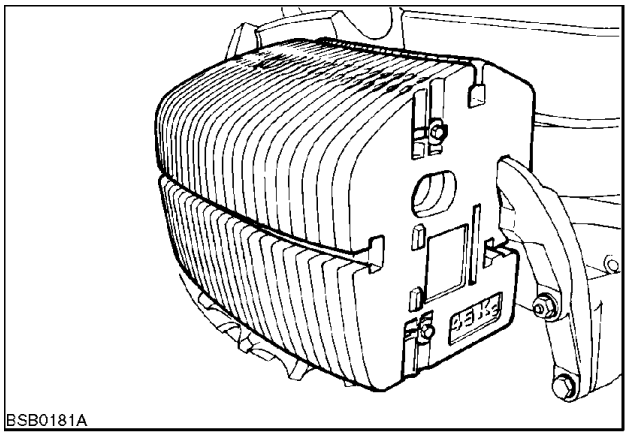
Prior operation:
Remove the cab (refer to **USER PLATFORM - Remove (E.34.A)**.
Prior operation:
Remove the fuel tanks (refer to **Fuel tank - Remove (B.20.A)**.
Prior operation:
Remove the hydraulic pump (refer to **Hydraulic pump Variable displacement pump - Remove (A.10.A)**.

1. Using a suitable sling, connect the front weights to a hoist and remove the front weights (if fitted).

⚠ **WARNING** ⚠

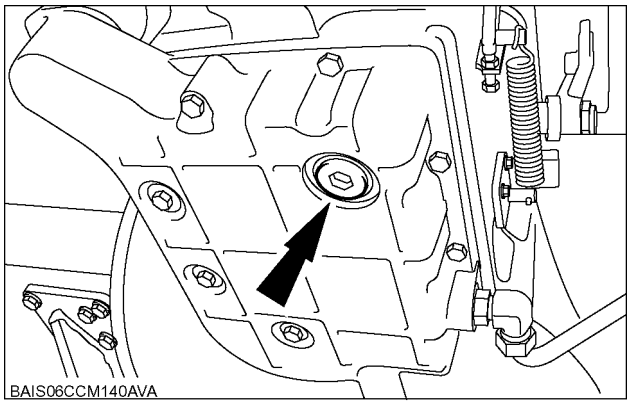
Suitcase weights are extremely heavy. To prevent injury, always use an adequate lifting device to install or remove front end or rear end weights.

M417



BSB0181A 1

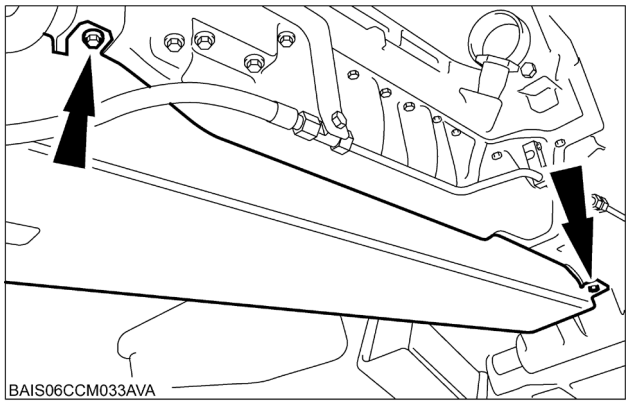
2. Remove the drain plug and drain the transmission oil into a suitable container.
   Reinstall the drain plug and tighten to **68 - 82 Nm** (**50 - 60 lbft**).



BAIS06CCM140AVA 2

3. Remove the four-wheel drive shaft guard retaining bolts.

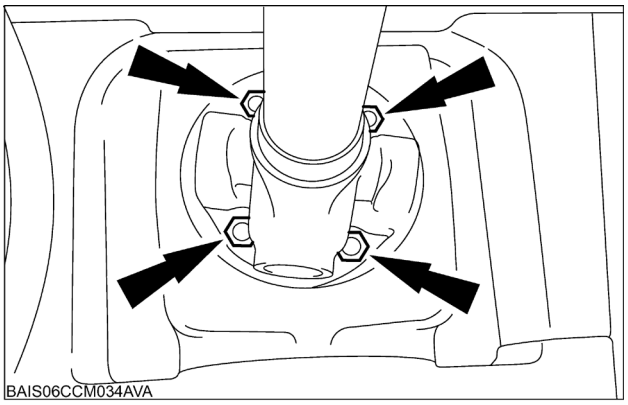
NOTE: *Repeat the operation on both sides of the tractor.*



BAIS06CCM033AVA 3

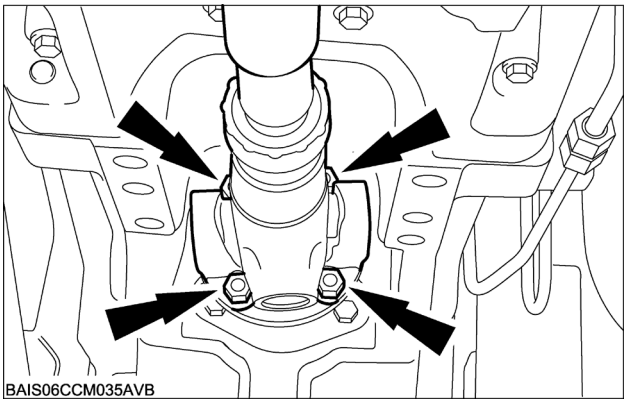
4. Remove the four-wheel drive shaft front retaining bolts.

NOTE: *Support the four-wheel drive shaft.*



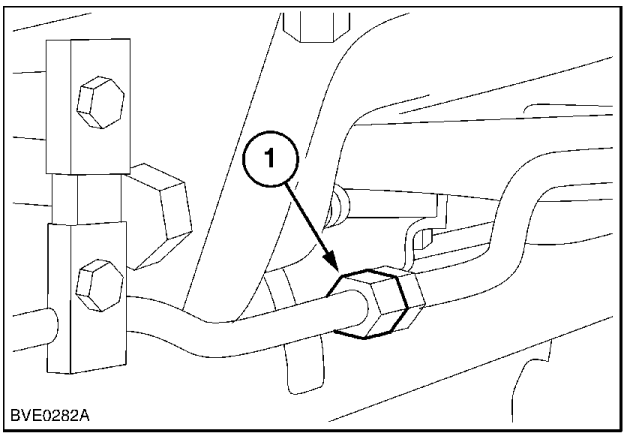
BAIS06CCM034AVA 4

5. Remove the four-wheel drive shaft.



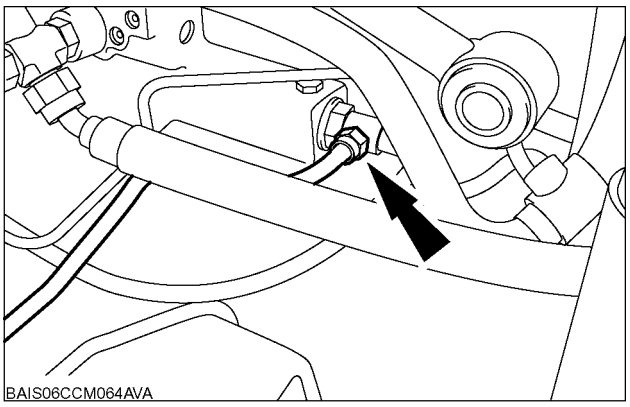
BAIS06CCM035AVB 5

6. Disconnect the differential lock supply pipe



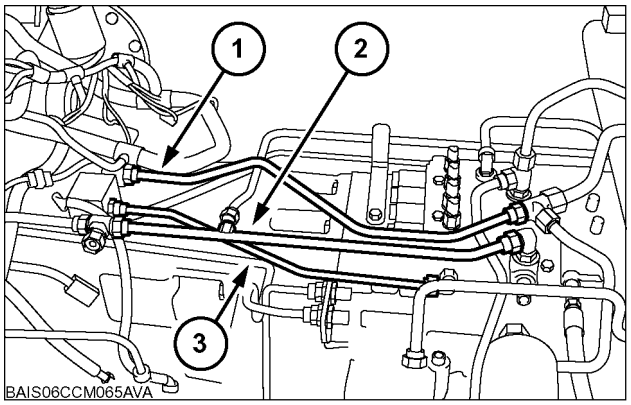
BVE0282A_42 6

7. Remove the differential lock supply pipe



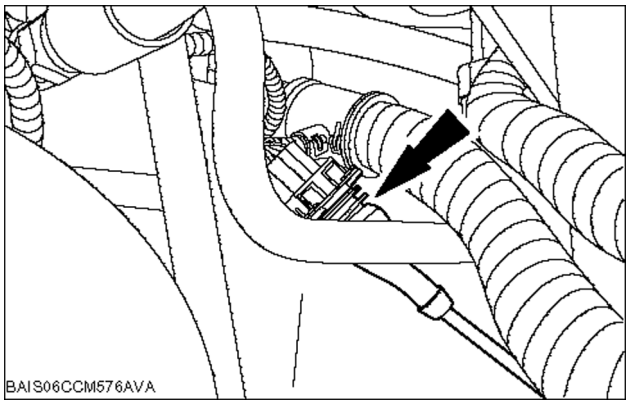
BAIS06CCM064AVA-2 7

8. Remove the lift ram return pipe **(1)**, main supply pipe **(2)**and the 19th gear supply pipe **(3)**.



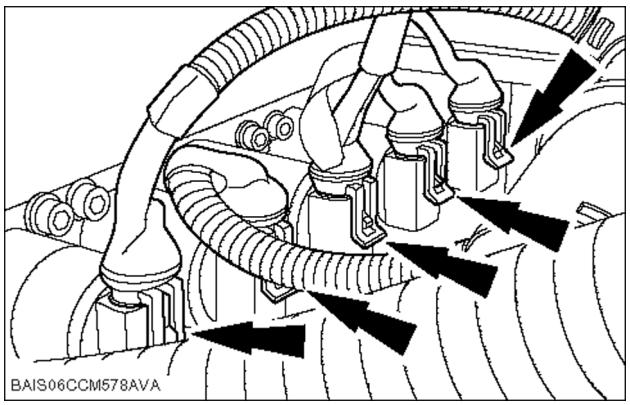
BAIS06CCM065AVA 8

9. Disconnect the flywheel speed sensor electrical connector.



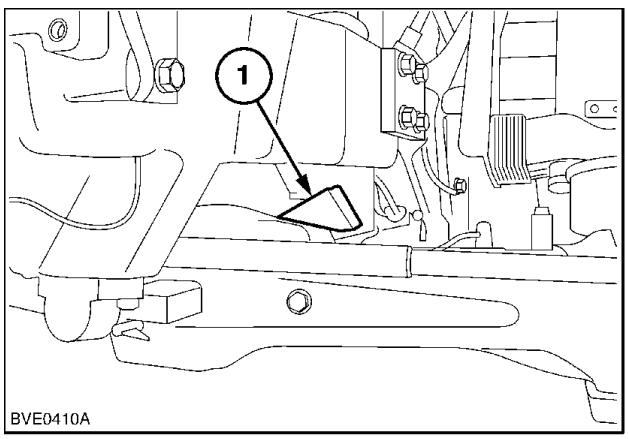
BAIS06CCM576AVA 9

10. Disconnect the five clutch solenoid electrical connectors.
Feed the loom back over the top of the transmission.



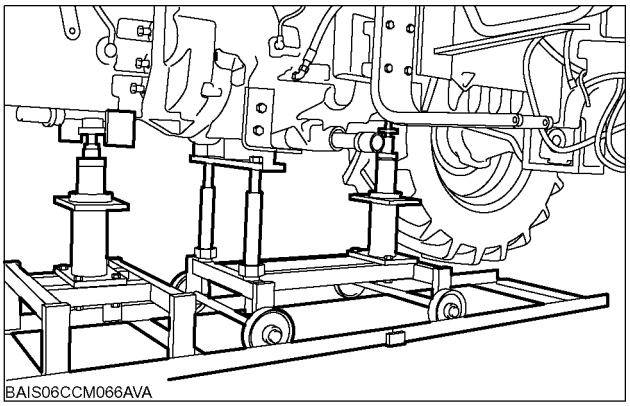
BAIS06CCM578AVA 10

11. Position wooden wedges **(1)** between the front axle and the front support. These prevent articulation of the front axle.



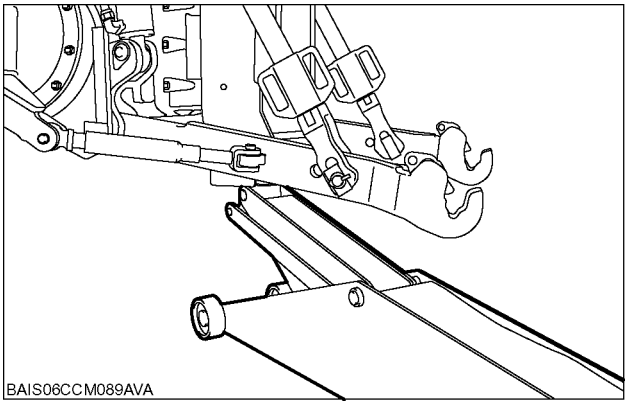
BVE0410A_25 11

12. Support the tractor on the splitting gear.



BAIS06CCM066AVA 12

13. Support the rear of the tractor.



BAIS06CCM089AVA 13

14. Remove the transmission to rear axle retaining bolts.
15. Remove the transmission and engine from the rear axle.

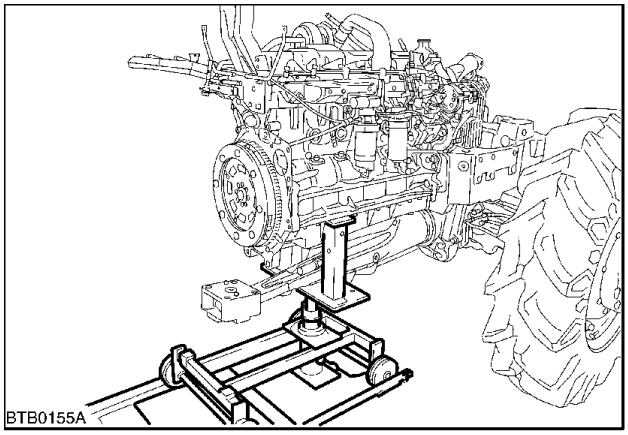
Housing - Install

⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

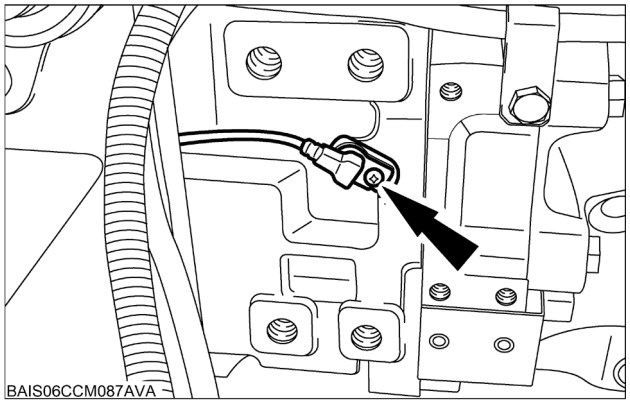
B012

1. Carefully wheel the front support and engine assembly to the transmission.
   Install the engine to transmission upper retaining bolts.
   Tighten to **285-315 Nm** (**210-232 lbft**).



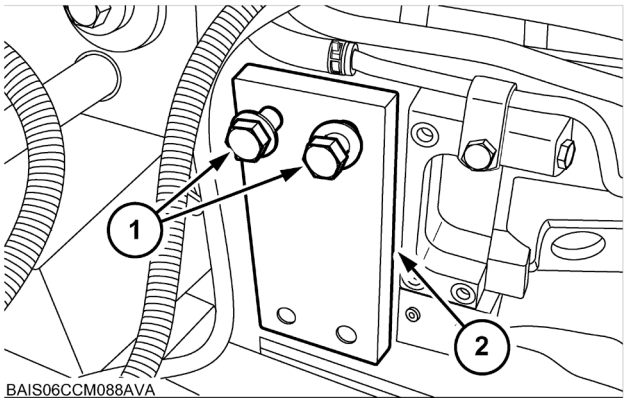
BTB0155A 1

2. Remove the adaptor plate and the engine support brackets from between the engine and the wheeled splitting trolley.
3. Install two rear oil pan retaining bolts to the left hand side. Repeat this step for the right hand side.
4. Install the engine to transmission lower retaining bolts.
   Tighten to **285-315 Nm**(**210-232 lbft**).
5. Remove the splitting gear from the transmission.
6. Install the flywheel speed sensor.



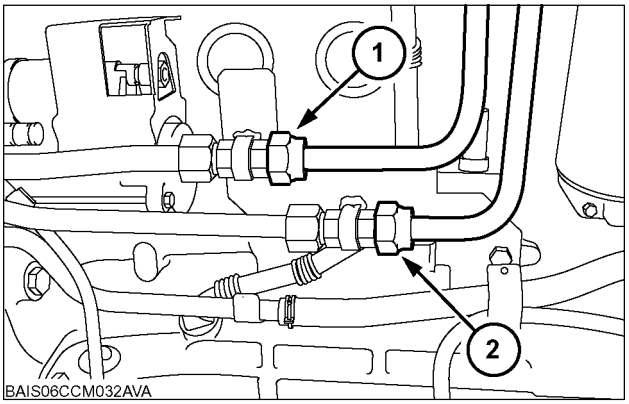
BAIS06CCM087AVA 2

7. Install the spacer **(2)** install the retaining bolts **(1)**.



BAIS06CCM088AVA 3

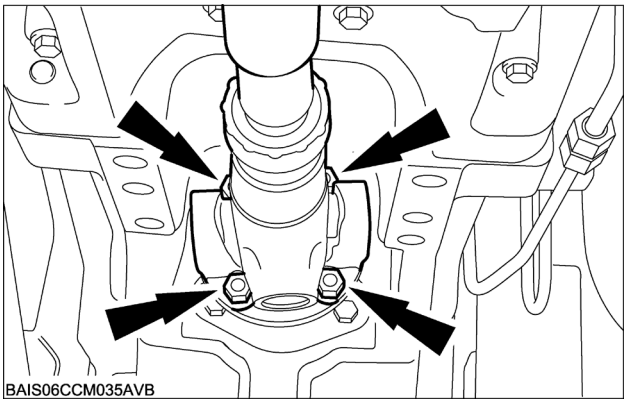
8. Connect the transmission oil cooler pipes **(1)** and **(2)**.



BAIS06CCM032AVA 4

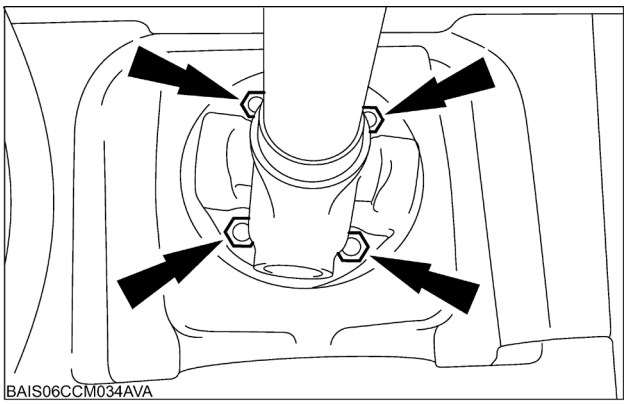
Tractors with SuperSteer™ front axle

9. Install the four-wheel drive shaft.
Tighten to **65 - 86 Nm** (**48 - 65 lbft**).



BAIS06CCM035AVB 5

10. Install the four-wheel drive shaft front retaining nuts.
Tighten to **65 - 86 Nm** (**48 - 65 lbft**).

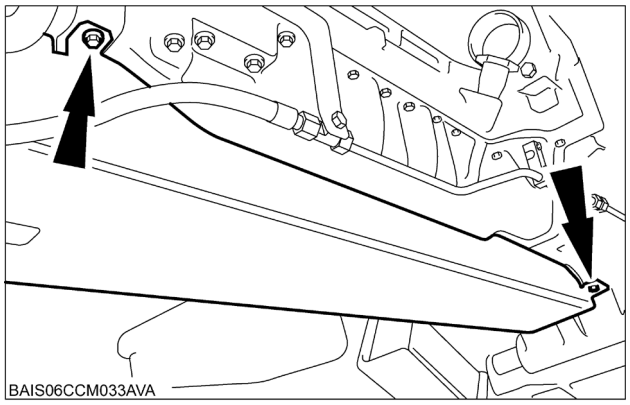


BAIS06CCM034AVA 6

11. Install the four-wheel drive shaft guard.

12. Install the four-wheel drive shaft guard retaining bolts.

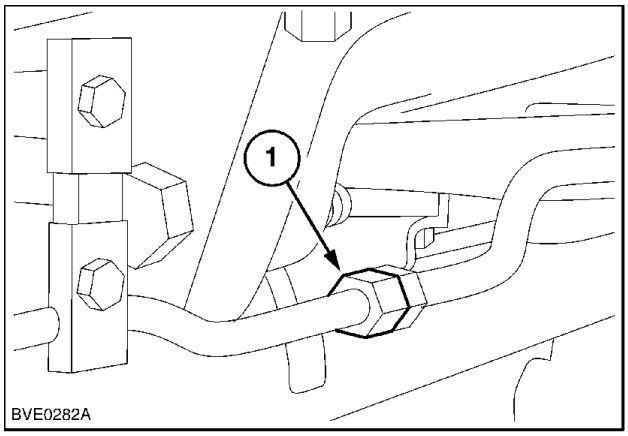
NOTE: *Repeat the operation on both sides of the tractor.*



BAIS06CCM033AVA 7

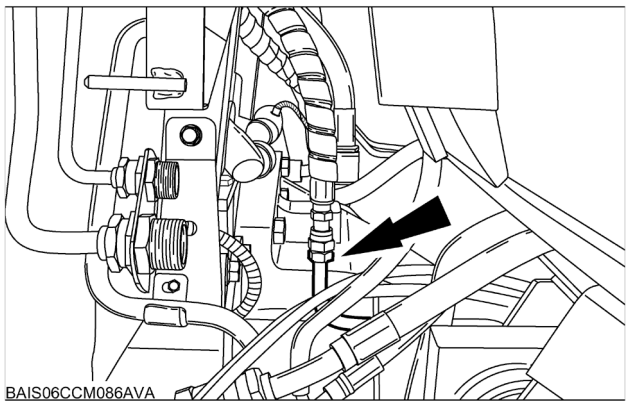
All Tractors

13. Connect the differential lock supply hose **(1)**.



BVE0282A 8

14. Connect the power brake valve supply hose.



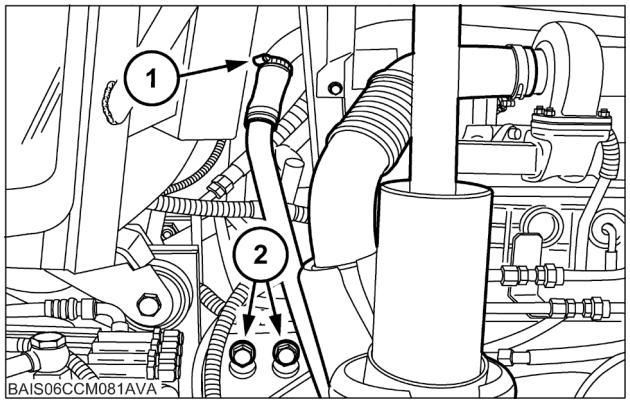
BAIS06CCM086AVA 9

15. Locate the exhaust and tighten the retaining bolts **(2)**. Connect air cleaner aspirator pipe **(1)**.

⚠ WARNING ⚠

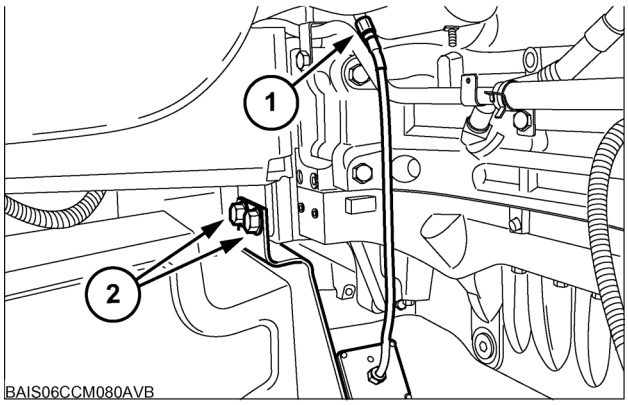
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



BAIS06CCM081AVA 10

16. Install the radar **(2)**.
Connect the radar electrical connector **(1)**.



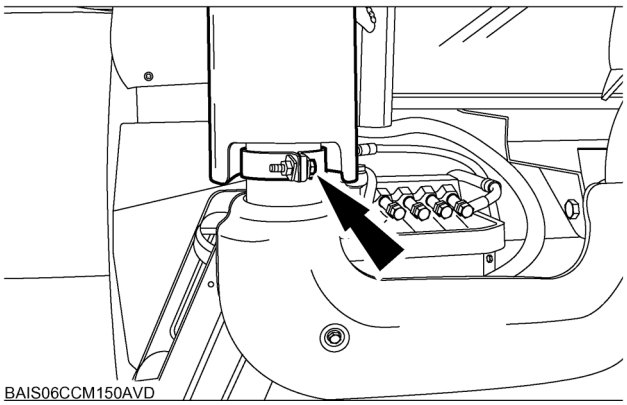
BAIS06CCM080AVB 11

17. Install the exhaust muffler and tighten the exhaust clamp.

⚠ WARNING ⚠

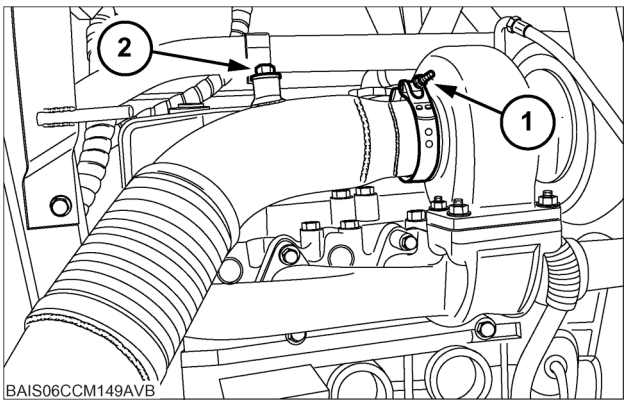
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



BAIS06CCM150AVD 12

18. Attach the air cleaner aspirator pipe bracket **(2)**.
Tighten the exhaust clamp **(1)**.



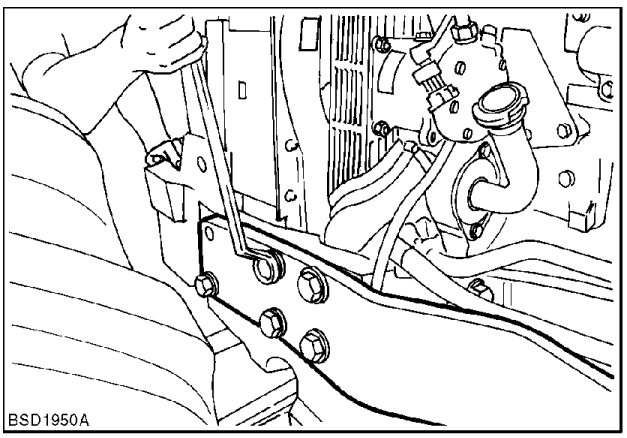
BAIS06CCM149AVB 13

19. Install the engine side rails (if fitted).

⚠ WARNING ⚠

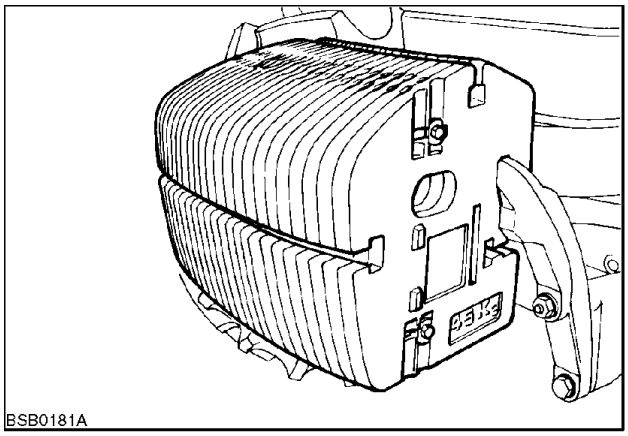
Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012



BSD1950A 14

20. Using a suitable sling, connect the front weights to a hoist and install the front weights (if fitted).

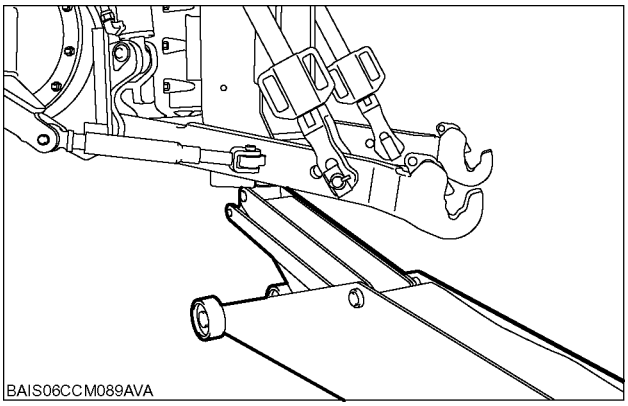


BSB0181A_10 15

Next operation:
Connect the transmission housing to the rear axle, for further information refer to **Housing - Connect (C.20.E)**

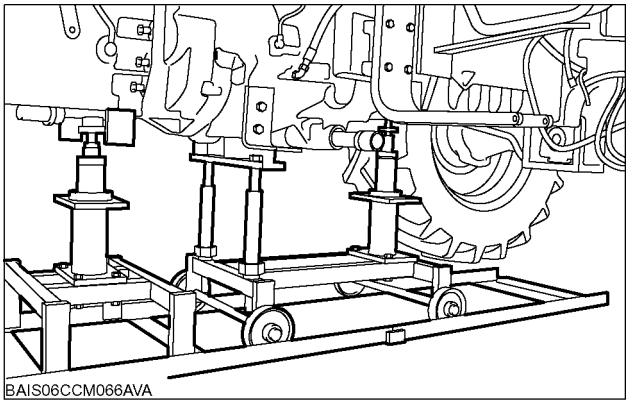
Housing - Connect

1. Align the transmission and engine to the rear axle.
2. Install the transmission to rear axle retaining bolts. Tighten to **200 Nm** (**147.5 lbft**).
3. Remove support from the rear of the tractor.



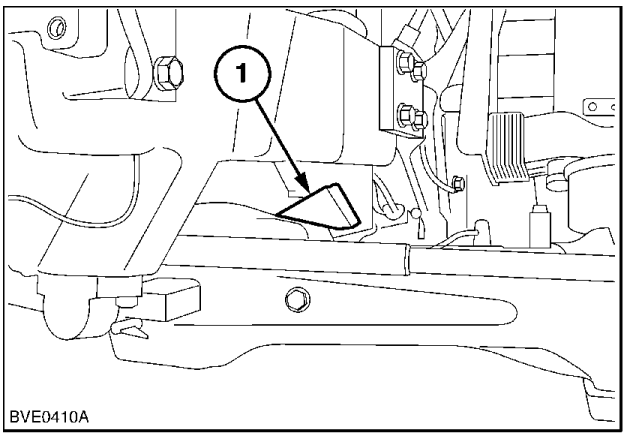
BAIS06CCM089AVA 1

4. Remove the splitting gear.



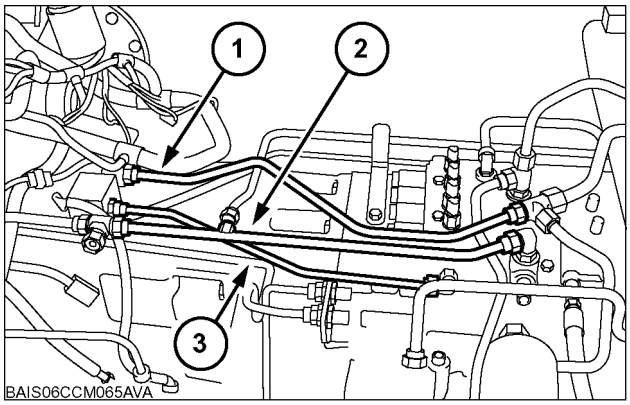
BAIS06CCM066AVA 2

5. Remove the wooden wedges **(1)** from between the front axle and the front support.



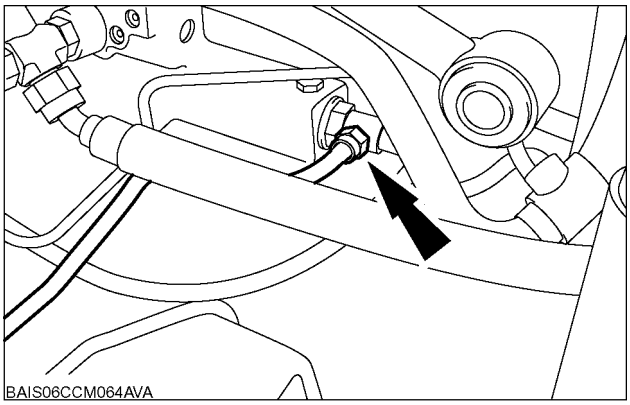
BVE0410A_25 3

6. Install the lift ram return pipe **(1)**, main supply pipe **(2)**and the 19th gear supply pipe **(3)**.



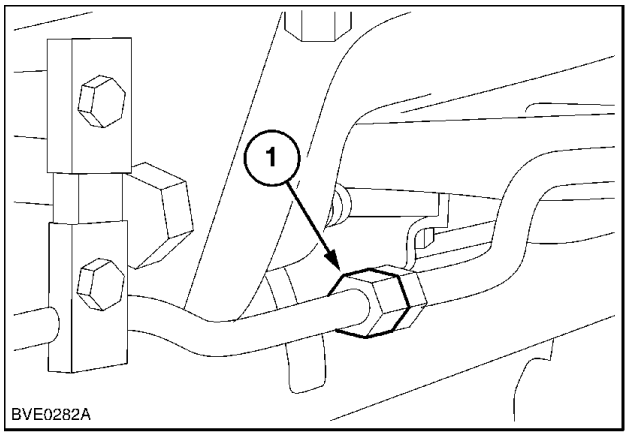
BAIS06CCM065AVA 4

7. Install the differential lock supply pipe



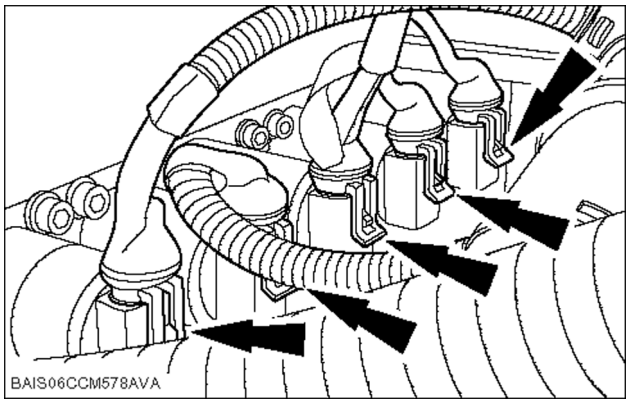
BAIS06CCM064AVA-2 5

8. Connect the differential lock supply pipe



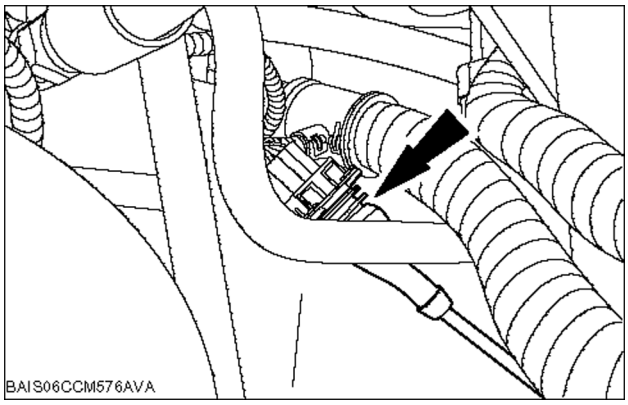
BVE0282A_42 6

9. Reposition the wiring harness across the top of the transmission.
Connect the five clutch solenoid electrical connectors.



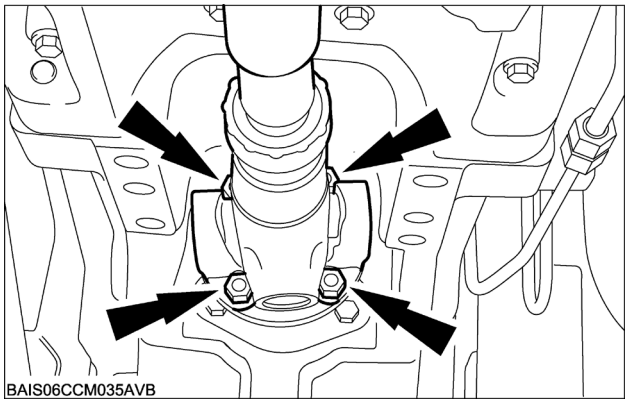
BAIS06CCM578AVA 7

10. Connect the flywheel speed sensor electrical connector.



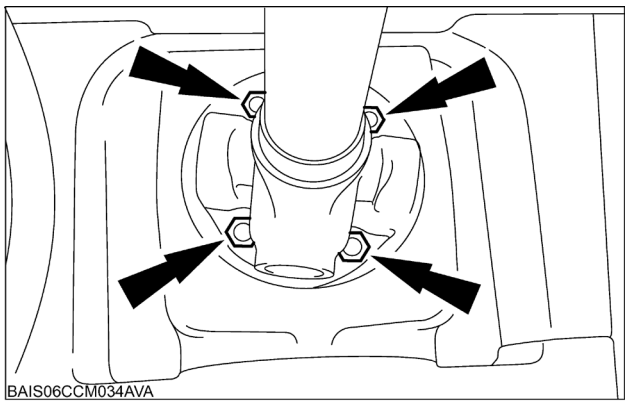
BAIS06CCM576AVA 8

11. Install the four-wheel drive shaft.
Tighten to **65 - 86 Nm** (**48 - 65 lbft**).



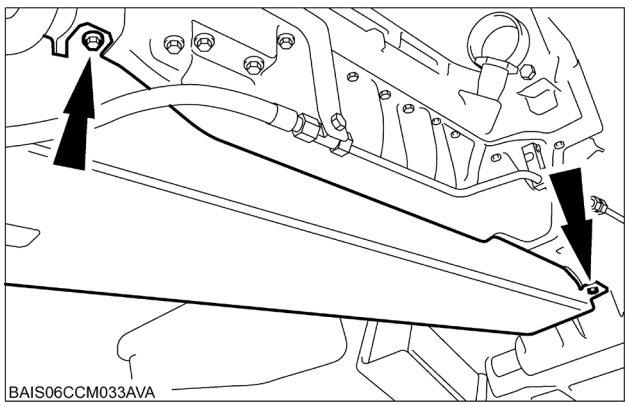
BAIS06CCM035AVB 9

12. Install the four-wheel drive shaft front retaining nuts.
Tighten to **65 - 86 Nm** (**48 - 65 lbft**).



BAIS06CCM034AVA 10

13. Install the four-wheel drive shaft guard.



BAIS06CCM033AVA 11

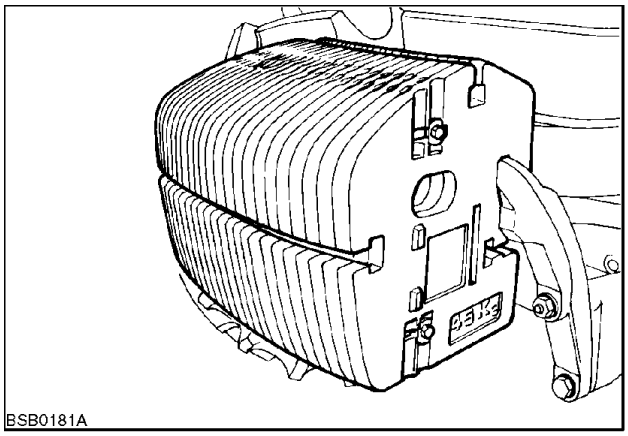
14. Refill the transmission with oil.

15. Using a suitable sling, connect the front weights to a hoist and install the front weights (if fitted).

⚠ WARNING ⚠

Suitcase weights are extremely heavy. To prevent injury, always use an adequate lifting device to install or remove front end or rear end weights.

M417



BSB0181A 12

Next operation:
Install the hydraulic pump (refer to **Hydraulic pump Variable displacement pump - Install (A.10.A)**
Next operation:
Install the fuel tanks (refer to **Fuel tank - Install (B.20.A)**
Next operation:
Install the cab (refer to **USER PLATFORM - Install (E.34.A)**

Index

POWER TRAIN - C

TRANSMISSION Powershift - 20.E

Clutch and gear - Overhaul 70
Clutch and gear - Test 84
Housing - Assemble 90
Housing - Connect 101
Housing - Disassemble 91
Housing - Disconnect 92
Housing - Install 96
Housing - Remove 85
TRANSMISSION Powershift - Adjust 53
TRANSMISSION Powershift - Assemble 56
TRANSMISSION Powershift - Calibrate 32
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller
TRANSMISSION Powershift - Calibrate 65
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POWER TRAIN - C

ADDITIONAL REDUCERS Creeper - 30.C

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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ADDITIONAL REDUCERS Creeper - 30.C

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ADDITIONAL REDUCERS Creeper
Remove 4
Command
Adjust 6

ADDITIONAL REDUCERS Creeper - General specification

Type		epicyclic spur gear set
Reduction ratio		20: (20+100)= 1:6
Control Type		Electronically using switch Hold down both brake pedals, clutch and downshift button.
Creeper housing and driven gear thrust washer thickness.....	mm	1.45 to 1.535

ADDITIONAL REDUCERS Creeper - Remove

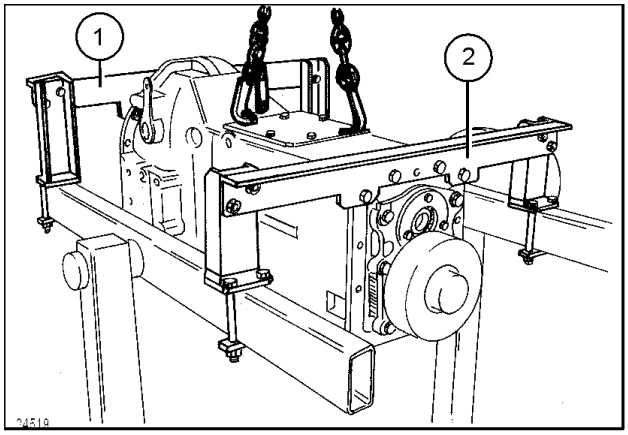
Prior operation:
To overhaul the creeper gear assembly it is necessary to disconnect the transmission housing (refer to **Housing - Disconnect (C.20.E)**).

⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

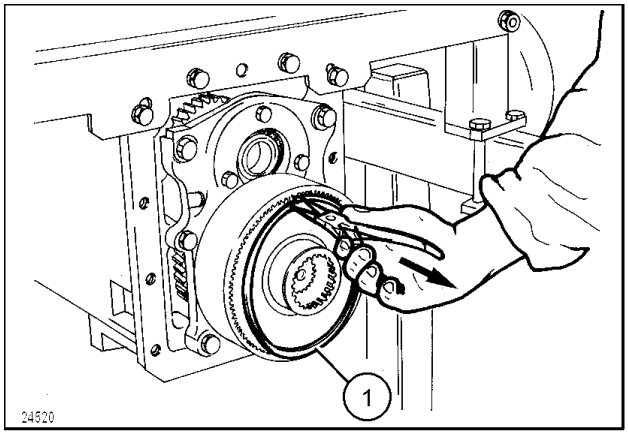
B026

1. Fix the transmission housing on the rotary stand tool no. **380000301** using front and rear brackets, tools nos. **380000271 (1)** and **380000272 (2)**, respectively.
.



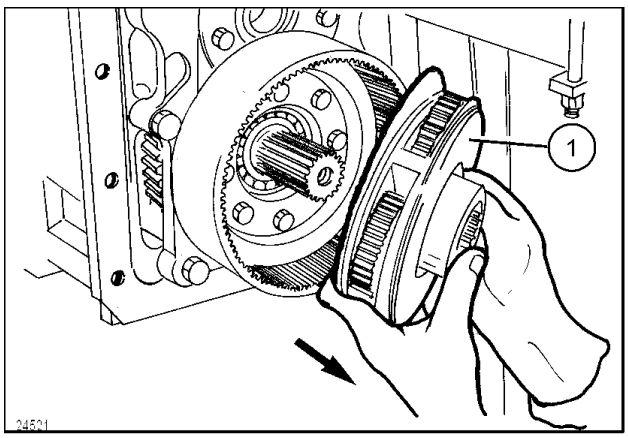
24519 1

2. Remove the circlip **(1)**



24520 2

3. Retrieve the driven gear assembly **(1)**.



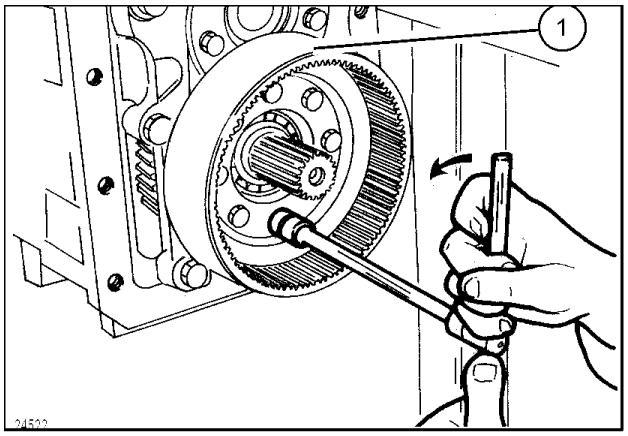
24521 3

4. Loosen retaining screws and remove the creeper gear housing **(1)**.

⚠ WARNING ⚠

Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

B020

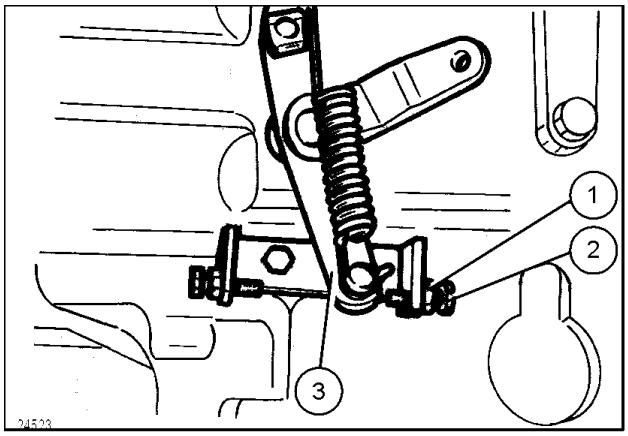


24522 4

Next operation:
Reassemble the creeper gear assembly observing the following:
Reassembly follows the disassembly procedure in reverse, from step **4**back to step **1**.
Next operation:
Refer to figures on **TRANSMISSION Powershift - Sectional view (C.20.E)** for correct orientation of different components.
Next operation:
Tighten the creeper housing bolts to **49 Nm** (**36.1 lbft**) For the remaining transmission torques refer to **TRANSMISSION Powershift - Torque (C.20.E)**.

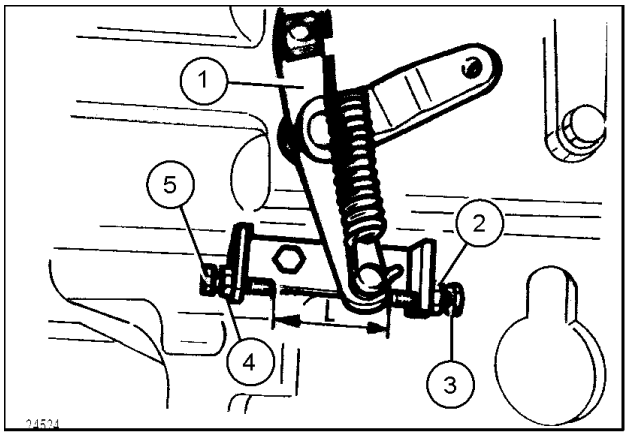
Command - Adjust

1. Creeper External Control Lever Travel Adjustment
   Prior to this adjustment, it is necessary to reinstall the transmission housing to the rear axle housing, but the fuel main tank should not be installed.
   Then proceed as follows:
   Loosen the locknut **(1)** and loosen the bolt **(2)** almost completely. Move the external lever **(3)** backwards to end of travel.



24523 1

2. Tighten the screw **(3)** until touching the external lever **(1)**. Then, screw it in a further 1 1/2 turn and lock using the locknut **(2)**. Loosen the locknut **(4)** and screw in the screw **(5)** until obtaining a distance(L) = **57 mm** between this screw and screw **(3)**. Tighten the locknut **(4)**.



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POWER TRAIN - C

ADDITIONAL REDUCERS Overdrive - 30.D

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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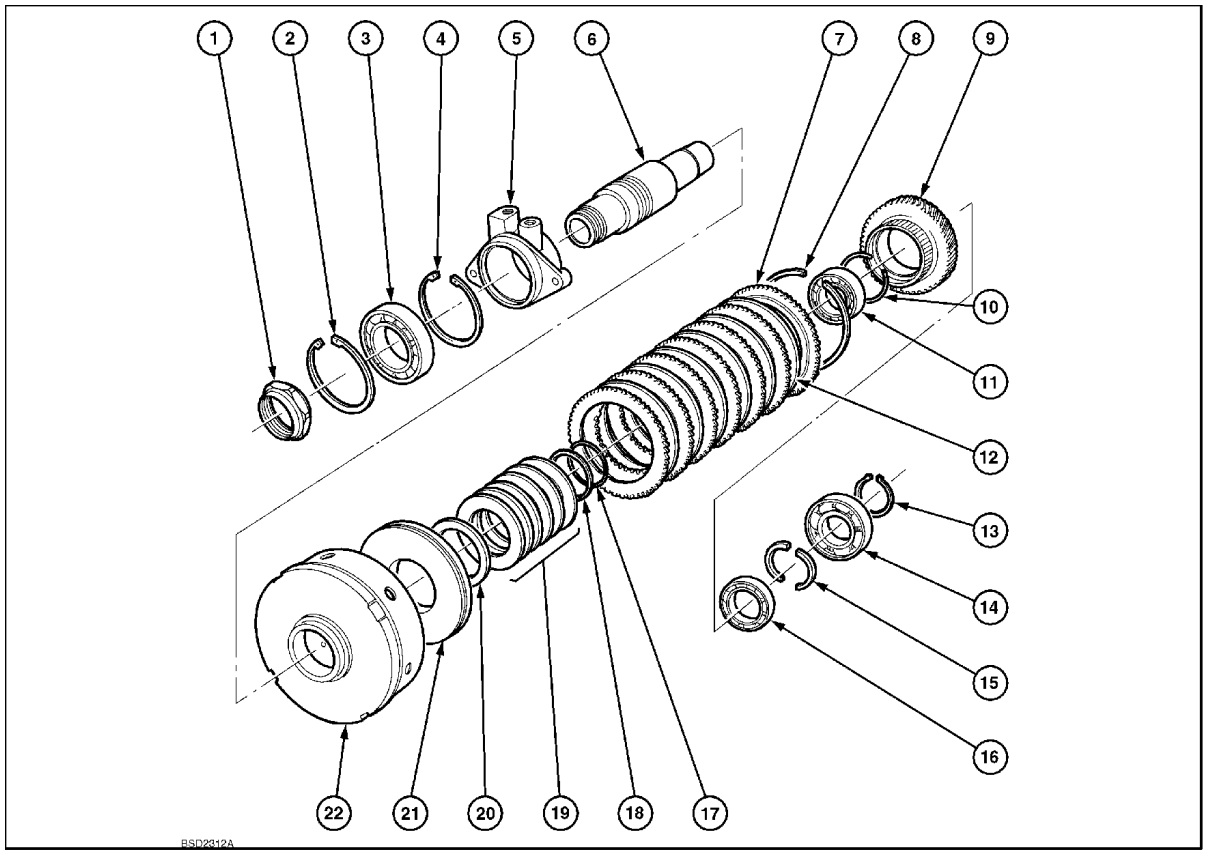
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ADDITIONAL REDUCERS Overdrive - Static description 50 Kph Clutch



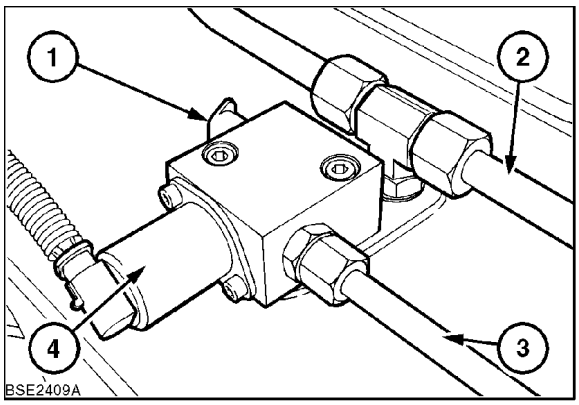
BSD2312A 1

50Kph Clutch Components

1 Ring Nut
2 Retaining Ring
3 Bearing
4 Retaining Ring
5 Manifold
6 Clutch Shaft and Manifold
7 End Plate
8 Retaining Ring
9 Gear
10 Retaining Ring
11 Bearing
12 Clutch Plates
13 Retaining Ring
14 Bearing
15 Half Ring
16 Bearing
17 Seal
18 Ring
19 Belleville washers
20 Inner Seal
21 Piston
22 Clutch Housing

Description and Operation

The **50 Kph** clutch is operated by the 19th gear solenoid on the transmission housing top cover (Refer to **TRANSMISSION Powershift - Static description (C.20.E)** for details). Low pressure oil is fed via the relief valve block to the manifold.



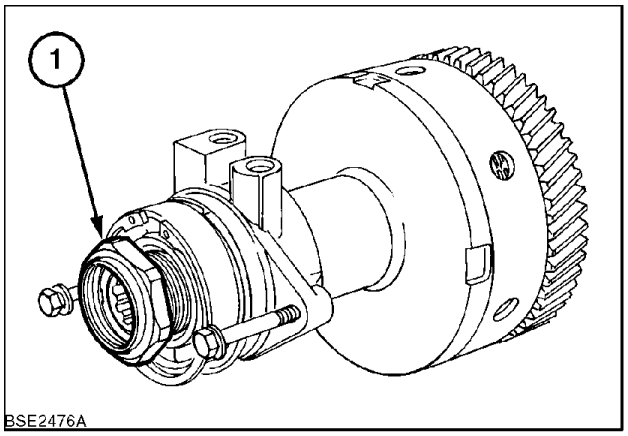
BSE2409A 2

1 Pressure Port
2 Lubrication Pipe
3 Low Pressure Inlet Pipe
4 Relief Valve

ADDITIONAL REDUCERS Overdrive - Overhaul 50 Kph Clutch

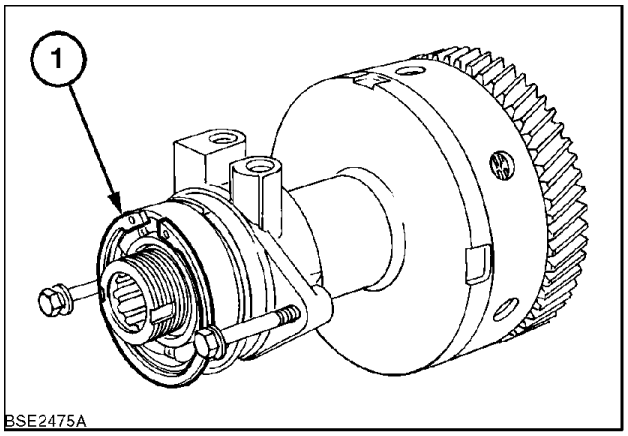
1. Removal and Installation
   Undo and remove nut from clutch shaft.

NOTE: *Illustrations are shown outside of rear axle housing for clarity.*



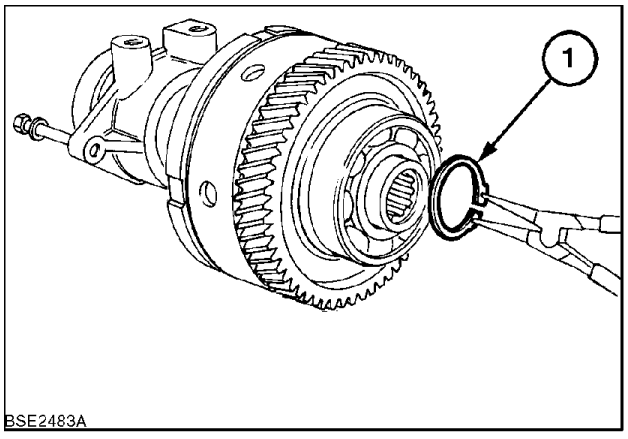
BSE2476A 1

2. Remove circlip and then loosen the two manifold retaining bolts.



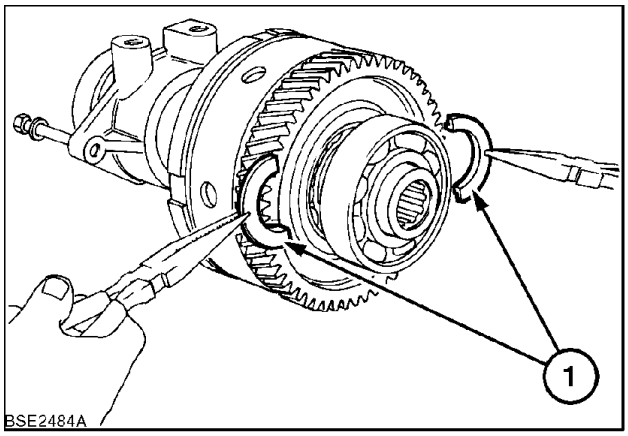
BSE2475A 2

3. From the rear of the axle housing remove retaining ring **(1)** from the end of the clutch shaft.



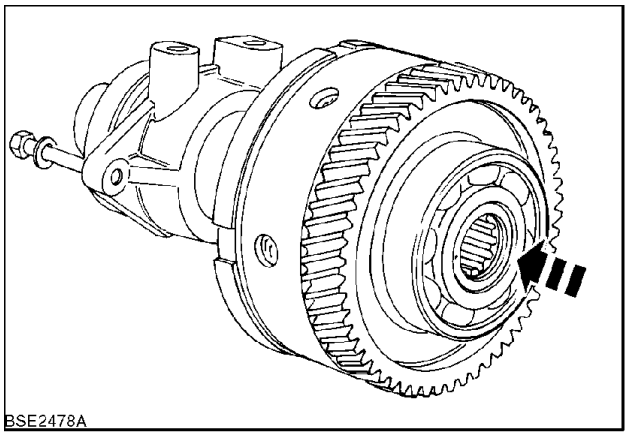
BSE2483A 3

4. Remove the two half rings **(1)** from behind the bearing.



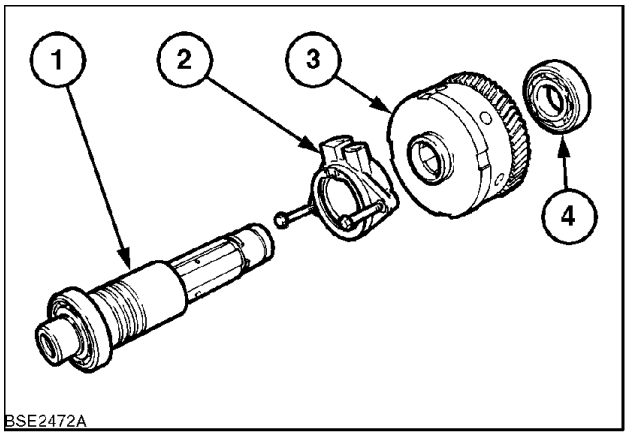
BSE2484A 4

5. Push Clutch Shaft towards front of housing. This will allow the components of the clutch to be removed via the handbrake or 4WD aperture.



BSE2478A 5

6. The clutch components removed will be as follows:
   1. Clutch Shaft ,Manifold, and Bearing
   2. Manifold
   3. Clutch and Gear Assembly
   4. Bearing



BSE2472A 6

7. Dissassemble clutch and gear assembly and check components for damage and excessive wear. If required replace worn or damaged parts and seals prior to re-assembly.

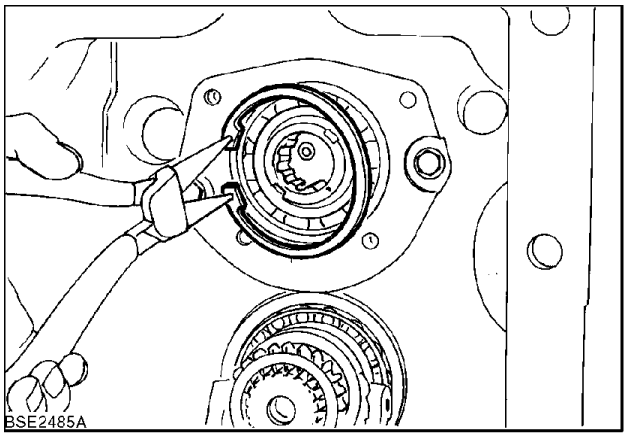
8. Coat inner and outer piston seals with oil or grease and assemble into their respective grooves on piston.

9. Install the clutch piston into the clutch housing by hand until it is completely home. Place washer in counterbore of the housing and place the 6 belleville washers concave side down onto the clutch housing sleeve. Using a suitable press compress the belleville washers and retain with the appropriate snapring which fits into the groove on the housing sleeve.

10. Assemble the clutch plates into the clutch housing using steelplates and friction plate alternately until six of each have been installed. Place a thrust plate on top and secure with a snapring.

11. Assemble a snapring into the inner bore of the clutch gear and on either side of this install a bearing. Install this gear assembly to the splines of the clutch plates in the main housing.

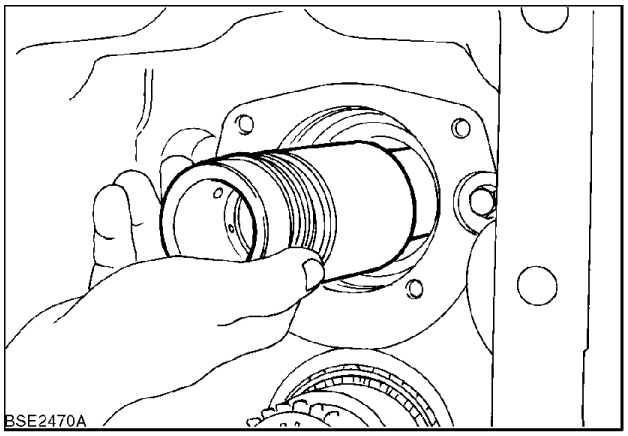
12. Install a snapring into the rear groove of the front bore of the axle housing. Bring the manifold into the axle housing through the hand brake or 4WD aperture and fasten with the two screws and washers.



BSE2485A 7

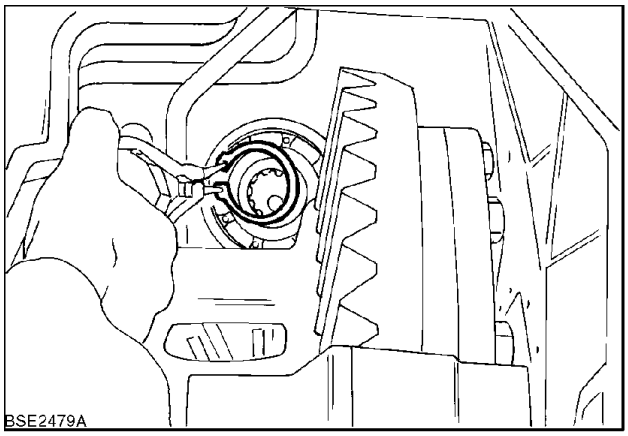
13. Insert the clutch and gear assembly into the axle housing. Assemble the manifold through the bore of the already assembled clutch manifold taking care not to damage the 3 sealing rings.Assemble the shaft to the housing picking up the clutch manifold and the splines of the clutch housing.

NOTE: *Align the timing notch of the shaft with the timing notch of the already assembled clutch housing to fit both splines.*



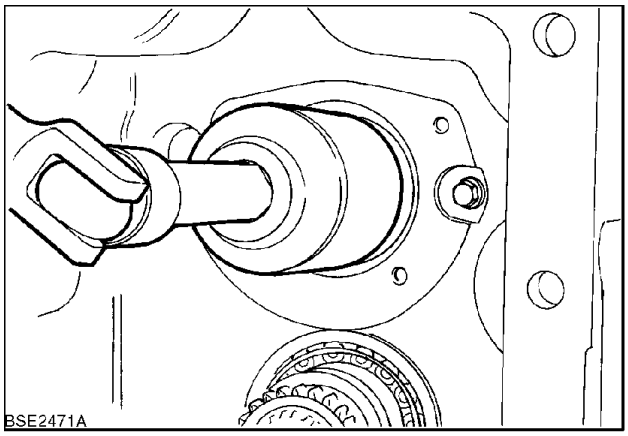
BSE2470A 8

14. Push the shaft down until the bearing seats against the snapring in the bore of the housing. Assemble the second snapring in the first groove of the housing to lock the bearing. Install the half rings in the groove of the shaft using grease to keep them in position. Push the shaft back until the half rings catch in the inner bearing diameter of the gear. Assemble the bearing on the shaft and lock with snapring.



BSE2479A 9

15. Replace nut onto end of shaft and torque to approximately **500 Nm**.



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ADDITIONAL REDUCERS Overdrive - Static description 50 Kph Clutch 3

POWER TRAIN - C

REAR PTO Mechanical - 40.B

PUMA 165
PUMA 180
PUMA 195
PUMA 210

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POWER TRAIN - C

REAR PTO Mechanical - 40.B

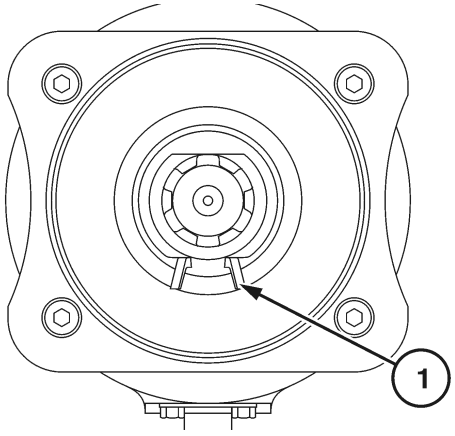
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Adjust 5
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REAR PTO Mechanical - Adjust

PUMA 165, PUMA 180, PUMA 195, PUMA 210

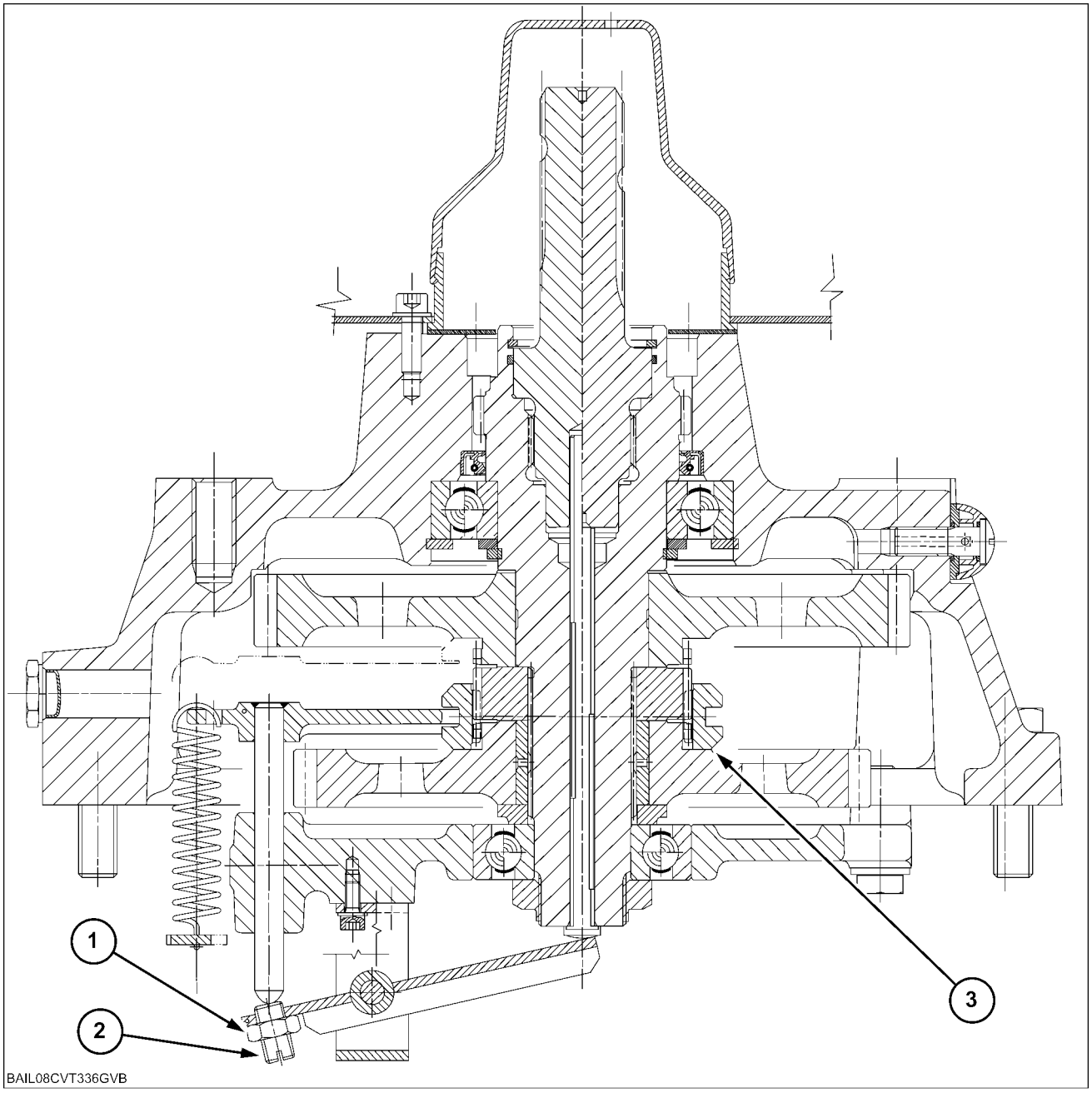
1. Position the PTO shaft into the assembly with the 21 teeth splines to the outside of the assembly.
2. Secure the shaft in place using the PTO shaft retaining ring **(1)**.

NOTE: *Make sure that the opening in the retaining ring is opposite the flat surface on the PTO output shaft.*



BCG0010A

BCG0010A 1



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2 Speed Shaft Change PTO - Initial PTO Shaft Set Up - 1000 RPM Position

IMPORTANT: *Make sure that the selector collar* ***(3)*** *is fully engaged into the 1000 rpm gear.*

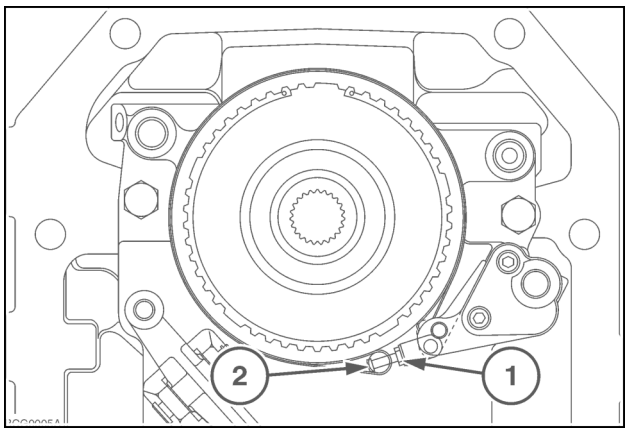
3. Loosen the locknut **(1)** and turn the adjuster screw **(2)** until the selector collar clears the 1000 RPM gear **(3)**.
4. Loosen the adjuster screw **(2)** until the selector sleeve just touches the 1000 RPM gear **(3)**.
5. Loosen the adjuster screw **(2)** a further half turn (**180 °**).
6. Tighten locknut **(1)** to secure.

PTO brake - Adjust

PUMA 165, PUMA 180, PUMA 195, PUMA 210

PTO Brake Band Adjustment

1. Loosen locknut **(1)**. Torque screw **(2)** to **3 Nm** (**2.21 lbft**), in order to close brake band.
2. Loosen screw **(2)** and check brake band alignment. Adjust if required.
3. Torque screw **(2)** to **1.1 Nm** (**0.81 lbft**)
4. Loosen screw **(2)** by two turns and tighten locknut **(1)** .
5. Check brake band alignment and repeat procedure if required.



BCG0005A 1

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POWER TRAIN - C

REAR PTO Hydraulic - 40.C

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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REAR PTO Hydraulic - Torque

PTO Sectional Views and Torques

a. Two-speed PTO sectional view (**540-1000 rpm**)

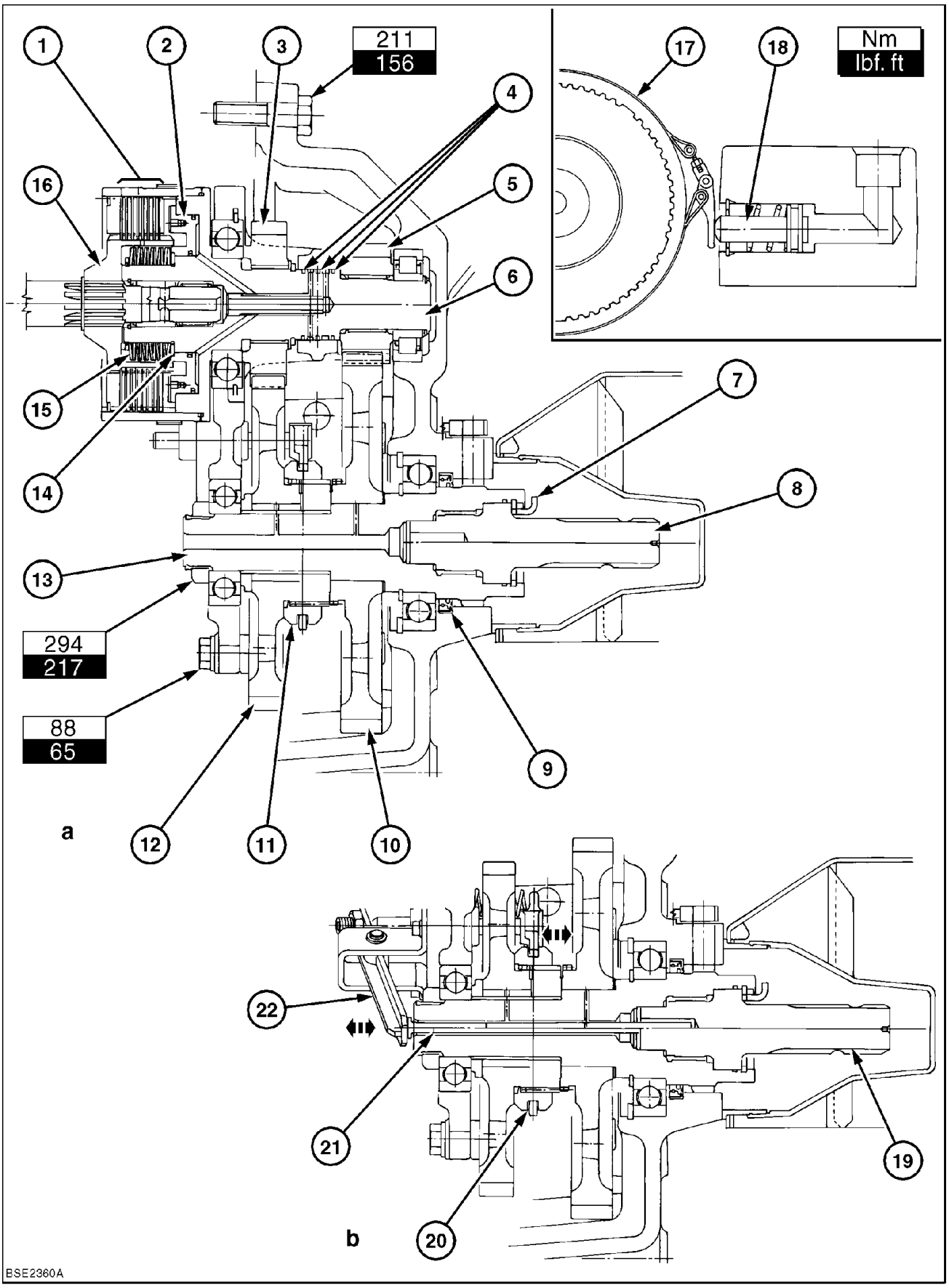
b. Two-speed PTO sectional view (**540-1000 rpm**) with speed selection by replacement of the splined output shaft

PTO Housing Retaining Bolts **211 Nm**
Support Plate Bolts **88 Nm**

PTO Output Shaft Nut **294 Nm**

1. Clutch Plates and Separator Discs
2. Piston
3. **1000 rpm** Drive Gear
4. Shaft Seals
5. **540 rpm** Drive Gear
6. Clutch Housing Shaft
7. Retaining Ring
8. PTO Output Shaft
9. Oil Seal
10. **540 rpm** Driven Gear
11. Coupler
12. **1000 rpm** Driven Gear
13. Driven Shaft
14. Washer
15. Belleville Springs
16. Hub
17. Brake Band
18. Brake Piston
19. PTO Output Shaft
20. Coupler
21. Speed Selector Pin
22. Coupler Lever

NOTE: *During installation apply liquid gasket on mounting surface.*



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PTO Sectional Views and Torques

REAR PTO Hydraulic - Special tools

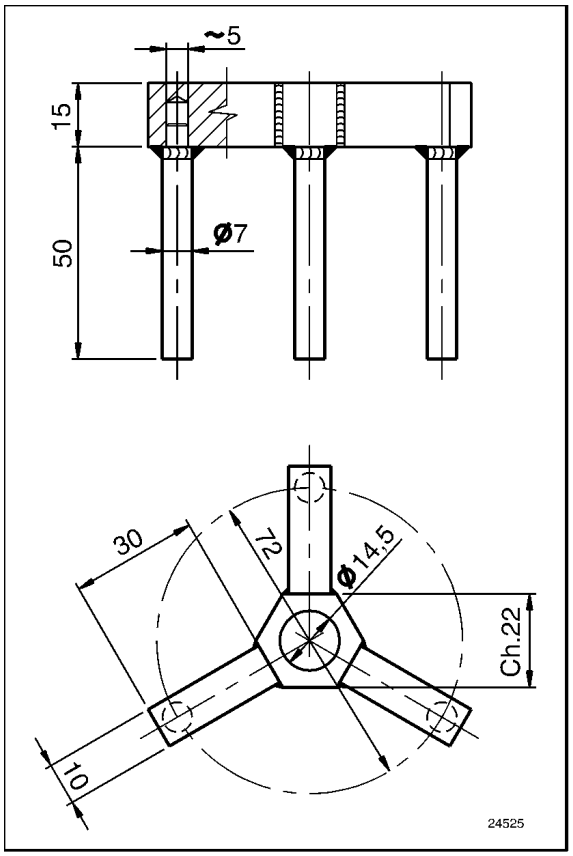
⚠ CAUTION ⚠

The operations described in this section can only be carried out with the ESSENTIAL tools indicated by an (X). To work safely and efficiently and obtain the best results, it is also necessary to use the recommended specific tools listed below and certain other tools, which are to be made according to the drawings included in this manual.

B008

List of special tools necessary to perform service operations covered by this section of the Manual:

380000480	Clutch drive shaft roller bearing installer (with tool **380000258**)
X **380000476**	Clutch drive shaft seal installer (with tool no. **380000258**)
X **380000540**	Seal Protector
380000258	Attachment (for tools nos. **380000476** and **380000480**)
380000481	Clutch shaft cup installer
380000557	Cup and shaft bush removal pliers



24525 1

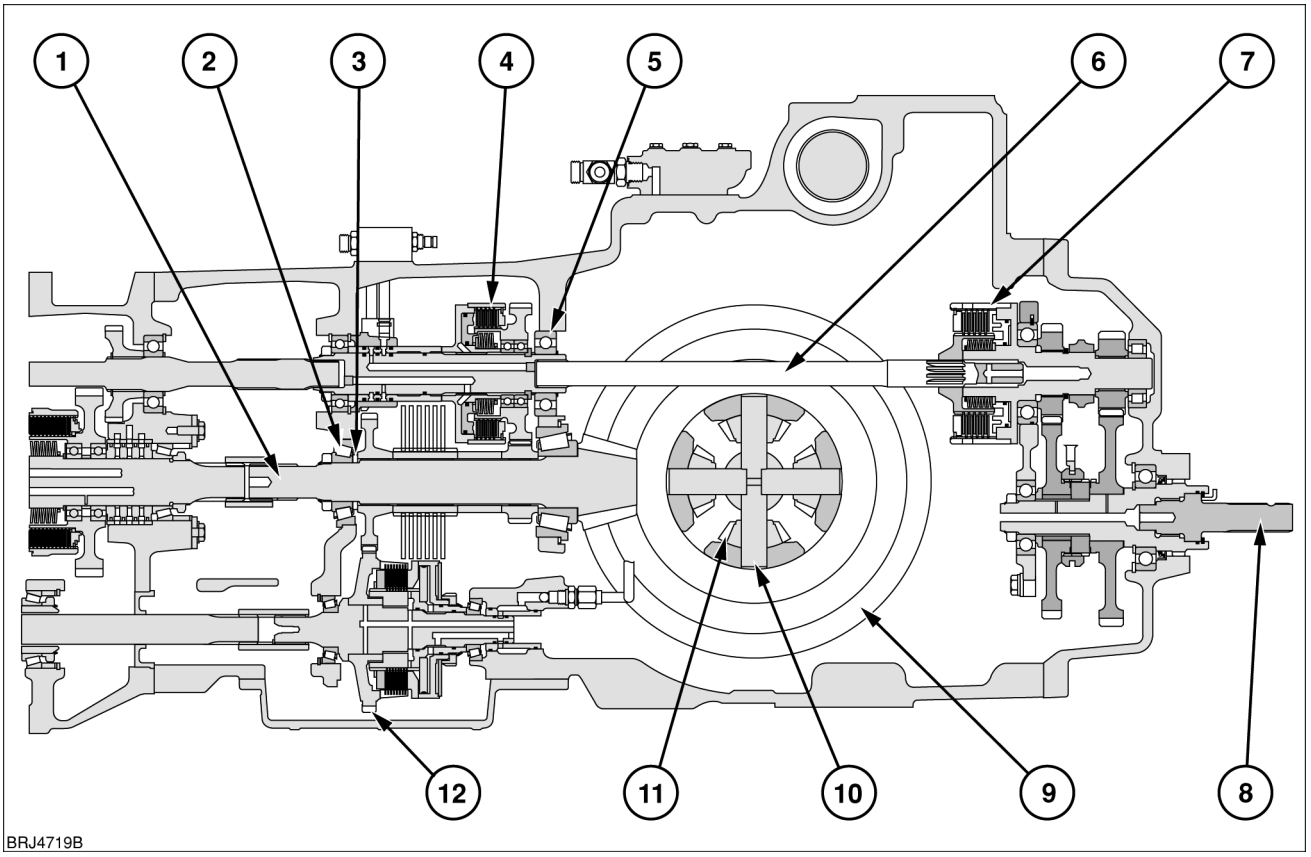
PTO hydraulic clutch spring cup tool (Mark tool with no. 50063. Dimensions in mm.)
Fabricate tool using Fe42C material.

REAR PTO Hydraulic - General specification

540/1000 rpm PTO: Type	Two speed, independent of tractor ground speed
Engagement and Control	Fully automatic softstart electro-hydraulic clutch pack
Rotation (looking from tractor rear end)	Clockwise

Speed Selection	By hand lever located at the operator's RH side or replaceable output shaft 6 Spline
Engine Speed at **540 rpm** PTO Speed	**1950 RPM**
Engine Speed at (economy) **540 rpm** PTO Speed	**1550 RPM**
Engine Speed at **1000 rpm** PTO Speed	**2178 RPM**
PTO Speed at Engine Rated Speed **540 rpm**	**609 RPM**
PTO Speed at Engine Rated Speed **540 rpm**(economy)	**766 RPM**
PTO Speed at Engine Rated Speed **1000 rpm**	**1010 RPM**
Splined Output Shaft Diameter: - **540 rpm**	**1.3/8 in** (6 splines) or Optional **1 3/4 in** (6 splines)
- **1000 rpm**	**1 3/8 "** (21 splines)
Driven Gear Bush OD mm (**(9)**, Refer to **REAR PTO Hydraulic - Torque (C.40.C)**)	54.910 to 54.940
PTO Engagement Clutch Type	hydraulically actuated clutch pack in oil bath
Number of Clutch Discs: Clutch Plates	8
Clutch Plate Thickness mm	1.7 to 1.8
Clutch Plate Separator Discs	8
Clutch Plate Separator Disc Thickness mm	2.15 to 2.25
Number of Belleville Springs	12
Brake	hydraulically controlled brake band acting on the clutch bell housing

REAR PTO Hydraulic - Static description



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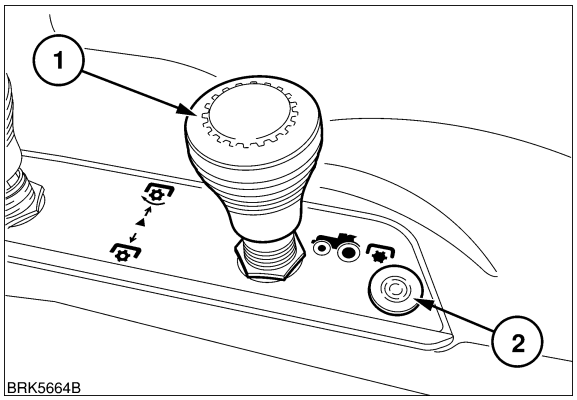
540-1000 rpm
PTO Drive

1. Bevel Pinion Shaft
2. Tapered roller bearing
3. Bevel pinion bearing adjustment shim
4. **50 Kph** Clutch
5. Bearing
6. PTO drive shaft
7. PTO Control Clutch
8. PTO output shaft
9. Crown wheel
10. Differential gear hub
11. Differential gear
12. Four wheel drive clutch

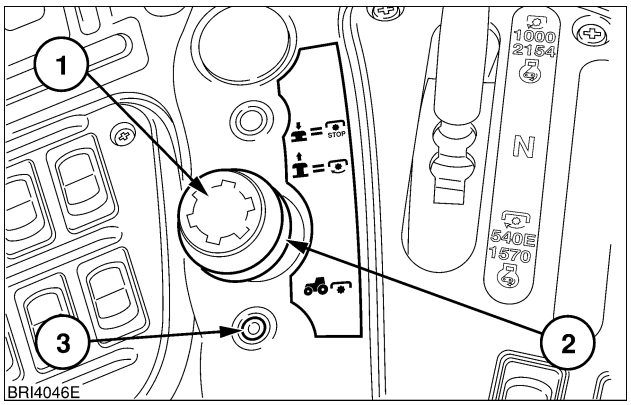
DESCRIPTION AND OPERATION

The power take-off (PTO) transfers engine power directly to mounted, semi-mounted or trailed equipment via a splined shaft at the rear of the tractor.
Drive to the PTO is achieved via a splined shaft which runs from the engine flywheel through the transmission upper shafts to the main shaft of the **50 kph** clutch **(4)** located at the rear of the transmission. A second shaft **(6)**, splined into the output side of the **50 kph** clutch main shaft continues the drive to the PTO control clutch **(7)**. It should be noted that the main shaft of the **50 kph** clutch is used solely as a means of continuing the drive from the engine flywheel to PTO and is not affected in any way by operation of the **50 kph** clutch.

The PTO is engaged and disengaged by means of a knob **(1)** on the right-hand console. The adjacent warning light **(2)** will illuminate when the PTO is engaged.
Two types of rear PTO system are available, dependent upon tractor model and country.
a)Two-speed PTO (North America only) with inter-changeable output shafts.
b)Two-speed, shiftable PTO (except North America) with inter-changeable output shafts and the option of fender-mounted switches for stationary PTO work.



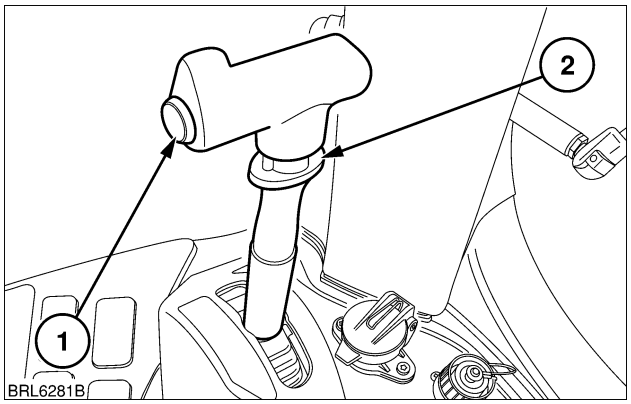
BRK5664B 2



BAIL07CCM278ASA 3

On models installed with shiftable P.T.O a range lever is provided. The lever **(1)** is used to select one of two PTO speed ranges and is located at the rear of the right-hand console.

NOTE: *In markets where the PTO speed selection is provided using an interchangeable PTO output shaft and there are no levers in the cab.*



BRL6281B 4

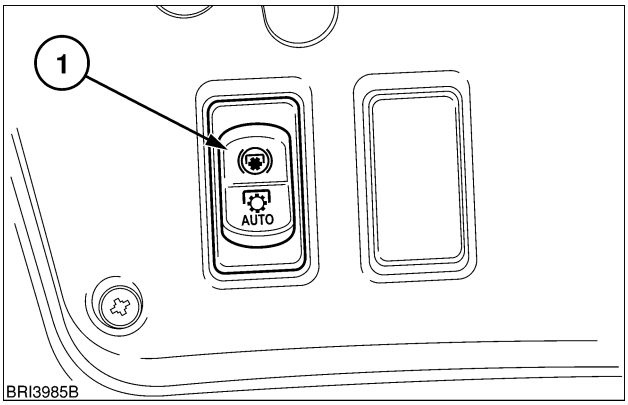
ELECTRONIC PTO RANGE SHIFT
(Where Fitted)

IMPORTANT: *An automatic PTO brake is installed to stop shaft rotation quickly when the PTO is disengaged. To avoid overstressing the PTO brake, slow down the implement by reducing engine speed before disengaging the PTO This is particularly important with implements having a high inertia. Such implements should, ideally, be fitted with an overrun clutch. To avoid damage to the brake when operating high inertia implements, hold down the switch* ***(1)****, to disengage the brake and allow the implement to come to rest naturally.*

⚠ DANGER ⚠

To avoid inadvertent movement of the implement, disengage the PTO after each use. Failure to comply could result in death or serious injury.

B014



BAIL07CCM276ASA 7

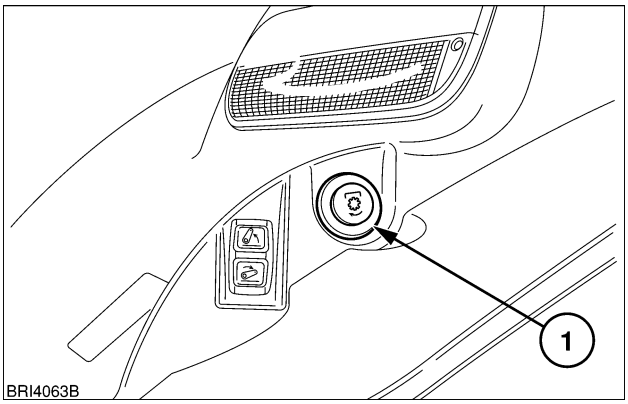
EXTERNAL PTO CONTROLS
(Where Fitted)

An optional, fender-mounted PTO switch **(1)**, may be installed on the outer surface of both rear fenders to aid alignment of the P.T.O shaft splines with equipment and facilitate stationary PTO operations.
With the engine running, touch the switch momentarily to cause the PTO shaft to index round to align the shaft splines. If the switch is pressed for less than **5 seconds**, the shaft will stop turning when the switch is released.
Press and hold in the switch for more than **5 seconds** and the PTO will operate continuously. Press the switch again to stop the PTO Alternatively, the PTO may be stopped by means of the in-cab controls, as previously described.

NOTE: *The warning light, on the PTO control panel, will illuminate when the PTO is engaged, momentarily or permanently.*

NOTE: *The PTO may be engaged or disengaged from the fender switch, whether the in-cab control is in the on or off position.*

NOTE: *Simultaneous operation, within two seconds, of in cab and external PTO controls will result in error code P38 showing. A **10 second** delay will also occur before PTO control operation will recommence.*



BAIL07CCM279ASA 8

(Where Fitted)

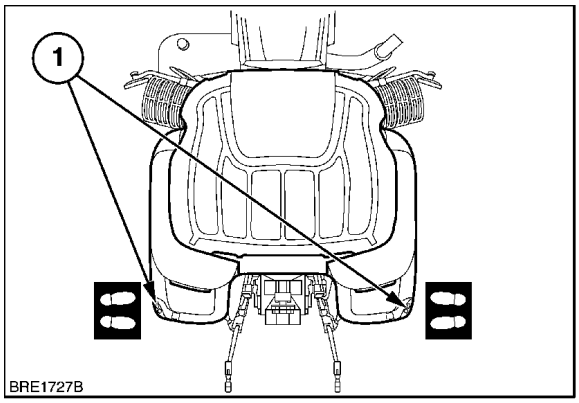
⚠ CAUTION ⚠

Before leaving the vehicle to operate the external PTO switches:- Move the gearshift levers to neutral.- Disengage the PTO- Apply the parking brake. With the engine running, move the hand throttle lever to the low idle position (fully rearwards).

B001

The operator must only activate the external Power Take Off switches **(1)** while standing to the side of the tractor (outboard of the rear tyres). To avoid damage to implement or tractor, operation of the in cab and external PTO switches should not be carried out simultaneously.

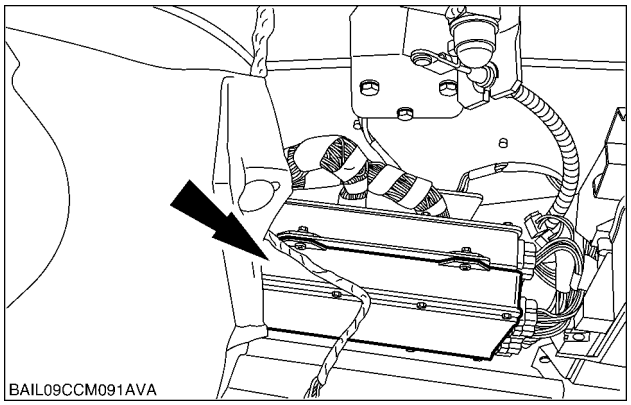
NOTE: *Before using the external Power Take Off switches, ensure that no person or object is in the area of the implement, 3-point linkage or PTO shaft.*
Never operate the external switches while standing:
- Directly behind the tractor or tyres.
- Between the lower links.
- On or near the implement.
- Never extend arms, legs, any part of the body or any object into the area near the 3-point linkage, PTO shaft or implement while operating the external switch.
- Never have an assistant working the opposite set of controls.
- When moving to the opposite set of controls, move around the tractor or implement.
- Do not cross between the implement and tractor.



BRE1727B 9

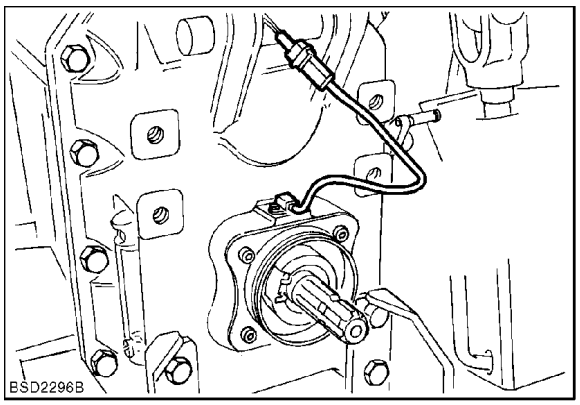
(Where Fitted)

The rear PTO is controlled by the Central Controller-(XCM) located behind the seat.



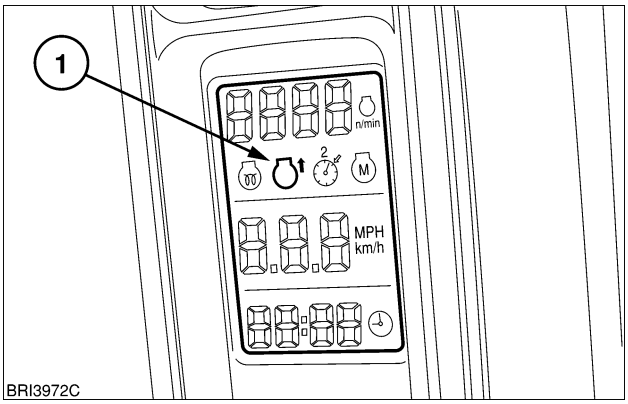
BAIL09CCM091AVA 10

The processor receives input from the PTO ON/OFF switches, (in cab and fender), PTO speed sensor, brake, soft start and engine controller. These signals are then used to provide the output signals to the PTO clutch engagement solenoid, P.T.O brake solenoid and the PTO ON/Off overspeed warning lamp.
If the correct conditions are met, i.e., speed parameters and switch engagements then the PTO is allowed to start.
The PTO speed sensor is located above the PTO output shaft



BSD2296B 11

The ‘soft start’ facility provides easy start up of heavy, high inertia, PTO driven equipment. Soft start is a fully automatic system controlled by electronic sensors on the engine and within the PTO driveline.
Soft start ‘feathers’ the PTO clutch engagement to provide a slower, gradual take up of the drive over the first **5 seconds**.
The engines are equipped with a Power Management system that monitors and boosts engine power when using the PTO under certain load conditions or using the vehicle in high road gears providing certain criteria are met. As load on the engine increases the engine power management will provide up to 35 additional horsepower to maintain tractor performance by electronically changing the characteristics of the engine power curve which is programmed into the vehicle and engine control modules.
The indicator light on the instrument panel will illuminate when power management is activated during PTO Operations.



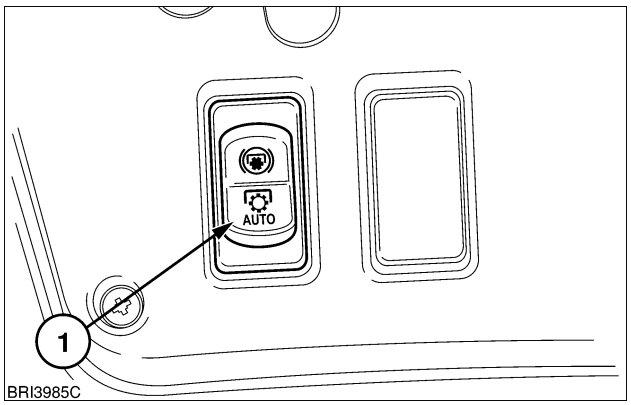
BAIL07CCM275ASA 12

Auto PTO

This facility provides an automatic starting and stopping of the PTO in relation to the raising or lowering of the lift arms. The height at which this occurs is pre-programmed by the operator.
To activate the Auto function, engage the P.T.O. as previously described and then depress and hold the switch **(1)**, for more than one second. The Auto P.T.O. lamp on the switch will illuminate to confirm activation. With the 3 point hitch in the lowered position and the P.T.O. engaged, the Auto lamp will remain on. Raising the implement will disconnect P.T.O. drive and cause both P.T.O. and Auto lamps to flash. Lowering the implement will re-engage P.T.O. drive, both lamps will cease to flash and will remain illuminated. Depressing the Auto P.T.O. switch again will de-activate the function and the Auto lamp will extinguish.

IMPORTANT: *If the P.T.O. is operating when the Auto function is de-activated, the P.T.O. will continue to rotate until switched off using the main P.T.O. control.*

NOTE: *The Auto P.T.O. function is de-activated every time the key start is switched off but the current programmed on/off values will be stored in the memory.*

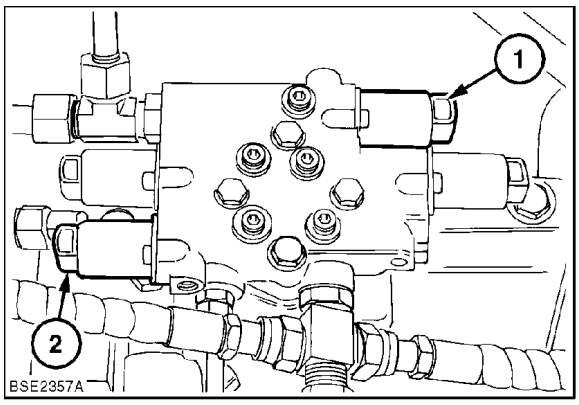


BAIL07CCM277ASA 13

To configure the Auto PTO refer to **REAR PTO Hydraulic - Calibrate (C.40.C)**

Hydraulic Operation of PTO - PTO Disengaged (Reference to **REAR PTO Hydraulic - Dynamic description (C.40.C)**)

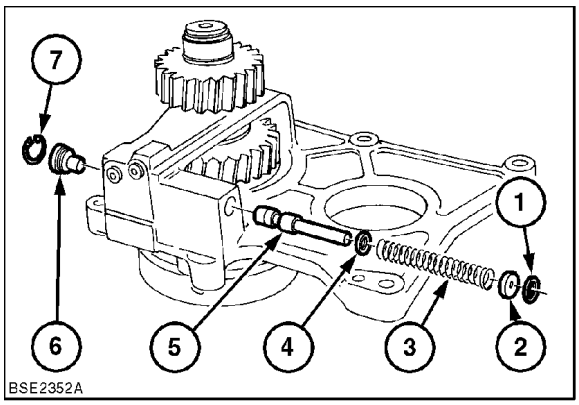
The PTO brake **(1)** and engagement solenoid **(2)**, Figure **15** are housed in the low pressure distribution block on top of the rear axle.
When the PTO is not in use the PTO brake solenoid is energised and the PTO engagement solenoid is de-energised.



BSE2357A 15

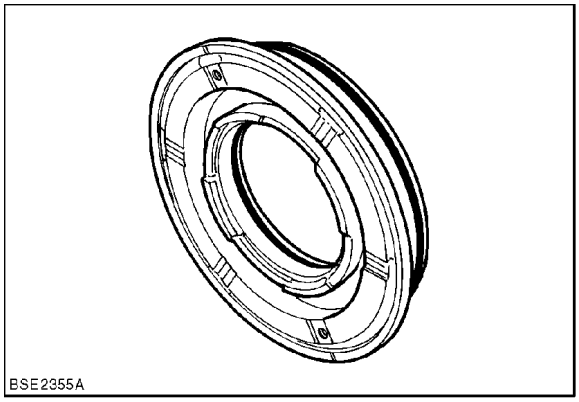
Oil behind the PTO clutch piston is open to reservoir through the lubrication control valve and de-energised PTO engagement solenoid.
The lubrication valve is housed in the PTO housing support plate and comprises of the following components

1. Circlip
2. Seat
3. Spring
4. Seat
5. Spool
6. Plug
7. Circlip



BSE2352A 16

The bellville springs force the piston into the piston housing and disengages drive through the clutch plates to the output shaft .
When the piston is seated in the housing their is a small gap between the rear of the washer and the clutch piston housing.
Lubrication oil flows from the lubrication circuit, through the lubrication valve into the centre of the clutch housing shaft and through drillings in the shaft to the washer.
The small gap behind the washer allows lubricating oil at a restricted rate of **2 - 3 l/min** (**0.53 - 0.79 US gpm**) to flow past the rear of washer then through the channels machined on the front of the piston to lubricate the clutch plates.
It should be noted that when the PTO clutch is disengaged the volume of oil required to lubricate the clutch plates is less than during engagement as described in **REAR PTO Hydraulic - Dynamic description (C.40.C)**. Consequently this method of restricting lubricating oil to the clutch plates allows additional lubrication to be available for other hydraulic circuits operating on the tractor.

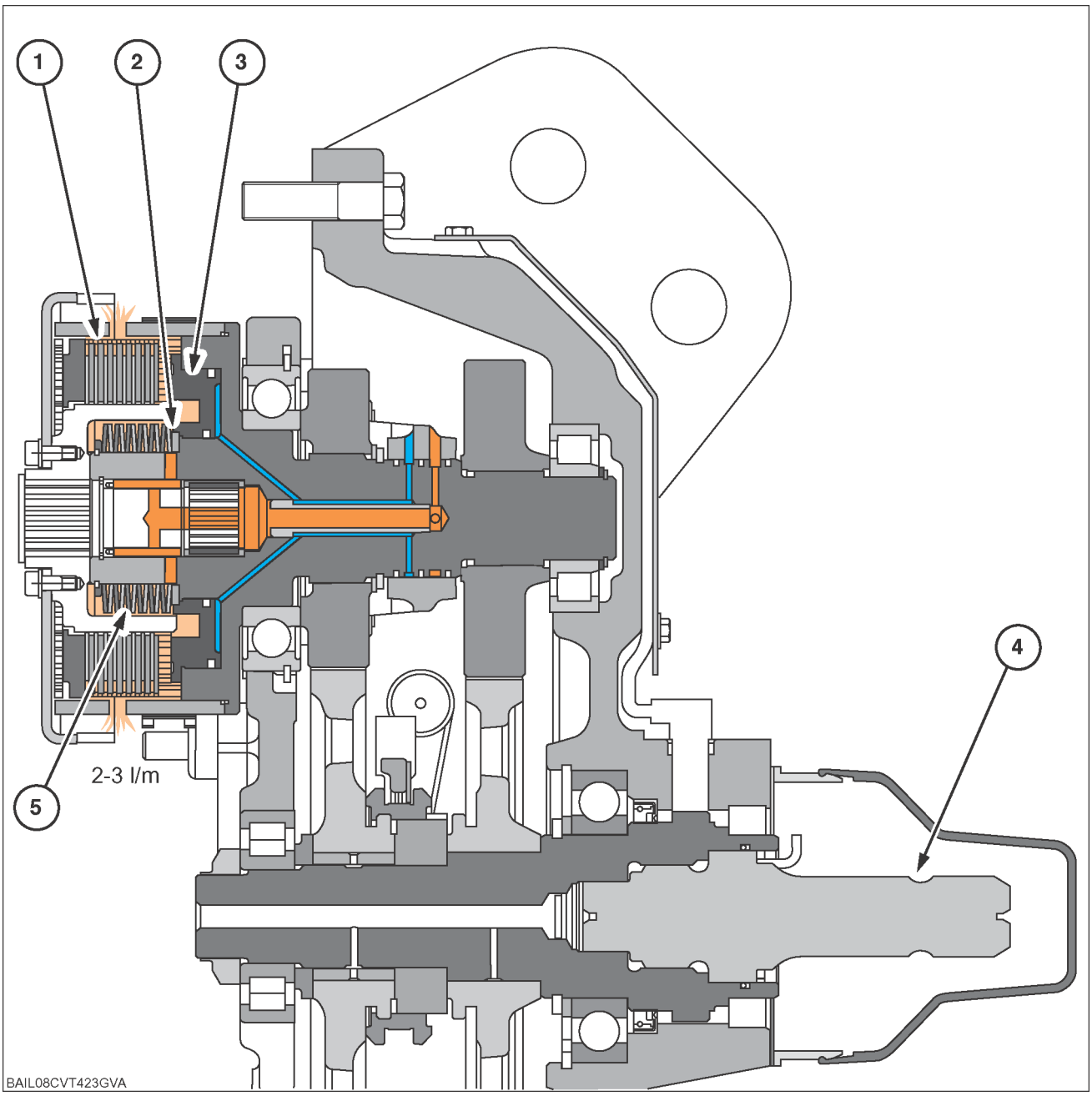


BSE2355A 17

REAR PTO Hydraulic - Fault code index

Rear PTO error codes are shown in the display as "5***" codes. Refer to **Control module - Fault code index (A.50.A)**

REAR PTO Hydraulic - Dynamic description



BAIL08CVT423GVA 1

PTO CONTROL CLUTCH-DISENGAGED

Lubrication Circuit Oil

Reduced Flow Lubrication Circuit Oil

Return to Reservoir

1 Clutch Plates
2 Washer
3 Piston
4 PTO Output Shaft
5 Belleville Springs

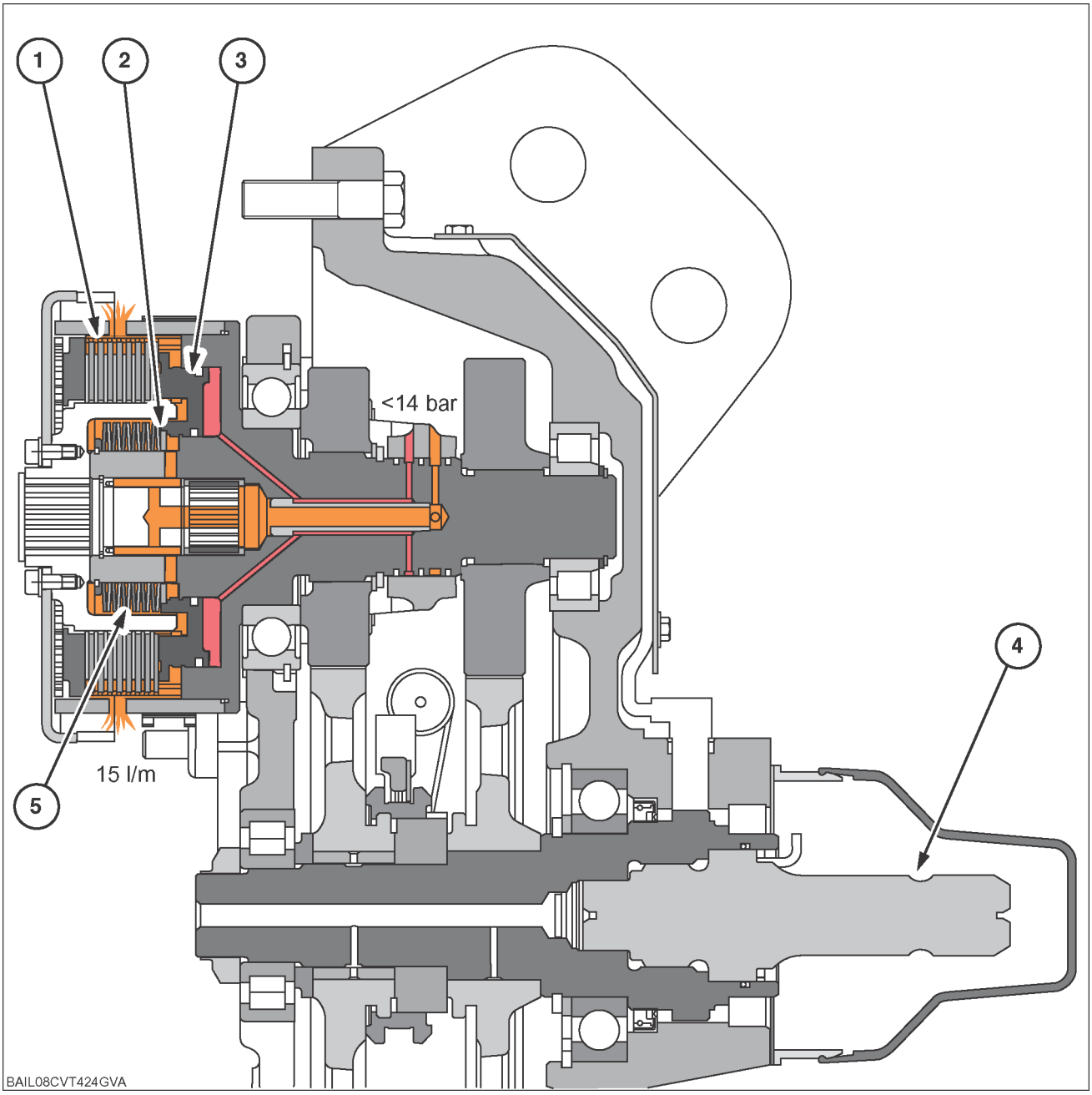
PTO Engaged (initial engagement)

Engagement of the PTO is considered as a two phase operation.
When the PTO is operated the engagement solenoid is energised and the brake solenoid disengaged.

Low pressure hydraulic circuit oil flows from the solenoid and past the end of the lubrication valve to the rear of the clutch piston. As pressure increases the PTO clutch piston moves forward against the washer **(2)** and Belleville springs **(5)** to compress the clutch plates **(1)**. The action of the piston moving forward increases the gap between the rear of the washer and the clutch piston housing allowing an increased flow of lubricating oil to the clutch plates. This increased flow of up to **15 l/min** (**3.96 US gpm**) makes sure that the clutch plates are adequately lubricated during the initial stages of engagement.

PTO Soft Start

The automatic PTO clutch softstart system ensures the load applied to the PTO is controlled in a predictable manner without putting undue stresses on the tractor engine, the PTO shaft and the connecting implement. The soft start feedback system senses engine deceleration and PTO shaft acceleration. Limits for these two parameters are set in the XCM central controller and if the system detects that either parameter is going above the set threshold limits, the rise in PTO clutch pressure is held until they return within the preset limit at which time the clutch pressure again increases to continue engaging the PTO. If the soft start parameters are again exceeded the pressure held process is repeated until full engagement is achieved. If engagement is not achieved after **5 seconds** the clutch pressure is released and the PTO system is turned off.



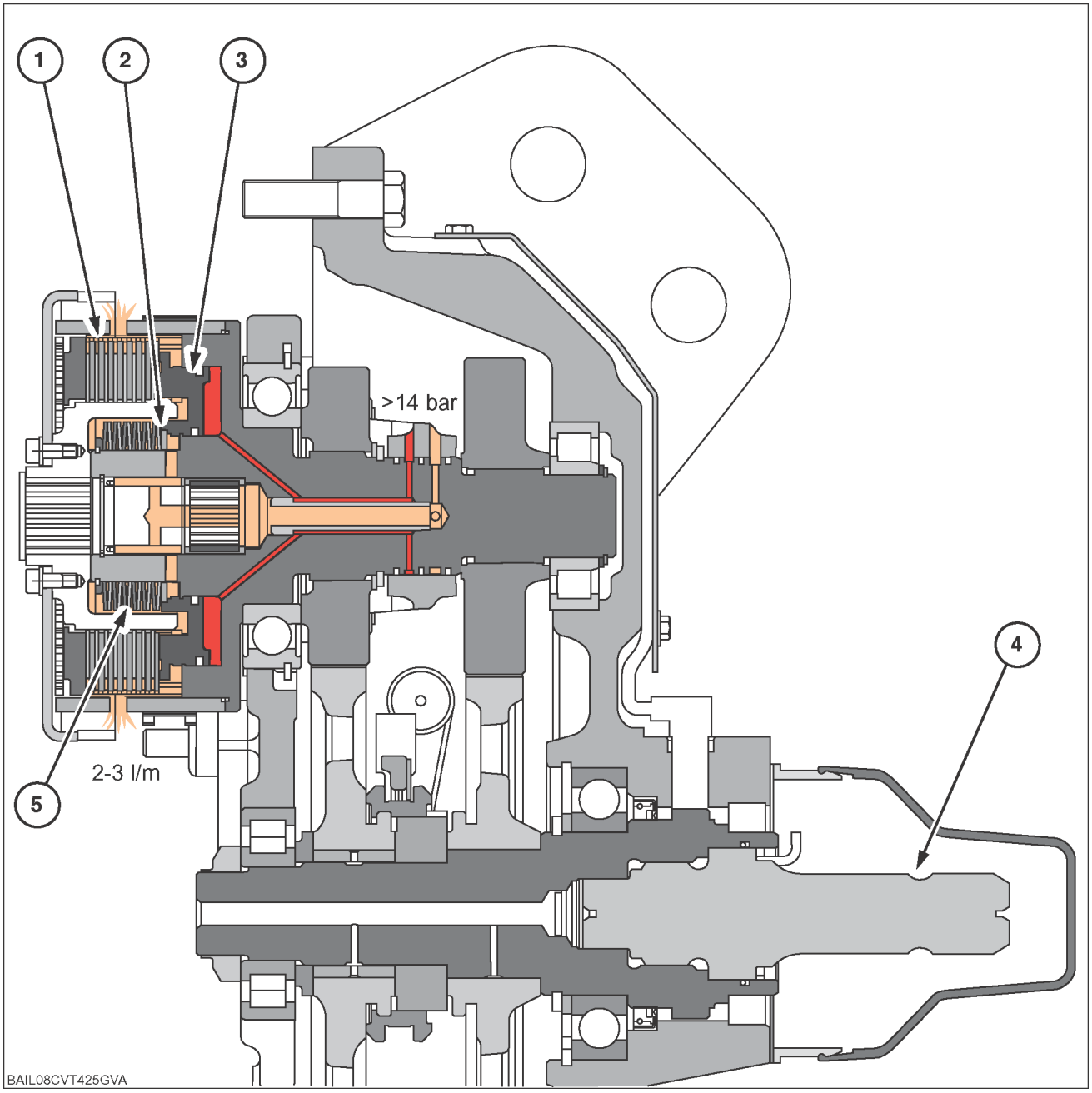
BAIL08CVT424GVA 2

PTO CONTROL CLUTCH-INITIAL ENGAGEMENT

Low Pressure Clutch Engagement Oil < **14 bar** (**203.00 psi**)

Lubrication Circuit Oil

1 Clutch Plates
2 Washer
3 Piston
4 PTO Output Shaft
5 Belleville Springs



BAIL08CVT425GVA 3

PTO CONTROL CLUTCH-FINAL ENGAGEMENT

Low Pressure Clutch Engagement Oil > **14 bar** (**203.00 psi**)

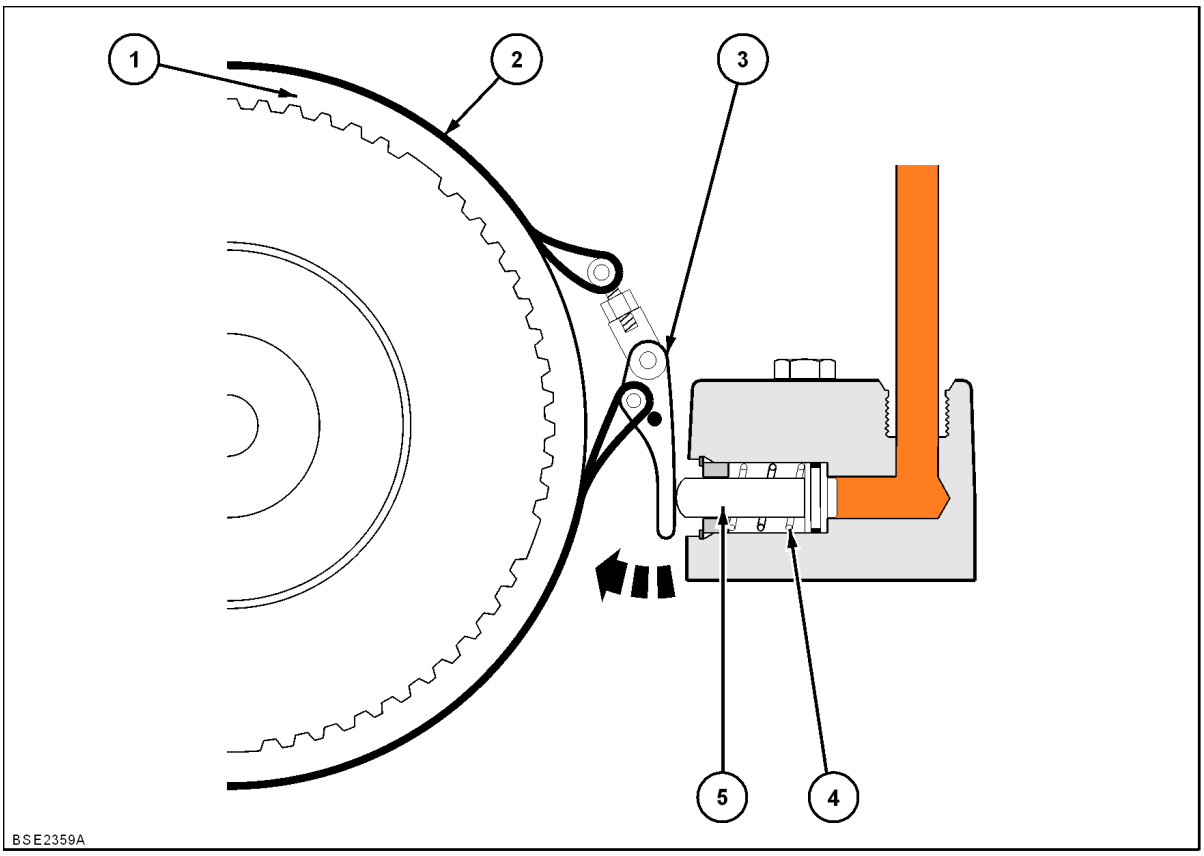
Reduced Flow Lubrication Circuit Oil

1 Clutch Plates
2 Washer
3 Piston
4 Lubrication Valve
5 PTO Output Shaft
6 Belleville Springs

PTO Engaged (final engagement)

When the pressure applied to the piston approaches **14 bar** (**203.00 psi**) the pressure applied to the end face of the lubrication valve moves the valve against the spring and reduces the flow of lubricating oil across the valve to the clutch plates to **2 - 3 l/min** (**0.53 - 0.79 US gpm**).
Less lubrication of the clutch plates is necessary after the initial stage of engagement and this process limits the demand of the PTO on the lubrication circuit oil which is also used for other circuits on the tractor. The pressure

applied to the rear of the piston will now continue to increases towards **26 bar** (**377.00 psi**) in order to maintain adequate clutch plate clamping pressure and drive through the clutch to the PTO output shaft.



BSE2359A 4

Low Pressure Circuit Oil

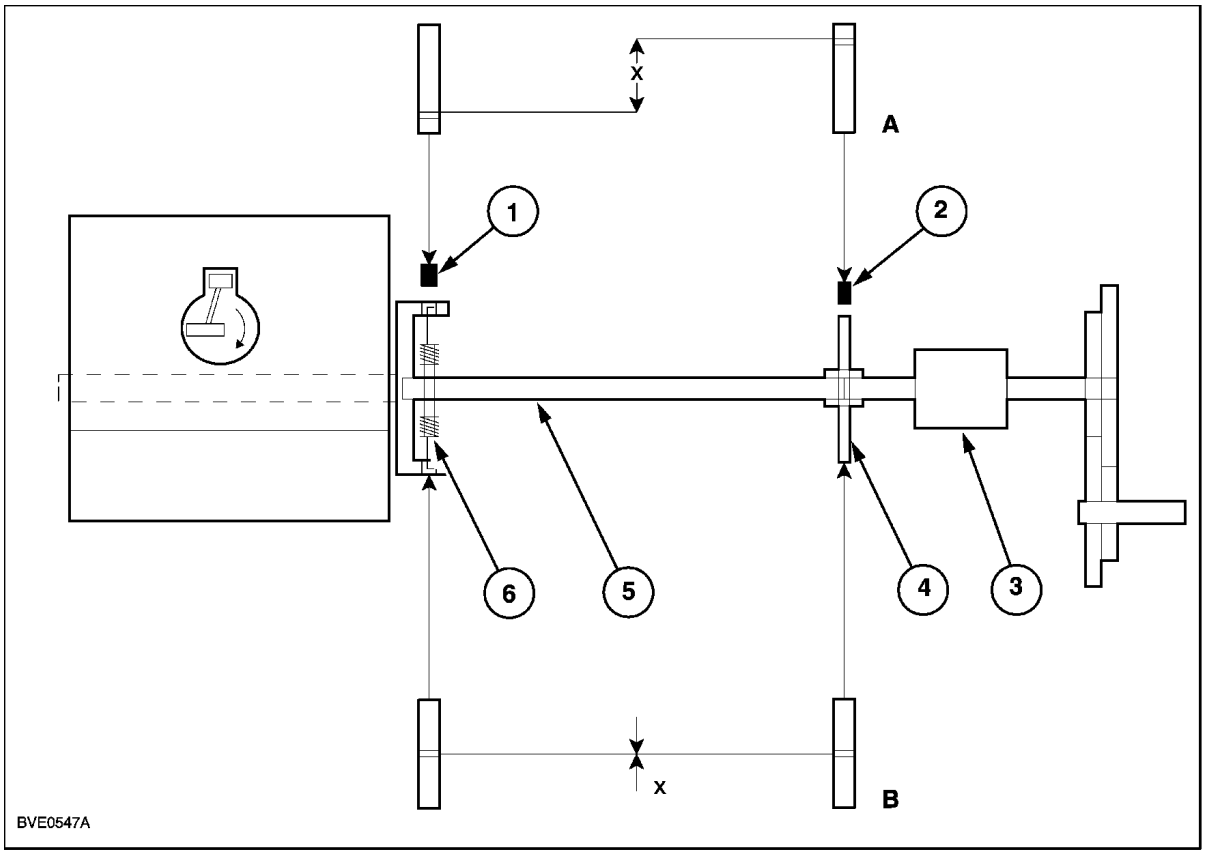
PTO CLUTCH BRAKE

The band type clutch brake operates automatically. It applies when the PTO clutch is being disengaged (braking start) and stops braking when the clutch is completely engaged.

When working with high inertia implements it is possible to keep the brake disengaged by pressing the switch located on the right hand console near the PTO control handle. When the PTO clutch is engaged, the brake control oil is returned to reservoir as the solenoid valve is in the discharge position (de-energised) and consequently there is no operation of the actuation piston **(5)** onto the band operating lever **(2)**, the piston **(5)** being returned by the spring **(4)**.

When the PTO control clutch is being disengaged, the solenoid valve is energised and opens, diverting oil from the low pressure circuit onto the piston **(5)**. The piston contacts the lever **(3)** and band **(2)** is tightened against the housing **(1)** to brake the assembly.

PTO Torque Sensor (Engine Power Management)



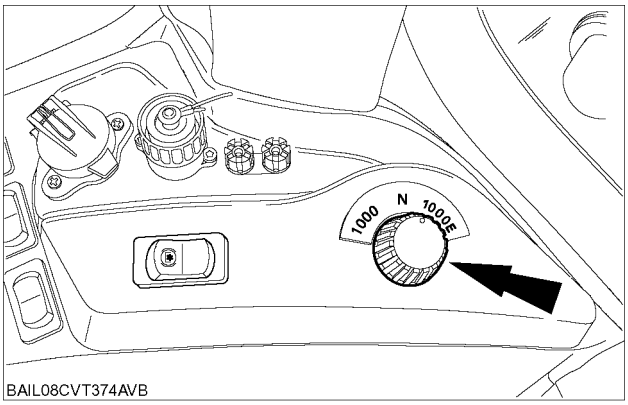
BVE0547A 5

PTO Torque Sensor (Engine Power Management)

A PTO under load
B PTO without load
1 Engine flywheel torque sensor
2 PTO torque sensor
3 PTO clutch
4 PTO torque sensor tone wheel
5 PTO input shaft
6 Engine flywheel damper

The PTO power management system records the amount of torque being transmitted through the PTO shaft **(5)** using two hall effect sensors **(1)** and **(2)**. One hall effect sensor is located at the engine flywheel damper **(6)** and the other is located at the PTO torque sensor tone wheel **(4)**.
The PTO shaft is engineered from high torsional steel and is designed to twist when a load is applied. Under no load **(B)** there is no difference **(x)** between the two sensor positions. Under load **(A)** the PTO management system detects the amount of twist by comparing the difference **(x)** between the two sensor positions. The PTO management system knows the torque required to twist the PTO shaft a given amount and uses the difference **(x)** to calculate the torque produced at the PTO shaft. The PTO management system can then detect an increase in torque and electronically modify the power curves of the engine management system to provide an increase of up to 25 additional horsepower to maintain the PTO performance.

Electric PTO Speed Shift



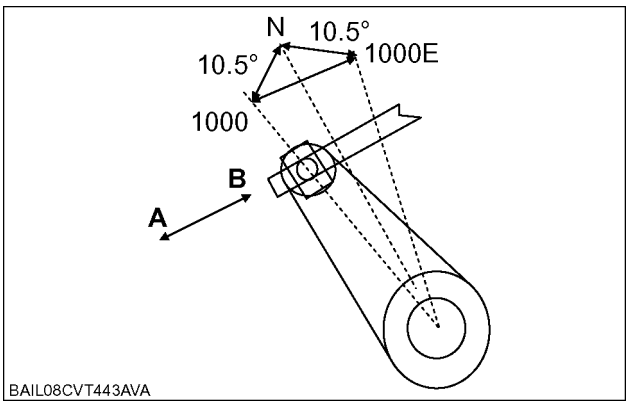
BAIL08CVT374AVB 6

The electric shift system replaces the PTO speed selecting lever with a rotary three position switch to select the required PTO speed. The speed change switch is located near the right hand side C pillar of the tractor cab. The electric speed selecting system replaces the control lever in the cab with a switch and motor coupled via a gearbox and worm drive system. The worm drive moves a carriage that has the Bowden cable attached to it, the motor can be driven in either direction using a H configuration relay drive system, so the PTO speed may be changed from low speed to N to high speed or vice versa as required. The motor drive system senses the current through the motor and has a Hall effect position sensor that is connected to the moving carriage within the electric shift unit.

To select the high PTO speed the motor is driven to a position approximately 200 A to D counts (0.97v or 19%) greater than the fully retracted position, acquired during the PTO shift mechanism calibration process; the drive current is also checked to ensure that it is lower than a preset level which occurs when the selector mechanism is in the detented position for the required speed.

To select the low PTO speed the cable is driven to a position approximately 200 A to D counts (0.97v or 19%) less than the fully extended position limit, acquired during the PTO shift mechanism calibration process, the drive current is checked to ensure that it is at or lower than a preset level which occurs when the selector mechanism is in the selected gear detented position.

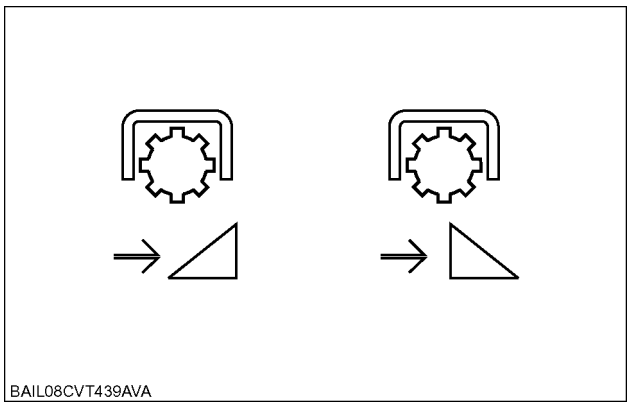
Mechanical layout of the PTO speed change lever on the transmission case (1000/1000E shown as an example).



BAIL08CVT443AVA 7

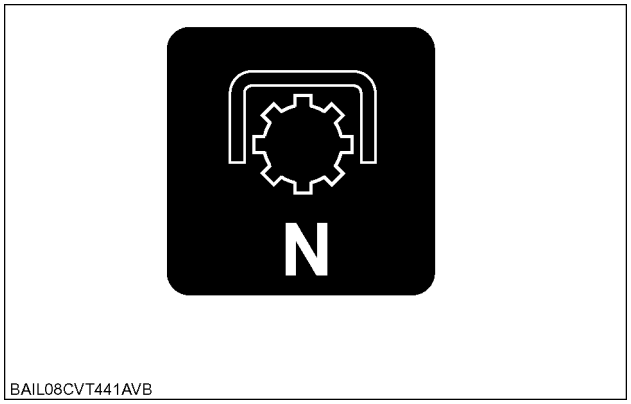
A Bowden cable extends in the direction of **(A)** and retracts in the direction of **(B)** and is connected to the speed change motor.

In order to facilitate a PTO speed change the PTO brake is released and the PTO shaft is allowed to turn to enable the PTO gears to mesh correctly at the selected PTO speed. Therefore to prevent unpredictable operation of the PTO shaft, a PTO speed change is initiated when the PTO is started. The PTO clutch is not energised until the PTO speed change operation is completed although the PTO lamp is illuminated to indicate the PTO is started. When a speed change occurs the PTO may not start turning for up to 3 seconds after the PTO switch has been switched on, either one of the following icons, (depending on the change from Hi to Lo or vice versa) will be displayed in the instrument cluster to indicate that the PTO speed change process is in operation.



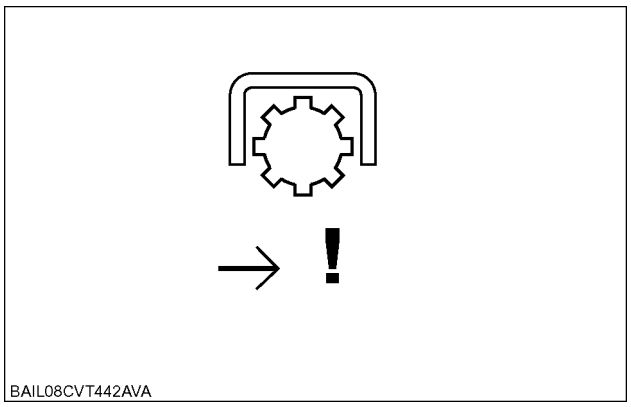
BAIL08CVT439AVA 8

If the PTO speed select mechanism stalls and cannot successfully complete the PTO speed change to the required speed, the system displays the following symbol to prompt the operator to return the PTO speed select system to the Neutral position.



BAIL08CVT441AVB 10

The PTO speed cannot be changed while the PTO is started. If the speed change switch is operated when the PTO is operating the speed change will occur at the next cycling of the PTO switch with no further operator action. The icon shown below will be momentarily displayed in the instrument cluster.



BAIL08CVT442AVA 11

If the fender switch is operated in a momentary manner to provide an inching function, the PTO speed operation will be completed before the PTO is activated although there may be some rotation of the PTO shaft when the PTO brake is released. If the fender switch is not held for long enough to complete the operation the PTO speed selector mechanism is returned to Neutral.

REAR PTO Hydraulic - Overhaul

Prior operation:
Refer to **REAR PTO Hydraulic - Remove (C.40.C)**

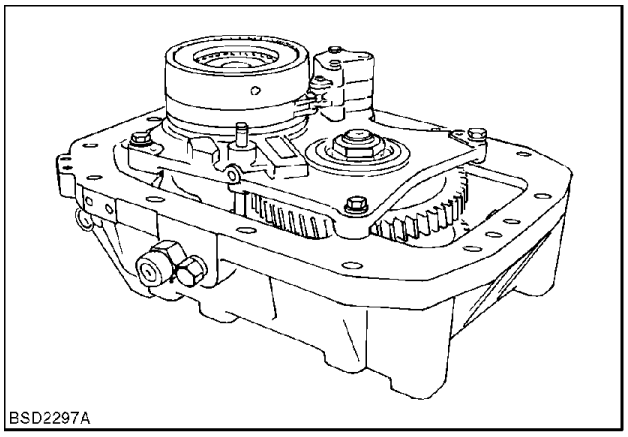
1. POWER TAKE OFF

   Place the PTO assembly on a suitable clean working surface or stand if available.

⚠ WARNING ⚠

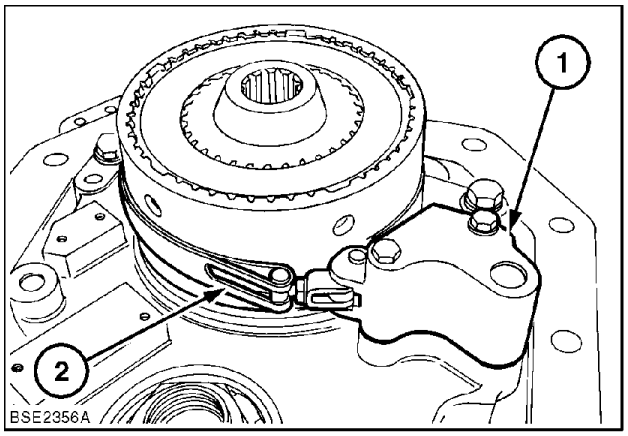
Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

B026



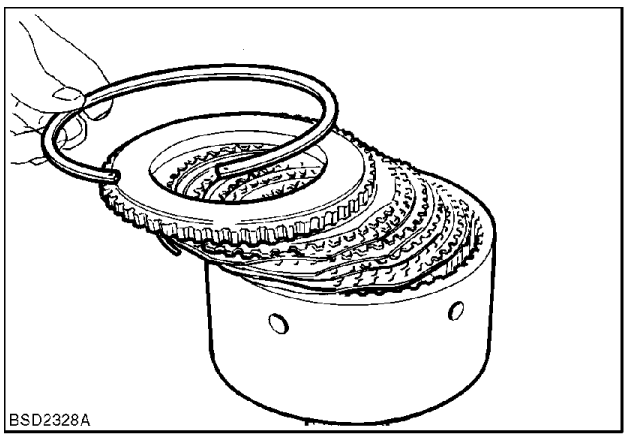
BSD2297A 1

2. Remove brake band and brake piston housing.



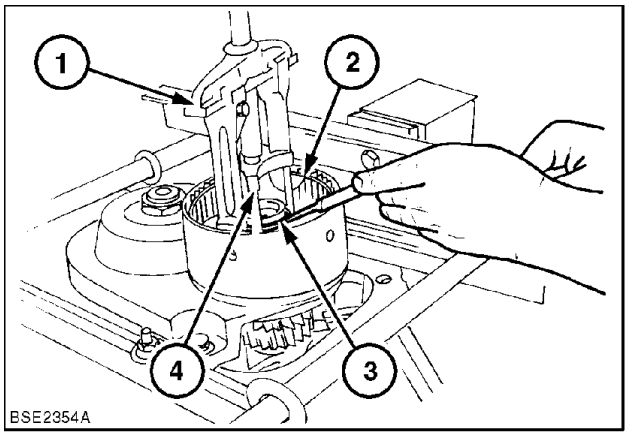
BSE2356A 2

3. Remove retaining ring and clutch plates.



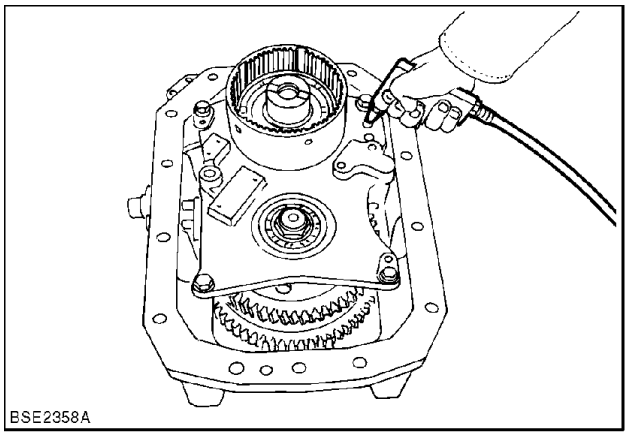
BSD2328A 3

4. If clutch piston is to be serviced and it is not deemed necessary that further repairs to the clutch hub are required compress and remove the clutch belleville springs as follows
Reinstall the snap ring **(2)** using a puller **(1)** and special tool 50063 (Refer to **REAR PTO Hydraulic - Special tools (C.40.C)**). Screw in the puller until releasing and removing the belleville spring retaining ring **(3)**. Remove components referring to Figure **15**.



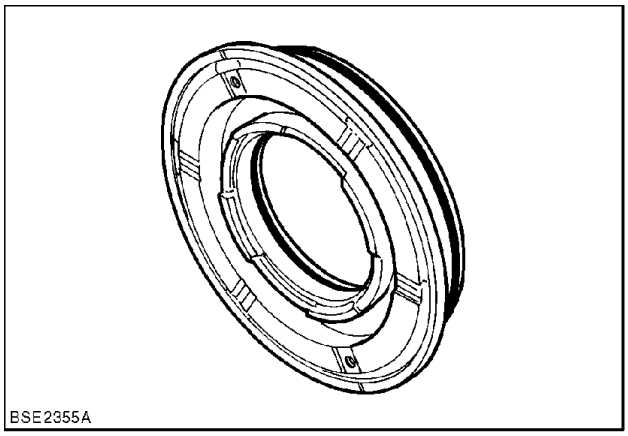
BSE2354A 4

5. Use compressed air in inlet port to remove piston from hub. Refer to Figure **15** for component layout.



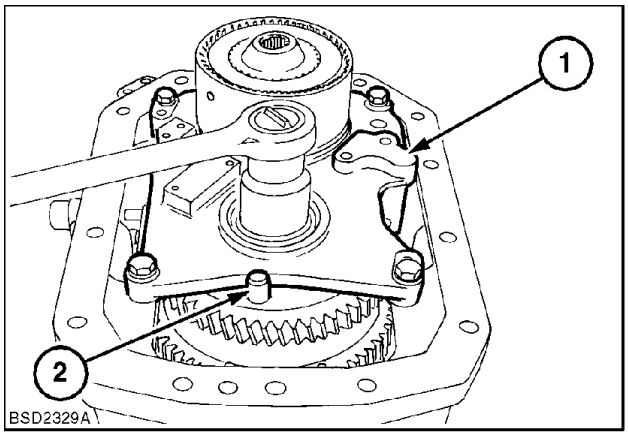
BSE2358A 5

6. Examine piston seals and replace if damaged



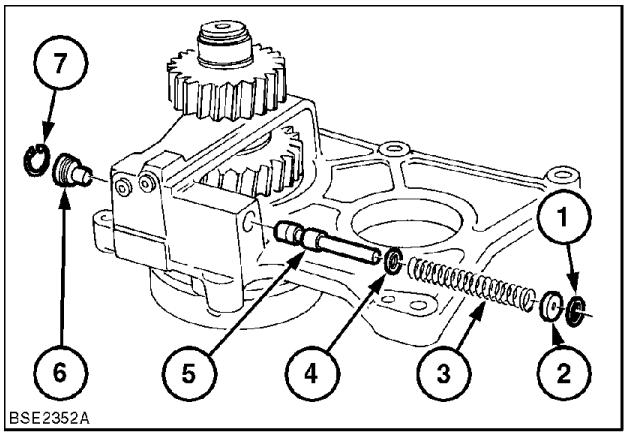
BSE2355A 6

7. If the PTO assembly output shaft gears are to be disassembled loosen the output shaft gear retaining nut using a suitable peg **(2)** to block the gear.
Remove support plate **(1)**



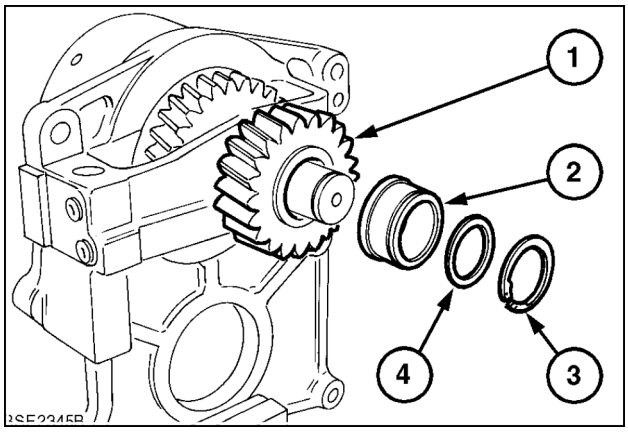
BSD2329A 7

8. Where required remove PTO clutch lubrication valve.
   1. Circlip
   2. Seat
   3. Spring
   4. Seat
   5. Spool
   6. Plug
   7. Circlip



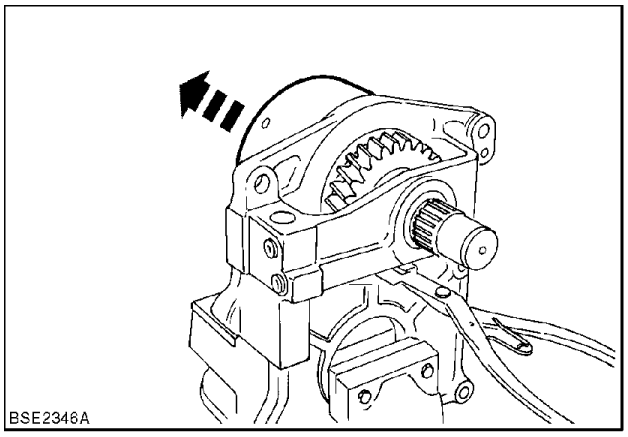
BSE2352A 8

9. Remove circlip **(3)**, ring **(4)**, sleeve **(2)**, and gear **(1)**.



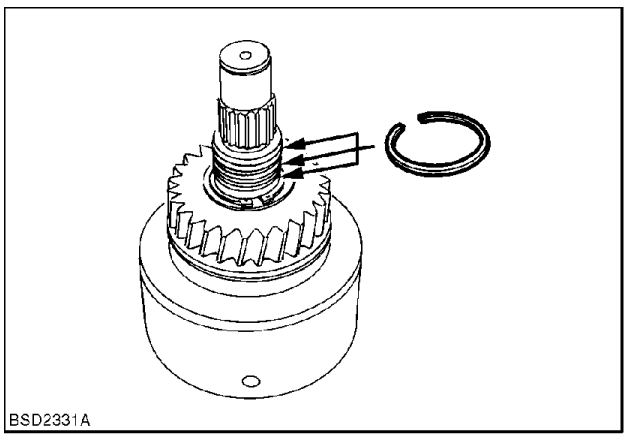
BSE2345B 9

10. Using circlip pliers expand support bearing retaining circlip and at the same time drive shaft forwards to remove the clutch hub assembly.



BSE2346A 10

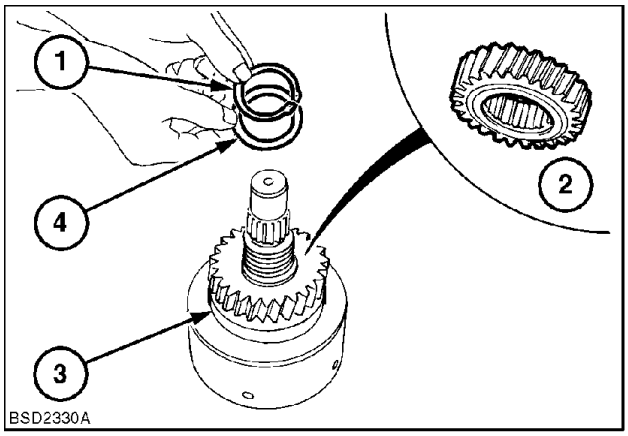
11. Remove sealing rings from clutch hub shaft shaft.



BSD2331A 11

12. Remove circlip **(1)**, washer **(4)**, gear **(2)** and bearing **(3)**.

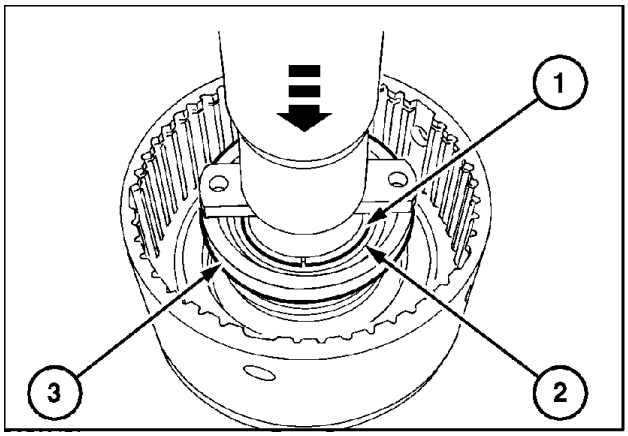
NOTE: *When re-assembling gear the raised edge of the gear faces towards the bearing.*



BSD2330A 12

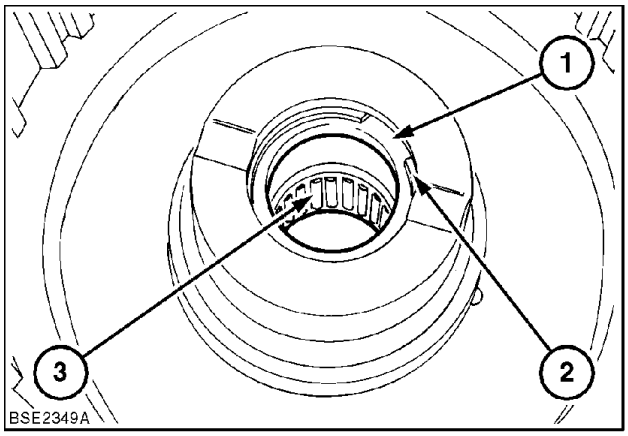
13. Position clutch hub in a press and using a suitable piece of tube **(3)** compress belleville washers and remove retaining ring **(1)** and retainer **(2)**.
Slowly and carefully release pressure applied by the press and remove belleville springs. Refer to Figure **15**.

NOTE: *Alternatively the belleville springs may be compressed as described in step **4***

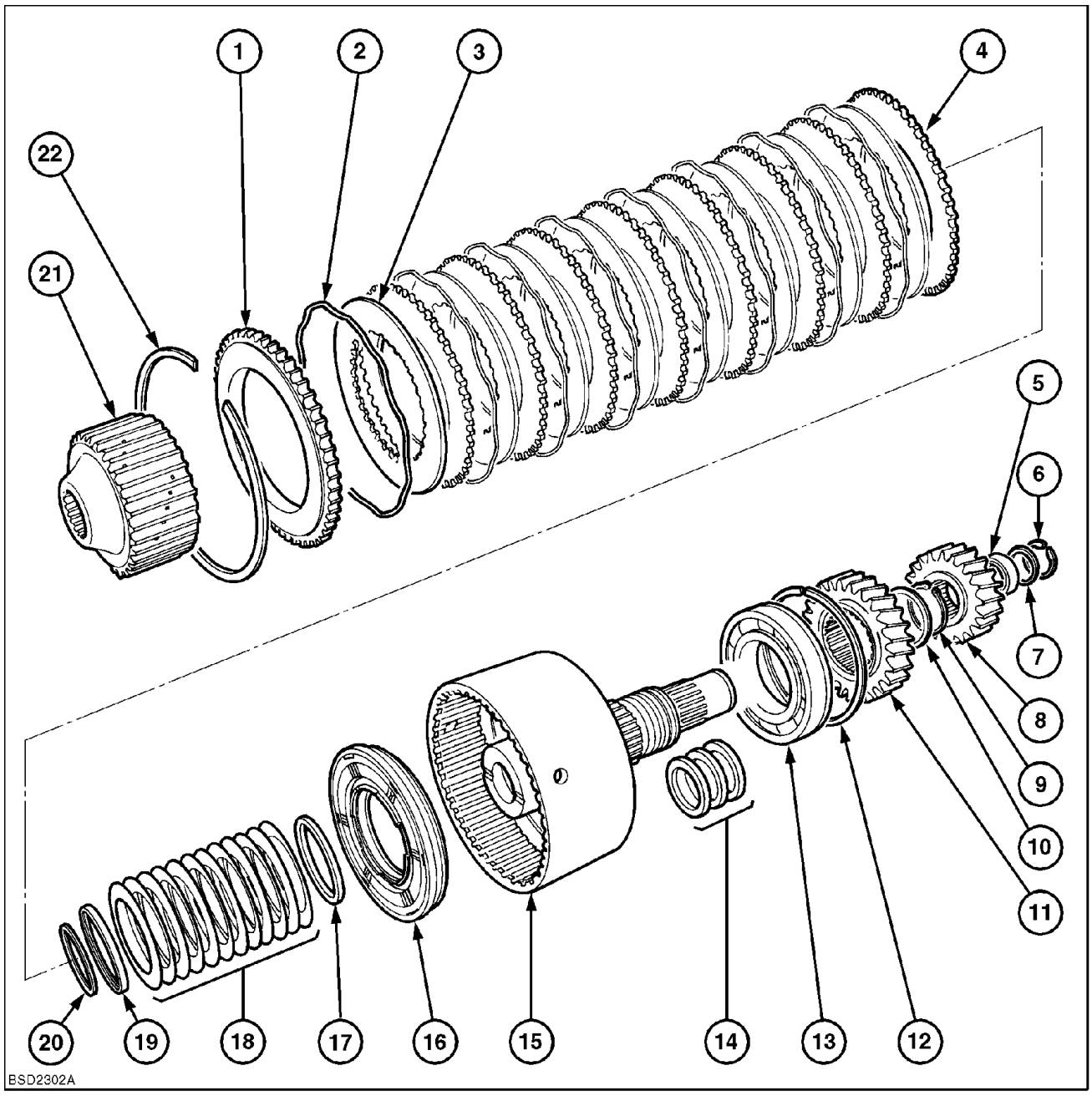


1b0o2004106219 13

14. Remove retaining ring **(1)** and oil seal **(2)** from clutch hub. The roller bearing **(3)** may be removed using a standard slide hammer and adjustable puller.



BSE2349A 14

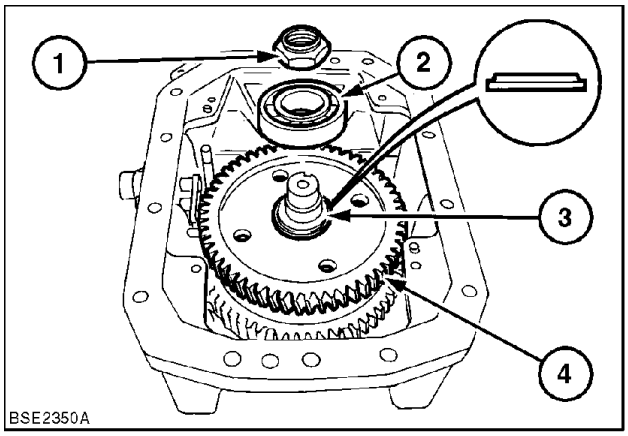


BSD2302A 15

PTO Clutch Assembly

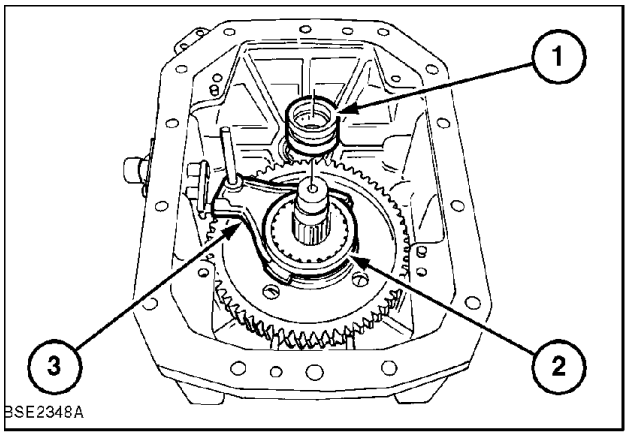
1 End Plate
2 Spring Separator
3 Clutch Plate
4 Clutch Plate Separator
5 Bearing
6 Circlip
7 Spacer
8 Drive Gear **540 rpm**
9 Circlip
10 Spacer
11 Drive Gear **1000 rpm**
12 Retainer
13 Bearing
14 Sealing Rings (3 off)
15 Clutch Housing
16 Piston
17 Washer
18 Belleville Springs
19 Spacer
20 Retaining Ring
21 Hub
22 Retaining Ring

15. Remove output shaft drive gear retaining nut **(1)** (previously loosened in step **7**).
Withdraw bearing **(2)**, Spacer **(3)** and **1000 rpm** output driven gear **(4)**.



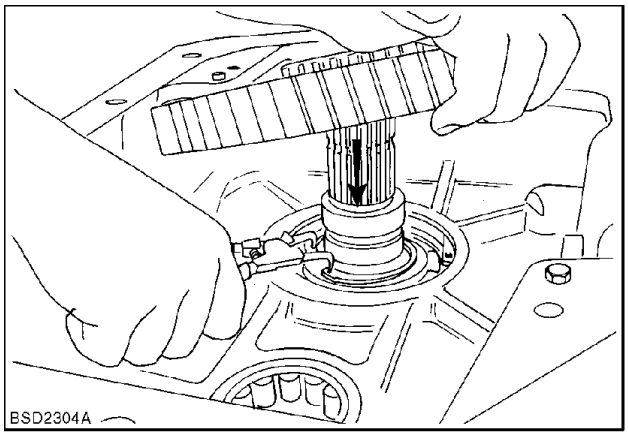
BSE2350A 16

16. Remove sleeve **(1)**, fork **(3)** and coupler assembly **(2)**



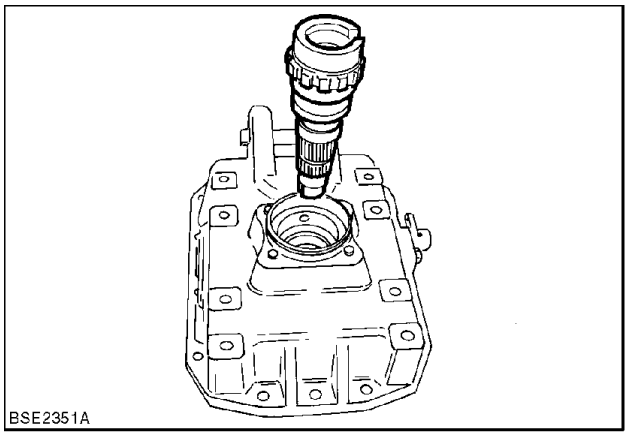
BSE2348A 17

17. Remove lower gear. Where obstruction in removing gear is experienced release shaft retaining circlip and push shaft forward.



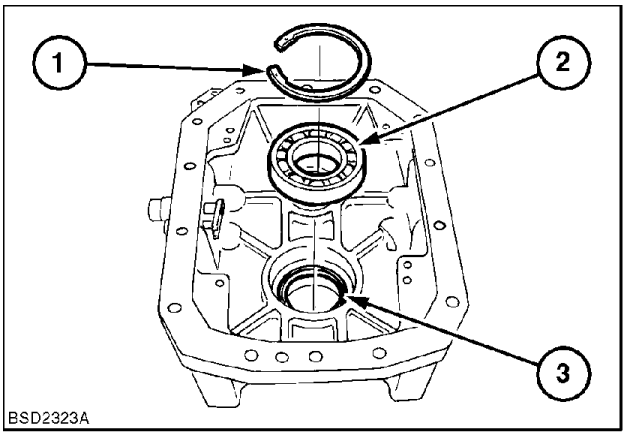
BSE2304A 18

18. Remove shaft.



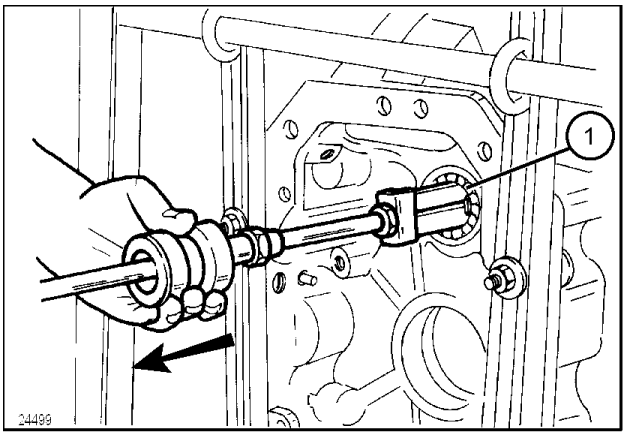
BSE2351A 19

19. Remove outer circlip **(1)** bearing **(2)** and seal **(3)**.



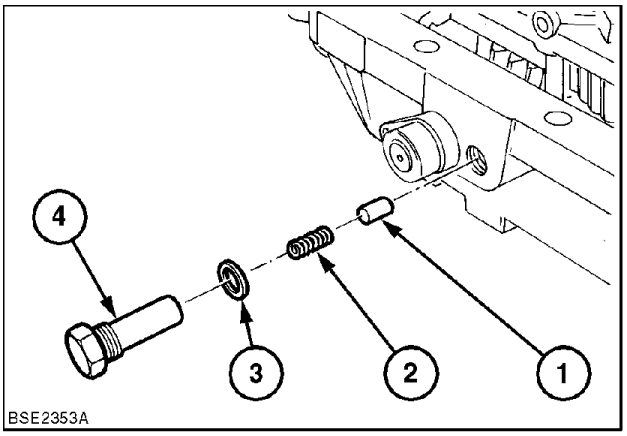
BSD2323A_160 20

20. Withdraw the upper bearing **(1)** using a slide puller equipped with a ring expander.



24499_161 21

21. Remove selector mechanism and detent assembly as required. Detent mechanism comprises of plunger **(1)**, spring **(2)**, washer **(3)** and retainer housing **(4)**.



BSE2353A 22

22. Reassembly follows the disassembly procedure in reverse.

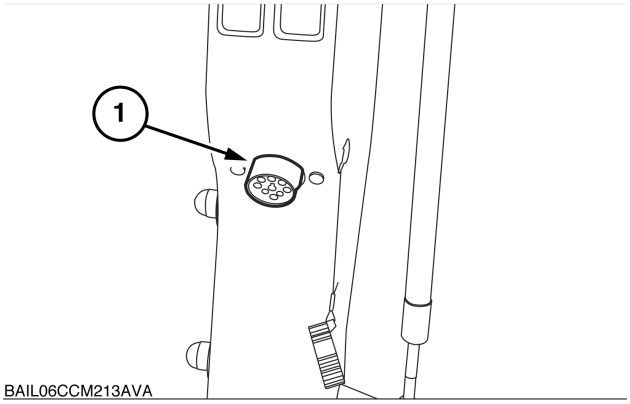
REAR PTO Hydraulic - Calibrate

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

NOTE: *This calibration is required, when the memory of the main control units (RD /RG module) has been cleared with a H8 procedure, the solenoid valve of the PTO clutch (C041) has been replaced or the PTO clutch has been refurbished.*

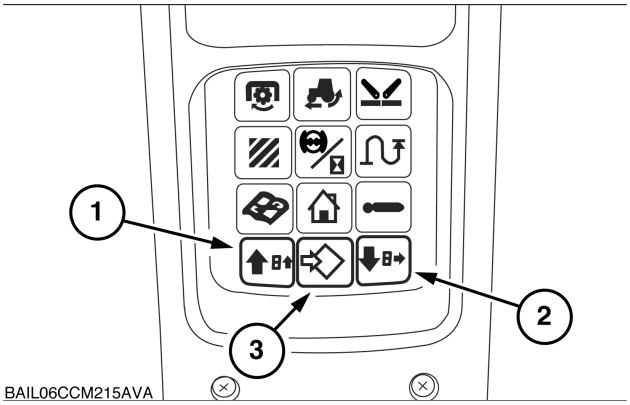
NOTE: *If new module is installed or after H8 has been carried out, the controller will default to PTO fender switches enabled. If the vehicle is not fitted with fender switches, change the option to 'NO' (fender switches disabled) in the H3 menu.*

1. Connect the diagnostics plug **380000843** to the diagnostics socket **(1)**.
   Unhitch all mounted implements from the rear PTO and ensure that the tractor is stationary and the parking brake is applied.

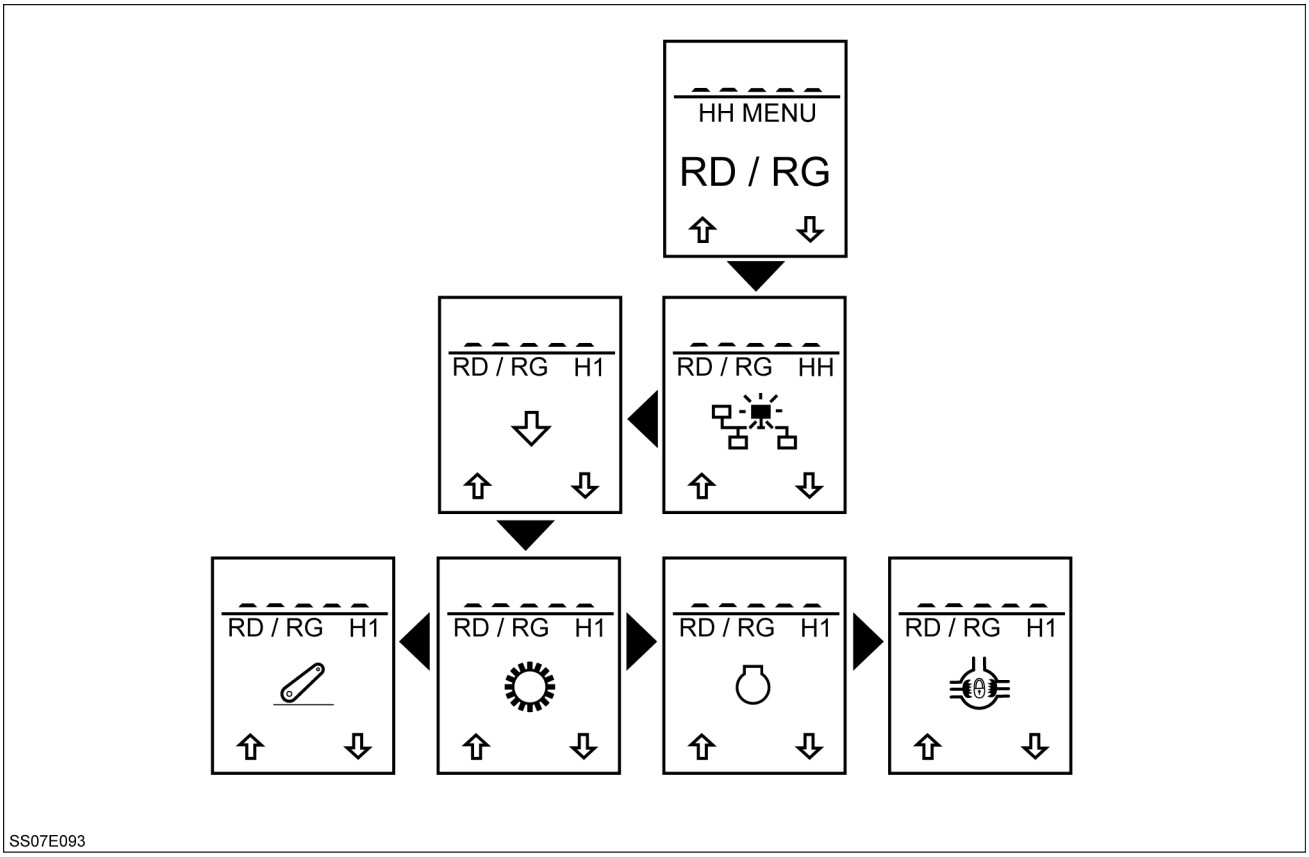


BAIL06CCM213AVA 1

2. Use the "Up" **(1)**button, "Down" **(2)** button and the "Menu" button **(3)** on the ICU2 instrument cluster to scroll through the HH menu until the option H1 and the engine symbol appear on the RC/RG control unit. "CAL" is displayed in the upper section of the display.

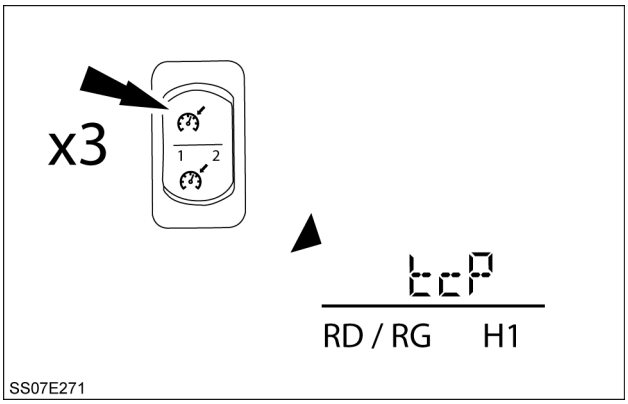


BAIL06CCM215AVA 2



SS07E093 3

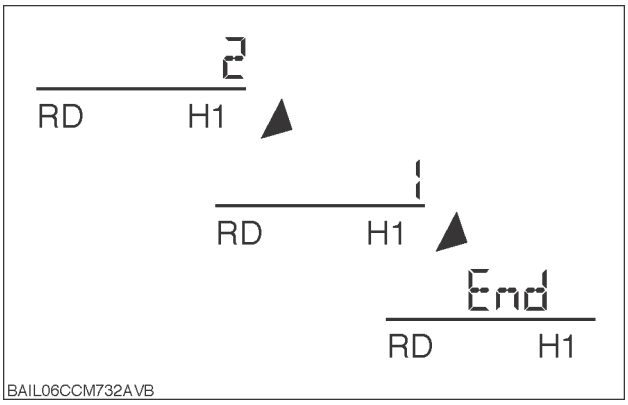
3. Press the constant speed switch 3 times within **4 seconds**.
   On the upper section of the display "TCP" appears.
   The engine speed is automatically set to **1200 RPM**.



SS07E271 4

4. After one second the upper section of the display displays a "2" and then a "1", as the PTO torque is calibrated.
   "END" is displayed at the end of the procedure.
   Switch the starter switch to OFF to store the calibration values.

***NOTE:** If a fault occurs during calibration, a U code is displayed and the process must be repeated. See the list of the U codes in **Control module - Fault code index (A.50.A)**.*



BAIL06CCM732AVB 5

REAR PTO Hydraulic - Remove

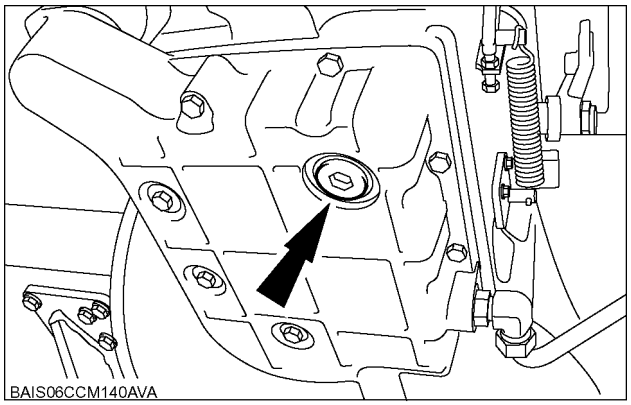
Prior operation:
Refer to **Battery - Disconnect (A.30.A)**

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

B026

1. Remove the PTO and hydraulic clutch as follows:
2. Unscrew plug and drain oil from transmission and rear axle housings. Collect oil in a suitable container.



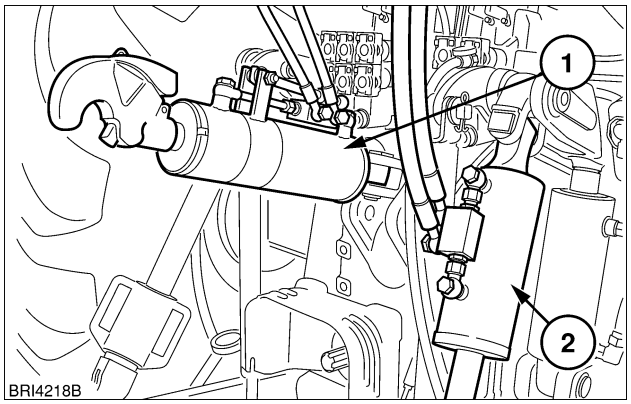
BAIS06CCM140AVA 1

3. Remove top link **(1)**, PTO guard, and parts of drawbar or hitch as required. (Refer to **Top link - Remove (H.10.C)**

⚠ WARNING ⚠

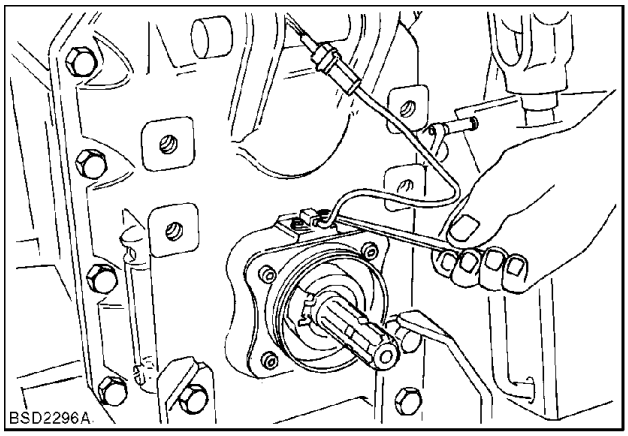
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



BAIL07CCM298ASA 2

4. Disconnect speed sensor. Remove the sensor for safe keeping during PTO removal.



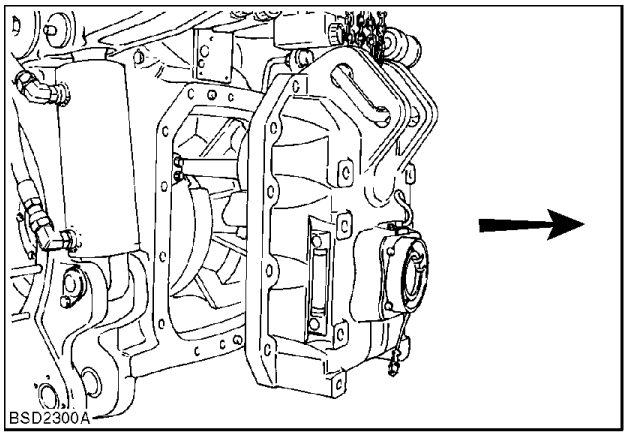
BSD2296A_159 3

5. Loosen the PTO assembly retaining bolts and using a suitable hoist and hook detach the PTO assembly **(1)** from the rear axle housing.

⚠ WARNING ⚠

The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



BSD2300A 4

Next operation:
REAR PTO Hydraulic - Overhaul (C.40.C)

REAR PTO Hydraulic - Install

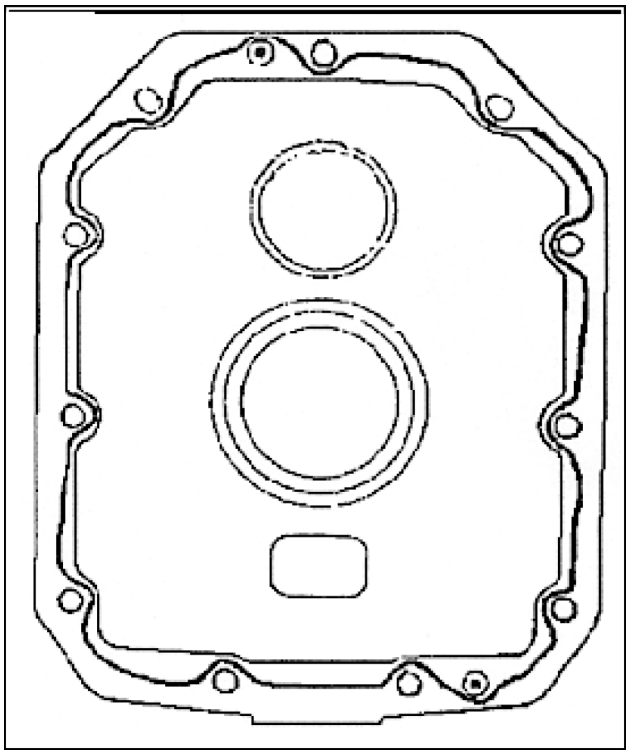
1. Reinstall the PTO case to the rear axle housing taking the following into consideration:
   Before reinstalling the PTO case, thoroughly clean and degrease mating surfaces and apply a bead of liquid gasket of approximately. **2 mm** of diameter following pattern shown in figure **1**.

   Pattern for application of liquid gasket between the PTO case and rear axle housing.

⚠ WARNING ⚠

Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

B020



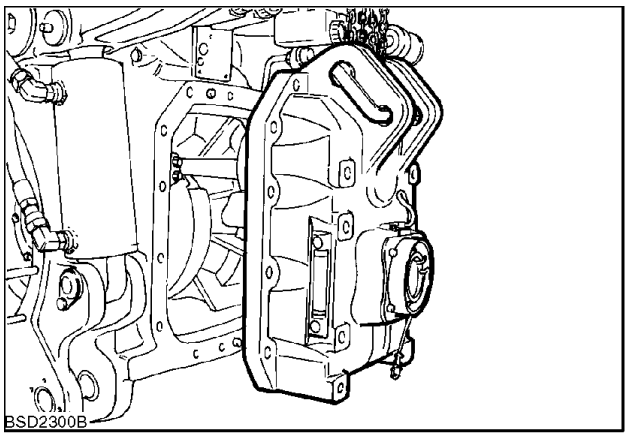
BAIL07CCM292AMA 1

2. Using a suitable hoist locate the PTO assembly in position on the rear axle housing . Tighten bolts to the required torque.

⚠ WARNING ⚠

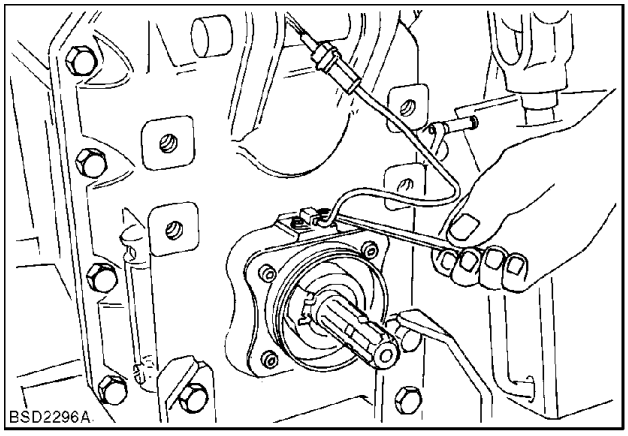
Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012



BSD2300B 2

3. Reconnect the speed sensor.



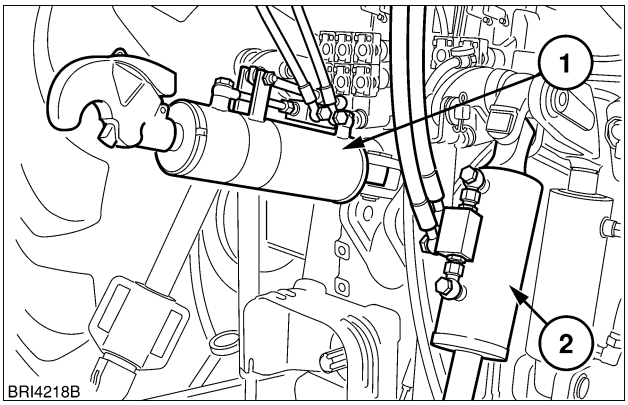
BSD2296A_159 3

4. Install top link , PTO guard and drawbar or hitch as required.

⚠ WARNING ⚠

The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



BAIL07CCM298ASA 4

ATTENTION: *Remember to refill tractor with the correct specification hydraulic fluid*

REAR PTO Hydraulic - Calibrate Electronically Shiftable P.T.O.

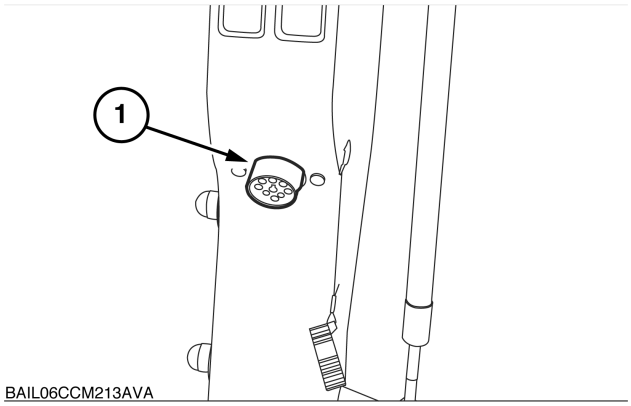
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

NOTE: *The travel position sensor for the Electronically shiftable PTO needs to be calibrated.*

IMPORTANT: *Before commencing the calibration procedure make sure no implements are connected to the rear PTO. During calibration the PTO will be operated.*

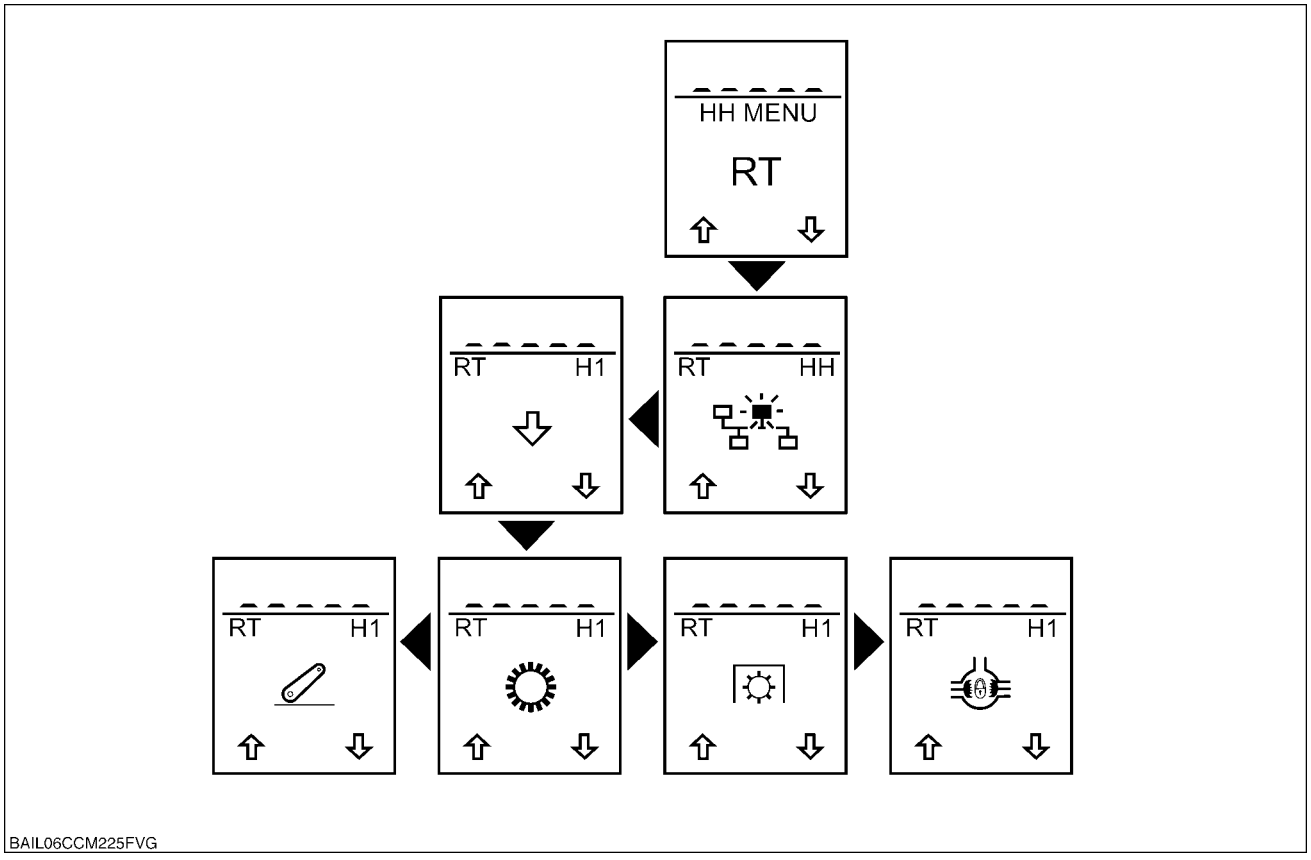
NOTE: *This procedure is only available if the 'Electronic Shiftable PTO' option has been enabled in the H3 menu mode.*

1. Park the vehicle on a flat surface, make sure that the tractor is stationary and the parking brake is applied.
2. Make sure the PTO speed select switch is turned fully clockwise.
3. Connect the diagnostics plug **380000843** to the diagnostics socket **(1)**.



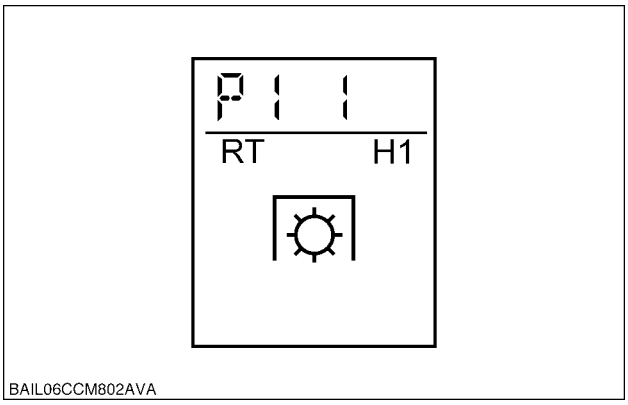
BAIL06CCM213AVA 1

4. Start the tractor and navigate to the RT module, H1 menu and select PTO.



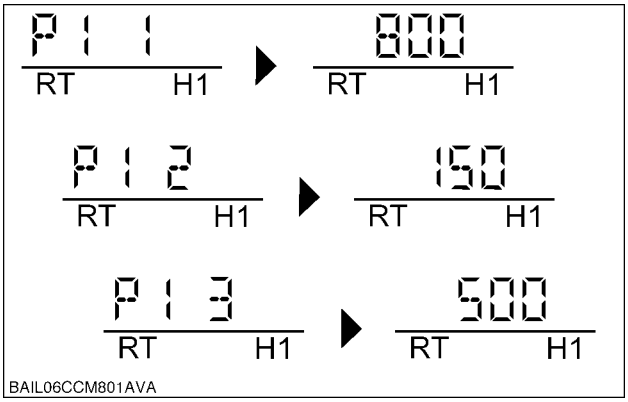
BAIL06CCM225FVG 2

5. The display will show ’P11’ to indicate that the calibration procedure has started. This indicates that part 1.x of the calibration is in progress.



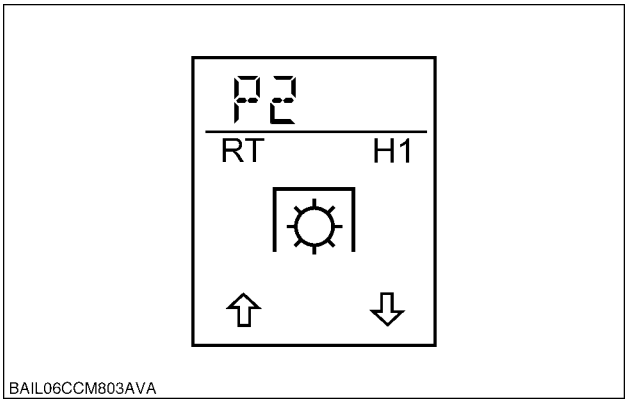
BAIL09CCM802AVA 3

6. The procedure will automatically run through the following items:-
P1.1 - calibrates the fully extended position of the mechanism. After the fully extended calibration is complete the display will show the calibration value (700-900) for approximately 2 seconds.
P1.2 - calibrates the fully retracted position of the mechanism. After the fully retracted calibration is complete the display will show the calibration value (100-300) for approximately 2 seconds.
P1.3 - calibrates the neutral position of the mechanism. After the neutral position calibration is completed the display will show the calibration value (450-600) for approximately 2 seconds.



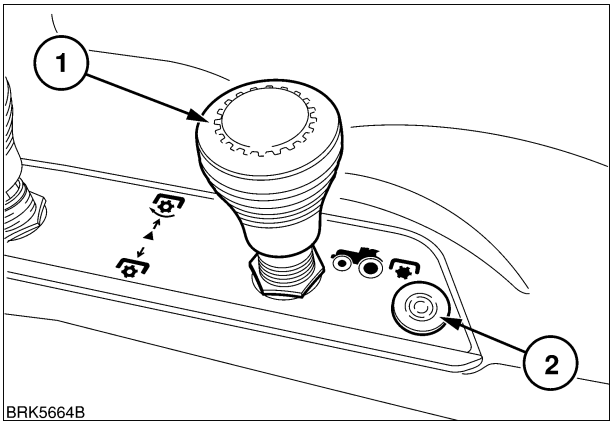
BAIL09CCM801AVA 4

7. After the ’P1.x’ calibrations are complete the display will then show ’P2’.
The engine speed will automatically be set to **1200 RPM**.
Part 2 of the calibrations will then proceed to determine the optional PTO speed value, ie, 540, 540E, 1000E.



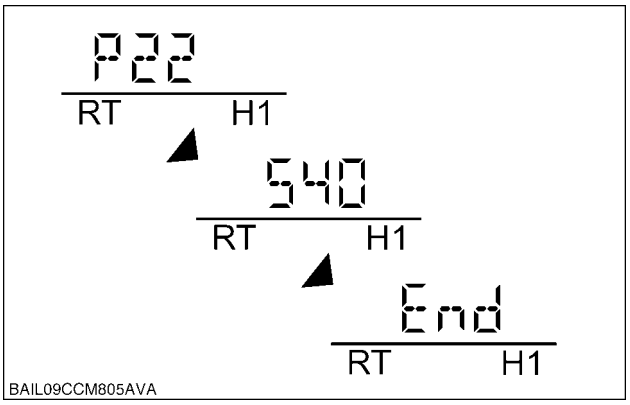
BAIL09CCM803AVA 5

8. Start the PTO using the cab switch **(1)**.



BRK5664B 6

9. ’P22’ is displayed after the speed is selected and the PTO is started while the PTO ratio is checked. After the ratio has been calculated the optional speed value is displayed for 5 seconds followed by ’End’. The PTO will be stopped automatically. Calibration is now complete.



BAIL09CCM805AVA 7

10. Turn the keystart to the ’off’ position to store the calibration values.

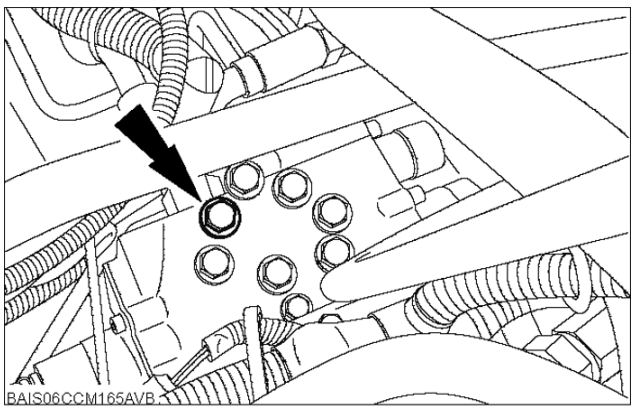
NOTE: *If an error occurs during calibration a "U" code will be displayed and the procedure will need to be repeated. Refer to the "U" code listing in* ***Control module - Fault code index (A.50.A)****.*

PTO clutch - Pressure test

IMPORTANT: *Before performing any pressure or flow testing operate the tractor until the oil in the rear axle is at normal operating temperature.* ***65 °C*** *(* ***145 °F****).*

1. The lubrication oil to the PTO clutch can be tested at the low pressure manifold through the test port. Remove the test port plug and install adaptor, 380000493 and quick release fitting 380000492.

NOTE: *On tractors with cab suspension the panhard rod may obstruct the installation of the pressure test equipment in the PTO lubrication test port. The use of additional adapter 380000572 may be required.*



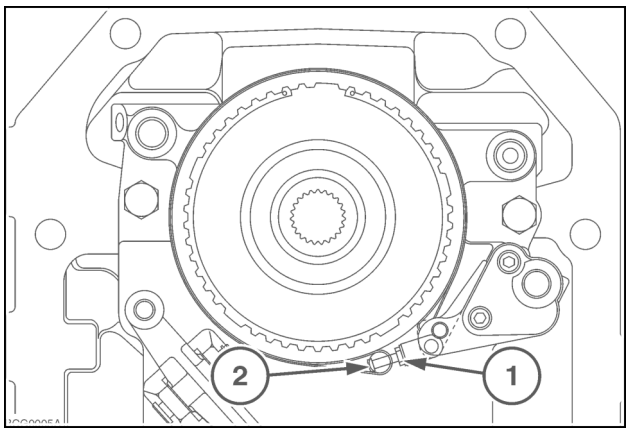
BAIS06CCM165AVB 1

2. Attach a **27 bar** (**300 lbf.in2**) gauge, **380001145**, using quick release coupler **380000543** and hose **380000545** .
   Start and run the engine at **1500 rev/min**. Operate the PTO and observe the gauge, the pressure may fluctuate slightly but should remain between **1 - 2 bar** (**15 - 30 lbf.in2**) with the PTO ON and approximately **2 bar** (**30 lbf.in2**) with the PTO OFF.

PTO brake - Adjust

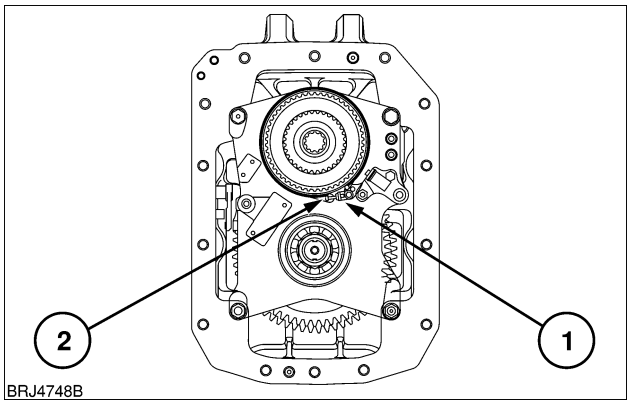
PTO Brake Band Adjustment

1. Loosen locknut **(1)**. Torque screw **(2)** to **3 Nm** (**2.21 lbft**), in order to close brake band.
2. Loosen screw **(2)** and check brake band alignment. Adjust if required.
3. Torque screw **(2)** to **1.1 Nm** (**0.81 lbft**)
4. Loosen screw **(2)** by two turns and tighten locknut **(1)** .
5. Check brake band alignment and repeat procedure if required.



BCG0005A 1

6. See Figure **2** for North American version.



BAIL07CCM307ASA 2

REAR PTO Hydraulic - Troubleshooting

NOTE: *The table below details some possible mechanical/hydraulic faults. The controller will also generate error codes related to the PTO system. The error codes are prefixed with the number (5) and displayed on the instrument cluster. (Refer to* ***Control module - Fault code index (A.50.A)***

Problem	Possible Cause	Correction
The PTO does not operate	Low transmission oil level.	Reset correct level.
	Blocked oil filter.	Replace filter. - Refer to **Filter - Replace (A.10.A)**
	Faulty hydraulic pump.	Repair or replace pump. - Refer to **Hydraulic pump Variable displacement pump - Overhaul (A.10.A)**
	Faulty PTO engagement switch	Replace switch.
	Lack of power supply to the solenoid valve: detached or damaged connectors, faulty remote switch.	Reset electrical connections and replace faulty parts.
	PTO control solenoid valve stuck open.	Repair or replace solenoid valve.
	Oil leakage through the seals with consequent pressure drop: manifold or control plunger seals	Replace damaged seals.
The PTO remains engaged.	Faulty PTO engagement switch.	Replace switch.
	Lack of power supply to the solenoid valve: detached or damaged connectors or faulty remote switch.	Reset electrical connections and replace faulty parts.
	PTO control valve stuck open	Repair or replace solenoid valve.
The PTO control clutch drags.	Faulty brake engagement switch	Replace switch.
	Lack of power supply to the solenoid valve: detached or damaged connectors or faulty remote switch.	Reset electrical connections and replace faulty parts.
	Brake control valve stuck closed.	Repair or replace solenoid valve..
	Worn PTO brake	Replace brake.(Refer to **REAR PTO Hydraulic - Overhaul (C.40.C)**

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PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

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POWER TRAIN - C

FRONT PTO Hydraulic - 42.C

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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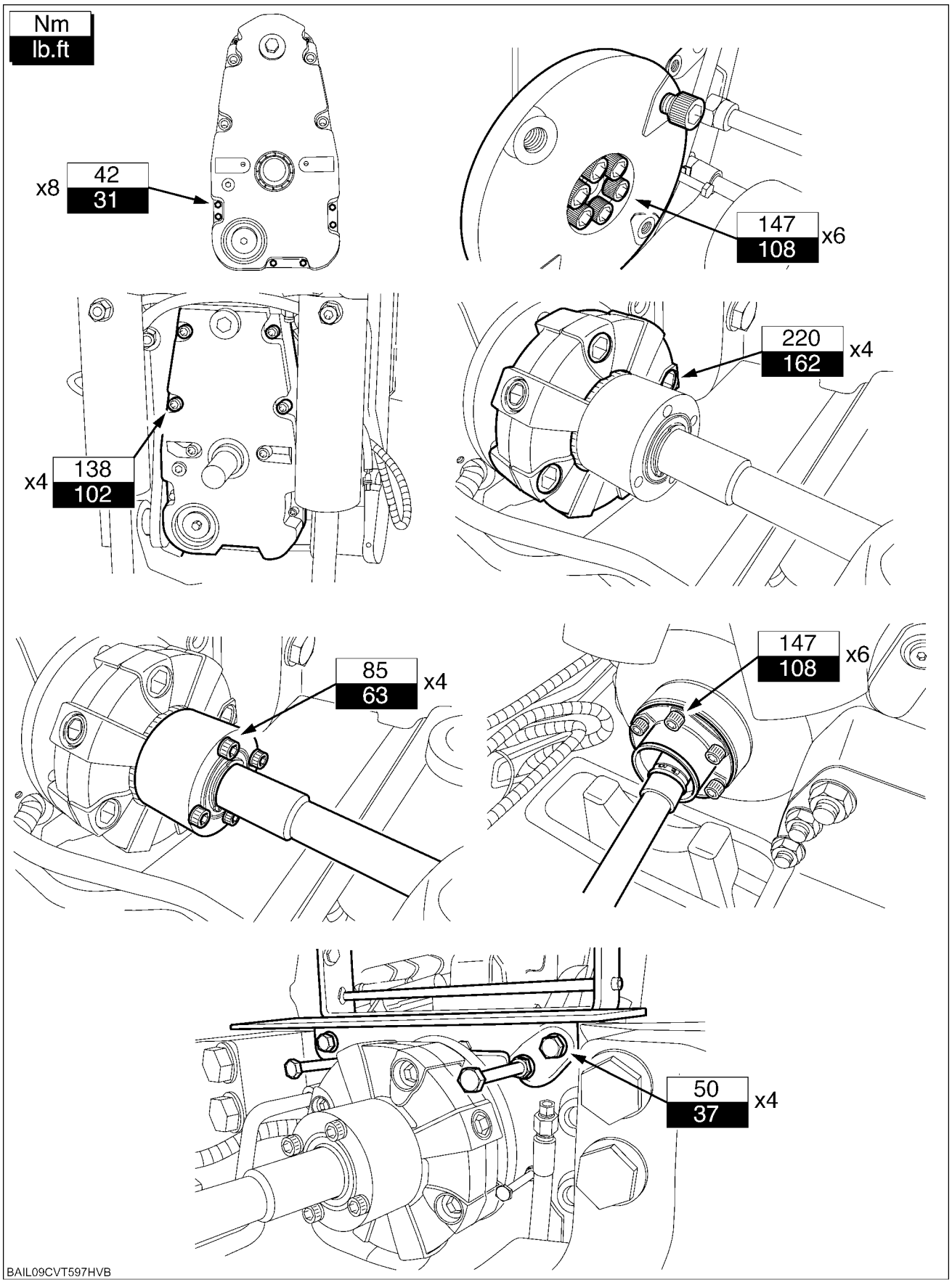
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FRONT PTO Hydraulic - General specification

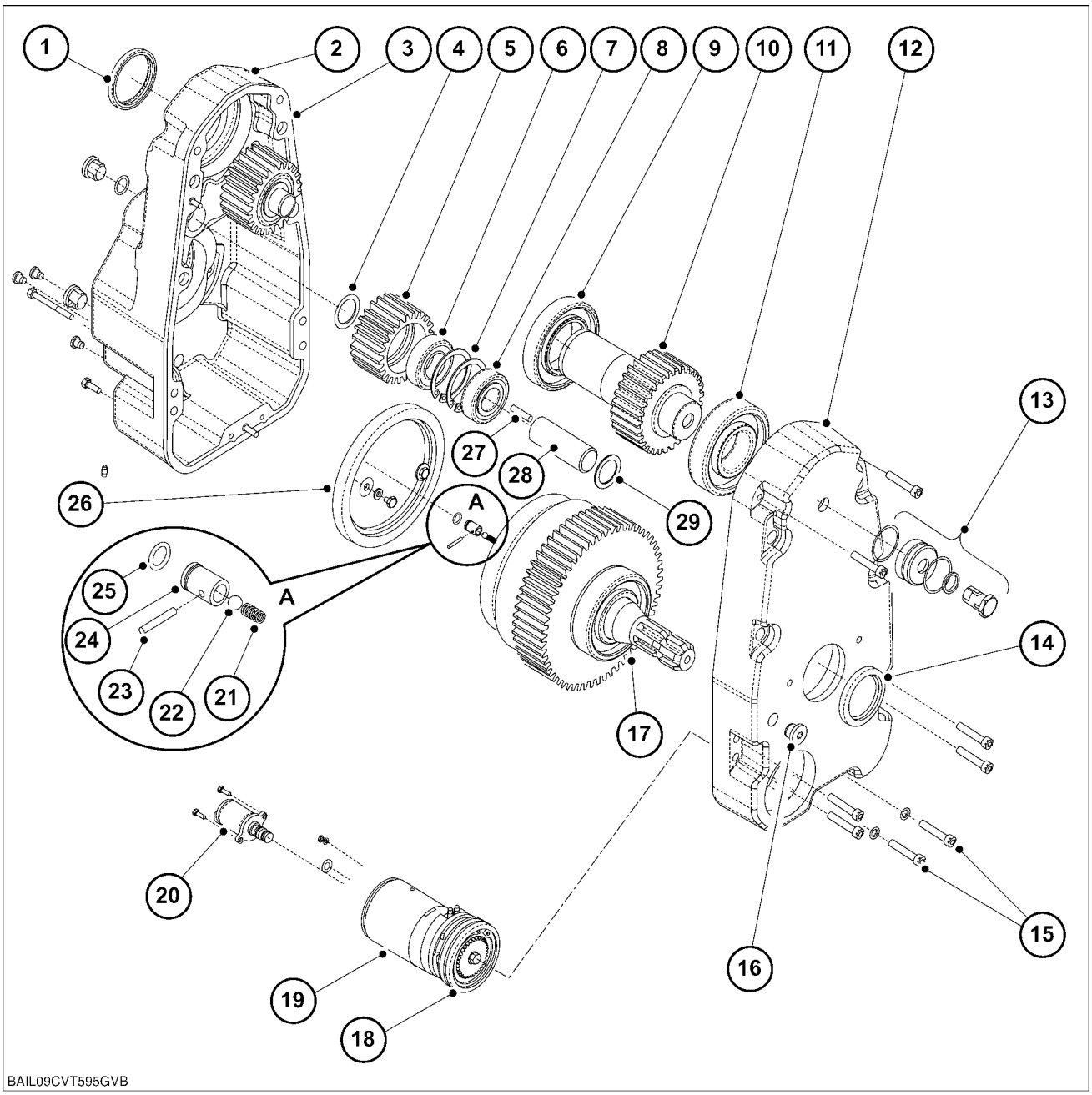
Front PTO		
Type Zuidberg		Fully independent **1000 rev/min**. Electro-hydraulic engagement. Spring disengagement
Clutch type		Multi wet-plate
Drive		From the engine front crankshaft pulley
Multi wet-plate clutch discs Friction discs Steel discs		 9 8
Engine speed when the PTO speed is **1000 rev/min**.		**2036 rev/min**
Maximum PTO capacity when the PTO speed is **1000 rev/min**	Hp	200
Reduction gearbox oil specification		BP: Autran DX 111 Fluid 9 Shell: Donax TX Esso: ATF E 25131 Castrol: Transmax S ELF: Elfmatic G2 Syn Elfmatic G3 FINA: Finamatic HP Finamatic S6726 Mobil: Mobil ATF Texaco: Texamatic 7045 Valvoline: ATF Dextron 11-E Beverol: Dextron 11-E (Fina)matic HP JD: Hygard JDMJ 20C Total: Fluide AT42 Fluidematic Syn Or oil with a similar specification

FRONT PTO Hydraulic - Torque



BAIL09CVT597HVB 1

FRONT PTO Hydraulic - Exploded view



BAIL09CVT595GVB 1

1. Input shaft oil seal
2. Rear housing
3. Gasket
4. Shim
5. Idler gear
6. Bearing
7. Circlip
8. Bearing
9. Bearing
10. Drive gear
11. Bearing
12. Front housing
13. Housing breather
14. Output shaft oil seal
15. Drain plugs
16. Filler plug
17. Clutch assembly
18. Oil filter
19. Oil pump
20. Front PTO engagement solenoid
21. Spring
22. Ball
23. Pin
24. One-way valve
25. Seal
26. Clearance ring
27. Pin
28. Idler gear shaft

29. Shim

FRONT PTO Hydraulic - Disassemble

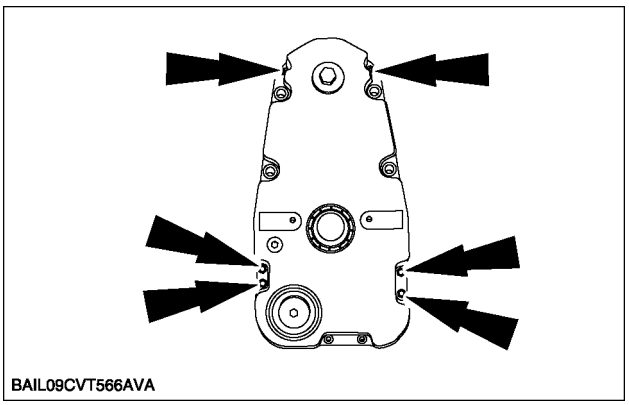
Prior operation:
Remove the front PTO housing, for further information refer to **FRONT PTO Hydraulic - Remove (C.42.C)**.

⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

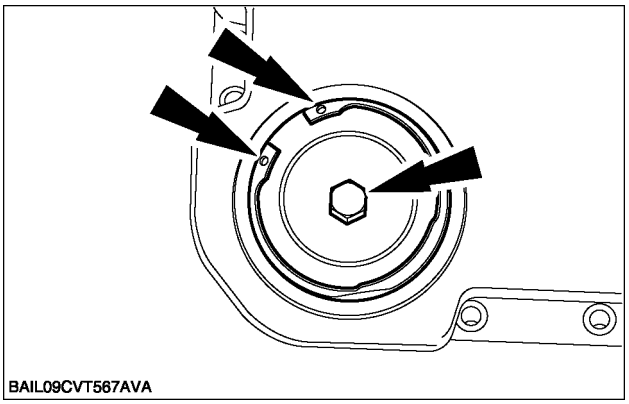
B026

1. Remove the front PTO housing bolts.



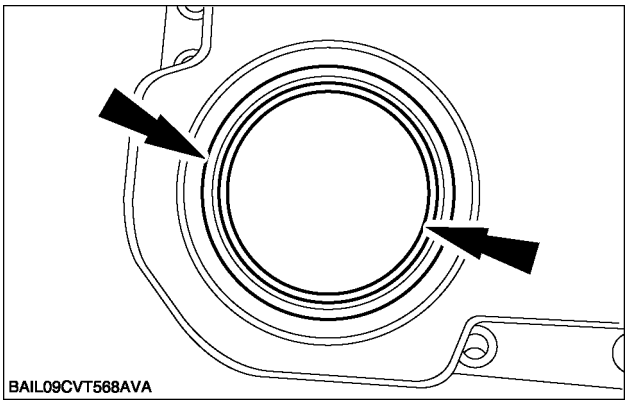
BAIL09CVT566AVA 1

2. Remove the circlip and the oil pump cover.



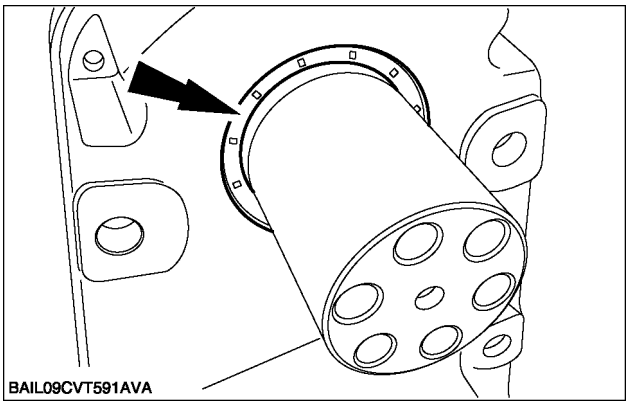
BAIL09CVT567AVA 2

3. Remove the oil filter and the O-ring seal.



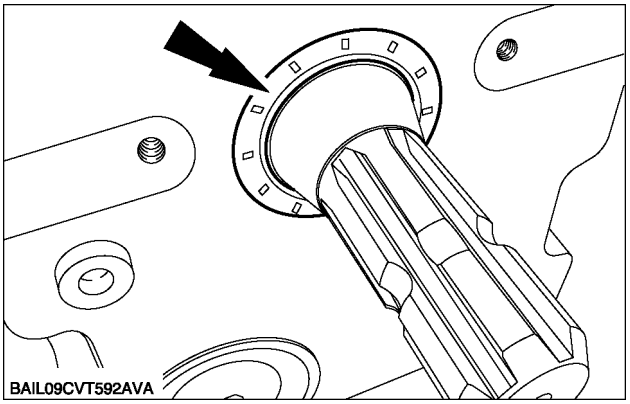
BAIL09CVT568AVA 3

4. Remove and discard the input shaft oil seal.



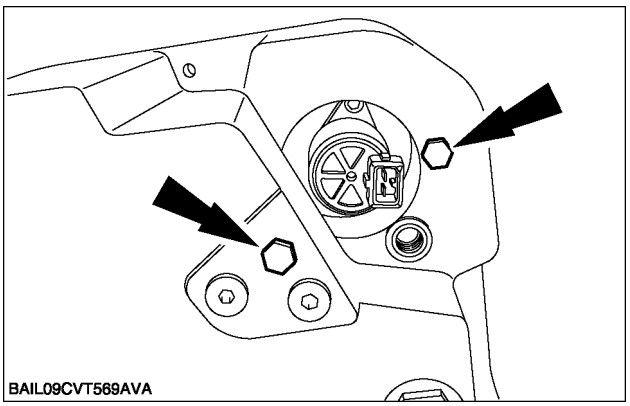
BAIL09CVT591AVA 4

5. Remove and discard the output shaft oil seal.



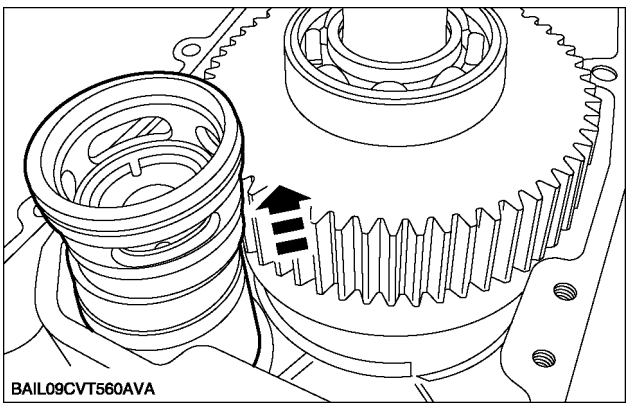
BAIL09CVT592AVA 5

6. Separate the two halves of the front PTO housing and discard the gasket.
7. Remove the oil pump assembly retaining bolts.



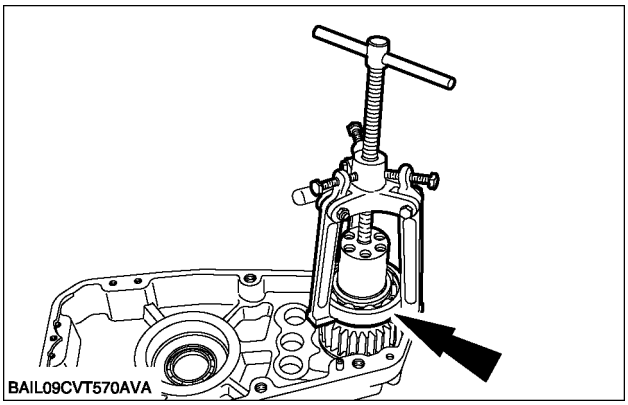
BAIL09CVT569AVA 6

8. Remove the oil pump assembly.



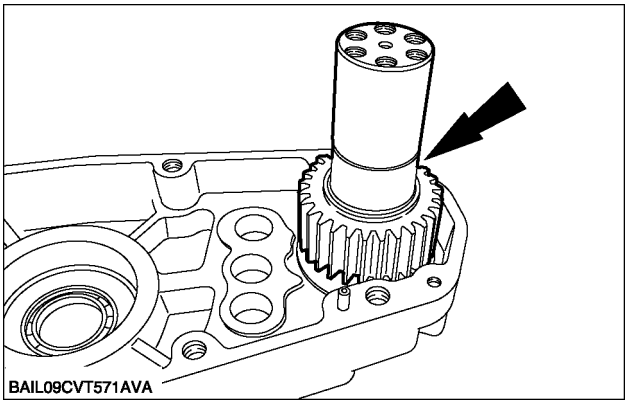
BAIL09CVT560AVA 7

9. Using a suitable puller, remove the input shaft bearing.



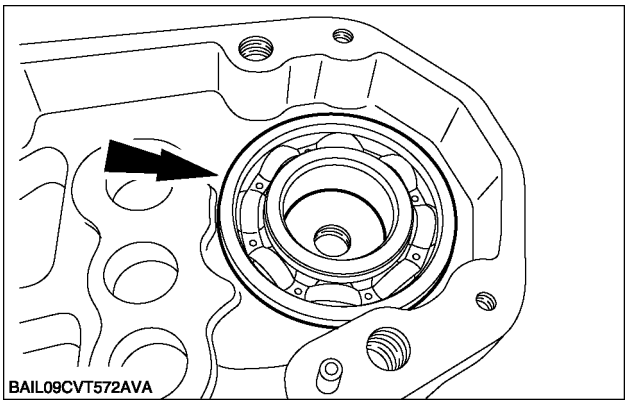
BAIL09CVT570AVA 8

10. Using a suitable lever, remove the gear and input shaft.



BAIL09CVT571AVA 9

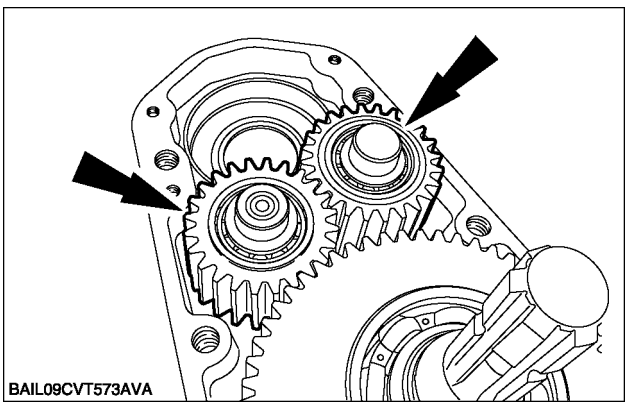
11. Using a suitable levers, remove the bearing.



BAIL09CVT572AVA 10

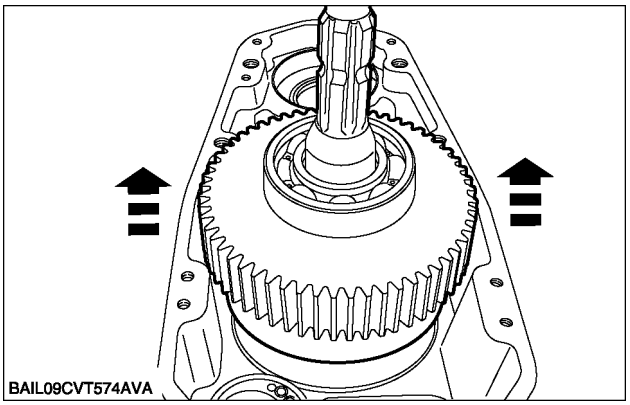
12. Remove the idler gears and shims.

NOTE: *Shims are installed above and below the gears.*



BAIL09CVT573AVA 11

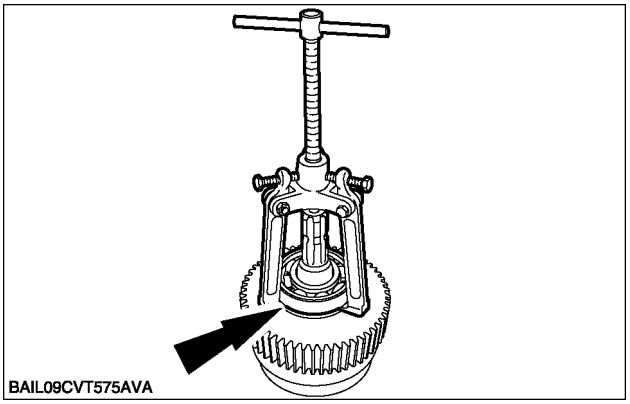
13. Remove the clutch housing assembly.



BAIL09CVT574AVA 12

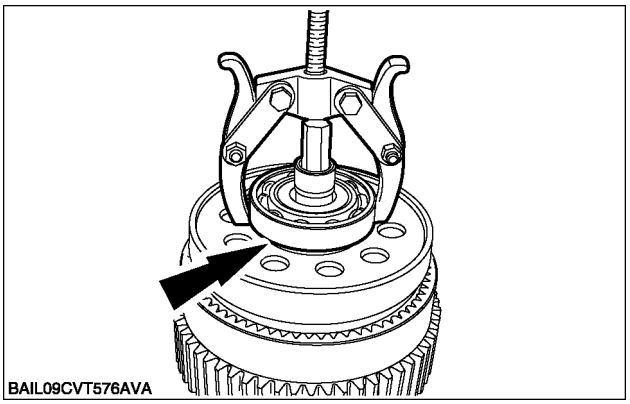
14. Using a suitable puller, remove the bearing and shim.

NOTE: *There is a shim installed below the bearing.*



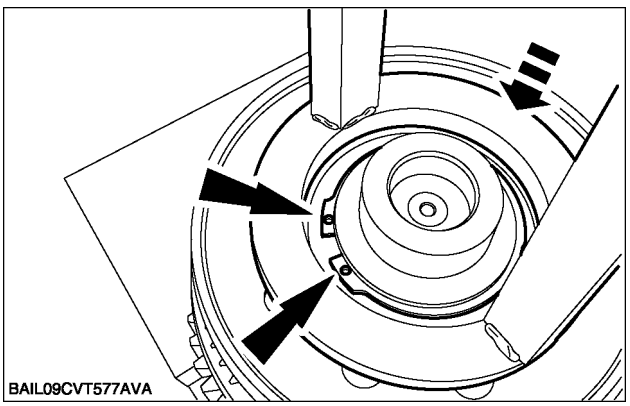
BAIL09CVT575AVA 13

15. Using a suitable puller, remove the bearing.



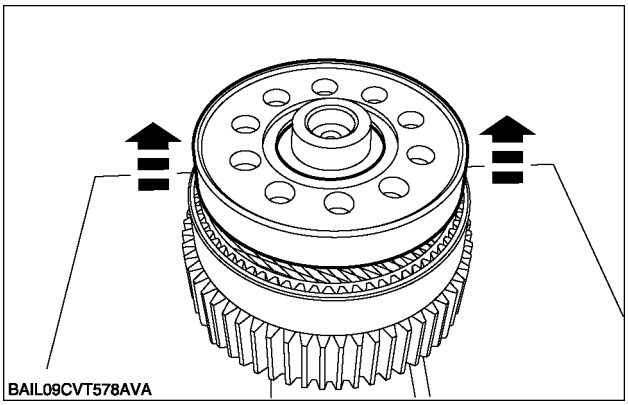
BAIL09CVT576AVA 14

16. Using a hydraulic press and suitable tool, compress the clutch and remove the circlip.



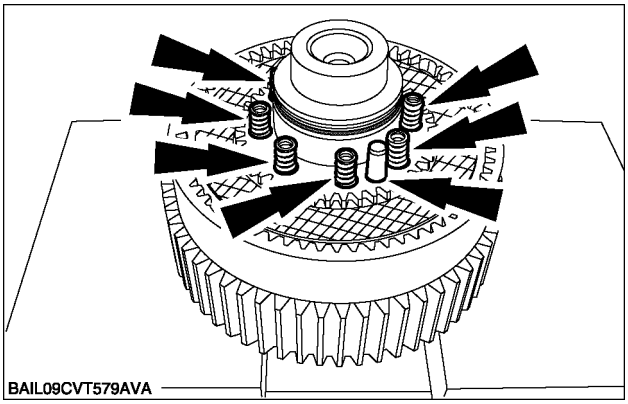
BAIL09CVT577AVA 15

17. Release the pressure in the hydraulic press.
18. Remove the end plate.



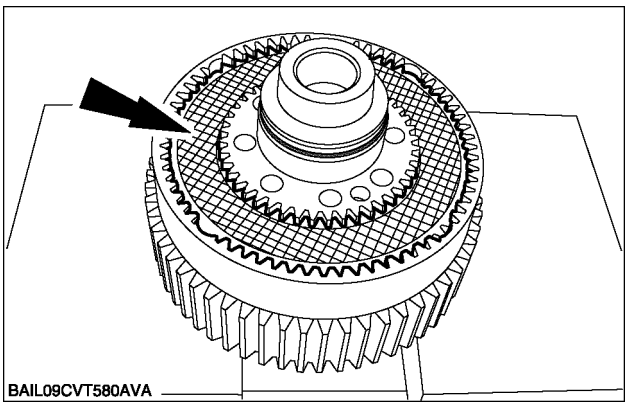
BAIL09CVT578AVA 16

19. Remove the springs and dowels.



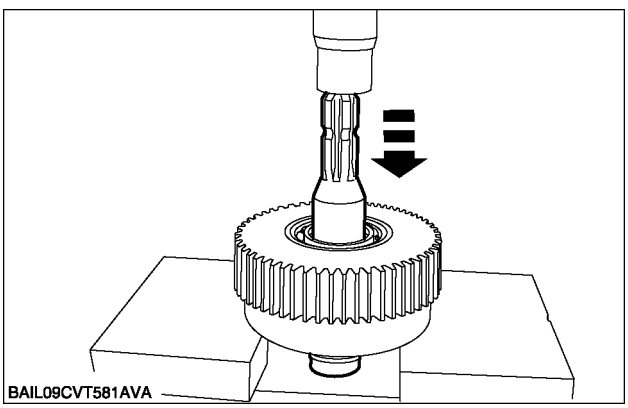
BAIL09CVT579AVA 17

20. Remove the clutch friction and steel plates.



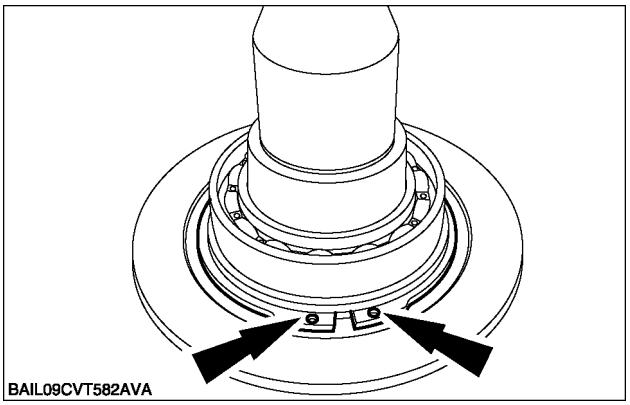
BAIL09CVT580AVA 18

21. Using a hydraulic press, remove the output shaft from the clutch housing.



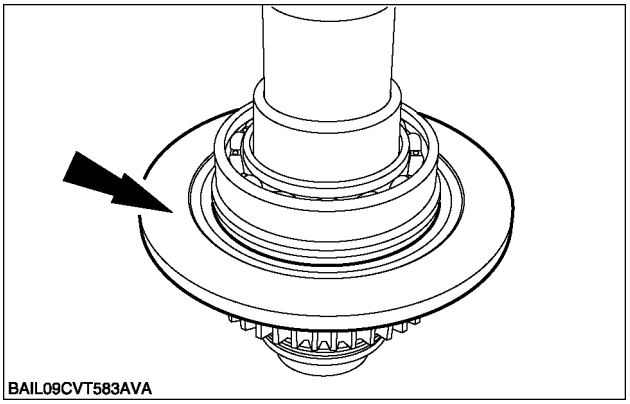
BAIL09CVT581AVA 19

22. Remove the circlip.



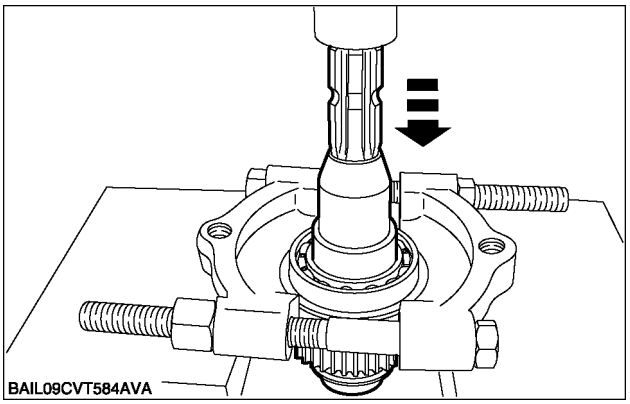
BAIL09CVT582AVA 20

23. Remove the ring.



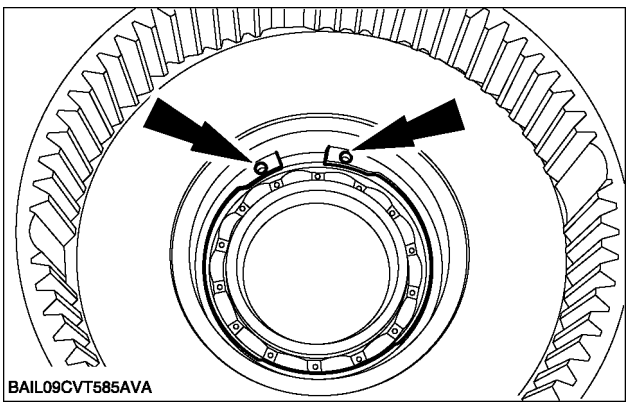
BAIL09CVT583AVA 21

24. Using a hydraulic press and suitable tool, remove the bearing from the output shaft.



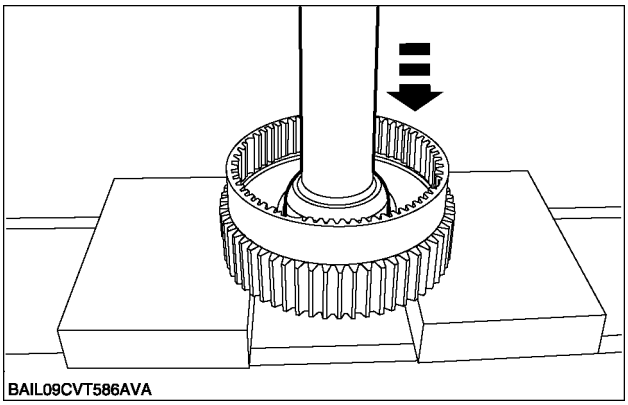
BAIL09CVT584AVA 22

25. Remove the circlip from the clutch housing.



BAIL09CVT585AVA 23

26. Using a hydraulic press, remove the bearing from the clutch housing.



BAIL09CVT586AVA 24

Next operation:
Assemble the front PTO housing, for further information refer to **FRONT PTO Hydraulic - Assemble (C.42.C)**

FRONT PTO Hydraulic - Assemble

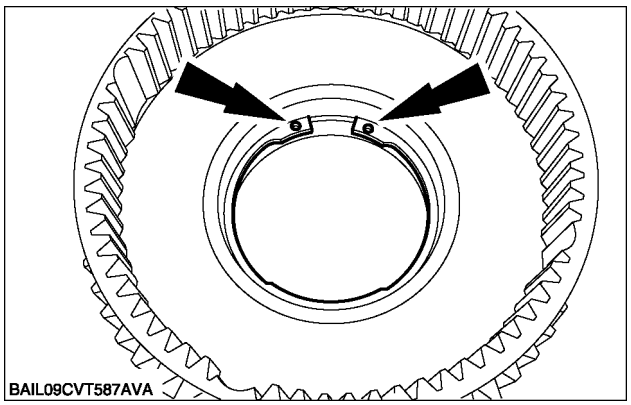
Prior operation:
Disassemble the front PTO housing, for further information refer to **FRONT PTO Hydraulic - Disassemble (C.42.C)**

⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

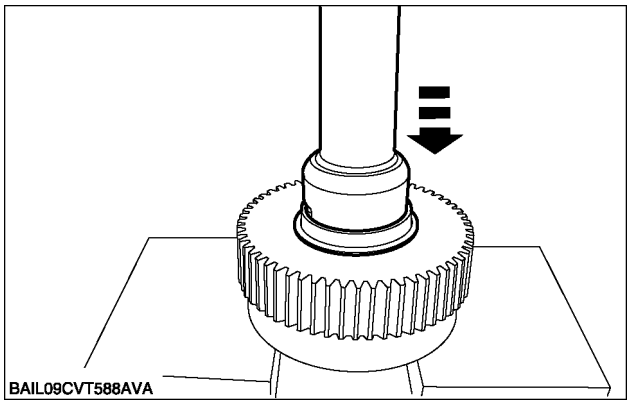
B026

1. Install the circlip into the clutch housing.



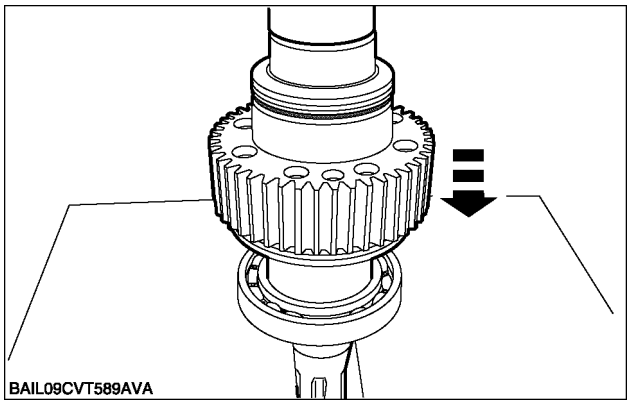
BAIL09CVT587AVA 1

2. Using a hydraulic press, install the bearing into the clutch housing.



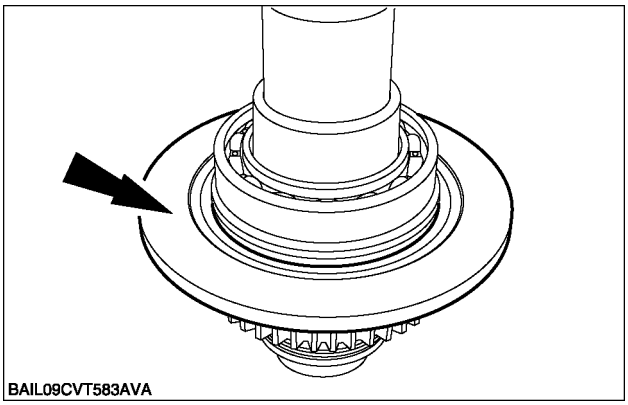
BAIL09CVT588AVA 2

3. Using a hydraulic press, install the bearing onto the output shaft.



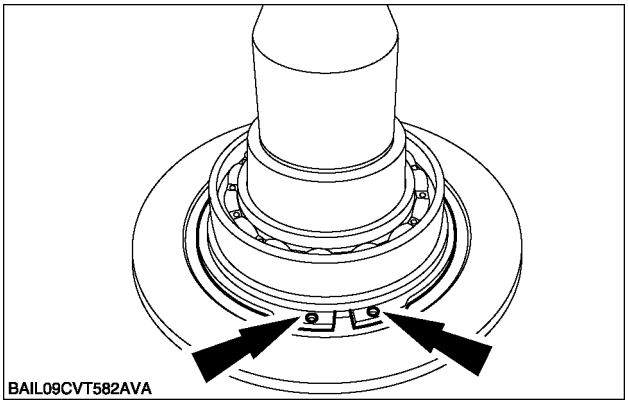
BAIL09CVT589AVA 3

4. Install the ring.



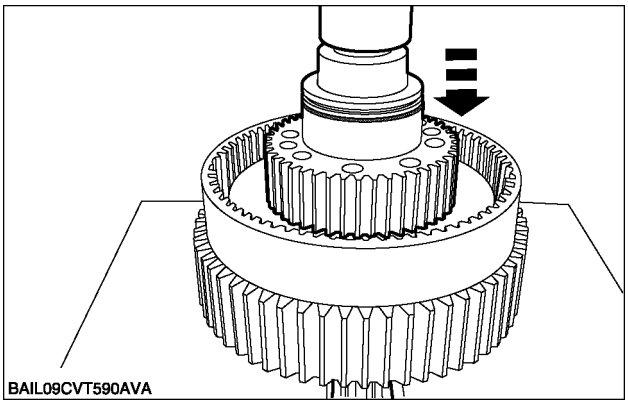
BAIL09CVT583AVA 4

5. Install the circlip.



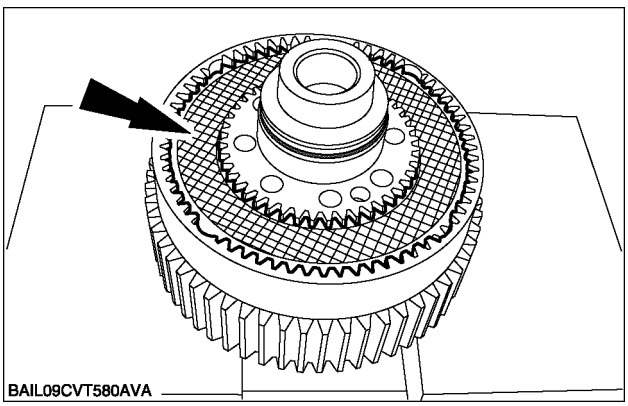
BAIL09CVT582AVA 5

6. Using a hydraulic press, install the output shaft into the clutch housing.



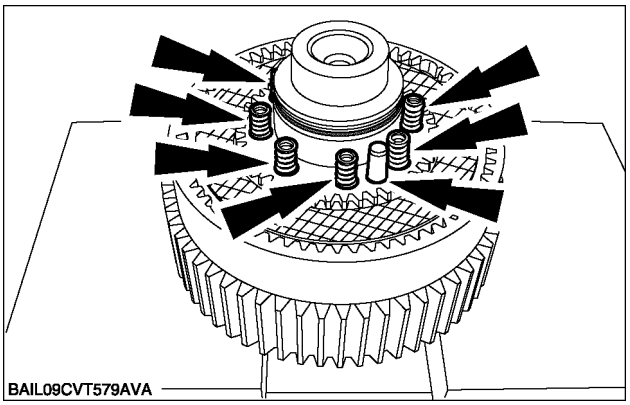
BAIL09CVT590AVA 6

7. Install the clutch friction and steel plates.



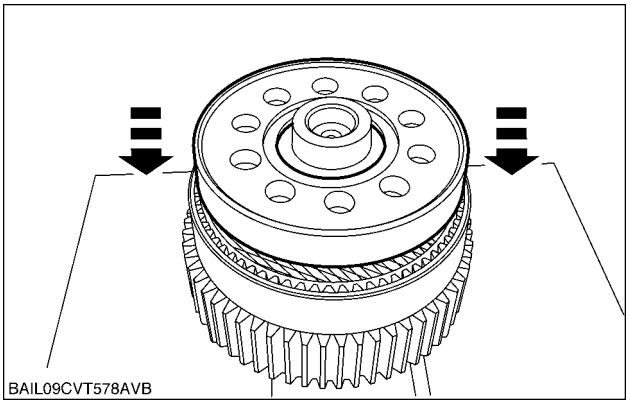
BAIL09CVT580AVA 7

8. Install the springs and dowels.



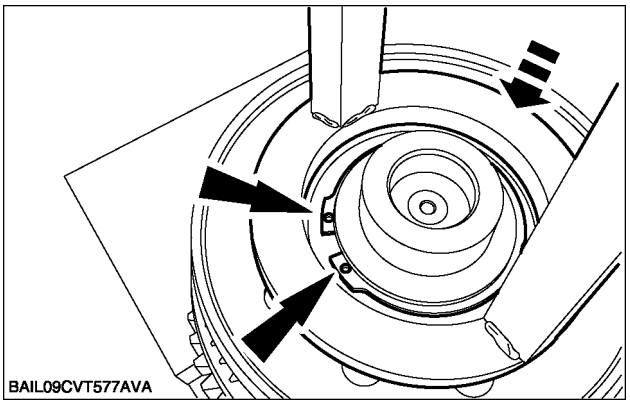
BAIL09CVT579AVA 8

9. Install the end plate.



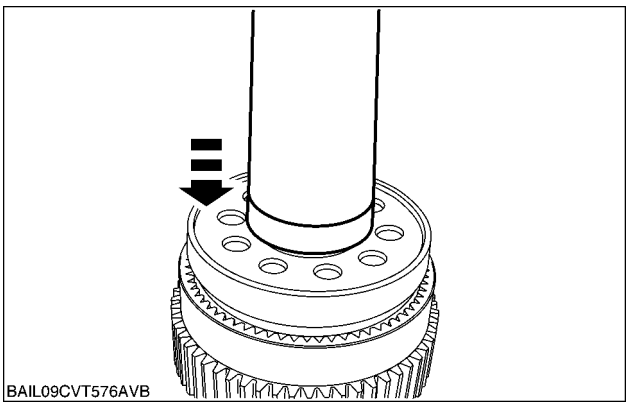
BAIL09CVT578AVB 9

10. Using a hydraulic press and suitable tool, compress the clutch and install the circlip.



BAIL09CVT577AVA 10

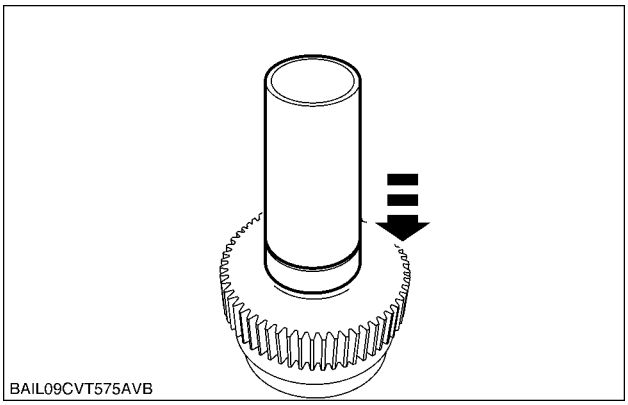
11. Release the pressure in the hydraulic press.
12. Using a suitable tool, install the bearing.



BAIL09CVT576AVB 11

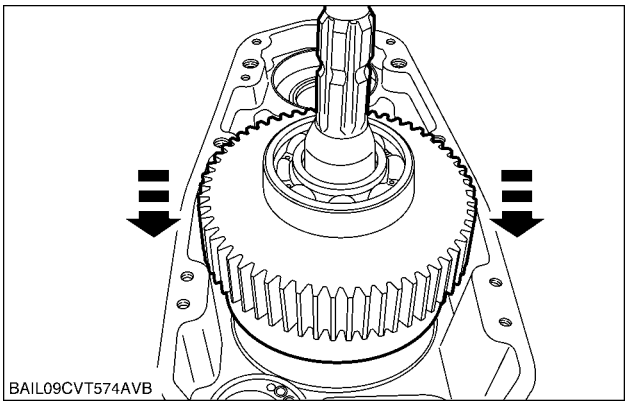
13. Using a suitable tool, install the shim and bearing.

NOTE: *Install the shim below the bearing.*



BAIL09CVT575AVB 12

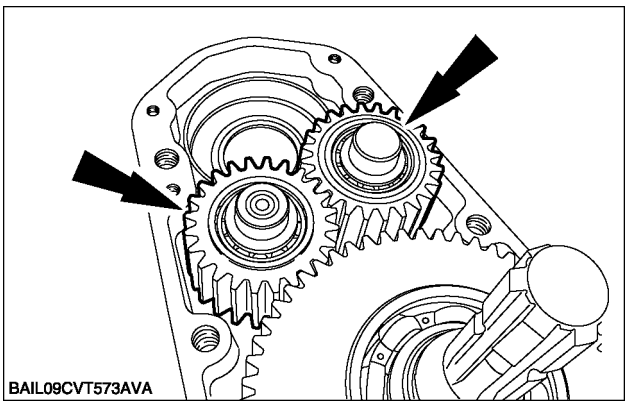
14. Install the clutch housing assembly.



BAIL09CVT574AVB 13

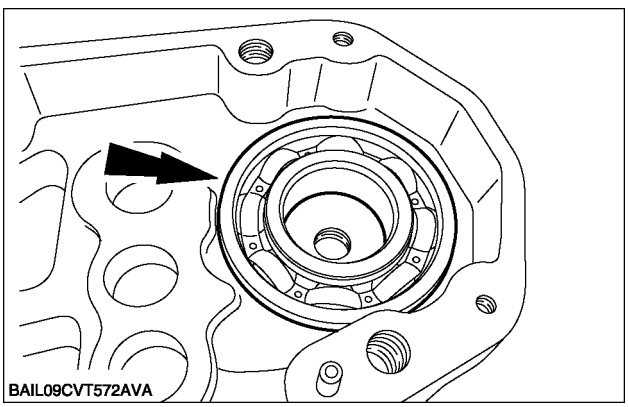
15. Install the idler gears and shims.

NOTE: *Shims are installed above and below the gears.*



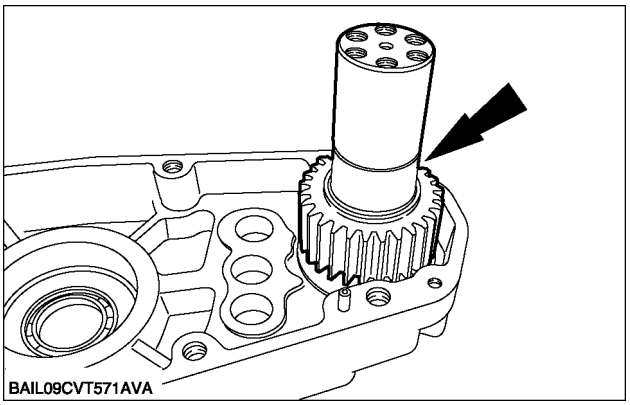
BAIL09CVT573AVA 14

16. Using a suitable tool, install the bearing.



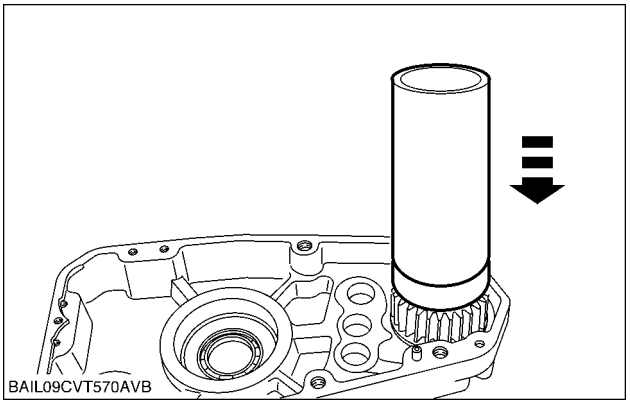
BAIL09CVT572AVA 15

17. Install the gear and input shaft.



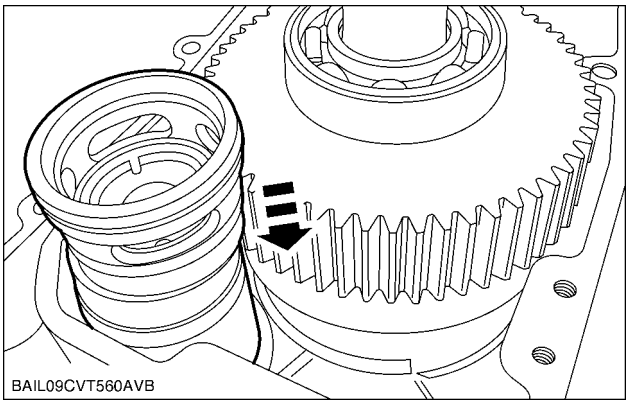
BAIL09CVT571AVA 16

18. Using a suitable tool, install the bearing.



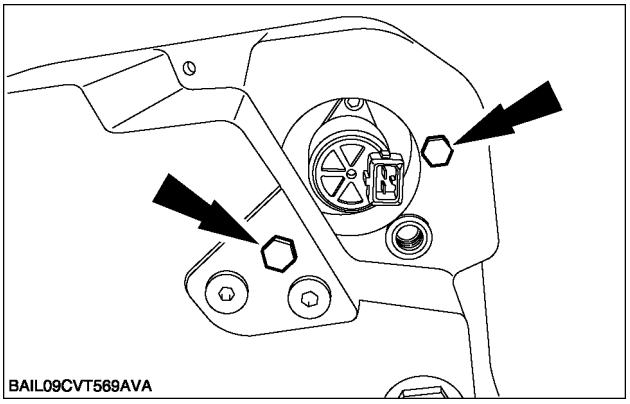
BAIL09CVT570AVB 17

19. Install the oil pump assembly.



BAIL09CVT560AVB 18

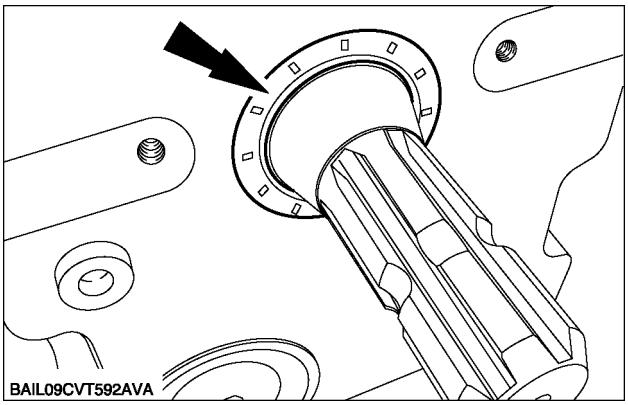
20. Install the oil pump assembly retaining bolts.



BAIL09CVT569AVA 19

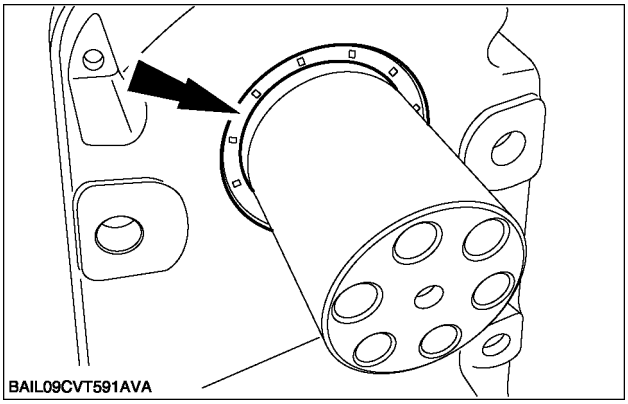
21. Install a new gasket and assemble the two halves of the front PTO housing together.

22. Install a new output shaft oil seal.



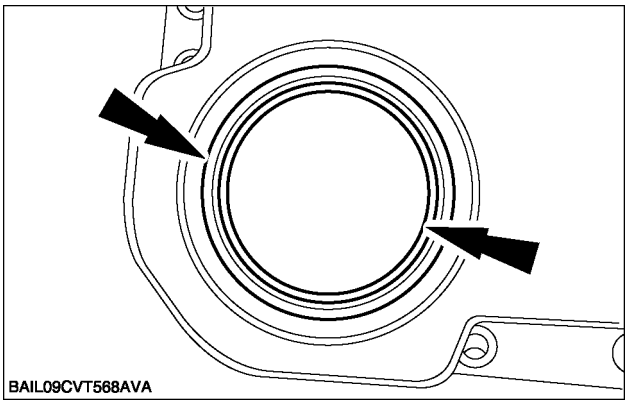
BAIL09CVT592AVA 20

23. Install a new input shaft oil seal.



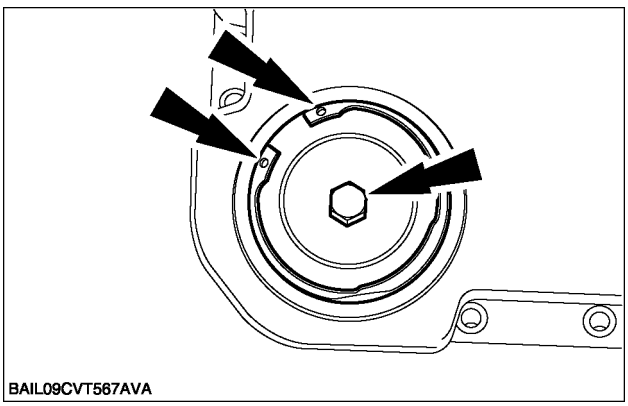
BAIL09CVT591AVA 21

24. Install the oil filter and the O-ring seal.



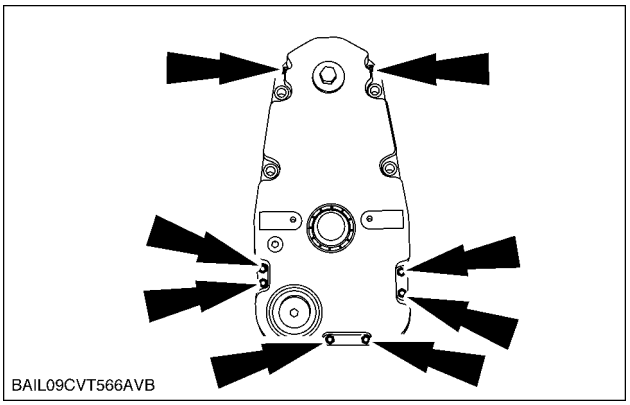
BAIL09CVT568AVA 22

25. Install the oil pump cover and circlip.



BAIL09CVT567AVA 23

26. Install the front PTO housing bolts.
Tighten to **42 N·m** (**31 lb ft**).



BAIL09CVT566AVB 24

Next operation:
Install the front PTO housing, for further information refer to **FRONT PTO Hydraulic - Install (C.42.C)**

FRONT PTO Hydraulic - Remove

⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

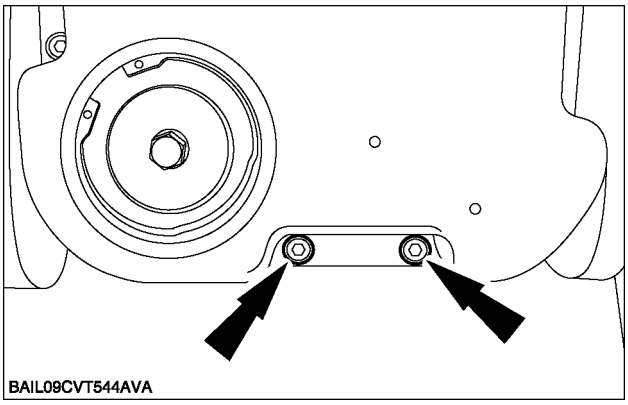
B012

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

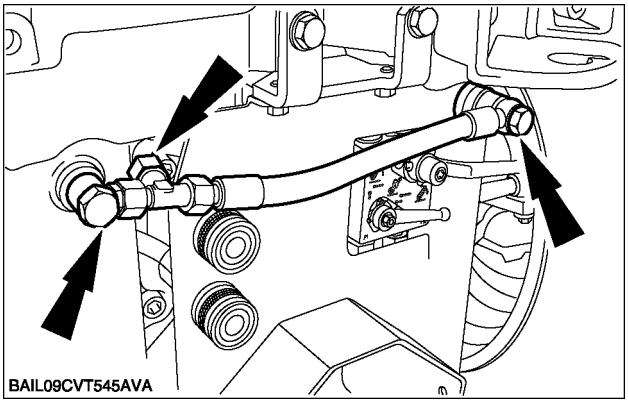
B026

1. Fully lower the front hitch.
2. Disconnect the battery, for further information refer to **Battery - Disconnect (A.30.A)**.
3. Remove the front PTO housing lower bolts and drain the oil into a suitable container.



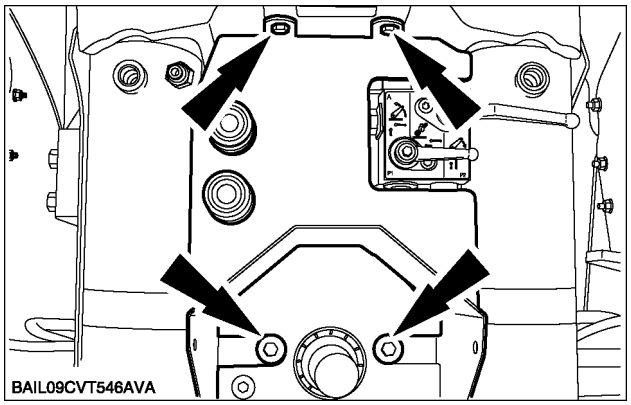
BAIL09CVT544AVA 1

4. Remove the hydraulic transfer pipe.



BAIL09CVT545AVA 2

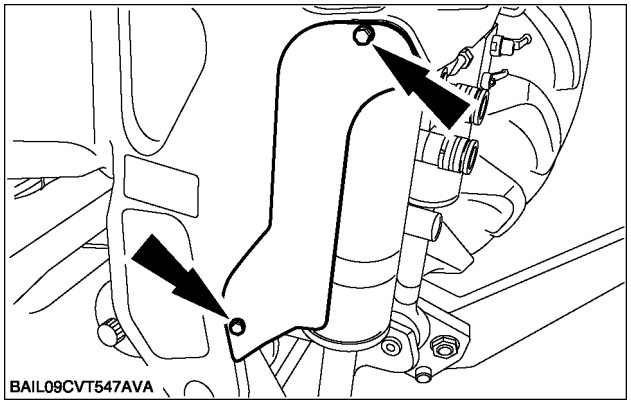
5. Remove the front PTO guard.



BAIL09CVT546AVA 3

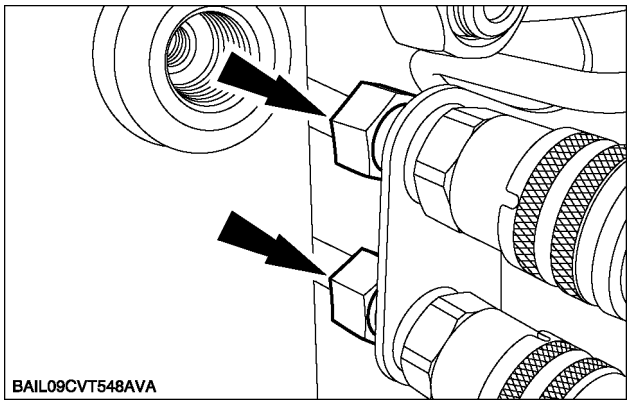
6. Remove the right-hand side shield.

NOTE: *Repeat this step for the left-hand side.*



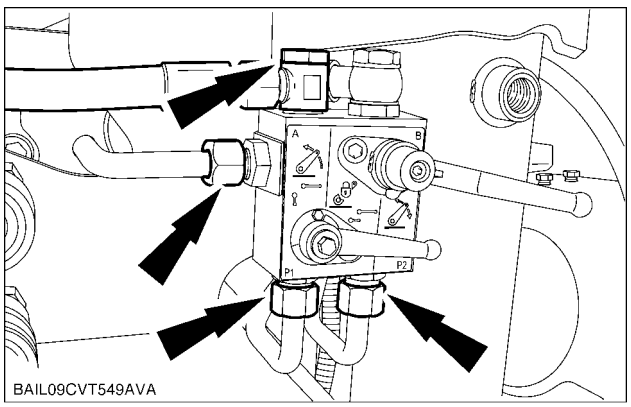
BAIL09CVT547AVA 4

7. Disconnect the auxiliary hydraulic line unions (if fitted).



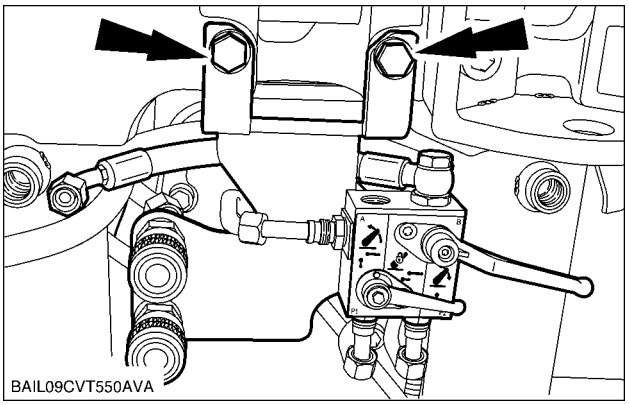
BAIL09CVT548AVA 5

8. Disconnect the four hydraulic valve block unions.



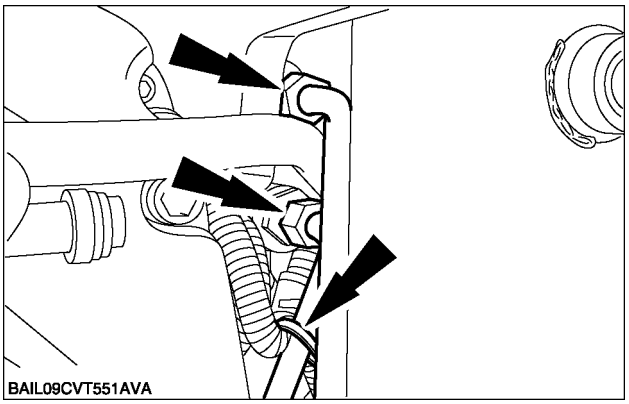
BAIL09CVT549AVA 6

9. Remove the valve block and mounting bracket.



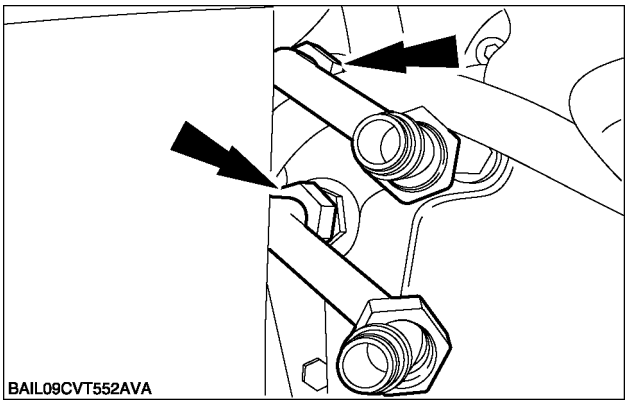
BAIL09CVT550AVA 7

10. Remove the two hydraulic lines. Cut the cable tie as necessary.



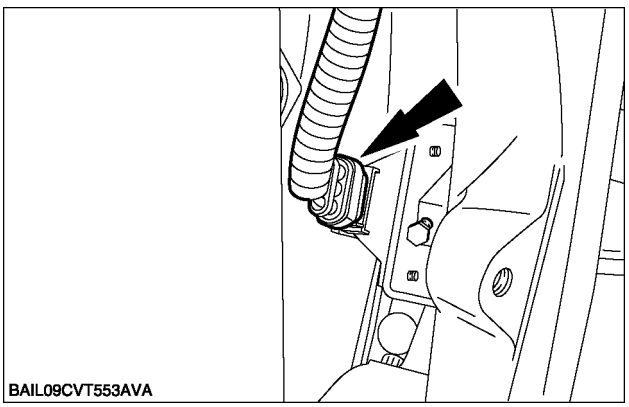
BAIL09CVT551AVA 8

11. Remove the two hydraulic lines.



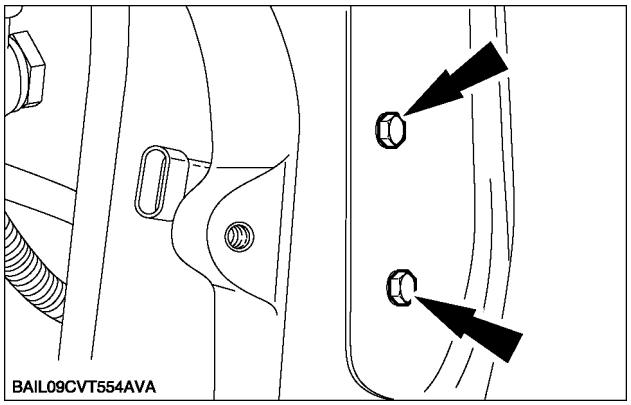
BAIL09CVT552AVA 9

12. Disconnect the lift position potentiometer electrical connector.



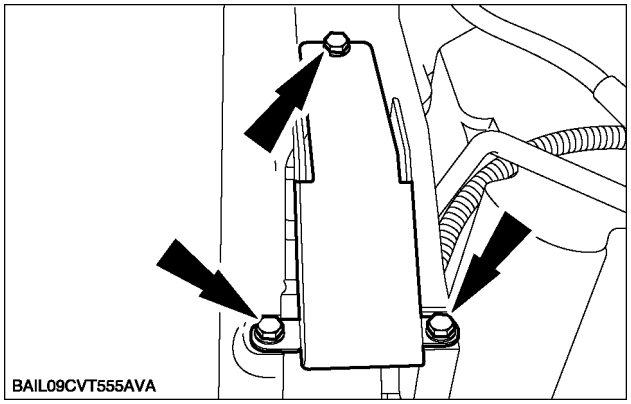
BAIL09CVT553AVA 10

13. Detach the lift position potentiometer.



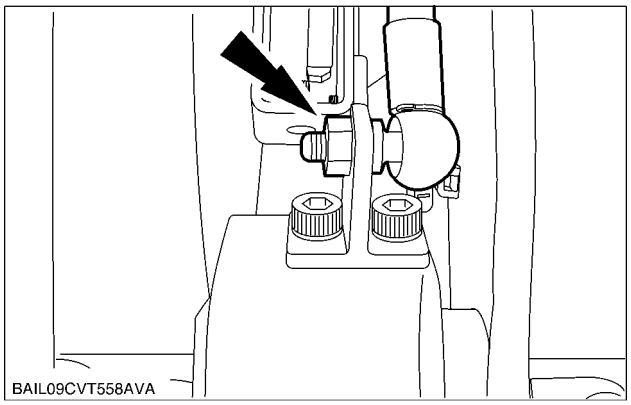
BAIL09CVT554AVA 11

14. Remove the lift position potentiometer cover.



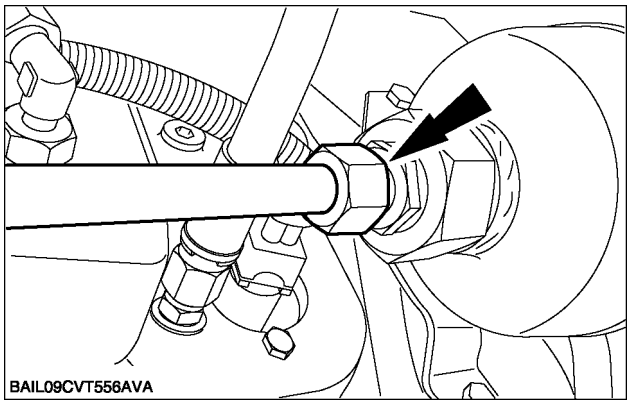
BAIL09CVT555AVA 12

15. Remove the lift position potentiometer.



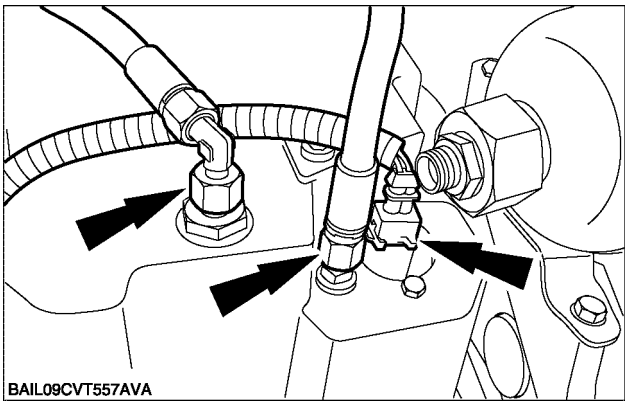
BAIL09CVT558AVA 13

16. Remove the accumulator pipe .



BAIL09CVT556AVA 14

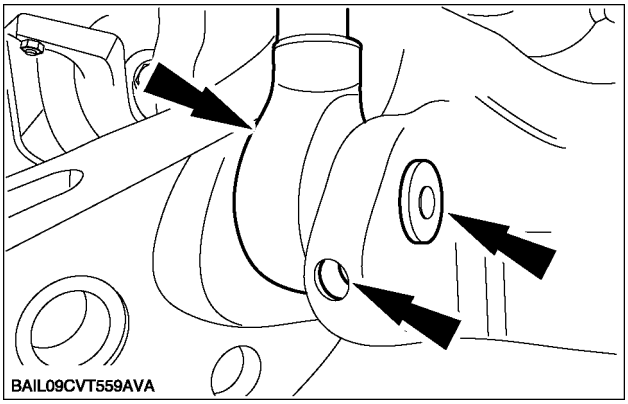
17. Disconnect the front PTO oil cooler supply and return lines and the front PTO engagement solenoid electrical connector.



BAIL09CVT557AVA 15

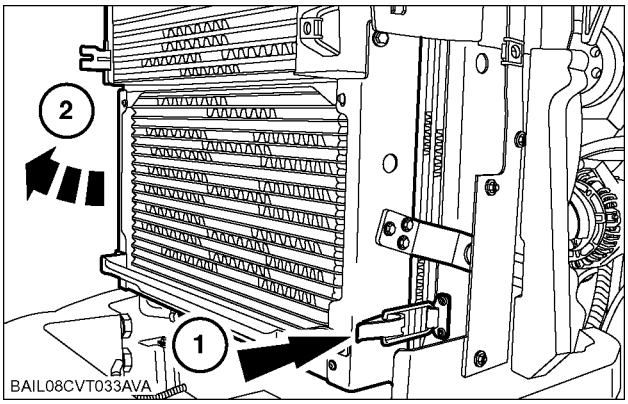
18. Loosen the Allen bolt, remove the pin and disconnect the right-hand hydraulic ram.

NOTE: *Repeat this step for the left-hand side.*



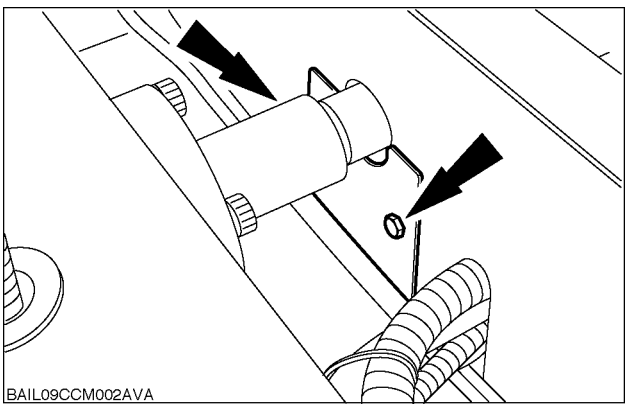
BAIL09CVT559AVA 16

19. Release the charge air cooler/oil cooler assembly **(1)** and pull forward **(2)**.



BAIL08CVT033AVA 17

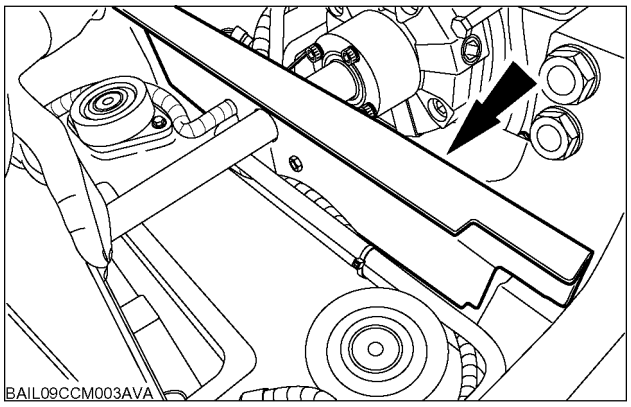
20. Remove the baffle plate insert beneath the front PTO drive shaft.



BAIL09CCM002AVA 18

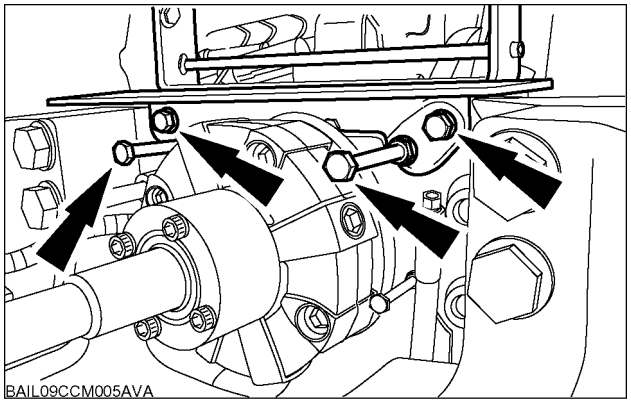
21. Remove the radiator baffle plate.

NOTE: *Radiator shown removed for clarity.*



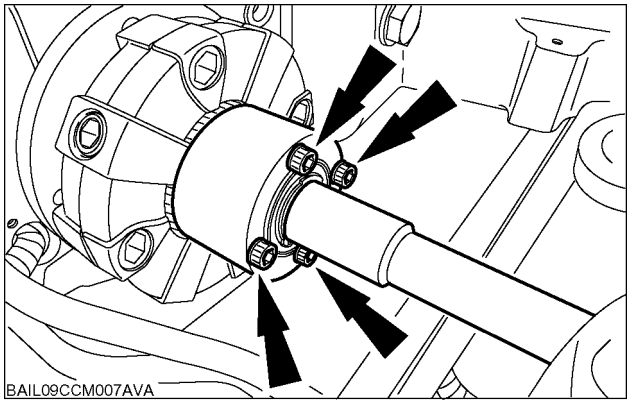
BAIL09CCM003AVA 19

22. Remove the front PTO oil cooler, hydraulic lines and bracket assembly.



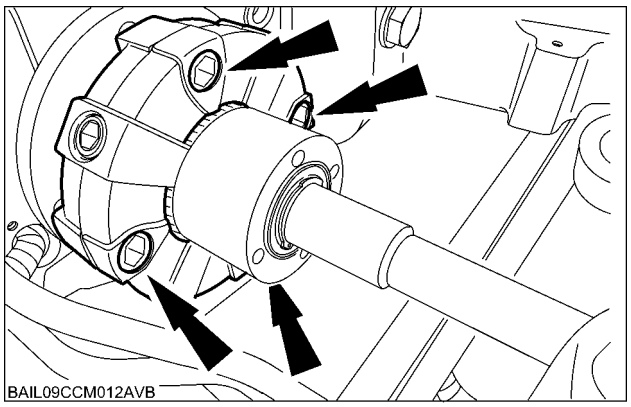
BAIL09CCM005AVA 20

23. Disconnect the front PTO drive shaft assembly.



BAIL09CCM007AVA 21

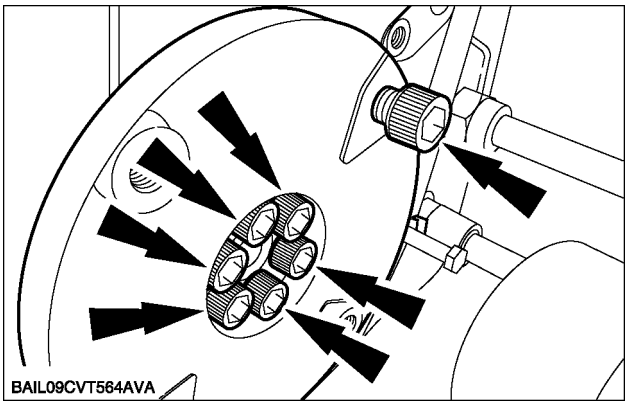
24. Remove the Centaflex coupling.



BAIL09CCM012AVB 22

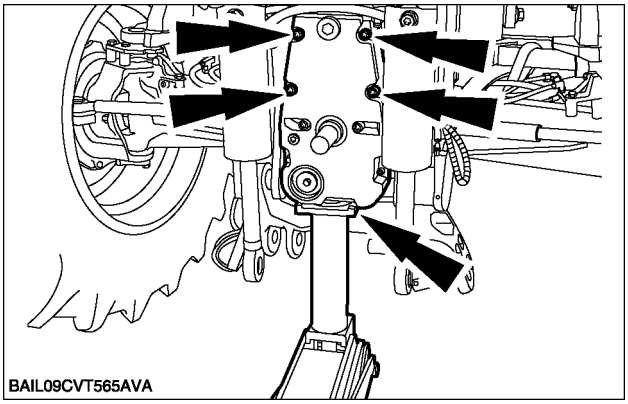
25. Remove the drive plate.

NOTE: *Use a bolt removed in the previous step to lock the drive plate.*



BAIL09CVT564AVA 23

26. Using a suitable jack, remove the front PTO housing.



BAIL09CVT565AVA 24

FRONT PTO Hydraulic - Install

⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

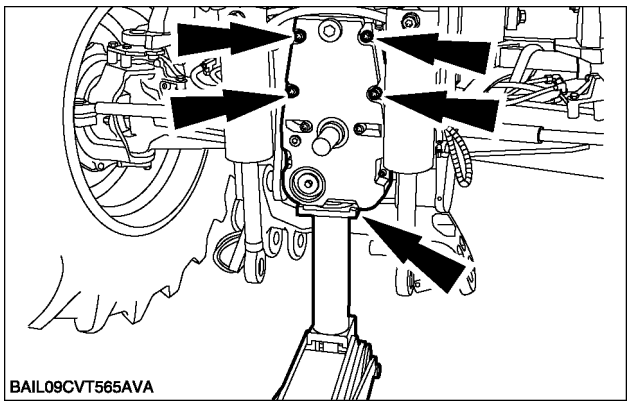
B012

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

B026

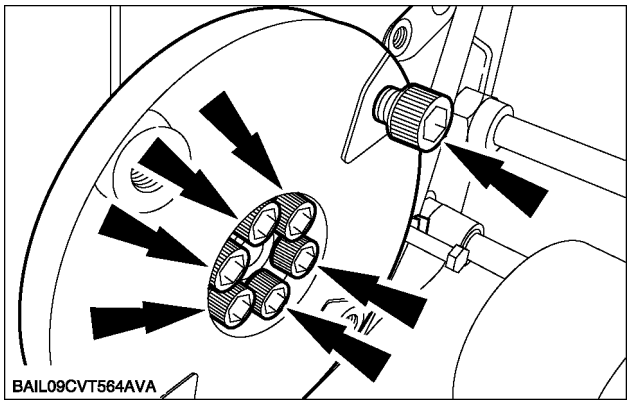
1. Using a suitable jack, install the front PTO housing. Tighten to **138 N·m** (**102 lb ft**).



BAIL09CVT565AVA 1

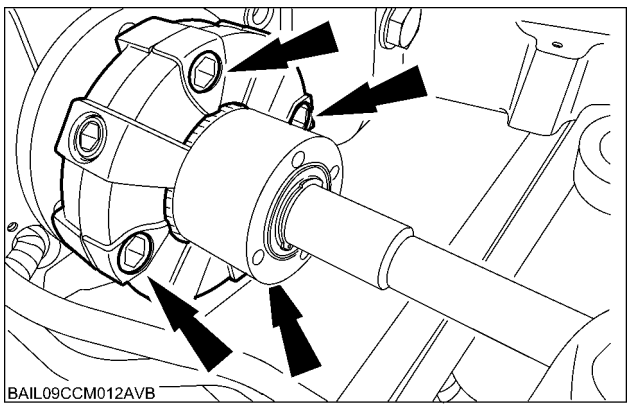
2. Install the drive plate. Tighten to **147 N·m** (**108 lb ft**).

NOTE: *Use a bolt to lock the drive plate.*



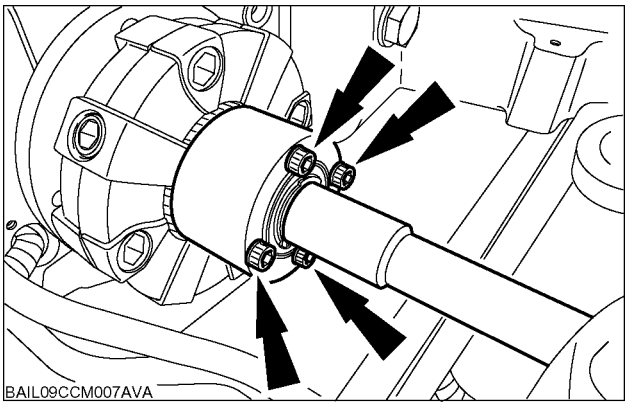
BAIL09CVT564AVA 2

3. Install the Centaflex coupling. Tighten to **220 N·m** (**162 lb ft**).



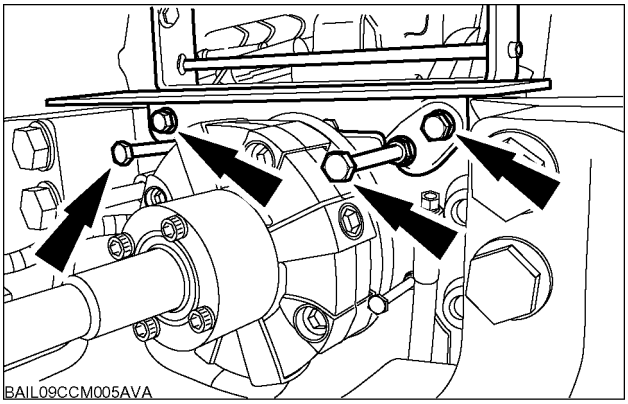
BAIL09CCM012AVB 3

4. Connect the front PTO drive shaft assembly. Tighten to **85 N·m** (**63 lb ft**).



BAIL09CCM007AVA 4

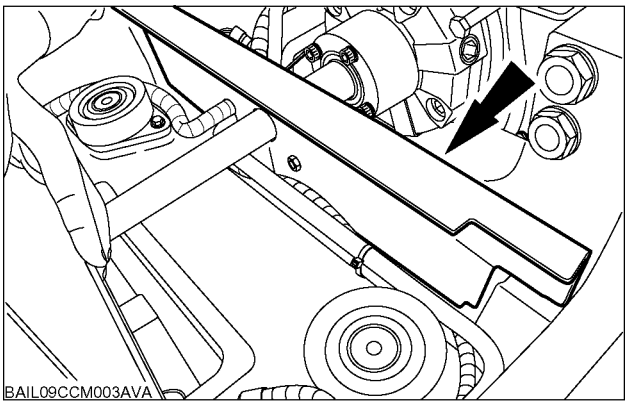
5. Install the bracket assembly. hydraulic lines and the front PTO oil cooler. Tighten to **50 N·m** (**37 lb ft**).



BAIL09CCM005AVA 5

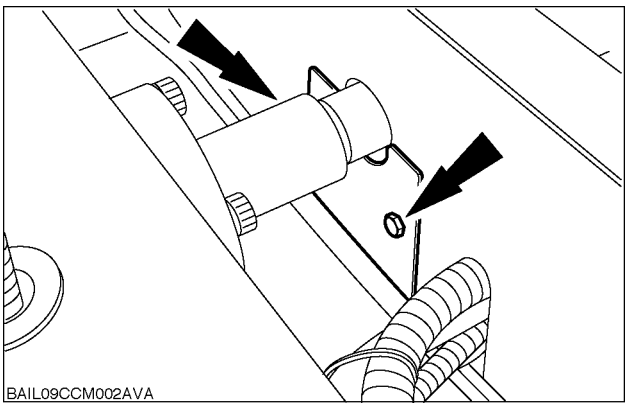
6. Install the radiator baffle plate.

NOTE: *Radiator shown removed for clarity.*



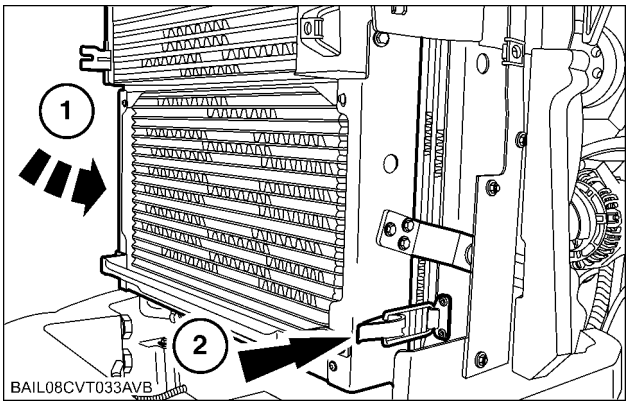
BAIL09CCM003AVA 6

7. Install the baffle plate insert beneath the front PTO drive shaft.



BAIL09CCM002AVA 7

8. Push the charge air cooler/oil cooler assembly into position **(1)** and secure **(2)**.

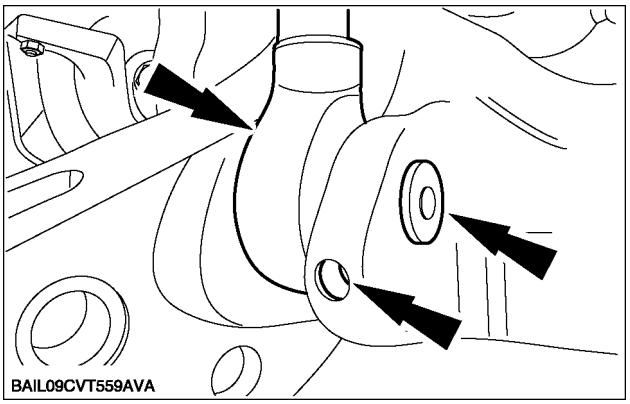


BAIL08CVT033AVB 8

9. Connect the right-hand hydraulic ram, install the pin and tighten the Allen bolt.

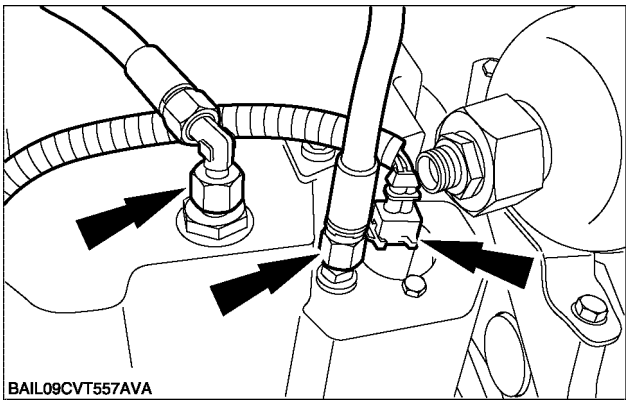
NOTE: *Make sure that the recess in the pin aligns with the Allen bolt.*

NOTE: *Repeat this step for the left-hand side.*



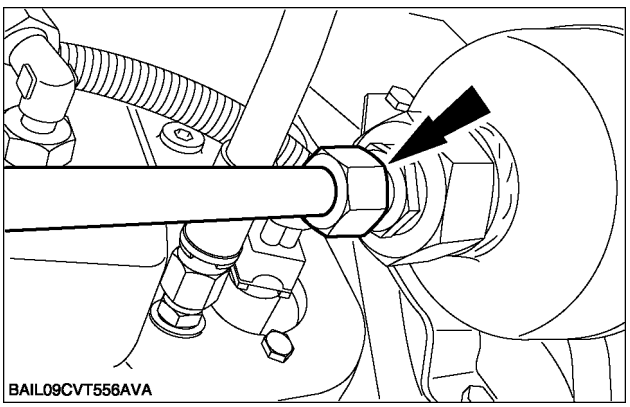
BAIL09CVT559AVA 9

10. Connect the front PTO oil cooler supply and return lines and the front PTO engagement solenoid electrical connector.



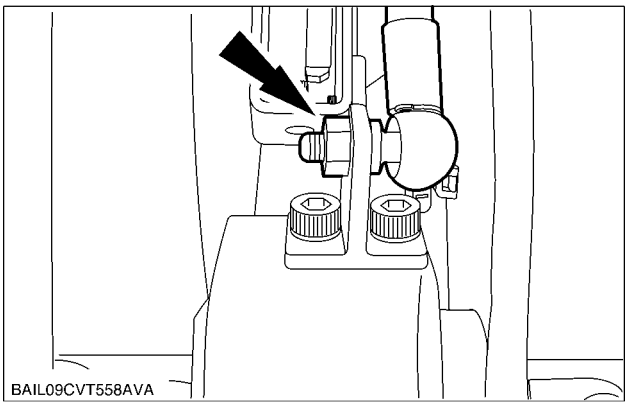
BAIL09CVT557AVA 10

11. Install the accumulator pipe.



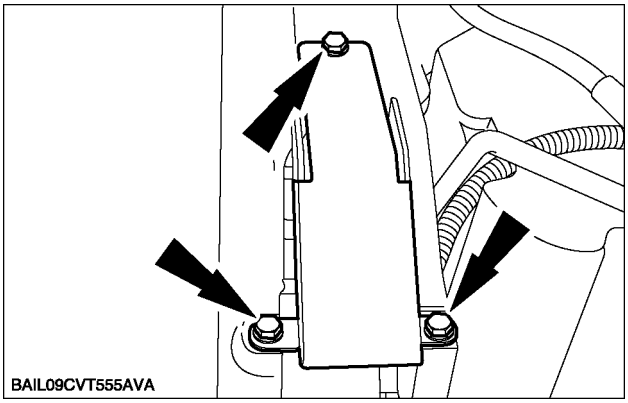
BAIL09CVT556AVA 11

12. Install the lift position potentiometer.



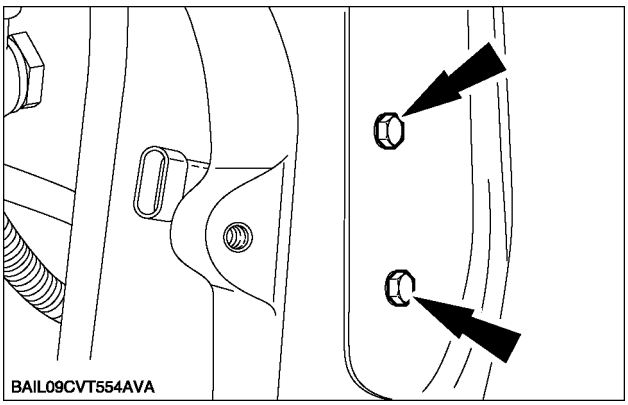
BAIL09CVT558AVA 12

13. Install the lift position potentiometer cover.



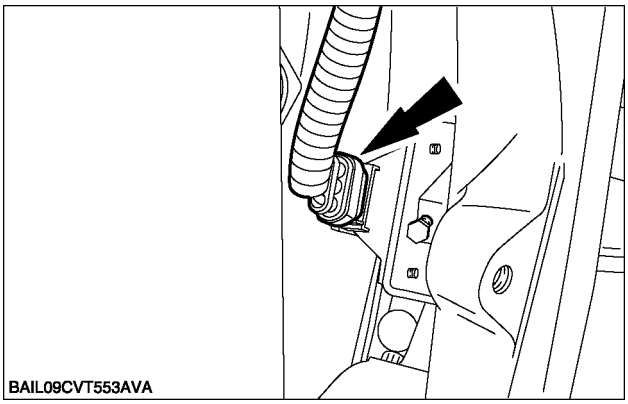
BAIL09CVT555AVA 13

14. Attach the lift position potentiometer.



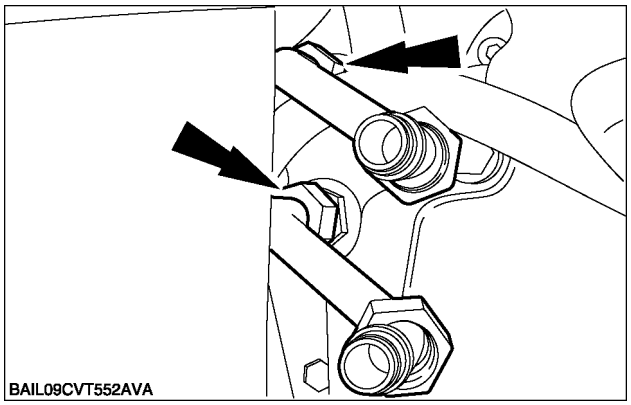
BAIL09CVT554AVA 14

15. Connect the lift position potentiometer electrical connector.



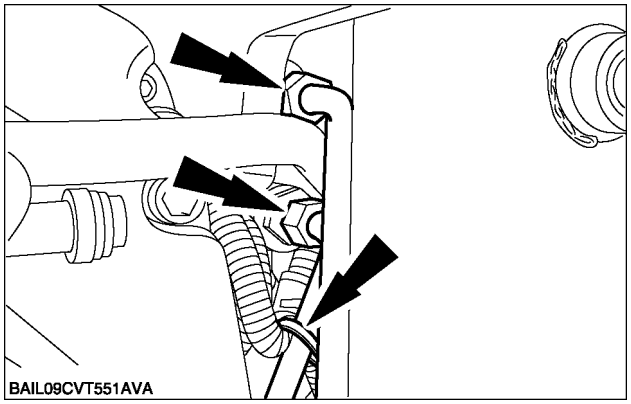
BAIL09CVT553AVA 15

16. Install the two hydraulic lines.



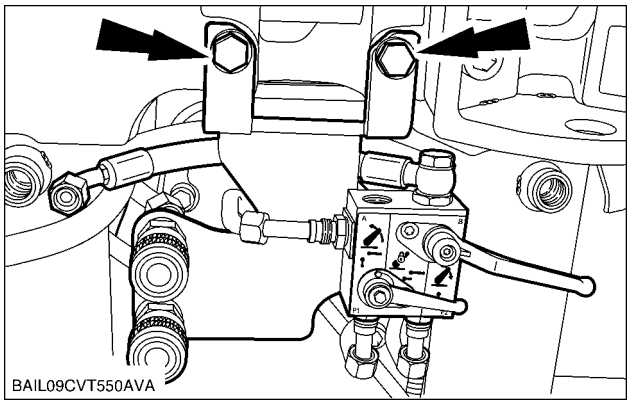
BAIL09CVT552AVA 16

17. Install the two hydraulic lines. Install a new cable tie as necessary.



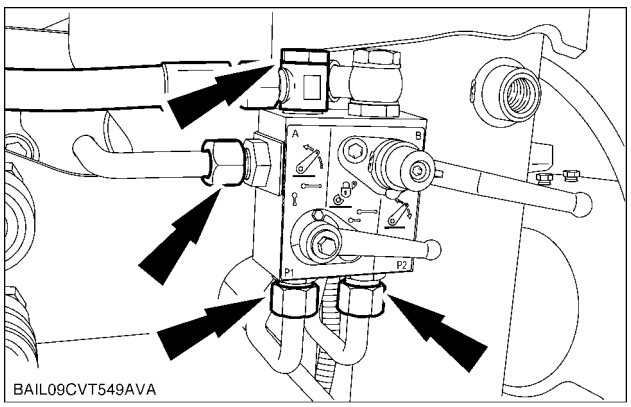
BAIL09CVT551AVA 17

18. Install the valve block and mounting bracket.



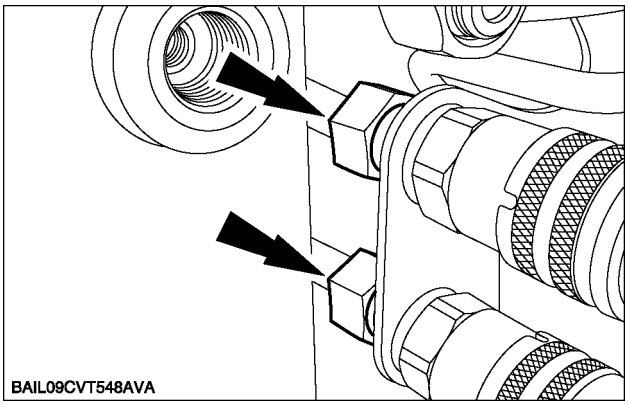
BAIL09CVT550AVA 18

19. Connect the four hydraulic valve block unions.



BAIL09CVT549AVA 19

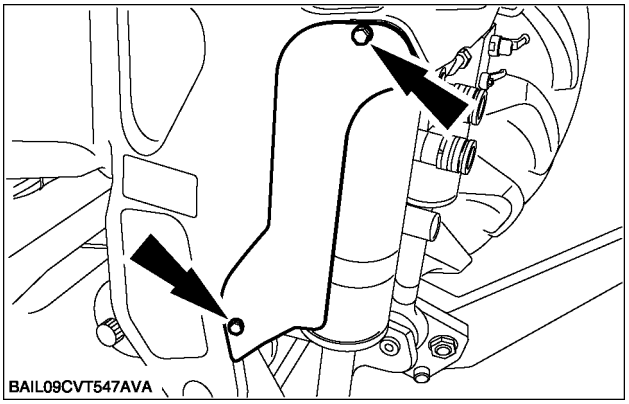
20. Connect the auxiliary hydraulic line unions (if fitted).



BAIL09CVT548AVA 20

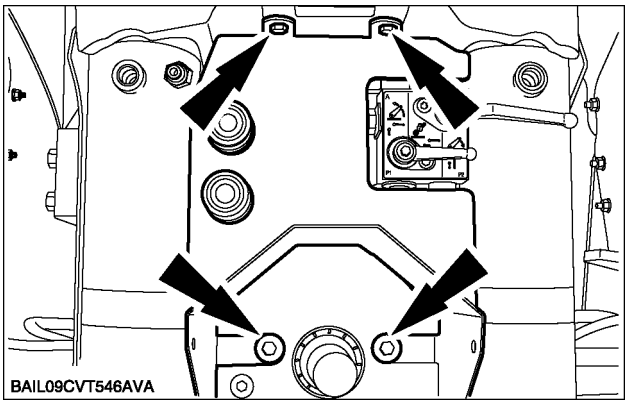
21. Install the right-hand side shield.

NOTE: *Repeat this step for the left-hand side.*



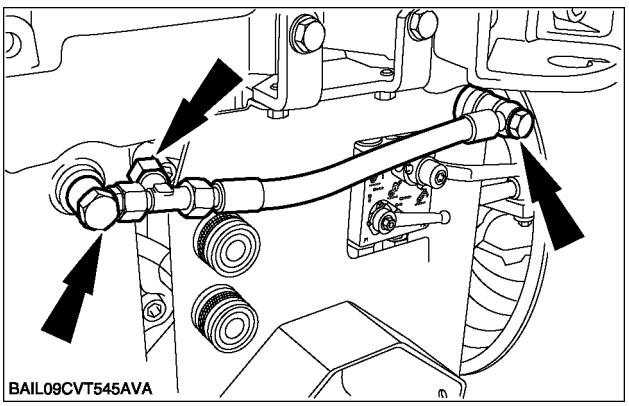
BAIL09CVT547AVA 21

22. Install the front PTO guard.



BAIL09CVT546AVA 22

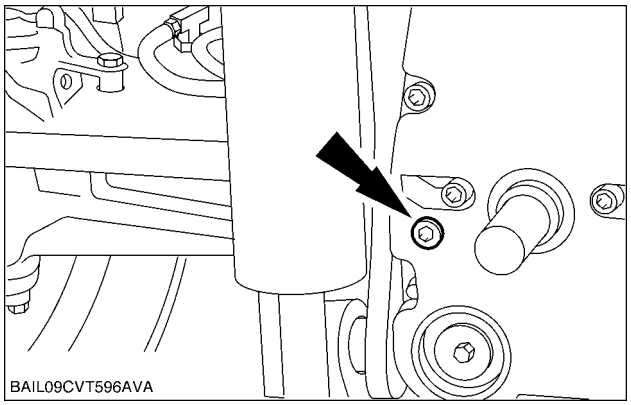
23. Install the hydraulic transfer pipe.



BAIL09CVT545AVA 23

24. Fill the front PTO with oil until the oil level reaches the bottom of the opening.

NOTE: *Refer to* ***FRONT PTO Hydraulic - General specification (C.42.C)*** *for the correct oil specification.*



BAIL09CVT596AVA 24

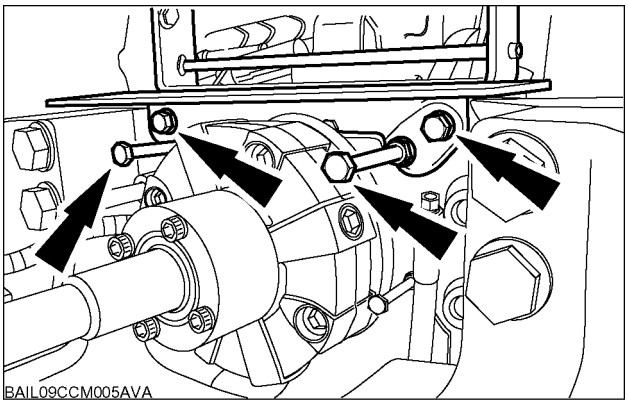
25. Connect the battery, for further information refer to **Battery - Connect (A.30.A)**.

26. Start the engine and run the front PTO for a short period, stop the engine, check for any oil leaks and recheck the oil level.

Shaft - Remove

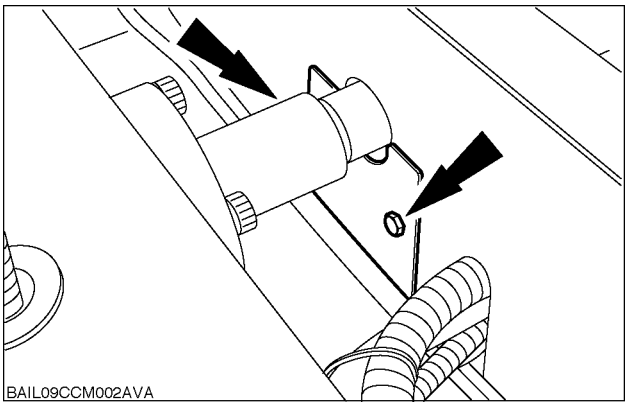
Prior operation:
Remove the radiator, for further information refer to **Radiator - Remove (B.50.A)**.

1. Detach the front PTO oil cooler, hydraulic lines and bracket assembly and position to one side.



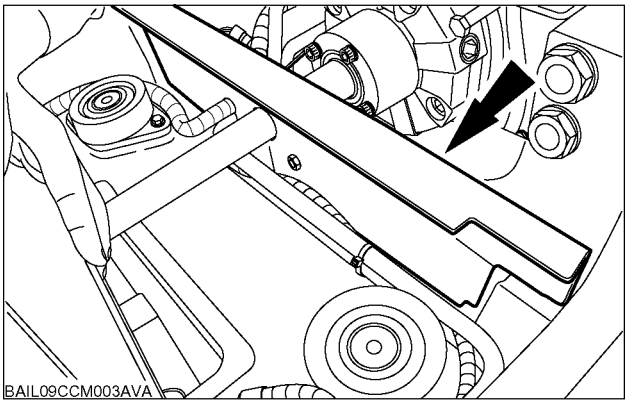
BAIL09CCM005AVA 1

2. Remove the baffle plate insert beneath the front PTO drive shaft.



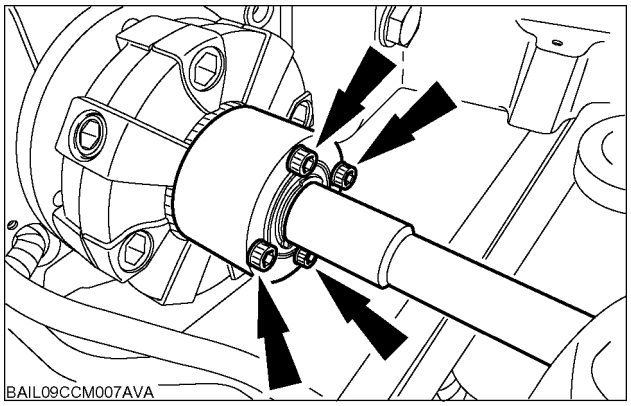
BAIL09CCM002AVA 2

3. Remove the radiator baffle plate.



BAIL09CCM003AVA 3

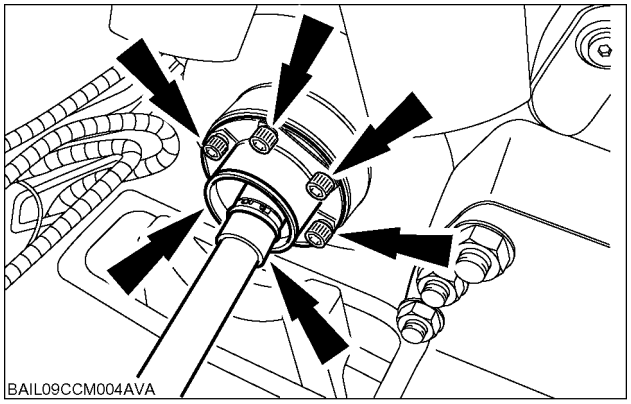
4. Disconnect the front PTO drive shaft assembly.



BAIL09CCM007AVA 4

5. Remove the front PTO drive shaft.

NOTE: *Collect all of the keeper plates*

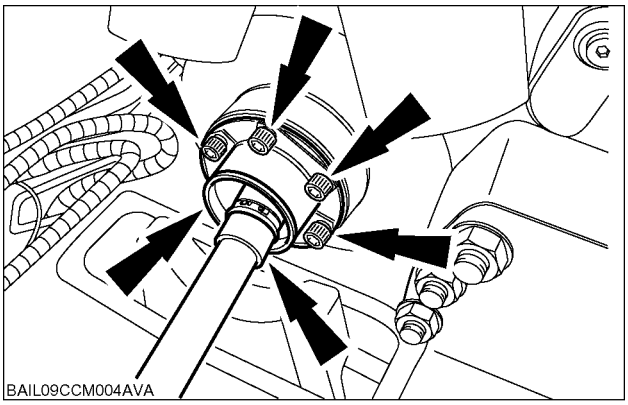


BAIL09CCM004AVA 5

Shaft - Install

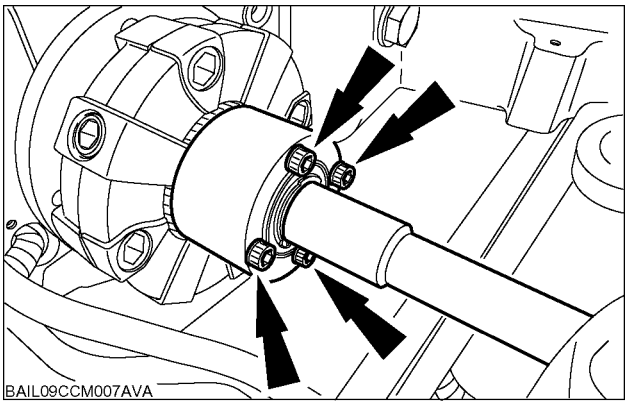
1. Install the front PTO drive shaft.
   Tighten to **147 N·m** (**108 lb ft**).

NOTE: *Install all of the keeper plates*



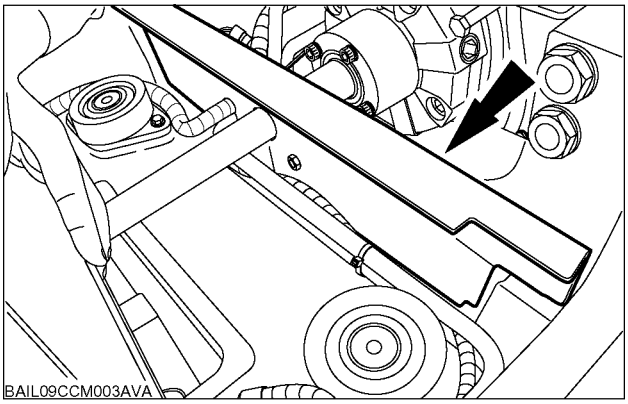
BAIL09CCM004AVA 1

2. Connect the front PTO drive shaft assembly.
   Tighten to **85 N·m** (**63 lb ft**).



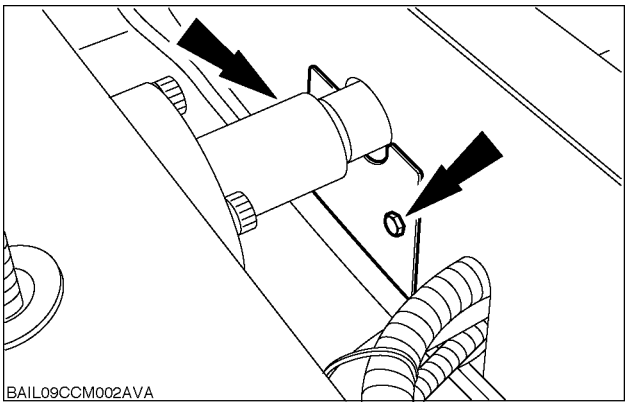
BAIL09CCM007AVA 2

3. Install the radiator baffle plate.



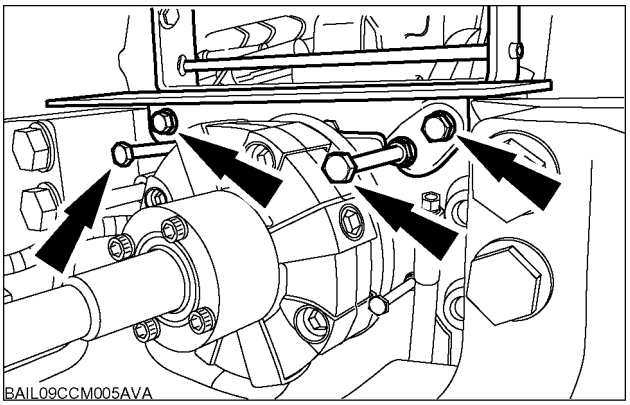
BAIL09CCM003AVA 3

4. Install the baffle plate insert beneath the front PTO drive shaft.



BAIL09CCM002AVA 4

5. Install the bracket assembly. hydraulic lines and the front PTO oil cooler.
   Tighten to **50 N·m** (**37 lb ft**).



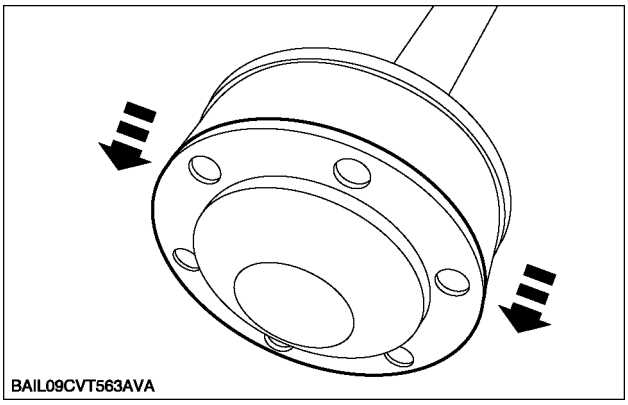
BAIL09CCM005AVA 5

Next operation:
Install the radiator, for further information refer to **Radiator - Install (B.50.A)**.

Shaft - Overhaul

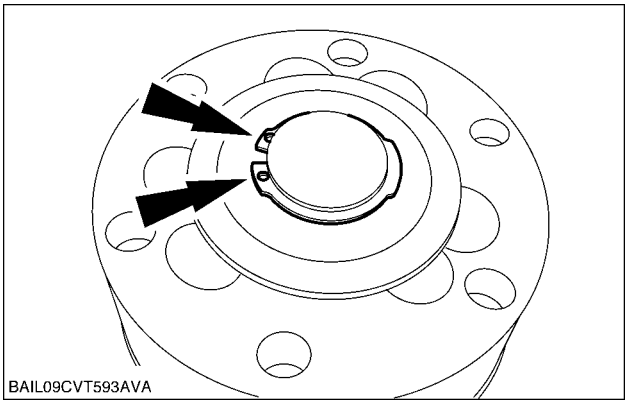
Prior operation:
Remove the front PTO drive shaft, for further information refer to **Shaft - Remove (C.42.C)**.

1. Remove the constant velocity joint outer cover.



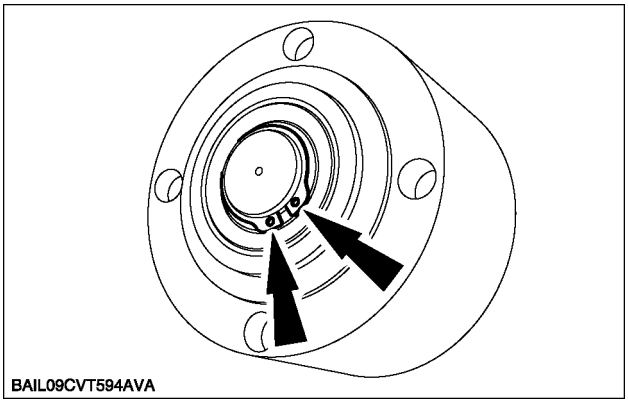
BAIL09CVT563AVA 1

2. Remove the circlip.



BAIL09CVT593AVA 2

3. Slide the constant velocity joint off the drive shaft.
4. Remove the circlip.



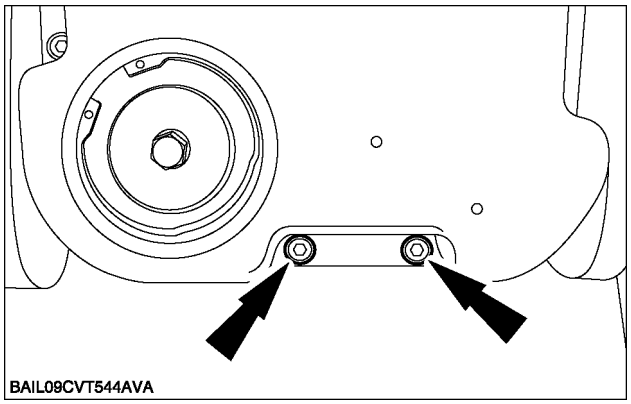
BAIL09CVT594AVA 3

5. Slide the bearing carrier off the drive shaft.

Next operation:
Install the front PTO drive shaft, for further information refer to **Shaft - Install (C.42.C)**.

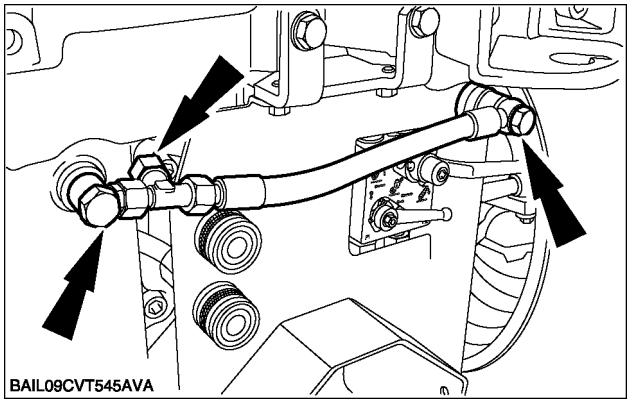
Electrical control Solenoid - Remove

1. Remove the front PTO housing lower bolts and drain the oil into a suitable container.



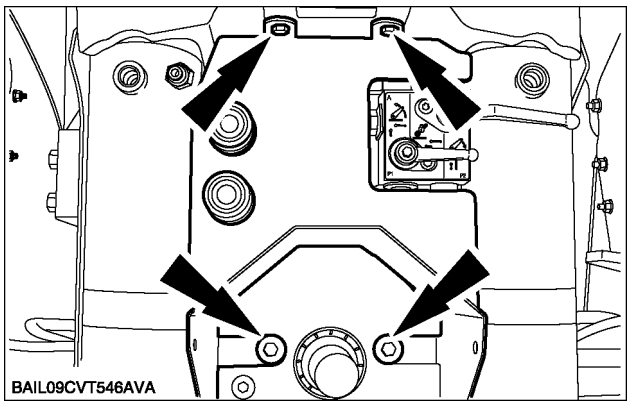
BAIL09CVT544AVA 1

2. Remove the hydraulic transfer pipe.



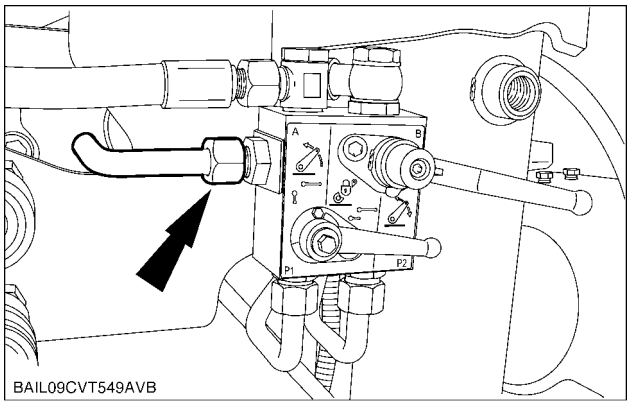
BAIL09CVT545AVA 2

3. Remove the front PTO guard.



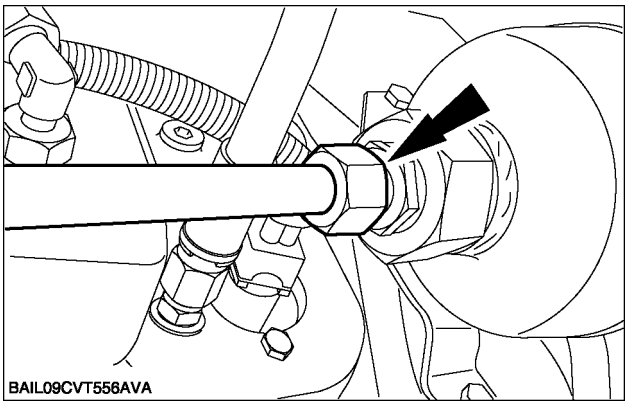
BAIL09CVT546AVA 3

4. Disconnect the accumulator pipe from the valve block.



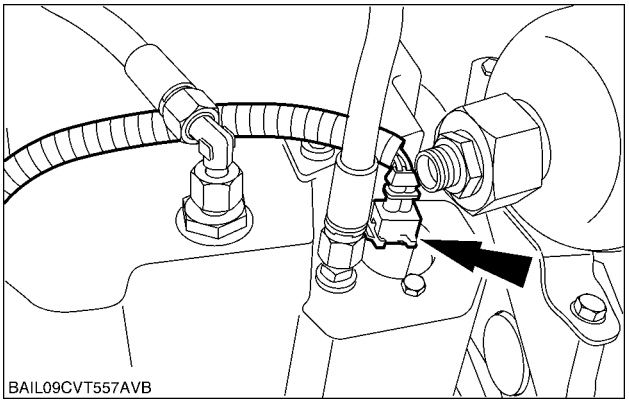
BAIL09CVT549AVB 4

5. Disconnect the accumulator pipe and position it to one side.



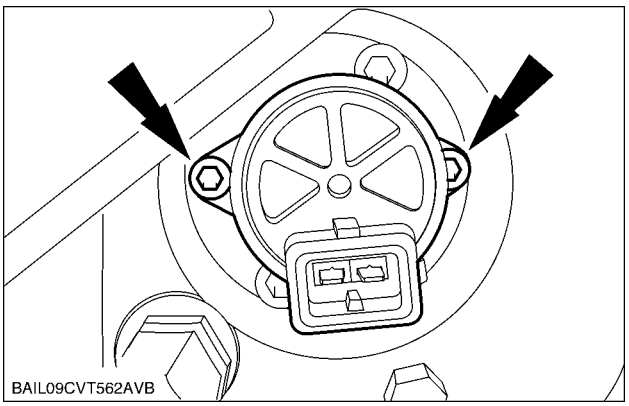
BAIL09CVT556AVA 5

6. Disconnect the front PTO engagement solenoid electrical connector.



BAIL09CVT557AVB 6

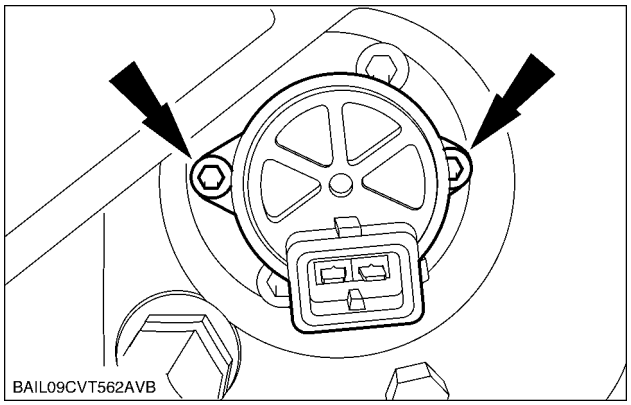
7. Remove the front PTO engagement solenoid.



BAIL09CVT562AVB 7

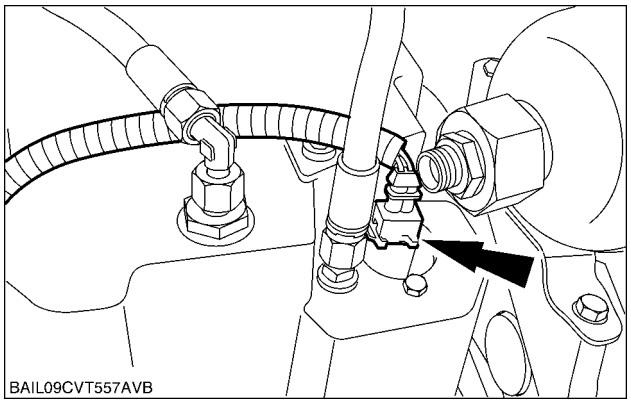
Electrical control Solenoid - Install

1. Install the front PTO engagement solenoid.



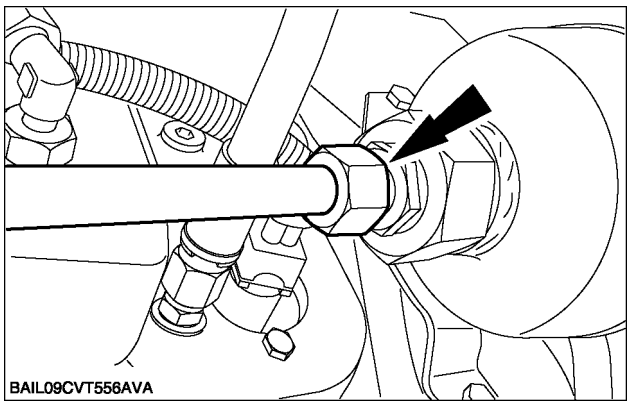
BAIL09CVT562AVB 1

2. Connect the front PTO engagement solenoid electrical connector.



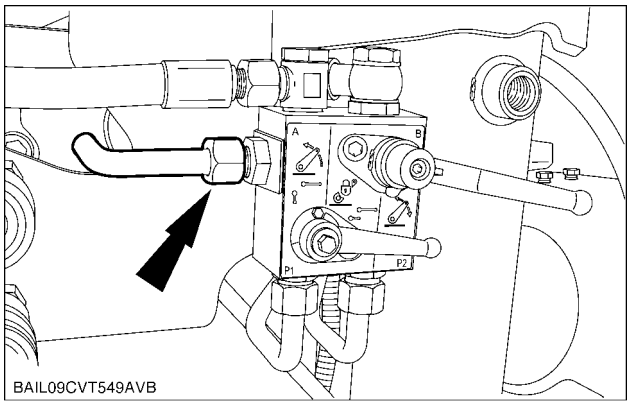
BAIL09CVT557AVB 2

3. Connect the accumulator pipe.



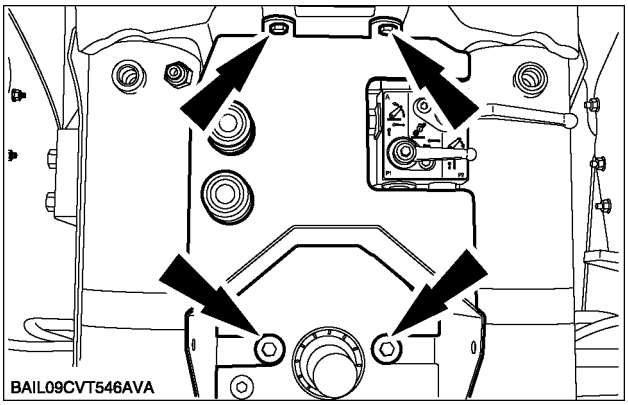
BAIL09CVT556AVA 3

4. Connect the accumulator pipe to the valve block.



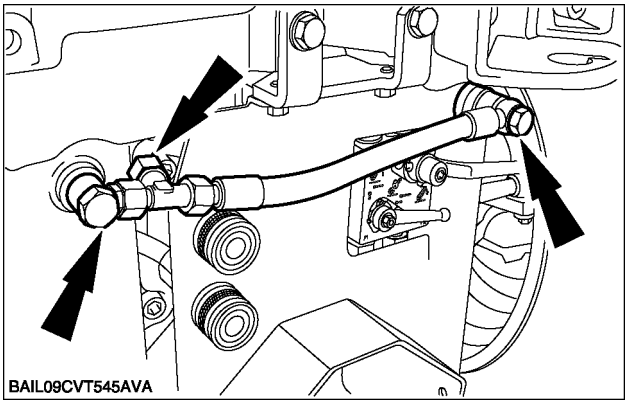
BAIL09CVT549AVB 4

5. Install the front PTO guard.



BAIL09CVT546AVA 5

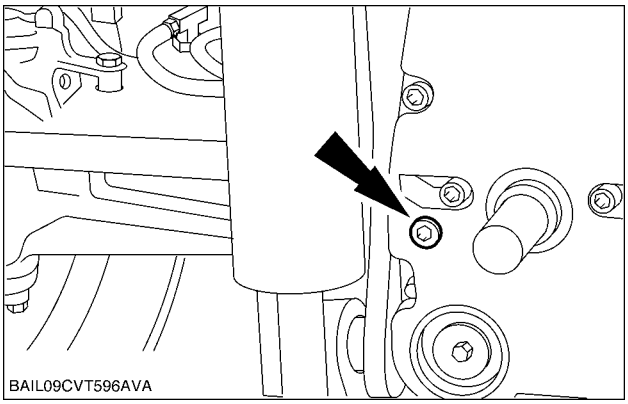
6. Install the hydraulic transfer pipe.



BAIL09CVT545AVA 6

7. Fill the front PTO with oil until the oil level reaches the bottom of the opening.

NOTE: *Refer to* ***FRONT PTO Hydraulic - General specification (C.42.C)*** *for the correct oil specification.*



BAIL09CVT596AVA 7

8. Start the engine and run the front PTO for a short period, stop the engine, check for any oil leaks and recheck the oil level.

FRONT PTO Hydraulic - Troubleshooting

Problem	Possible Cause	Correction
Front PTO not engaging	Front PTO is not turned on in machine configurations.	Turn the front PTO on in machine configurations (refer to **Control module - Static description (A.50.A)**).
	Front PTO solenoid valve not energizing.	Check the electrical circuit.
	Solenoid valve sticking.	Replace the solenoid valve.
Low power from the front PTO output shaft	Fault in the low pressure circuit.	Pressure test the low pressure circuit.
	Front PTO piston oil seals leaking.	Overhaul the front PTO control housing.
	Front PTO multi-dry plate clutch plates worn.	Overhaul the front PTO multi-dry plate clutch.
Front PTO output shaft oil seal leak	Worn oil seal.	Replace the oil seal and check the level of oil in the reduction gearbox.
	Excessive oil level in the front PTO reduction gearbox.	Check the oil level.
Front PTO bearings overheated/worn	Lack of oil in front PTO reduction gearbox.	Check the oil level. If low examine the front PTO reduction gearbox for leaks.
	Incorrect specification oil or old oil in the front PTO reduction gearbox.	Replace with the correct specification of oil.
Front hydraulic lift not raising	Diverter valve not open.	Open the diverter valve.
	Height limit control incorrectly set.	Adjust the height limit control to the required setting.
	Front hydraulic lift arm position sensing potentiometer damaged.	Replace the potentiometer.
Front hydraulic lift will not raise heavy loads	Front hydraulic lift cylinder oil seals leaking.	Overhaul the front hydraulic lift cylinders.

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SERVICE - Technical Publications & Tools



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SERVICE MANUAL

TRAVELLING



PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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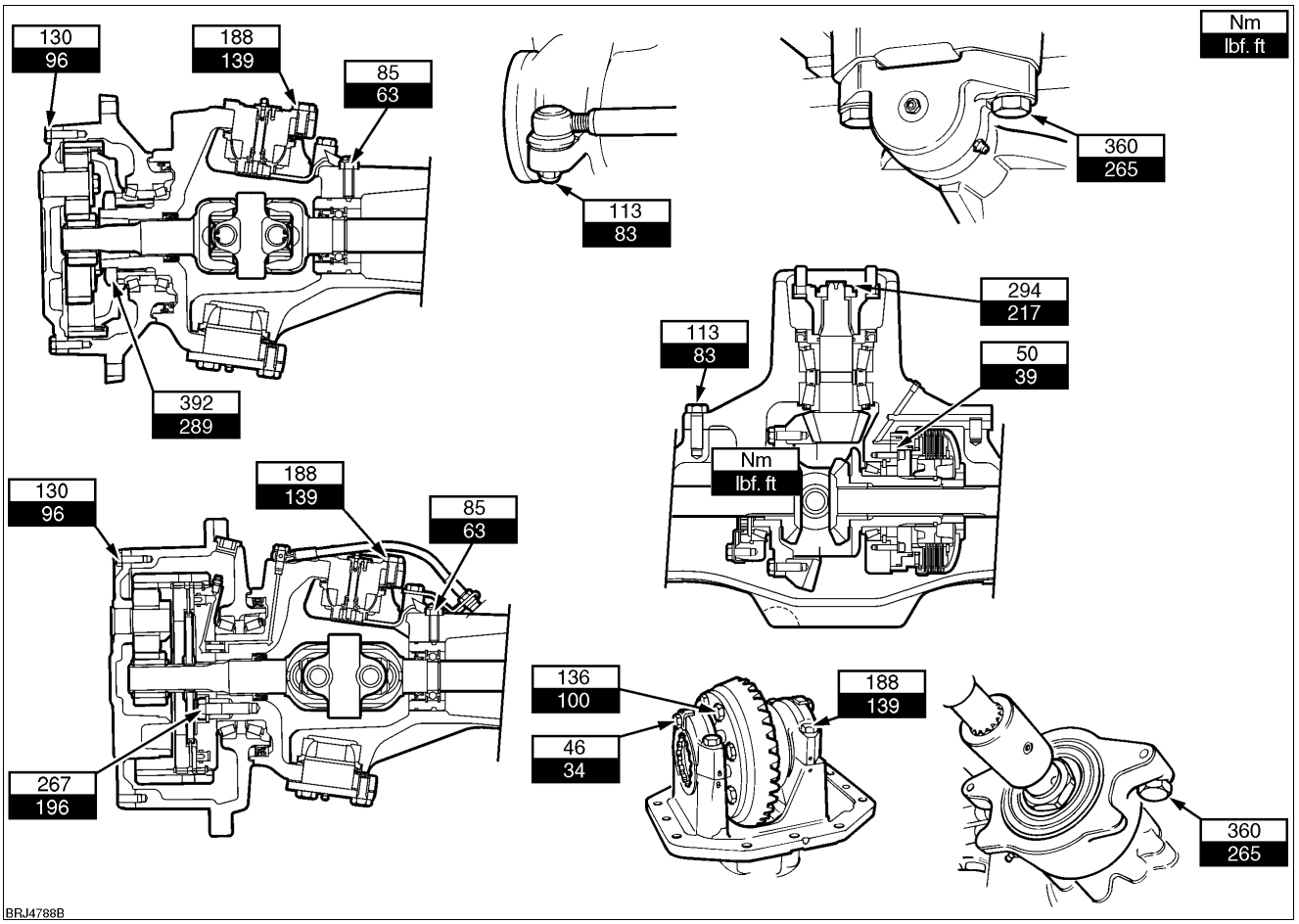
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FRONT AXLE - General specification

Type		steering, stress-supporting, centrally pivoted
Pinion and Crown Wheel - Differential		
Pinion to crown wheel reduction ratio		10/34 = 1:3.4
Pinion to crown wheel backlash mm		0.18 - 0.23
Cone point adjustment shims **(8)**(**FRONT AXLE - Sectional view (D.10.A)**)	mm	2.3 - 2.4 - 2.5 - 2.6 - 2.7 - 2.8 - 2.9 - 3.0 - 3.1 - 3.2 - 3.3 - 3.4 - 3.5
Pinion bearing adjustment shims **(12)**	mm	2.2-2.25-2.3-2.35-2.4-2.45-2.5-2.55-2.6-2.65-2.7-2.75-2.8-2.85-2.9-2.95-3.00-3.05-3.10-3.15-3.20-3.25-3.3- 3.35-3.4-3.45
Crown wheel point adjustment shims **(2)**	mm	1 - 1.1 - 1.2 - 1.3 - 1.4 - 1.5- 1.6 - 1.7 - 1.8 - 1.9 - 2
Side gear to differential gear backlash	mm	0.18
Differential gear thrust washer **(5)** thickness	mm	1.470 - 1.530
Side gear thrust washer **(3)** thickness	mm	1.4-1.5-1.6-1.7-1.8
Differential gear pin **(6)** diameter	mm	24.939 - 24.960
Pin bore diameter on differential gears **(7)**	mm	25.040 - 25.061
Pins to seats mounting clearance	mm	0.080 - 0.122
Side gear hub **(4)** diameter	mm	50.954 - 51.000
Hub bore diameter on differential casing	mm	51.100 - 51.146
Side gears to seats mounting clearance	mm	0.100 - 0.192
Differential Lock Assembly (Dog Clutch)		
Free spring length **(1)**(**FRONT AXLE - Sectional view (D.10.A)**)	mm	approx. 87
Compressed spring length, under a load of **1888 - 2035 N** (**192.5 - 207.5 kg**)	mm	approx. 48
Differential Lock Assembly (Multi Wet Plate Clutch)		
Drive discs **(9)**	mm	1.75 - 1.855
Drive discs **(9)** quantity		5
Driven discs **(10)**	mm	2.35 - 2.45
Driven discs **(10)** quantity		6
Axle-Shafts and Swivel Assemblies		
Outer axle-shaft **(7)**(**FRONT AXLE - Sectional view (D.10.A)**) dia. at the bushings **(8)**	mm	44.975 - 45.000
Press-fit bushing **(8)** inner diameter	mm	45.100 - 45.175 **(1)**
Axle-shafts to bushings mounting clearance	mm	0.100 - 0.200
Bushings to seats fitting interference	mm	0.064 - 0.129
Swivel pin bearing adjust shims **(10)**	mm	0.10-0.15-0.20-0.25-0.30
Planetary Reduction Hubs		
Reduction ratio		16:(16+68) = 1:5.25
Planet gear thrust washer **(9)** thickness	mm	0.77 - 0.83
Front Axle Support Pillars		
Axle housing to support pillars end play	mm	0.3 - 1.1
Max. wear end play	mm	2
Front support pillar **(1)** diameter	mm	62.720 - 62.740
Press-fit front bush **(2)** inner diameter	mm	62.80 - 62.884 **(1)**
Pillar **(1)** to bush **(2)** mounting clearance	mm	0.060 - 0.164
Rear bush **(4)** outer diameter (press-fit into pinion support)	mm	115.527 - 115.585
Rear bush **(5)** inner diameter (press-fit into support pillar)	mm	115.636 -115.711 **(1)**
Bush to bush mounting clearance	mm	0.051 - 0.184

Axle front and rear thrust washer (3 and 6) thickness	4.90 - 5.00

FRONT AXLE - Torque



BRJ4788B 1

FRONT AXLE - Special tools

⚠ CAUTION ⚠

The operations described in this section can only be carried out with the ESSENTIAL tools indicated by an (X). To work safely and efficiently and obtain the best results, it is also necessary to use the recommended specific tools listed below and certain other tools, which are to be made according to the drawings included in this manual.

B008

List of special tools necessary to carry out the different operations described in this Section.

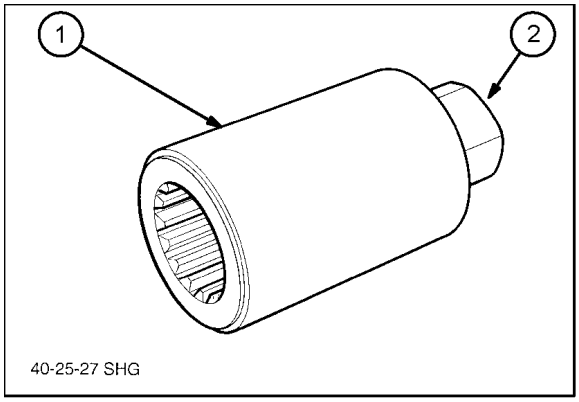
380000251	Front axle overhaul stand
380000227	Front differential casing removal-installation hook
380000255	Front axle differential casing overhaul fixture
X **380000468**	Front axle drive pinion nut spanner (Class IV)
X **380000248** / X **380000463**	Drive pinion bearing adjustment tool
X	

X	
X **380000504**	Front axle drive pinion retaining tool (Class IV)
380000249	Front axle drive pinion cone point adjustment gauge
X **380000441**	Front axle differential casing bearing adjustment ring nut spanner (Class IV)
X **380000469**	Front wheel hub bearing ring nut spanner (Class IV).
X **380000270**	Front axle hub bearing pulling aids (two)
380000548	Front axle planetary reduction hub alignment pins (M12x1.25)
380001597	Front wheel removal/installation pins (M16x1.25)
X **380000265**	Front axle swivel pin puller
X **380000234**	Front axle swivel pin bearing outer race puller
X **380002489**	Threaded adaptor, spreader rod and studs to use with **380000234** and **380000265**
X **380000235**	Front axle bearing rolling torque test tool
380000240	Front axle differential engagement oil pressure test kit
380002719	Seal installer (Class IV) Standard Axle With Brakes
380000482	Seal installer (Class IV) Standard Axle Less Brakes
380200092	Front axle pinion seal installer
380200093	Front axle pinion seal protector installer
380200094	Front axle pinion seal installer
380200095	Front axle seal protector installer (85x37 seal)
380200105	Front axle pinion seal and protection shield installation press

LOCALLY FABRICATED TOOLS

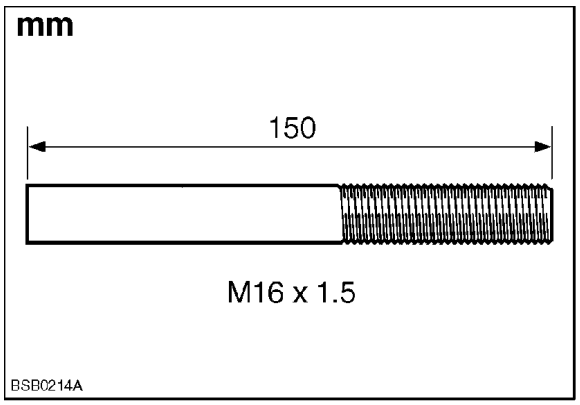
Front pinion shaft holding tool - fabricate from 4WD shaft coupling.

- suspended axle differential unit guides 2 x M16 x 1.5 bolts
- suspended axle pinion flange holding tool
-
- suspended axle differential pinion adjustment tool spacer (use with **380000248**).
-



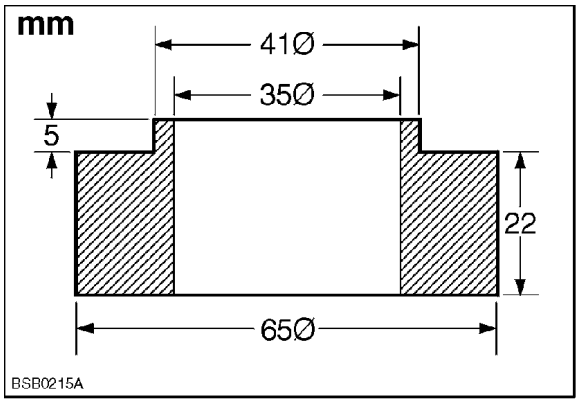
40-25-27 SHG 1

Pinion Shaft Tool (Standard Axle)



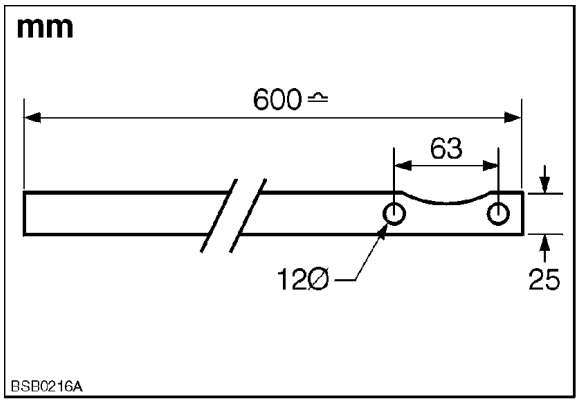
BSB0214A 2

Differential Casting Guide Bolts (Suspended Axles).



BSB0215A 3

Differential Pinion Bearing Setting Spacer (Suspended Axles)



BSB0216A 4

Pinion Shaft Holding Tool (Suspended Axles)

Axle - General specification Two Wheel Drive

PUMA 165, PUMA 180, PUMA 195, PUMA 210

AXLE SPECIFICATIONS

Type		Centrally pivoted square tube centre beam with telescopic outer sections
Track settings (6 off)	mm	1549-1651-1752-1854-1955- 2057
Wheel camber		**2 °**, corresponding to approximately. **15 mm** with **16 in** rims
Wheel toe-in	mm	3 to 9
Swivel Pin Assembly		
Swivel pin diameter at the bushes	mm	49.961 to 50.000
Press-fit bush **(4)** inner diameter	mm	50.050 to 0.140 **(1)**
Swivel pin to bush clearance	mm	0.050 to 0.179
Axle Pivot Pin Assembly		
Pivot pin diameter	mm	49.95 to 50.000
Press-fit bush **(2)** and **(28)** inner diameter (Refer to **Axle - Exploded view (D.10.A)**)	mm	38.050 to 38.140 **(1)**
Pivot pin to bush clearance	mm	0.050 to 0.179

(1) final dimension without reaming

Axle - Special tools

PUMA 165, PUMA 180, PUMA 195, PUMA 210

⚠ **CAUTION** ⚠

The operations described in this section can only be carried out with the ESSENTIAL tools indicated by an (X). To work safely and efficiently and obtain the best results, it is also necessary to use the recommended specific tools listed below and certain other tools, which are to be made according to the drawings included in this manual.

B008

List of special tools necessary to carry out the different operations on the two wheel drive axle.

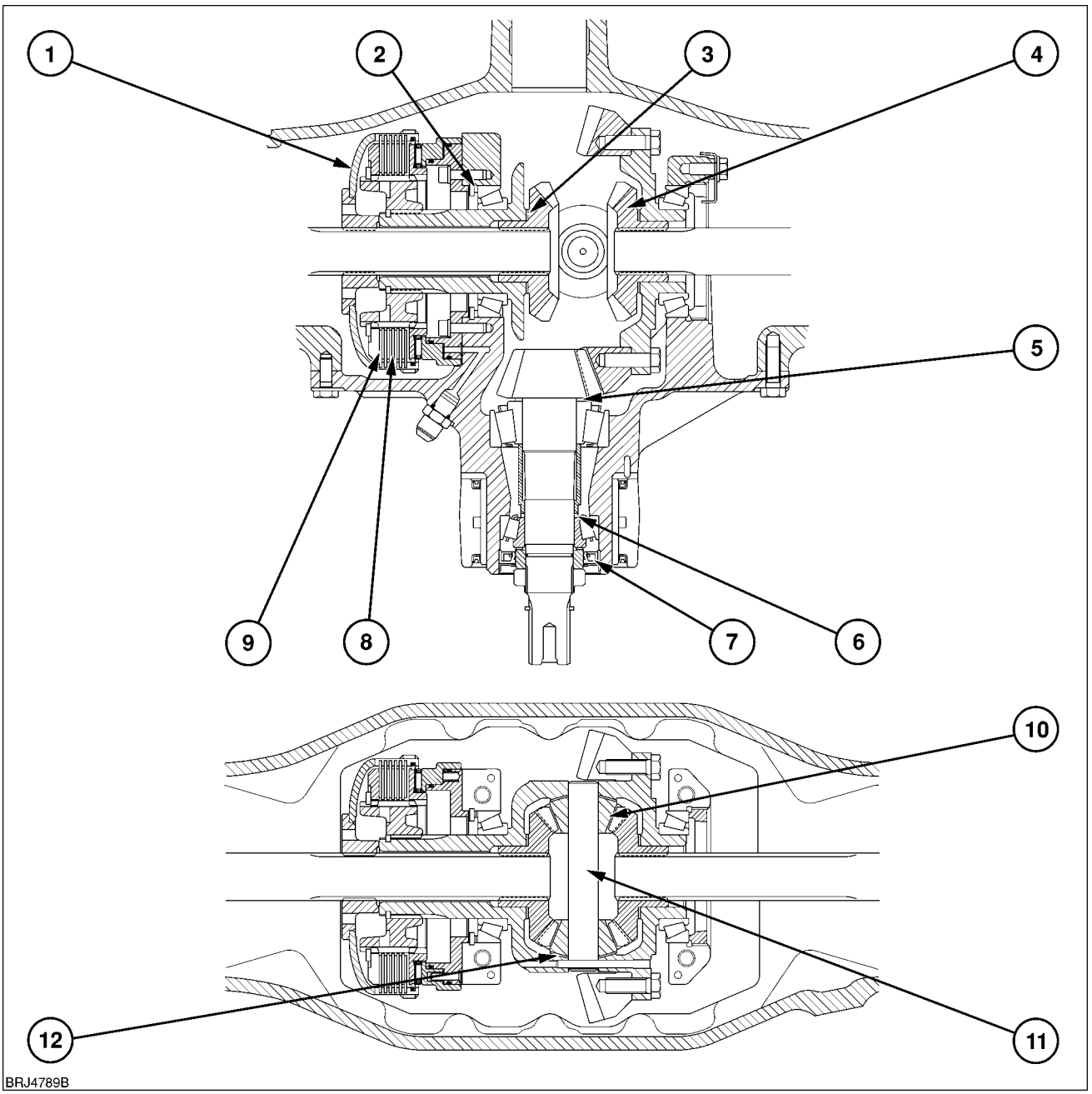
X **380000502**	Swivel pin ring nut spanner.
X **380000541**	Axle pivot pin adapter (M 12x1.25) (use with **380000549**).
380000549	Slide hammer.
380000237	Wheel lifting hook.

Axle - Torque Two Wheel drive

PUMA 165, PUMA 180, PUMA 195, PUMA 210

DESCRIPTION	Thread size	Torque
Bolts or nuts, front axle carrier to housing	**3/4 in** - 10UNC	**333 - 373 Nm** (**245.6 - 275.1 lbft**)
Nut, track control rod clamp	M 20	**136 Nm** (**100.3 lbft**)
Locknut, steering rod	1-1/8	**271 - 305 Nm** (**199.9 - 225.0 lbft**)
Bolt, RH and LH levers to swivel pins retaining screw	M 20 x 55	**470 - 530 Nm** (**346.7 - 390.9 lbft**)
Bolt, axle outer section	M 24 x 200	**530 - 950 Nm** (**390.9 - 700.7 lbft**)
Bolt, front wheel to hub	M 18 x 1.5	**314 Nm** (**231.6 lbft**)
Bolt, axle pivot pin	M 10 x 1.25	**49 Nm** (**36.1 lbft**)

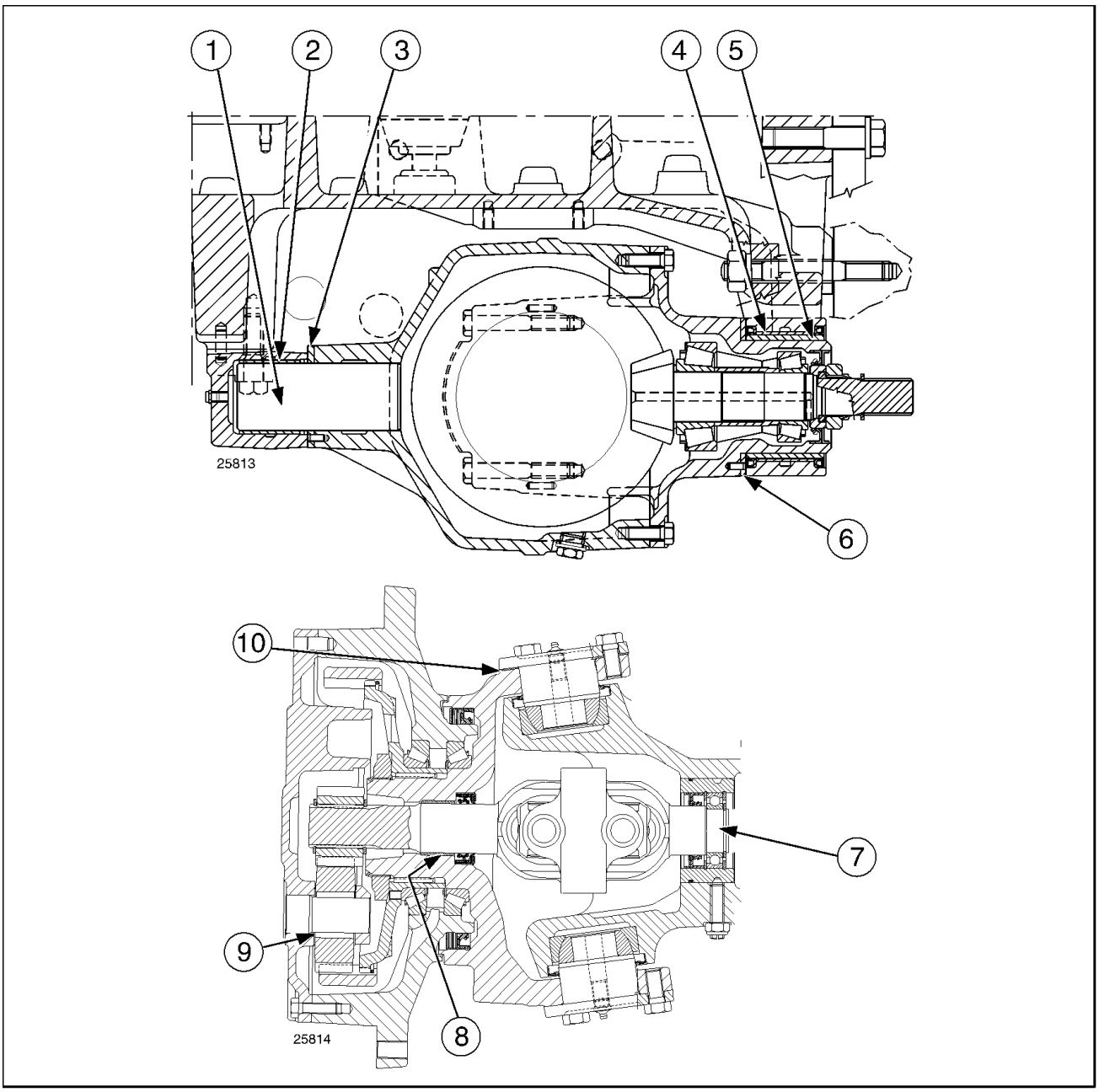
FRONT AXLE - Sectional view



BRJ4789B 1

Front Axle Section view

1 Multi wet plate clutch assembly
2 Crown wheel bearing adjustment shims
3 Side gear thrust washer shims
4 Side gears
5 Pinion cone point adjustment shims
6 Pinion bearing adjustment shims
7 Seal
8 Clutch drive discs
9 Clutch driven discs
10 Differential gears
11 Differential gear pin
12 Differential gear thrust washer shims



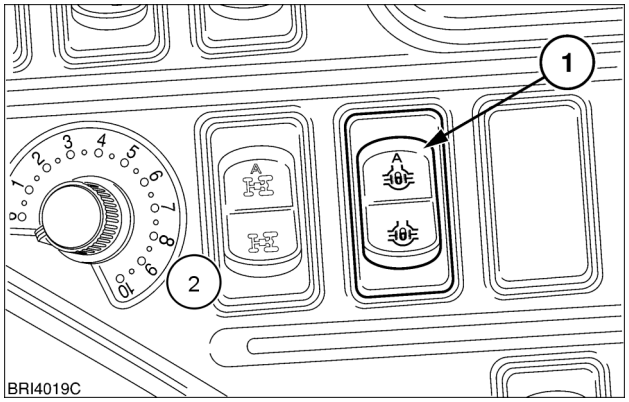
25814 2

Support Pillars and Planetary Reduction Hub Cross-Sections

1 Front support pillar
2 Front support pillar bush
3 Front thrust washer
4 Rear bush (press-fit into support pillar)
5 Rear bush (press-fit into pinion support)
6 Rear thrust washer
7 Outer axle-shafts
8 Bushings
9 Driven gear thrust washers
10 Swivel pin adjustment shims

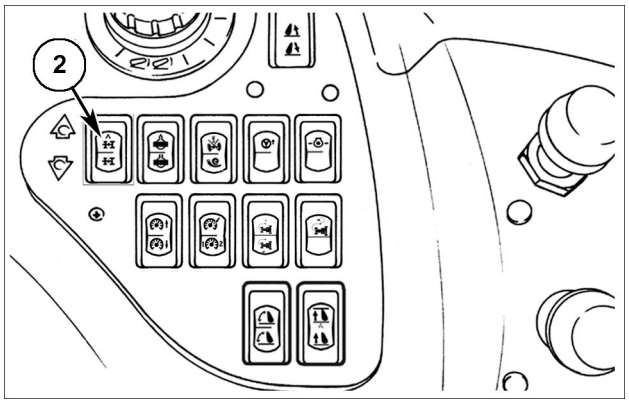
FRONT AXLE - Static description

The front axle of this tractor is floating and mid-mounted. The pintles of the front axle suspension and the drive shaft are parallel to the mid-line of the tractor.
There are two planet wheels in the differential gear. The driving torque is transmitted via maintenance-free universal joints to the planet wheel end drive.
The all wheel drive is switched via a rocker switch on the right-hand console **(2)**. The drive torque is transmitted from the rear axle via a coupling to the front axle. The coupling is operated by means of pressure oil from the low pressure oil circuit. When switching on the all-wheel drive, a solenoid valve is actuated, which interrupts the oil flow to the coupling, so that this can engage by spring force. When the all-wheel drive is switched off, the low pressure oil disengages the disc coupling. You will find more information in **2WD-4WD SYSTEM Hydraulic - Static description (D.14.C)**.



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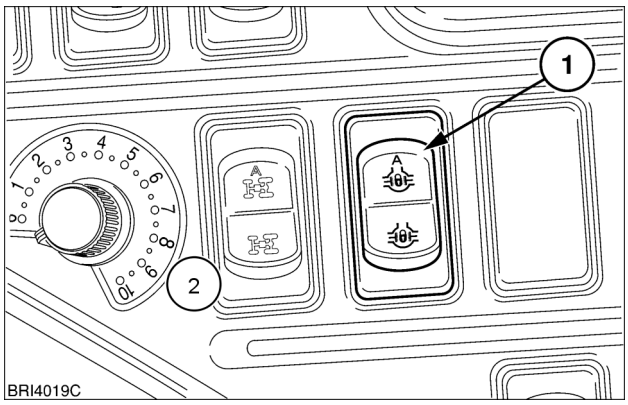
PUMA Standard



SS07F175 2

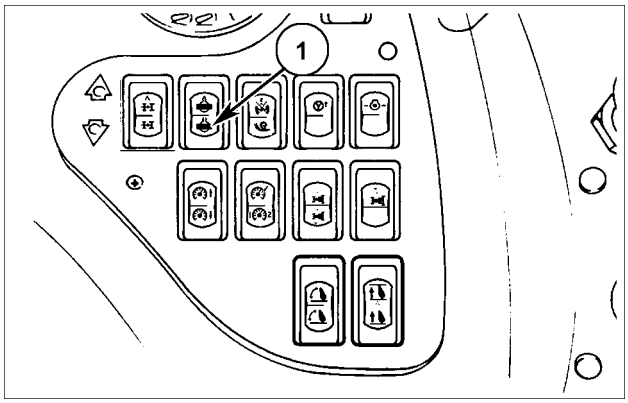
PUMA Multicontroller

The axle is fitted with a differential lock with disc oil bath clutch, which the driver operates with a rocker switch **(1)** on the right-hand side console. When operating the switch in driving situations, in which wheel slip may occur, low pressure oil is diverted via a solenoid valve to the front and rear axle and all four wheels are non-positive linked. You will find more information in **Differential lock Multi plate clutch - Dynamic description (D.10.A)**.



BRI4019C 3

PUMA Standard



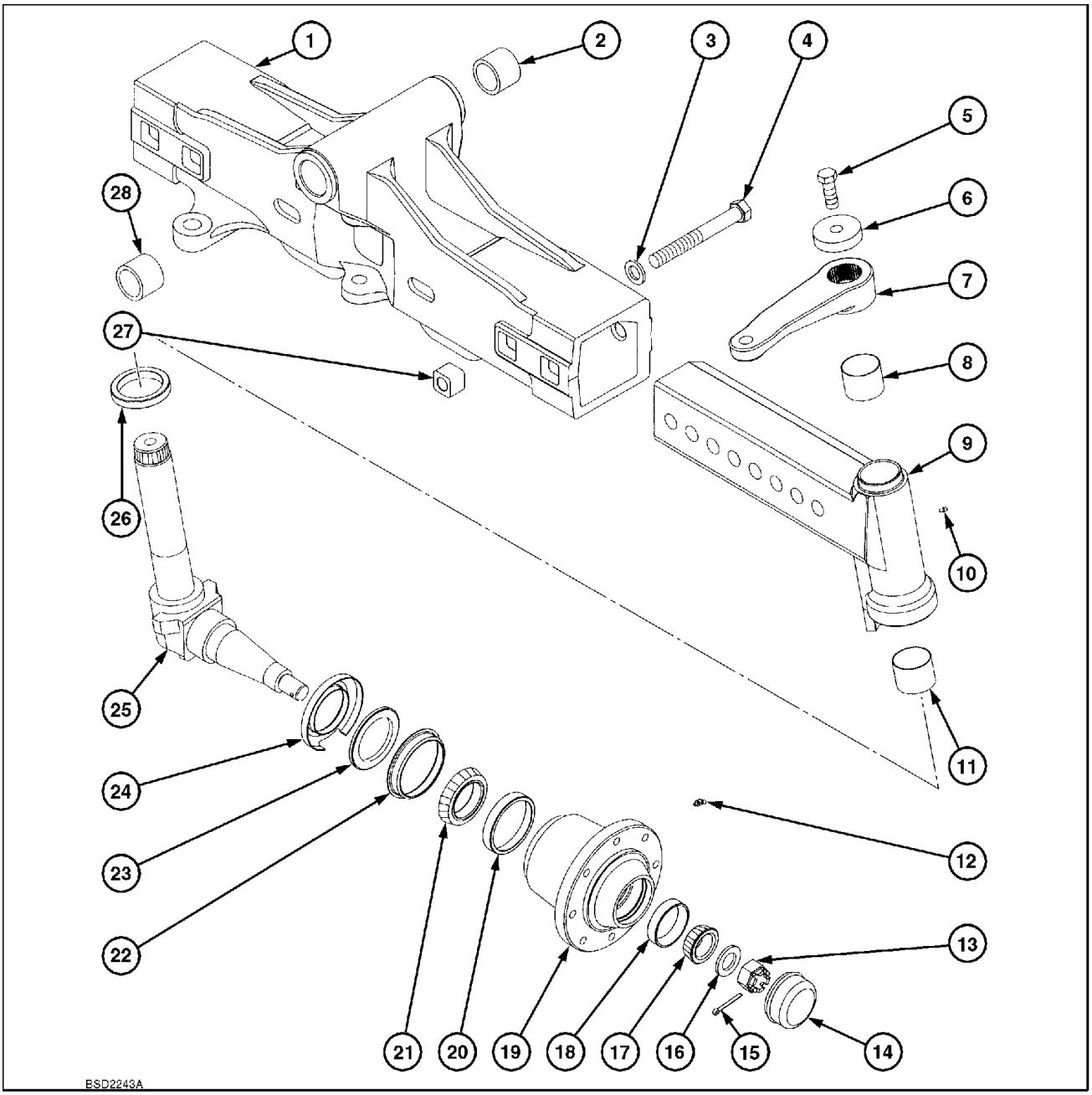
SS07F180 4

PUMA Multicontroller

All-wheel drive and differential lock can be operated manually or in automatic mode. Automatics mode switches the systems on and off automatically depending on the conditions of travel such as wheel speed, steering angle and status of the hydraulic powerlift (differential lock). The parameters for Automatic mode are defined in option H3 in the H menu of the RD module, see **Control module - Configure (A.50.A)**.

Axle - Exploded view Two Wheel Drive axle

PUMA 165, PUMA 180, PUMA 195, PUMA 210

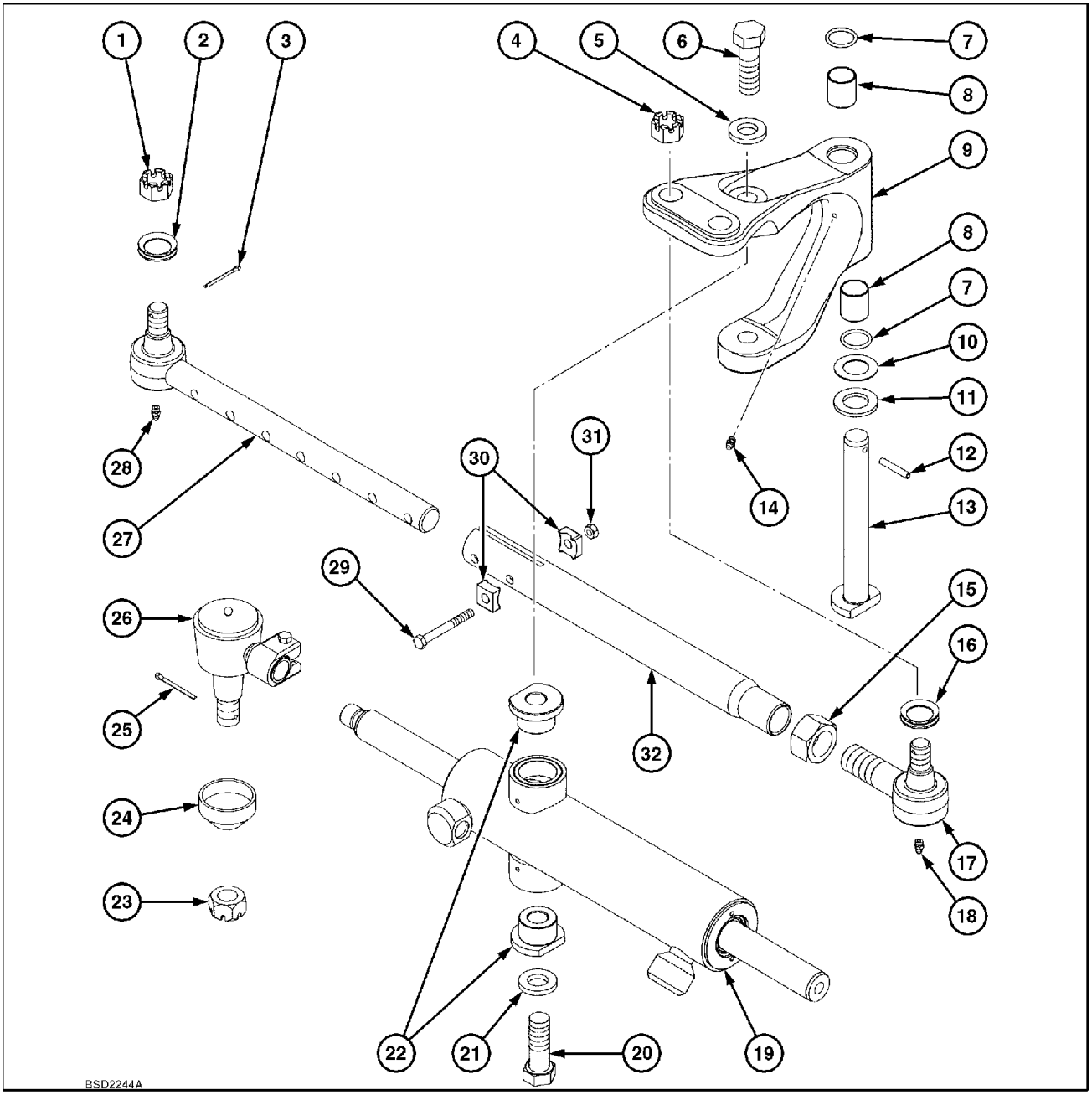


BSD2243A 1

Heavy Duty Front Axle Components

1 Axle Assembly
2 Bushing
3 Washer
4 Bolt
5 Bolt
6 Special Washer
7 Arm
8 Bushing
9 Axle Assembly
10 Grease Fitting
11 Bushing
12 Grease Fitting
13 Nut
14 Cap
15 Cotter Pin
16 Washer
17 Bearing Cone
18 Bearing Cup
19 Hub assembly
20 Bearing Cup
21 Bearing Cone
22 Retainer
23 Seal
24 Protective Shield

25 Spindle Assembly
26 Thrust Bearing
27 Square Nut
28 Bushing



BSD2244A 2

Heavy Duty Axle Tie Rod and Steering Cylinder Components

1 Nut
2 Seal
3 Cotter Pin
4 Nut
5 Washer
6 Bolt
7 O-Ring
8 Bushing
9 Arm assembly
10 Washer
11 Washer
12 Roll Pin
13 Pin
14 Grease Fitting
15 Nut
16 Seal
17 Socket Assembly
18 Grease Fitting
19 Cylinder
20 Bolt
21 Washer
22 Trunnion
23 Slotted Nut
24 Seal
25 Cotter Pin
26 Socket Assembly

27 Socket Assembly

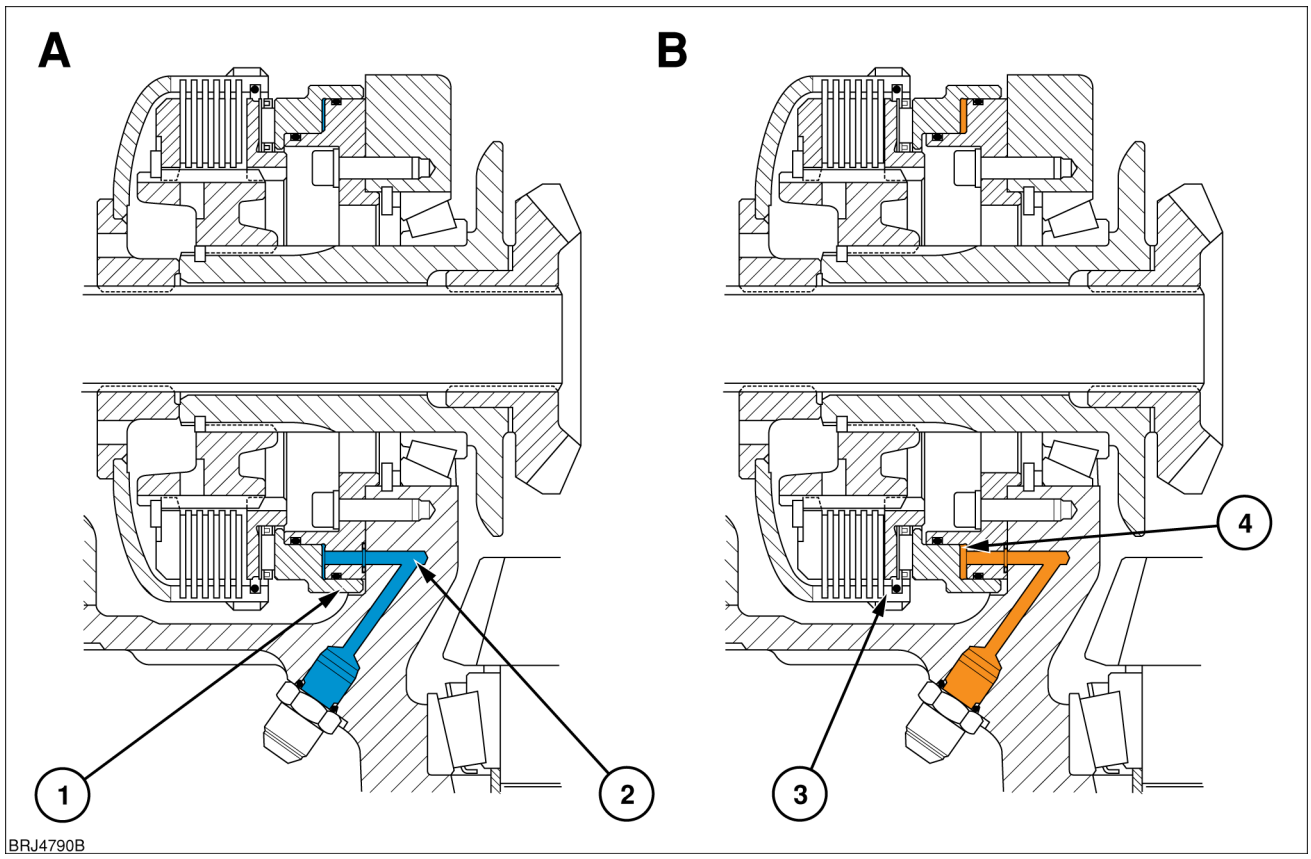
28 Grease Fitting

Axle - Static description Two Wheel Drive

PUMA 165, PUMA 180, PUMA 195, PUMA 210

The two wheel drive front axle is composed of a square tube centre beam with telescopic outer sections. The centre beam is attached to the front axle carrier by means of a single pivot which allows oscillation on both sides. The centre beam and telescopic outer sections are drilled to obtain six possible track settings. Refer to **Axle - Width adjust (D.10.A)**
The axle is controlled by the power steering system through a cylinder attached to the axle housing and the swivel pin control lever. Refer to **Axle - Exploded view (D.10.A)**

Differential lock Multi plate clutch - Dynamic description



BRJ4790BV2 1

A.Front differential lock Disengaged **B.Front differential lock engaged**

Trapped oil

Pressure oil

When the differential lock is disengaged, the solenoid valve is in the discharge position (not energised) and the oil **(2)** is free to return to the sump.
Under these conditions, the clutch piston **(1)** and the drive and driven discs remain separated and the differential lock is disengaged.
When the differential lock switch is activated, the solenoid valve opens and directs oil from the low pressure circuit into the clutch piston **(4)** locking the differential plates **(3)**.

FRONT AXLE - Remove

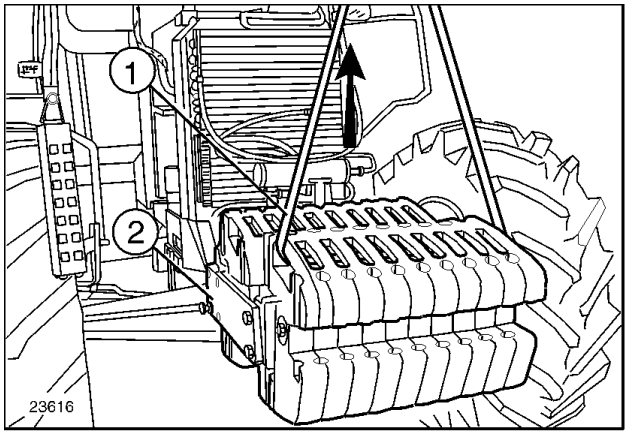
Prior operation:
Disconnect the battery ground (earth) lead, for additional information refer to **Battery - Disconnect (A.30.A)**

⚠ **DANGER** ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

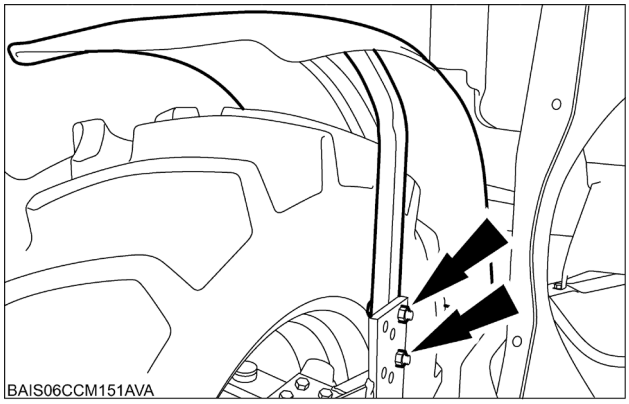
B012

1. If front ballast is fitted, thread a nylon cable **(1)** through the first row of ballast, unscrew support plate **(2)** retaining screws and remove ballast using a hoist.
   Unscrew retaining screws of the second row of ballast and slide them out, one at a time.



23616 1

2. Remove the front fenders (if equipped)

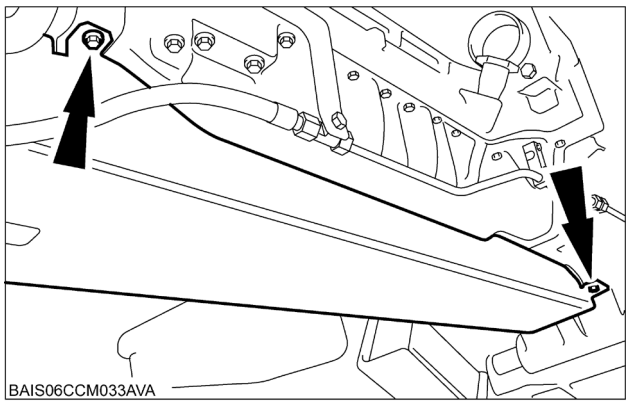


BAIS06CCM151AVA 2

3. Remove the four-wheel drive shaft guard retaining bolts.

NOTE: *Repeat the operation on both sides of the tractor.*

NOTE: *SuperSteer™ axle shown.*

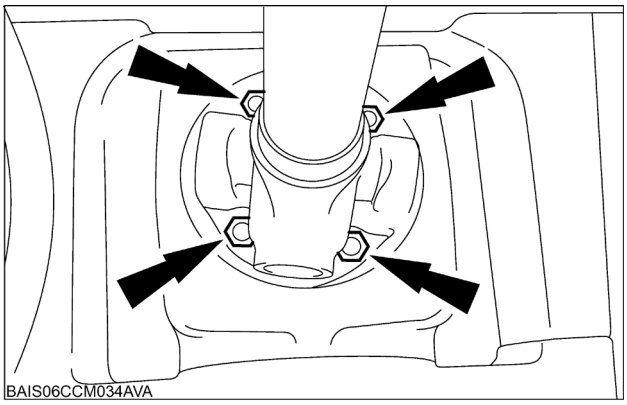


BAIS06CCM033AVA 3

4. Remove the four-wheel drive shaft guard.

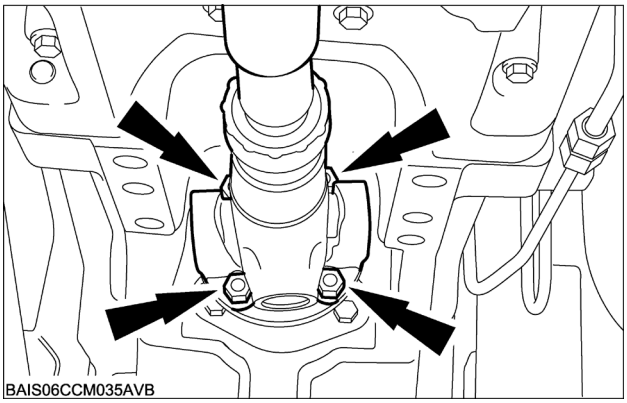
5. Remove the four-wheel drive shaft front retaining nuts.

NOTE: *Support the four-wheel drive shaft.*



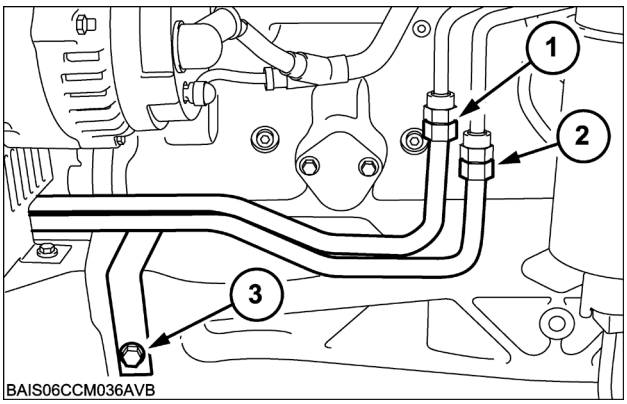
BAIS06CCM034AVA 4

6. Remove the four-wheel drive shaft.



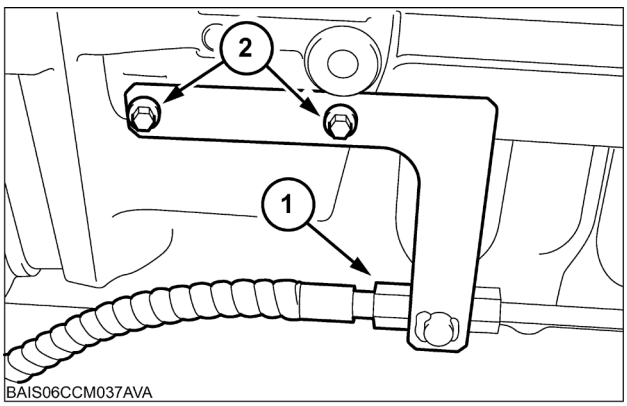
BAIS06CCM035AVB 5

7. Disconnect the steering supply **(1)** and return pipes **(2)**.
   Detach the steering pipe support bracket **(3)**.



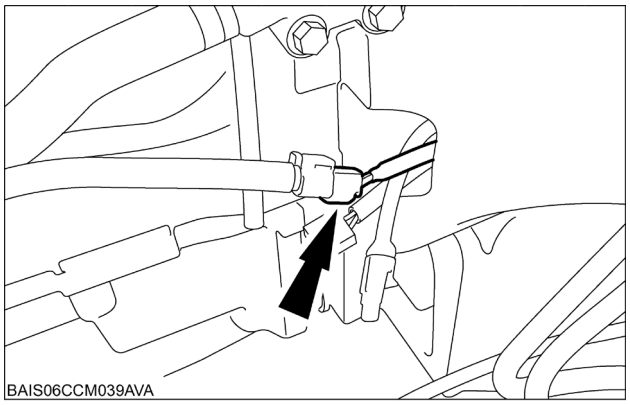
BAIS06CCM036AVB 6

8. Disconnect the differential lock supply hose **(1)**.



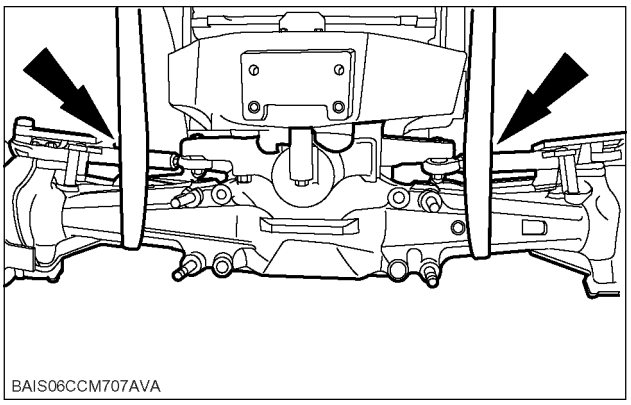
BAIS06CCM037AVA 7

9. Disconnect the steering sensor electrical connector.



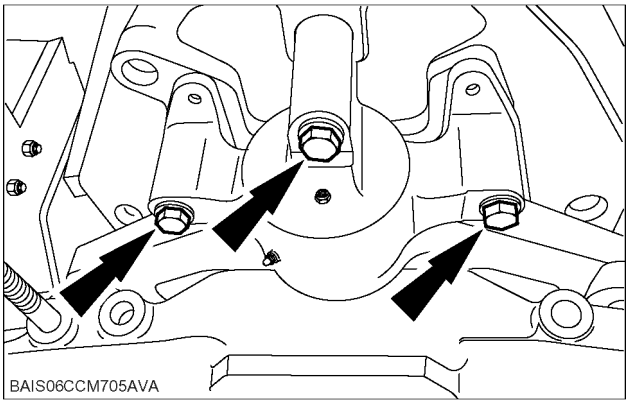
BAIS06CCM039AVA 8

10. Remove the front wheels.
11. Attach the front axle to a suitable hoist using nylon cables.



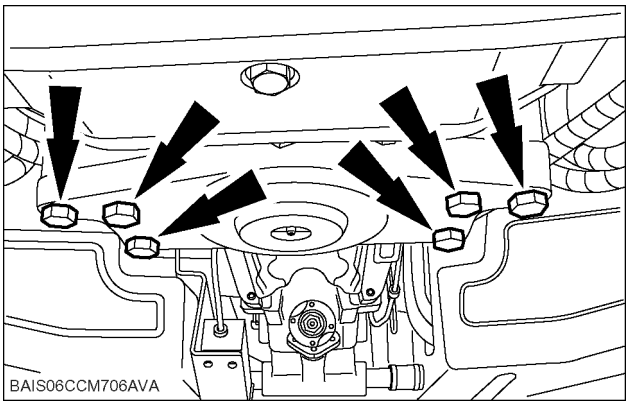
BAIS06CCM707AVA 9

12. Remove the front axle forward retaining bolts.



BAIS06CCM705AVA 10

13. Remove the front axle rear retaining bolts.
Remove the front axle assembly.



BAIS06CCM706AVA 11

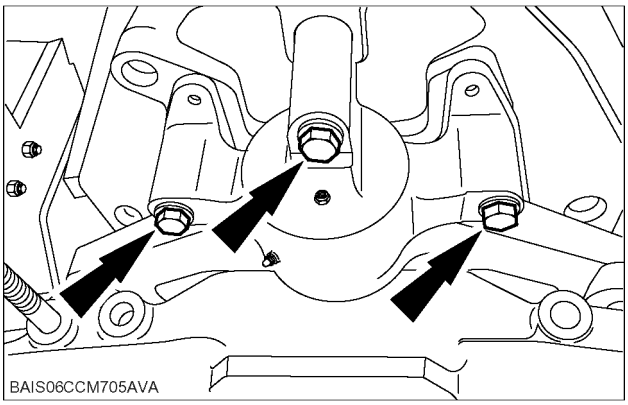
FRONT AXLE - Install

⚠ **WARNING** ⚠

Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

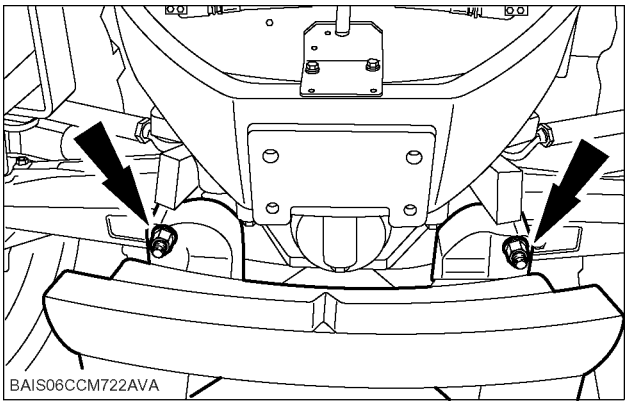
B020

1. Install the front axle forward retaining bolts.



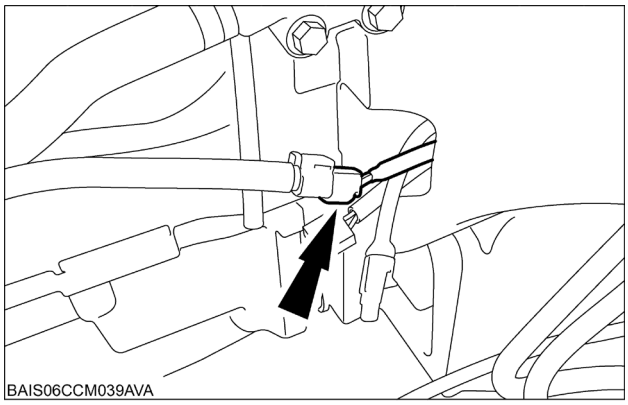
BAIS06CCM705AVA 1

2. Install the front wheels.
   Tighten to the specified torque, for further information refer to **Front wheel - Torque (D.50.C)**
3. Attach the front weight carrier to suitable lifting equipment.
   Install the front weight carrier.



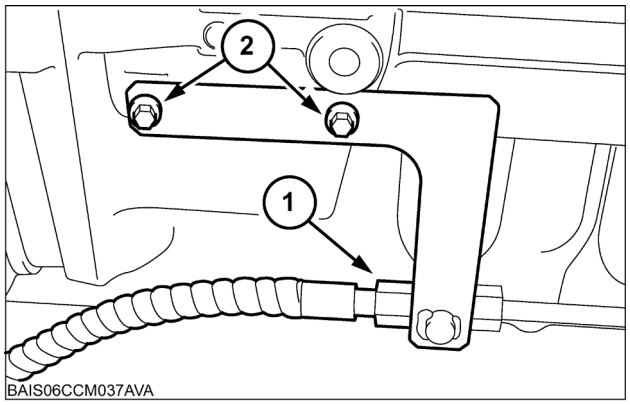
BAIS06CCM722AVA 2

4. Connect the steering sensor electrical connector.



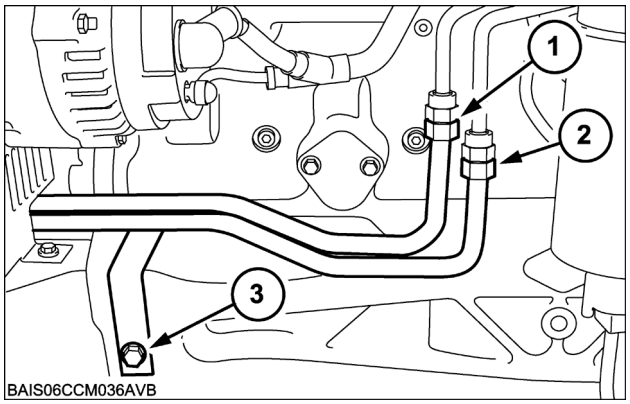
BAIS06CCM039AVA 3

5. Connect the differential lock supply hose **(1)**.



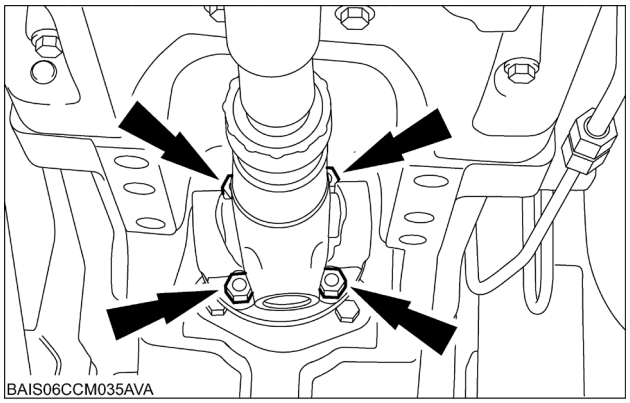
BAIS06CCM037AVA 4

6. Connect the steering supply **(1)** and return pipes **(2)**. Attach the steering pipe support bracket **(3)**.



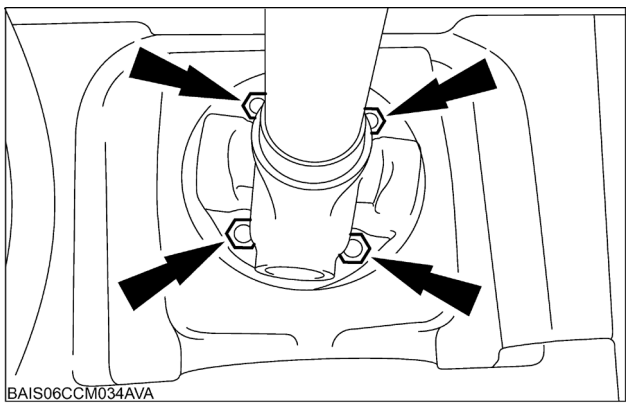
BAIS06CCM036AVB 5

7. Install the four-wheel drive shaft rear retaining nuts. Tighten to **65 - 86 Nm** (**48 - 63 lbft**).



BAIS06CCM035AVA 6

8. Install the four-wheel drive shaft front retaining nuts. Tighten to **65 - 86 Nm** (**48 - 63 lbft**).

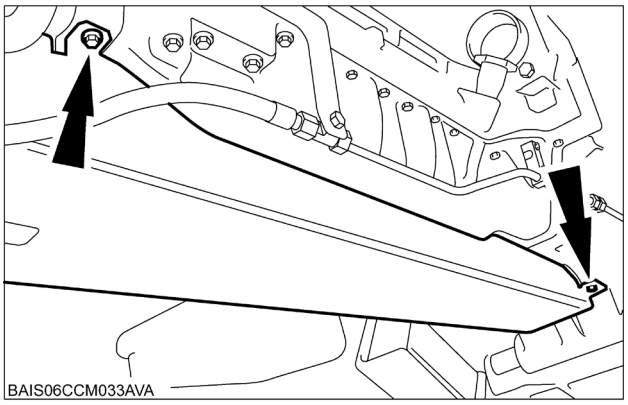


BAIS06CCM034AVA 7

9. Install the four-wheel drive shaft guard.

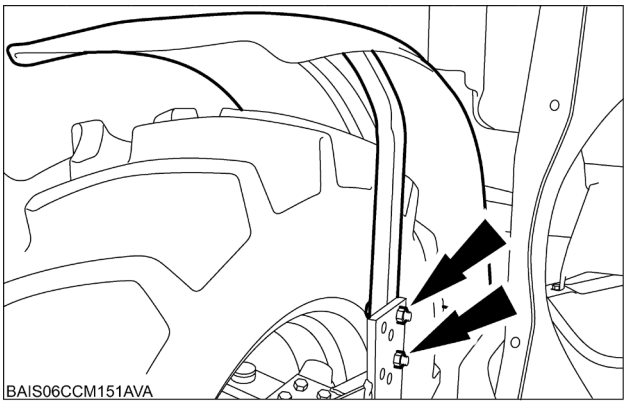
10. Install the four-wheel drive shaft guard retaining bolts.

NOTE: *Repeat the operation on both sides of the tractor.*



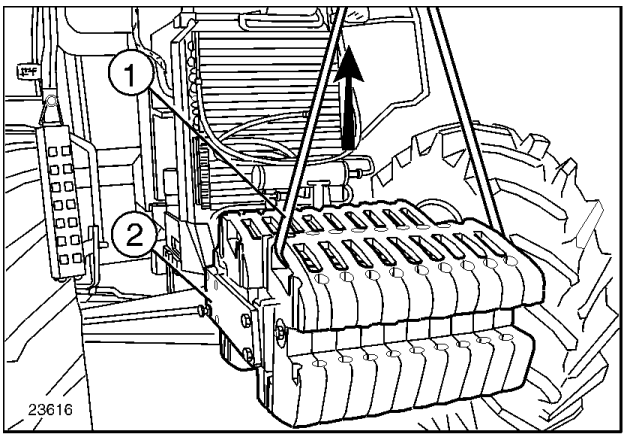
BAIS06CCM033AVA 8

11. Install the front fenders (if equipped)



BAIS06CCM151AVA 9

12. Install the front ballast (if fitted)



23616 10

Next operation:
Connect the battery ground (earth) lead. For further information refer to **Battery - Connect (A.30.A)**.

FRONT AXLE - Calibrate

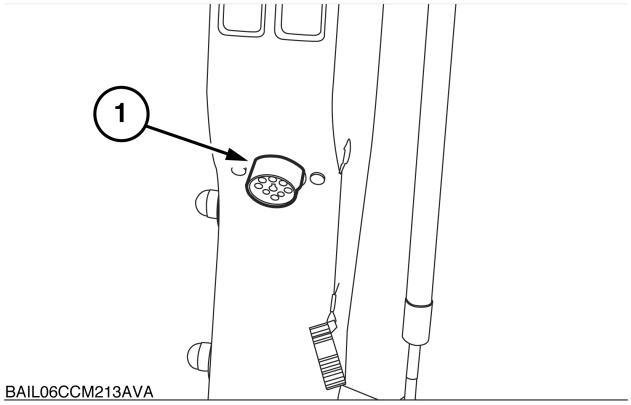
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

Steering angle sensor

NOTE: *The calibration is controlled by the electronic control unit. To prevent the tractor from rolling away inadvertently, do not park the tractor in the vicinity of obstacles, apply the parking brake and chock the front and rear wheels. Before undertaking any work, ensure that the ground speed display is on zero.*

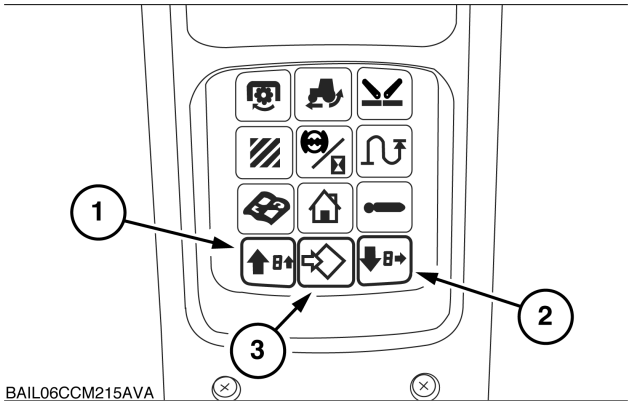
NOTE: *If the vehicle is fitted with the Autoguidance system, make sure the steering angle sensor is connected to the main engine wiring harness rather than the Autoguidance harness while performing the calibration procedure. On completion of the calibration reconnect the steering angle sensor to the Autoguidance harness.*

1. Connect the diagnostics plug **380000843** to the diagnostics socket **(1)**.

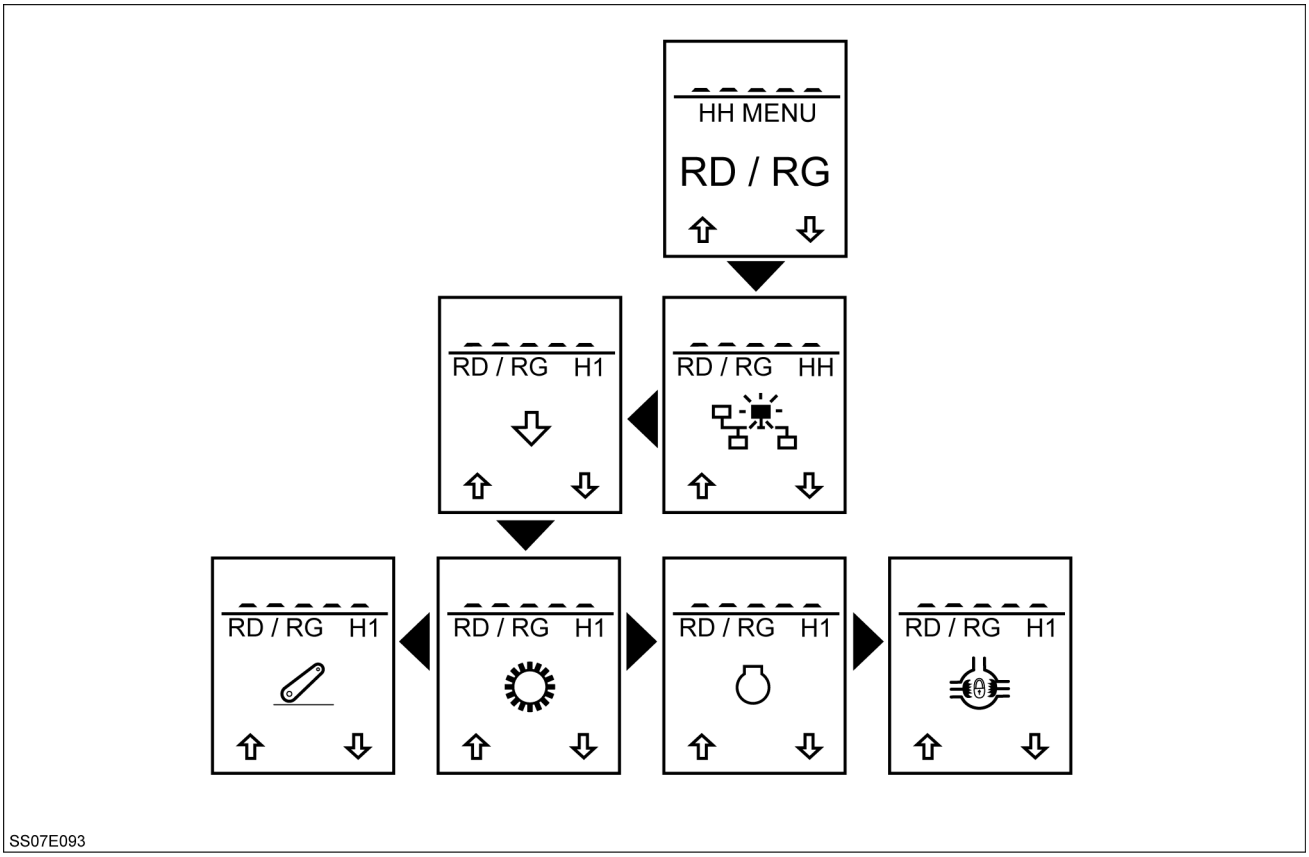


BAIL06CCM213AVA 1

2. Use the "Up" **(1)**button, "Down" **(2)** button and the "Menu" button **(3)** on the ICU2 instrument cluster to scroll through the HH menu until the option H1 and the differential lock symbol appear on the RD/RG control unit.
"CAL" is displayed on the upper section of the display.

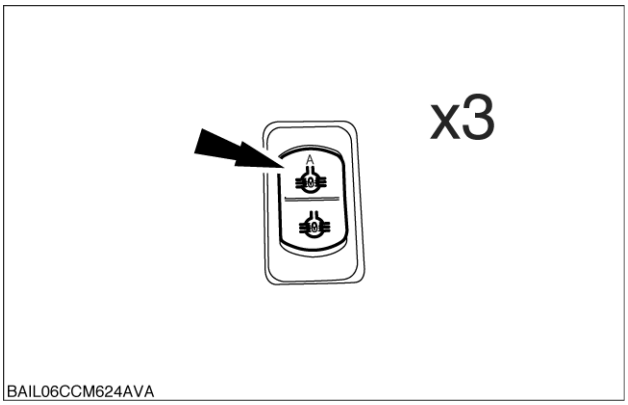


BAIL06CCM215AVA 2



SS07E093 3

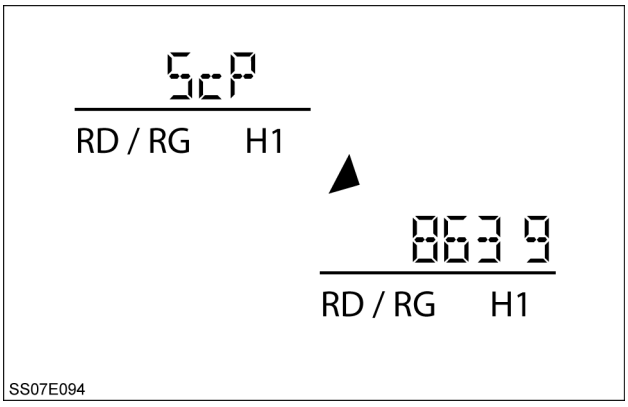
3. Press the automatic differential lock switch three times.



BAIL06CCM624AVA 4

4. On the upper section of the display "ScP" is displayed and the measured voltage of the steering angle sensor is then displayed.

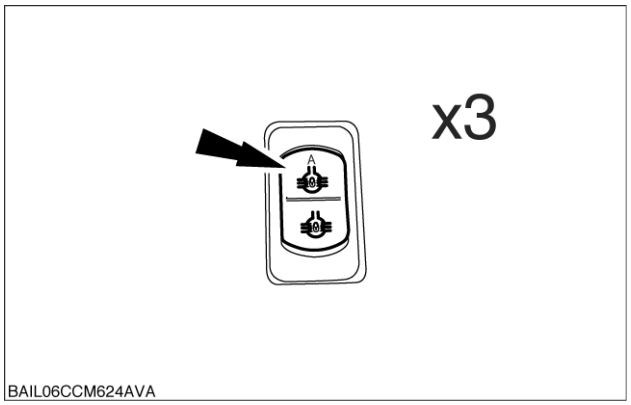
NOTE: *If the display indicates the number "-1", the steering angle sensor option must be activated with the H3 menu, before the steering angle sensor can be calibrated.*



SS07E094 5

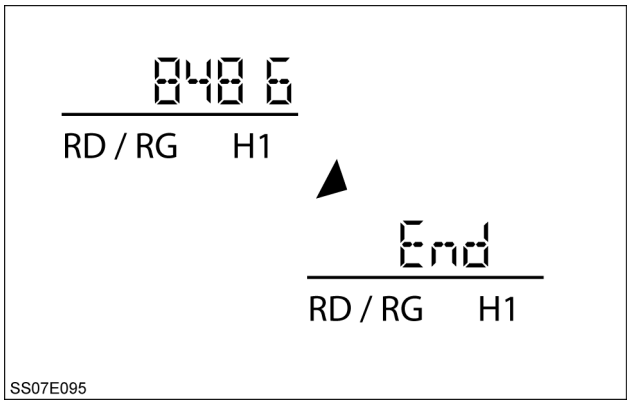
5. Turn the steering wheel so the front wheels are in line with the driveline.

6. Press the automatic differential lock switch three times.



BAIL06CCM624AVA 6

7. The upper section of the display shows the measured value of the steering angle sensor and then "End" to show that the calibration procedure is completed.



SS07E095 7

8. Switch the starter switch to OFF to store the calibration values.

NOTE: *If a fault occurs during calibration, a U code is displayed and the process must be repeated. See the list of the U codes in* ***Control module - Fault code index (A.50.A)****.*

FRONT AXLE - Remove (Suspended Axle)

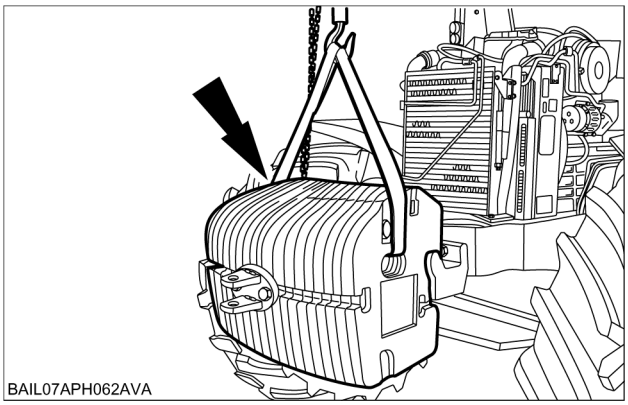
Prior operation:
Disconnect the battery, for further information refer to **Battery - Disconnect (A.30.A)**

⚠ **DANGER** ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

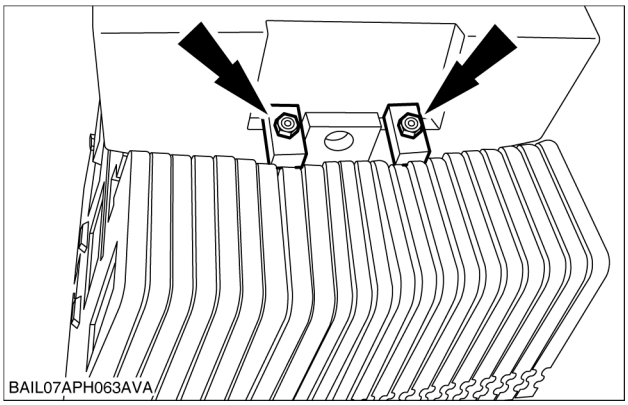
B012

1. Using suitable lifting equipment support the front weights



BAIL07APH062AVA 1

2. Disconnect and remove the front weights from the weight carrier.



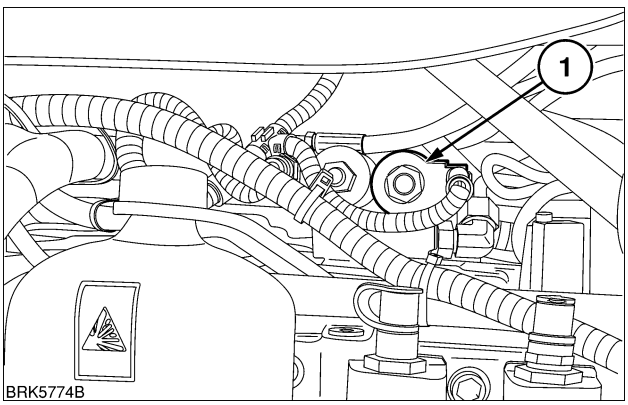
BAIL07APH063AVA 2

⚠ **DANGER** ⚠

Exercise extreme caution when performing tasks on the front suspension system. ALWAYS ensure that the system is depressurised and that the axle is at rest on the support stops.

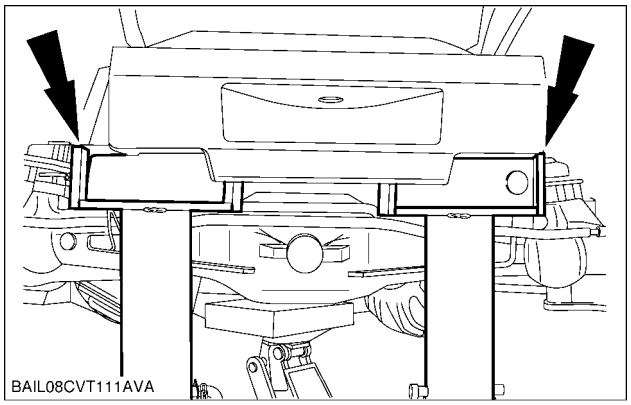
B011

3. Depressurise the suspension system, by rotating knurled knob on the lower solenoid **(1)** counterclockwise, and allow the tractor to lower completely onto the axle stops then rotate the screw clockwise to close the valve.



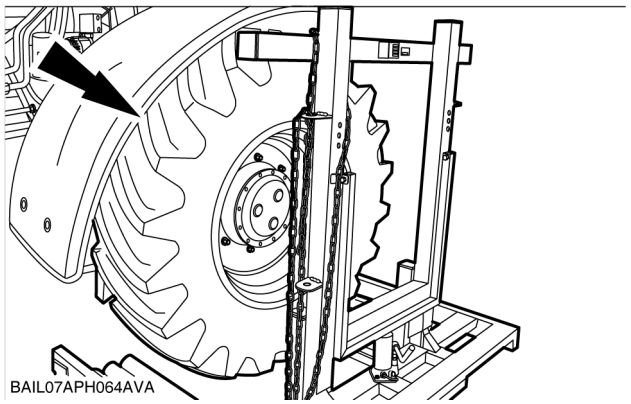
BAIL08CVT029ASA 3

4. Raise and support the front of the vehicle under the front weight carrier.



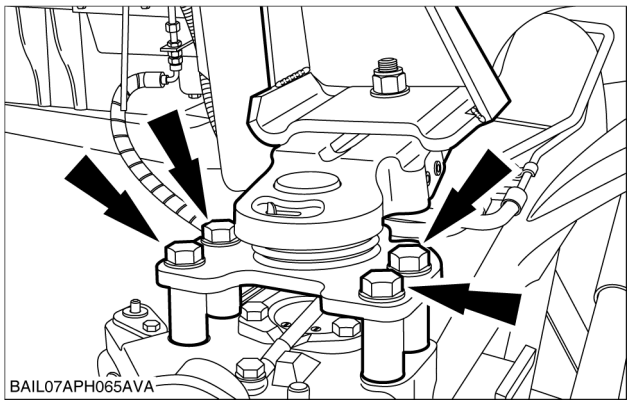
BAIL08CVT111AVA 4

5. Remove both front wheels.



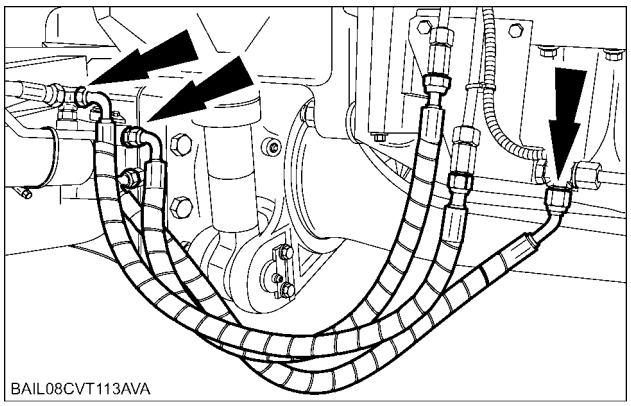
BAIL07APH064AVA 5

6. Remove both dynamic front fenders (if equipped).



BAIL07APH065AVA 6

7. Disconnect the steering supply and return hoses and the differential lock hose.



BAIL08CVT113AVA 7

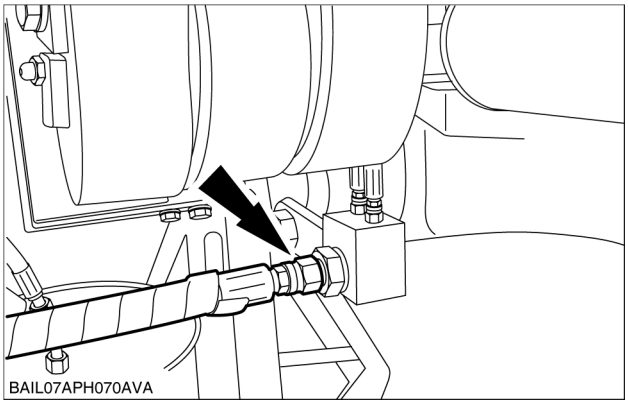
⚠ CAUTION ⚠

The brake accumulator can have a maximum charge pressure of 850 psi. Check for pressure in the accumulator. Remove the pressure in the accumulator before accumulator line is disconnected. Apply the brakes with the pedal approximately 40 times when the engine is off. Loosen the special fitting for removing air from the brakes and push on the brake pedal. If oil flow does not flow from the special fitting, the accumulator is not charged.

M670

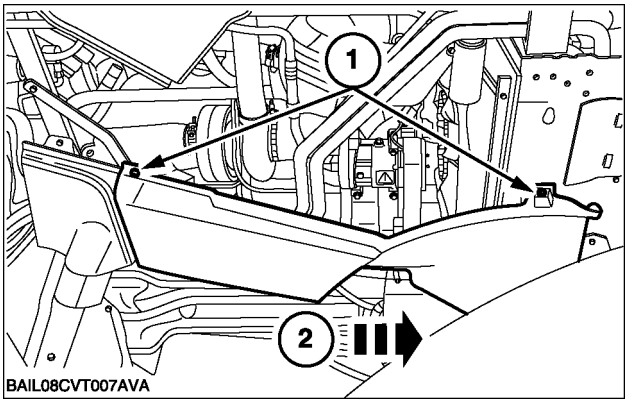
8. Depressurise the front brake accumulator as described above.

9. Disconnect the brake hose from the front axle.



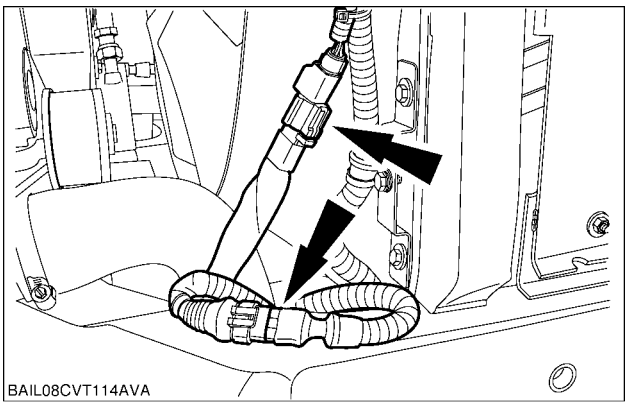
BAIL07APH070AVA 8

10. Remove the right-hand engine shield.



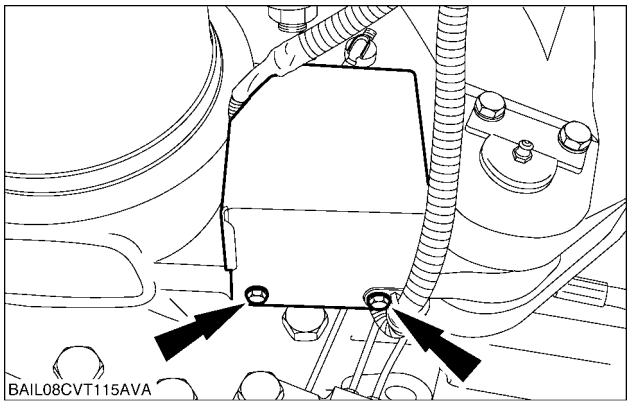
BAIL08CVT007AVA 9

11. Disconnect the steering angle sensor and front axle potentiometer electrical connectors.



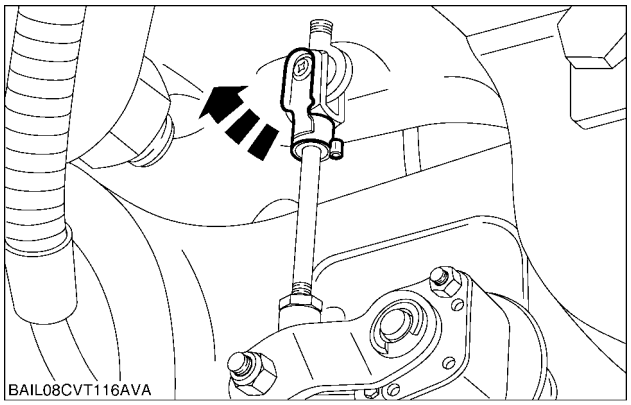
BAIL08CVT114AVA 10

12. Remove the front axle potentiometer cover.



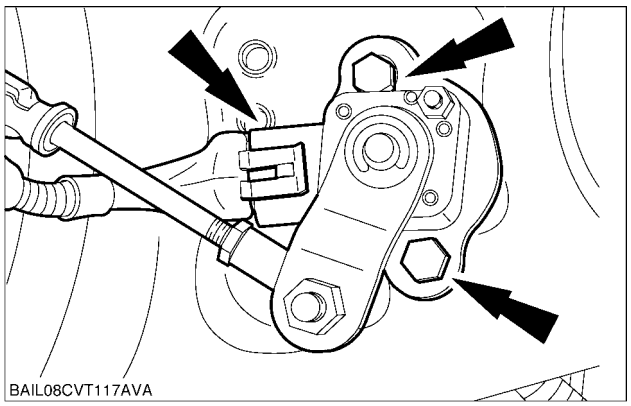
BAIL08CVT115AVA 11

13. Disconnect the front axle potentiometer quick release clip.



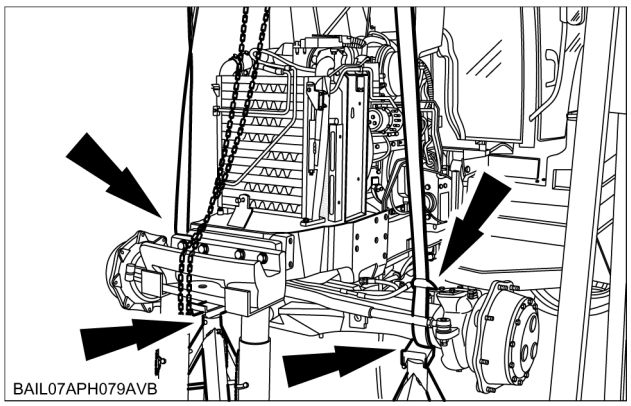
BAIL08CVT116AVA 12

14. Disconnect the potentiometer electrical connector, and remove the potentiometer.
Feed the wiring loom through the tombstone.



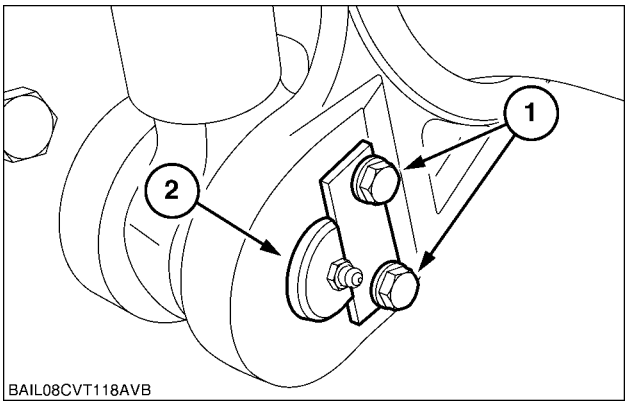
BAIL08CVT117AVA 13

15. Support the front axle with a suitable hoist, and remove the axle stands from under the front axle.



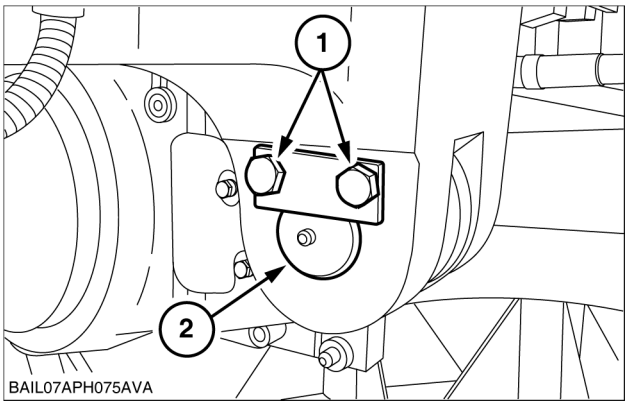
BAIL07APH079AVB 14

16. Remove the left-hand pivot pin retaining plate **(1)** and remove the pivot pin **(2)**.



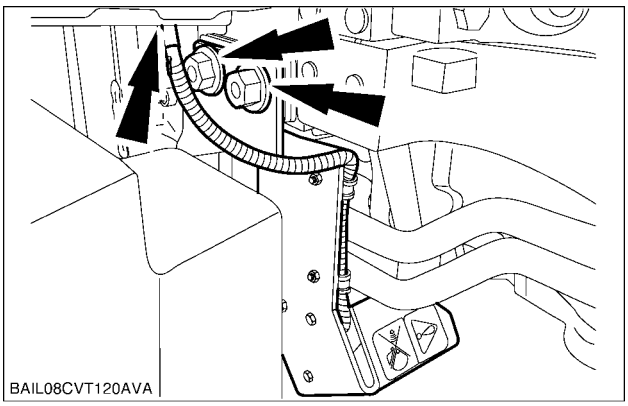
BAIL08CVT118AVB 15

17. Remove the right-hand pivot pin retaining plate **(1)** and remove the pivot pin **(2)**.



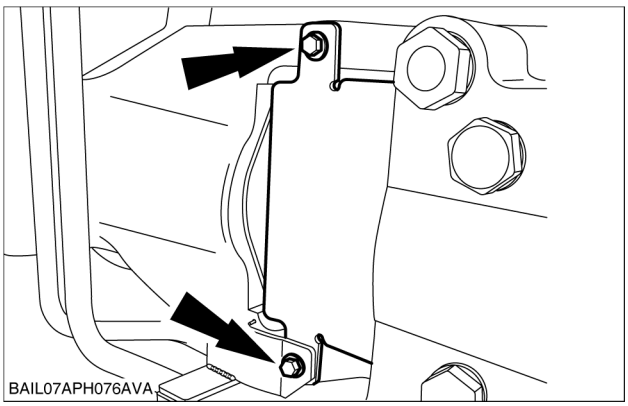
BAIL07APH075AVA 16

18. Disconnect the radar electrical connector and remove the radar.



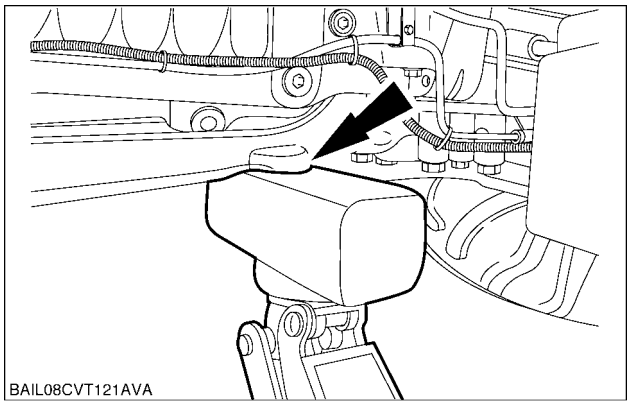
BAIL08CVT120AVA 17

19. Remove the drive shaft cover plate.



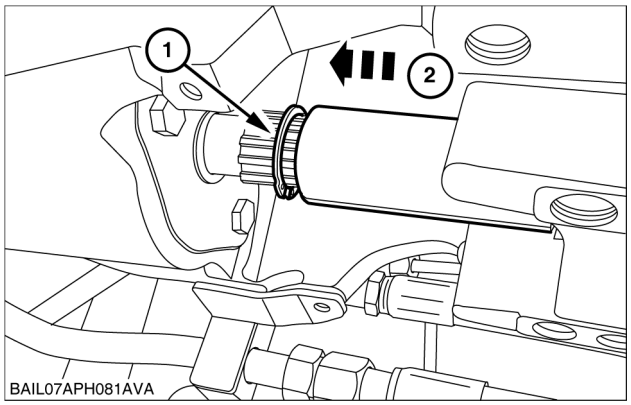
BAIL07APH076AVA 18

20. Support the rear of the front axle suspension arm.



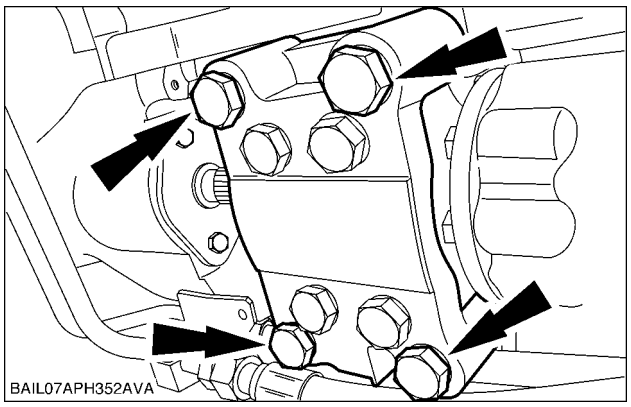
BAIL08CVT121AVA 19

21. Release the circlip (1) and drift the sleeve (2) backwards.



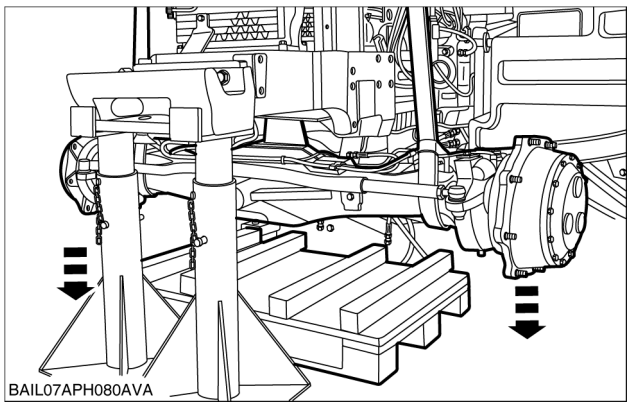
BAIL07APH081AVA 20

22. Remove the drive shaft bearing carrier.



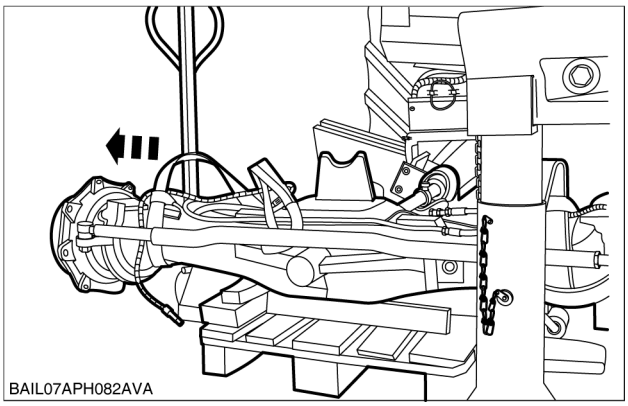
BAIL08CVT352AVA 21

23. Lower the front axle, while supporting the drive shaft and suspension arm.



BAIL07APH080AVA 22

24. Remove the front axle from below the vehicle.



BAIL07APH082AVA 23

FRONT AXLE - Install Suspended Axle

⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

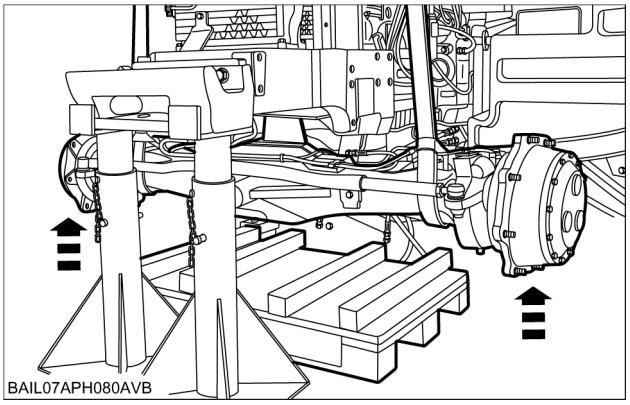
B012

⚠ WARNING ⚠

Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

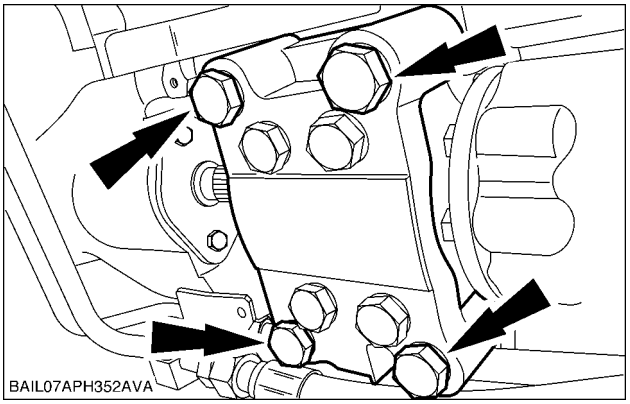
B020

1. Locate the front axle while supporting the drive shaft and suspension arm.



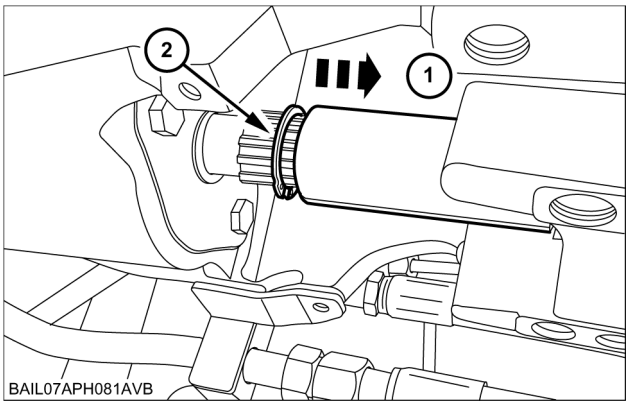
BAIL07APH080AVB 1

2. Install the drive shaft bearing carrier. Tighten to **550 Nm** (**405 lb ft**).



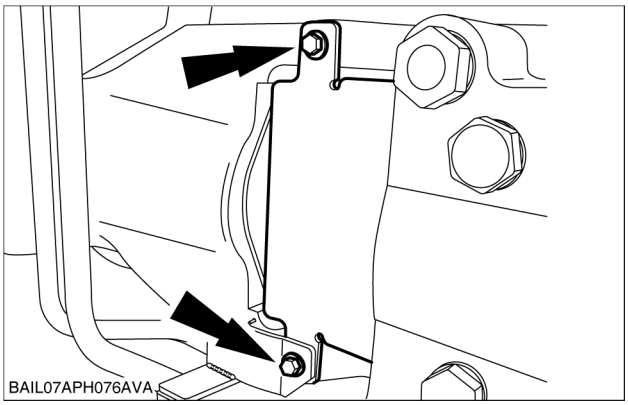
BAIL08CVT352AVA 2

3. Drift the sleeve back onto the drive shaft **(1)** and install the circlip **(2)** .



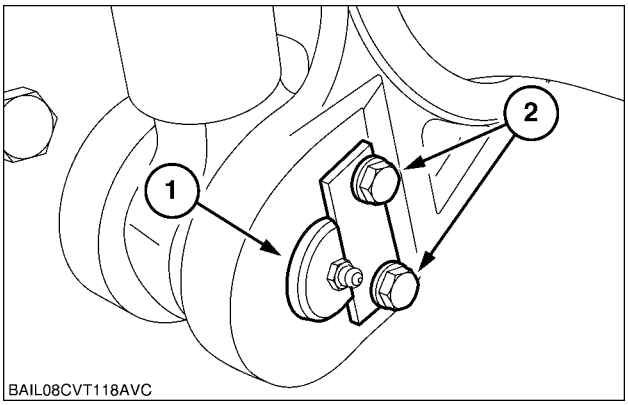
BAIL07APH081AVB 3

4. Install the drive shaft cover plate.



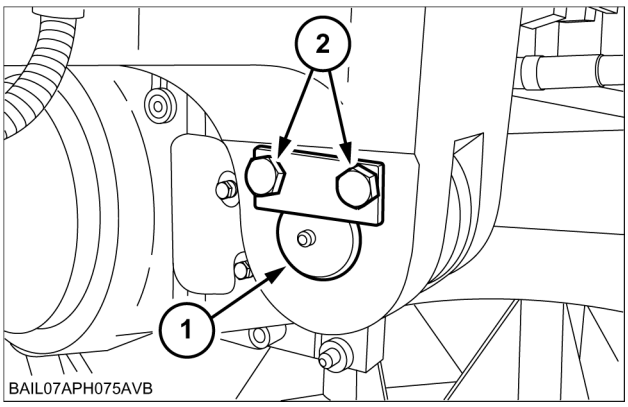
BAIL07APH076AVA 4

5. Install the left-hand pivot pin **(1)** and install the pivot pin retaining plate **(2)**.



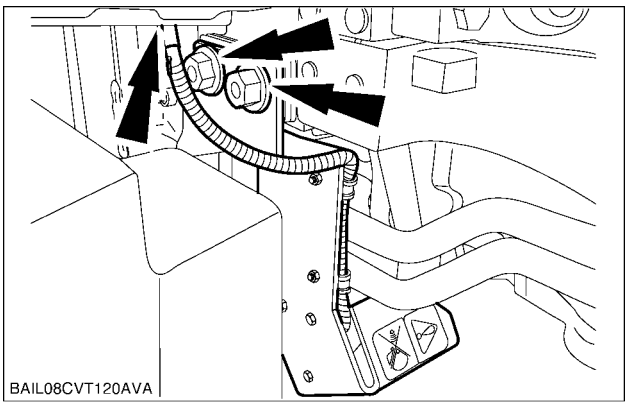
BAIL08CVT118AVC 5

6. Install the right-hand pivot pin **(1)** and install the pivot pin retaining plate **(2)**.



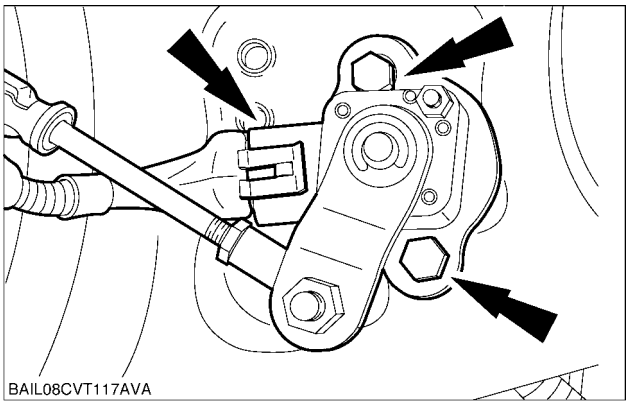
BAIL07APH075AVB 6

7. Install the radar and connect the radar electrical connector.



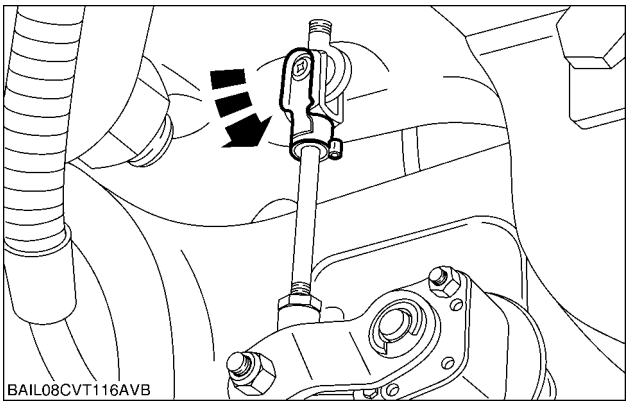
BAIL08CVT120AVA 7

8. Feed the front axle potentiometer wiring loom through the tombstone.
Connect the front axle potentiometer electrical connector.
Install the potentiometer retaining bolts.



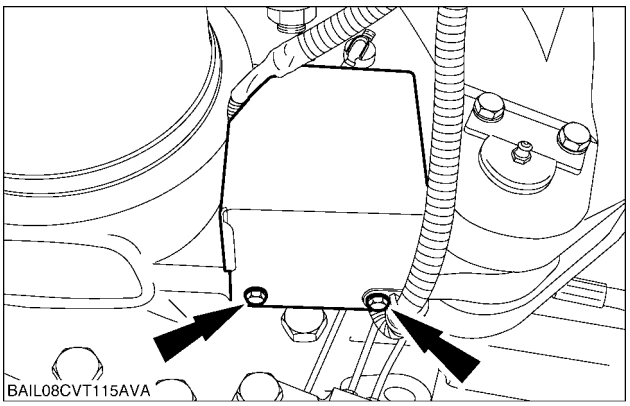
BAIL08CVT117AVA 8

9. Connect the front axle potentiometer quick release clip.



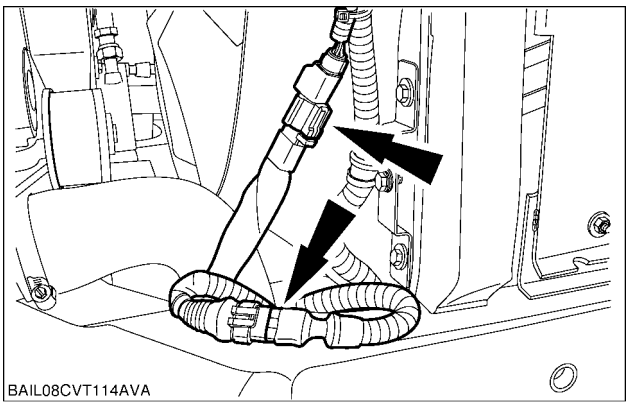
BAIL08CVT116AVB 9

10. Install the front axle potentiometer cover.



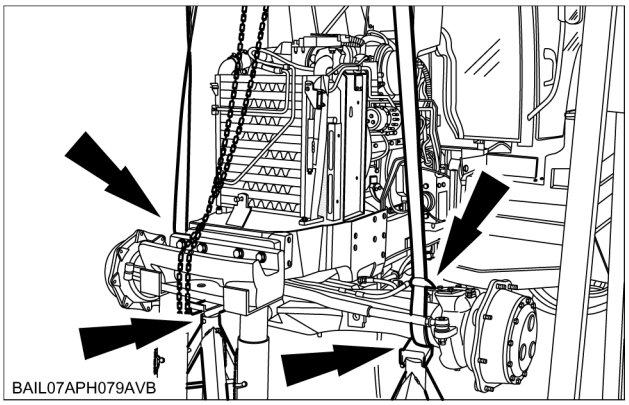
BAIL08CVT115AVA 10

11. Connect the steering angle sensor and front axle potentiometer electrical connectors.



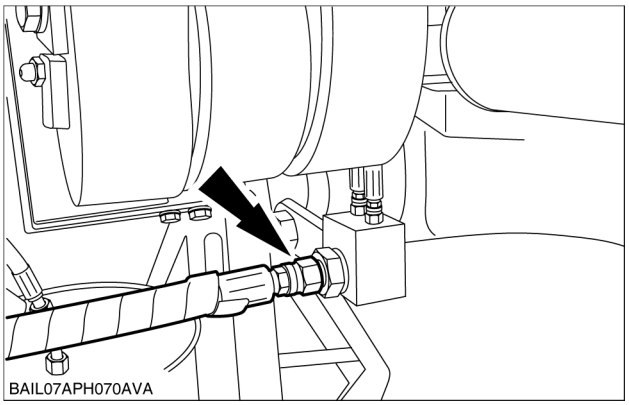
BAIL08CVT114AVA 11

12. Support under the front axle with suitable axle stands and remove the hoist.



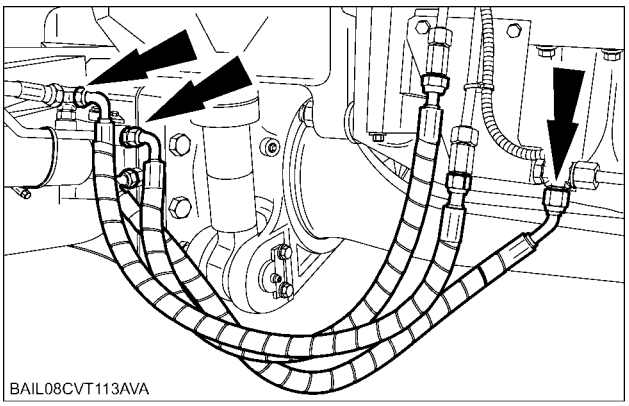
BAIL07APH079AVB 12

13. Connect the brake hose to the front axle.



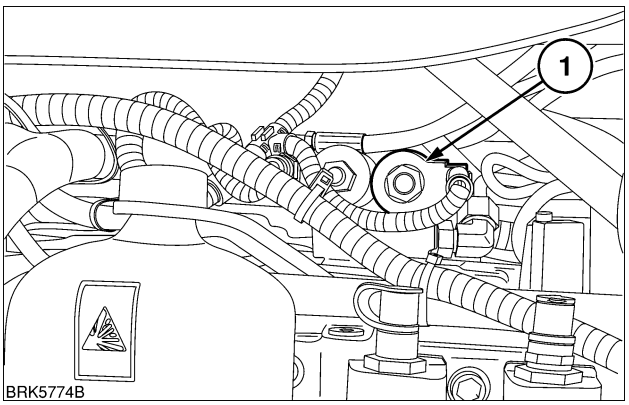
BAIL07APH070AVA 13

14. Connect the steering supply and return hoses and the diff lock hose.



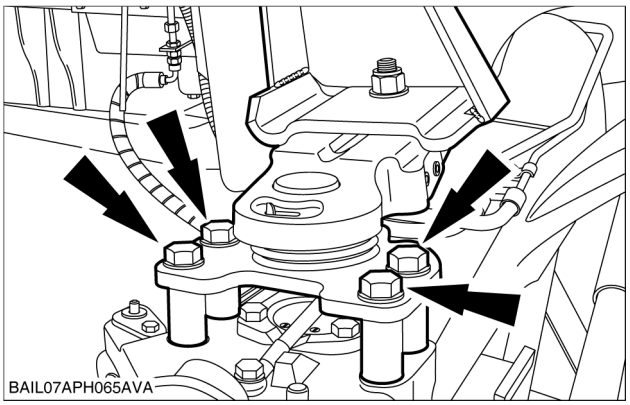
BAIL08CVT113AVA 14

15. Make sure the knurled knob on the suspension lower solenoid **(1)** is fully closed.



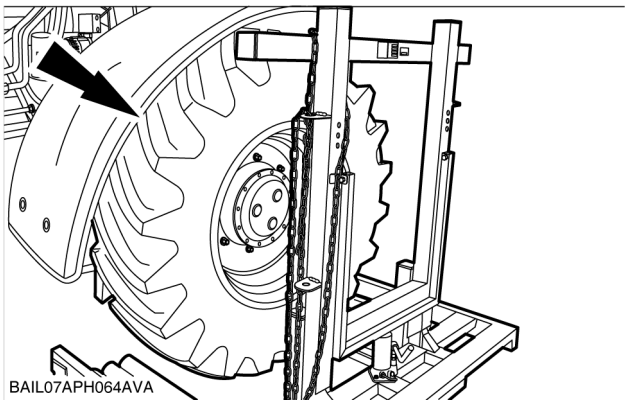
BAIL08CVT029ASA 15

16. Install both dynamic front fenders (if equipped).



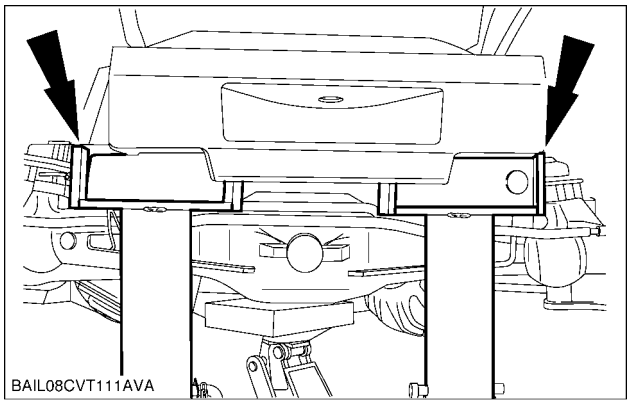
BAIL07APH065AVA 16

17. Install both front wheels.
Tighten to the specified torque, for further information refer to **Front wheel - Torque (D.50.C)**.



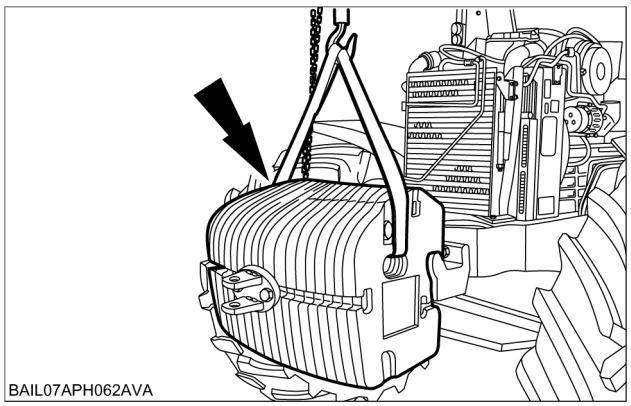
BAIL07APH064AVA 17

18. Raise the front of the vehicle and remove the supports from under the weight carrier.
Lower the vehicle.



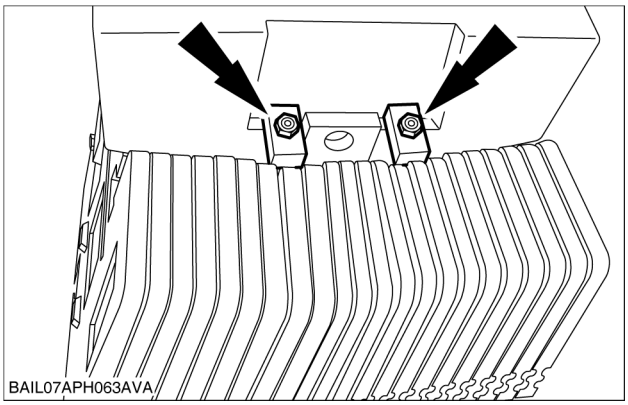
BAIL08CVT111AVA 18

19. Using suitable lifting equipment install the front weights onto the weight carrier.



BAIL07APH062AVA 19

20. Secure the front weights to the weight carrier.



BAIL07APH063AVA 20

Next operation:
Connect the battery, for further information refer to **Battery - Connect (A.30.A)**.

FRONT AXLE - Calibrate

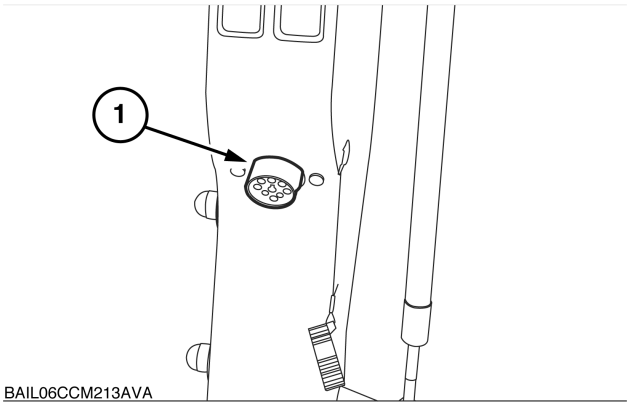
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Steering Angle Sensor

NOTE: *The calibration procedure is controlled by the electronic management system. To prevent inadvertent movement of the tractor, park the tractor away from any obstacles, firmly apply the parking brake and block the rear wheels. Check that the Ground speed display is Zero before commencing.*

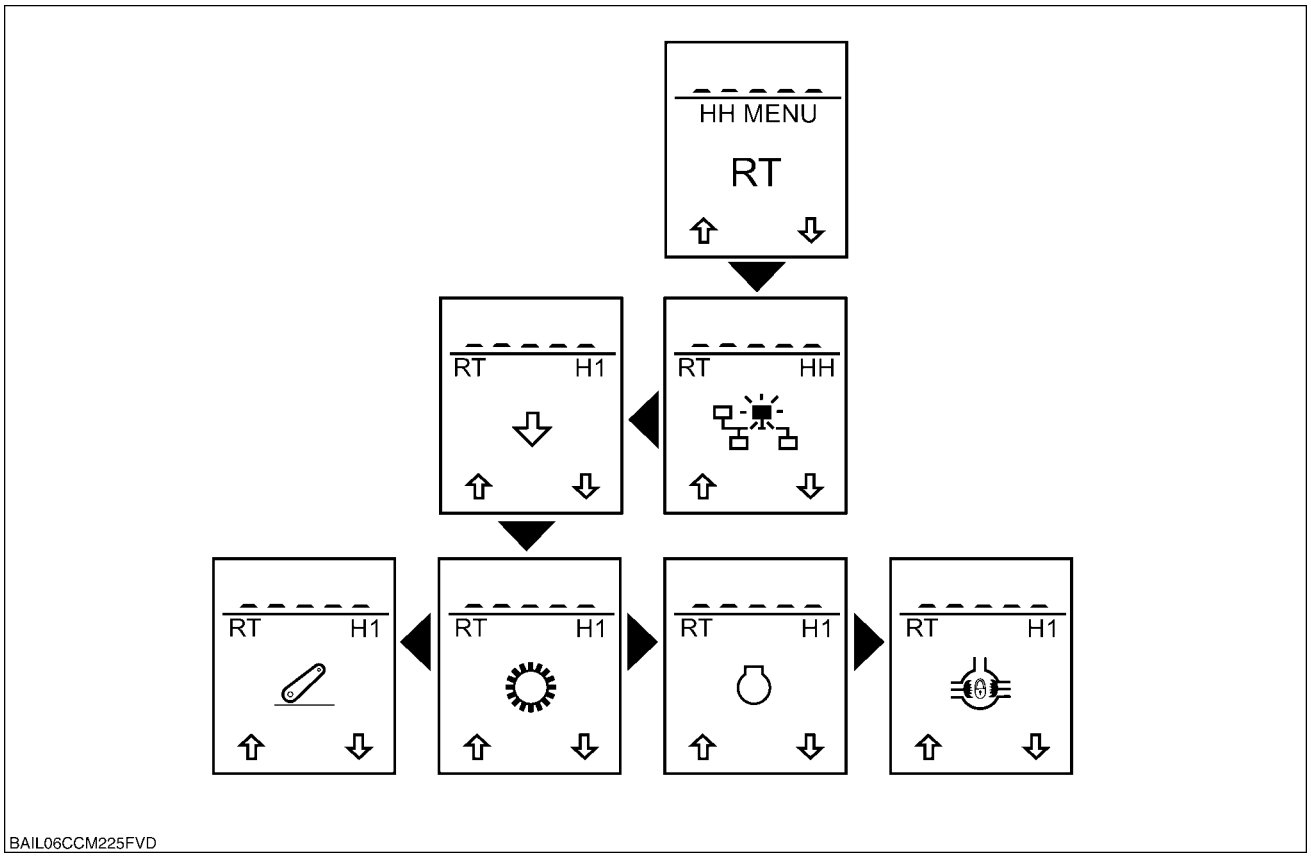
NOTE: *If the vehicle is fitted with AFS AccuGuide™ make sure that the steering angle sensor is connected to the main engine wiring harness rather than the AutoGuidance wiring harness during the calibration procedure. When calibration is complete the steering angle sensor should be reconnected to the AutoGuidance harness.*

1. Install the diagnostic connector **380000843** into the diagnostic socket **(1)**.



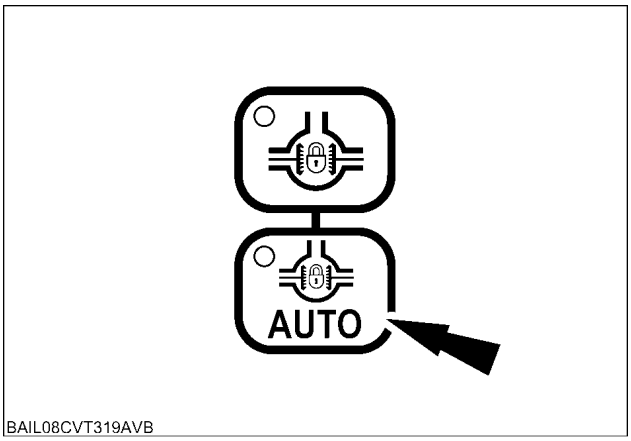
BAIL06CCM213AVA 1

2. Use the "up", "down" and "menu" keys on the ICU3 to navigate the HH menu's to H1 and the Difflock symbol on the RT module.
   The top section of the display will show "CAL".



BAIL06CCM225FVD 2

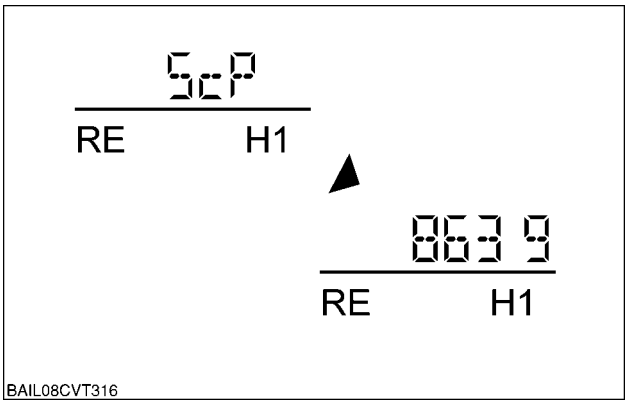
3. Press and hold the Auto Difflock switch for 2 seconds.



BAIL08CVT319AVB 3

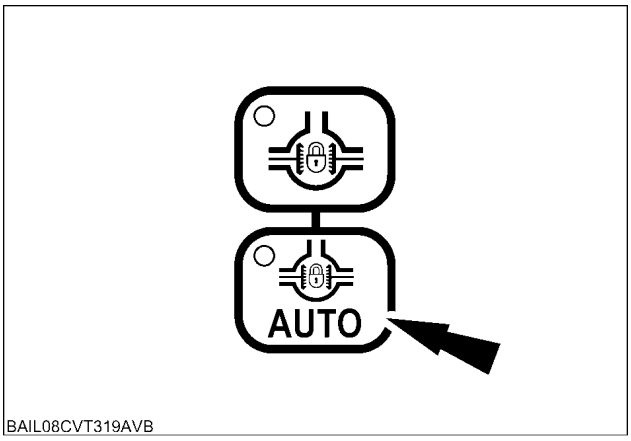
4. The top section of the display will display "ScP" followed by the current steering sensor reading.

NOTE: *If the display shows "-1" then the steering sensor option needs to be enabled using the H3 menu before the steering sensor can be calibrated.*
If the display shows "-2", this indicates an error with the steering angle sensor input to the cluster. Review the associated instrument cluster error codes to determine the cause, for further information refer to ***ELECTRONIC SYSTEM - Fault code index (A.50.A)****.*



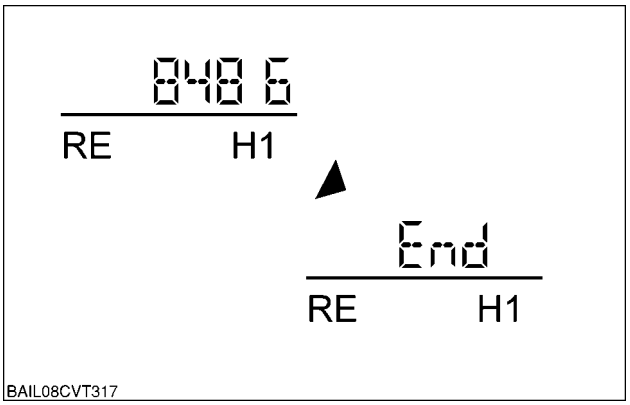
BAIL08CVT316 4

5. Turn the steering wheel so that the front wheels are in line with the drive line.
6. Press and hold the Auto Difflock switch for 2 seconds to confirm the steering angle position.



BAIL08CVT319AVB 5

7. The top section of the display will show the calibrated steering sensor value and then "End" to indicate the calibration procedure has been completed.



BAIL08CVT317 6

8. Key OFF to store the calibration values.

NOTE: *There are no 'U' codes available for this calibration procedure.*

Axle - Remove Two Wheel Drive

PUMA 165, PUMA 180, PUMA 195, PUMA 210

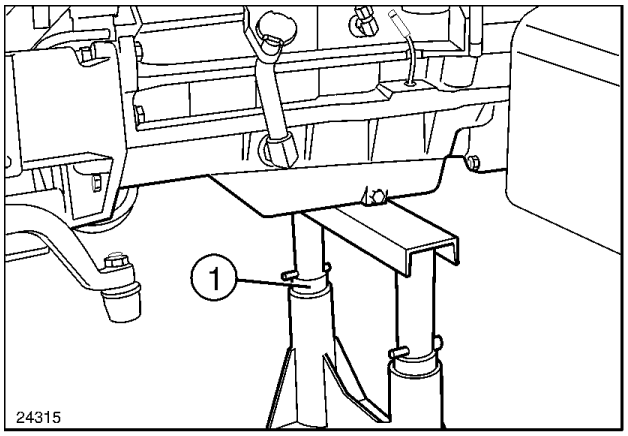
⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012

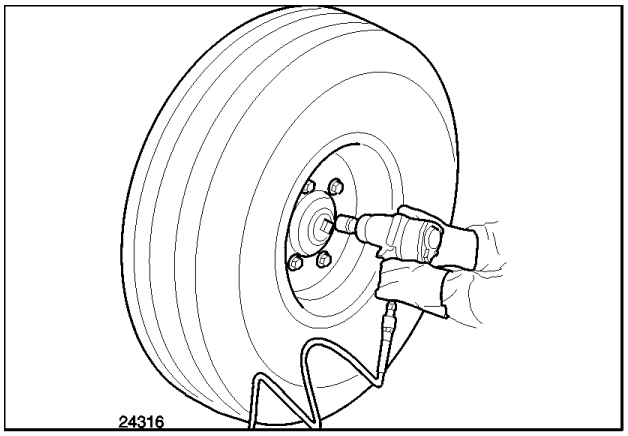
1. Disconnect the negative cable from the battery and insulate. Refer to **Battery - Disconnect (A.30.A)**
   Safely block rear wheels.
   Remove front weights and weight support, where fitted.

2. Jack up front of tractor and place a stationary stand **(1)** under the sump.



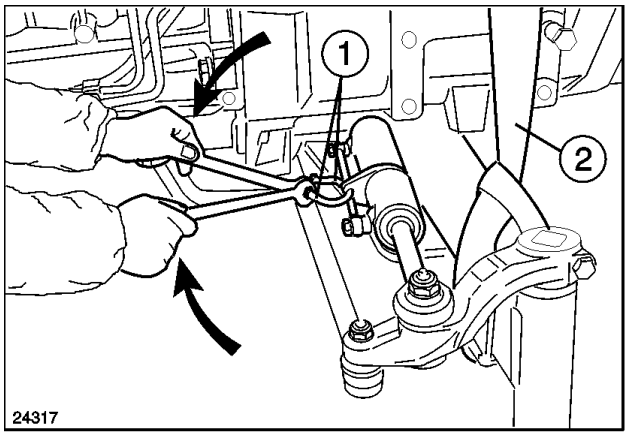
24315 1

3. Loosen retaining bolts and remove front wheels.



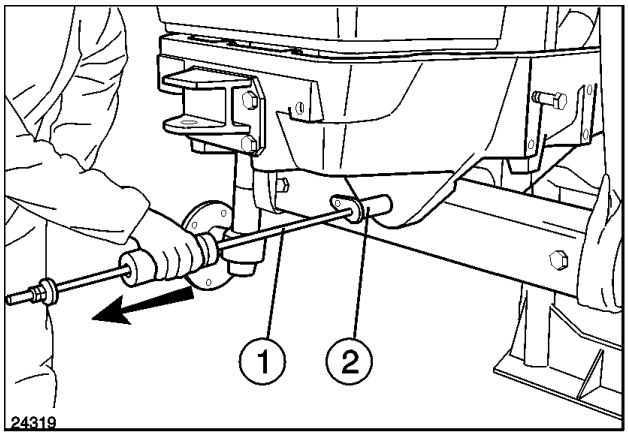
24316 2

4. Connect axle to a hoist using two nylon cables **(2)** (one on each side). Disconnect steering cylinder control lines **(1)**.



24317 3

5. Using a slide puller **(1)** on the pivot pin **(2)** withdraw the pivot pin.



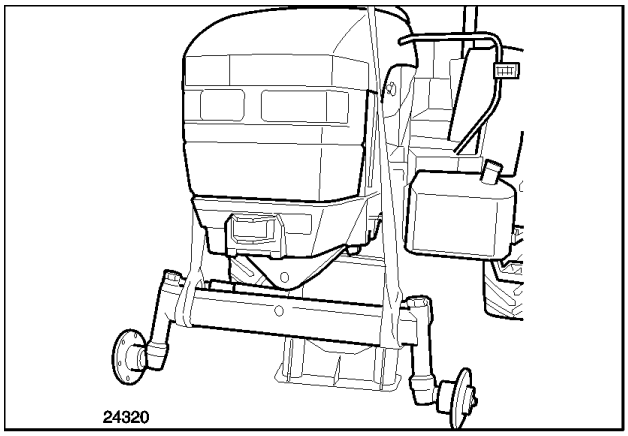
24319 4

6. Remove front axle using a hoist.

⚠ WARNING ⚠

Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

B020



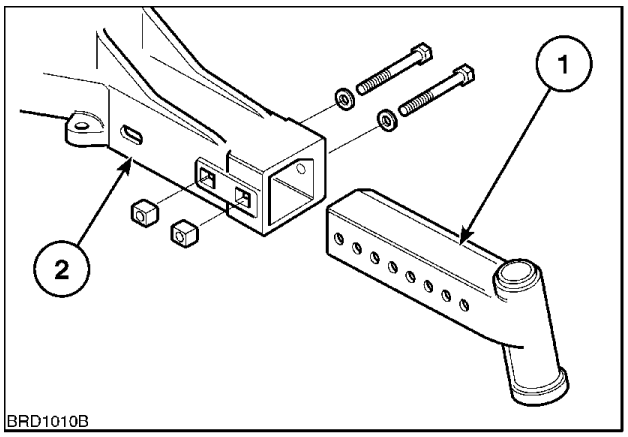
24320 5

Next operation:
Spindle drive - Remove (D.10.A)

Axle - Width adjust Two Wheel Drive

PUMA 165, PUMA 180, PUMA 195, PUMA 210

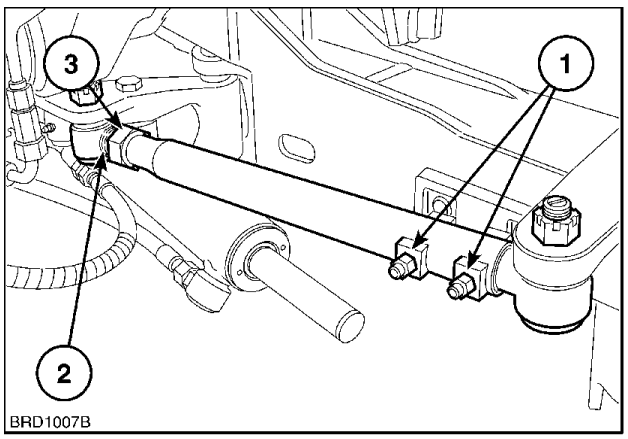
1. To alter the track setting, apply the handbrake and block the rear wheels. Jack up the front axle and place on axle stands. Remove the nuts, bolts and washers securing the right-hand telescopic section **(1)** to the centre beam **(2)**. Repeat on the left-hand side of the axle.



BRD1010B 1

2. The two adjustable track control rods consist of a hollow tube that is attached to the central steering pivot, and a solid, extendible rod that attaches to the steering arm on the kingpin. Each control rod has a number of adjustment holes at **50 mm**(**2 in.**) intervals.

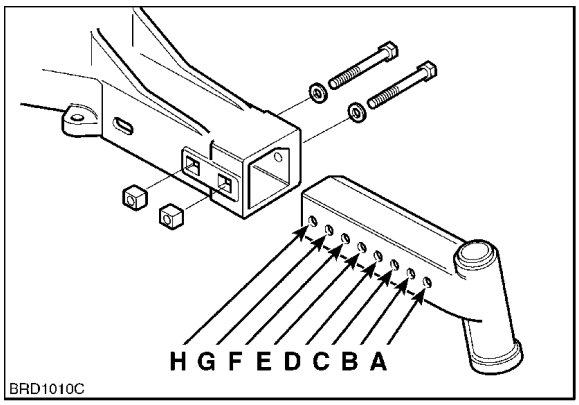
3. The two locating bolts **(1)**, pass through the hollow tube and the holes in the extendible rod, locking the track rod assembly at the desired length. Additionally, the inner ends of each track rod have a threaded section **(2)**, and locknut **(3)**, to provide fine adjustment.
   Remove the locating bolts **(1)** from the both track rods. This will permit the track rods to extend or retract freely.



BRD1007B 2

4. Reset the left and right-hand axle telescopic sections, passing the securing bolts through the centre beam and telescopic sections, as indicated in Figure **3** and table below:
   Tighten the nuts on the axle extension securing bolts to **530 - 950 Nm** (**391 - 701 lbf.ft.**).

NOTE: *If the outer locating bolt on the axle is in the fourth hole from the kingpin, then the outer bolt on the track control rod must also be in the fourth hole from the outer end of the control rod.*



BRD1010C 3

Track Settings (11.0 x 16 tyres)

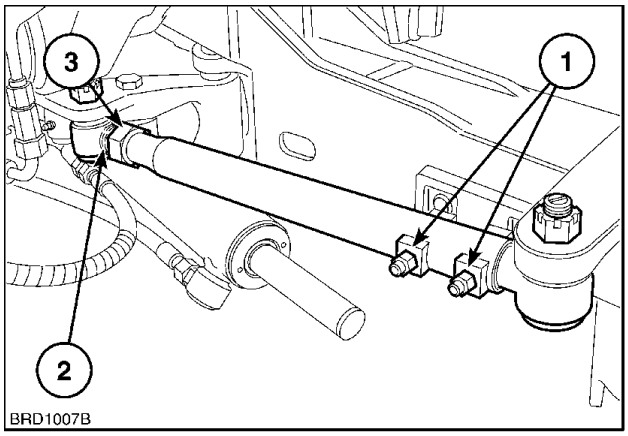
Track Setting		Securing Bolt Locations	
mm	(in.)	Refer to Figure **3**	
1549	(61.0)	A	C
1651	(65.0)	B	D
1752	(69.0)	C	E
1854	(73.0)	D	F
1955	(77.0)	E	G
2057	(81.0)	F	H

Track Settings (14L x 16.1 tyres)

Track Setting		Securing Bolt Locations	
mm	(in.)	Refer to Figure **3**	
1574	(62.0)	A	C
1676	(66.0)	B	D
1778	(70.0)	C	E
1879	(74.0)	D	F
1981	(78.0)	E	G
2082	(82.0)	F	H

5. With both front wheels parallel, reinstall the locating bolts **(1)** in the nearest aligning holes in the track control rod. Tighten the nuts on the locating bolts to **50 - 68 Nm** (**40 - 50 lbf. ft.**).

IMPORTANT: *The front wheel discs are offset relative to the centre line of the rim. The track settings in the table above are with the deeply dished side of the wheel nearest the axle hub. If the front wheels are reversed on the hubs each track setting will be increased by approximately* ***203 mm*** *(* ***8.0 in****.).*

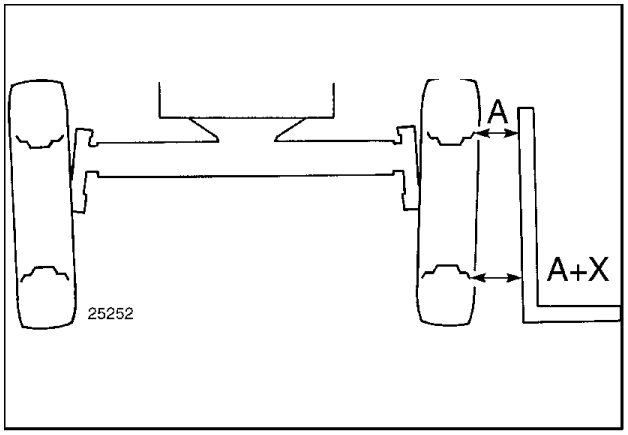


BRD1007B 4

Axle - Check Two Wheel Drive

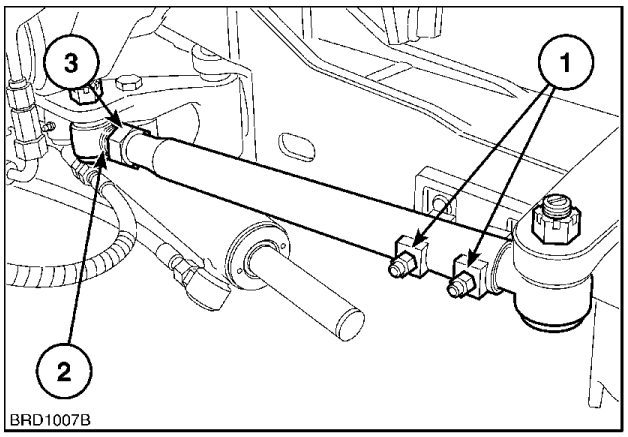
PUMA 165, PUMA 180, PUMA 195, PUMA 210

1. Wheel camber test
   Check the front wheel camber considering that, when the tractor moves along a straight line, wheels should be tilted by **2 °** relative to the ground, corresponding to a difference (X) of approximately **15 mm** between the rim edges (with **16 in** rims).



25252 1

2. Front Wheel Toe–in alignment
   Toe–in Setting **3 - 9 mm** (**0.118 - 0.354 in**)
   To adjust the toe-in setting first loosen the locknut **(3)** on the inner end of the track rod. Remove the two clamp bolts **(1)** to allow the track rod tube to be rotated. To increase toe-in the track rod must be lengthened.
   After adjusting, replace the two bolts **(1)** and tighten to **54 - 68 Nm** (**40 - 50 lbf.ft.**). Retighten the lock nut **(3)** to **271 - 305 Nm.**, and check the toe-in setting again.
   If the toe–in setting requires considerable adjustment, both track control rods should be moved by the same amount to ensure the steering action remains centralised.



BRD1007B 2

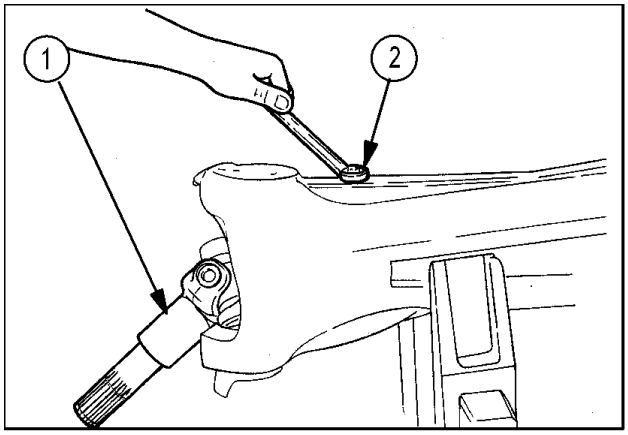
NOTE: *Operators should ensure that all steering components are maintained in a reliable and satisfactory condition to ensure safe operation and comply with legal requirements.*

Axle shaft - Remove

PUMA 165, PUMA 180, PUMA 195, PUMA 210

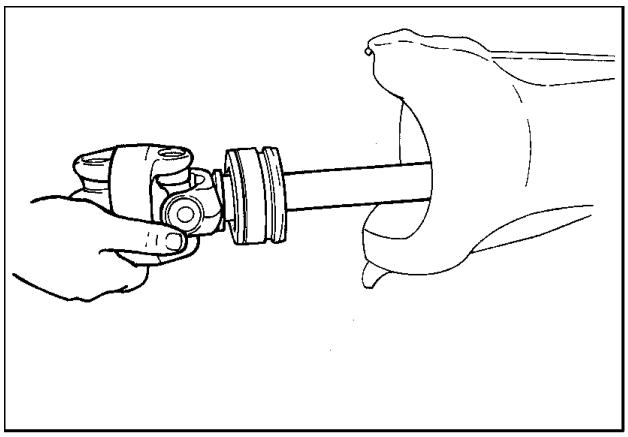
Prior operation:
Hub - Remove (D.10.A).

1. Release the locking nut and loosen the retaining bolt **(2)** holding the axle shaft **(1)**.



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2. Remove the axle shaft from the casing.
   To disassemble the right-hand final drive unit, follow the same procedure as the left hand final drive unit.



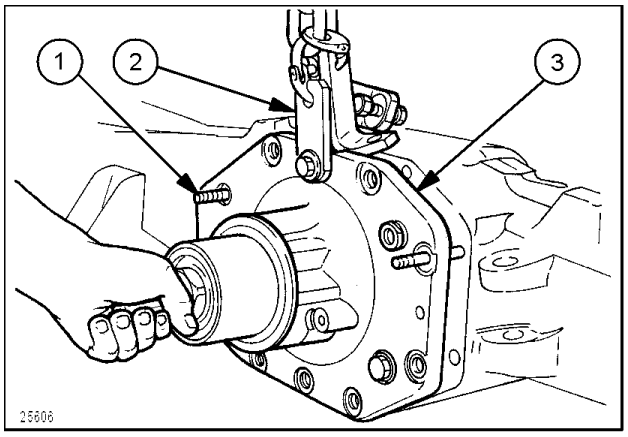
1b0o2004061018 2

Next operation:
Differential - Remove (D.10.A).

Differential - Remove

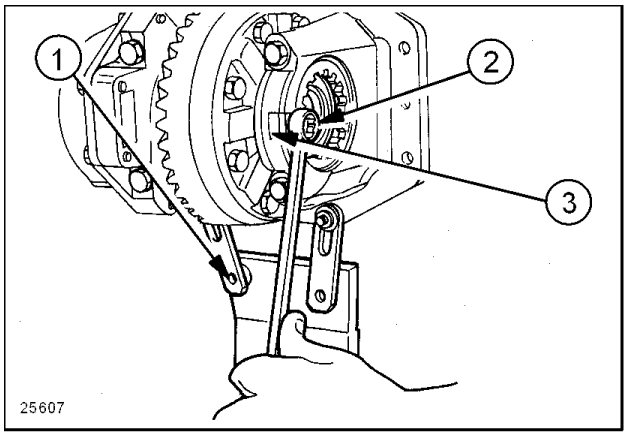
Prior operation:
Axle shaft - Remove (D.10.A)

1. Unscrew two of the bolts fixing the bevel drive-differential support to the axle casing. Screw in the two dowels **380000548 (1)**. Remove the remaining bolts and separate the differential support from the axle casing. Attach a hoist **(2)** to the support and remove the differential support **(3)** from the axle casing.



25606 1

2. Install tool **380000255 (1)** in the vice on the work bench. Bolt the differential support on to the tool detach the lifting hoist.
.
Unscrew bolt **(2)** and remove the ring nut lock tab **(3)**. Remove the internal diff. lock control pipe.



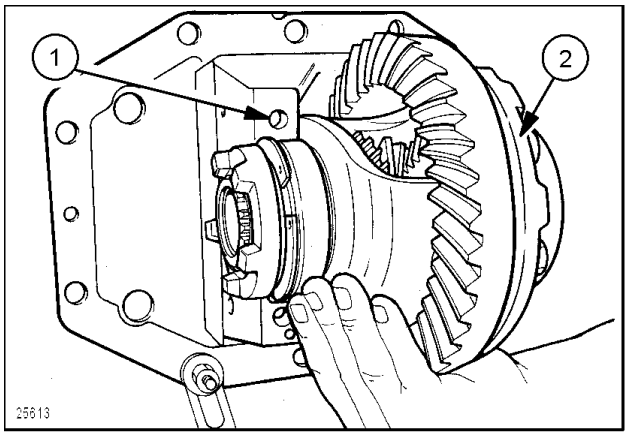
25607 2

3. .

Bevel gear - Disassemble

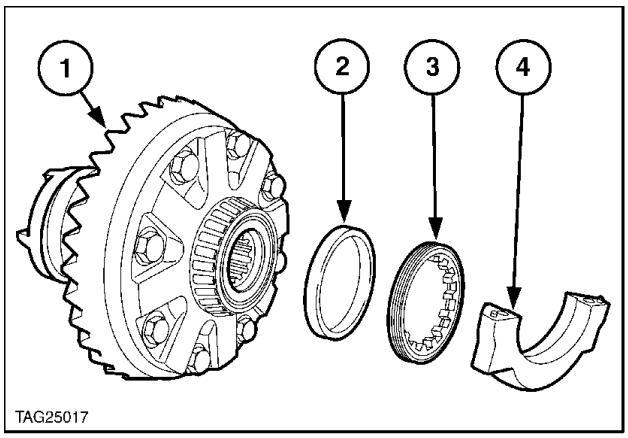
Prior operation:
Differential - Remove (D.10.A)

1. Remove the crown wheel-differential assembly **(2)** from the housing **(1)**.



25613 1

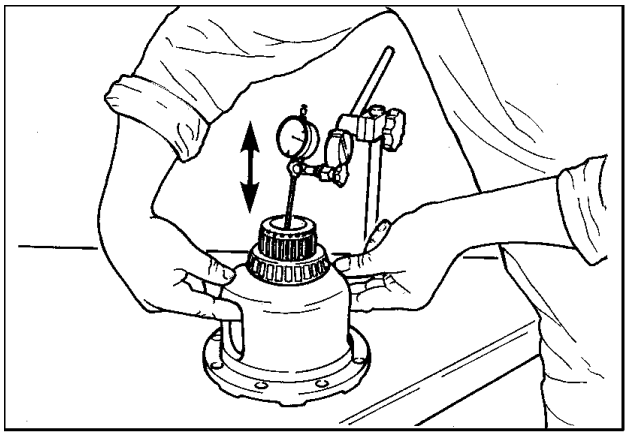
2. DIFFERENTIAL BEARING COMPONENTS
   1. Differential assembly
   2. Bearing Cup
   3. Adjuster Ring
   4. Support Cup



TAG25017 2

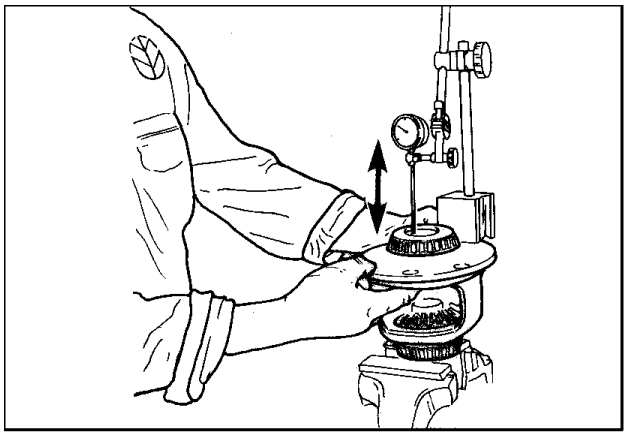
DIFFERENTIAL GEAR SET UP

3. In case of differential assembly overhaul it is necessary to adjust the backlash between the teeth of the planet pinions and side gears.
   Proceed as follows:
   Thoroughly clean the components of the differential to remove any traces of oil which would otherwise prevent accurate backlash measurement.
   Install the two side gears without thrust washers.
   Fit the planet gears complete with thrust washers and pins and screw the pin retaining bolts in by a few turns to hold the pins in place.
   Position a dial gauge on the differential housing.
   Move the left-hand the side gear to bring it into full contact with the planet pinion and then push it up against the differential housing, reading the endfloat (Gs) on the dial gauge.



1b0o2004105929 3

4. Repeat the above operations to measure the endfloat on the right-hand side gear (Gd).
The endfloat should be **0.25 mm**.
Therefore the shims to be inserted in the differential housing are given by:
S L.H. = Gs - **0.25 mm** for the left-hand side gear;
S L.H. = Gd - **0.25 mm** for the right-hand side gear.
Install shims as near as possible to the calculated value, and, using a dial gauge and following the procedure described above, check that the endfloat of the left and right-hand side gears is approximately **0.25 mm**.



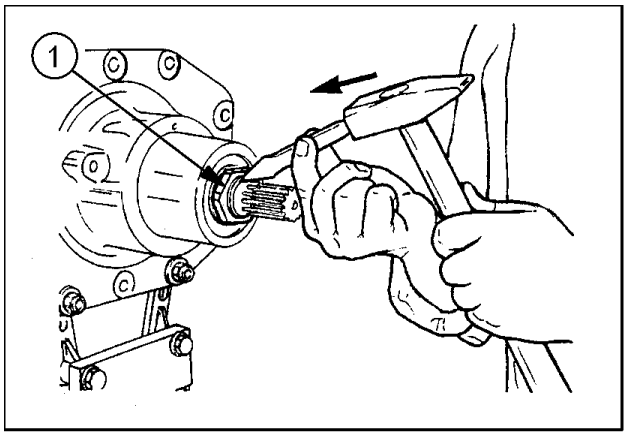
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PINION SHAFT ADJUSTMENTS

5. See **Bevel gear - Install (D.10.A)**.

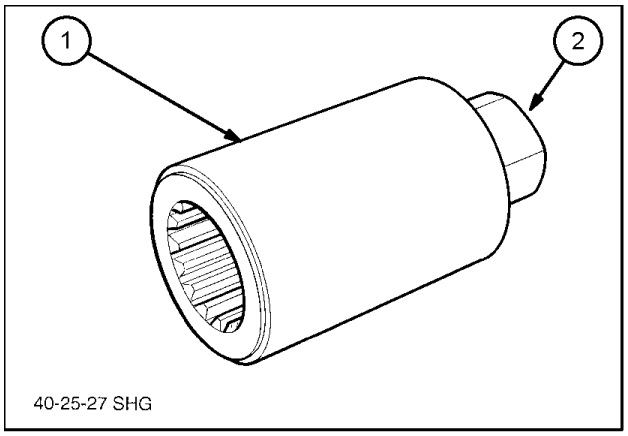
PINION SHAFT REMOVAL

6. Straighten the locking tab on the splined shaft lock nut **(1)**.



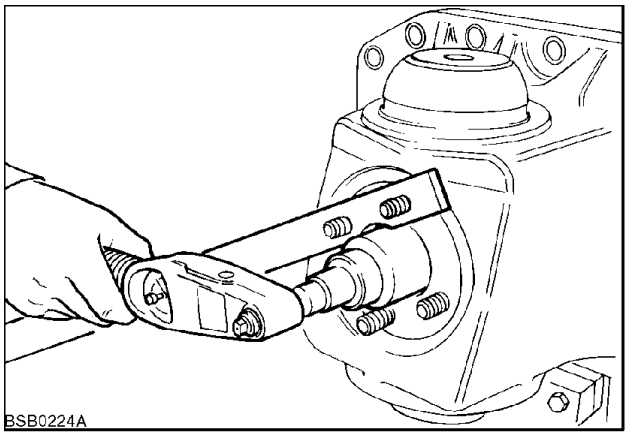
1b0o2004105931 5

7. To loosen the pinion nut it is necessary to manufacture a tool to hold the pinion shaft. This can be manufactured by welding a suitable **20 mm** nut to the end of a drive shaft coupling 81873108.
Locally Manufactured Pinion Shaft Tool
1. Coupler Part No 81873108
2. **20 mm** Nut



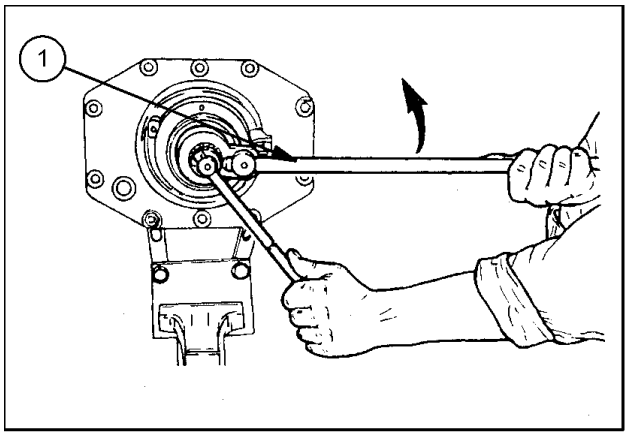
40-25-27 SHG_122 6

8. Suspended Axle Pinion nut removal. Prevent rotation with suitable lever (protect threads).



BSB0224A 7

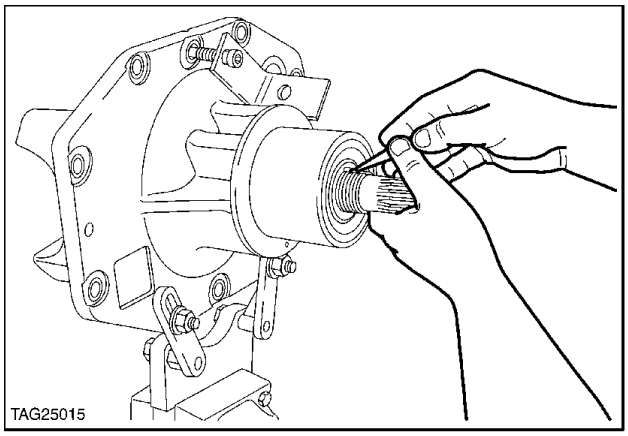
9. Unscrew the nut using wrench **380000468** , **(1)** while holding the bevel drive pinion shaft against rotation with the locally fabricated tool.



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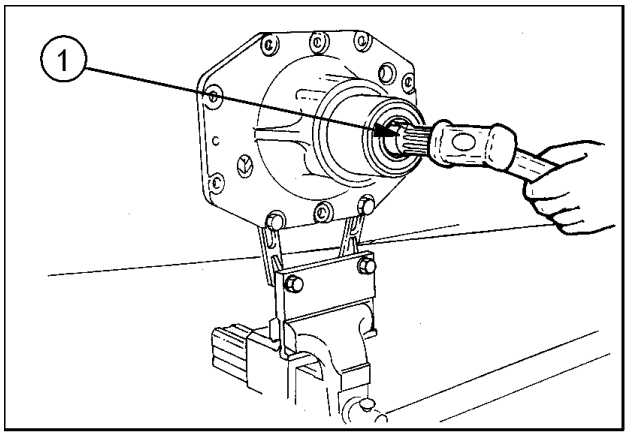
10. Remove the locking ball from the sleeve.

NOTE: *Not applicable for Suspended Axle Assemblies.*



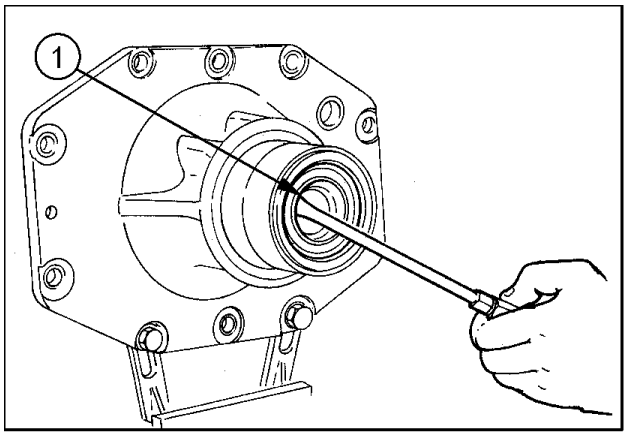
TAG25015 9

11. Withdraw the pinion shaft **(1)** from the rear of the casing and remove the spacer, the adjustment shims and the bearing.



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12. Remove the dust seal, the oil seal **(1)** and the rear bearing.



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Bevel gear - Install

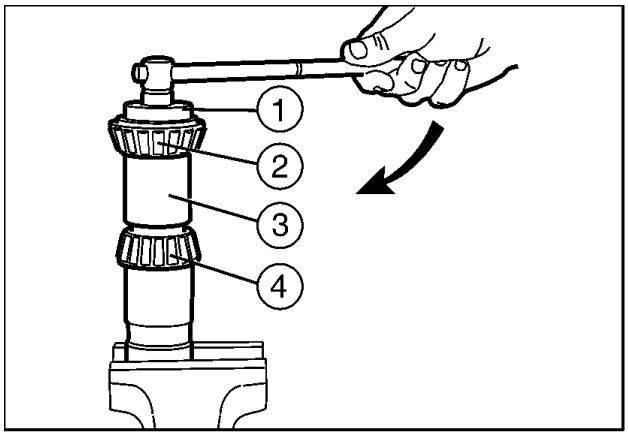
⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

B026

Pinion Bearing Preload Shimming

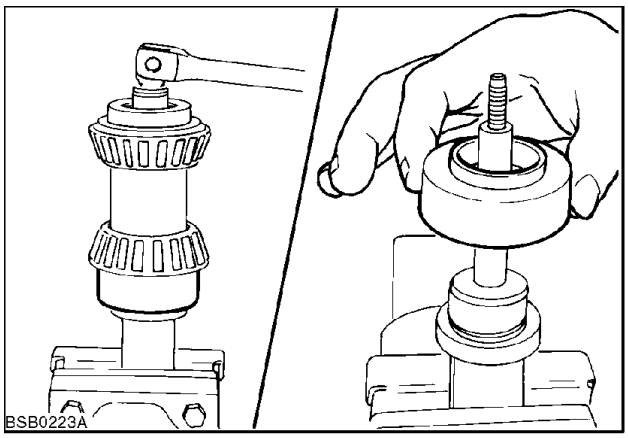
1. Proceed as follows.
   Remove bearing from pinion.
   Clamp tool **380000463** , **(1)** in the vice, fit the inner races of the bearings (2 and 4) and the bearing spacer **(3)** and secure the nut on the tool.



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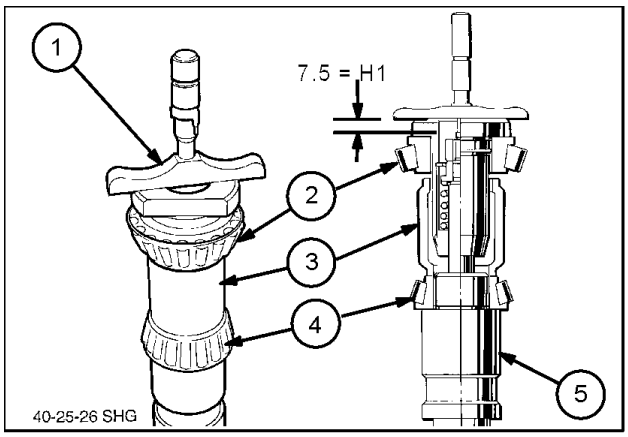
2.

NOTE: *The pinion of the suspended assembly is shorter and tool* ***380000463*** *requires a spacer to be inserted under the lower bearing* ***(4)****. The spacer can be manufactured locally using the dimensions shown in* ***FRONT AXLE - Special tools (D.10.A)****.*



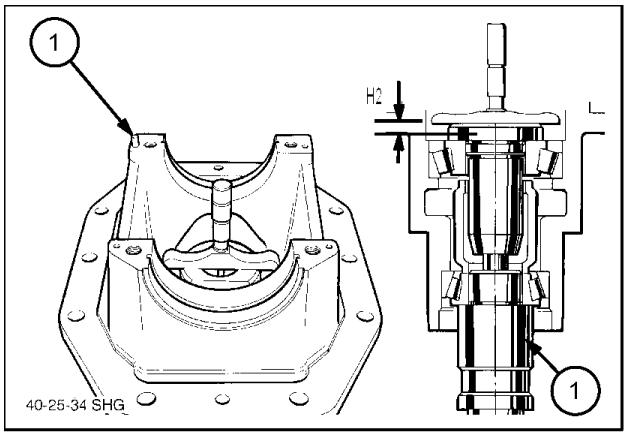
BSB0223A 2

3. Using a depth micrometer, measure distance (H1) between the upper surface of the tool and the central threaded pin of tool **380000463 (1)**.
   Disassemble the above parts, lubricate the bearings with oil and then re-assemble the parts, excluding the bearing spacer, in the differential housing. Hold the differential housing in the vice using tool **380000255**, not applicable to Suspended axles.



40-25-26 SHG 3

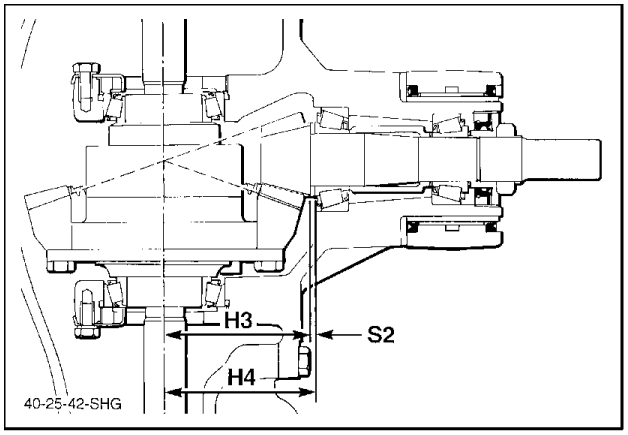
4. Tighten a nut of tool **380000463 (1)**, while turning the tool to ensure that the bearings are seated correctly.
Install spacer for suspended axle.
Using a depth micrometer, measure distance (H2).
The thickness of the adjustment shim required is calculated by:
Shim S1 = H2 - H1 + **0.05 mm**
If necessary, round the value thus obtained up to the nearest **0.05 mm**.
Leave tool in differential housing for pinion depth measurement.



40-25-34 SHG 4

Pinion To Crown Wheel Shimming Procedure

5. The pinion to crown wheel shimming procedure calculates the thickness of shims S2, positioned beneath the shoulder of the pinion gear to ensure that the theoretical conical point of the pinion aligns with the centre of the differential crown wheel.
Pinion Shimming Dimensions
H4 Dimension from Pinion Bearing to Centre line of Differential Casing
H3 **122.5 mm +/- C** Manufacturers Pinion Dimension"C (Correction Factor).
S2 Shim Thickness
The dimension H4 necessary in the calculation of the shim thickness can be determined using either New Holland pinion adjustment tool **380000249** or **380000600** .
Both procedures are explained as follows.

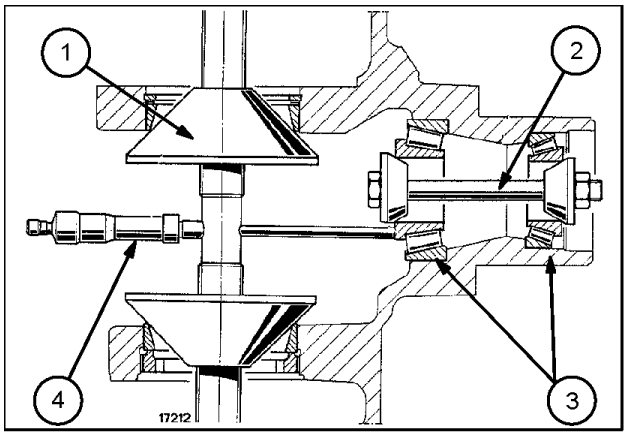


40-25-42 SHG 5

Pinion Shimming using Pinion Adjustment Tool 380000249

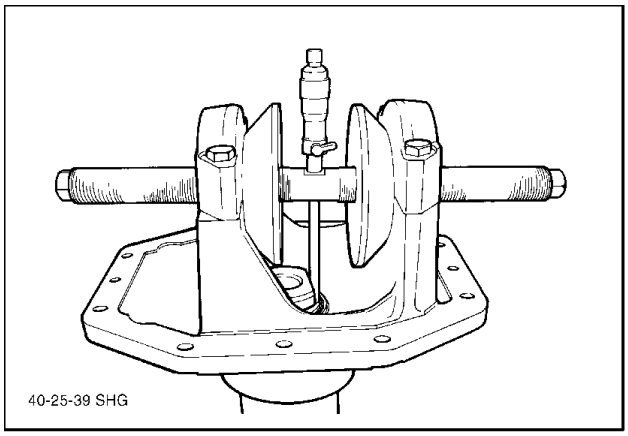
6. Install pinion bearings in differential support housing and clamp in position using tool No **380000463** as used when determining thickness of shims for bearing preload.

1. Pinion Measuring Gauge Tool No **380000249**
2. Pinion Bearing Clamp. Use Tool No **380000463**
3. Pinion Bearings
4. Micrometer (Part of Tool No **380000249**)



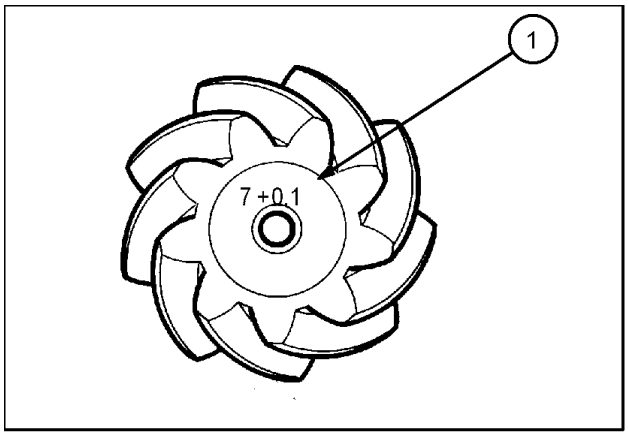
17212 6

7. Install Pinion Setting Tool No **380000249** complete with bearing cup and adjusting rings. Tighten bearing caps to **113 Nm** (**83 lbf**).
If Tool No **380000463** as described in pinion bearing shimming procedure is not available the Bearing Clamp Tool No 50048 may be used to clamp the bearings.
Adjust the cones of the tool so that the depth micrometer tip touches the inner race of the bearing and measure the dimension **(H4)**.



40-25-39 SHG 7

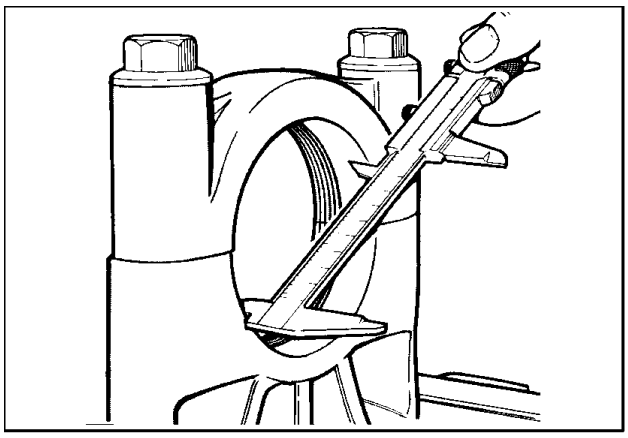
8. Determine the thickness of shims to be installed beneath the pinion gear as follows:
Shim thickness S2 = H4-H3
Where:-
H4 = Dimension measured using pinion micrometer tool
H3 = **122.5 mm +/- C**
122.5 mm is the nominal manufacturing dimension from rear face of pinion gear to conical point of pinion. (Supplied by Manufacturer)
C = Manufacturing correction factor stamped on face of pinion.
Example
H4 = 125.77
C = **+0.1 mm**
H3= 122.5 + 0.1 = **122.6 mm**
S2 = H4-H3 = 125.77 - 122.6
Shim Thickness S2 = **3.17 mm**



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Pinion Shimming using Tool 380000600

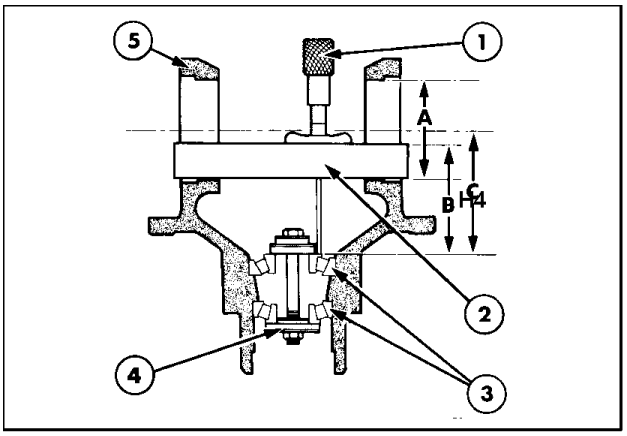
9. Install bearing caps (less bearing cup) and tighten to a torque of **113 Nm** (**83 lbf**).
Measure internal dimension of bearing bore and call this dimension ‘A’.



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10. Install pinion bearings in the differential support housing and clamp in position with Tool No **380000600** .
    Locate the bar gauge, part of Tool No **380000600** , across bearing bore and measure dimension 'B'.
    1. Depth Gauge
    2. Bar Gauge - Part Of Tool No **380000600**
    3. Pinion Shaft Bearings
    4. Pinion Setting Gauge - Tool No **380000600**
    5. Differential; Support Casing

NOTE: *Tighten the clamp so that the bearing cones can just be turned by hand.*



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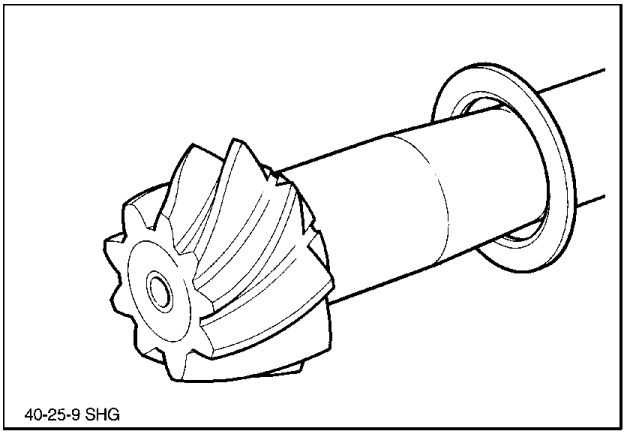
11. Calculate Dimension 'H4' using Formula
    H4 = B - 25* + (A/2)

NOTE: ** **380000600** Bar Gauge is **25 mm** diameter.*

12. Determine the thickness of shims S2 to be installed beneath the pinion gear as follows:
    S2 = H4 - H3
    Where:-
    H4 = Dimension Calculated in **11** above.
    H3 = **122.5 mm ±C**
    122.5 mm is the nominal manufacturing dimension from rear face of pinion gear to conical point of pinion. (Supplied by Manufacturer)
    C = Manufacturing correction factor stamped on face of pinion.
    Example
    A = **100 mm**
    B = **100.77 mm**
    H4 = B-25* + (A/2)
    H4 = 100.77-25* + (100/2)
    H4= 125.77
    C = **0.1 mm**
    H3 = 122.5 + 0.1 = 122.6
    Shim Thickness S2 = 125.77- 122.6 = **3.17 mm**

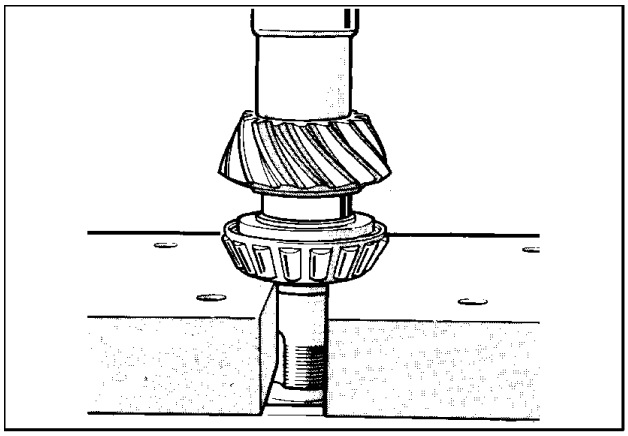
Pinion Shim and Bearing Installation

13. Install shim selected in pinion to crown wheel shimming procedure between pinion head and bearing. Ensure the chamfer on the shim faces towards the pinion head.



40-25-9 SHG 11

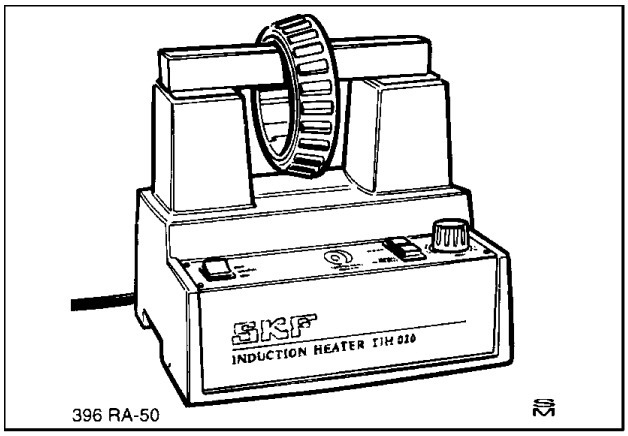
14. Install bearing onto pinion



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15.

NOTE: *The use of a electronic induction heater will assist in the installation of the bearings without the need for a press.*

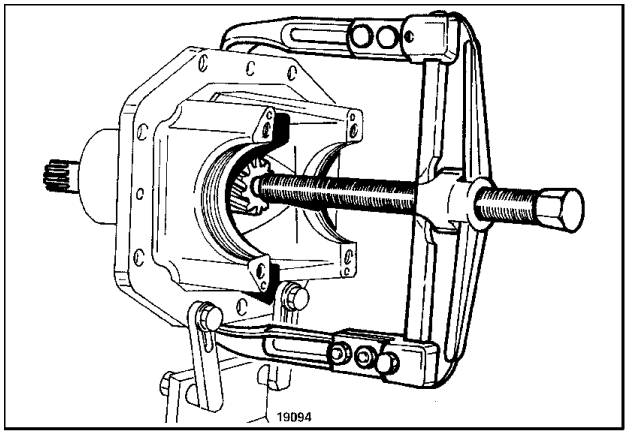


396 RA-50 13

Pinion Bearing Preload Rolling Torque

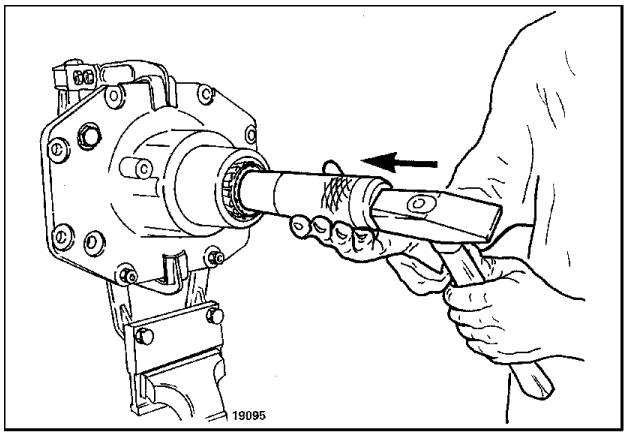
16. The pinion bearing preload is measured as the torque or force required to rotate the pinion. The shim selected in the Pinion Bearing preload shim adjustment procedure previously described ensures that the correct preload is achieved when the pinion nut is tightened to a torque of **294 Nm** (**217 lbf ft**). Install the inner pinion bearing onto the pinion and locate the pinion into the differential carrier. Hold the pinion in position with a universal puller.

NOTE: *If the special tool required to determine the thickness of preload shim is not available install the same shim as removed during disassembly.*

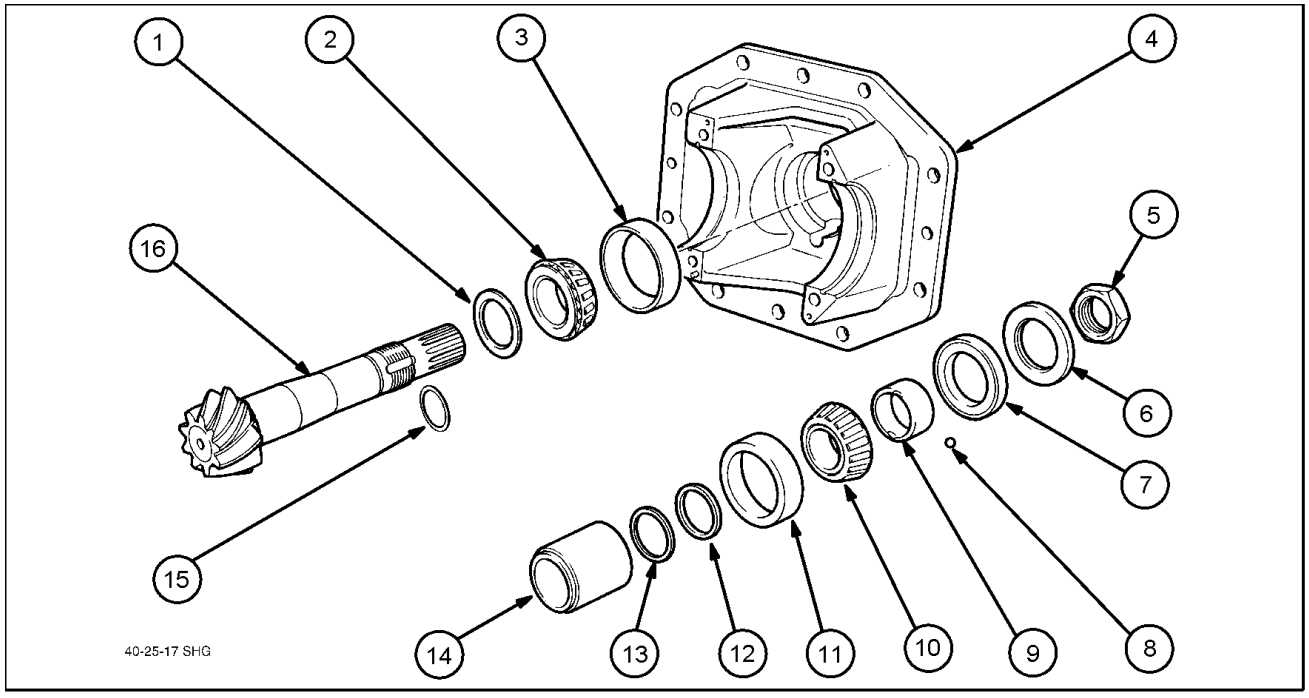


19094 14

17. Install the spacer and shims onto the pinion shaft. Lubricate and install the pinion outer bearing.



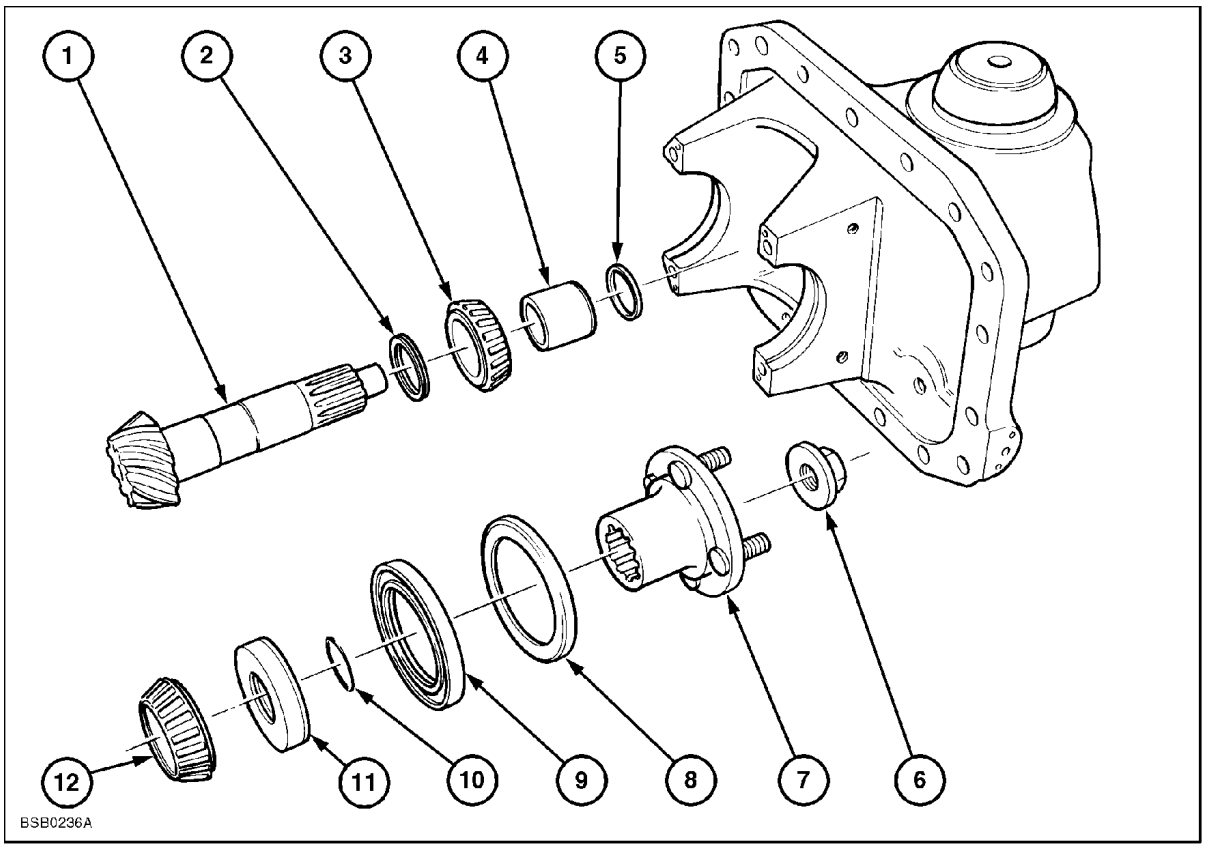
19095 15



40-25-17 SHG 16

Drive Pinion Components (Standard Steer Axle)

1 Shim
2 Bearing
3 Bearing Cup
4 Housing
5 Nut
6 Dust Cap
7 Seal
8 Ball
9 Sleeve
10 Bearing
11 Bearing Cup
12 Shim
13 Shim
14 Spacer
15 ‘O’ Ring
16 Pinion

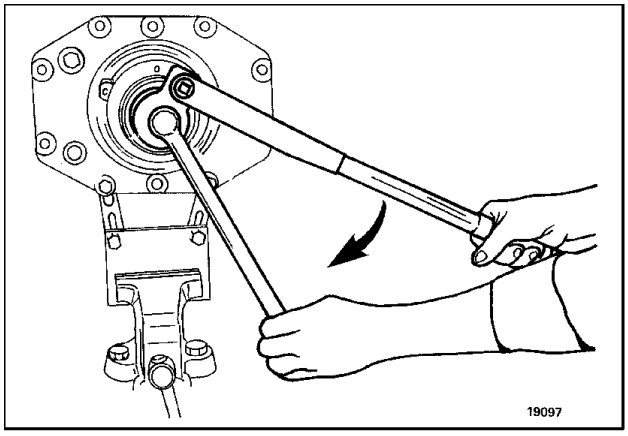


BSB0236A 17

Suspended Pinion Components

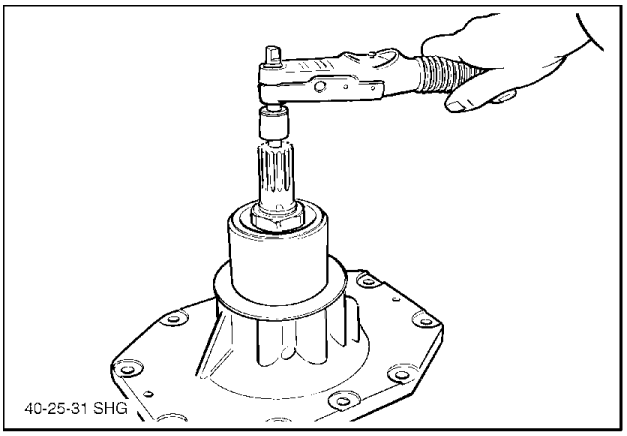
1 Pinion
2 Pinion depth shim
3 Bearing
4 Spacer
5 Shim
6 Nut
7 Coupling
8 Dust shield
9 Seal
10 O-ring
11 O-ring carrier
12 Bearing

18. Install the sleeve. ball and pinion nut. Do not install the ‘O’ ring, oil seal and dust shield at this stage. Tighten the pinion nut to a torque of **294 Nm** (**217 lbf.ft**).



19097 18

19. Screw an M12 bolt into end of the pinion shaft or use the locally fabricated pinion holding tool. Using a suitable low value torque meter measure the rolling torque of the pinion A1.
The rolling torque should be **0.5 - 1.0 Nm** (**4.5 - 8.5 lbf in**) excluding breakaway torque.
If the values recorded during the adjustment procedure are outside the specification adjust the thickness of shim and recheck bearing preload.



40-25-31 SHG 19

20. When the correct shim thickness has been established remove the pinion nut, sleeve and ball and install the 'O' ring and pinion oil seal.

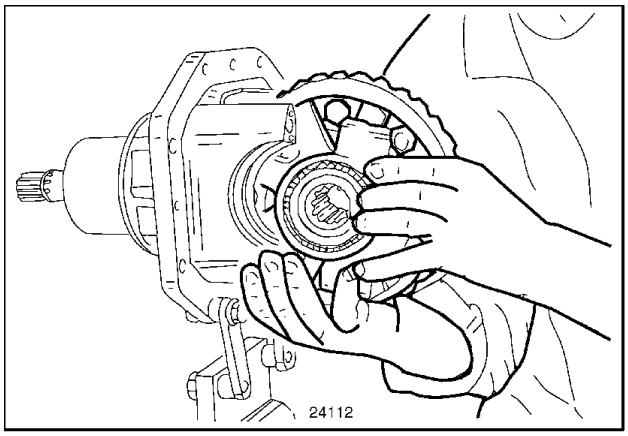
21. Carefully reinstall the sleeve, ball and pinion nut.

NOTE: *Attempting to fit the oil seal with the sleeve installed may damage the oil seal lip.*

22. Tighten the pinion nut to a torque of **294 Nm** (**217 lbf.ft**) and deform the locking tab.
Measure and record the pinion and seals rolling resistance A1.

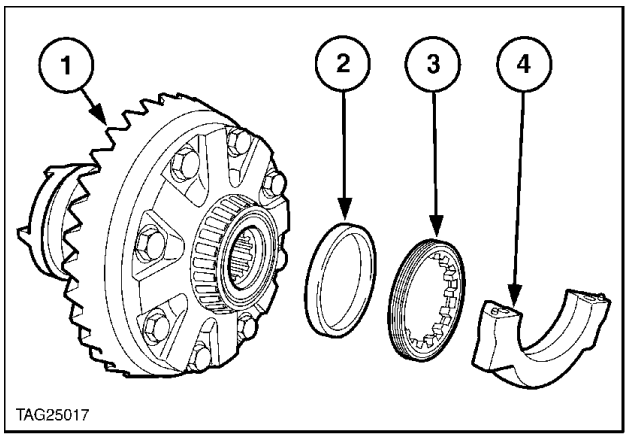
Bevel gear - Backlash

1. Install the differential assembly complete with crown wheel and inner crown wheel bearing rings in the differential housing.



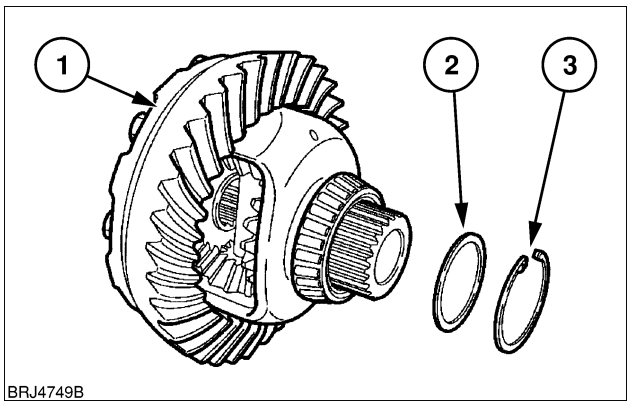
24112 1

2. Insert the outer bearing rings in the differential housing, fit the differential support caps, ensuring correct orientation of the threaded adjustment ring **(3)**, smooth edge facing outwards. Tighten the bolts to a torque of **59 Nm** (**43.5 lbft**), then slacken them off and re-tighten to a torque of **20 Nm** (**14.8 lbft**).



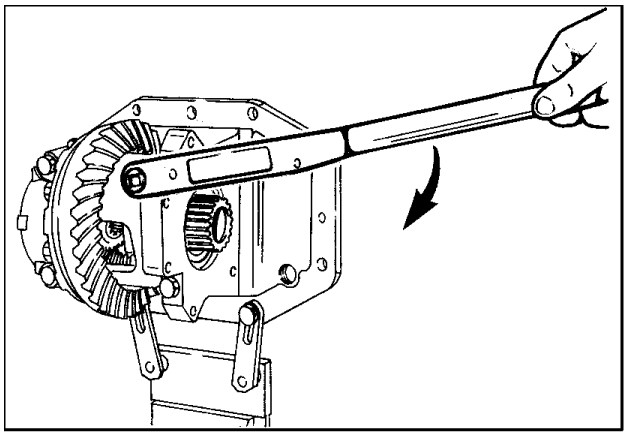
TAG25017_123 2

3. Measure the thickness SP the adjustment shim **(2)** which was previously removed during the axle overhaul procedure. Refit the shim and circlip.



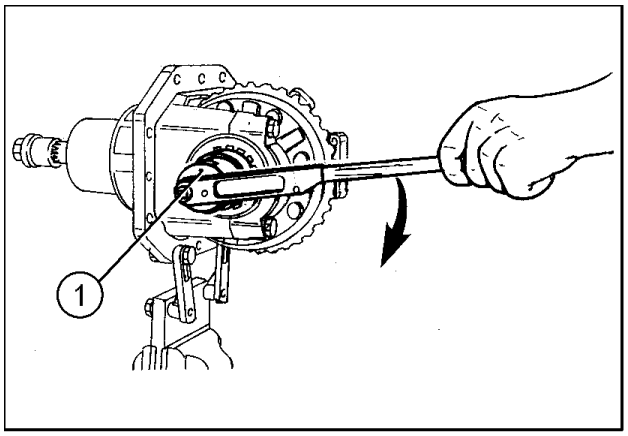
BRJ4749B 3

4. With the bearings lubricated, rotate the crown wheel and at the same time tighten the threaded adjustment ring using wrench **380000253** to a torque of **39 - 59 Nm** (**28.8 - 43.5 lbft**) to take up the axial play between the components.



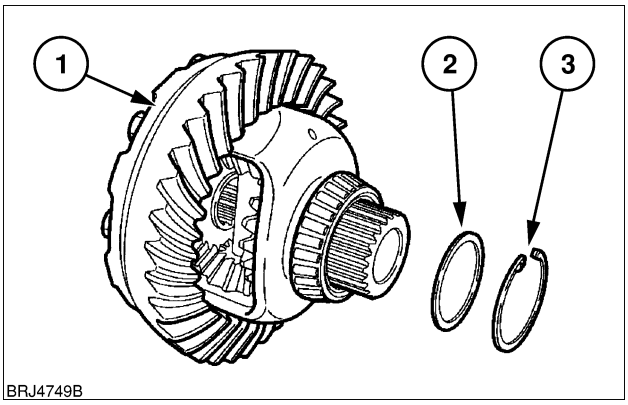
1b0o2004105962 4

5. Measure the backlash between pinion and crown wheel, using a dial gauge perpendicular to the outer edge of a tooth on the crown wheel.
Repeat the measurement in a further two positions **120 °** apart and compare the average of the three values (Gm) with the specification backlash: **0.15 - 0.20 mm**, with an average of **0.18 mm**.



1b0o2004105963 5

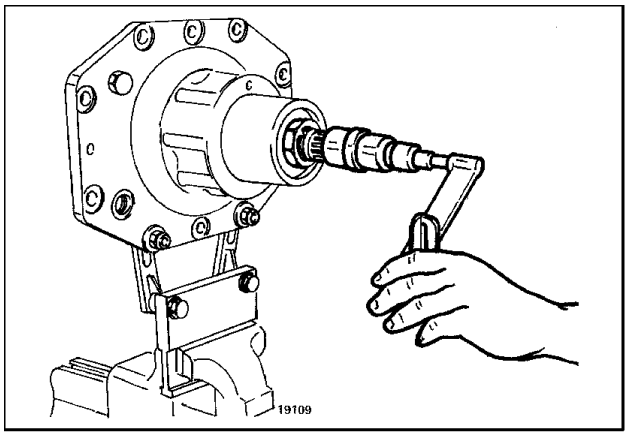
6. If the measured backlash exceeds the prescribed value, fit a thinner adjustment shim.
The thickness of the adjustment shim to be fitted in the differential housing is given by:
Shim S = Sp - {(Gm - 0.18) x 1.35}
where:
Sp = thickness of test shim installed in the differential housing. i.e. original shim used as a test shim.
Gm = average backlash measured between the pinion and crown wheel
If the backlash measured is less than the prescribed value, fit a thicker adjustment shim, the value being given by:
Shim S = Sp +{(0.18 - Gm) x 1.35}
Recheck the backlash and adjust shim if necessary.



BRJ4749B 6

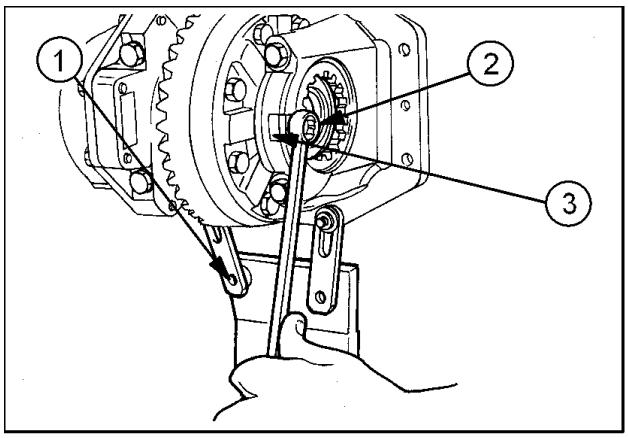
Bevel gear - Preload

1. The differential bearing preload is checked by measuring the combined rolling torque of the crown wheel and pinion assembly and comparing it to the pinion and seals rolling torque value.
   Attach a torque meter to the pinion shaft and measure the rolling torque to rotate the pinion and crown wheel A2.



19109 1

2. Subtract from the rolling torque reading A2 described in instruction **1**, the pinion only rolling torque A1, refer to **Bevel gear - Install (D.10.A)**.
   The difference between the two values should be **1 - 1.5 Nm**, (**9 - 13 lbf in**).
   If the rolling torque of the pinion and differential assembly is not to specification adjust the ring 'opposite' the crown wheel to increase or reduce differential bearing preload. Recheck the rolling torque as detailed above.
   Refit the lock tabs to secure the adjusting ring(s).

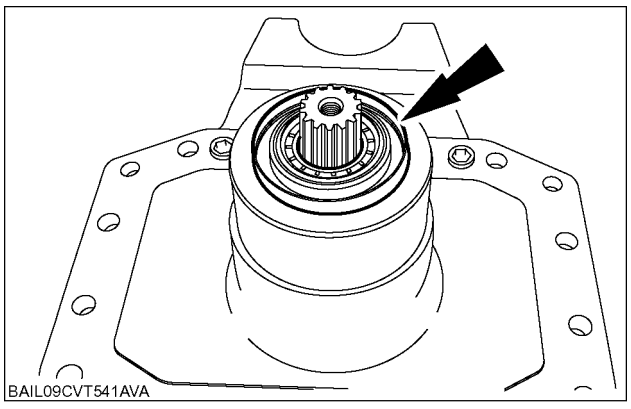


1b0o2004105965 2

3. EXAMPLE
   Rolling torque of Pinion and Differential
   A2 = **2.1 Nm** (**19 lbf in**)
   Rolling torque of Pinion
   A1 = **0.7 Nm** (**6 lbf in**)
   Calculated Rolling Torque of Differential
   = **2.1 - 0.7 Nm** (**19 - 6 lbf in**)
   = **1.4 Nm** (**13 lbf in**)

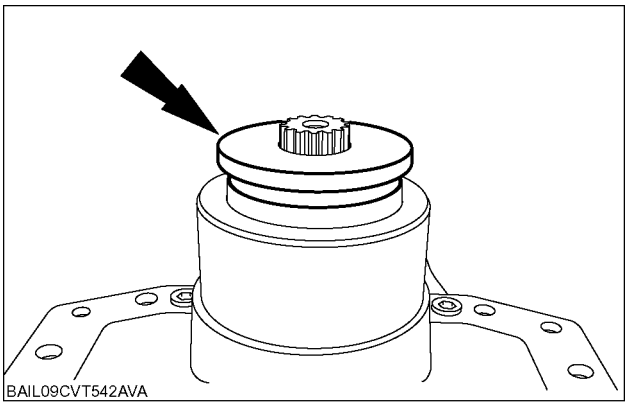
Pinion Seal Installation

4. Position the pinion seal on the differential housing.



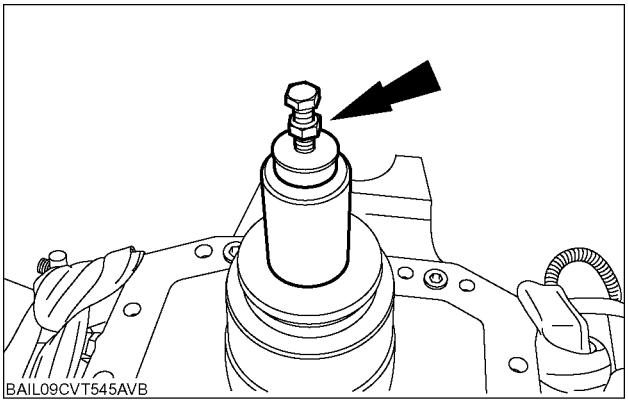
BAIL09CVT541AVA 3

5. Vehicles with Standard axle locate special tool **380200094** on the pinion seal.
Vehicles with Suspended axle, locate special tool **380200092** on the pinion seal.



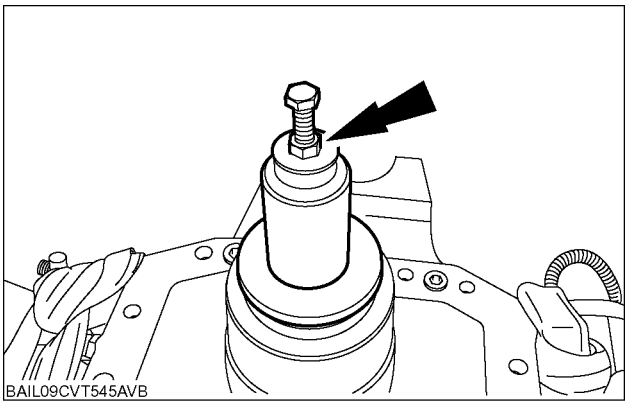
BAIL09CVT542AVA 4

6. Install the pinion seal installation press tool **380200105**.



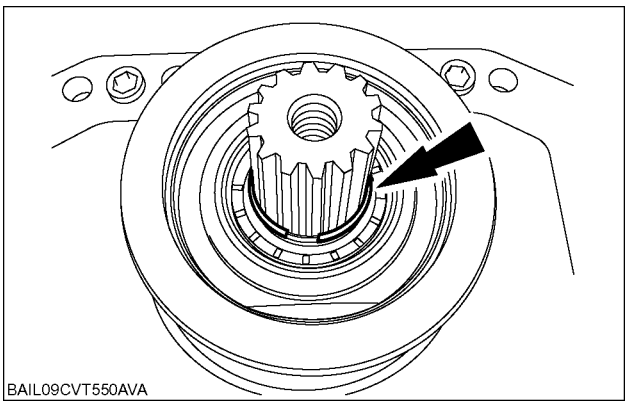
BAIL09CVT545AVB 5

7. Tighten the nut to pull the seal flush with the differential housing.



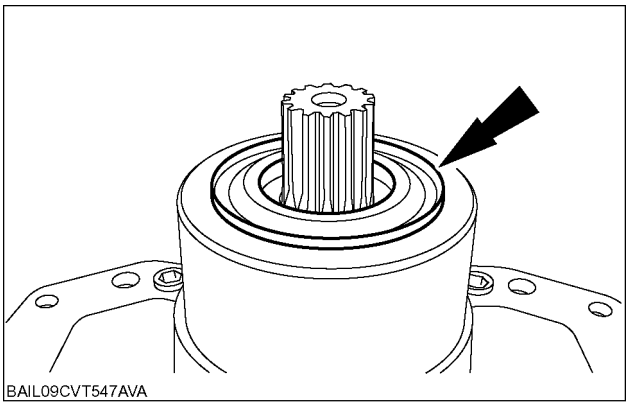
BAIL09CVT545AVC 6

8. Install the snap ring.



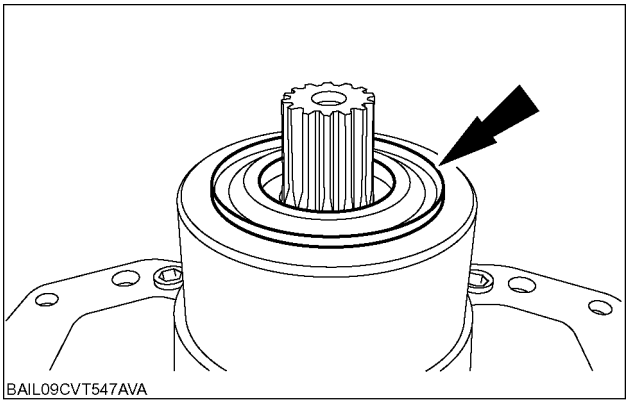
BAIL09CVT550AVA 7

9. Position the oil seal protector on the differential housing.



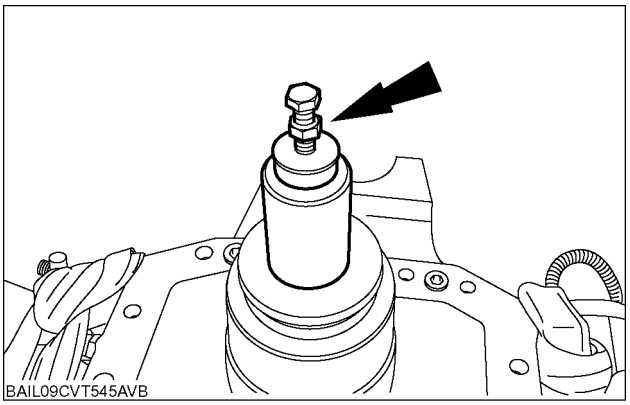
BAIL09CVT547AVA 8

10. Vehicles with Standard axle, locate special tool **380200095** on the seal protector.
Vehicles with Suspended axle locate special tool **380200093** on the seal protector.



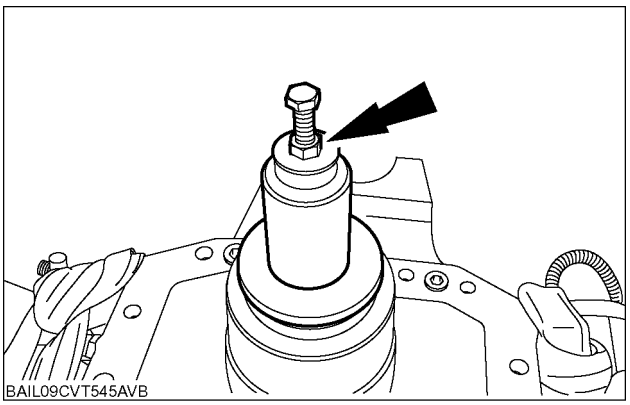
BAIL09CVT547AVA 9

11. Install the pinion seal installation press tool **380200105**.



BAIL09CVT545AVB 10

12. Tighten the nut to pull the seal protector flush with the differential housing.



BAIL09CVT545AVC 11

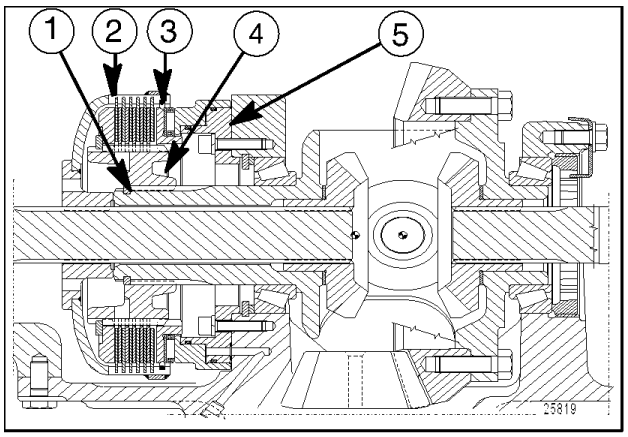
Differential lock Multi plate clutch - Disassemble

⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

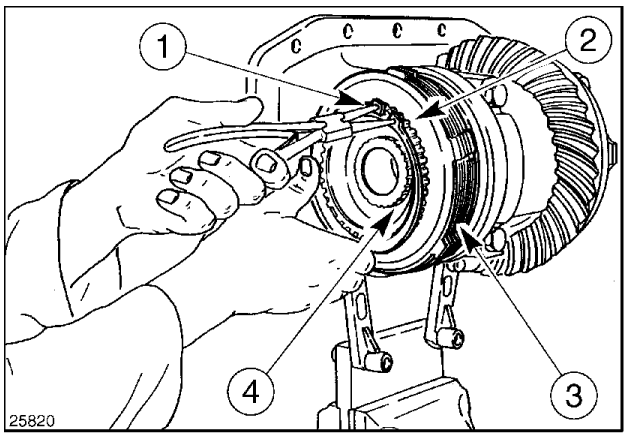
B026

1. With the pinion and crown wheel carrier placed on the fixture tool no. **380000255**.
   Proceed as follows:
   Remove the retaining ring **(3)**, bell housing **(2)**, clutch disc **(4)** hub retaining ring **(1)**.



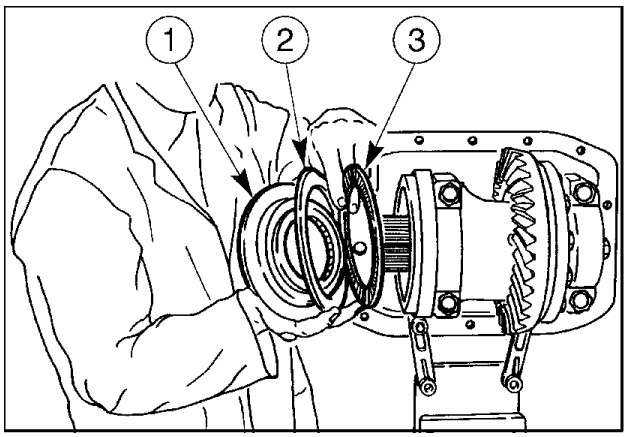
25819 1

2. Remove the circlip **(1)**, disassemble the reaction ring **(2)** along with the clutch discs **(3)** and clutch disc hub **(4)**.



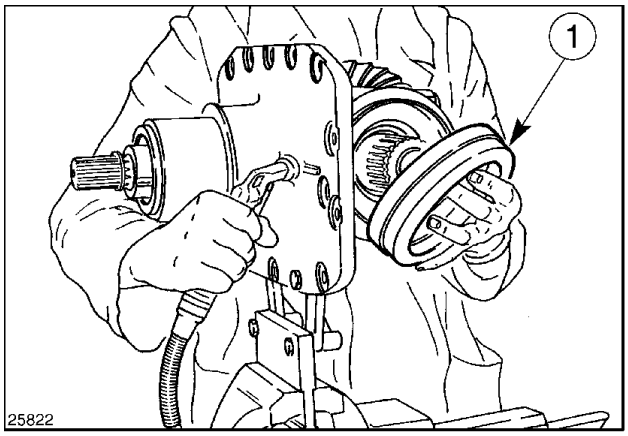
25820 2

3. Remove the thrust washer **(1)**, washer **(2)** and release bearing **(3)**.



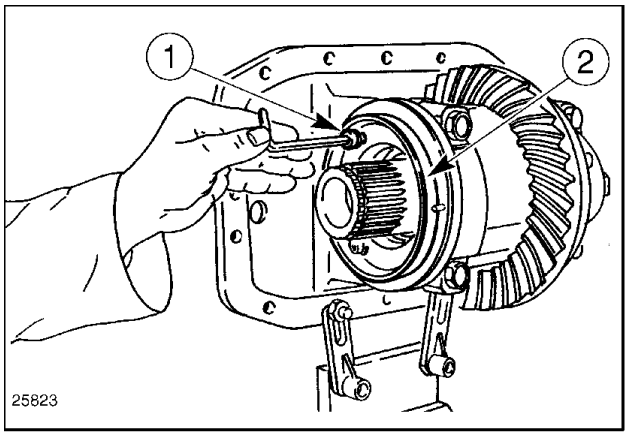
1b0o2004105924 3

4. Blow compressed air into the oil inlet fitting and drive out the differential. clutch lock piston **(1)**.



25822 4

5. Remove the attaching bolts **(1)** and differential. lock support plate **(2)**. Retrieve oil seal.
Check all hydraulic cylinder sliding surfaces are free from scuffs and in perfectly good condition.
Check clutch discs for abnormal wear or imperfections. Replace if damaged.
Reinstall the differential lock assembly observing the following:
- Reassembly follows the disassembly procedure in reverse, from **5** back to **1**.
- Refer to figures on **FRONT AXLE - Sectional view (D.10.A)** for correct orientation of the different parts.
- Check seals and replace if damaged.
- Tighten to correct torques as detailed on **FRONT AXLE - Torque (D.10.A)**.



25823 5

Spindle drive - Remove

PUMA 165, PUMA 180, PUMA 195, PUMA 210

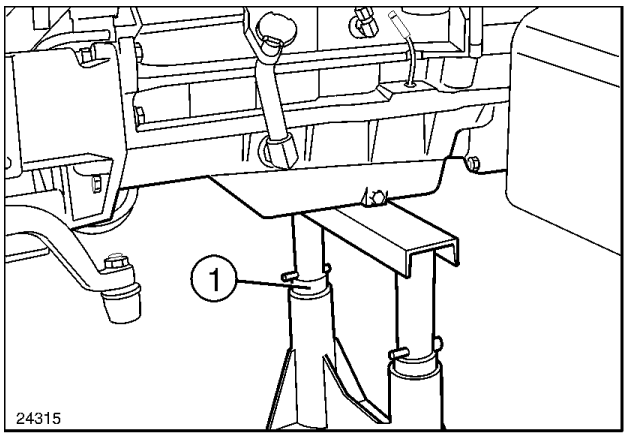
⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

B026

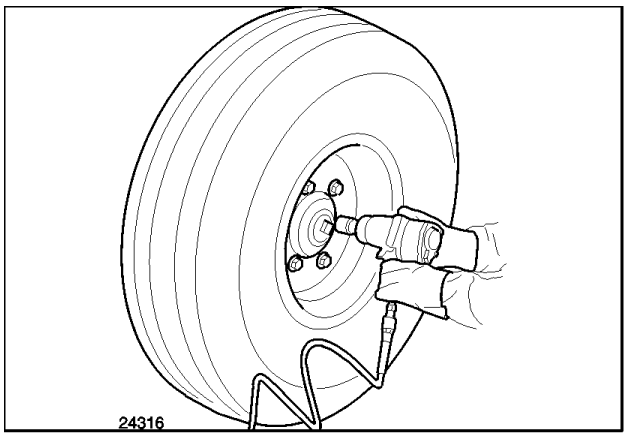
1. Swivel pins can be overhauled with the front axle on the tractor. Proceed as follows for each wheel:
   Open and raise engine hood.
   Detach the negative cable **(1)** from the battery and insulate.Refer to : **Battery - Disconnect (A.30.A)**
   Safely block rear wheels.
   Remove front ballast and ballast support, if present.

2. Jack up front of tractor and place a stationary stand **(1)** under the sump.



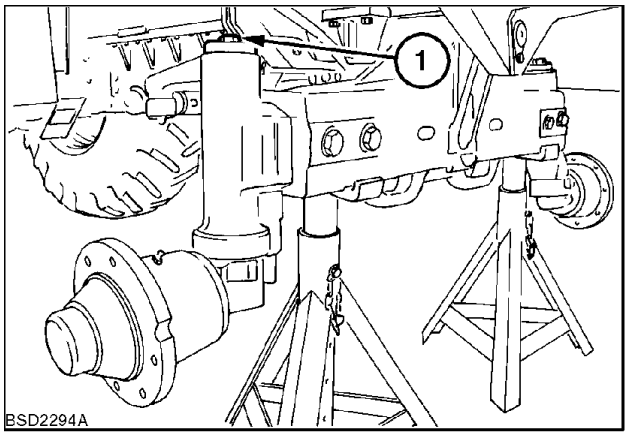
24315 1

3. Loosen retaining bolts and remove front wheels.



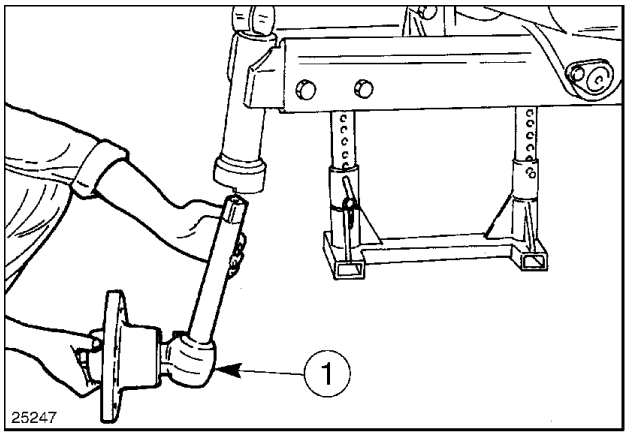
24316 2

4. A bolt **(1)** holds the spindle in place. Loosen the bolt and lower using a hydraulic jack.



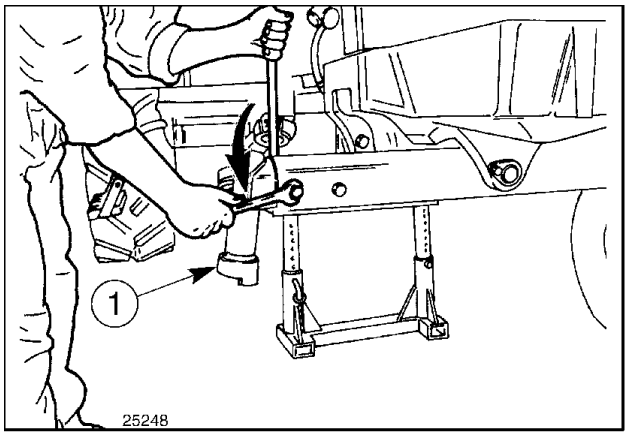
BSD2294A 3

5. Lower the hydraulic jack and remove the spindle and hub assembly **(1)**.



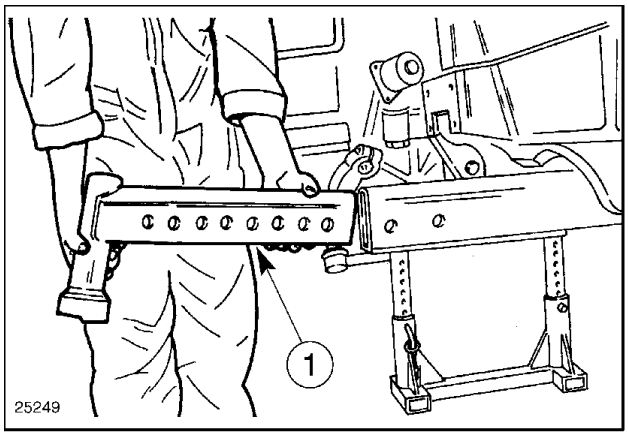
25247 4

6. Loosen the axle outer section **(1)** attaching bolts.



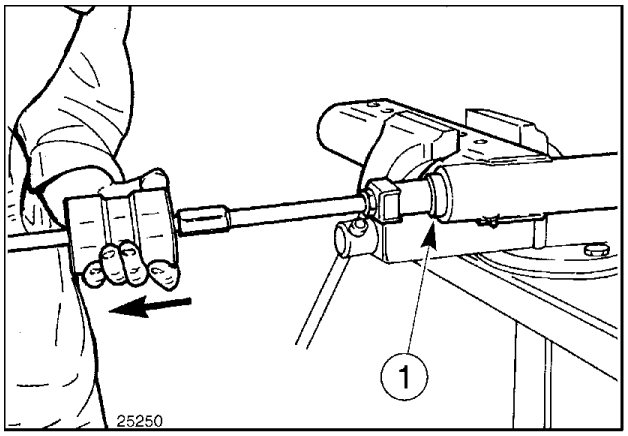
25248 5

7. Remove the axle outer section **(1)**.



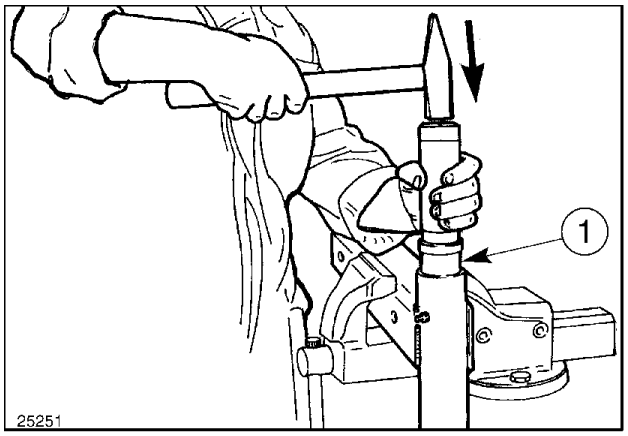
25249 6

8. Fix the axle outer section in a vice and using a slide puller remove the swivel bearing bushings **(1)**.



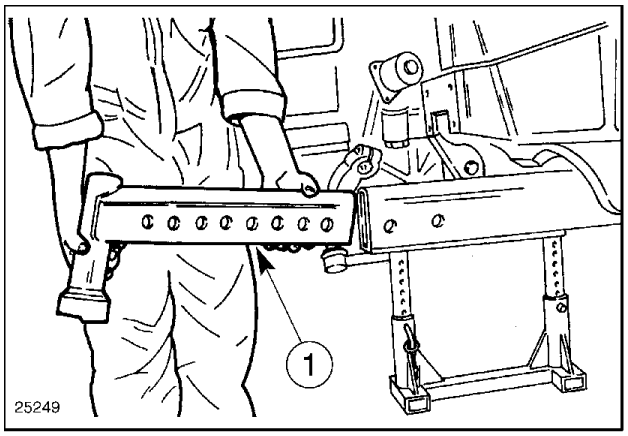
25250 7

9. Reinstall the spindle assembly to the front axle following the disassembly procedure in reverse and using a suitable drift to install new bushings **(1)** on the axle outer section.



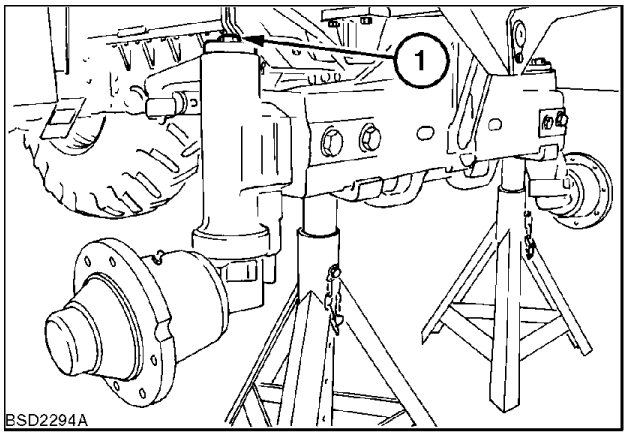
25251 8

10. Reinstall axle outer section **(1)**.
Reinstall the spindle assembly to the axle outer section.



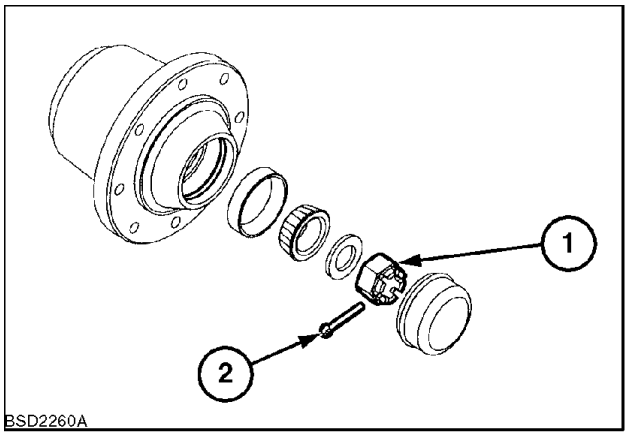
25249 9

11. Insert spindle and replace bolt. Apply Loctite 242 and torque bolt to **470 - 530 Nm**.



BSD2294A 10

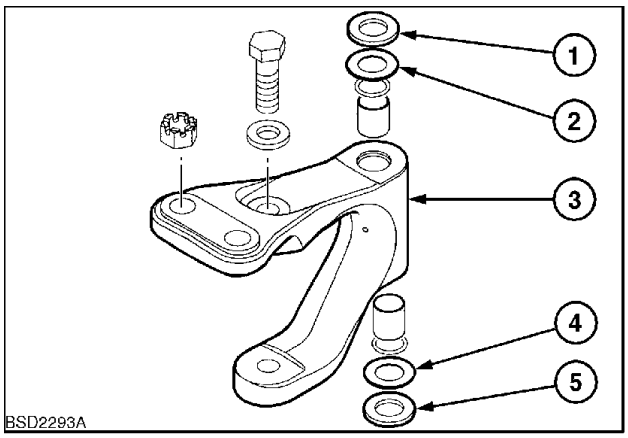
12. Heavy Duty Axle Hub Removal and Installation
Support axle and tractor as previously described.
Remove the bearing grease cup
Remove the cotter pin **(2)**and undo the hub nut **(1)**.
Remove the wheel hub and recover bearings
Replace faulty seals and worn bearings.
Fill the wheel hub with **NEW HOLLAND AMBRA GR 75 MD GREASE CASE AKCELA MOLY GREASE**.



BSD2260A 11

13. Re-assemble the hub and bearings
Revolve the hub and torque the castellated nut to **20.3 Nm**. Then back the nut off to the first slot.
Lock the nut using the cotter pin **(2)**.
Refit the bearing grease cup.

14. Centre Arm Installation
Press two bushings into the centre steering arm so they are **5 mm** (**0.196 inch**) below the surface.Install the pivot pin through the bottom of the axle centre section. Lubricate the two o–rings with petroleum jelly and install in the top and bottom of the centre arm. Locate the centre arm between the upper and lower boss of the axle.
Install two **3.96 mm** (**0.156 inch**) thickness washers **(4) (5)** between the bottom of the arm and the axle.
Push the pivot pin through the arm and then install one **3.96 mm** (**0.156 inch**) washer **(1)** and one **1.06 mm** (**0.042 inch**) washer **(2)** at the top of the arm.
Check the clearance between the upper washer and axle centre section. The gap must be no greater than **1067 mm** (**0.042 inch**). Add or subtract washers at the top of the steering arm to adjust the clearance.Insert the spring pin through the pivot pin to complete installation.
Steering cylinder alignment is critical to seal life. Use washers **(1)** and **(2)**, **(4)** and **(5)**, as shown Fig **12**. to shim gap at top of centre steering arm to a maximum gap of **1 mm**.
Position arm such that there is a gap between trunnion fitting (**Axle - Exploded view (D.10.A)**) and cylinder at top and bottom.



BSD2293A 12

Spindle drive - Install

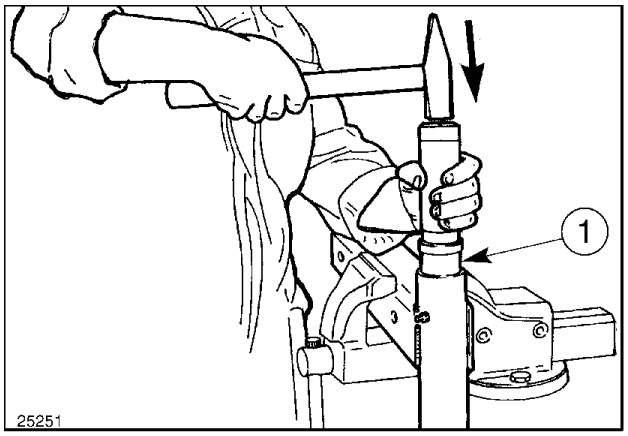
PUMA 165, PUMA 180, PUMA 195, PUMA 210

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

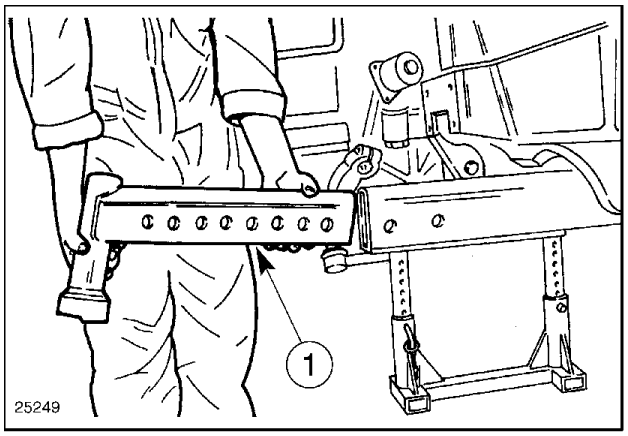
B026

1. Reinstall the spindle assembly to the front axle. Install new bushings **(1)** on the axle outer section.



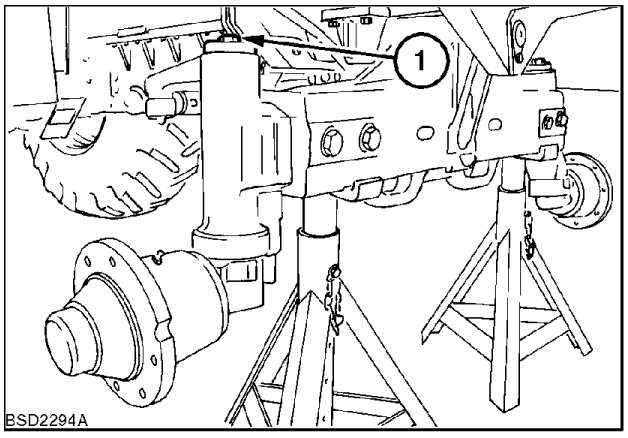
25251 1

2. Reinstall axle outer section **(1)**.
Reinstall the spindle assembly to the axle outer section.



25249 2

3. Insert spindle and replace bolt. Apply Loctite 242 and torque bolt to **470 - 530 Nm** (**346.7 - 390.9 lbft**).



BSD2294A 3

4. Centre Arm Installation

Press two bushings into the centre steering arm so they are **5 mm** (**0.196 inch**) below the surface.Install the pivot pin through the bottom of the axle centre section. Lubricate the two o–rings with petroleum jelly and install in the top and bottom of the centre arm. Locate the centre arm between the upper and lower boss of the axle.

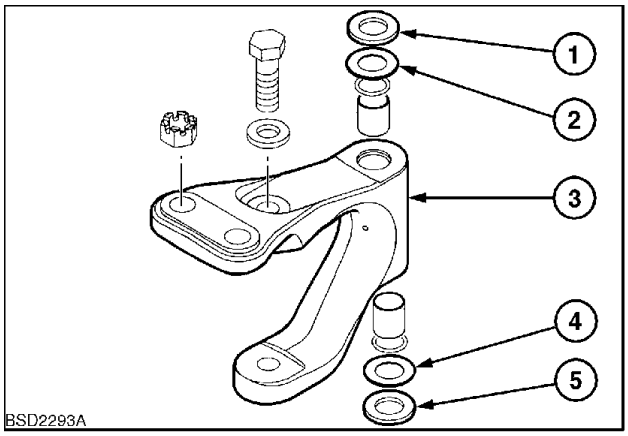
Install two **3.96 mm** (**0.156 inch**) thickness washers **(4) (5)** between the bottom of the arm and the axle.

Push the pivot pin through the arm and then install one **3.96 mm** (**0.156 inch**) washer **(1)** and one **1.06 mm** (**0.042 inch**) washer **(2)** at the top of the arm.

Check the clearance between the upper washer and axle centre section. The gap must be no greater than **1067 mm** (**0.042 inch**). Add or subtract washers at the top of the steering arm to adjust the clearance.Insert the spring pin through the pivot pin to complete installation.

Steering cylinder alignment is critical to seal life. Use washers **(1)** and **(2)**, **(4)** and **(5)**, as shown Fig **4**. to shim gap at top of centre steering arm to a maximum gap of **1 mm**.

Position arm such that there is a gap between trunnion fitting (**Axle - Exploded view (D.10.A)**) and cylinder at top and bottom.

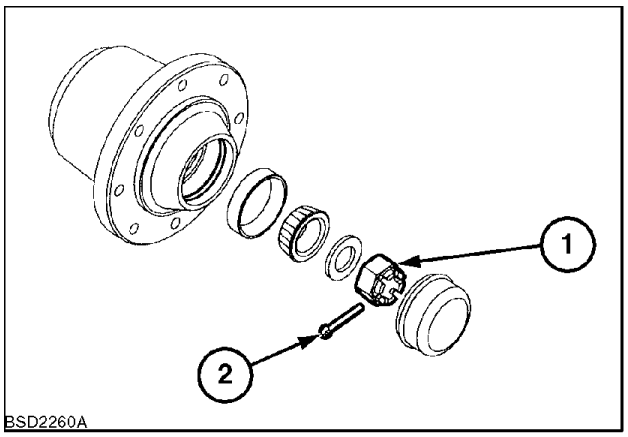


BSD2293A 4

Hub - Remove Two Wheel Drive Axle

PUMA 165, PUMA 180, PUMA 195, PUMA 210

1. Hub Removal
   Support axle and tractor and remove wheels as previously described in . **Spindle drive - Remove (D.10.A)**
   Remove the bearing grease cup
   Remove the cotter pin **(2)** and undo the hub nut **(1)**.
   Remove the wheel hub and recover bearings



BSD2260A 1

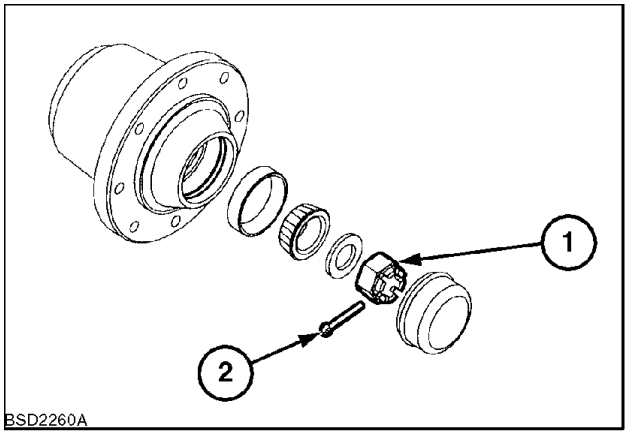
Next operation:
Hub - Install (D.10.A).

Hub - Install Two Wheel Drive Axle

PUMA 165, PUMA 180, PUMA 195, PUMA 210

Prior operation:
Hub - Remove (D.10.A).

1. Reassemble the hub and bearings
   Replace faulty seals and worn bearings.
   Fill the wheel hub with **CASE AKCELA MOLY GREASE**.
   Revolve the hub and torque the castellated nut to **20.3 Nm** (**15.0 lbft**). Then back the nut off to the first slot.
   Lock the nut using the cotter pin **(2)**.
   Refit the bearing grease cup.

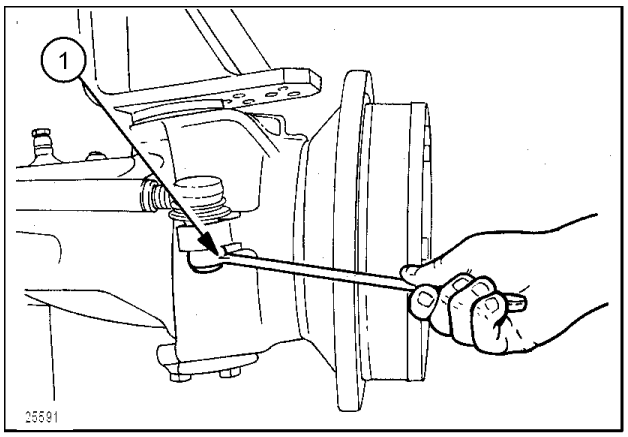


BSD2260A 1

Hub - Remove Four Wheel Drive Axle

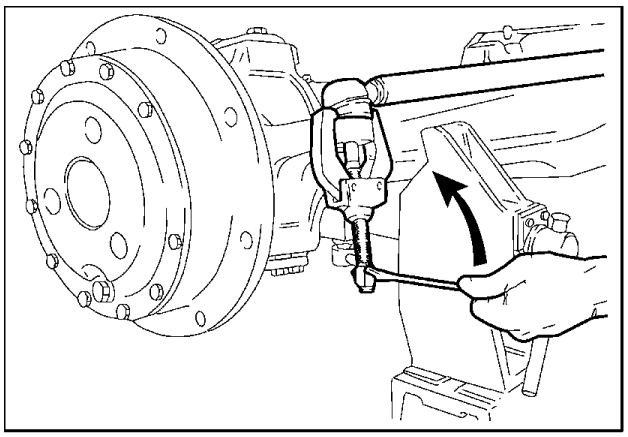
PUMA 165, PUMA 180, PUMA 195, PUMA 210

1. Unscrew the two track rod retaining bolts **(1)**.



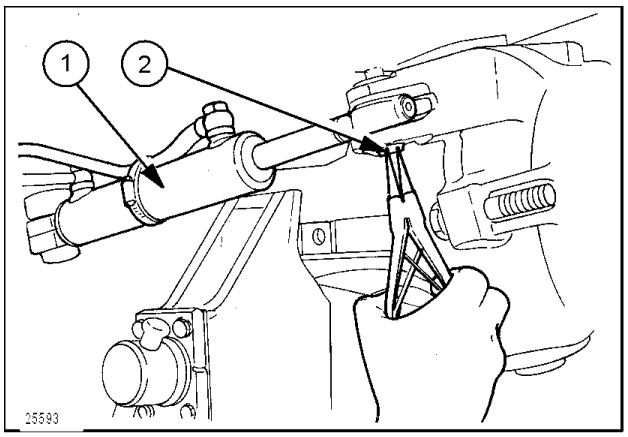
25591 1

2. Prior to removal of the track rod ensure that the hubs will not rotate on their swivels, causing the axle to fall from its stand.
Using a removal tool, withdraw the pins from their bores in the stub axle housing, and remove the track rod.



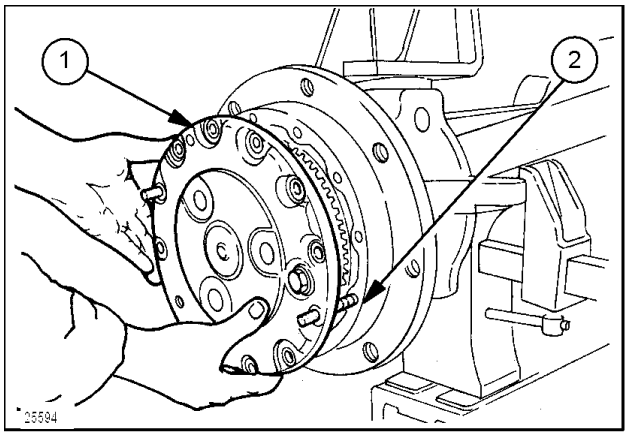
1b0o2004105903 2

3. Remove the circlips **(2)** from the cylinder rod pivot pins, unscrew the pin retaining bolts of the cylinder **(1)**, withdraw the pins and detach the two cylinders. Recover the four pins, washers, spacers and cylinders complete with hoses.



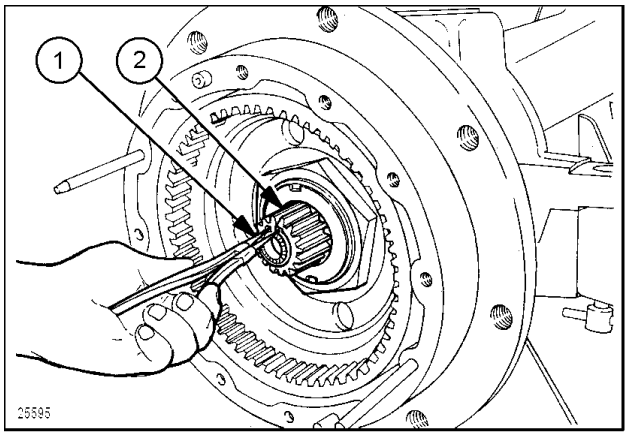
25593 3

4. Unscrew the retaining bolts of the left-hand final drive casing cover **(1)**. Screw in the two studs **380000548 (2)** and, using a slide hammer screwed into the oil drain plug, detach the cover **(1)** from the casing.



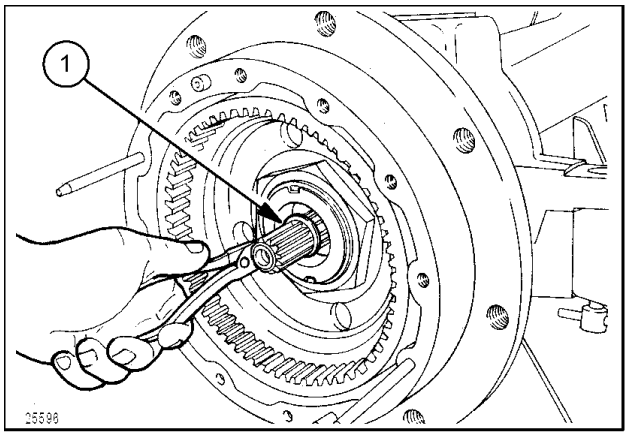
25594 4

5. Remove the outer circlip **(1)** securing the driving gear **(2)** and remove the gear.



25595 5

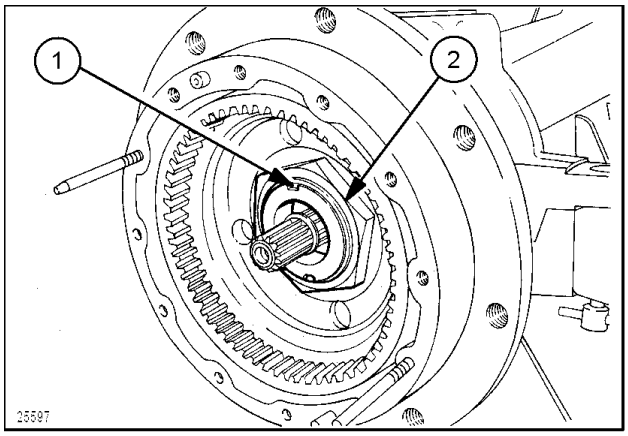
6. Remove the inner circlip **(1)**.



25596 6

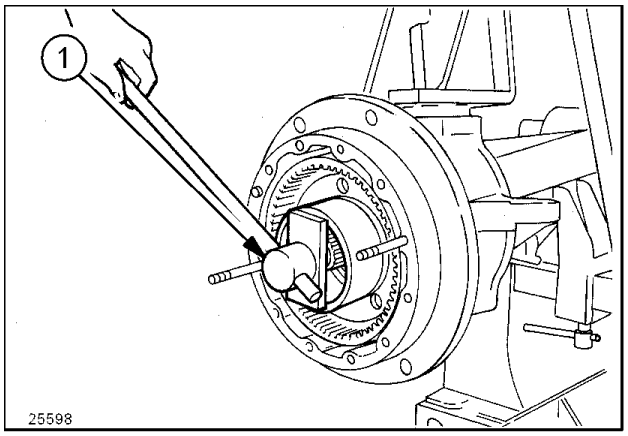
7. Remove the staking **(1)** on the wheel hub bearing lock nut **(2)**.

NOTE: *If desired it is possible to remove the hub and swivel housing together, without the need to remove the wheel hub bearing lock nut.*



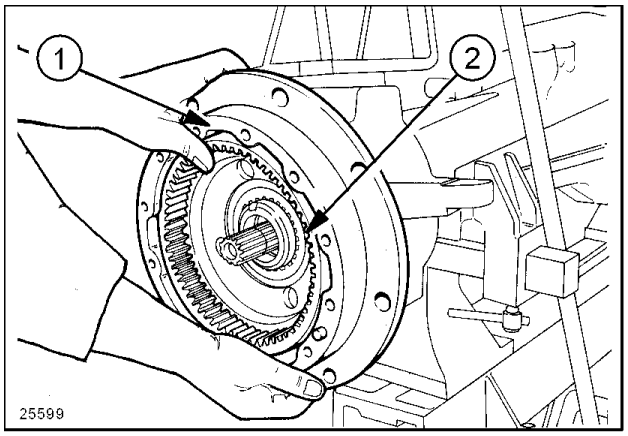
25597 7

8. Remove the wheel hub bearing lock nut using special tool **380000469** .



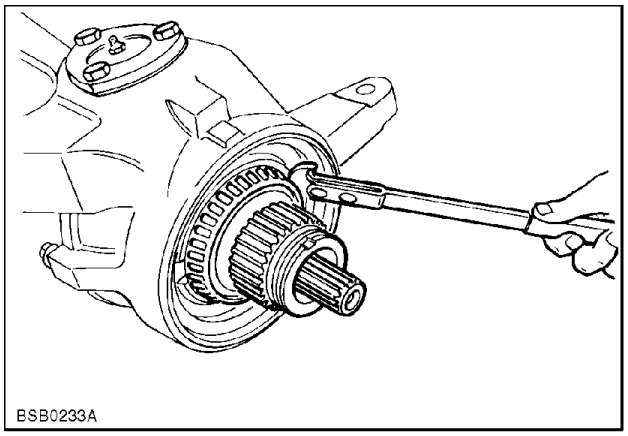
25598 8

9. Remove the wheel hub **(1)** with the ring gear **(2)**.



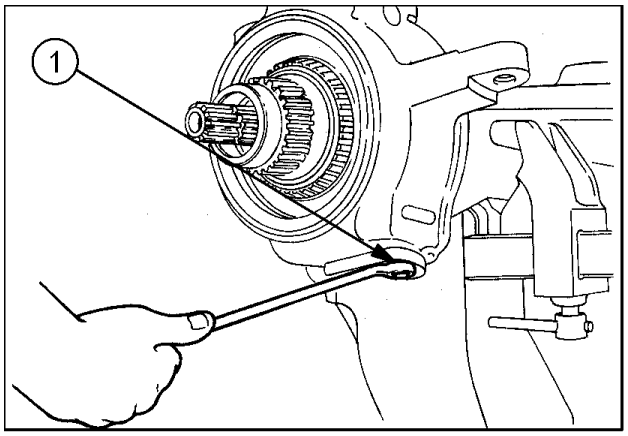
25599 9

10. Remove seal using suitable extracting tool.



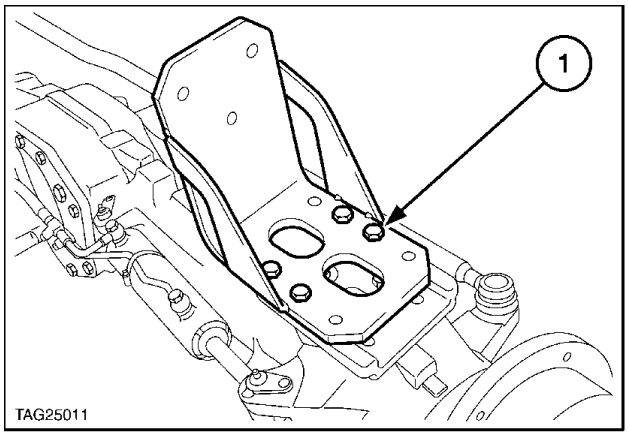
BSB0233A 10

11. Unscrew the three retaining bolts **(1)** of the lower pin of the stub axle housing. Recover the lower pivot pin and the adjustment shims.



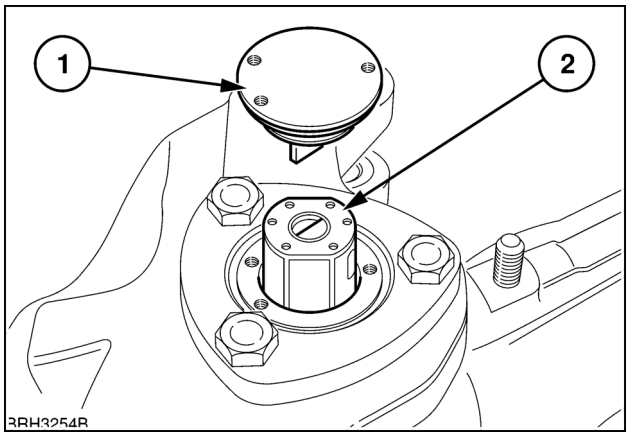
1b0o2004105906 11

12. Unscrew the four retaining bolts **(1)** of the mudguard bracket **(2)** and remove the bracket.



TAG25011 12

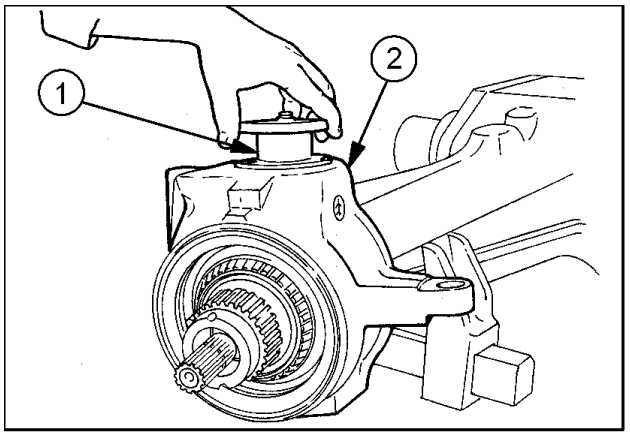
13. If fitted, remove the steering angle potentiometer. Remove the potentiometer retaining plate **(1)** and withdraw the potentiometer **(2)** from the axle hub.



BRH3254B 13

14. Unscrew the three retaining bolts of the upper pivot pin.
Withdraw the upper pivot pin **(1)** and detach the stub axle housing **(2)**.
.

NOTE: *Refer to* ***Sensing system - Replace (D.10.A)*** *for replacement of steering angle potentiometers.*



1b0o2004105909 14

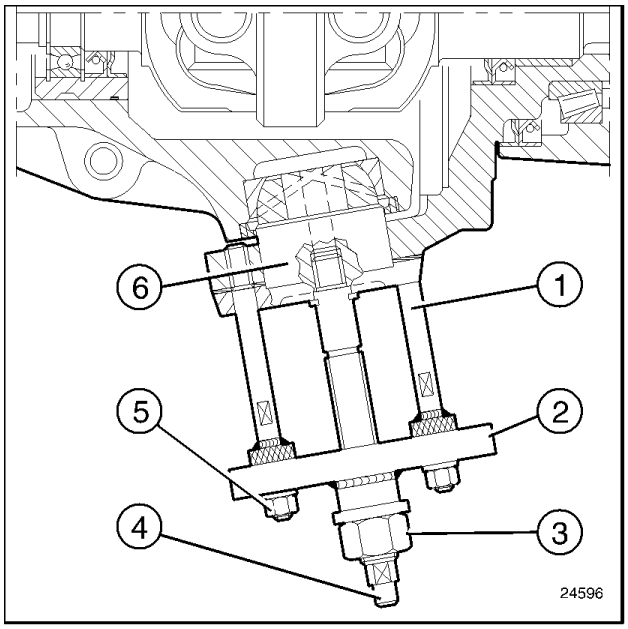
Hub Swivel pin and bearing - Overhaul Four Wheel Drive Axle

STEERING SWIVEL PINS AND BEARINGS - Less Steering Angle Potentiometer

Replacement

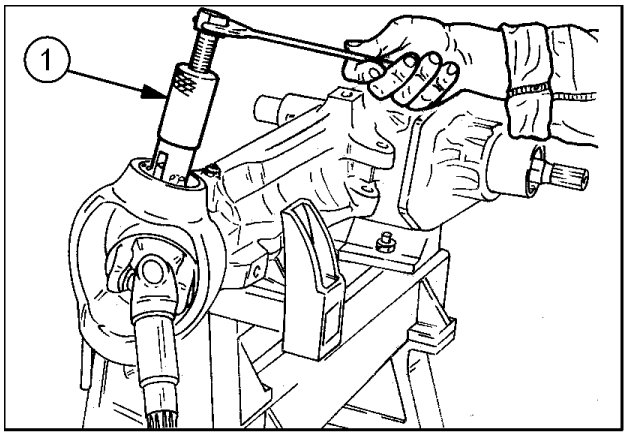
Prior operation:
Hub - Remove (D.10.A).

1. In the event that the steering swivel pins prove difficult to remove, proceed as follows.
   Remove the grease nipples and the steering swivel pin retaining bolts.
   Fit the bolts **(1)** of the special tool **380000265** .
   Fit the plate **(2)** of the tool and fix it to the three bolts with nuts **(5)**.
   Fit the central tie bolt **(4)** screwing it fully into the grease nipple bore on the pin **(6)**.
   Screw in the nut **(3)** to drive the pin out of its bore.



24596 1

2. Using the extractor special tool **380000234 (1)** remove the steering swivel bearings.
   Re-install the steering swivel bearings using a suitable drift.

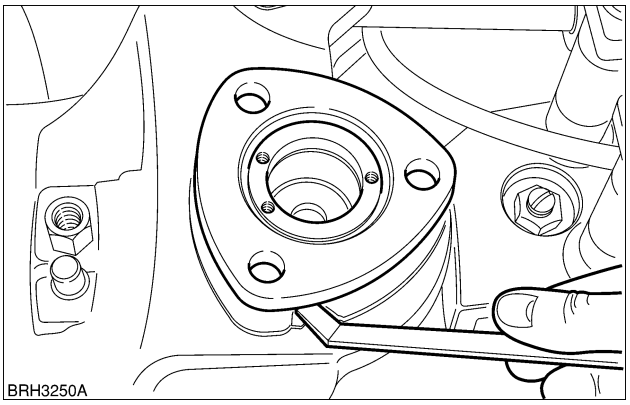


1b0o2004061038 2

Steering Swivel Pins and Bearings - With steering angle potentiometer

3. Remove the steering angle potentiometer, refer to **Sensing system - Replace (D.10.A)**.

4. In the event that the steering swivel pins prove difficult to remove, remove the 3 steering swivel retaining bolts. Using suitable pry bars located in the swivel housing casting slots, carefully lever the swivel pin from the housing.

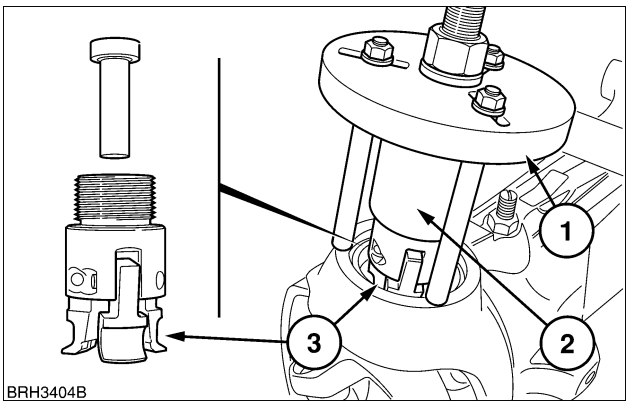


BRH3250A 3

5. Remove the swivel housing, refer to **Hub - Remove (D.10.A)**.

6. Remove the steering angle potentiometer shaft from the axle housing. Refer to **Sensing system - Replace (D.10.A)**.

7. Using the bearing puller attachment of extractor, special tool No. **380000234 (3)** with adaptor tool, **380002489 (2)** couple these to special tool **380000265 (1)** and remove the steering swivel bearings.



BRH3404BB 4

8. Install the new steering swivel bearings using a suitable drift.

NOTE: *Take care when installing the bearings not to damage the special bearing coating.*

Hub Swivel pin and bearing - Preload

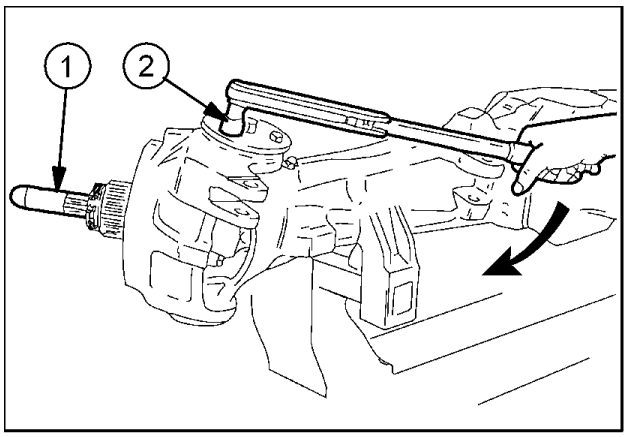
⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

B026

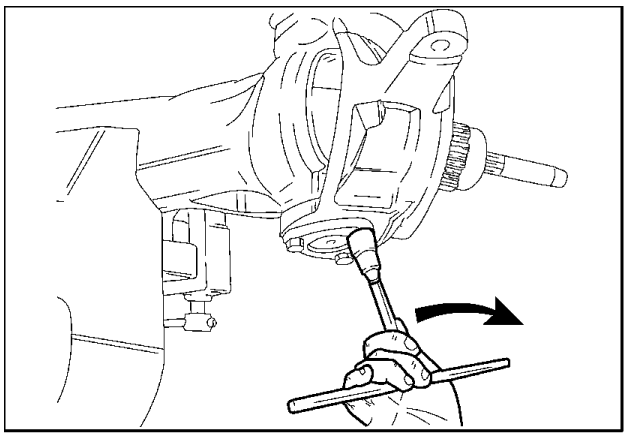
1. Apply grease **CASE AKCELA MOLY GREASE** on the outer races of the bearings and fit the upper cover, without the shims, and with special tool **380000235 (2)** attached. Torque the retaining bolts to the specified torque value of **130 Nm** (**96 lb ft**).

NOTE: *To aid installation of the swivel pin, it is recommend that guide* ***380001143 (1)*** *is installed on the axle shaft.*



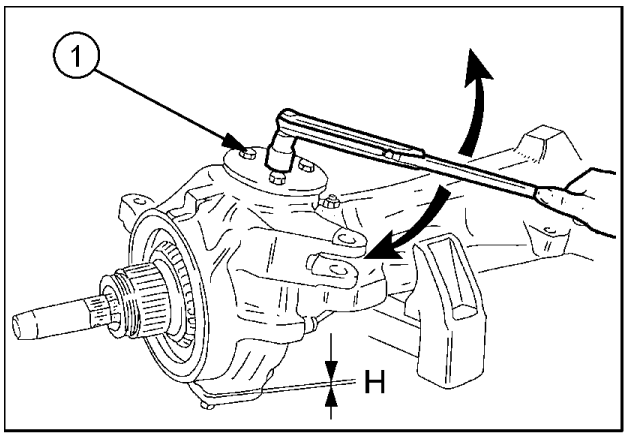
1b0o2004061039 1

2. Fit the lower cover without shims, lubricate the three retaining bolts with engine oil.
Gradually, tighten the lower cover bolts equally while rotating the casing to allow the excess grease to escape.



1b0o2004061040 2

3. Using a torque wrench and special tool **380000235 (1)**, check that the torque required to rotate the casing is **15 - 20 Nm**. Adjust the three lower bolts until the correct torque is achieved.
Measure the gap (H) created between the lower cover and the casing in three places.

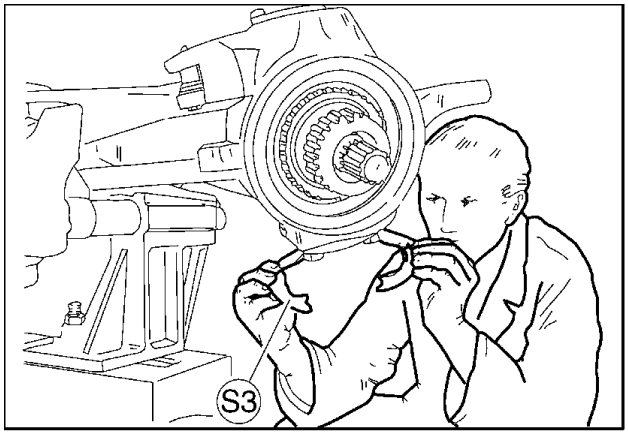


1b0o2004061041 3

4. Calculate the average of the three values measured. The total thickness of the adjustment shims to be fitted under the lower cover is Shim S3= H - **0.20 mm**
.
If necessary, round up the value to the next **0.05 mm**.

5. Insert shims under lower swivel cover. Tighten the retaining bolts to the specified torque value of **113 Nm**.

6. After having rotated the casing a few times to allow the components to bed down, check that the torque necessary to rotate the casing is **147 Nm** (**108 lb ft**). If the torque value measured is greater than the specified value, increase the thickness of the shims, if it is less than the specified value, reduce the thickness of the shims.
   Remove the special tool **380000235** , fit the grease nipples in the upper and lower covers and grease the assembly.

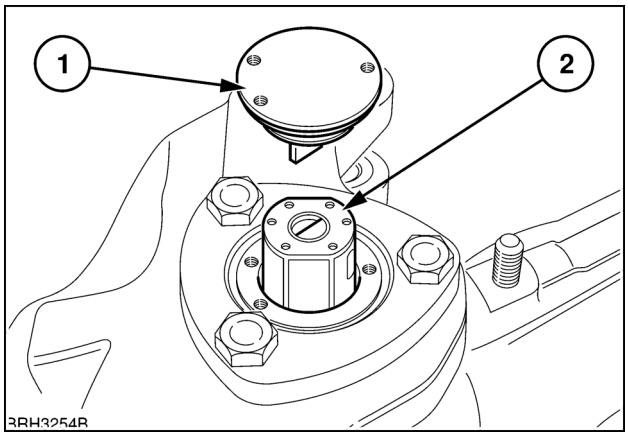


1b0o2004061042 4

Next operation:
Tie rod - Toe in adjust (D.20.C)

Sensing system - Replace

1. To replace the potentiometer sensor unit only, remove the potentiometer retaining plate **(1)** and withdraw the potentiometer **(2)** from the axle swivel housing.



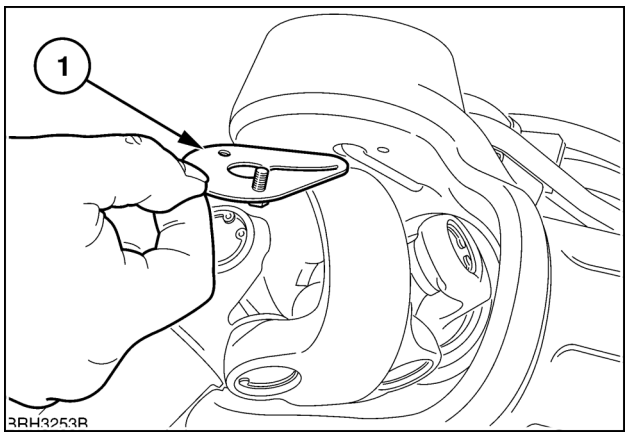
BRH3254B 1

2. Refit the potentiometer ensuring that the 'D' drive of the shaft and potentiometer are correctly aligned.
3. Check the sealing ring of the retaining plate is in good condition and refit the retaining plate

NOTE: *Calibration of the steering angle sensor must then be carried out. Refer to* ***FRONT AXLE - Calibrate (D.10.A)****.*

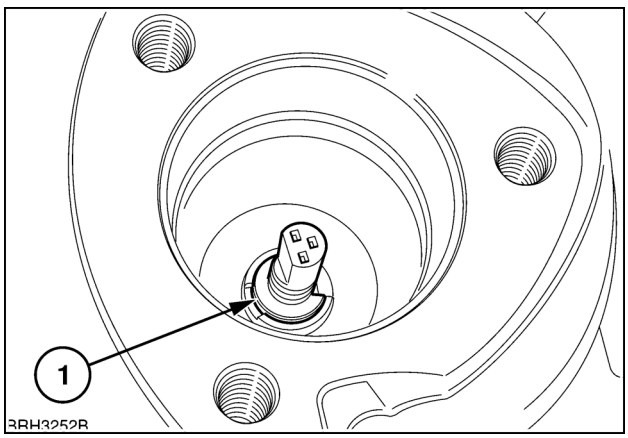
Potentiometer shaft and wiring replacement

4. With the swivel housing and axle shaft removed, refer to **Hub - Remove (D.10.A)**, carefully remove the electrical connector from the potentiometer wiring. Remove the wire retaining plate **(1)** and pull the potentiometer shaft and wiring up through the top of the axle housing.



BRH3253B 2

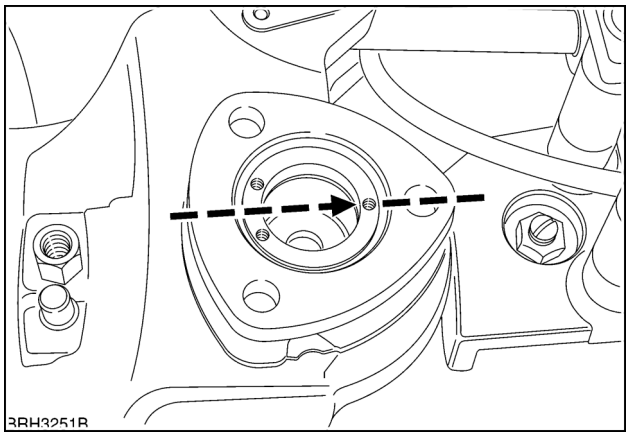
5. Install the new potentiometer shaft (1) and wiring through the axle hole and locate as shown in Figure **3**. Refit the wire retaining plate and ensure the rubber grommet for the wiring is correctly installed into the housing. Reconnect the wiring to the connector.



BRH3252B 3

6. Fit the swivel housing, the adjustment shims, the upper and lower pivot pins, ensuring that the upper pin flange is correctly positioned as shown in Figure **4**, refer to **Hub - Remove (D.10.A)**.

NOTE: *Calibration of the steering angle sensor must then be carried out. Refer to* ***FRONT AXLE - Calibrate (D.10.A)****.*



BRH3251B 4

Axle - Troubleshooting Two Wheel Drive

PUMA 165, PUMA 180, PUMA 195, PUMA 210

Problem	Possible Cause	Correction
Premature tyre wear	Wrong inflation pressure.	Inflate tyres to correct pressure, refer to values suggested in the Operator's Manual. Always comply with values specified by the tyre manufacturer.
	Wrong front wheel toe-in.	Adjust toe-in (see **Axle - Check (D.10.A)**).
Poor tractor stability	Wrong inflation pressure.	Inflate tyres to correct pressure

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PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]
FRONT AXLE - Calibrate 40
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
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REAR AXLE - 12.A

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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REAR AXLE - General specification

Pinion and crown wheel ratio:		9/42 = 1:4.66
Pinion to crown wheel backlash		**0.25 - 0.33 mm** (**0.010 - 0.013 in**)
Differential		4-pinion
Differential lock control:		
- Multi-plate clutch		Acting through a hydraulically controlled multi-pack clutch in oil bath
Number of clutch discs:		
- Driven discs.	n.	4
- Drive discs.	n.	4
- Driven disc thickness (each)		**3.45 - 3.55 mm** (**0.136 - 0.140 in**)
- Drive disc thickness (each)		**1.95 - 2.05 mm** (**0.077 - 0.081 in**)
Differential pinion bore dia. (Refer to **REAR AXLE - Sectional view (D.12.A)**)		**30.04 - 30.061 mm** (**1.183 - 1.184 in**)
Differential pinion journal dia. **(6)**		**29.939 - 29.96 mm** (**1.1787 - 1.1795 in**)
Differential pinion running clearance		**0.080 - 0.122 mm** (**0.003 - 0.005 in**)
Side gear hub seat in differential Casing dia. (Refer to **REAR AXLE - Sectional view (D.12.A)**)		**70 mm** (**2.756 in**)
Side gear hub dia. **(3)**		**68 mm** (**2.677 in**)

Pinion shaft position adjustment (Refer to **REAR AXLE - Sectional view (D.12.A)**)	Refer to **REAR AXLE - Adjust (D.12.A)**
- shims available	**3 mm** (**0.12 in**) **3.1 mm** (**0.122 in**) **3.2 mm** (**0.126 in**) **3.3 mm** (**0.130 in**) **3.4 mm** (**0.134 in**) **3.5 mm** (**0.138 in**) **3.6 mm** (**0.142 in**) **3.7 mm** (**0.146 in**) **3.8 mm** (**0.150 in**) **3.9 mm** (**0.154 in**) **4 mm** (**0.157 in**)
Pinion bearing adjustment	Refer to **REAR AXLE - Adjust (D.12.A)**

Pinion bearing shimming (Refer to **REAR AXLE - Sectional view (D.12.A)**)	**4.40 mm** (**0.173 in**) **4.50 mm** (**0.177 in**) **4.60 mm** (**0.181 in**) **4.70 mm** (**0.185 in**) **4.80 mm** (**0.189 in**) **4.85 mm** (**0.191 in**) **4.90 mm** (**0.193 in**) **4.95 mm** (**0.195 in**) **5.0 mm** (**0.197 in**) **5.05 mm** (**0.199 in**) **5.10 mm** (**0.201 in**) **5.15 mm** (**0.203 in**) **5.20 mm** (**0.205 in**) **5.25 mm** (**0.207 in**) **5.30 mm** (**0.209 in**) **5.35 mm** (**0.211 in**) **5.40 mm** (**0.213 in**) **5.45 mm** (**0.215 in**) **5.50 mm** (**0.217 in**) **5.55 mm** (**0.219 in**) **5.60 mm** (**0.220 in**) **5.65 mm** (**0.222 in**) **5.70 mm** (**0.224 in**) **5.75 mm** (**0.226 in**) **5.80 mm** (**0.228 in**) **5.85 mm** (**0.230 in**) **5.90 mm** (**0.232 in**) **5.95 mm** (**0.234 in**) **6.0 mm** (**0.236 in**) **6.05 mm** (**0.238 in**) **6.10 mm** (**0.240 in**) **6.15 mm** (**0.242 in**) **6.20 mm** (**0.244 in**) **6.30 mm** (**0.248 in**) **6.40 mm** (**0.252 in**) **6.50 mm** (**0.256 in**) **6.60 mm** (**0.260 in**)
Crown wheel bearing and backlash shims available (Refer to **REAR AXLE - Adjust (D.12.A)**)	Refer to **REAR AXLE - Adjust (D.12.A)** **0.15 mm** (**0.006 in**) **0.20 mm** (**0.008 in**) **0.50 mm** (**0.020 in**)
Differential gear and pinion backlash	**0.20 mm** (**0.008 in**)
Differential gear thrust washer thickness (Refer to **REAR AXLE - Adjust (D.12.A)** and **REAR AXLE - Sectional view (D.12.A)**)	**2.70 mm** (**0.106 in**) **2.75 mm** (**0.108 in**) **2.80 mm** (**0.110 in**) **2.85 mm** (**0.112 in**) **2.90 mm** (**0.114 in**) **2.95 mm** (**0.116 in**) **3.00 mm** (**0.118 in**) **3.05 mm** (**0.120 in**) **3.10 mm** (**0.122 in**) **3.15 mm** (**0.124 in**) **3.20 mm** (**0.126 in**) **3.25 mm** (**0.128 in**) **3.30 mm** (**0.130 in**)
Differential gear end play (each)	**0.226 mm** (**0.0089 in**)± **0.302 mm** (**0.0119 in**)
Differential gear end play adjustment	Refer to **Differential lock Multi plate clutch - Overhaul (D.12.A)**

REAR AXLE - Special tools

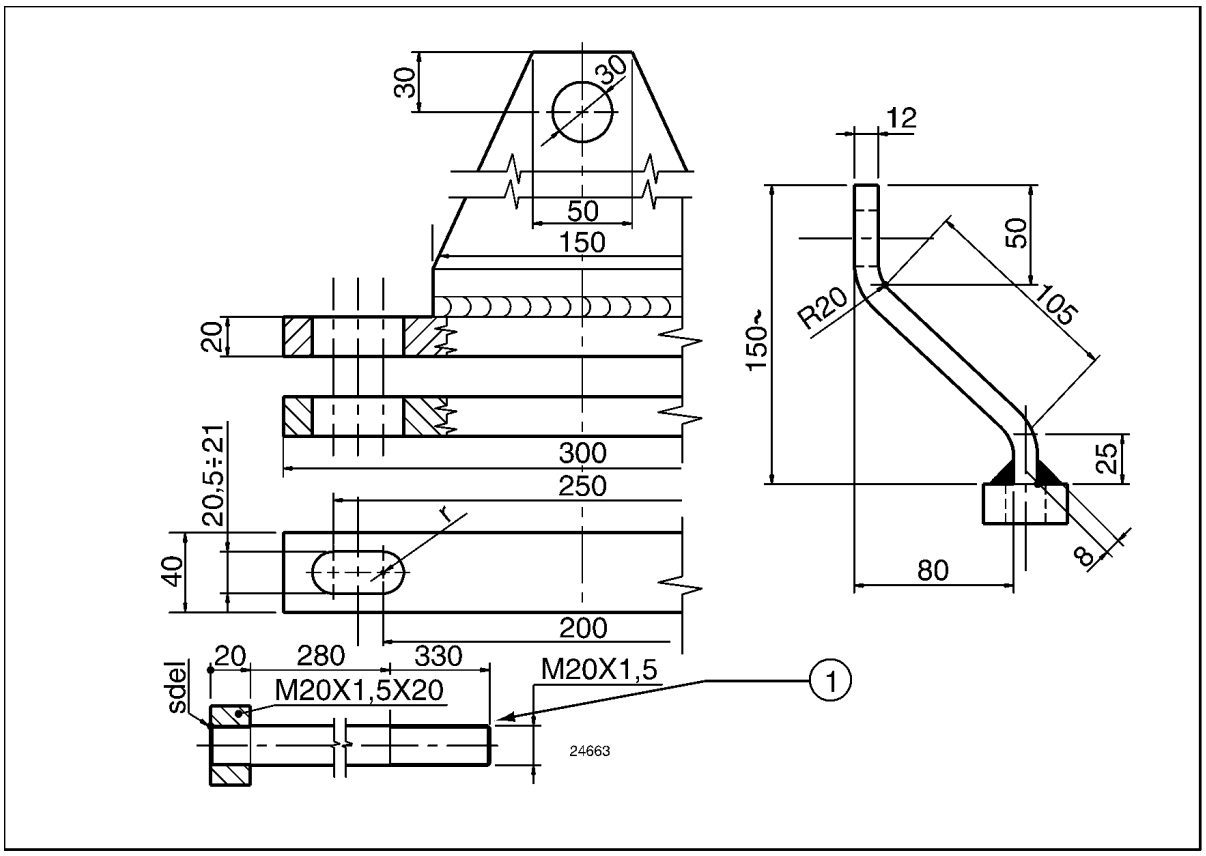
⚠ CAUTION ⚠

The operations described in this section can only be carried out with the ESSENTIAL tools indicated by an (X). To work safely and efficiently and obtain the best results, it is also necessary to use the recommended specific tools listed below and certain other tools, which are to be made according to the drawings included in this manual.

B008

List of special tools necessary to carry out the different operations described in this Section.

380000301	Rotary stand
380000236	Tractor separation stand
380000227	Rear axle housing lifting hook
380000272	Front bracket for rear axle overhaul (to be used with **380000301**)
380000273	Rear bracket for rear axle overhaul (to be used with **380000301**)
X **380000459**	Nut wrench for checking pinion rolling torque
380001783	Transfer box shaft puller
380000452	Pinion ring nut tool
X **380000470**	Pinion bearing adjustment tool
X **380000472**	Spacer (to be used with **380000470**)
380000249	Universal pinion installer
X 380000477	Crown wheel-differential lifting hook
380000240	Universal differential lock pressure test kit
X **380000475**	Differential planetary gear adjustment tool
380000237	Rear wheel lifting hook.
380000462	Differential overhaul stand.
380000549	Slide hammer.
X **380000486**	Spacer and bushing (to be used with **380000470**).
380000569	Tractor splitting kit
380000403	Rear axle support
380200104	Crown Wheel Removing Tool



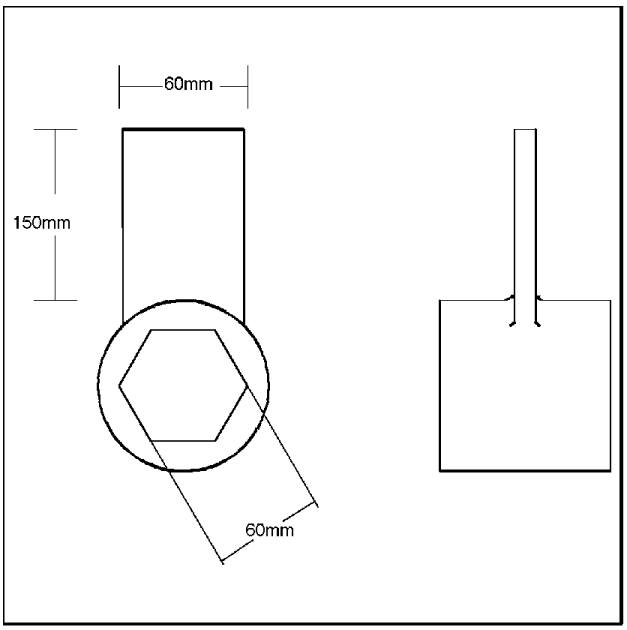
24663-2 1

Tool to be fabricated to disassemble-assemble the final drives (Mark tool with no. 50091 - - Dimensions in mm).

Fabricate tool using Aq 42 D.material
1. Make 2 legs in C 40 H&T material

Tool to be fabricated to disassemble-assemble the Bevel Pinion Shaft

- Make from **60 mm** socket (remove square drive end).
- Weld suitable rectangular piece of metal to socket (See Fig. **2**).
- Use in conjunction with pinion drive coupler and **3/4 in** drive socket.(Refer to **REAR AXLE - Disassemble (D.12.A)**).

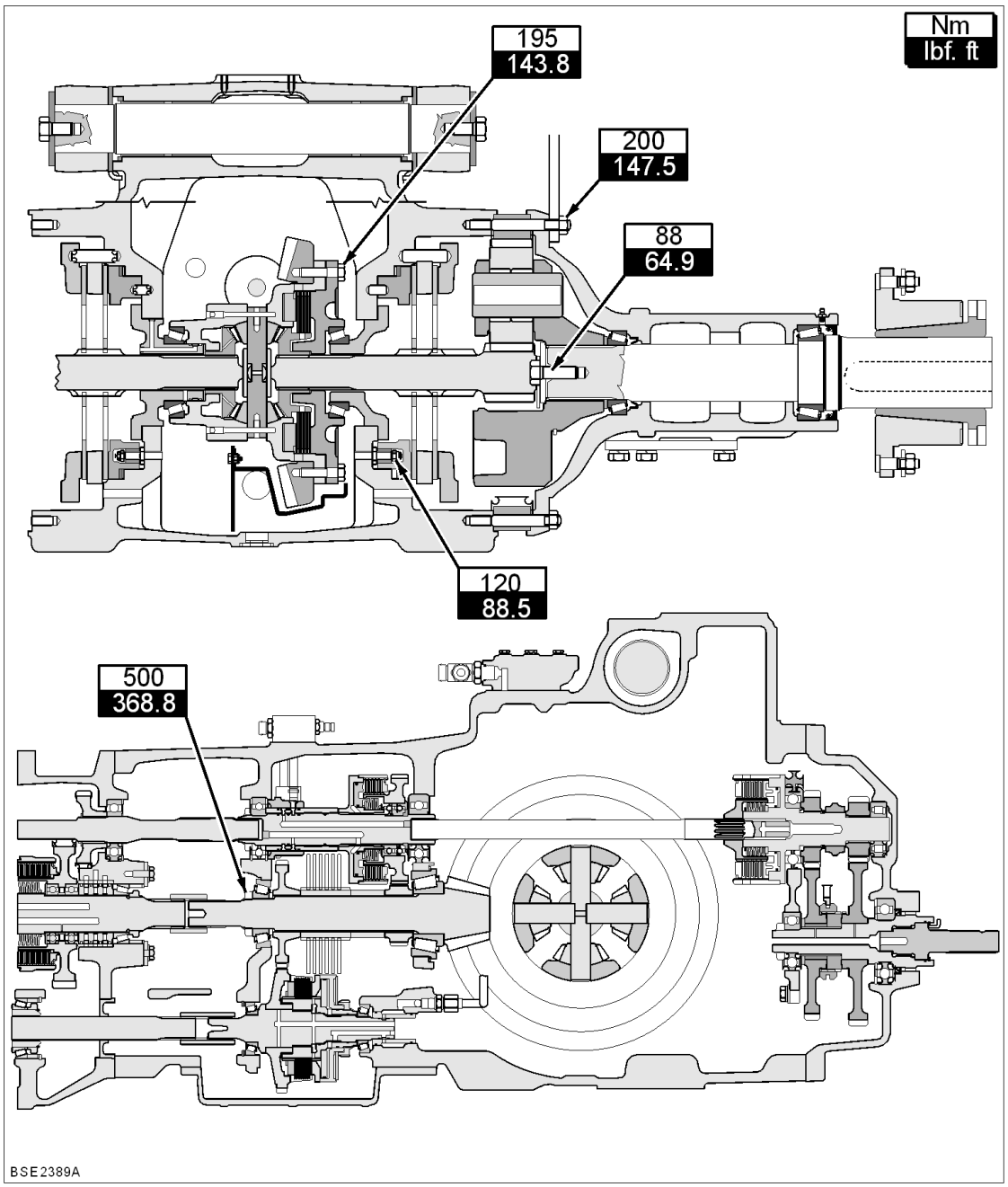


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REAR AXLE - Torque

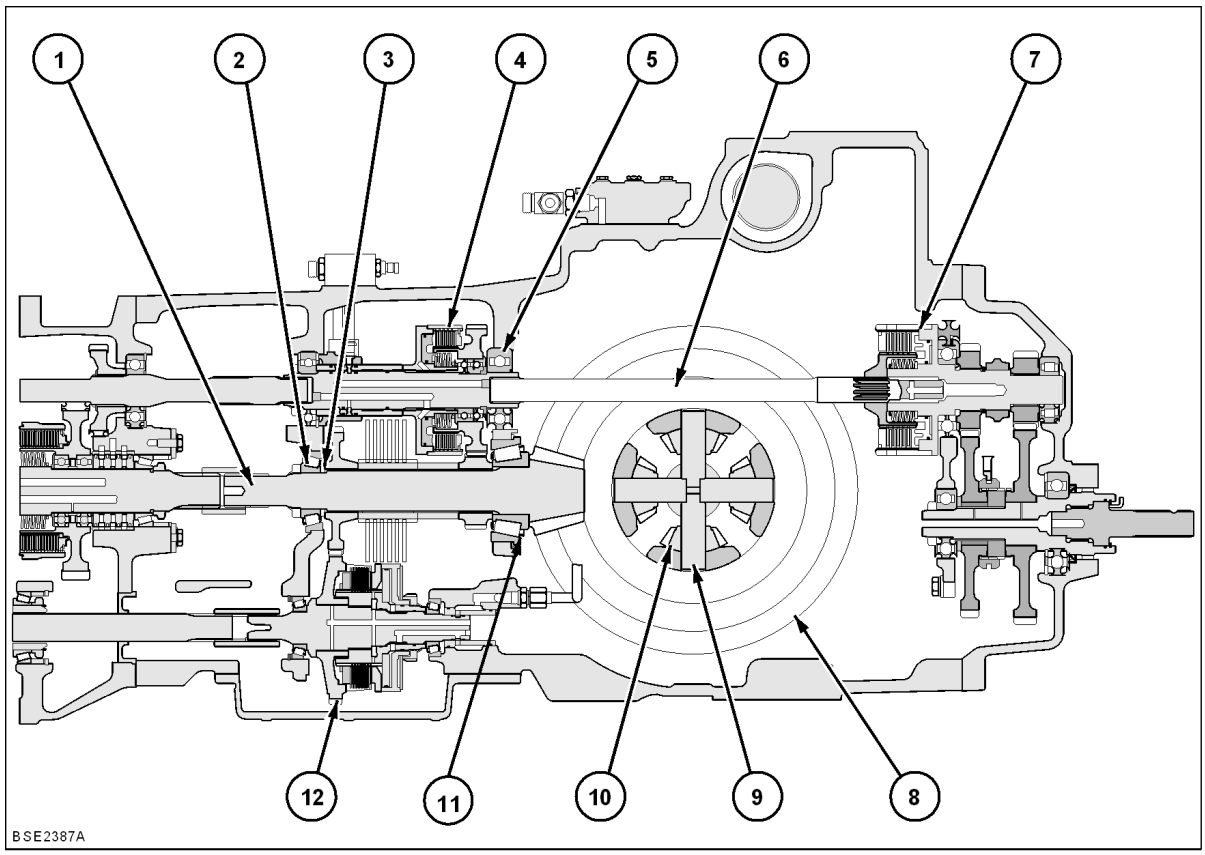
DESCRIPTION	Thread size	Torque
Nut, bevel pinion shaft	M45x1. 5	**500 Nm** (**368.78 lbft**)
Nut, final drive case	M14x1. 5	**200 Nm** (**147.51 lbft**)
Nut, wheel disc to wheel rim	M16x1.5	**250 Nm** (**184.39 lbft**)
Nut, steel wheel disc to wheel hub	M18x1.5	**255 Nm** (**188.08 lbft**)
Capscrew, wheel hub on dual wheel axle shaft	M16x1.5	**294 Nm** (**216.84 lbft**)
Capscrew, RAIL disc on dual wheel axle shaft	M16x1.5	**294 Nm** (**216.84 lbft**)
Capscrew, drive wheel shaft	M22x1.5	**88 Nm** (**64.91 lbft**)(*)
Capscrew, crown wheel and differential caps	M10x1.25	**54 Nm** (**39.8 lb ft**)
Capscrew, crown wheel	M14x1.5	**195 Nm** (**143.82 lbft**)
Nut, RAIL disc block	M20x2.5	**245 Nm** (**180.70 lbft**)
Nut, RAIL disc to wheel hub	M18x1.5	**314 Nm** (**231.59 lbft**)
Nut, weight screw to steel wheel disc	M16x1.5	**294 Nm** (**216.84 lbft**)
Attaching screws, wheel weights	M16x1.5	**211 Nm** (**155.63 lbft**)
Allen screw, wheel weights to cast iron disc	M16x1.5	**186 Nm** (**137.19 lbft**)

(*) see adjustment procedure on Refer to **Final drive Shaft - Install (D.12.A)**



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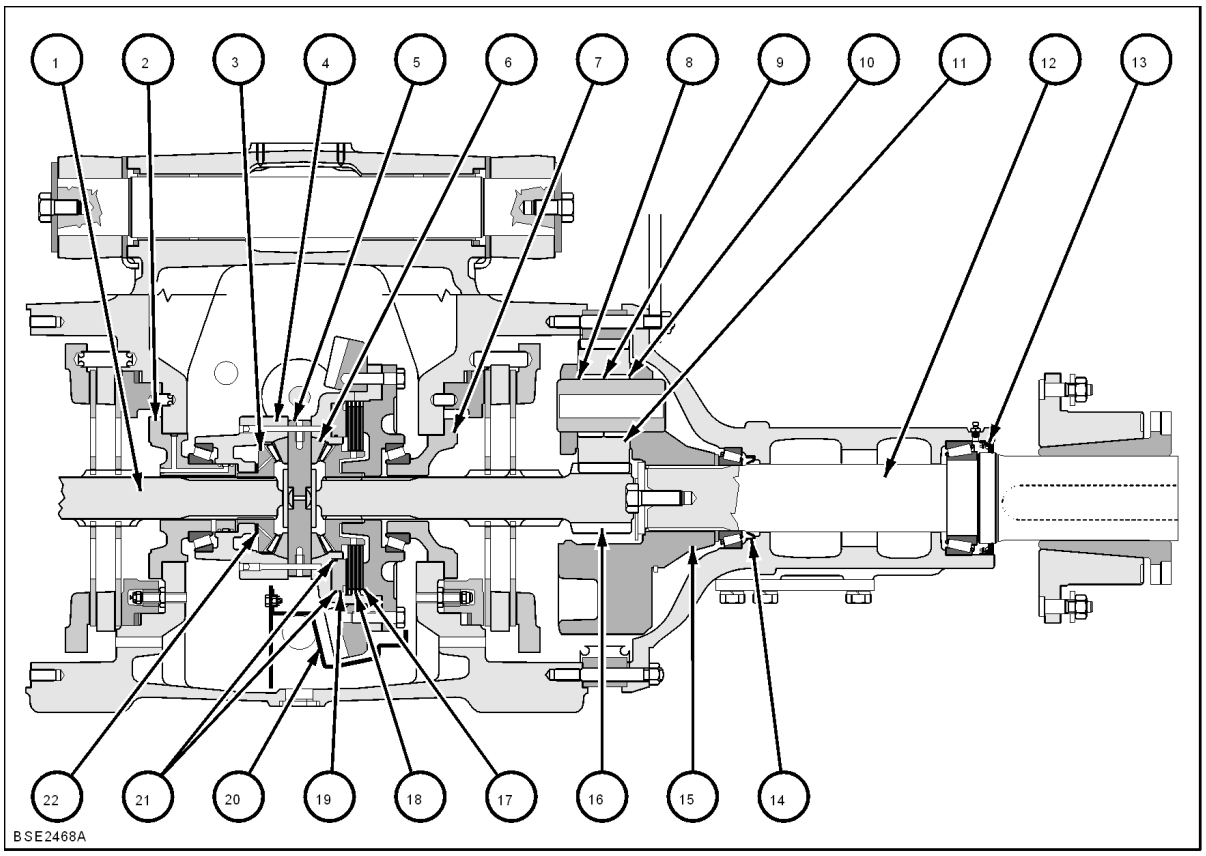
REAR AXLE - Sectional view



BSE2387A 1

Rear Axle Longitudinal Sectional View

1 Bevel pinion shaft
2 Tapered roller bearing
3 Bevel pinion bearing adjusting shim
4 **50 Kph** Clutch (Where Fitted)
5 Bearing
6 PTO Drive Shaft
7 PTO Clutch
8 Crown Wheel
9 Differential gear hub
10 Differential gear
11 Pinion shaft position shim
12 Four Wheel Drive Clutch



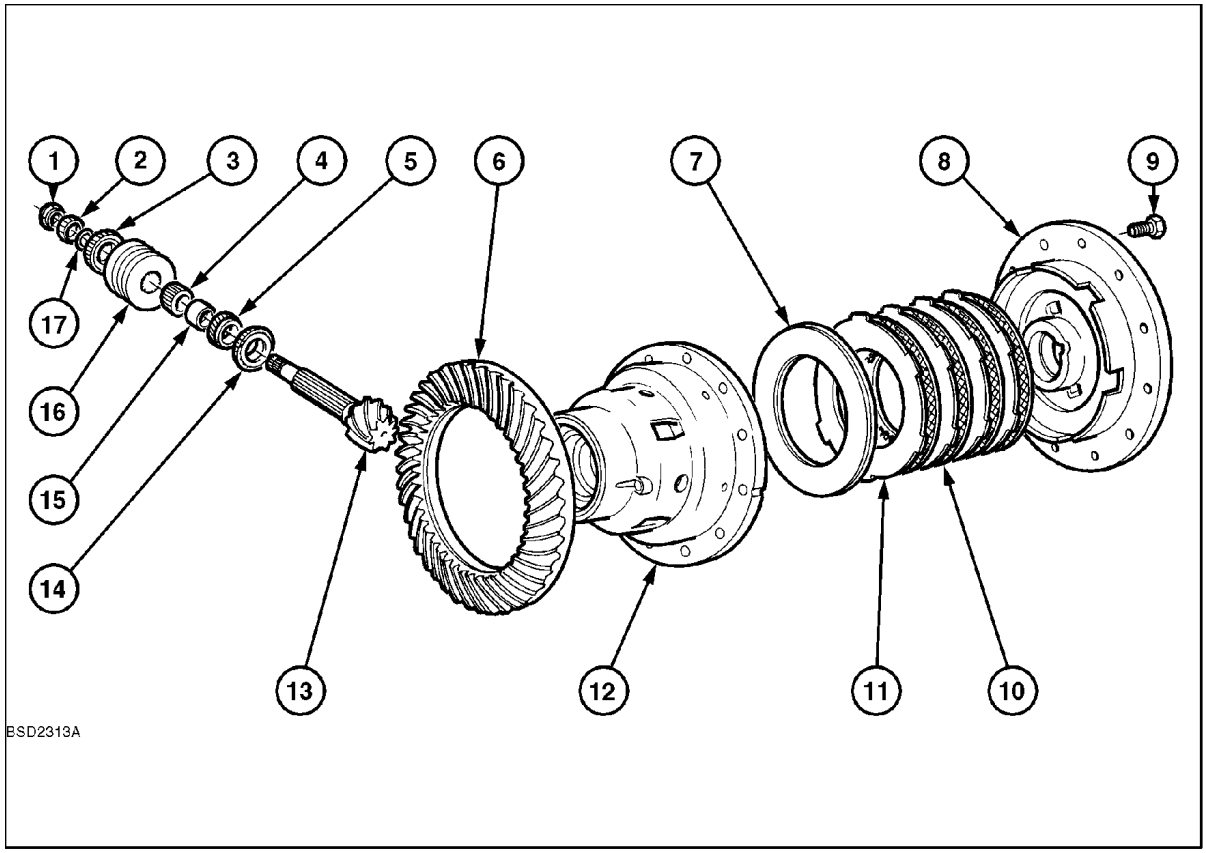
BSE2468A 2

Rear Axle Cross-Section (with multi-plate clutch differential lock)

1 Differential output half-shaft
2 Differential Support
3 Side gears
4 Differential casing
5 Differential gear Hub
6 Differential Pinion
7 Crown wheel bearing cap
8 Thrust washer
9 Planetary gear **(11)** bearing spacer
10 Thrust washer
11 Planetary final reduction gears
12 Wheel axle shaft
13 Seal.
14 Seal.
15 Planetary carrier
16 Differential output half-shaft
17 Drive discs
18 Driven discs
19 Differential lock control piston
20 Crown Wheel Guard
21 Seal
22 Side Gear End Play Adjuster Rings

REAR AXLE - Static description

The rear axle assembly transfers drive from the transmission to the epicyclic final drives through a bevel pinion and crown wheel coupling. The bevel gears are spiral type and are supported by tapered roller bearings.
The differential is fitted with four planetary gears and hydraulic differential lock. The differential lock being of a multi-plate type.
Refer to **Differential lock Multi plate clutch - Dynamic description (D.12.A)**
The epicyclic final reduction gear sets are controlled by the bevel pinion and crown wheel output half-shafts, which also control the brakes. On Models with 19Fx6R **50 Kph**Transmissions the **50 Kph** clutch is housed in the rear axle.
Refer to **ADDITIONAL REDUCERS Overdrive - Static description (C.30.D)**

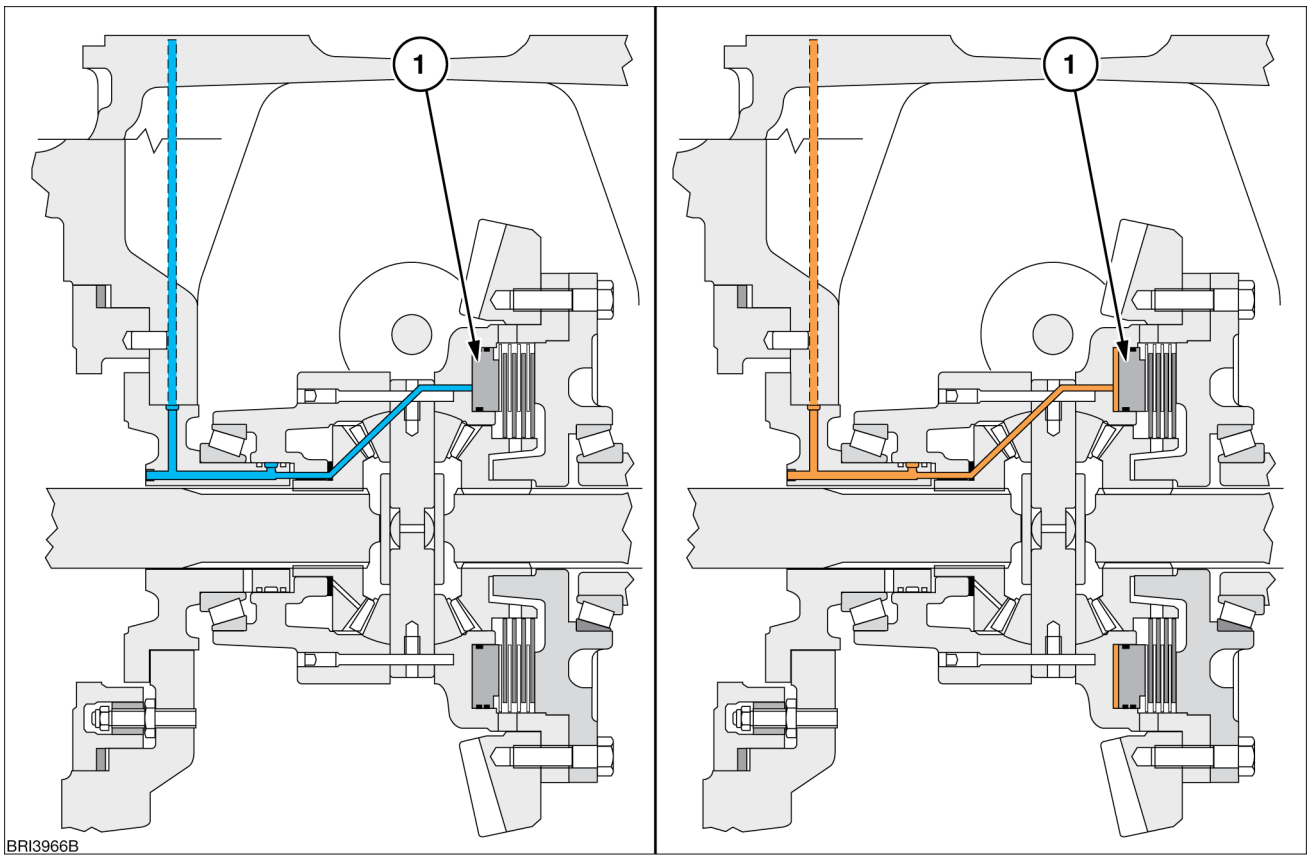


BSD2313A 1

Crown Wheel and Pinion Components

1 Ring Nut
2 Bearing
3 Four Wheel Drive Gear
4 Parking Brake Disc Hub
5 **50 Kph** Drive Gear (Where Fitted)
6 Crown Wheel
7 Piston
8 Cover
9 Bolt
10 Driven Disc
11 Lock Plate
12 Differential Casing
13 Shaft and Bevel Pinion
14 Bearing
15 Spacer
16 Brake Discs
17 Shim

Differential lock Multi plate clutch - Dynamic description



BAIL06CCM044GSA 1

REAR DIFFERENTIAL LOCK ASSEMBLY (Multi-plate clutch)

Return to dump

Low pressure oil (**22 - 24 bar** (**319.00 - 348.00 psi**))

When the switch on the instrument panel is activated, the solenoid valve opens and directs oil from the pump into the control piston **(1)** annular groove in left hand bearing carrier.
The pressure applied over the piston **(1)** surface compresses the multi-pack clutch drive and driven discs and locks the differential.

Differential lock - Fault code index

If an error code is displayed in the instrument panel identified with the numbers ’7----’ refer to **Control module - Fault code index (A.50.A)**

REAR AXLE - Remove

Prior operation:
Battery - Disconnect (A.30.A)
Prior operation:
Disconnect the rear axle from the transmission housing, for further information, refer to **Housing - Disconnect (C.20.E)**

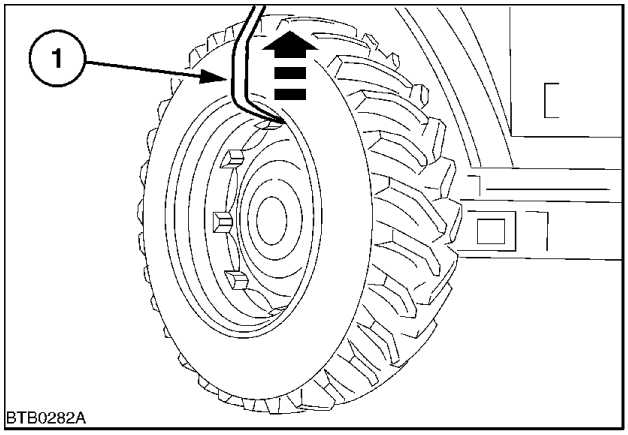
⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012

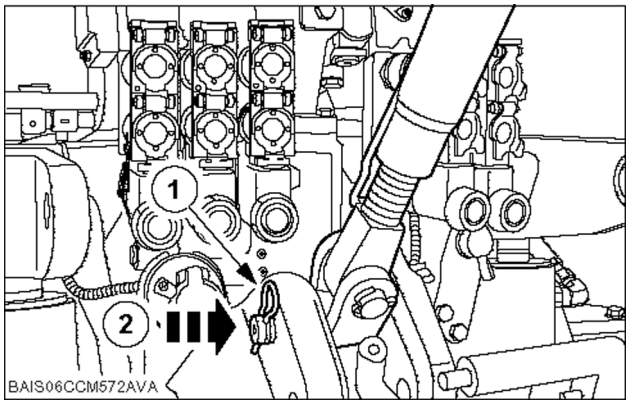
1. Ensure the rear axle is adequately supported.
2. Using a suitable sling **(1)** connect the rear wheel to a hoist and remove the rear wheel.

NOTE: *Repeat for left hand wheel.*



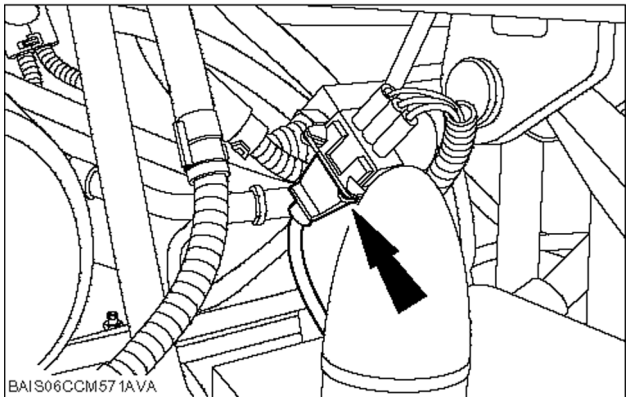
BTB0282A 1

3. Remove the 'R' clip **(1)** slide out the hinge pin **(2)** and remove the top lift link.



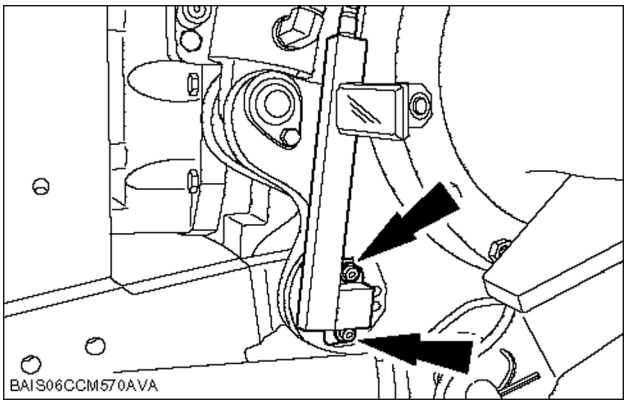
BAIS06CCM572AVA 2

4. Disconnect the EDC electrical connector.



BAIS06CCM571AVA 3

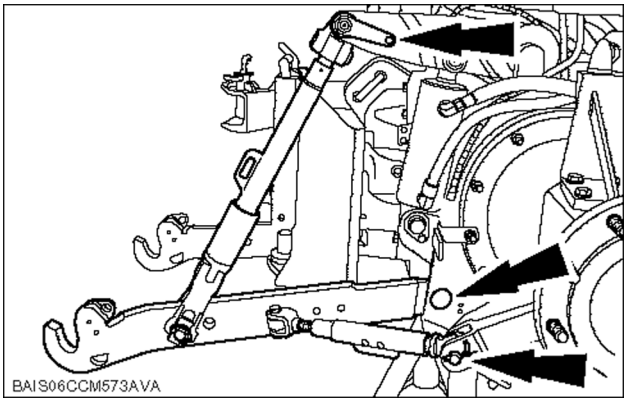
5. Remove the EDC sensor.



BAIS06CCM570AVA 4

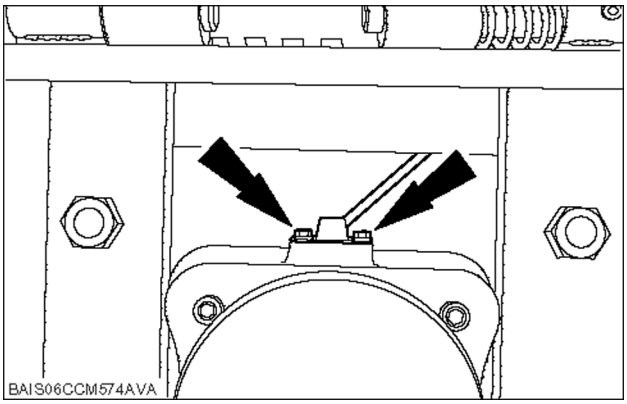
6. Remove the lift arm assembly.

NOTE: *Repeat this operation for the left hand side.*



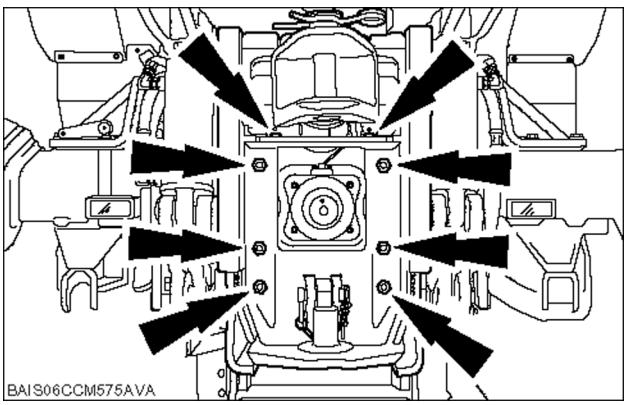
BAIS06CCM573AVA 5

7. Remove the PTO speed sensor.



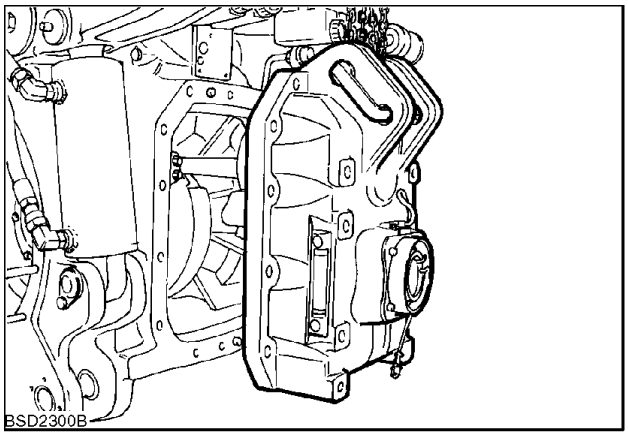
BAIS06CCM574AVA 6

8. Using suitable lifting equipment support the tow hitch support.
Remove the retaining bolts and remove the tow hitch support.



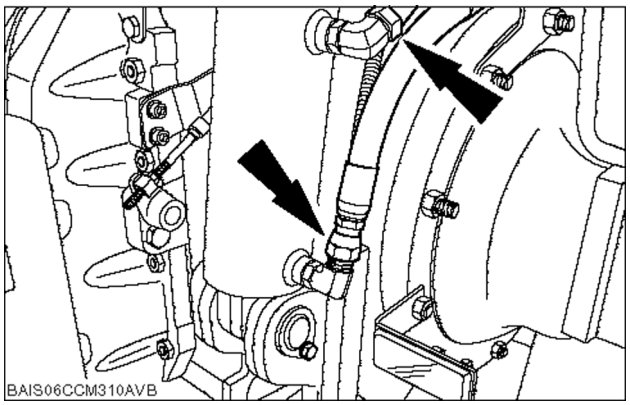
BAIS06CCM575AVA 7

9. Using suitable lifting equipment support the PTO assembly.
Remove the retaining bolts and remove the PTO assembly and shaft.



BSD2300B 8

10. Disconnect the lift arm cylinder hydraulic hoses.

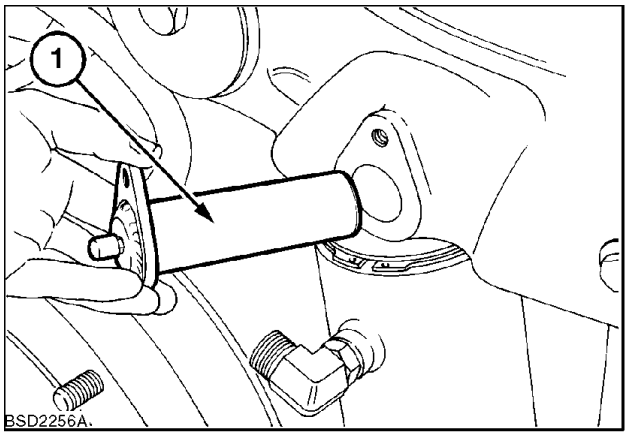


BAIS06CCM310AVB 9

11. Remove the pivot pins **(1)** and remove the lift arm cylinder.

NOTE: *Repeat for right hand side.*

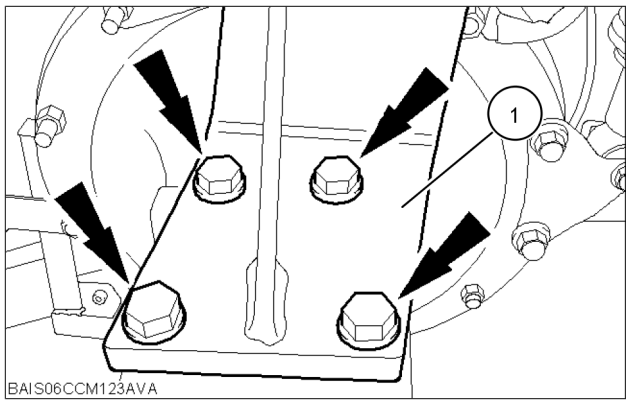
NOTE: *It is not necessary to remove the rams for most operations.*



BSD2256A 10

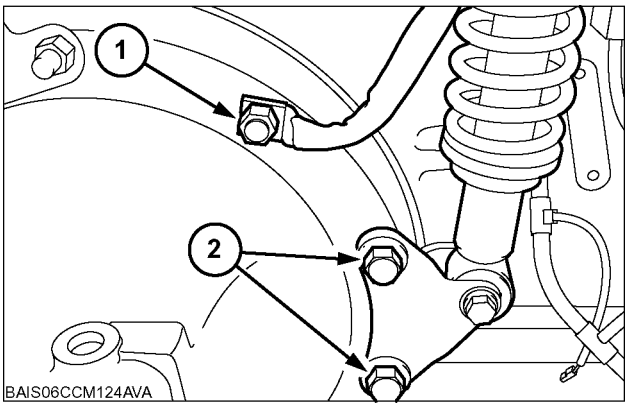
Tractors with Cab Suspension

12. Remove the cab support from the final drive housing.



BAIS06CCM123AVA 11

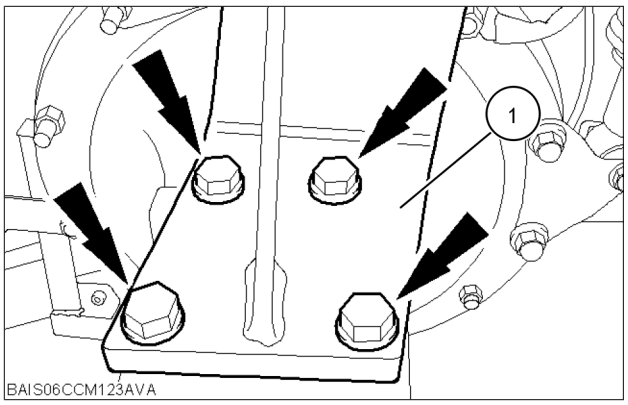
13. Disconnect the cab to chassis strap **(1)** and detach the cab suspension bracket **(2)**.



BAIS06CCM124AVA 12

Tractors with Standard Cab

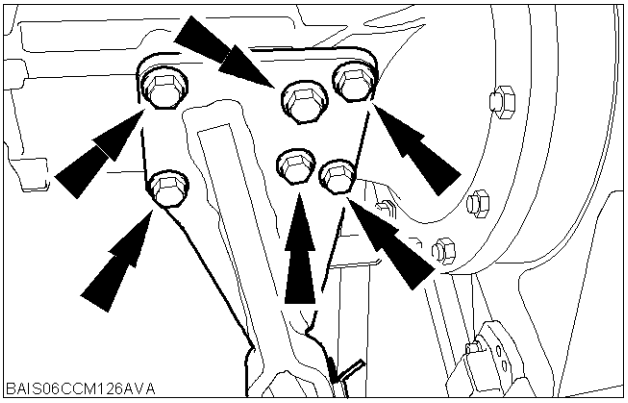
14. Remove the cab support from the final drive housing.



BAIS06CCM123AVA 13

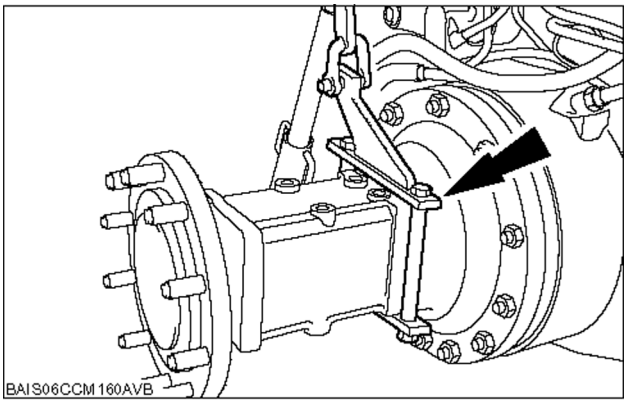
All Tractors

15. Remove the lift arm stabilizer bracket.



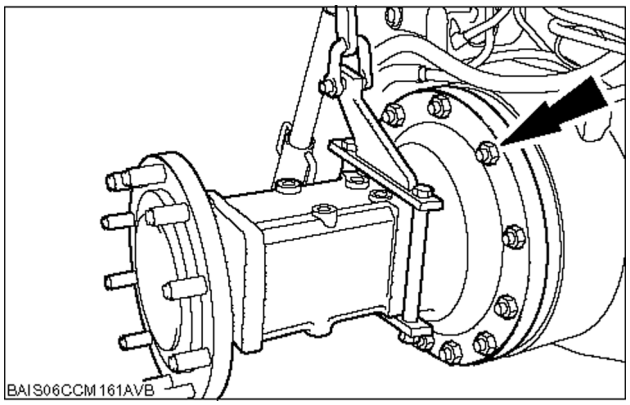
BAIS06CCM126AVA 14

16. Install special tools. 50091 and 38020004 and attach to suitable lifting equipment.



BAIS06CCM160AVB 15

17. Remove the final drive housing retaining nuts. Remove the final drive assembly together with the half shaft



BAIS06CCM161AVB 16

Next operation:
REAR AXLE - Disassemble (D.12.A)

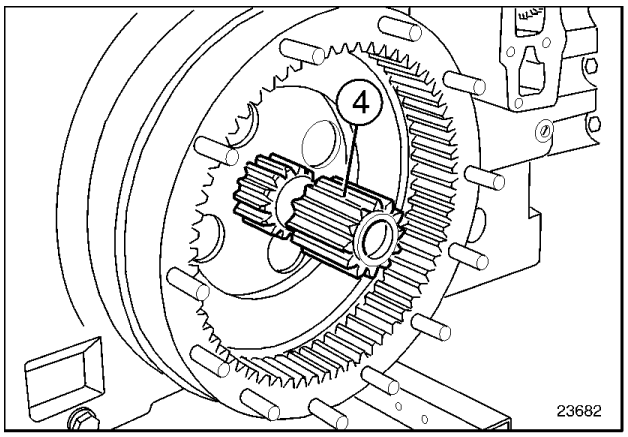
REAR AXLE - Install

⚠ **WARNING** ⚠

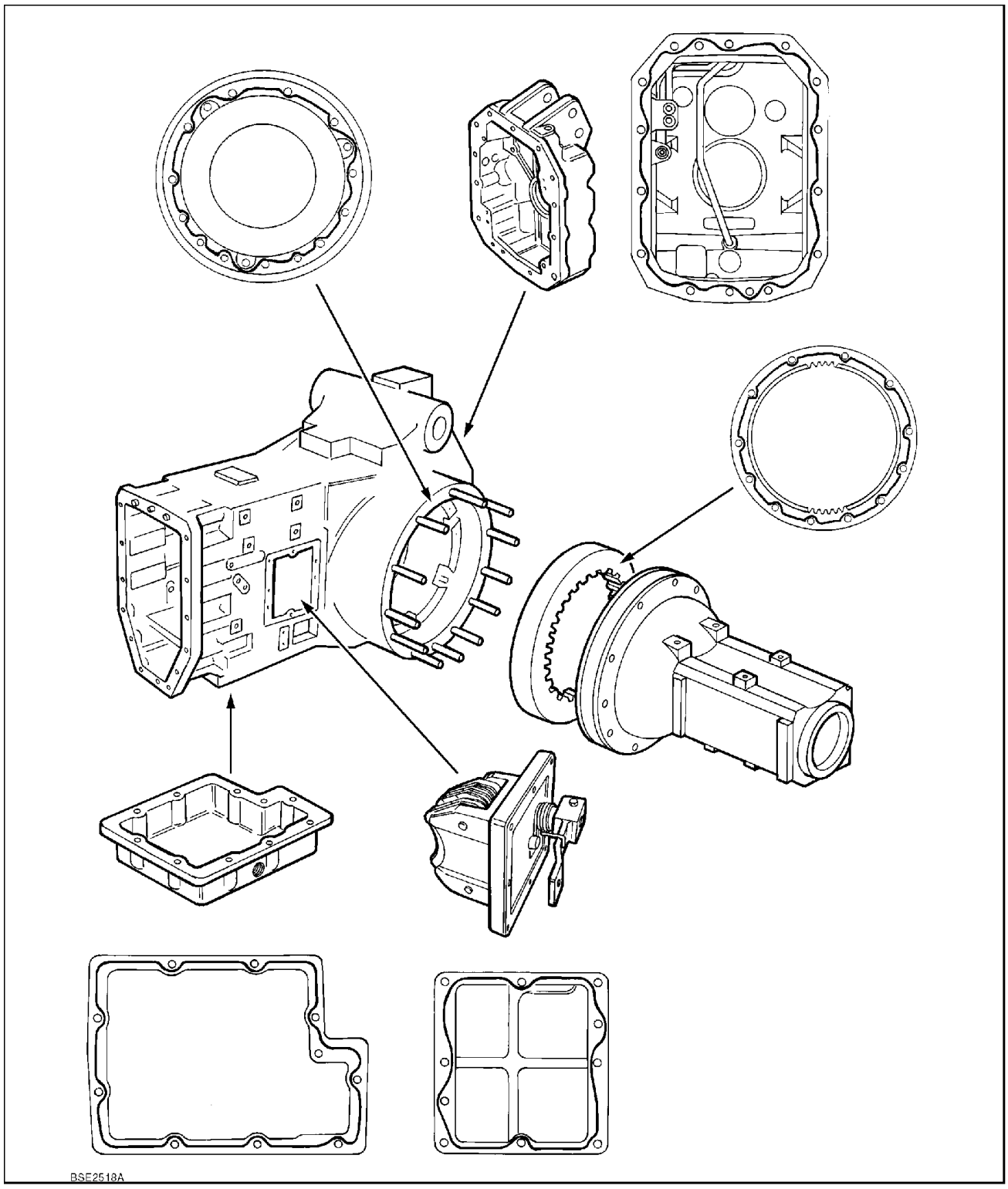
Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

B020

1. To assist reinstallation of the final drive housing, position the half-shaft **(4)** into its seat on the differential and brake disc.



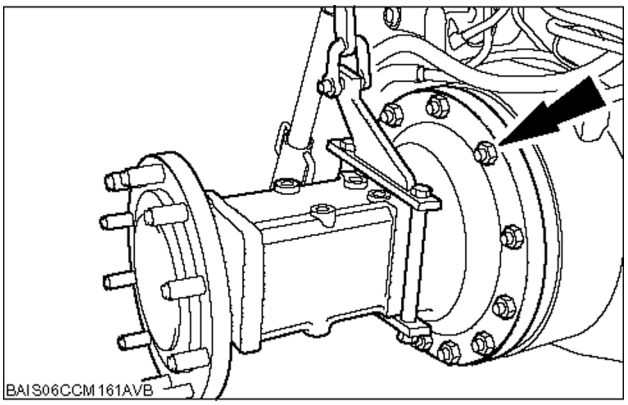
23682 1



BSE2518A 2

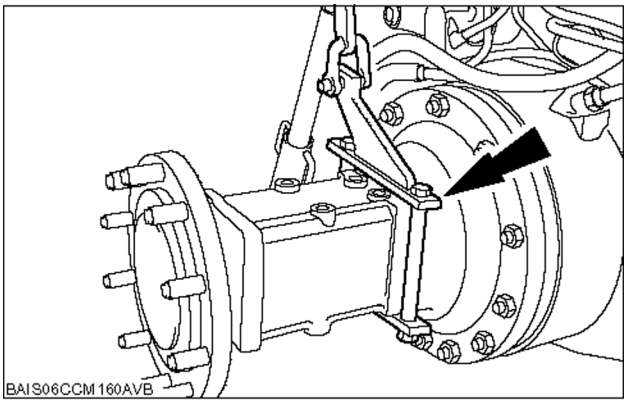
Patterns for application of liquid gasket during reinstallation of: rear PTO housing ; final drive housings ; four wheel drive clutch housing ; and park brake housing to rear axle housing .

2. Install the final drive assembly.
   Install the final drive housing retaining nuts.
   Tighten to **200 Nm 147 lbft**



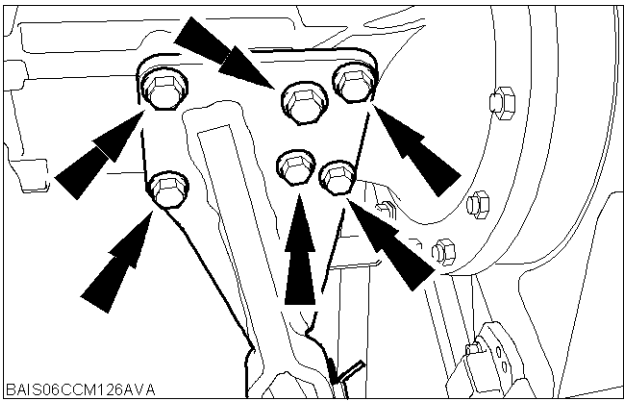
BAIS06CCM161AVB 3

3. Remove special tools. 50091 and 38020004.



BAIS06CCM160AVB 4

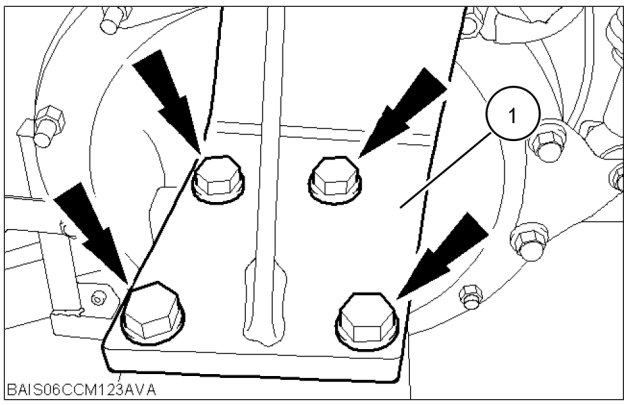
4. Install the lift arm stabilizer bracket.



BAIS06CCM126AVA 5

Tractors with Standard Cab

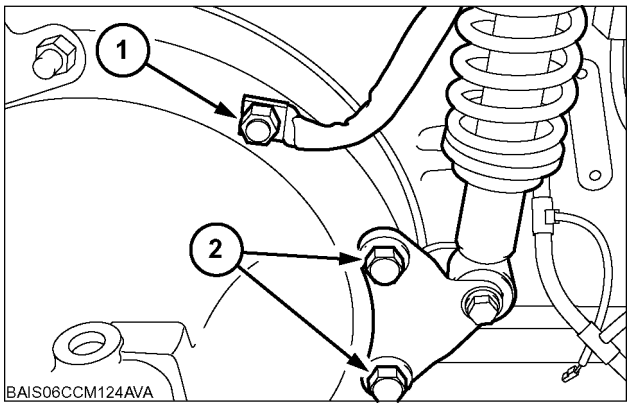
5. Install the cab support to the final drive housing.



BAIS06CCM123AVA 6

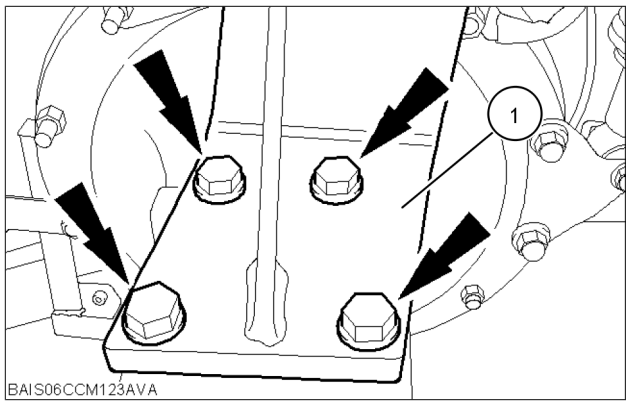
Tractors with Cab Suspension

6. Connect the cab to chassis strap **(1)** and attach the cab suspension bracket **(2)**.



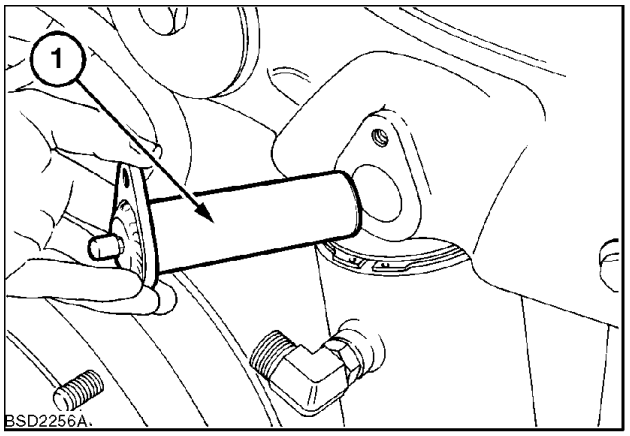
BAIS06CCM124AVA 7

7. Install the cab support to the final drive housing.



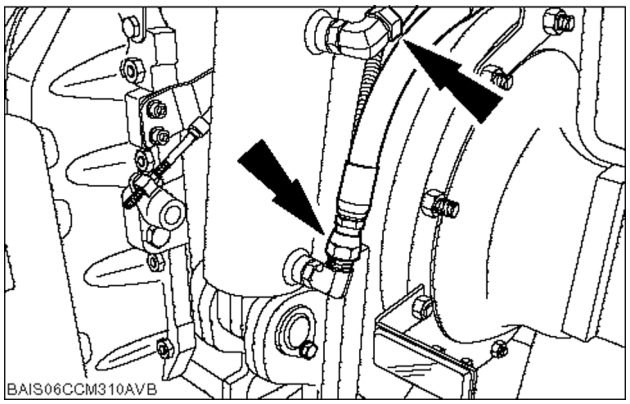
BAIS06CCM123AVA 8

8. If removed, install the lift arm cylinders.



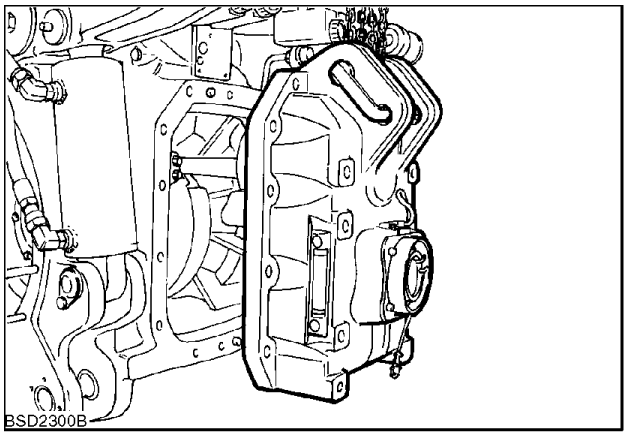
BSD2256A 9

9. Connect the lift arm cylinder hoses.



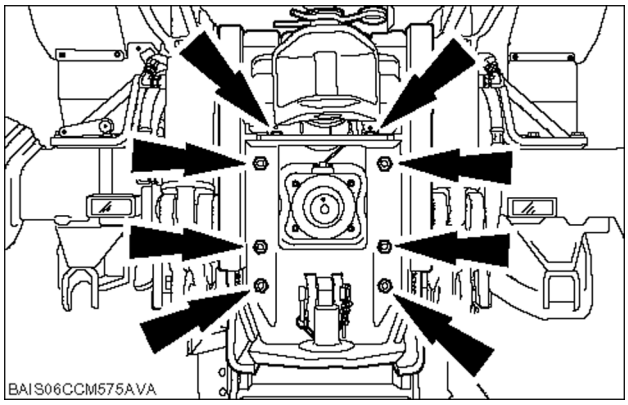
BAIS06CCM310AVB 10

10. Using suitable lifting equipment install the PTO assembly and shaft. Install the compressor. Tighten to **211 Nm** (**156 lb ft**)



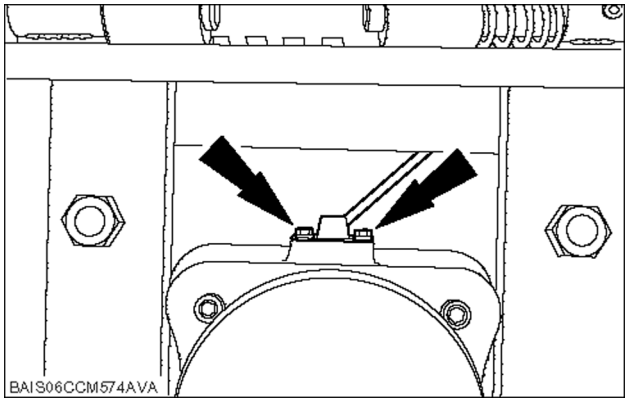
BSD2300B 11

11. Using suitable lifting equipment install the tow hitch support.



BAIS06CCM575AVA 12

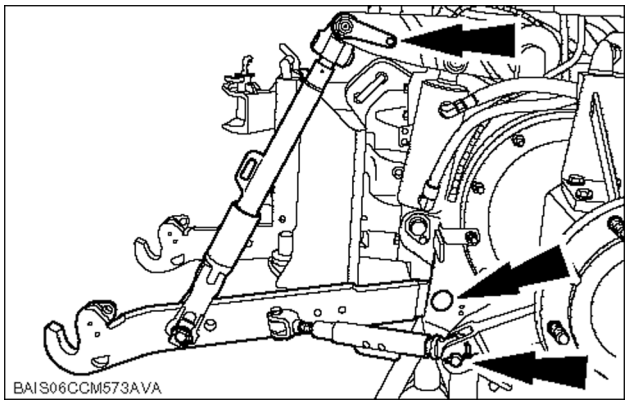
12. Install the PTO speed sensor.



BAIS06CCM574AVA 13

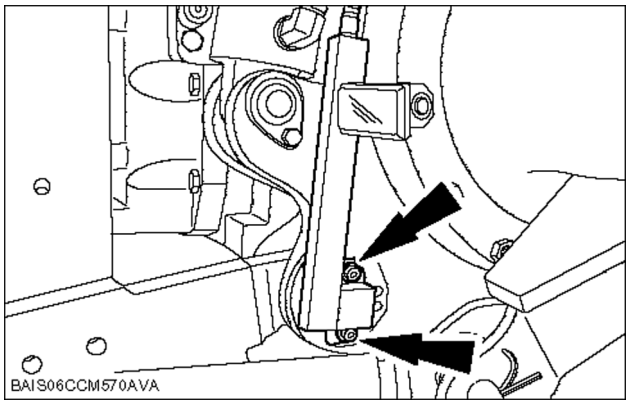
13. Install the lift arm assembly.

NOTE: *Repeat this operation for the left hand side.*



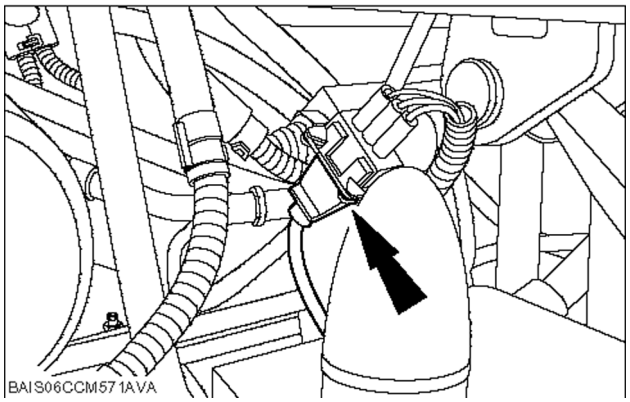
BAIS06CCM573AVA 14

14. Install the EDC sensor.



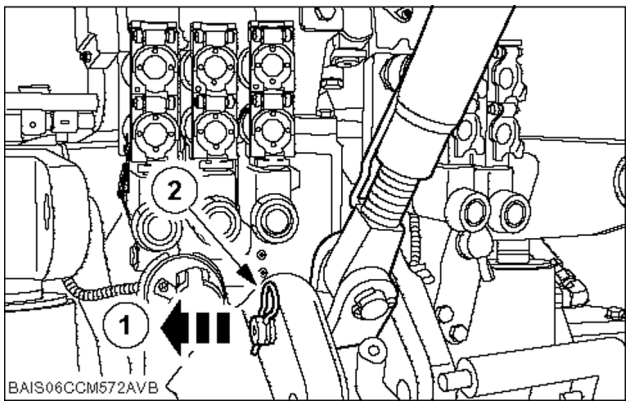
BAIS06CCM570AVA 15

15. Connect the EDC electrical connector.



BAIS06CCM571AVA 16

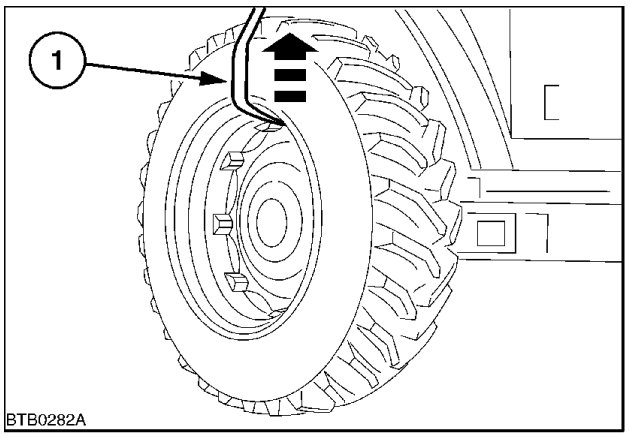
16. Locate the top lift link, slide in the hinge pin **(1)**. and install the 'R' clip **(2)**.



BAIS06CCM572AVB 17

17. Using a suitable sling **(1)** connect the rear wheel to a hoist and install the rear wheel.
For correct torques, refer to **Rear wheel - Torque (D.50.C)**

NOTE: *Repeat for left hand wheel.*



BTB0282A 18

Next operation:
Connect the rear axle to the transmission housing, for further information refer to **Housing - Connect (C.20.E)**

REAR AXLE - Disassemble

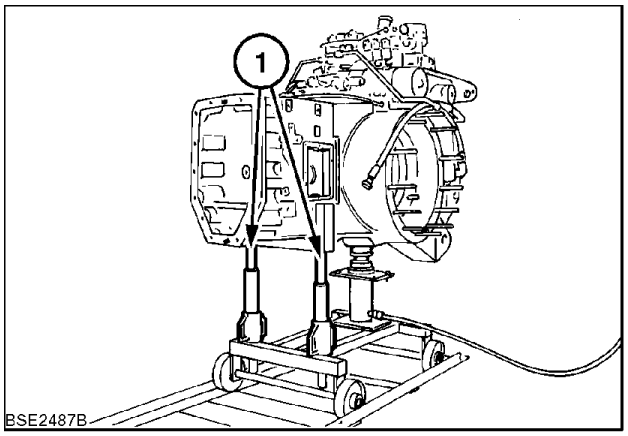
Prior operation:
REAR AXLE - Remove (D.12.A)

⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

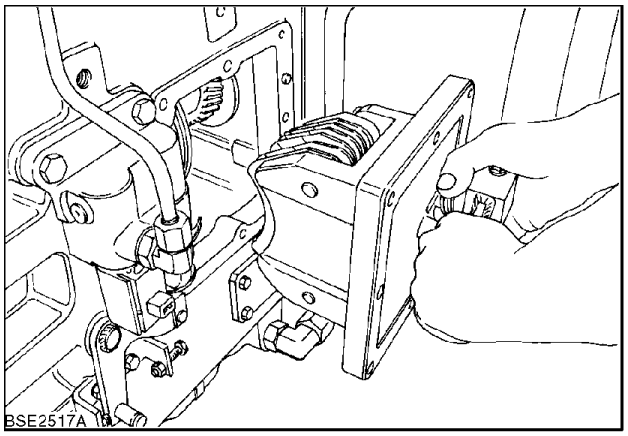
B026

1. Support the rear axle housing using the tractor splitting tool **380000569** and support tool **380000403 (1)**.



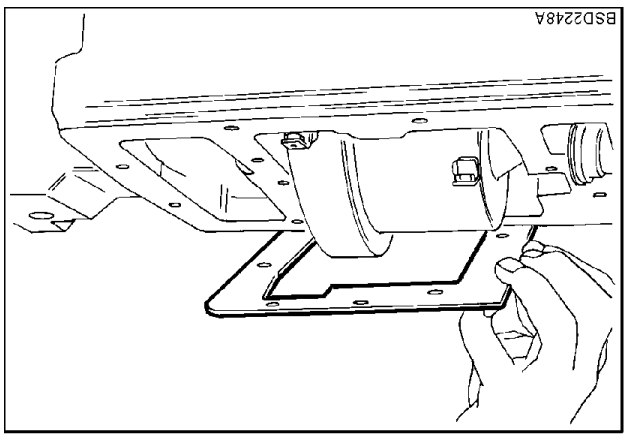
BSE2487B_134 1

2. Loosen the attaching bolts and remove the parking brake control assembly.



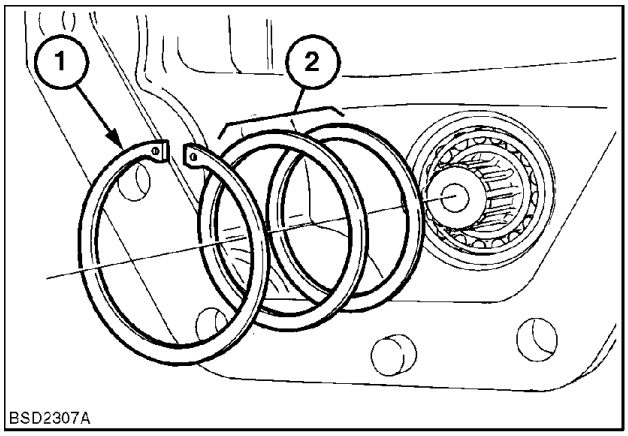
BSE2517A 2

3. Remove the inner transfer box guard.



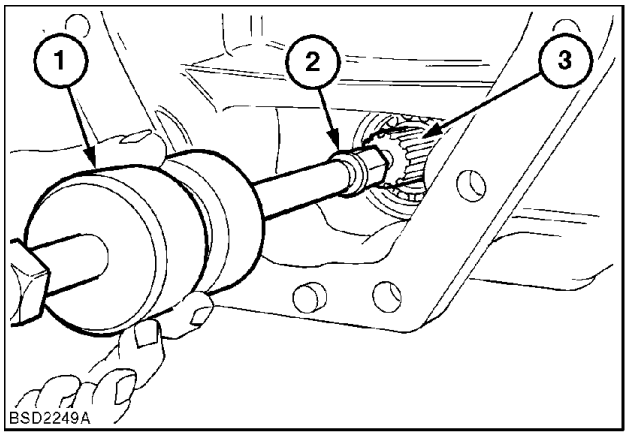
BSD2248A_135 3

4. Remove clutch driveshaft retaining ring **(1)** and shims **(2)**.



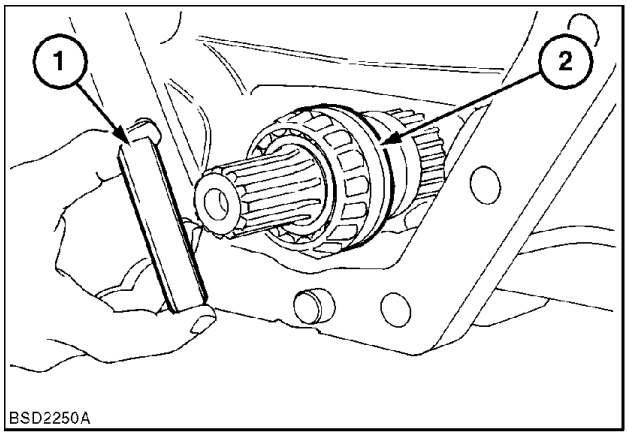
BSD2307A_136 4

5. Using a suitable slide hammer **(1) 380000549** and M8 x 1.25 adaptor **(2) 380001783** partially withdraw transfer clutch driveshaft **(3)**.



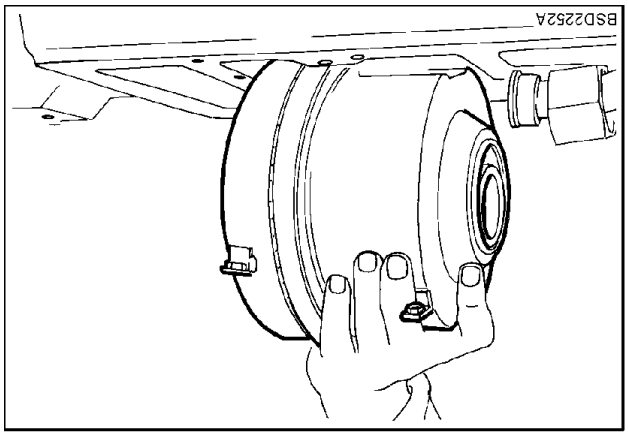
BSD2249A_137 5

6. Retrieve bearing cap **(1)** and using an assistant, support the clutch housing, Figure **7**. Completely remove clutch driveshaft **(2)** taking care to ensure that the clutch housing does not drop to the ground.



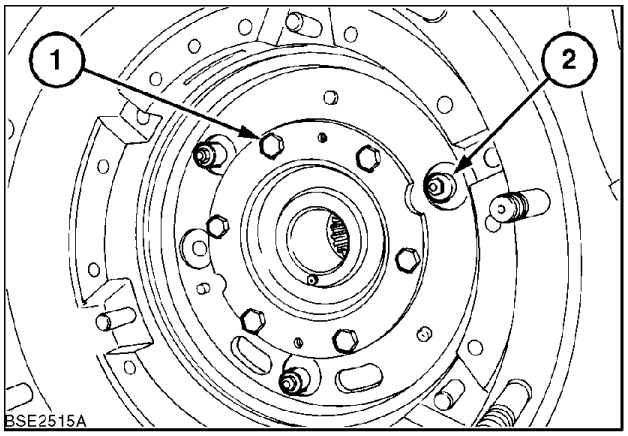
BSD2250A_138 6

7. Remove clutch assembly from beneath transmission.
   Separate and inspect all components. Refer to **Clutch - Overhaul (D.14.C)**.



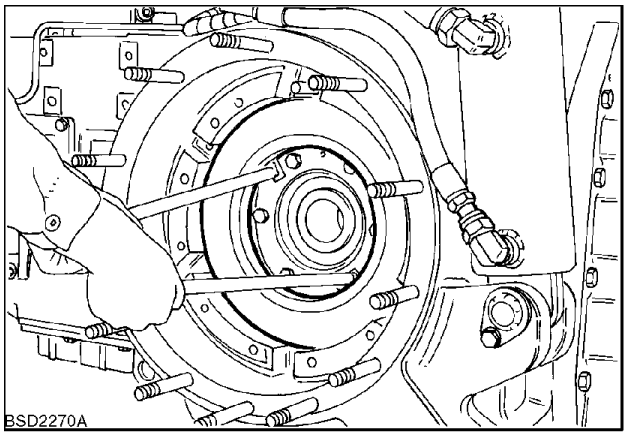
BSD2252A_139 7

8. Loosen the attaching bolts **(1)** on the crown wheel support caps. Support the crown wheel as shown in figure **10**. Remove the crown wheel support caps and shims on both sides. Also remove piston pin assembly **(2)** .

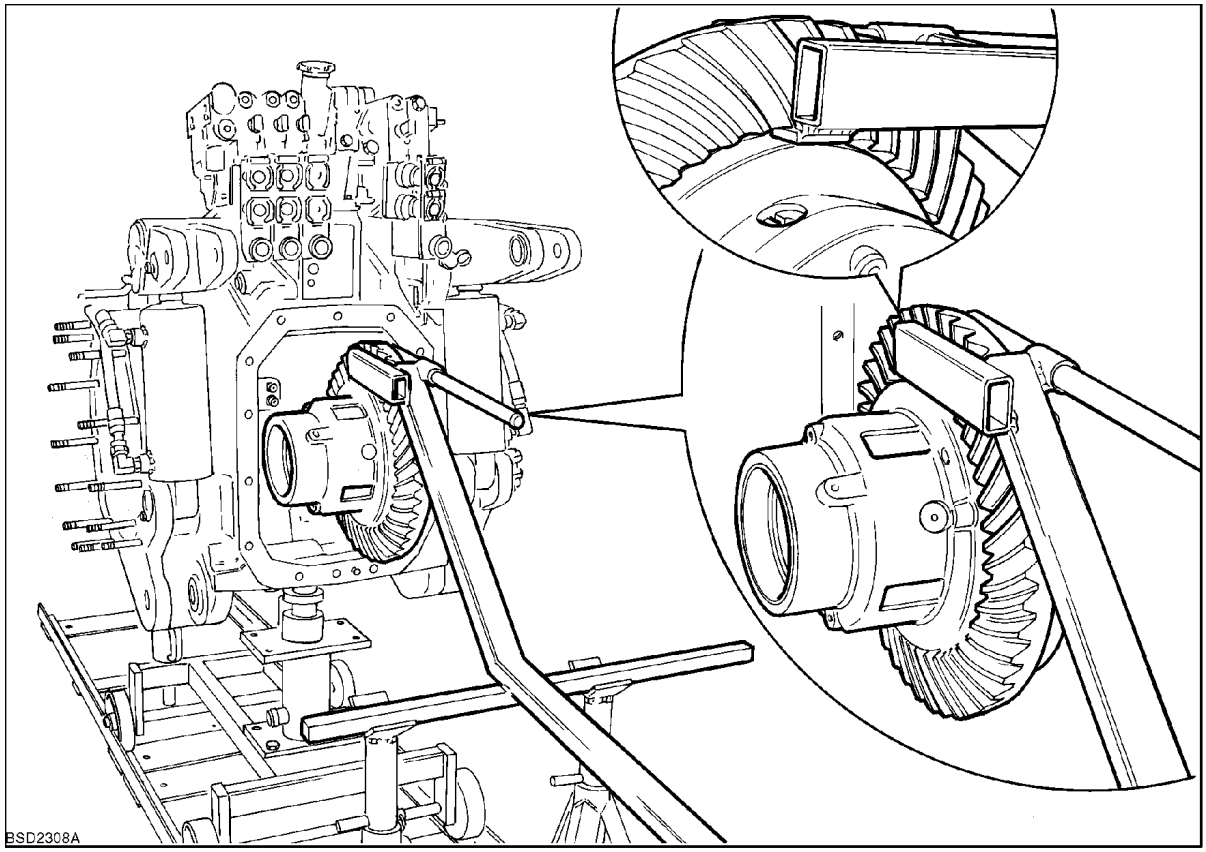


BSE2515A 8

9. Remove the brake drive piston using a pry bar.



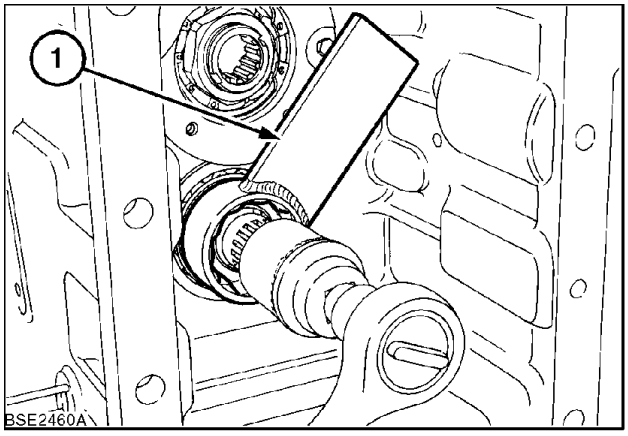
BSD2270A 9



BSD2308A 10

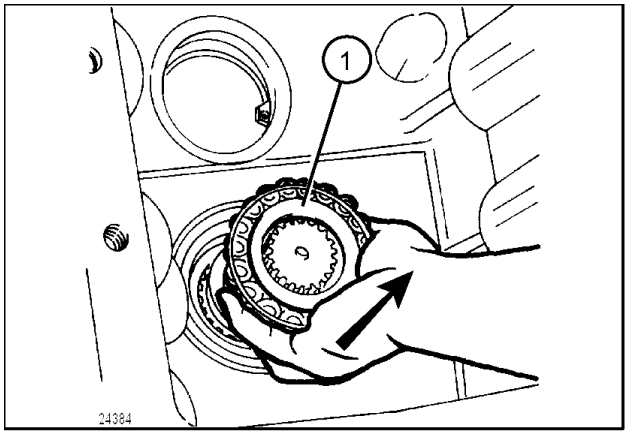
10. Remove Crown wheel using locally fabricated tool. Refer to **REAR AXLE - Special tools (D.12.A)**

11. Unstake the crushed nut, hold the pinion steady and loosen the nut using the locally fabricated wrench tool **(1)**, pinion coupler and **3/4 in** drive socket.



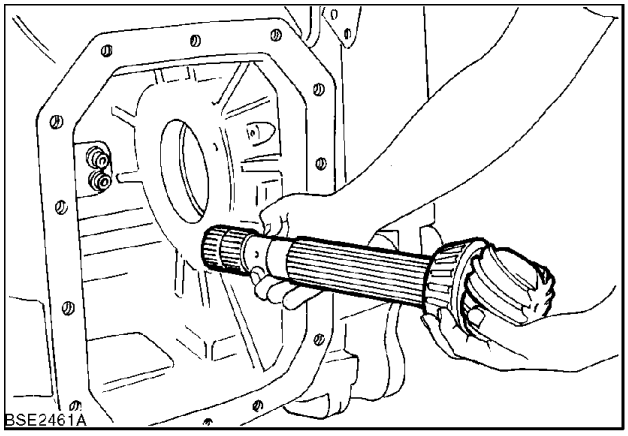
BSE2460A 11

12. Using a universal puller , partially withdraw the bevel pinion.
Disassemble the universal puller and remove front bearing **(1)**.



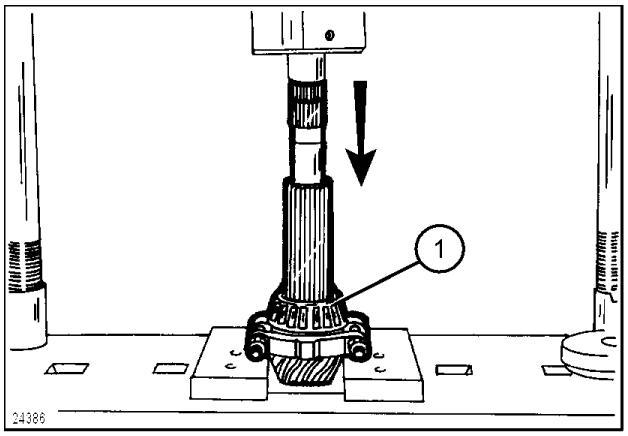
24384 12

13. Slide out the pinion and recover the inner parts through the parking brake compartment.



BSE2461A 13

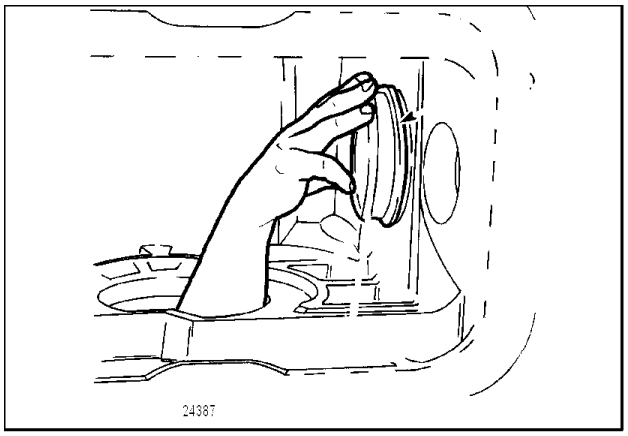
14. Slide out the bearing **(1)** from pinion using a drive puller and a hydraulic press.



24386 14

15. Remove the pinion rear bearing cup **(1)** from front end using a driver tool, and recover adjustment shim **(S)** .

NOTE: *Sectional view shown for illustration purposes*



24387 15

16. Reinstall all components into the rear axle housing observing the following:
    - Thoroughly clean the housing, especially the inner compartments.
    - Reassembly follows the disassembly procedure in reverse.

⚠ WARNING ⚠

Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

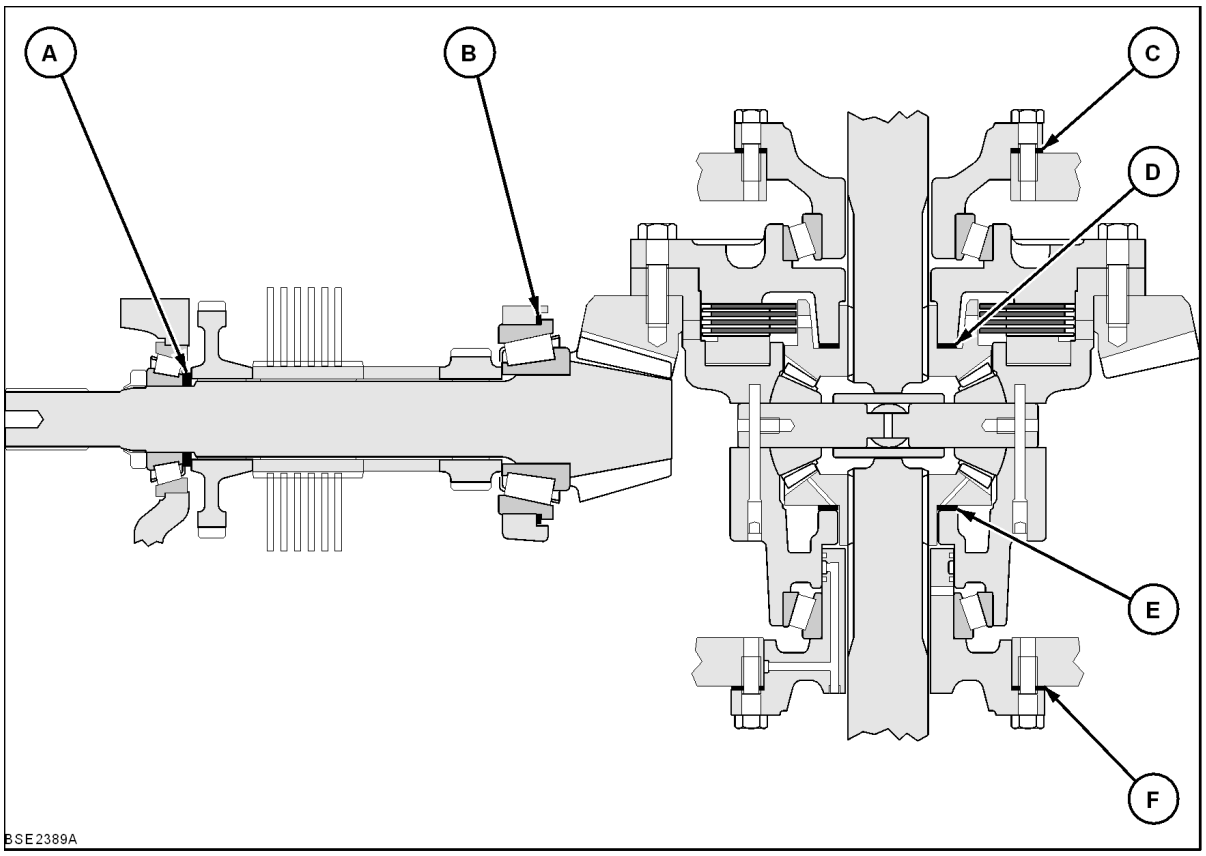
B020

Next operation:

- Refer to **REAR AXLE - Sectional view (D.12.A)** and **REAR AXLE - Static description (D.12.A)** for correct positioning and orientation of the different parts.
- Tighten to correct torques as detailed (Refer to **Final drive - Torque (D.12.A)**).
- Before reassembling housings, supports and covers, thoroughly clean and degrease mating surfaces and apply a bead of liquid gasket of approx. **2 mm**. of diameter following the patterns shown in the figures (Refer to **REAR AXLE - Install (D.12.A)**).
- During bevel pinion installation, carry out the adjustments as detailed (Refer to **REAR AXLE - Adjust (D.12.A)**).
- During crown wheel installation, carry out operations described (Refer to **REAR AXLE - Adjust (D.12.A)**) to adjust tapered roller bearings and for pinion to crown wheel correct mating.
- Install and adjust transfer box bearings as detailed in **Clutch - Install (D.14.C)**.
- Refer to **Command - Adjust (C.30.C)** to adjust the creeper control lever.

REAR AXLE - Adjust

Prior operation:
REAR AXLE - Disassemble (D.12.A)



BSE2389A_140 1

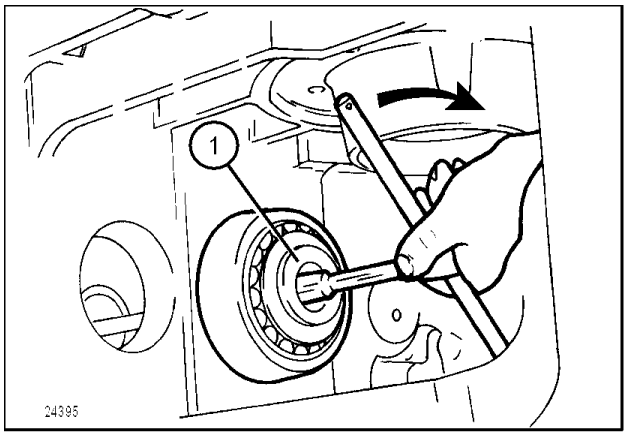
(A) - Pinion shaft pre-load shim. Adjusts the pre-load on the pinion shaft bearings and components.
(B) - Pinion shaft position shim. Adjusts the position of the pinion relative to the crown wheel.
(**(C)** and **(F)**) - Left and right hand crown wheel backlash and differential support bearing pre-load shims. Adjusts the horizontal position of the crown wheel relative to the pinion gear. This affects the backlash depending on which side the shims are fitted. Also affects the pre-load on the differential support bearings, affected by the total shims, **(C+F.)**
(**(D)** and **(E)**) - Left and right differential side gear shims. Adjusts pre-load on differential gear assembly.

NOTE: *The pinion and differential should be set up in the following order:*

1. (D and E) Refer to: **Differential lock Multi plate clutch - Overhaul (D.12.A)**
2. (B)
3. (A)
4. (C and F)

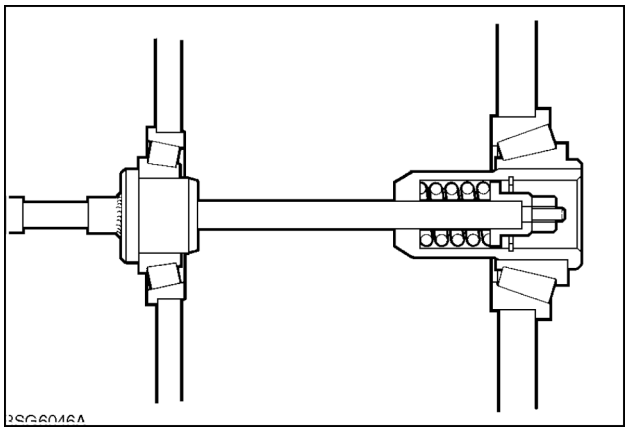
1. PINION AND CROWN WHEEL ADJUSTMENTS
   Determining pinion shaft position shim thickness (Shim **(B)** figure **1**) using special tool no. **380000470**
   .
   Proceed as follows:
   Place pinion rear bearing outer cup **(2)** on the rear axle housing less shim

2. Assemble special tool no. **380000470 (1)** complete with the bearings on the rear axle housing. Lock the nut while turning the bearings.



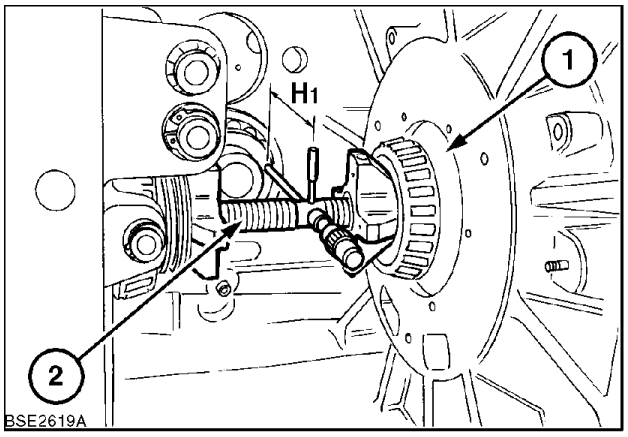
24395 2

3.



BSG6046A 3

4. Assemble universal tool no. 380000249 **(2)** on crown wheel caps **(1)** complete with the bearing outer cups. Bring the rod of tool no. 380000249 (H) to contact bearing inner cup and measure dimension (H1).
Determine correct nominal dimension, H2 **(2)** between the crown wheel centreline and pinion larger base:
H2 = H3 ± C
where:
H3 = **212 mm**. Nominal dimension between the crown wheel centreline and pinion larger base for tractors fitted with power command transmissions.
C = Correction factor stamped on the pinion, expressed in mm and prefixed by + or - if other than 0, to be added to or subtracted from the nominal dimension (H3), depending on the sign.



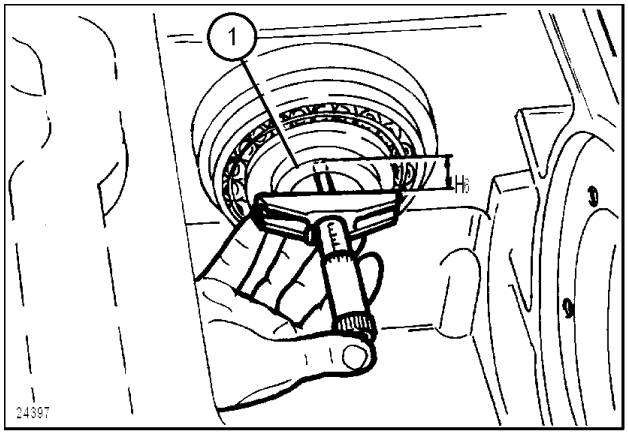
BSE2619A 4

5. Adjuster ring thickness (S1) is given by:
S1 = H1 - H2
where:
H1 = Depth gauge reading

H2 = Correct nominal dimension between crown wheel centreline and pinion larger base.
If necessary, round off the value (S1) to the next **0.05 mm**.
Examples:
- Depth gauge reading:: H1 = **215.4 mm**
- Nominal dimension between crown wheel centre-line and pinion larger base: H3 = **212 mm**
Example 1:
- Correction factor: C = + **0.1 mm**
- Correct nominal dimension: H2 = 212 + 0.1 = **212.1 mm**
- Adjuster ring thickness
- S1 = 215.4 - 212.1 = **3.3 mm**
Example 2:
- Correction factor: C = - **0.1 mm**
- Correct nominal dimension: H2 = 212 - 0.1 = **211.9 mm**
- Adjuster ring thickness:
- S1 = 215.4 - 211.9 = **3.5 mm**
Example 3:
- Correction factor C = **0 mm**
- Correct nominal dimension: H2 = H3 = **212 mm**
- S1 Adjuster ring thickness:
- S1 = 215.4 - 212 = **3.4 mm**

6. Remove universal tool no. 380000249.

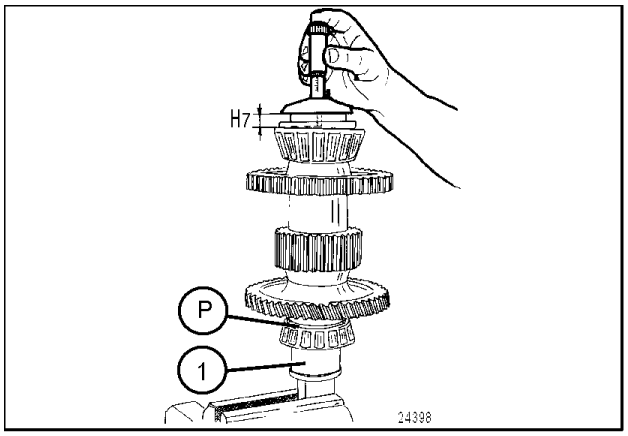
7. PINION AND CROWN WHEEL ADJUSTMENTS
Determining pinion shaft pre-load shim thickness (Shim **(A)** figure **1**) of the pinion shaft tapered roller bearings using special tool no. **380000470** .
Proceed as follows:
1. Using a depth gauge, measure dimension (H6) between the end of tool no. **380000470 (1)** and the end of the inner screw.
2. Remove tool no. **380000470** from rear axle housing.



24397 5

8. Fix tool no. **380000470** into a vice, assemble all parts on it including a test shim **(P)** .
Screw in tool nut to lock the tool and using a depth gauge measure dimension (H7) between tool end and end of the inner screw.
Adjuster ring thickness (S2) is given by:
S2 = H6 + P + S1 - H7 +0.2
where:
P = Test shim
S1 = Pinion shaft position adjustment shim, as found in the previous paragraph.
0.2 mm = Increase necessary to compensate for bearing increased preload deriving from tightening of the pinion shaft locknut
If necessary, round off the value (S2) to the next **0.05 mm**

Example
- Pinion shaft position adjustment shim, found in the previous paragraph: S1 = **1.8 mm**
- Depth gauge reading: H6 = **13.60 mm**
Test shim:P= **2 mm**
Depth gauge reading:H7= **12.10 mm**
Adjuster ring thickness.
S2=13.60+2+1.8-12.1+0.2= **5.5 mm**

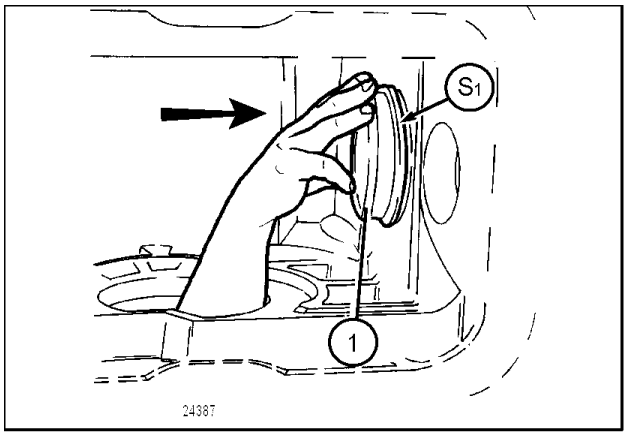


24398 6

9. PINION AND CROWN WHEEL ADJUSTMENTS
Adjustment of crown wheel bearing pre-load and crown wheel to pinion backlash, shims **(C and F)**, Figure **1**

Proceed as follows:
1. Assemble rear bearing outer cup **(1)** and shim **(S1)** as in previous adjustments. .

NOTE: *Sectional view shown for illustration purposes*

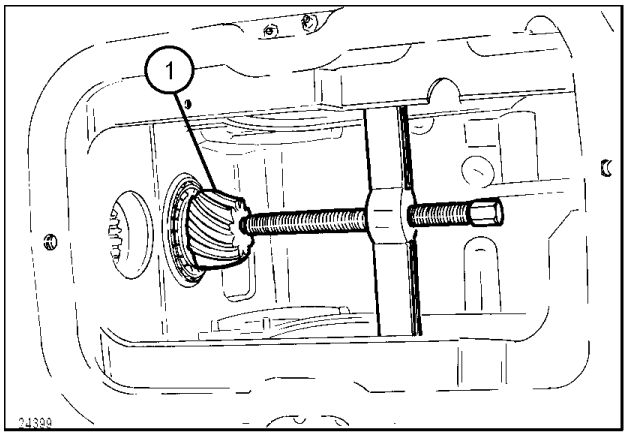


24387_141 7

10. Assemble pinion **(1)** complete with all components and respective bearing adjuster rings (Refer to **REAR AXLE - Sectional view (D.12.A)**) as found during previous adjustments. If necessary, hold the pinion in place using a suitable tool.

NOTE: *Pinion shaft position and pinion bearing shims (Refer to **REAR AXLE - Sectional view (D.12.A)**) are listed on Refer to **REAR AXLE - General specification (D.12.A)**.*

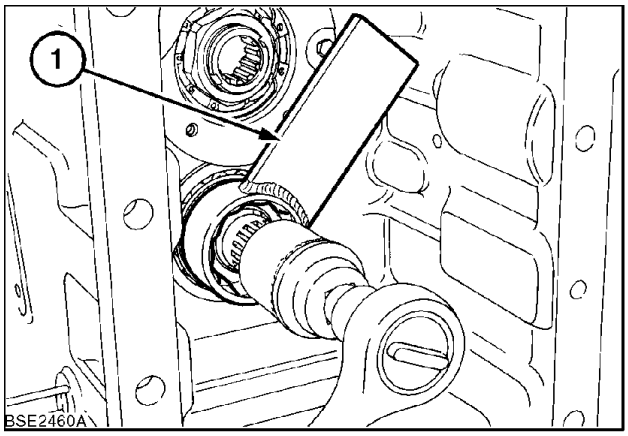
NOTE: *Sectional view shown for illustration purposes*



24399 8

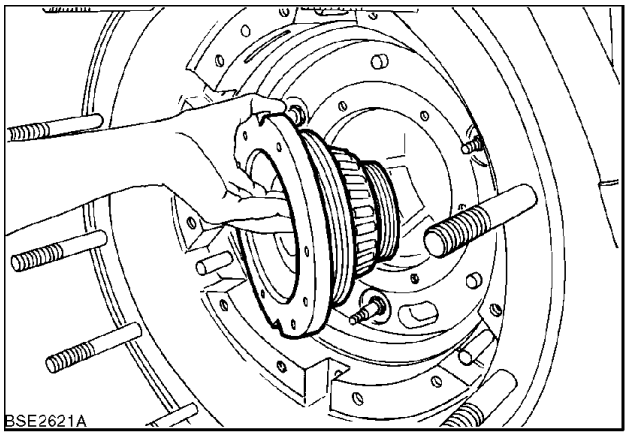
11. Using the fabricated tool **(1)** tighten the pinion nut to **500 Nm** (**368.78 lbft**)) and while turning the pinion shaft to settle the bearings. Remove pinion tool.
Check if the rolling torque necessary to turn the pinion shaft is **1.0 - 2.0 Nm** (**0.74 - 1.48 lbft**)) by measuring it at the end of the shaft using the fabricated wrench tool no. **(1)** and torque wrench tool no. **380000506 (2)**. Crush the nut (See **REAR AXLE - Static description (D.12.A)**).

NOTE: *Decrease the bearing adjustment shim pack (Refer to **REAR AXLE - Sectional view (D.12.A)**) if the rolling torque is lower than specified, or increase it if higher.*



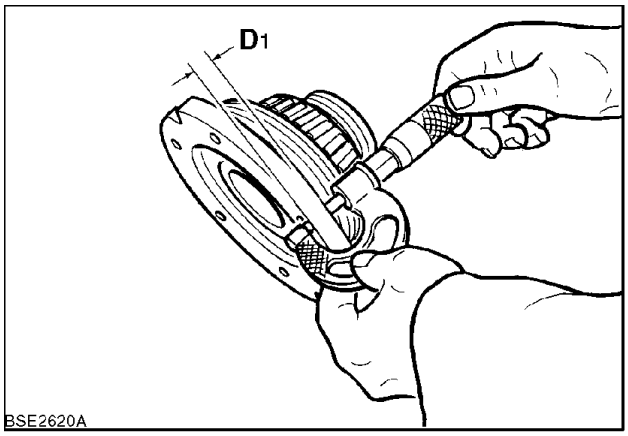
BSE2460A_142 9

12. Assemble the crown wheel - differential assembly to the rear axle housing, insert the right hand cap complete with a test shim and fix with three screws. Tighten the screws to **54 Nm** (**39.83 lbft**) .



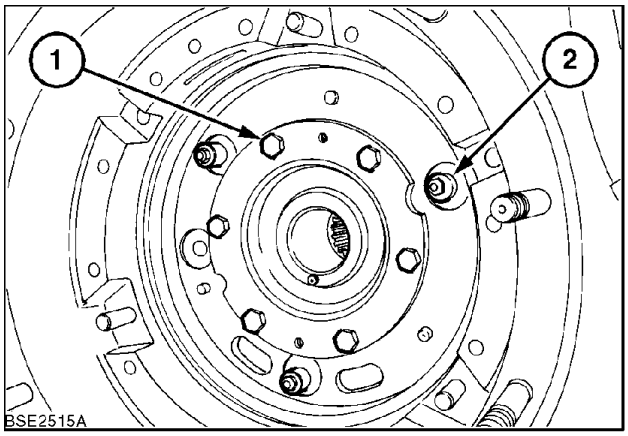
BSE2621A 10

13. Measure left hand cap thickness (D1).



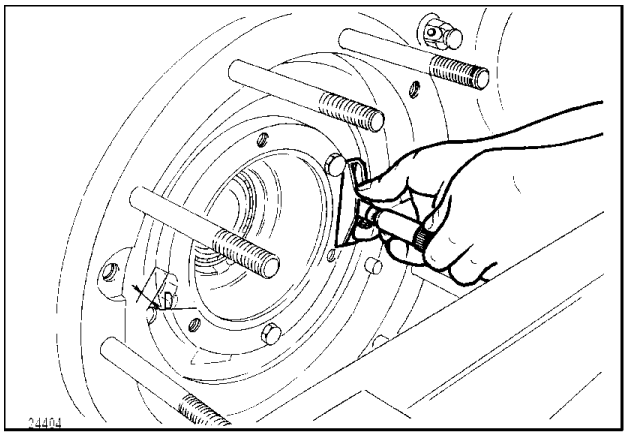
BSE2620A 11

14. Assemble the left hand cap without adjuster rings using three lubricated screws **(1)** arranged at **120 °**. Tighten alternatively and gradually the three screws **(1)** until **6 - 9 Nm** (**4.425 - 6.638 lbft**) while turning the crown wheel to settle the bearings



BSE2515A_143 12

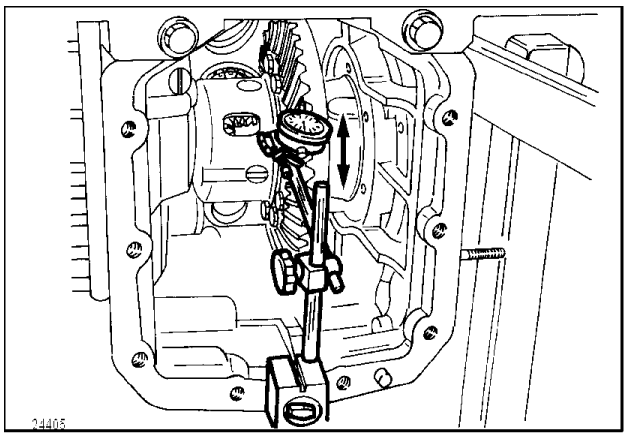
15. Using a depth gauge, measure dimension (D) at the two recesses in the left hand cap. Calculate the average of the two readings.
The total shim pack **(S)** to be inserted beneath the right hand and left hand caps is given by:
S = D2-D1+A+0.3
where:
A = Test shim = **1.5 mm**
D1 = left hand cap thickness, in mm.
D2 = Dimension measured at **18**, in mm.
0.3 mm = Increase necessary to diminish the bearing preload deriving from the screws (1).
If necessary, round off the value (S) to the next **0.05 mm**.



24404 13

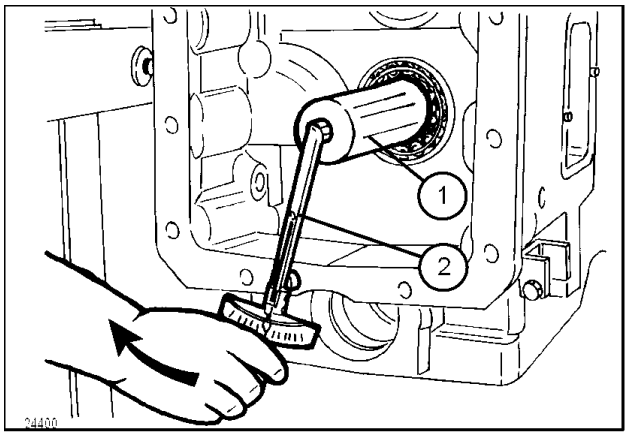
16. Using a dial gauge, measure the backlash (G) between the crown wheel and pinion teeth (take three measures at **120 °** and take the average of the readings).
Normal crown wheel to pinion backlash is **0.20 - 0.28 mm**, with an average of **0.24 mm**
To compensate for possible backlash values higher or lower than specified, consider the 1:1.34 ratio existing between normal backlash and corresponding crown wheel end displacement.
Therefore, the end displacement (Z) necessary to restore specified backlash is:
Z = (G - 0.24) x 1.34
Adjustment shim packs (Sd and Ss) to be inserted on the right hand and left hand caps are given by:
Sd = A Z
Ss = S - Sd
where:
S = Total shim pack value
Z = Crown wheel end displacement, found above.
A = Test shim = **1.5 mm**

17. Assemble the shim packs determined above on the caps and tighten the screws **(1)** at the specified torque.



24405 14

18. Check if the rolling torque necessary to turn the crown wheel and pinion assembly is:



24400 15

19. Rp + (**1.25 - 2.0 Nm**)
opp. Rp + (**0.125 - 0.2 kgm**)
by measuring it at the end of the pinion shaft using the wrench tool no. **380000459 (1)** and torque wrench tool no **380000506 (2)**.
where:
Rp = Rolling torque measured for the pinion only (Refer to **Final drive Reducer, spur gear - Overhaul (D.12.A)**)
Example:
- Measure of left hand cap thickness (D1)= **14.00 mm**
- Test shim A = **1.5 mm**
- Measure of clearance of D2 between left hand cap and its seat on the rear axle housing
14.15 mm; **14.25 mm**.
D2 = Mean value (14.15 + 14.25):2 = **14.20 mm**
- Total adjuster ring thickness
S = 14.20-14.00 + 1.5 + 0.3 = **2.00 mm**
- Measured backlash: **0.13 mm**; **0.12 mm**; **0.14 mm**
G = Mean value= (0.13 + 0.12 + 0.14): 3 = **0.13 mm**
- End displacement (Z) necessary to restore specified backlash.
Z = (0.13 - 0.24) x 1.34= - 0.11 x 1.34 = - 0.15
- Adjuster ring thickness to be inserted on the right hand cap is:
Sd = 1.5 - 0.15 = **1.35 mm**
- Adjuster ring thickness to be inserted on left hand cap is: Ss = 2.00 -135 = **0.65 mm**

Final drive Housing - Remove

Prior operation:
Disconnect the battery ground (earth) lead, for additional information refer to **Battery - Disconnect (A.30.A)**

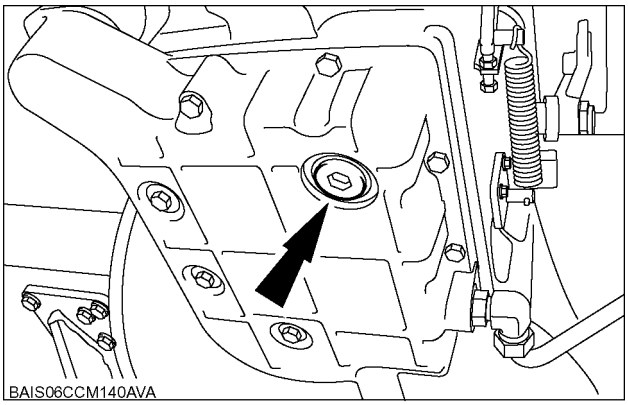
⚠ WARNING ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012

All Tractors

1. Remove the drain plug and drain oil into a suitable container.
   Reinstall the drain plug and tighten to **68 - 82 Nm** (**50 - 60 lbft**)



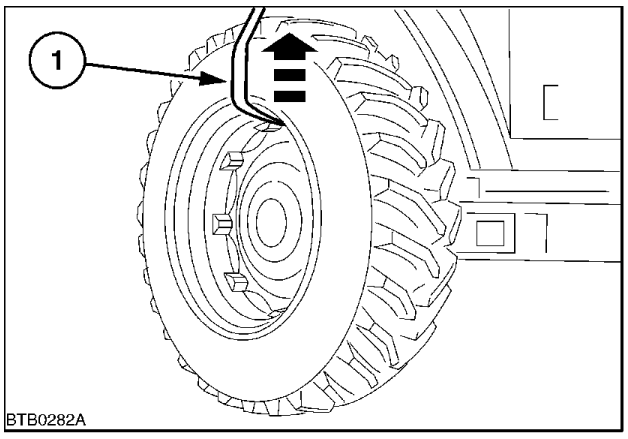
BAIS06CCM140AVA 1

2. Raise the rear of the tractor and place a suitable axle stand under the rear axle housing.
   Using a suitable sling **(1)**, connect the rear wheel to a hoist and remove the rear wheel.

⚠ WARNING ⚠

Tractor wheels are very heavy. Handle with care and ensure, when stored, that they cannot fall and cause injury. Never operate the tractor with a loose wheel rim or disc. Always tighten nuts to the specified torque and at the recommended intervals.

B105

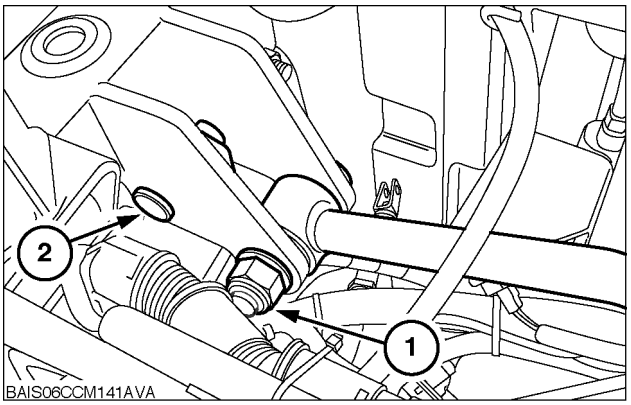


BTB0282A_370 2

3. Raise and support the cab, for additional information refer to **USER PLATFORM - Remove (E.34.A)**.

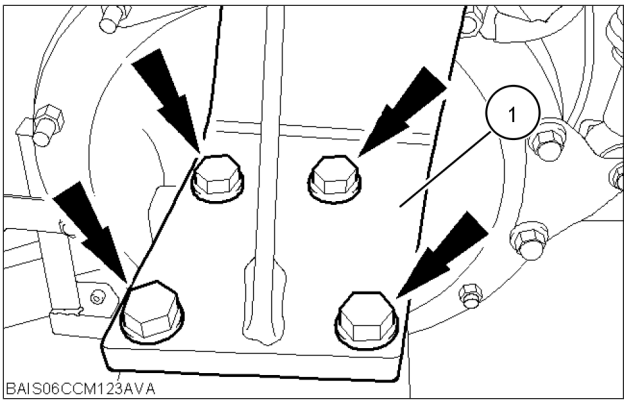
Tractors with Cab Suspension

4. Detach the panhard rod **(1)** and the strap retaining pin **(2)**.



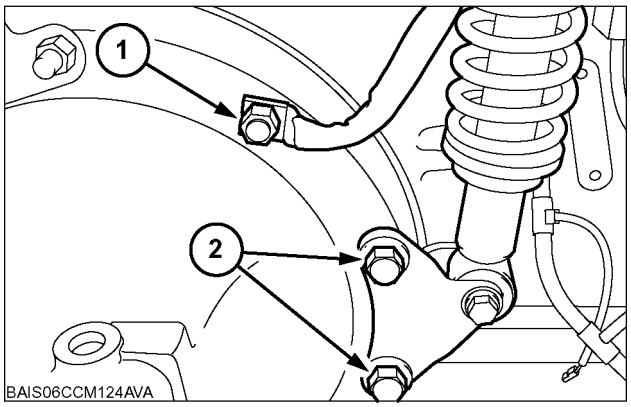
BAIS06CCM141AVA 3

5. Remove the cab support from the final drive housing.



BAIS06CCM123AVA 4

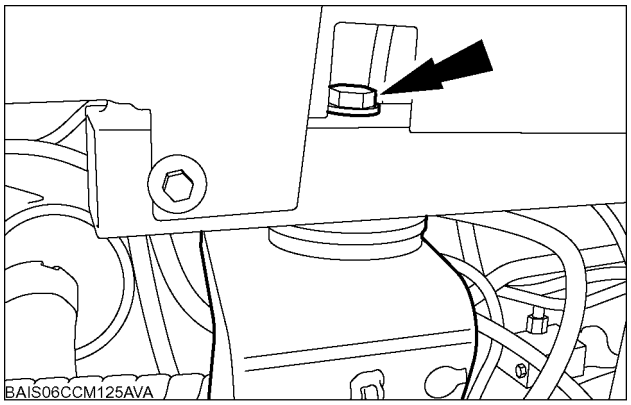
6. Remove the cab to chassis strap **(1)** and detach the cab suspension bracket **(2)**.



BAIS06CCM124AVA 5

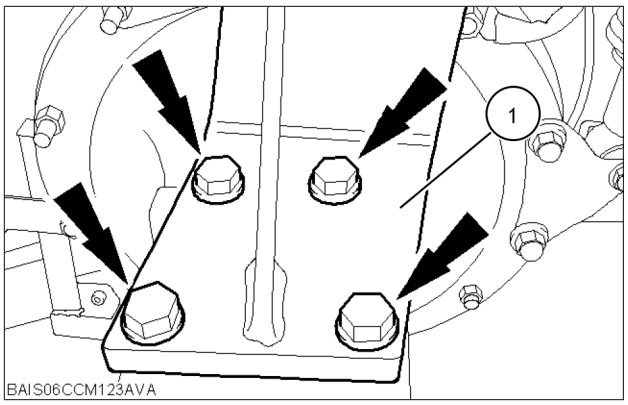
Tractors with Standard Cab

7. Remove the cab retaining bolt.



BAIS06CCM125AVA 6

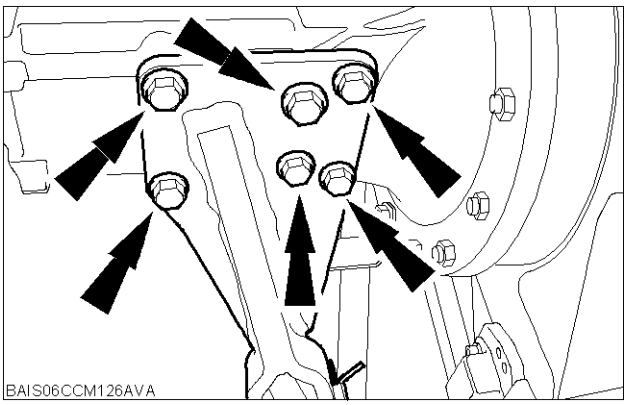
8. Remove the cab support from the final drive housing.



BAIS06CCM123AVA 7

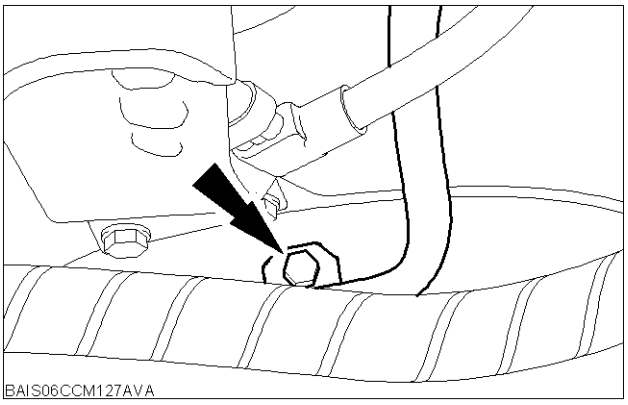
All Tractors

9. Remove the lift arm stabiliser bracket.



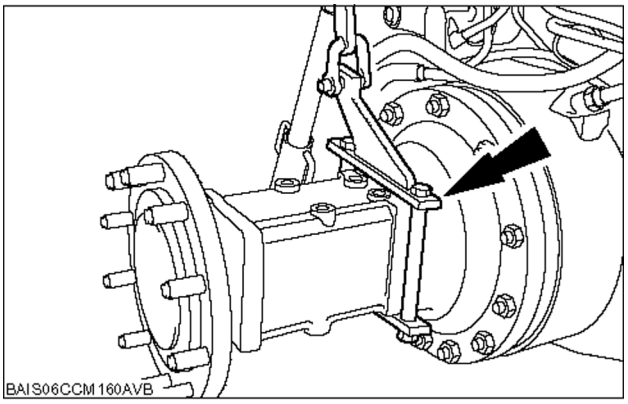
BAIS06CCM126AVA 8

10. Detach the lift arm cylinder supply hose.



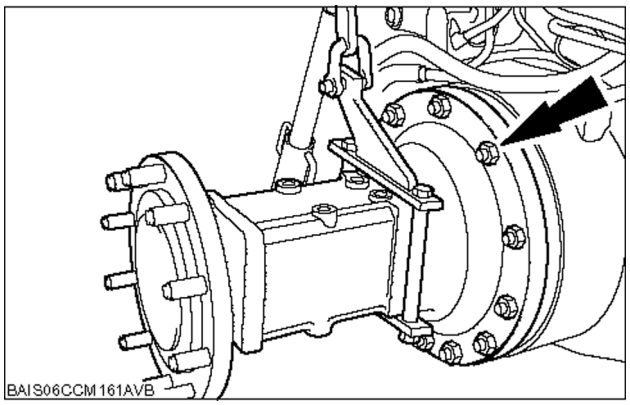
BAIS06CCM127AVA 9

11. Install special tools, lifting bracket,. **380001113** (50091) with adaptor studs, 38020004 and attach to suitable lifting equipment.



BAIS06CCM160AVB 10

12. Remove the final drive housing retaining nuts. Remove the final drive assembly together with the half shaft



BAIS06CCM161AVB 11

Final drive Shaft - Remove

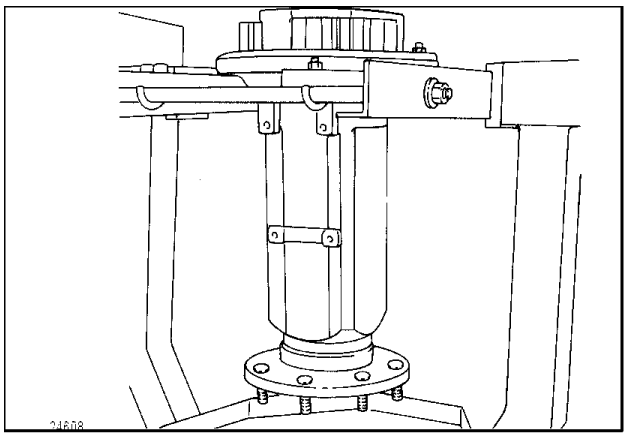
Prior operation:
Remove final drive housing, for further information refer to **Final drive Housing - Remove (D.12.A)**.

⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

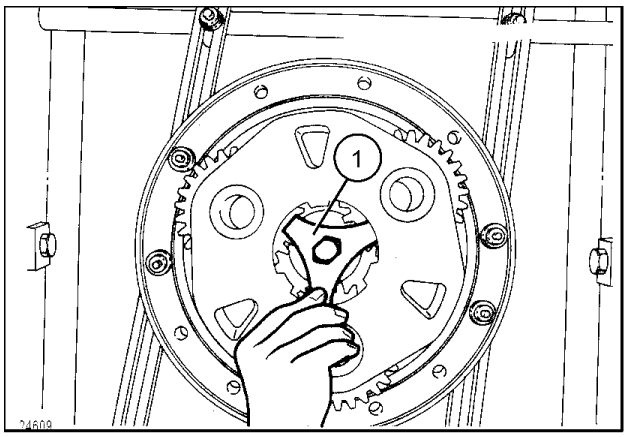
B026

1. With the final drive case removed from the rear axle housing, proceed as follows:
   Position the final drive case on a rotary stand.



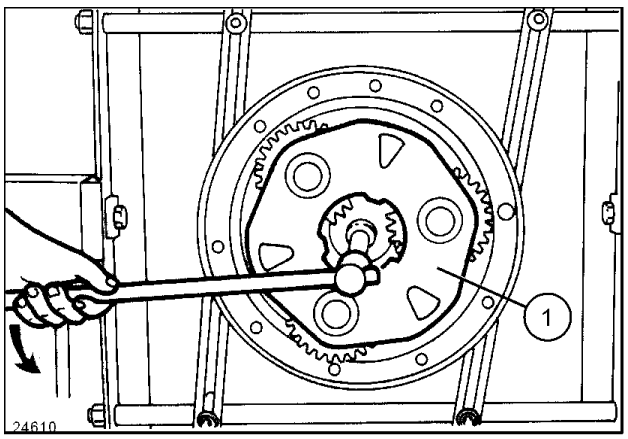
24608_544 1

2. If necessary, remove the locking plate **(1)** by slightly turning it



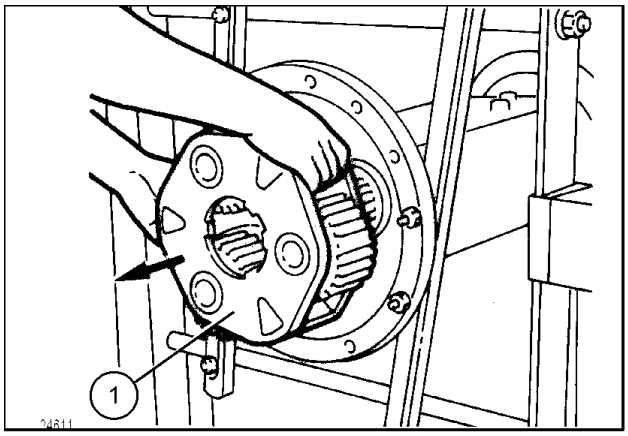
24609_545 2

3. Loosen the screw attaching the planetary carrier **(1)** to the drive shaft.



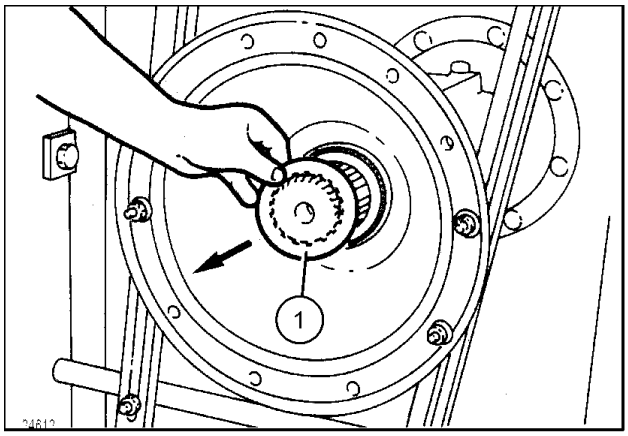
24610_546 3

4. Slide out the planetary carrier **(1)**.



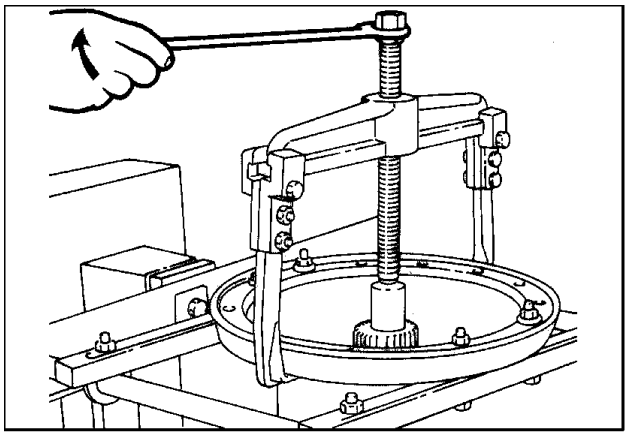
24611_547 4

5. Recover the thrust washer **(1)**.



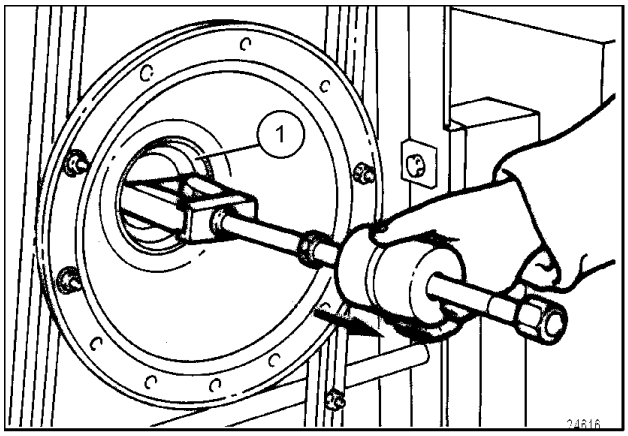
24612_548 5

6. Using a suitable puller, remove the drive shaft.



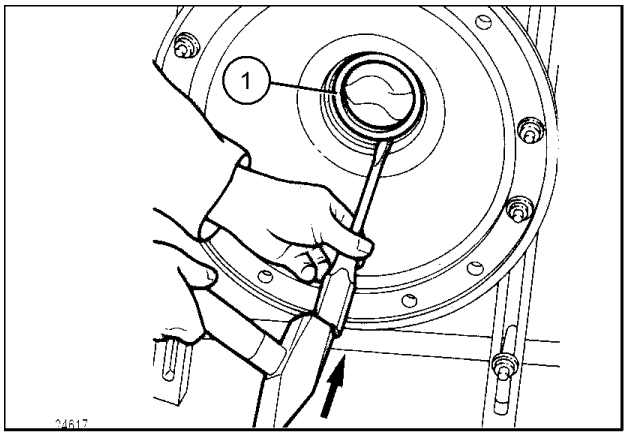
1b0o2004108874 6

7. Using an expansion puller and a slide hammer, remove the bearing outer cup **(1)** from the final drive side.



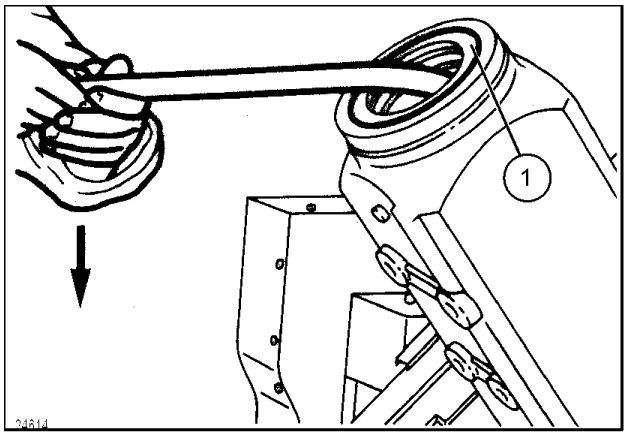
24616_549 7

8. Remove the seal **(1)**.



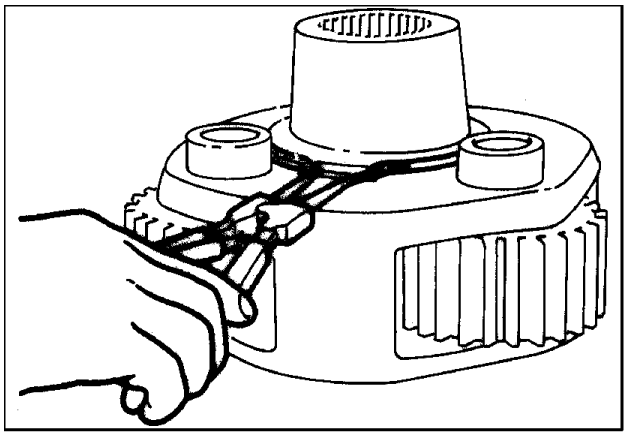
24617_550 8

9. Remove the seal **(1)** and recover the bearing inner cup from the wheel side.
Use an expansion puller and a slide hammer to remove the bearing outer cup from the wheel side.



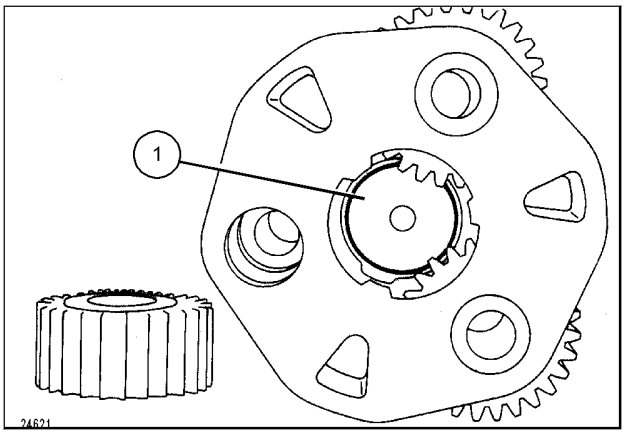
24614_551 9

10. Inspect and disassemble planetary gear set.
Remove retaining ring.



1b0o2004108878 10

11. Slide out the pivot pins and recover the gears complete with the needle bearings. Remove the thrust washer **(1)**.
When reassembling planetary gear set Insert the thrust washer **(1)** into carrier before installing each planetary gears.



24621_552 11

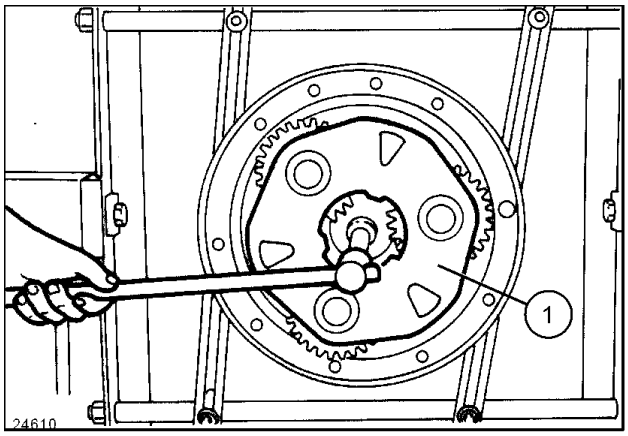
Final drive Shaft - Install

Prior operation:
Reinstall all the components of the drive wheel shaft assembly observing the following:
- Refer to **REAR AXLE - Static description (D.12.A)** and **Differential - Overhaul (D.12.A)** for correct orientation of the different parts.

⚠ WARNING ⚠
Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

B020

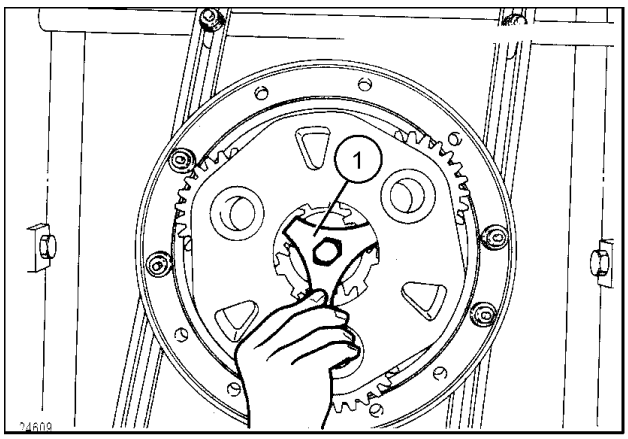
1. Install the outer bearing cups and seals on the housing using suitable drifts.
2. After installing all components on the final drive case, adjust the drive wheel taper bearings.
3. Drive wheel taper bearing adjustment:
   Tighten the bolt (**Final drive - Torque (D.12.A)**) to **196 Nm** (**20 kgm**) while turning the shaft to settle the assembly.
   Loosen the bolt (Refer to **Final drive - Torque (D.12.A)**) then tighten it again to **88 Nm** (**9 kgm**) while turning the shaft to settle the bearings properly.



24610_553 1

4. Insert the safety plate **(1)** and lock it screwing in or out the bolt (C3) until reaching the next notch

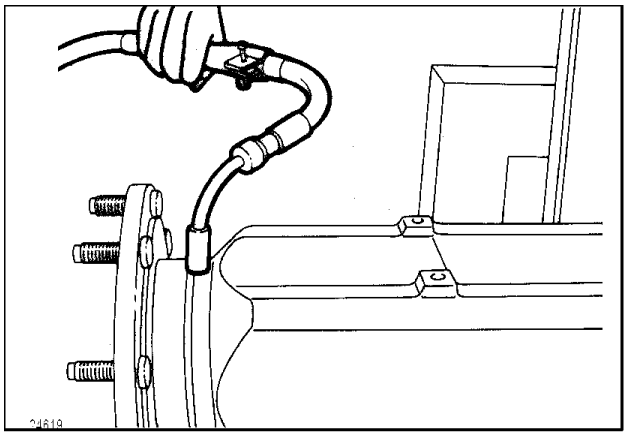
NOTE: *Screw in or out to a maximum. angular variation of* ***15 °****.*



24609_545 2

5. Turn the shaft by hand and check if it turns freely, with no end float or excess resistance.

6. Using the grease nipple, fill the inner recess with grease **CASE AKCELA 251H EP MULTI-PURPOSE GREASE** (several grease gun strokes are required).



24619 3

Final drive Reducer, spur gear - Overhaul

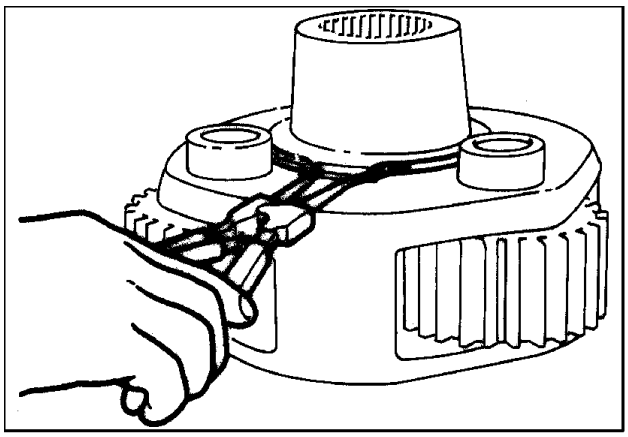
⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

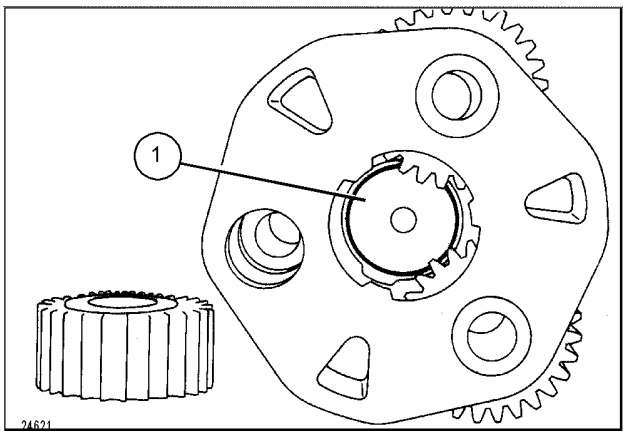
B026

1. With the assembly removed from the case, proceed as follows:
   Remove retaining ring **(1)**.

2. Slide out the pivot pins and recover the gears complete with the needle bearings. Remove the thrust washer **(1)**.
   Reinstall all components of the planetary gear set observing the following:
   - Reassembly follows the disassembly procedure in reverse, from step 2 back to step 1.
   - Insert the thrust washer **(1)** first on the driven gear holder.



1b0o2004106106 1



24621 2

Differential lock Multi plate clutch - Overhaul

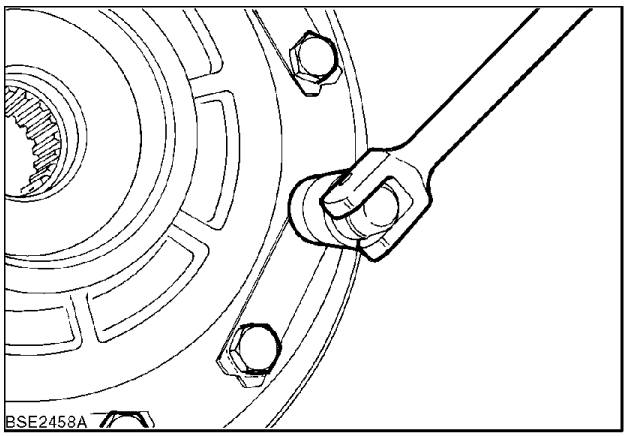
Prior operation:
REAR AXLE - Disassemble (D.12.A)

⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

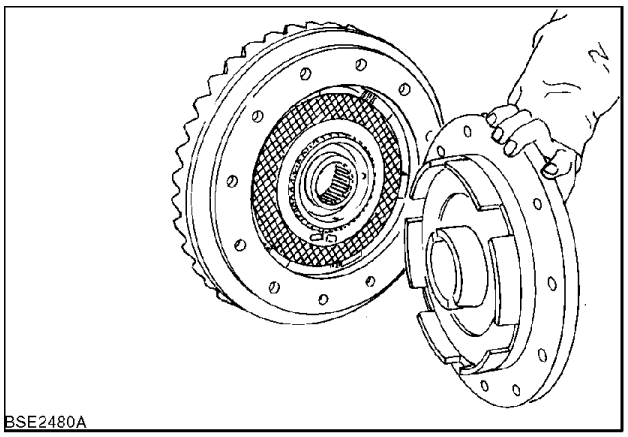
B026

1. With the crown wheel/pinion and differential assembly on the bench, proceed as follows:
   Loosen the bolts retaining the differential lock and differential casings .
   Detach the differential lock case and recover the multi-plate clutch .



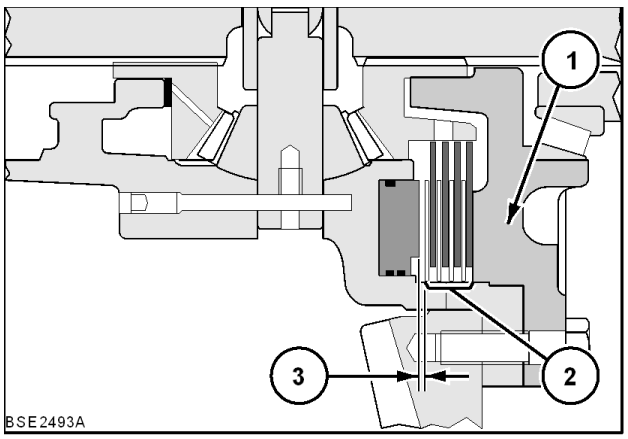
BSE2458A 1

2. Using a depth gauge, check if the clearance **(3)** between the differential casing and the multi-pack clutch **(2)** is **1.35 - 3.1 mm**. If this is not the case, replace clutch discs.
   Reinstall all the components of the differential lock control unit observing the following:
   - Reassembly follows the disassembly procedure in reverse, from step 3 back to step 1.
   - Refer to **REAR AXLE - Sectional view (D.12.A)** for correct orientation of the different parts.
   - Lubricate all components with **CASE AKCELA HY-TRAN ULTRA** oil.



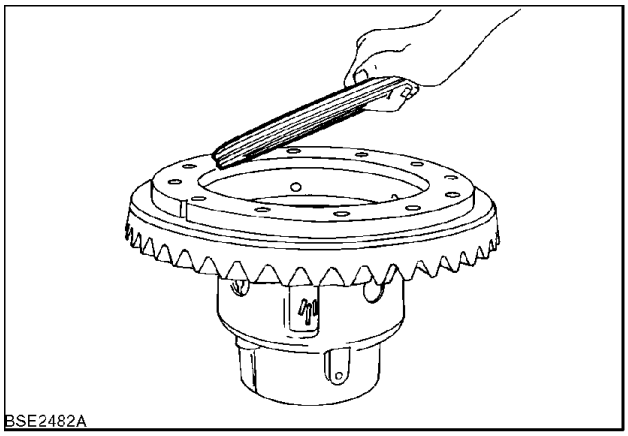
BSE2480A 2

3. Error Codes and Diagnostics
   If there is a fault with the differential lock an error code will be displayed on the instrument panel. Refer to **ELECTRONIC SYSTEM - Static description (A.50.A)** for more detail.



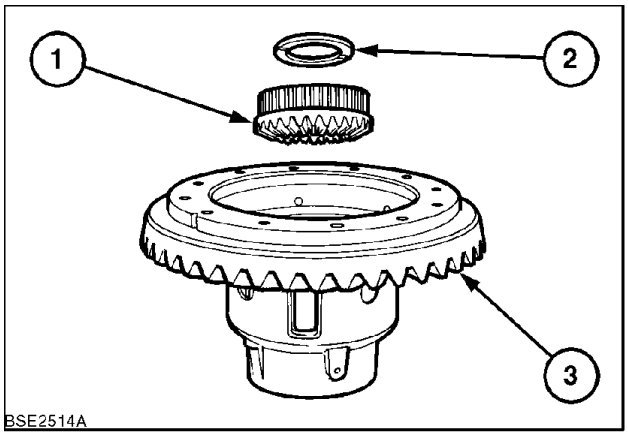
BSE2493A 3

4. Crown Wheel Components
   Remove clutch plates as previously shown
   Remove piston from crown wheel assembly.



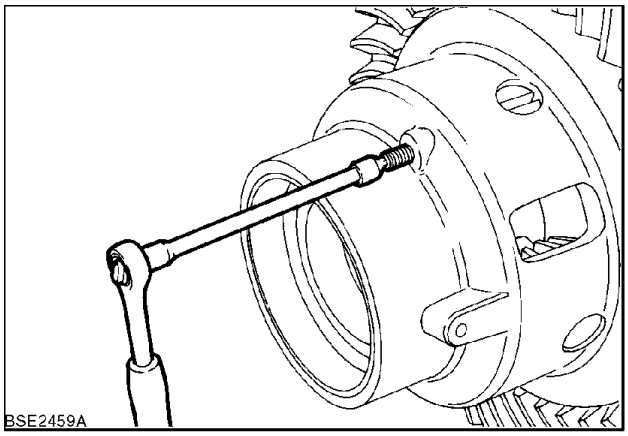
BSE2482A 4

5. Remove side gear **(1)** and shim **(2)** from crown wheel assembly **(3)**.



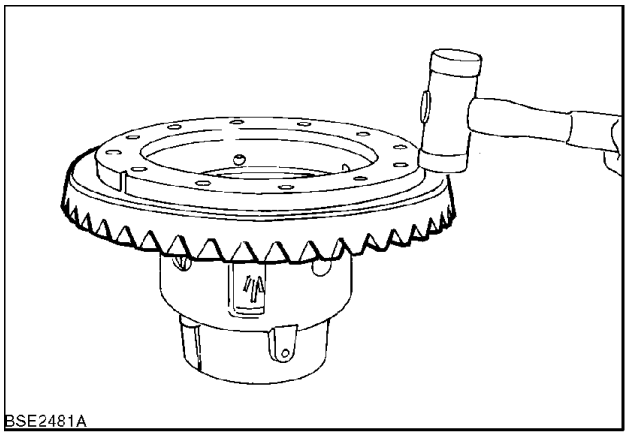
BSE2514A 5

6. Undo the Allen key screws to enable access to the locking pins holding the journal pinion carrier.



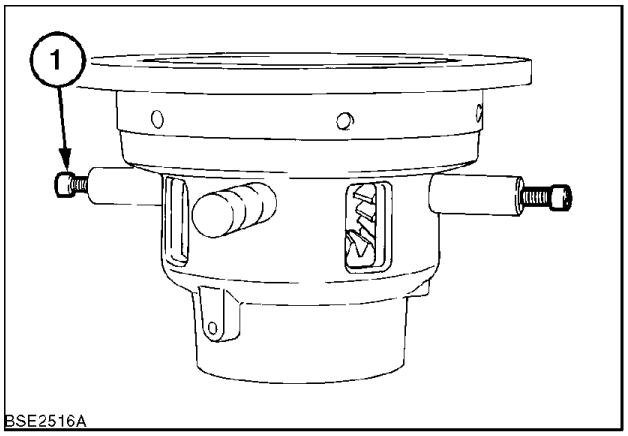
BSE2459A 6

7. Remove the ring gear using a suitable soft faced hammer.



BSE2481A 7

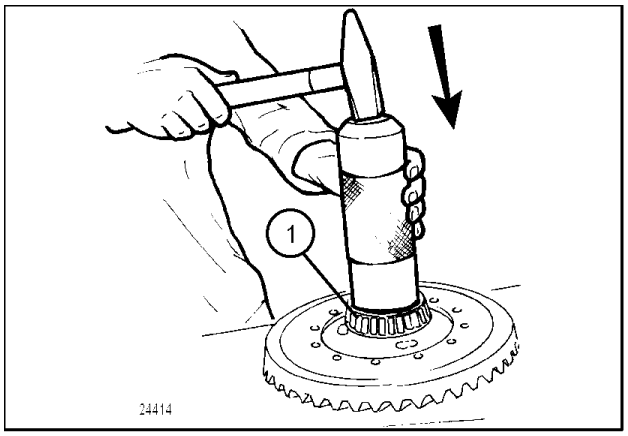
8. Loosen the screws **(1)** holding the journal pinion carriers in place and pull out to allow removal of the differential gears. It is advisable to keep the pinion carriers and side gears matched as they are removed.



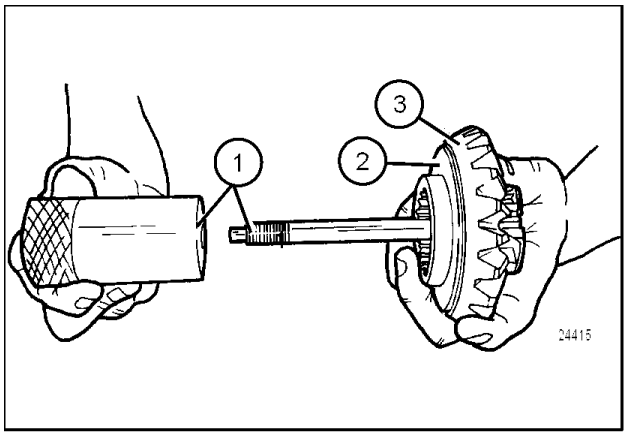
BSE2516A 8

9. Side gear end float adjustment (Refer to **REAR AXLE - Adjust (D.12.A)**).
Assemble side gears, pivot pins and retaining pins.
Place the side gear **(3)** complete with a test shim **(2)** on tool no. **380000475 (1)**

NOTE: *Adjust the left hand side carrier end float as indicated for the right hand side gear.*

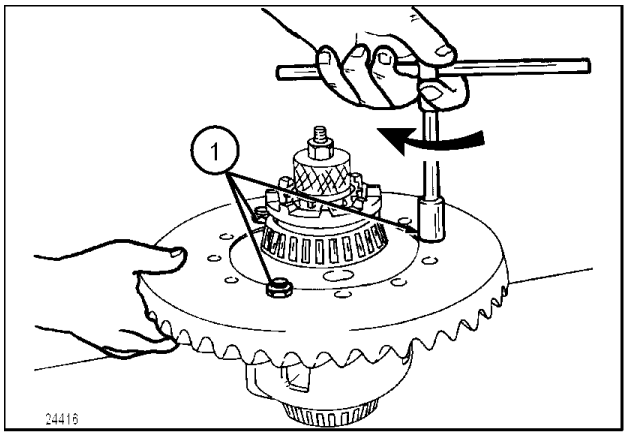


24414 9



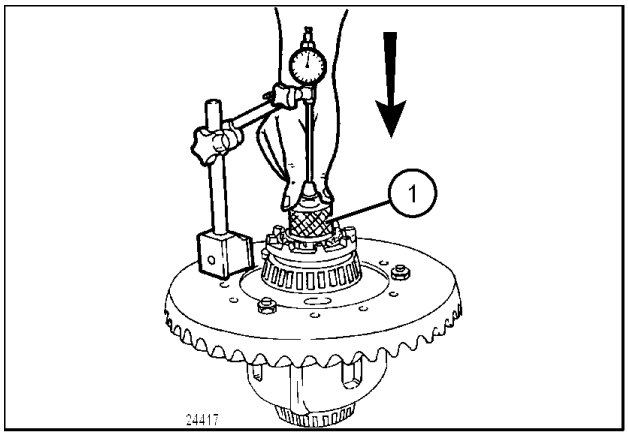
24415 10

10. Assemble the side gear and attached tool no. **380000475** on the differential casing, place the crown wheel above it and fix the crown wheel with three bolts **(1)**. Turn the assembly to settle.



24416 11

11. Place a dial test indicator gauge with the stylus on the tool screw **(1)**, press the tool and set gauge to zero.



24417 12

12. Pull the tool **(1)** upwards and read the travel **(H)** on the gauge.

13. Adjuster ring thickness to be inserted on RH side gear is given by:
Rd = (B + H) - 0,05 - 0.30
where:
Rd = Adjustment shim to be inserted on right hand side gear.
B = Test shim = **3.00 mm**
H = Travel measured using the gauge
0.05 mm = Half end play of differential gears in relation to their pivot pins
0.30 mm = Specified side gear end play
Example
- Travel measured using the gauge H = **0.50 mm**
- Test shim B = **3.00 mm**
- Thickness of the ring to be inserted on the right hand side gear is
Rd = (3.00 + 0.50) - 0.05 - 0.30 = **3.15 mm**

14. Once determined the shim packs for left hand and right hand side gears, reassemble the whole unit and tighten the crown wheel to differential casing attaching bolt nuts at **137 Nm** (**101.05 lbft**))

15. Refer to **ADDITIONAL REDUCERS Overdrive - Static description (C.30.D)**
Refer_to **ADDITIONAL REDUCERS Overdrive - Overhaul (C.30.D)**

REAR AXLE - Troubleshooting

Problem	Possible Cause	Correction
Noisy rear axle when the tractor is moving, and also with transmission in neutral (not originating from final drives)	Pinion and/or crown wheel bearing incorrect adjustment	Remove rear axle housing and adjust pinion and crown wheel bearings correctly . Refer to **REAR AXLE - Adjust (D.12.A)**
	Worn or incorrectly adjusted sun and planetary gears	Remove rear axle housing, replace worn parts and adjust the differential gear backlash . Refer to **REAR AXLE - Adjust (D.12.A)**
	Excess differential side gears to half-shaft spline backlash	Remove rear axle housing and replace damaged parts.. Refer to **REAR AXLE - Disassemble (D.12.A)**
Noisy rear axle with tractor under load and upon release	Excess bevel pinion to crown wheel backlash	Remove rear axle housing and adjust pinion and crown wheel bearings correctly. Refer to **REAR AXLE - Adjust (D.12.A)**
	Faulty or defective inner component	Remove rear axle housing, replace worn parts and adjust differential gear backlash correctly. Refer to **REAR AXLE - Adjust (D.12.A)**
Noisy rear axle and over-heating	Insufficient pinion and/or crown wheel bearing backlash	Remove rear axle housing and adjust pinion and crown wheel bearings correctly. Refer to Refer to **REAR AXLE - Adjust (D.12.A)**
	Insufficient bevel pinion to crown wheel tooth backlash	Remove rear axle housing and adjust crown wheel bearings correctly Refer to Refer to **REAR AXLE - Adjust (D.12.A)**
	Contaminated oil or incorrect specification of oil	Check condition and specification of oil and if required replace accordingly.

Final drive - Troubleshooting

Problem	Possible Cause	Correction
Noisy final drives when the tractor is moving and also with transmission in neutral	Wheel axle shaft bearing incorrectly adjusted	Remove final drive case and adjust bearings. Refer to **REAR AXLE - Remove (D.12.A)**and **REAR AXLE - Adjust (D.12.A)**
	Faulty or defective internal component.	Remove final drive case and replace damaged parts.
	Excess wheel axle shaft to final drive spline backlash	Remove final drive case and replace damaged parts.

Differential lock - Troubleshooting

Problem	Possible Cause	Correction
Differential lock not engaging.	Low rear axle oil level.	Top up to correct level.
	Blocked oil filter.	Replace filter.
	Faulty hydraulic pump.	Overhaul or replace pump.
	Oil leaks through the seals with consequent pressure drop: cylinder piston oil supply line seals.	Replace faulty seals.
Differential lock not disengaging	Faulty diff lock-unlock switch	Replace switch
	Power supply not reaching solenoid valve: detached or damaged connectors, faulty remote switch.	Restore electrical connection and replace faulty parts.
	Diff lock control solenoid valve stuck on delivery.	Overhaul or replace solenoid valve.
	Oil leaks through the seals with consequent pressure drop: cylinder piston or supply line seals.	Replace faulty seals.
With differential lock engaged and control switch on automatic mode, the diff lock does not disengage when raising lift arms using the Fast Raise switch.	Faulty diff lock switch (connected to the Fast Raise switch).	Replace switch.
With differential lock engaged, the diff lock does not disengage when brake pedals are pressed.	Faulty diff lock switch (connected to the brake pressure switches/foot pedal switches).	Replace switch.

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TRAVELLING - D

2WD-4WD SYSTEM Hydraulic - 14.C

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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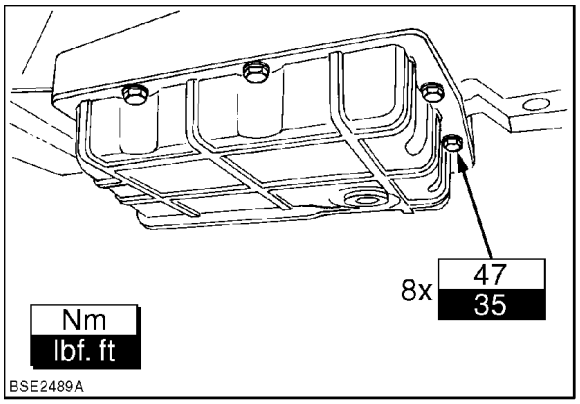
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2WD-4WD SYSTEM Hydraulic - Torque

Apply Flexible Gasket Sealant Loctite 574 to mounting face of cover.



BSE2489A 1

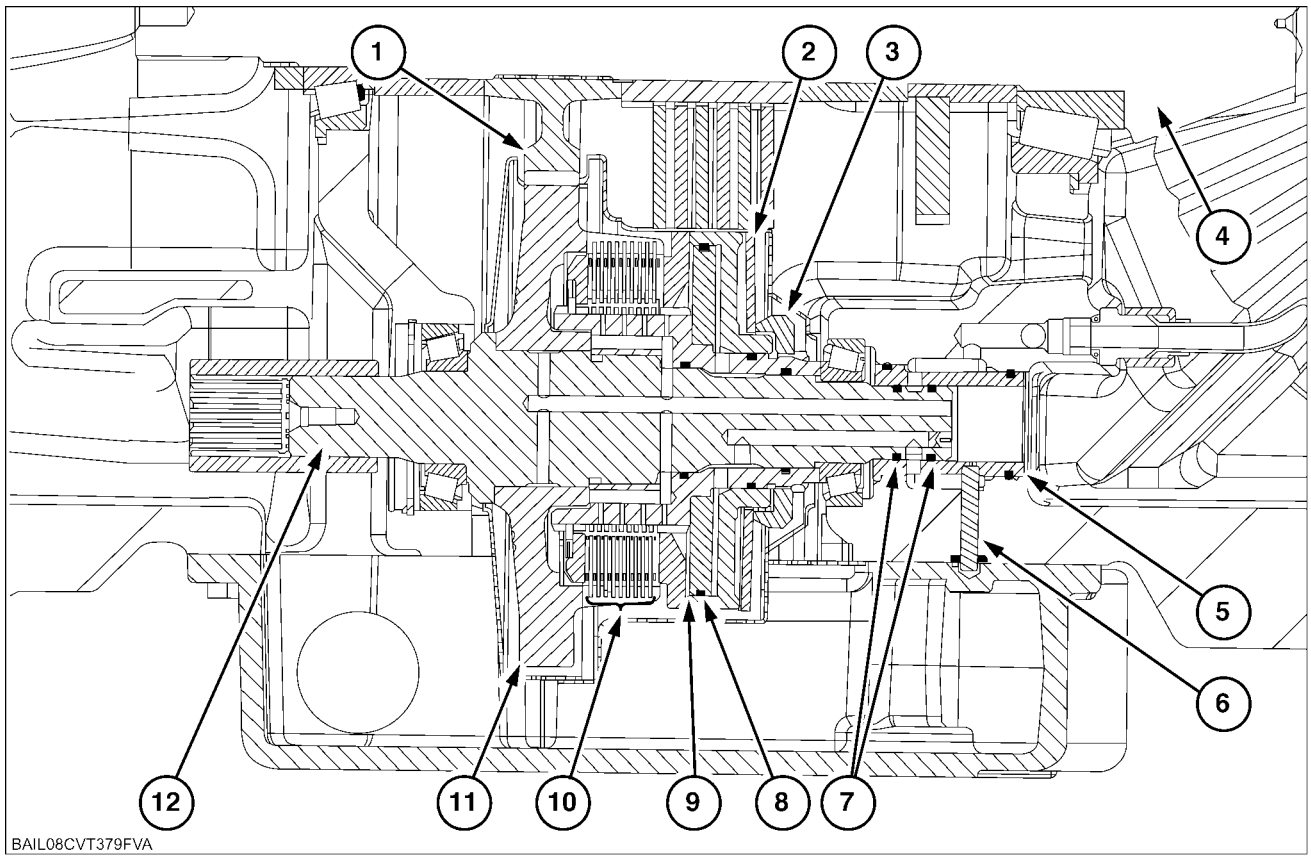
2WD-4WD SYSTEM Hydraulic - Special tools

380000479	Transfer box drive shaft puller (M8x1.25) adapter
380000549	Slide Hammer

Clutch - General specification

MFD ELECTRO-HYDRAULIC CLUTCH SPECIFICATIONS	
Reduction Ratio - :	45/60 = 1:333
Clutch Driven Discs	10
Clutch Drive Discs	9
Clutch Driven Disc Thickness	**1.7 - 1.8 mm**
Clutch Drive Disc Thickness	**1.5 - 1.55 mm**
Free Belleville Spring Height (one)	**9.35 - 9.8 mm**

2WD-4WD SYSTEM Hydraulic - Sectional view

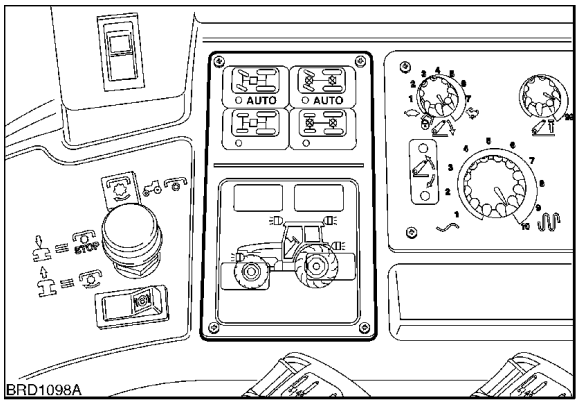


BAIL08CVT379AVA 1

1. Drive Gear
2. Belleville Washer
3. Retaining Nut
4. Pinion Shaft
5. Supply Manifold
6. Supply Manifold Retaining Pin
7. Seals
8. Piston Seals
9. Piston
10. Clutch Plates
11. Driven Gear
12. Drive Shaft

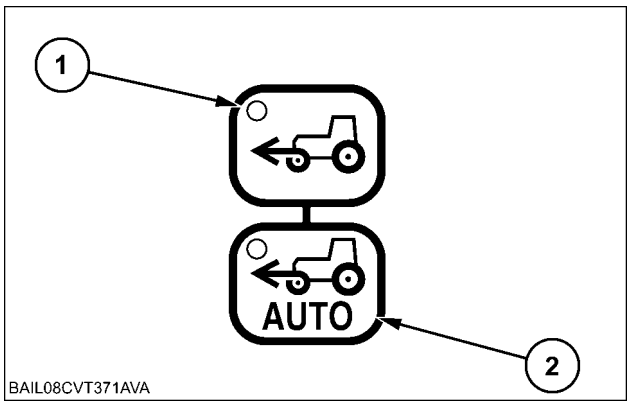
2WD-4WD SYSTEM Hydraulic - Static description

The front wheel drive is engaged by means of the switch located on the EMU panel.



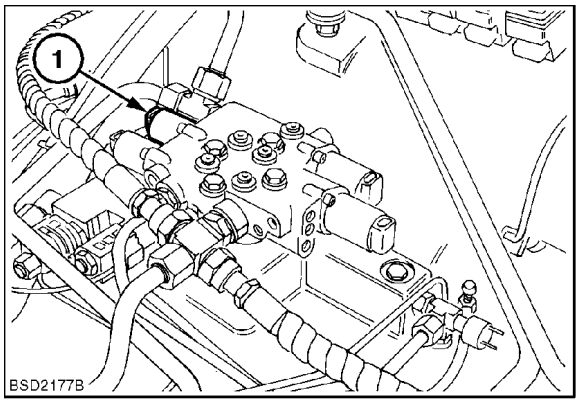
BRD1098A 1

Switch on later models with armrest unit.



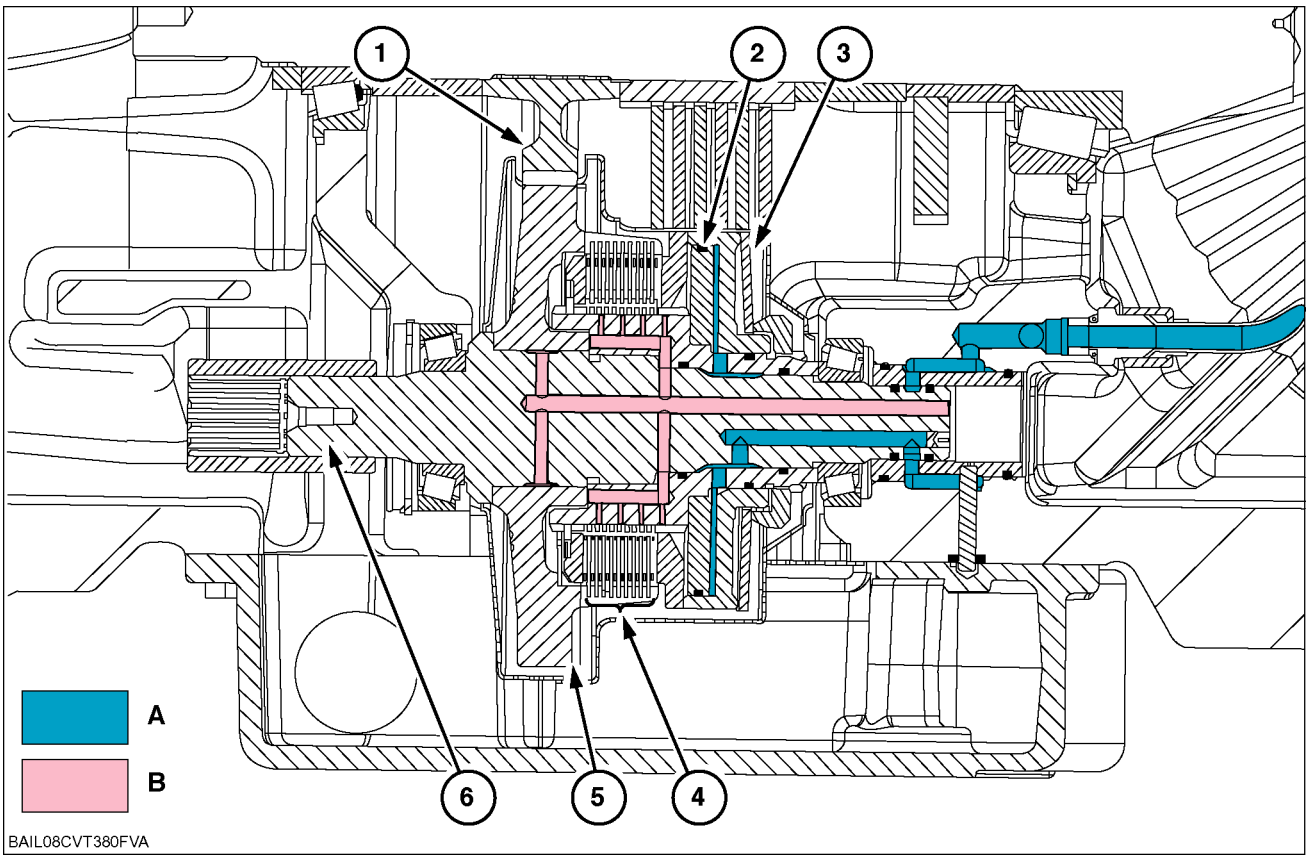
BAIL08CVT371AVA 2

When front wheel drive is selected the MFD solenoid valve **(1)** in the low pressure distributor valve block on top of the rear axle is in the discharge position (de-energised).
The oil within the control piston figure **(9) 2WD-4WD SYSTEM Hydraulic - Sectional view (D.14.C)** is open to sump through the MFD solenoid valve.



BSD2177B 3

2WD-4WD SYSTEM Hydraulic - Dynamic description



BAIL08CVT380FVA 1

Four Wheel Drive Multi-Wet Plate Clutch (Engaged)

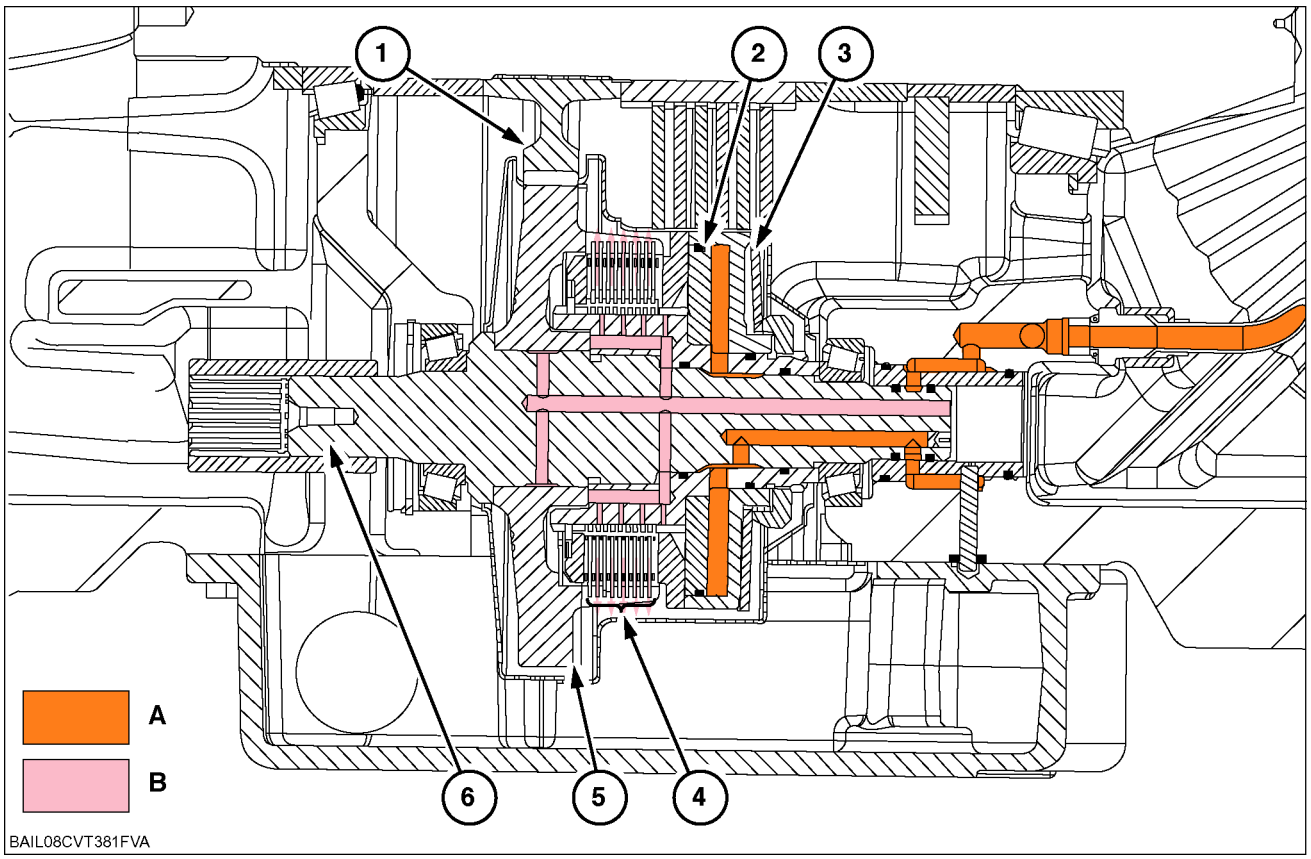
1. Drive Gear
2. Control Piston
3. Belleville Washer
4. Clutch Plates
5. Driven Gear
6. Drive shaft

Figure Colour Key

A. Return to reservoir

B. Lubrication

When the four wheel drive clutch solenoid is de-energized and the Belleville washer **(3)** applies a force to the control piston **(2)** which compresses the friction and steel clutch plates **(4)**. Drive is transferred from the drive gear **(1)** mounted on the rear axle pinion to the driven gear **(5)** and through the clutch to the front axle via the drive shaft **(6)**.



BAIL08CVT381FVA 2

Four Wheel Drive Multi-Wet Plate Clutch (Disengaged)

1. Drive Gear
2. Control Piston
3. Belleville Washer
4. Clutch Plates
5. Driven Gear
6. Drive shaft

Figure Colour Key

A. Low pressure circuit

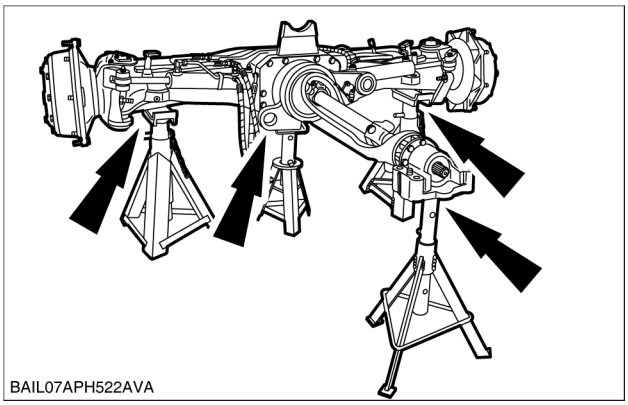
B. Lubrication

When the four wheel drive clutch solenoid is energized, low pressure circuit oil is supplied to the face of the control piston **(2)**.
The oil pressure on the piston face moves the piston **(2)** back against the force applied by the Belleville washer **(3)**, releasing the pressure on the clutch plates **(4)**.
The driven gear **(5)** can now rotate freely without transferring the drive through the clutch to the drive shaft **(6)**. Lubrication oil now flows freely between the friction and steel plates **(4)**.

Shaft - Remove (Suspended axle)

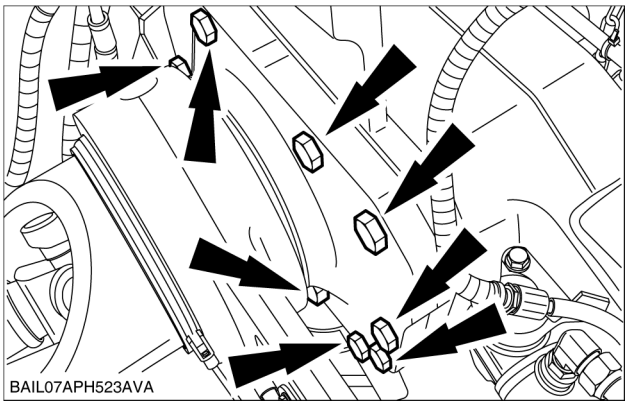
Prior operation:
Remove the front axle, for further information refer to **FRONT AXLE - Remove (D.10.A)**

1. Support the front axle on suitable axle stands.



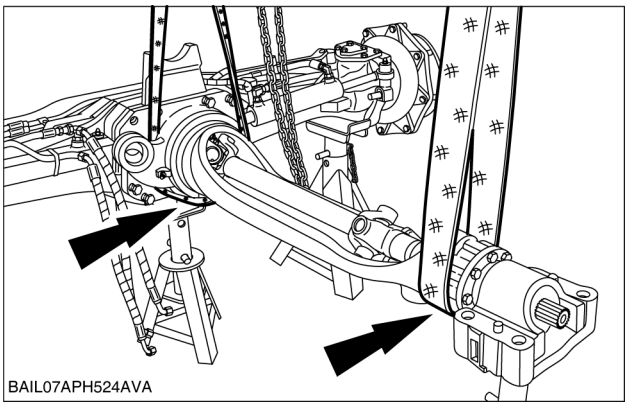
BAIL07APH522AVA 1

2. Remove the suspension arm retaining bolts.



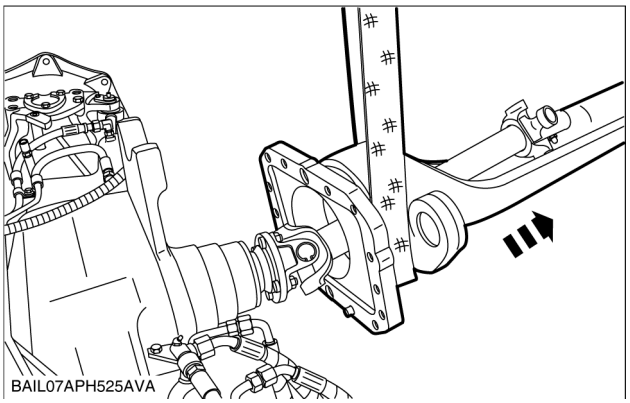
BAIL07APH523AVA 2

3. Using suitable lifting equipment, support the suspension arm.



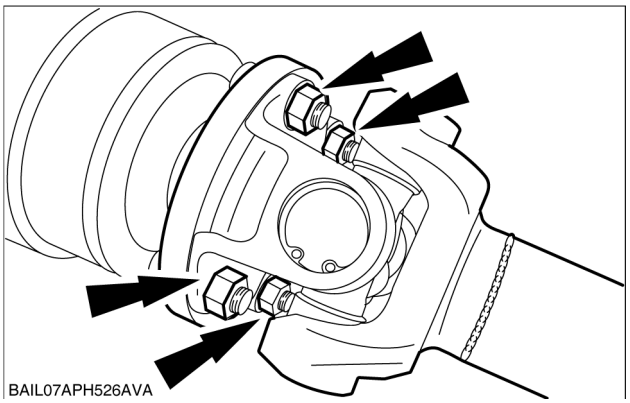
BAIL07APH524AVA 3

4. Remove the suspension arm.



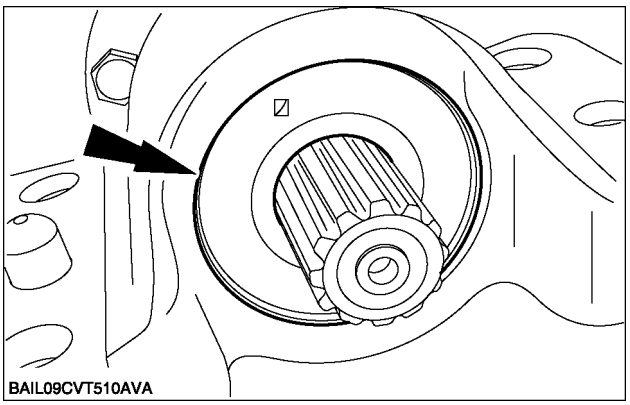
BAIL07APH525AVA 4

5. Remove the drive shaft retaining bolts and remove the drive shaft.



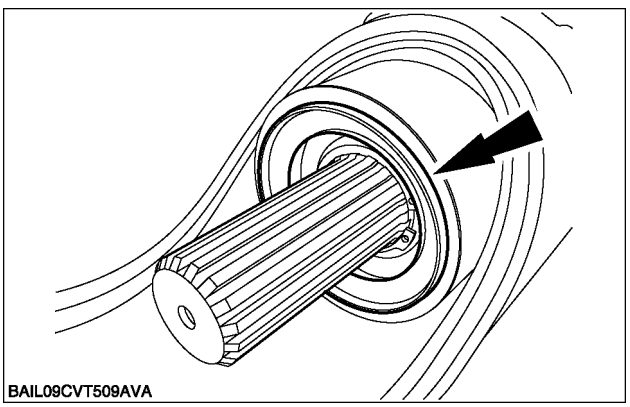
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6. Remove the outer dust shield.



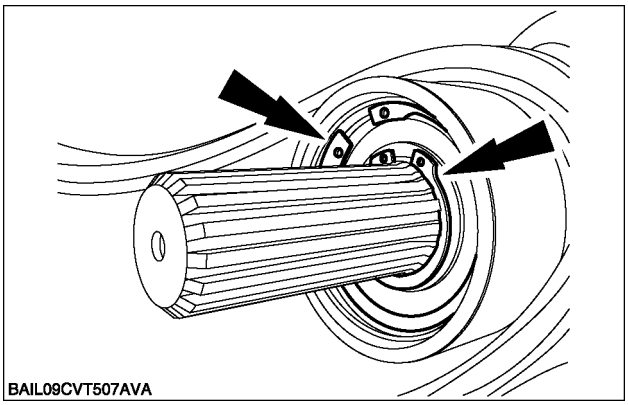
BAIL09CVT510AVA 6

7. Remove the inner dust shield.



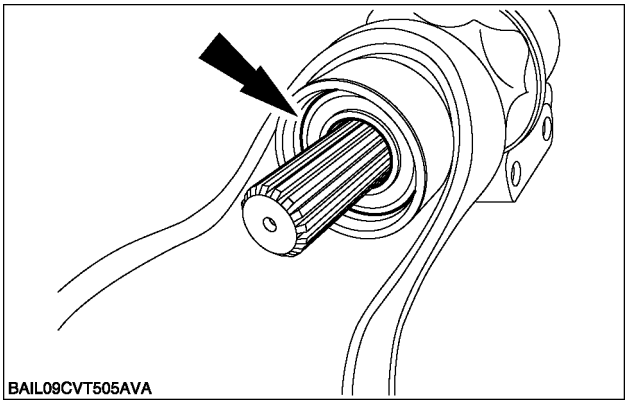
BAIL09CVT509AVA 7

8. Remove the shaft retaining circlips.



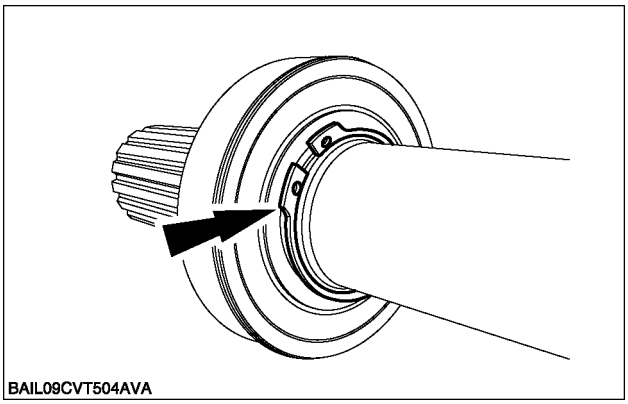
BAIL09CVT507AVA 8

9. Remove the shaft and bearing from the housing.



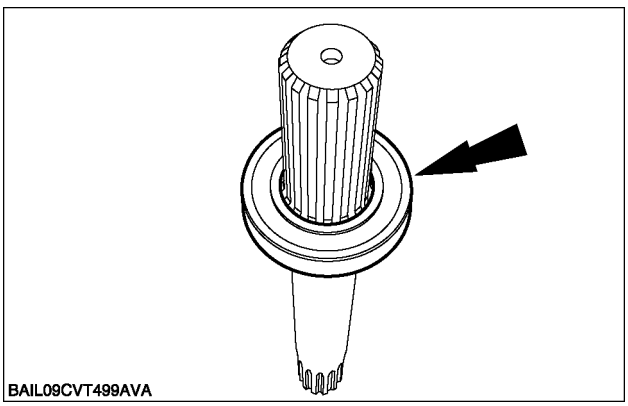
BAIL09CVT505AVA 9

10. Remove the circlip



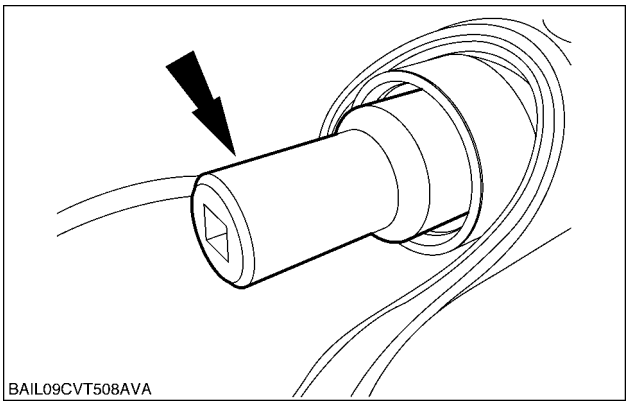
BAIL09CVT504AVA 10

11. Remove the bearing.



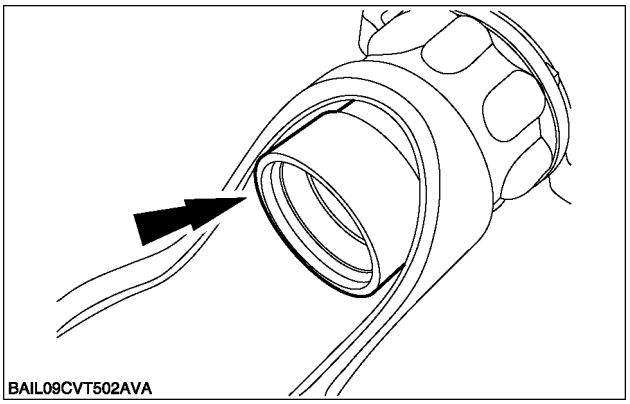
BAIL09CVT499AVA 11

12. Using special tool **380200107** remove the retaining nut.



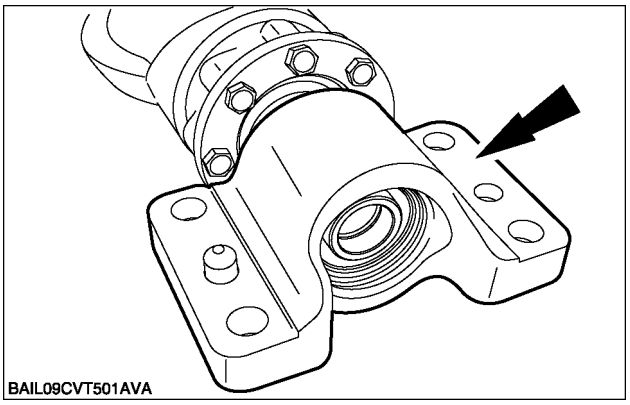
BAIL09CVT508AVA 12

13. Remove the bearing carrier.



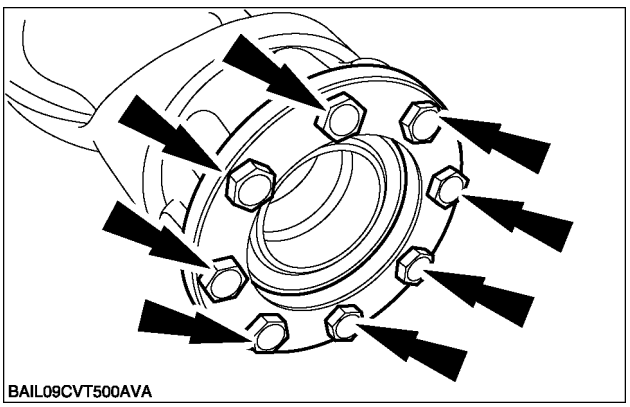
BAIL09CVT502AVA 13

14. Remove the support housing.



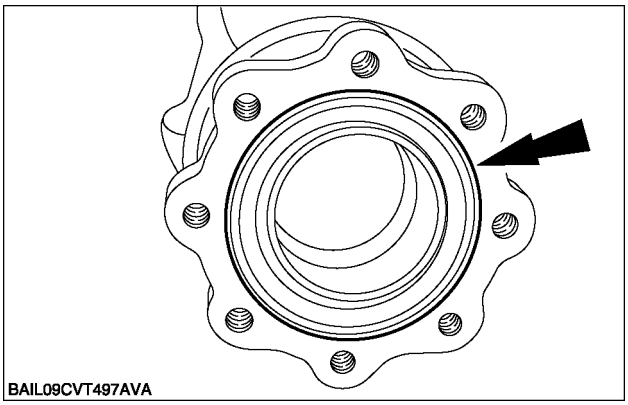
BAIL09CVT501AVA 14

15. Remove the bearing retaining ring.



BAIL09CVT500AVA 15

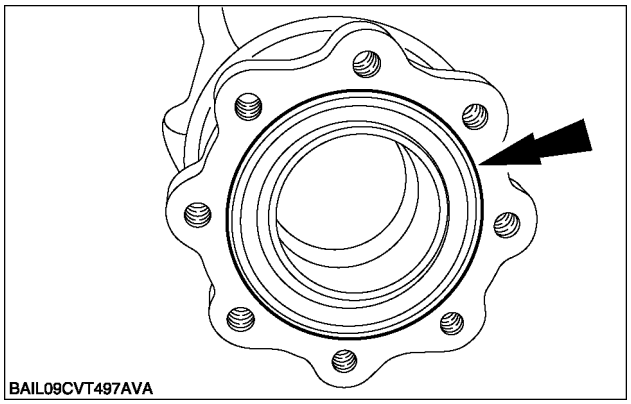
16. Remove the bearing.



BAIL09CVT497AVA 16

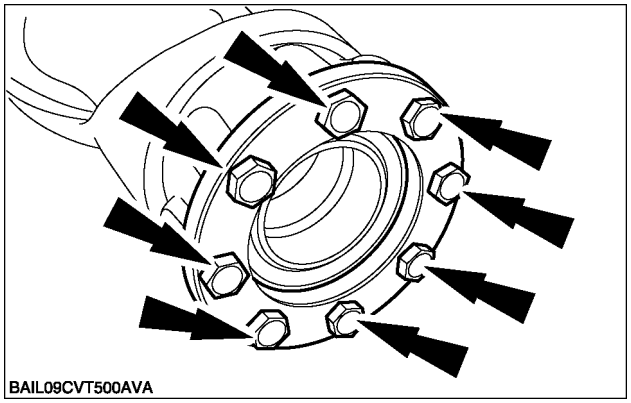
Shaft - Install (Suspended axle)

1. Install the bearing.



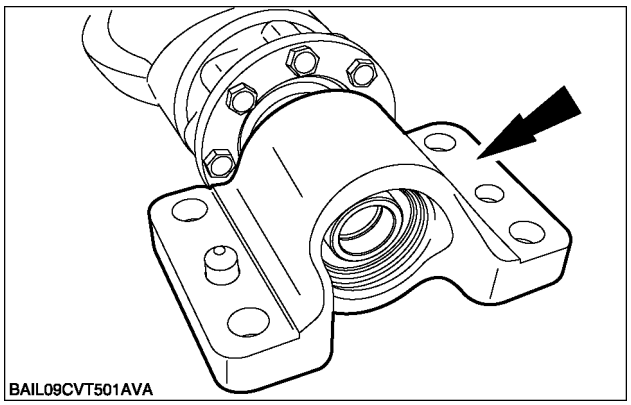
BAIL09CVT497AVA 1

2. Install the retaining ring.



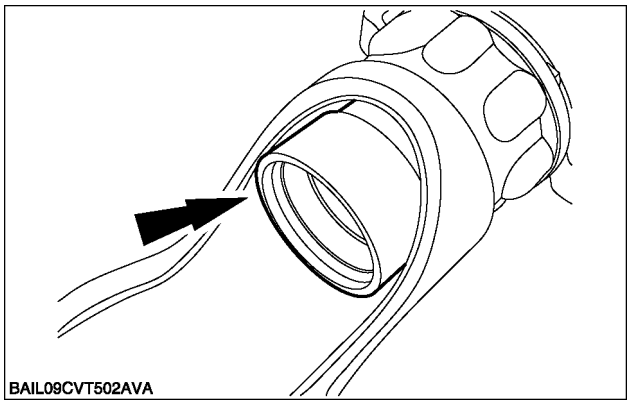
BAIL09CVT500AVA 2

3. Locate the support housing.



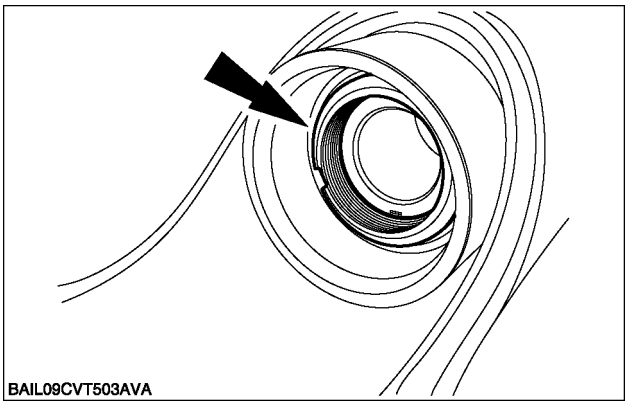
BAIL09CVT501AVA 3

4. Locate the bearing carrier.



BAIL09CVT502AVA 4

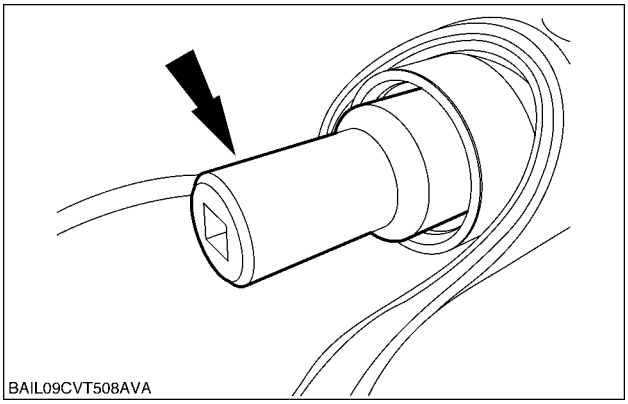
5. Install a new retaining nut.



BAIL09CVT503AVA 5

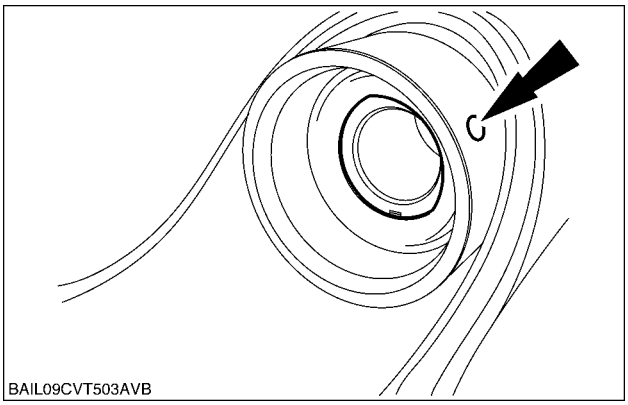
6. Using special tool **380200107** tighten to **300 - 350 N·m** (**220 - 258 lb ft**).

NOTE: *Make sure there is no end float.*



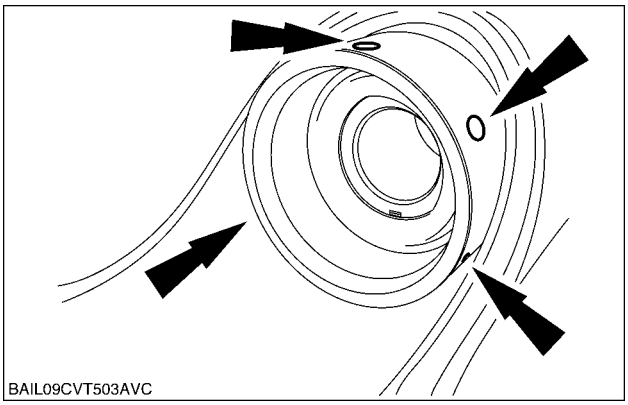
BAIL09CVT508AVA 6

7. Stake the retaining nut in a minimum of two places.



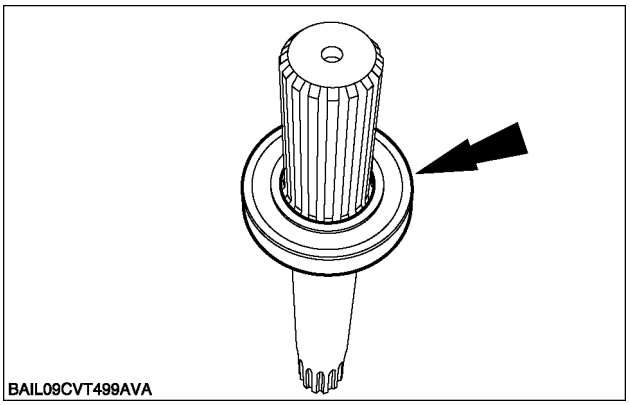
BAIL09CVT503AVB 7

8. Install the four blanking plugs.



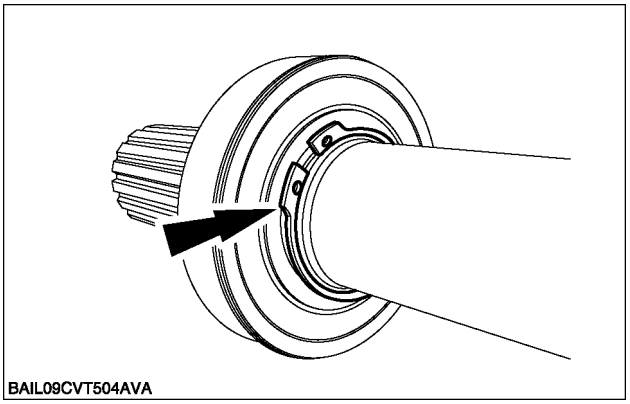
BAIL09CVT503AVC 8

9. Install the bearing onto the shaft.



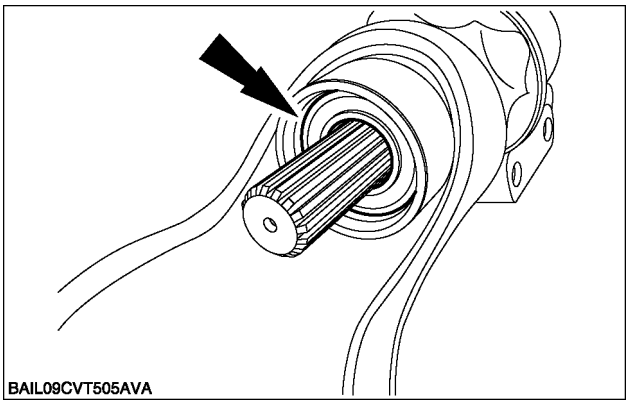
BAIL09CVT499AVA 9

10. Install the bearing retaining circlip.



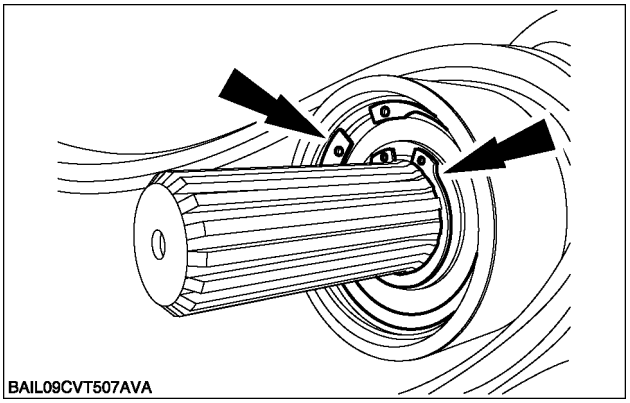
BAIL09CVT504AVA 10

11. Install the shaft into the housing.



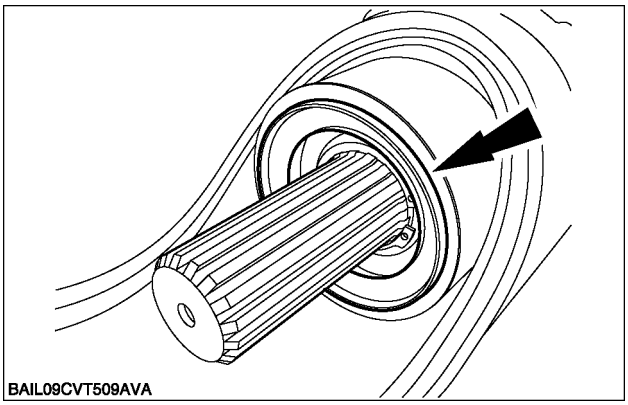
BAIL09CVT505AVA 11

12. Install the shaft retaining circlips.



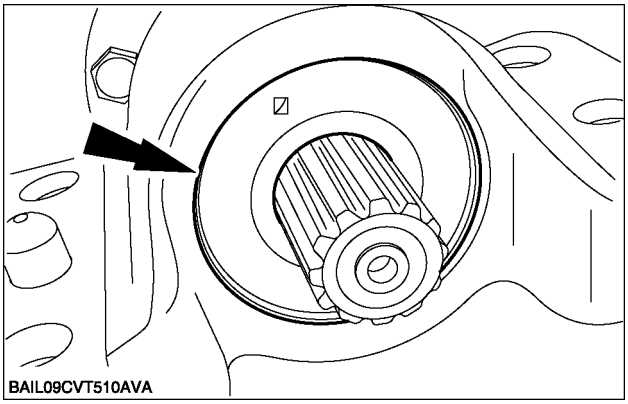
BAIL09CVT507AVA 12

13. Install the inner dust shield.



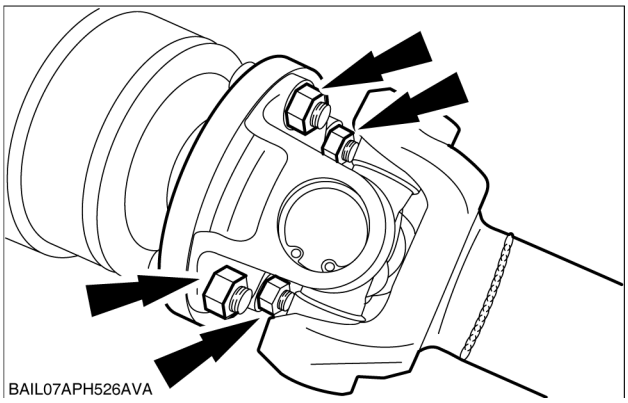
BAIL09CVT509AVA 13

14. Install the outer dust shield.



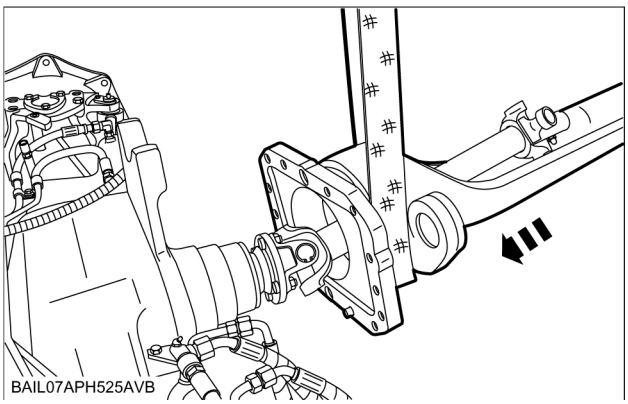
BAIL09CVT510AVA 14

15. Install the drive shaft to the front axle. Tighten to **65 - 86 Nm** (**48 - 63 lbft**).



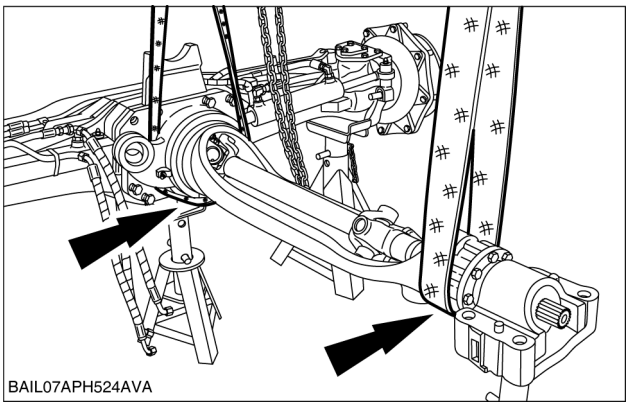
BAIL07APH526AVA 15

16. Install the suspension arm.



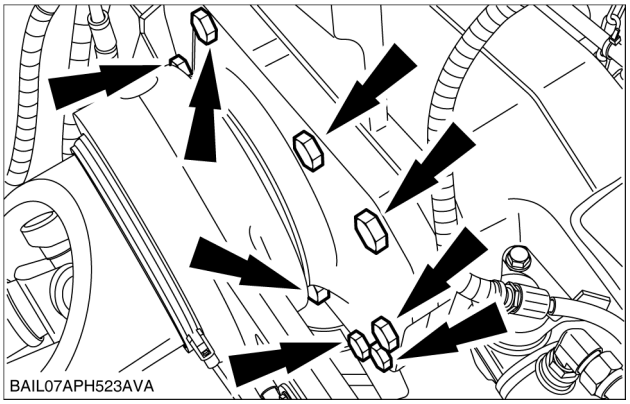
BAIL07APH525AVB 16

17. Support the suspension arm on suitable axle stands and remove the lifting equipment from the suspension arm.



BAIL07APH524AVA 17

18. Install the suspension arm retaining bolts. Tighten to **275 Nm** (**203 lb ft**).



BAIL07APH523AVA 18

Clutch - Remove 4WD Clutch

Prior operation:
Disconnect the transmission from the rear axle, for further information refer to **Housing - Disconnect (C.20.E)**

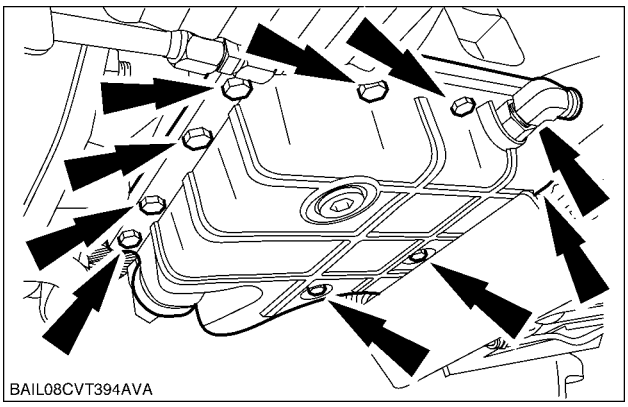
⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

B026

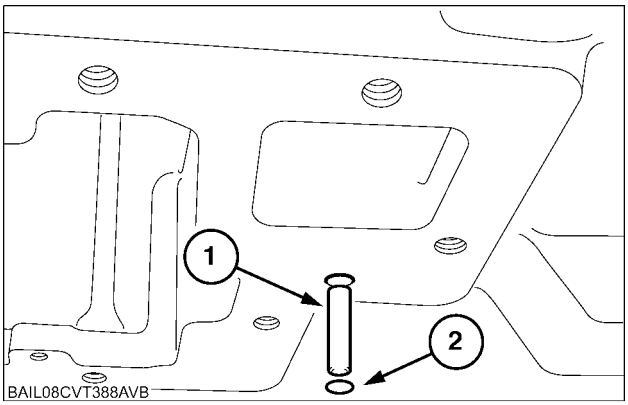
1. Remove the rear axle sump.

NOTE: *Prepare for some oil loss when the sump is removed.*



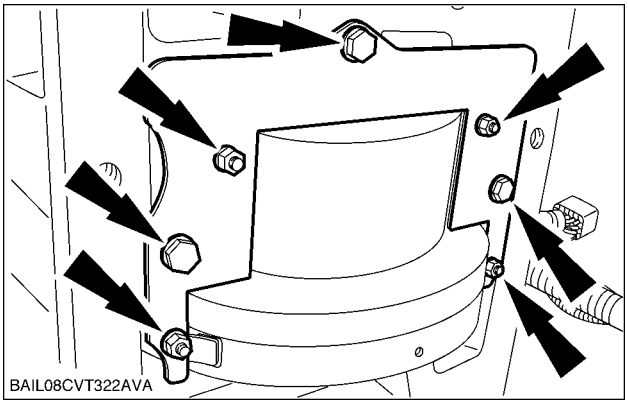
BAIL08CVT394AVA 1

2. Retrieve the oil supply manifold retaining pin **(1)** and O-ring seal **(2)**.



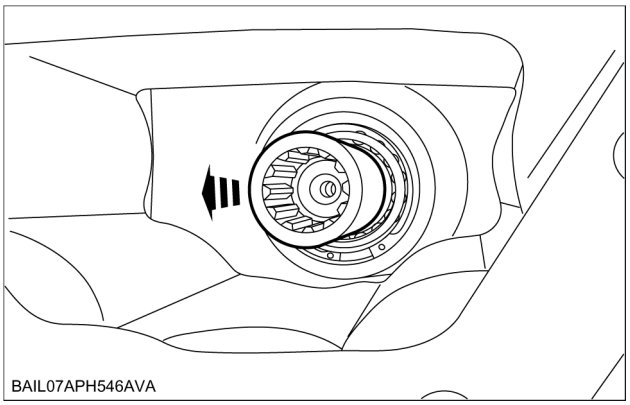
BAIL08CVT388AVB 2

3. Remove the inner clutch guard.



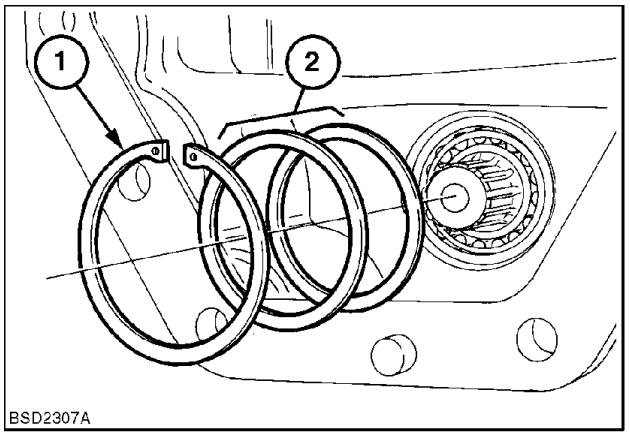
BAIL08CVT322AVA 3

4. Remove the sliding sleeve from the 4WD clutch drive shaft.



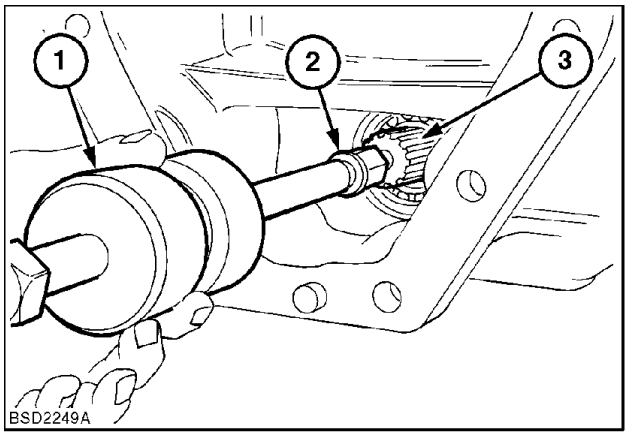
BAIL07APH546AVA 4

5. Remove the 4WD clutch drive shaft retaining circlip **(1)** and shims **(2)**.



BSD2307A 5

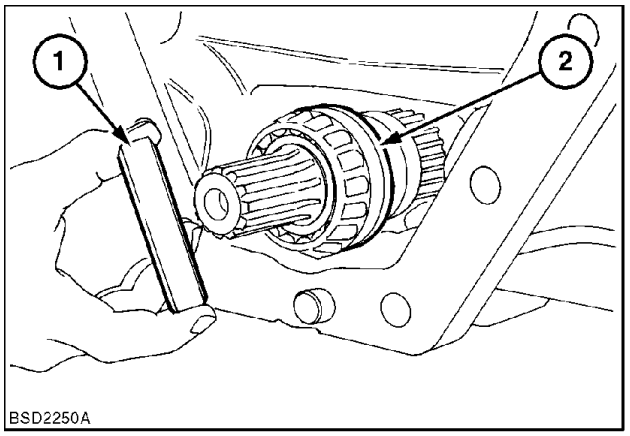
6. Using a slide hammer **(1) 380000549** and an adaptor **(2) 380000479** partially withdraw the 4WD clutch drive shaft **(3)**.



BSD2249A 6

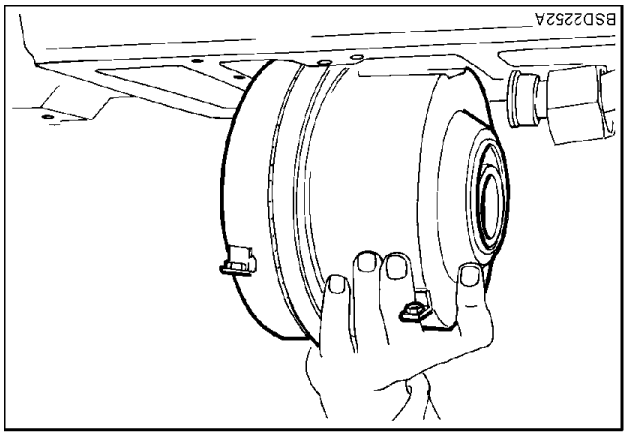
ATTENTION: *When the drive shaft is moved forward the 4WD clutch will need to be supported.*

7. Retrieve the bearing cap **(1)** and whilst supporting the 4WD clutch housing. Completely remove the 4WD clutch drive shaft **(2)**.



BSD2250A 7

8. Remove the 4WD clutch.

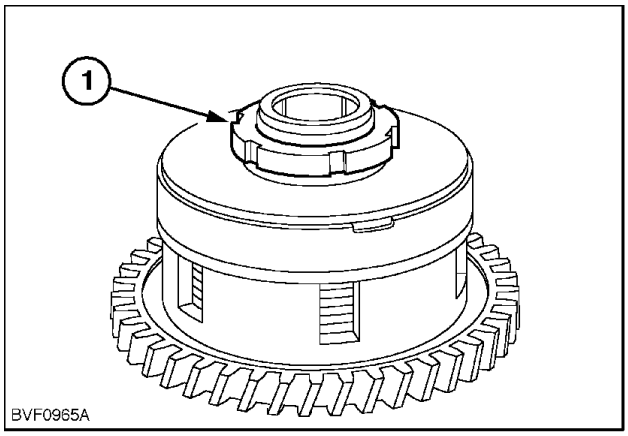


BSD2252A 8

Clutch - Disassemble 4WD Clutch

Prior operation:
Remove the 4WD Clutch, for further information refer to **Clutch - Remove (D.14.C)**

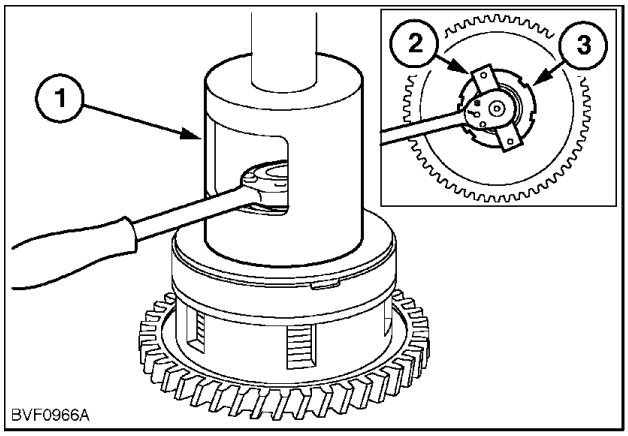
1. Unstake the retaining nut **(1)**.



BVF0965A 1

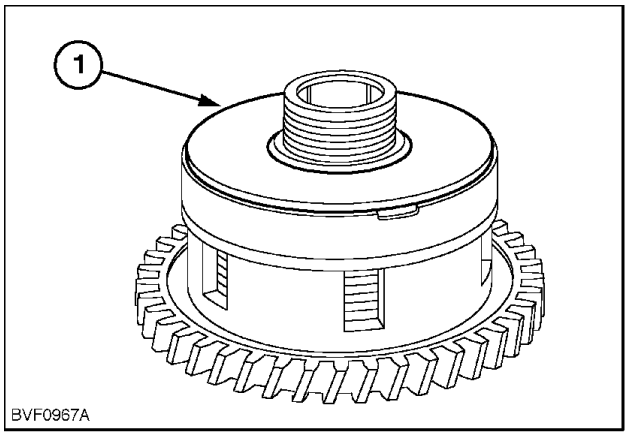
2. Using special tool **380000984 (1)** and a suitable hydraulic press, compress the Belleville washer. Using special tool **380000984 (2)**, remove the retaining nut **(3)**.

NOTE: *Make sure the retaining nut is fully unstaked or damage to the threads may occur.*



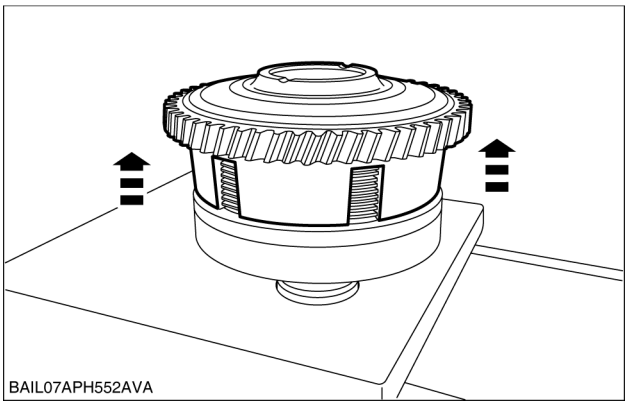
BVF0966A 2

3. Remove the special tools and the belleville washer **(1)**.



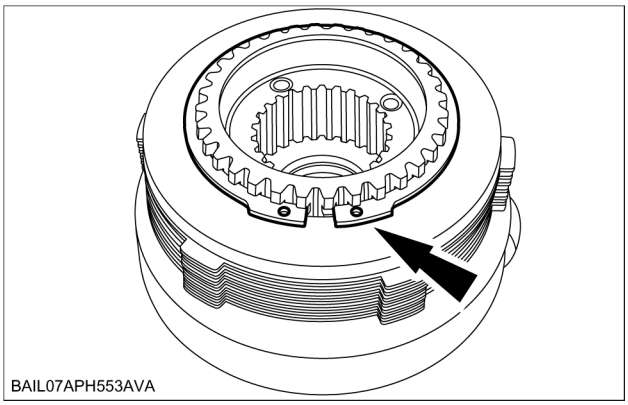
BVF0967A 3

4. Turn the clutch assembly over.
Remove the driven gear.



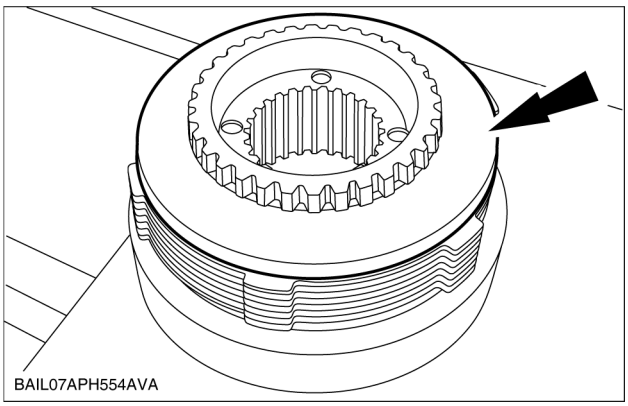
BAIL07APH552AVA 4

5. Remove the clutch plate retaining circlip.



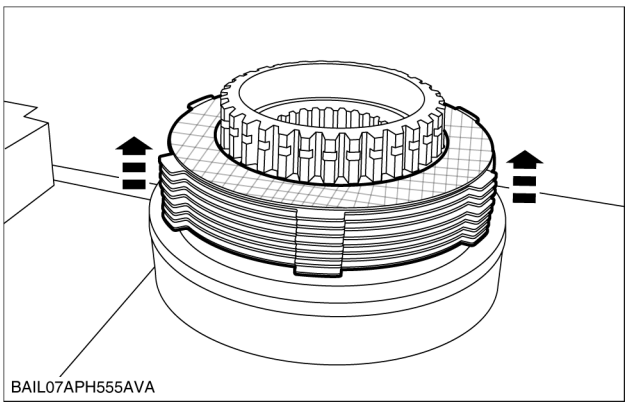
BAIL07APH553AVA 5

6. Remove the end plate.



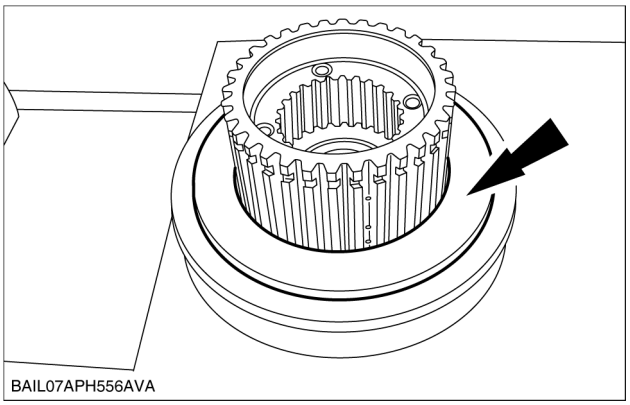
BAIL07APH554AVA 6

7. Remove the clutch friction discs and steel plates.



BAIL07APH555AVA 7

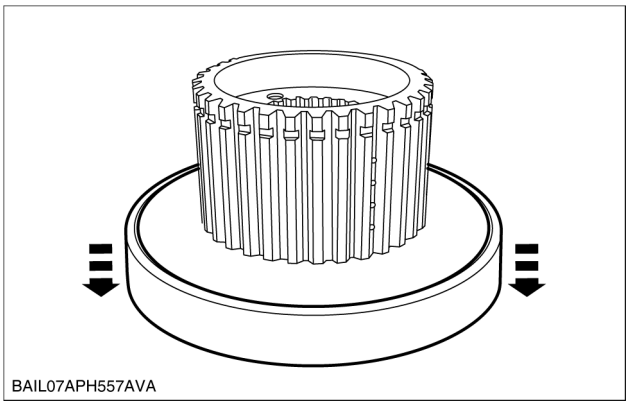
8. Remove the pressure plate.



BAIL07APH556AVA 8

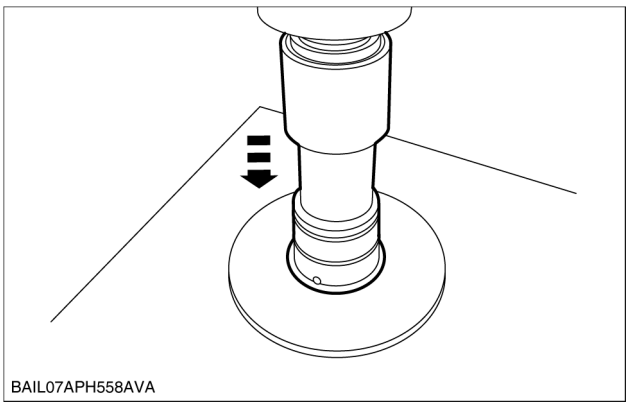
9. Remove the piston from the oil seal carrier.

NOTE: *Apply pressure evenly to the piston.*



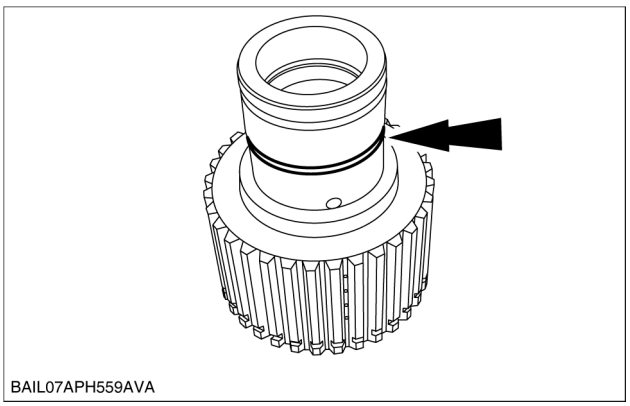
BAIL07APH557AVA 9

10. Using a suitable hydraulic press, remove the shaft from the oil seal carrier.



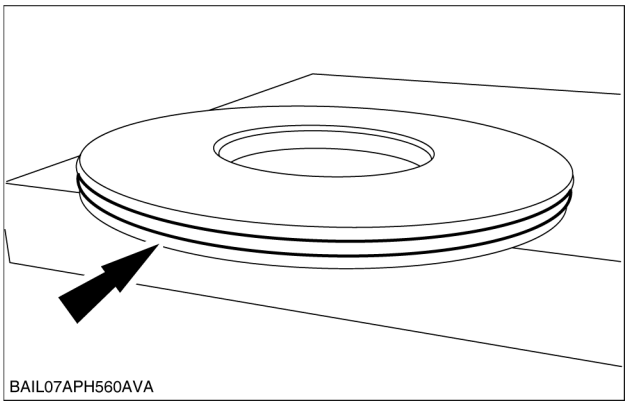
BAIL07APH558AVA 10

11. Remove the oil seal from the shaft.



BAIL07APH559AVA 11

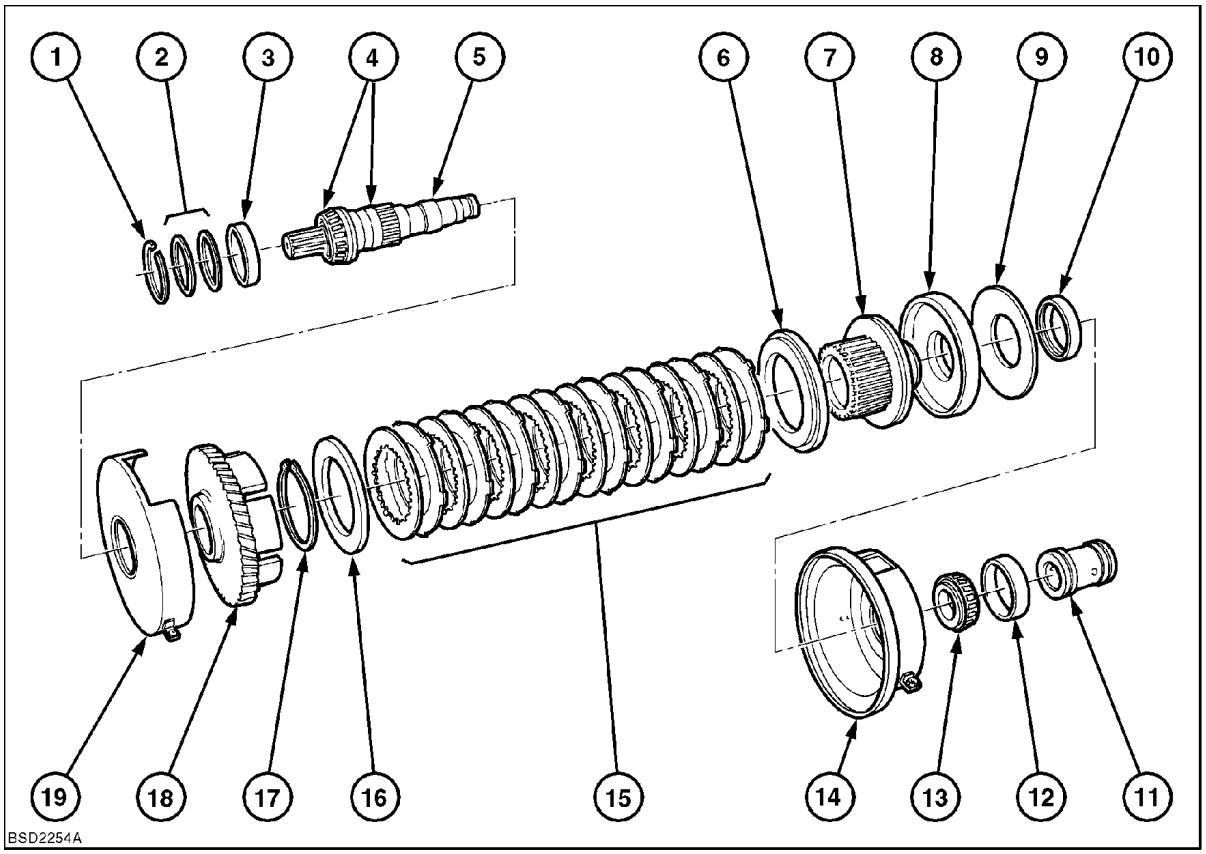
12. Remove the oil seal from the carrier.



BAIL07APH560AVA 12

Clutch - Overhaul

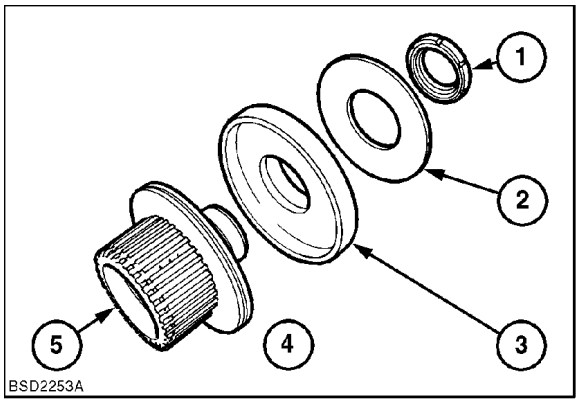
1. Separate and inspect all components.



BSD2254A 1

Electro Hydraulic Transfer Clutch

1.	Retaining Ring	11.	Sleeve
2.	Shims	12.	Bearing Cup
3.	Bearing Cup	13.	Bearing
4.	Bearing	14.	Cover
5.	Shaft	15.	Clutch Plates and Separators (8 off each)
6.	Spacer	16.	Spacer
7.	Piston	17.	Retaining Ring
8.	Piston Housing	18.	Drive Gear
9.	Belleville Spring	19.	Cover
10.	Nut		

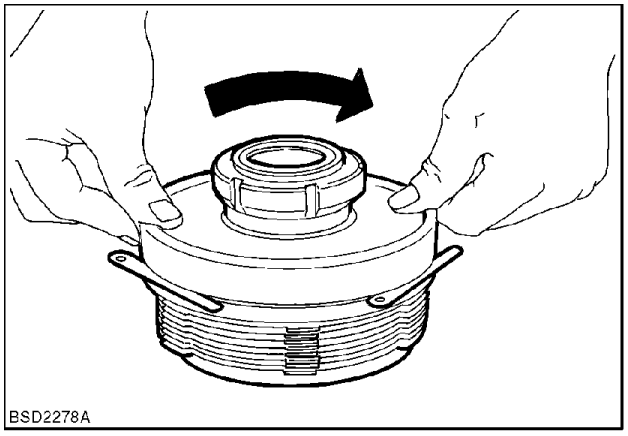


BSD2253A 2

Piston Assembly

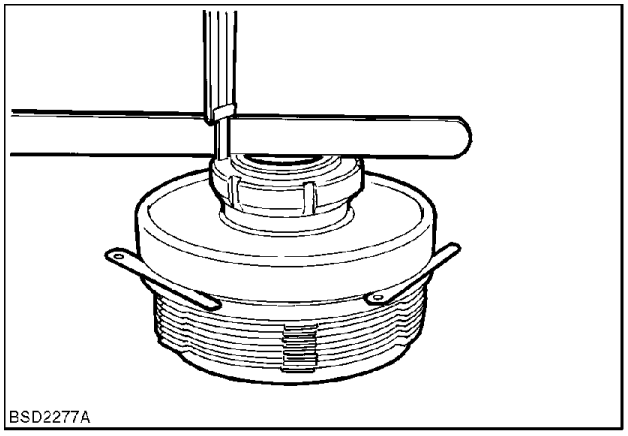
1.	Nut	4.	Seal
2.	Belleville spring	5.	Piston
3.	Piston Housing		

2. Reassemble piston assembly and clutch plates (Items 6, 7, 8, 10, 15, 16, 17 Figure **1**) Do not install Belleville spring (item 9) at this stage.
Equally space three feeler gages set to **1.2 mm** between piston housing and spacer.
Press piston housing against clutch plates and screw down nut until it touches the piston housing



BSD2278A 3

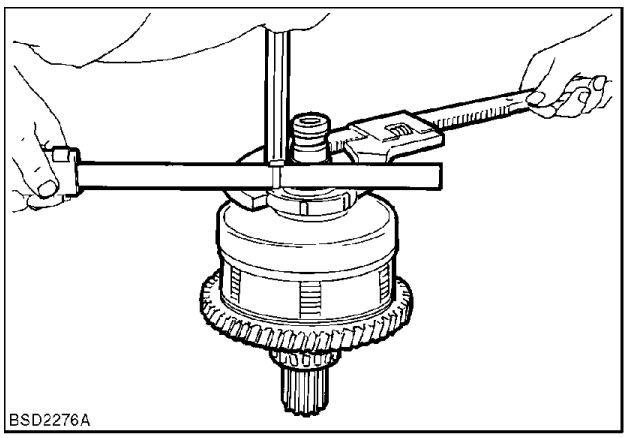
3. Using a vernier measure the position of the face of the nut to the top of the assembly and scribe an alignment mark on nut and housing.



BSD2277A 4

4. Reassemble clutch complete with Belleville spring and screw down the nut to the same dimension measured in step **3**. Realign the marks on the nut and housing. The marks made in step **3** ensure that the nut is positioned in exactly the same place.

NOTE: *To assist in tightening the nut the splined shaft can be held in a vice with soft jaws.*



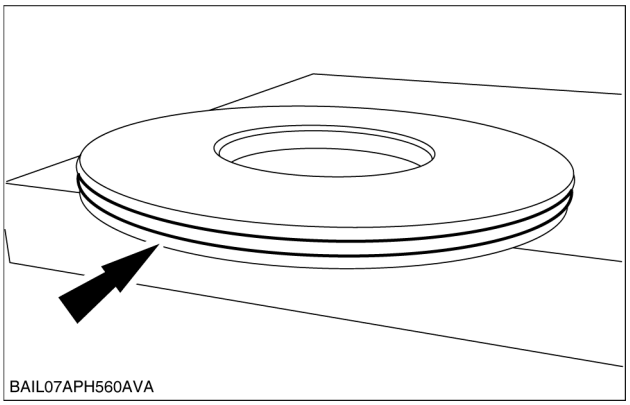
BSD2276A 5

Next operation:
Clutch - Install (D.14.C)

Clutch - Assemble

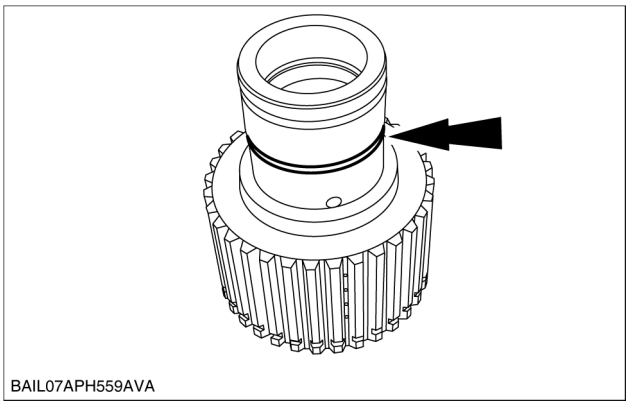
Prior operation:
Disassemble the clutch, for further information refer to **Clutch - Disassemble (D.14.C)**

1. Install a new oil seal onto the carrier.



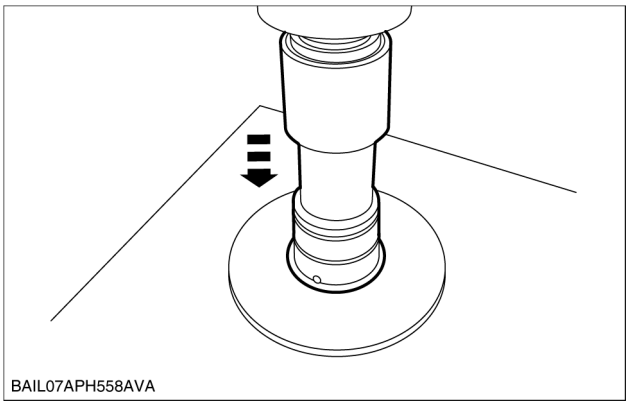
BAIL07APH560AVA 1

2. Install a new oil seal onto the shaft.



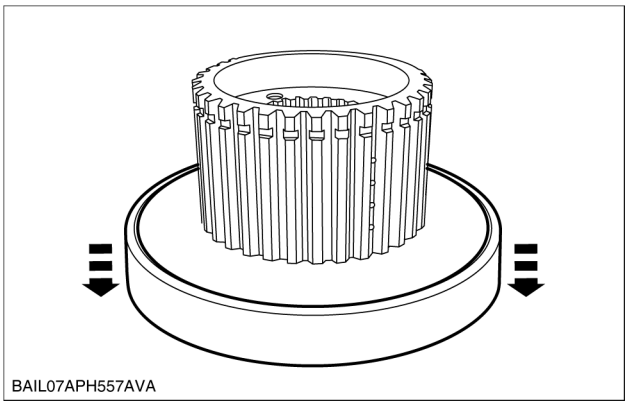
BAIL07APH559AVA 2

3. Using a suitable hydraulic press, install the oil seal carrier onto the shaft.



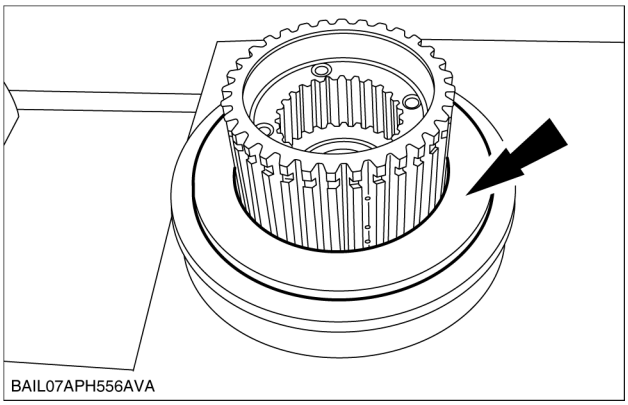
BAIL07APH558AVA 3

4. Install the oil seal carrier into the piston.



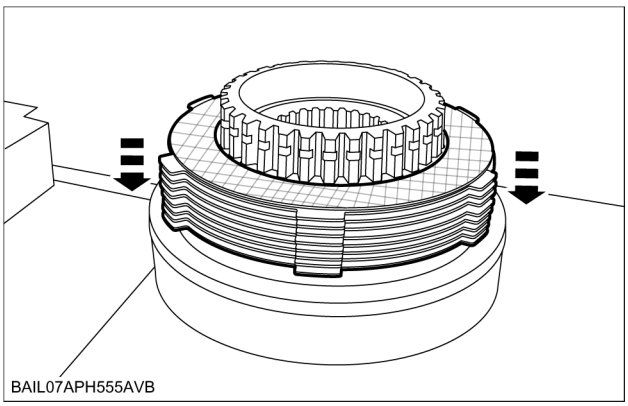
BAIL07APH557AVA 4

5. Install the pressure plate.



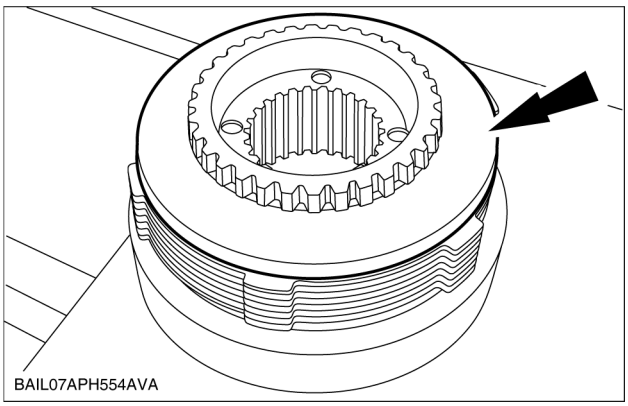
BAIL07APH556AVA 5

6. Install the clutch friction and steel plates.



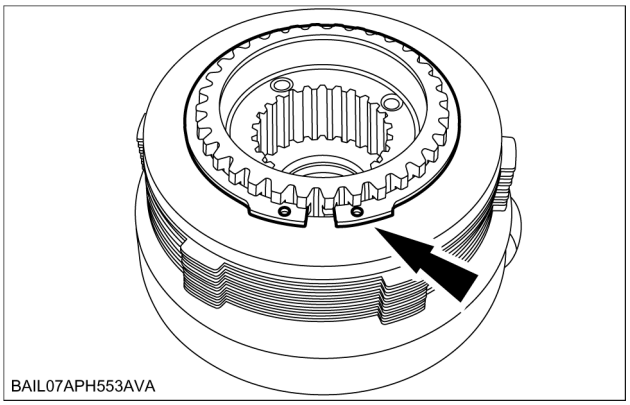
BAIL07APH555AVB 6

7. Install the end plate.



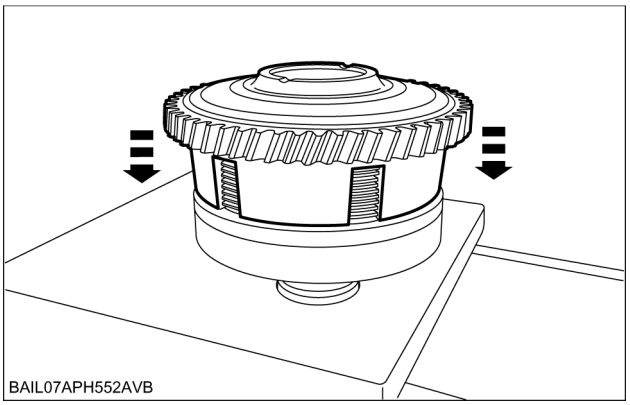
BAIL07APH554AVA 7

8. Install the circlip.



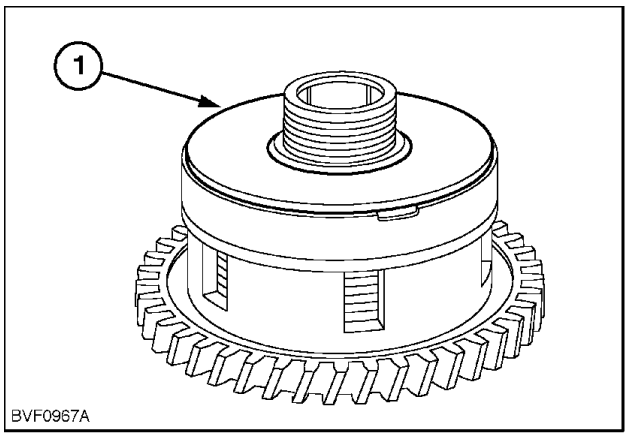
BAIL07APH553AVA 8

9. Install the driven gear.



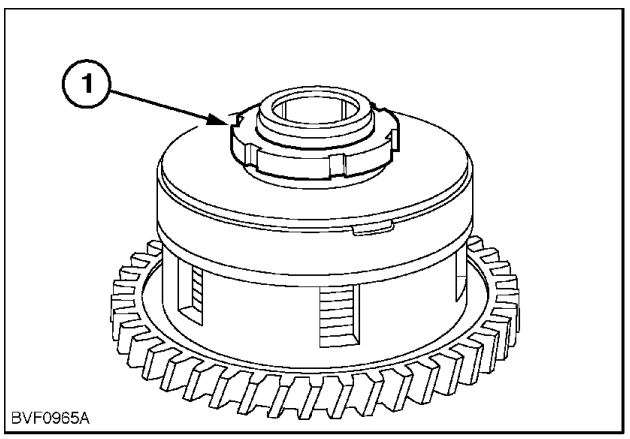
BAIL07APH552AVB 9

10. Install the Belleville washer **(1)**.



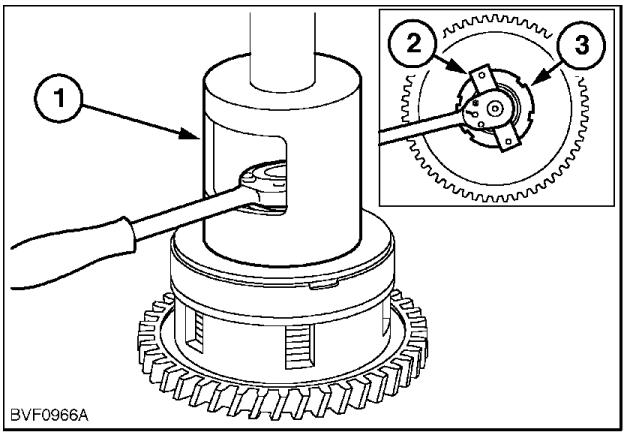
BVF0967A 10

11. Loosely install the retaining nut **(1)**.



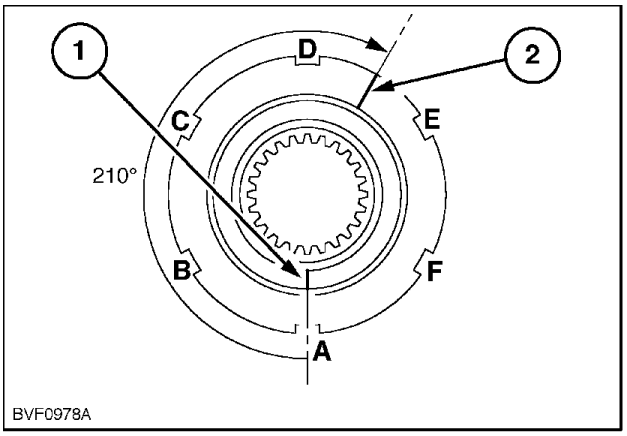
BVF0965A 11

12. Using special tool **380000984**. **(1)** and a suitable hydraulic press, compress the Belleville washer with a force of **2000 - 2200 Kg** (**4410 - 4850 lbs**). Using special tool **380000984 (2)**, tighten the retaining nut **(3)** to the specified torque value of **15 - 25 Nm** (**11 - 18 lbf. ft**).



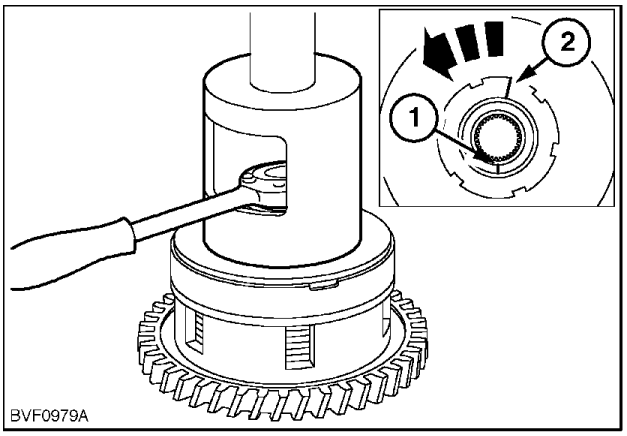
BVF0966A 12

13. Remove the special tools.
Make a reference mark **(1)** on the shaft opposite the cut out **(A)**.
Make an alignment mark **(2)** on the retaining nut which is **210 °** (3.5 flats) clockwise from the reference mark **(1)** midway between the cut outs **(D)** and **(E)**.



BVF0978A 13

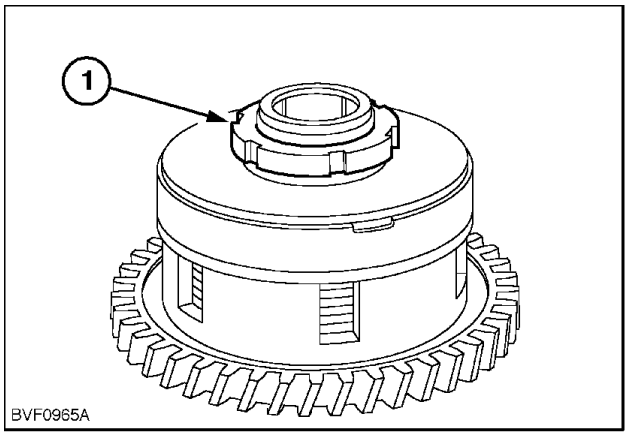
14. Using special tool **380000984** and a suitable hydraulic press, compress the Belleville washer with a force of **2000 - 2200 Kg** (**4410 - 4850 lbs**).
Using special tool **380000984**, rotate the retaining nut counterclockwise until the alignment mark **(2)** is aligned with the reference mark **(1)**.



BVF0979A 14

15. Release the pressure in the hydraulic press and remove the special tools.

16. Stake the retaining nut **(1)**.



BVF0965A 15

Next operation:
Install the clutch, for further information refer to **Clutch - Install (D.14.C)**

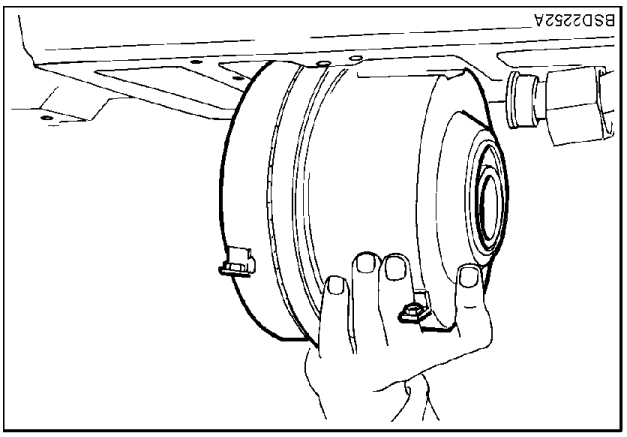
Clutch - Install 4WD Clutch

⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

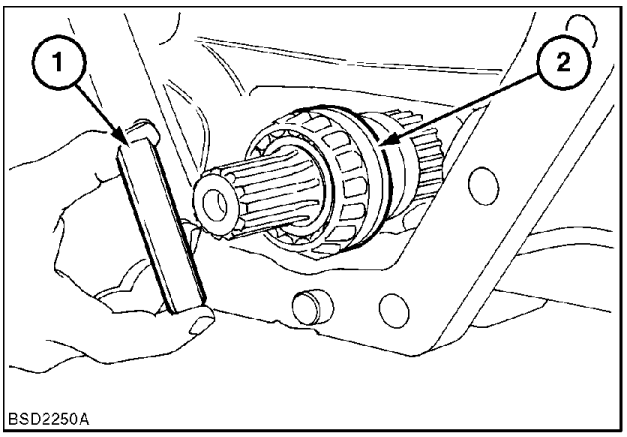
B026

1. Position the 4WD clutch assembly.



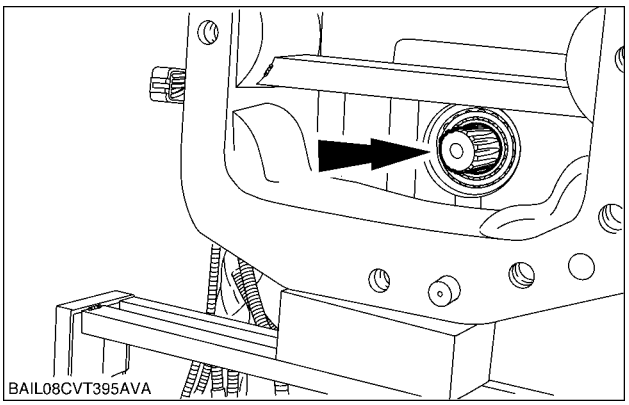
BSD2252A_139 1

2. Partially install the 4WD clutch drive shaft **(2)**, install the bearing cap **(1)**,



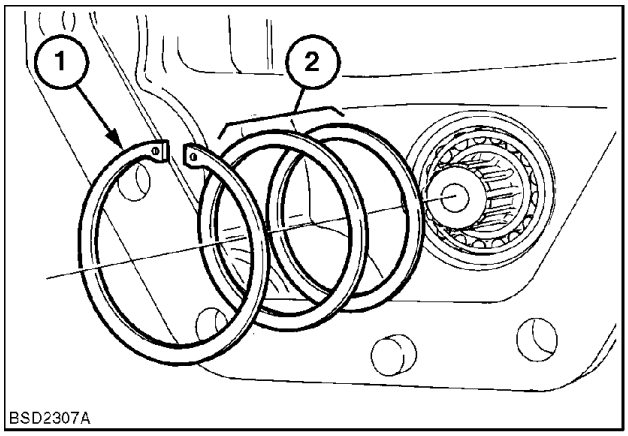
BSD2250A 2

3. Fully install the 4WD clutch shaft.



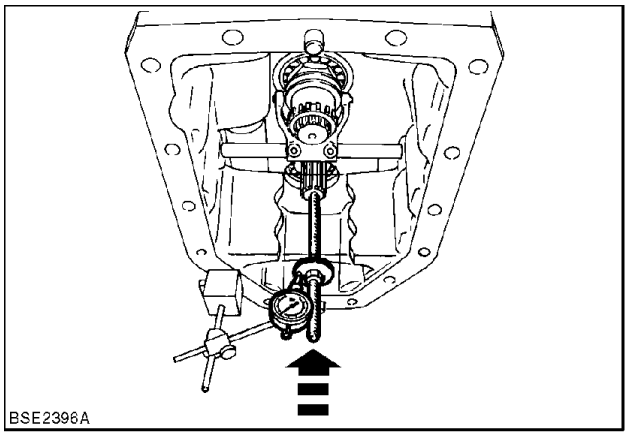
BAIL08CVT395AVA 3

4. Install the shims **(2)** and the 4WD clutch drive shaft retaining circlip **(1)**.



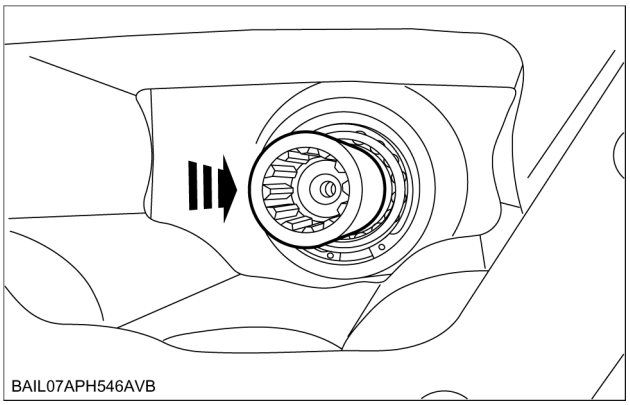
BSD2307A 4

5. Using a dial test indicator gauge and a suitable M8 x 1.25 threaded adaptor screwed into the end of the 4WD drive shaft, push and pull the shaft to measure the end float.
The end float should be **0.05 mm**. If away from specification, add or remove shims accordingly as per the previous step.



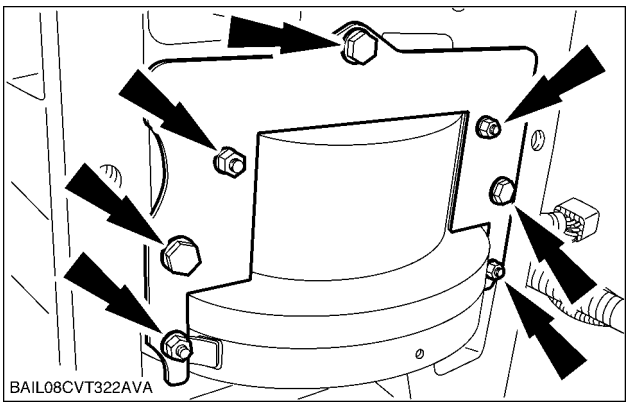
BSE2396A 5

6. Install the sliding sleeve onto the 4WD clutch drive shaft.



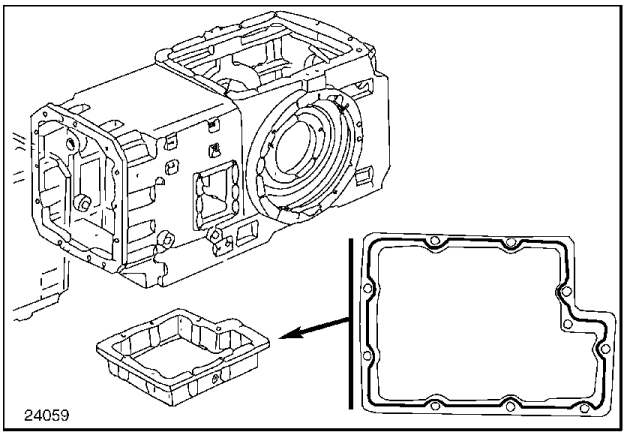
BAIL07APH546AVB 6

7. Install the 4WD clutch inner guard



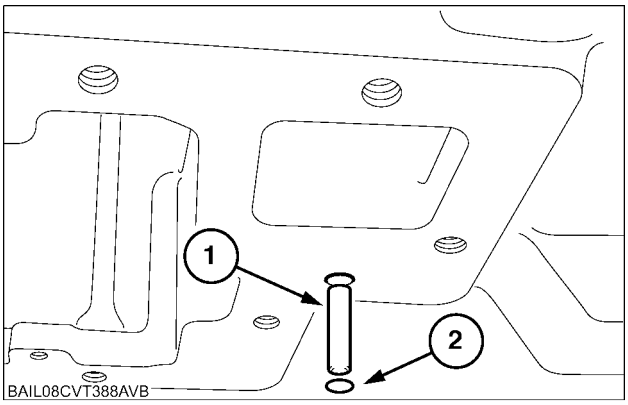
BAIL08CVT322AVA 7

8. Thoroughly clean and degrease the rear axle housing and the rear axle sump mating surfaces. Apply gasket sealant Loctite 574 to the pattern shown.



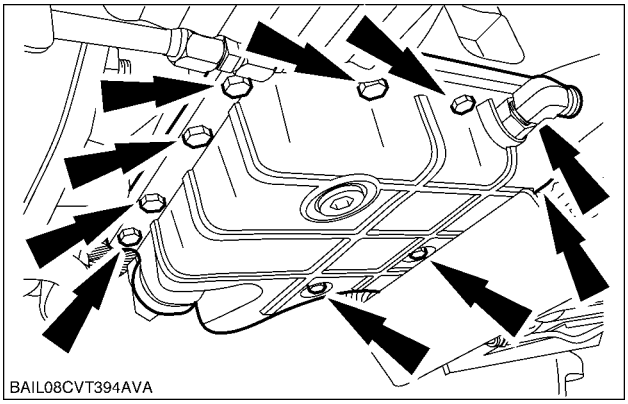
24059_115 8

9. Install the oil supply manifold retaining pin **(1)** and O-ring seal **(2)**.



BAIL08CVT388AVB 9

10. Install the rear axle sump.
Tighten the bolts to **47 Nm** (**35 lb ft**).



BAIL08CVT394AVA 10

Next operation:
Connect the transmission to the rear axle, for further information refer to **Housing - Connect (C.20.E)**

2WD-4WD SYSTEM Hydraulic - Troubleshooting

Problem	Possible Cause	Correction
Four wheel drive does not engage	Four wheel drive engagement switch faulty.	Replace the four wheel drive engagement switch.
	Four wheel drive control solenoid valve stuck open.	Repair or replace the solenoid valve.
	Worn clutch discs.	Replace the clutch discs.
	Incorrectly set multi wet-plate clutch release travel.	Adjust the release travel.
Four wheel drive does not disengage	Low transmission oil.	Refill the transmission to the correct oil level.
	Faulty low pressure circuit.	Pressure test the low pressure circuit, for further information refer to pressure testing in the hydraulic systems section **Priority valve - Pressure test (A.12.A)**).
	Faulty four wheel drive engagement circuit.	Check the circuit.
	Four wheel drive control solenoid valve stuck closed.	Repair or replace the solenoid valve.
	Oil leaks through the oil seals with consequent pressure drop: hub, piston, and transfer box shaft oil seals.	Replace any faulty oil seals.

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TRAVELLING - D

STEERING Hydraulic - 20.C

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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DIAGNOSTIC
STEERING Hydraulic
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STEERING Hydraulic - Torque

Steering General		
	Nm	lbf.ft
Steering cylinder tube connections	34	25
Steering Motor to cab frame bolts	73	54
Steering motor hose connections	73	54
Steering pump tube connections	50	37
Steering Wheel Retaining Nut	23.0	17.0
Front Wheel Nut	210.0	155.0
Motor End Cover	23.0	17.0
Cylinder, Rod End Nut (2WD)	280.0	207.0
Cylinder, Tube End Pin Retaining Bolt (4WD)	24.0	17.0
Column to Frame Bolt	23.0	17.0

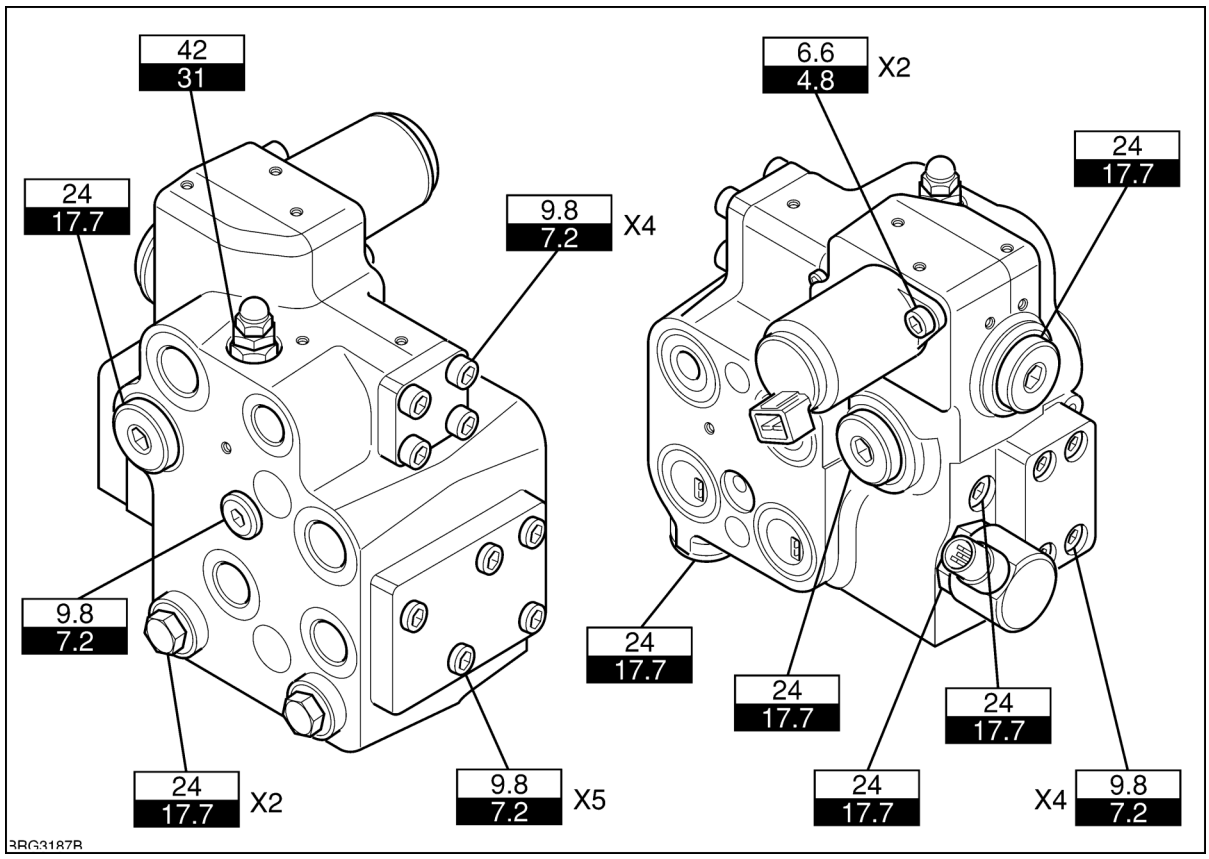
STEERING Hydraulic - Special tools

DESCRIPTION	Tool Number
Pressure Gauge (**0 - 250 bar** (**0.0 - 3625.0 psi**))	**380000553**
Roto-glyd Seal Installer	**380000281**
Test Hose	**380000545**
Quick release coupler	**380000543**
Hydraulic hose Tee adaptor	**380000570**
Quick release fitting (7/16 UNF male fitting)	**380000492**

STEERING Hydraulic - General specification

Steering Pump	
Maximum pump flow @ rated engine speed	**66.5 l/min**
Maximum pump pressure @ rated engine speed	**190 bar**
Steering type	Dual gereotor - reactive
Steering rams	Balanced
Maximum steering angle (standard and suspended)	**55 °**

Fast steer system Control valve - Torque



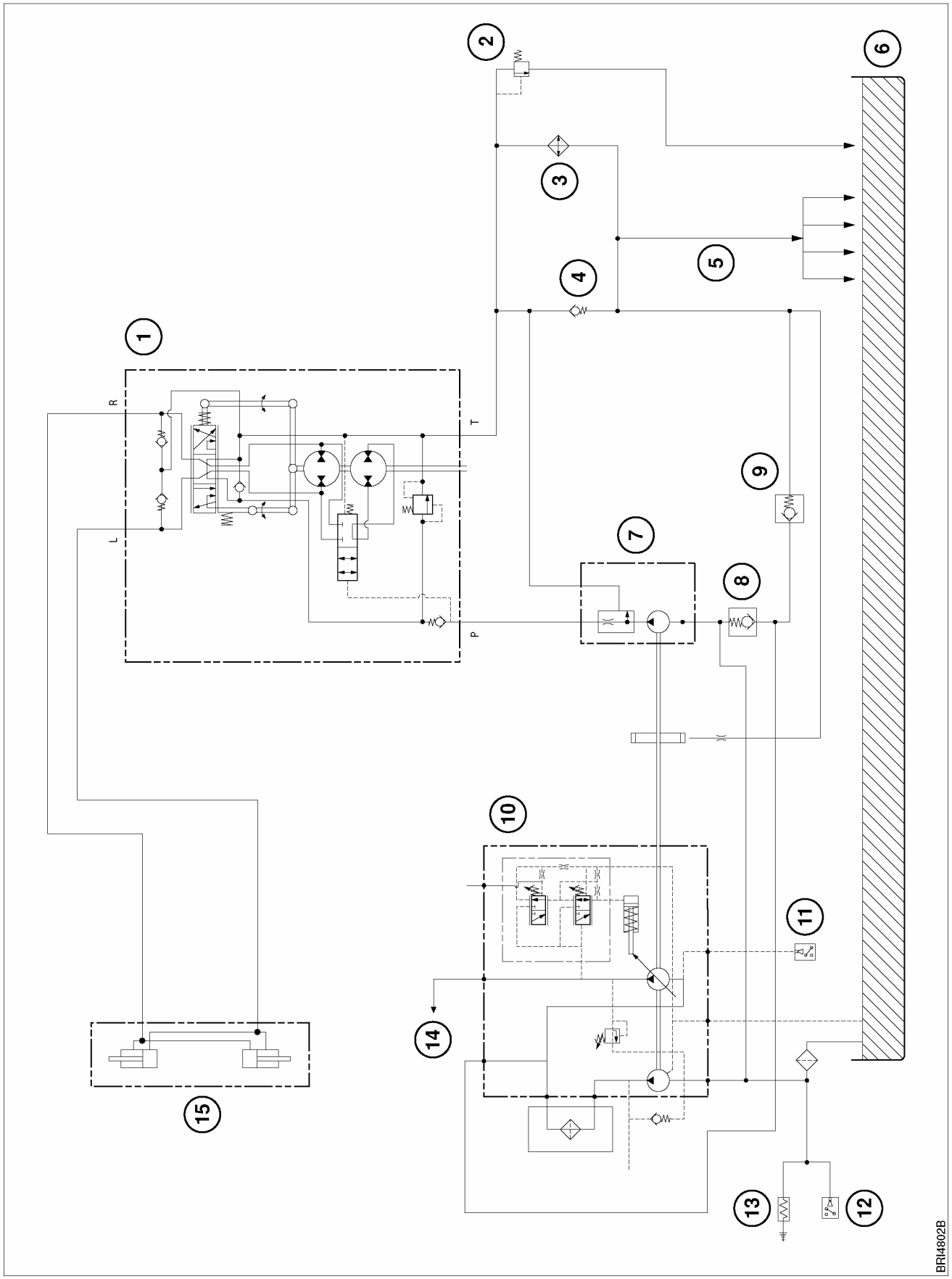
BAIL06CCM069FSA 1

STEERING Hydraulic - Static description

All models have fitted as standard, hydrostatic steering systems that are powered when the engine is running, by a hydraulic pump mounted on the rear axle.
The hydraulic system incorporates a steering pump as part of the hydraulic pump assembly and shares the main intake filter of the system.
The pump, driven by a gear straight from the P.T.O. shaft, pressurise the steering column operated steering motor. The pressurised oil from the steering motor drives the axle mounted double acting steering cylinder (2WD), or twin cylinders (4WD).
The steering motor is a reactive type and is similar across the vehicle range. It is bolted to a bracket within the steering console and connected to the steering column by a splined shaft.
The steering column is adjustable for varying angles of tilt on all models.
On two wheel drive units the steering cylinder is fixed at one end to the front axle beam and at the other to an eye on the spindle steering arm.
On four wheel drive units two steering cylinders are used, one for each wheel. The cylinders are fixed at one end to the axle casing and the piston end to steering arms from the swivel housings.
The pressure relief valve for the system is contained within the steering motor itself.

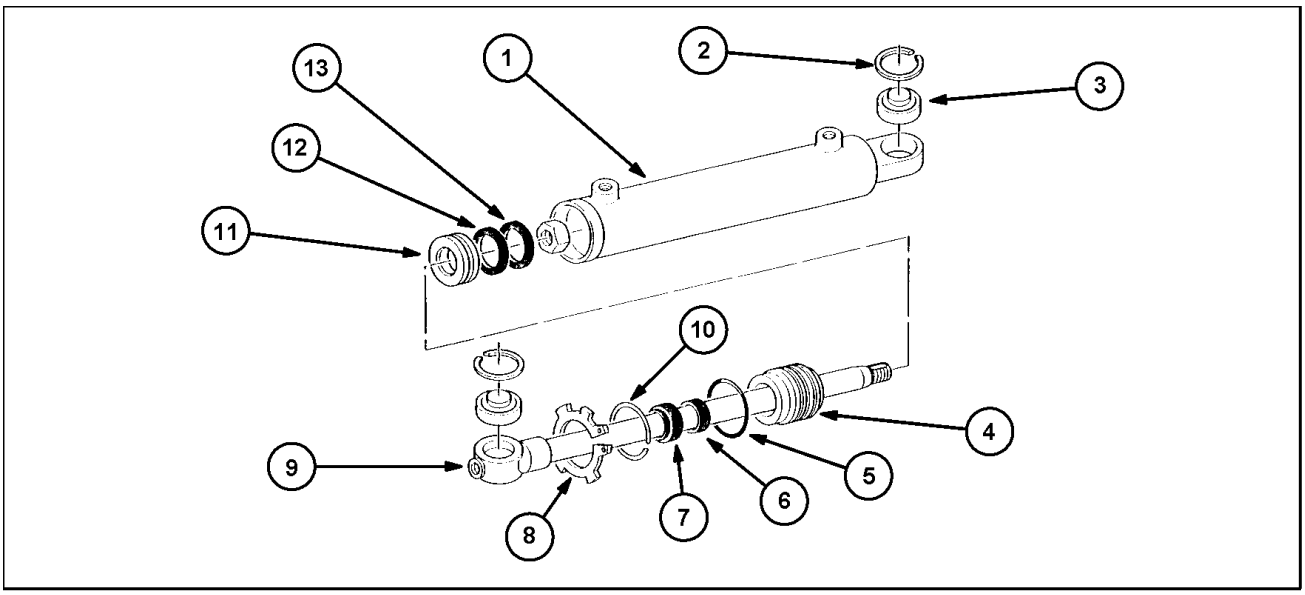
STEERING Hydraulic - Hydraulic schema

1. Steering motor
2. Lubrication relief valve
3. Oil cooler
4. Oil cooler bypass valve
5. Transmission lubrication return to tank
6. Transmission housing (oil tank)
7. Steering motor with flow divider
8. Charge pressure bypass valve
9. Supplementary lubrication valve
10. Variable displacement pump assembly
11. Low charge pressure warning switch
12. Blocked filter warning switch
13. Oil temperature switch
14. Pump high pressure output
15. Steering cylinders



BRJ4802B_V2 1

Steering cylinder - Exploded view



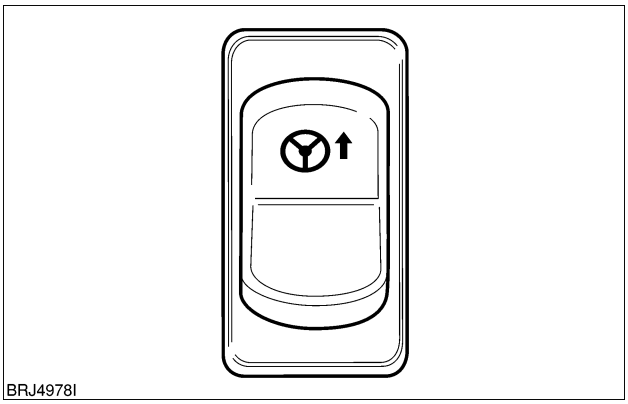
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Steering Cylinder Assembly - Two Wheel Drive

1 Cylinder
2 Lockring
3 Bearing
4 Gland
5 ‘O’ Ring
6 Seal
7 Wiper Seal
8 Gland Lockring
9 Cylinder Rod
10 Retaining Ring
11 Piston
12 Seal
13 Seal

Fast steer system - Static description

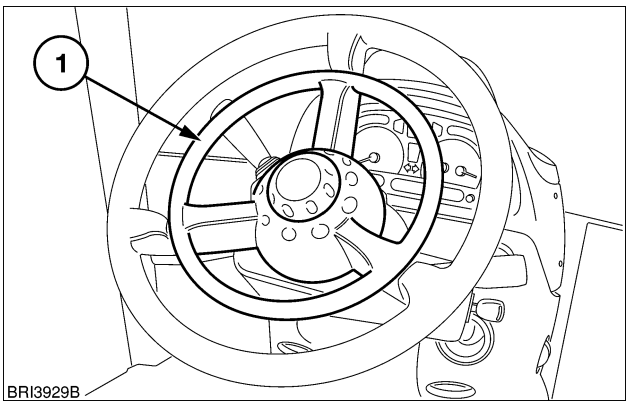
The optional Turn Assist system is designed to provide fast steering response when required i.e. when operating with a front loader.
From the straight ahead position, Turn Assist will provide full right or left hand steering lock with plus or minus **8 °** movement of the steering wheel.
To activate Turn Assist , depress the isolator switch Figure . **1**
The green warning light on the instrument panel will illuminate indicating that the system is active.



BAIL08CVT106ASA 1

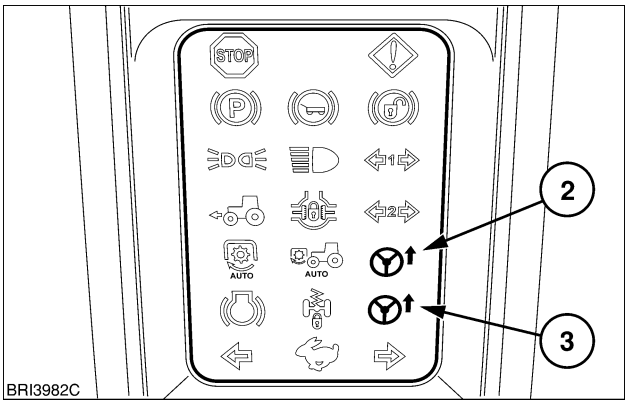
NOTE: *For Turn Assist function the tractor speed must not exceed* ***10 km/h 6.2 mph***

To operate Turn Assist, depress and hold the centre ring **(1)** Figure **2** on the steering wheel, to disengage, release the ring. .

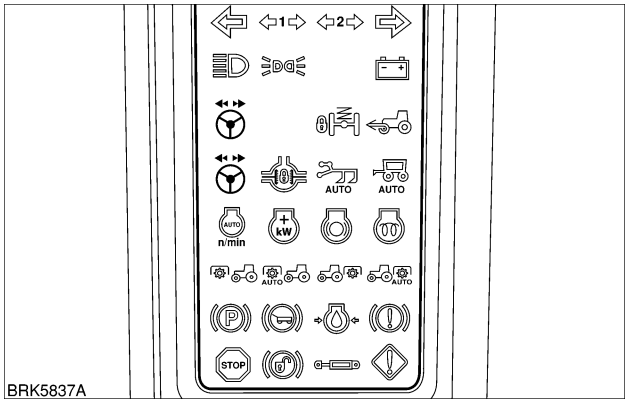


BAIL06CCM072ASA 2

With the Turn Assist centre ring depressed, the yellow warning light **(2)**, Figure **3** will illuminate on the instrument panel. It will extinguish when the centre ring is released.



BAIL06CCM078ASA 3



BRK5837A 4

Turn Assist will only function if all the following conditions are met:

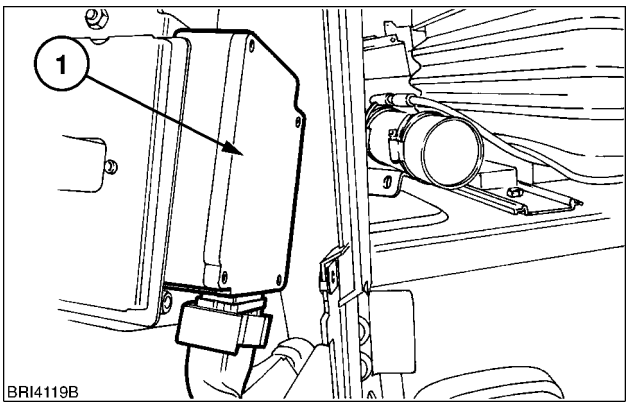
- The isolator switch is in the ON position
- The speed of the tractor does not exceed **10 km/h 6.2 mph**
- The Centre ring **(1)** Figure **2** is held down.
- The warning light on the instrument panel is illuminated .

Turn Assist will automatically disengage if a fault occurs or one of the above conditions are not applied. Should automatically disengage, an audible warning will sound and an error code will be appear in the Dot Matrix Display. To re-activate the Turn Assist function, turn off the isolator switch Figure . **1**, ensure the tractor speed is below **10 km/h 6.2 mph**, and turn the switch on again.

IMPORTANT: *To promote safe operation of Turn Assist , it is advised that the operator become familiar with the system before operating in the field.*

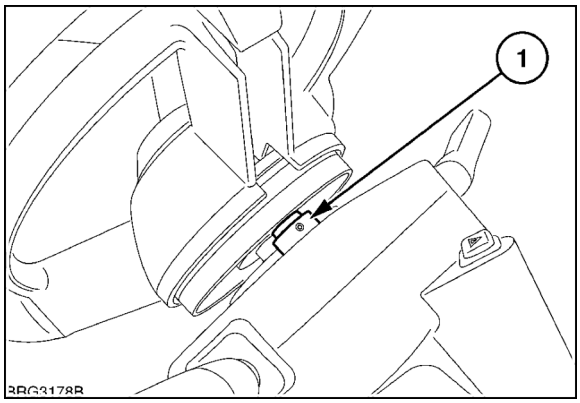
NOTE: *In cold oil temperature conditions it is advisable to turn steering from lock to lock before engaging the Turn Assist System.*

The Turn Assist controller is located on the right hand side underneath the instrument console. The module **(2)** is connected to the Turn Assist valve via a harness **(1)** See Figure **5**.



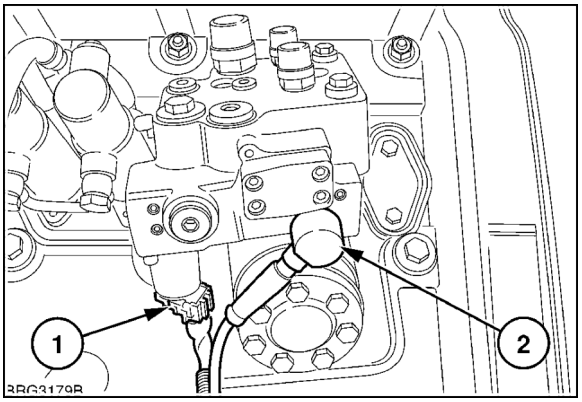
BAIL06CCM123ASA 5

A proximity sensor **(1)** is located on the steering column. This senses the magnetic field strength change as the metal in the plate of the inner steering wheel ring moves away or closer to the sensor.



BAIL06CCM075ASA 6

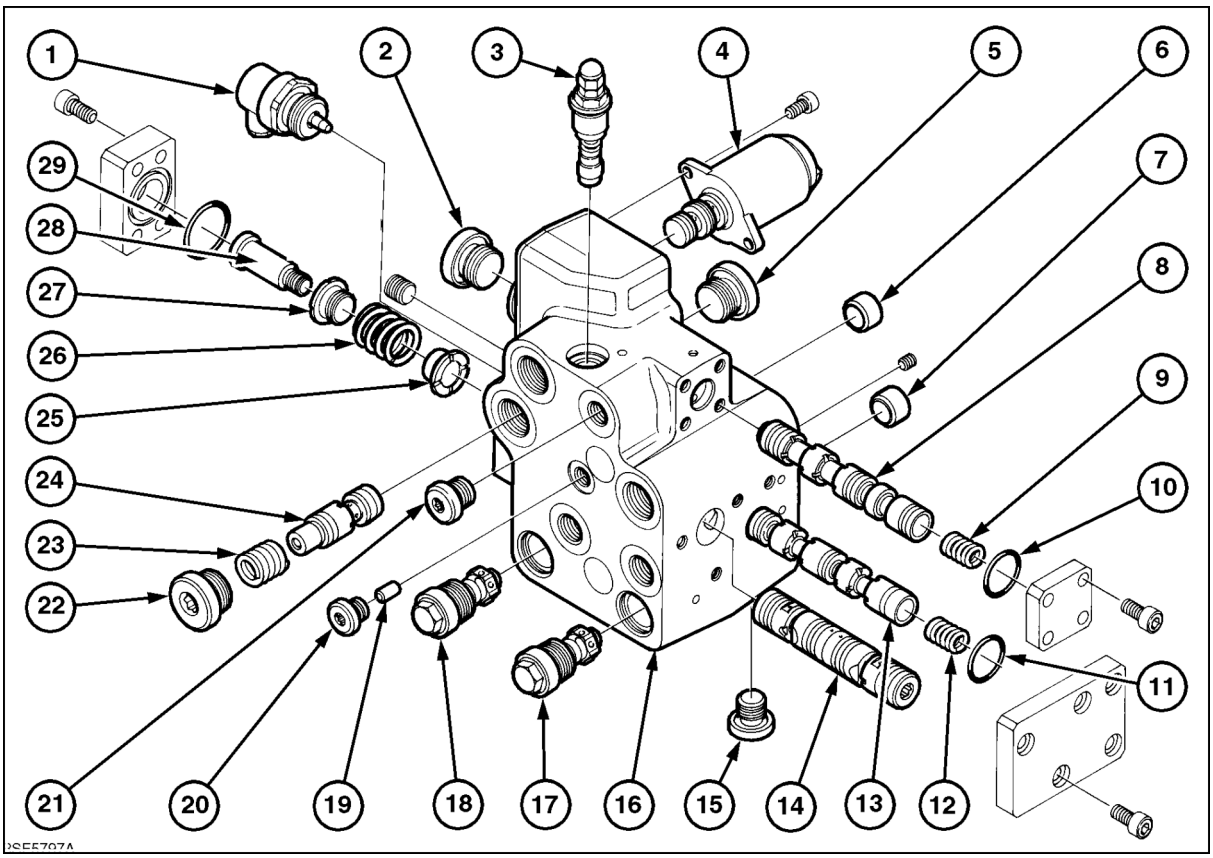
The Turn Assist valve is connected electronically to the controller by a harness . When the system is enabled the controller powers a pilot valve solenoid **(1)** . The position of the split valve spool is checked by the sensor (LVDT) **(2)** to verify that the spool is not stuck in such a manner that would allow the Fast steer to be active or operate in an unsafe condition.
The construction of the LVDT consists of three coils which make up the static transformer and a movable inner iron core. One of the coils is the primary coil and the other two are secondary coils. When the iron core slides through the transformer, a certain number of coils are affected by the proximity of the sliding core and thus generate a unique output to the controller.



BAIL06CCM076ASA 7

After the operator has enabled Turn Assist operation and the diagnostic program has not encountered any faults , the Turn Assist controller powers a pilot valve solenoid attached to a change valve on the Turn Assist valve. this directs the oil flow from the steering motor directly to the distributor spool and split valve. When the steering wheel is turned the trapped oil in the steering motor now acts as pilot pressure to move the distributor valve, connecting the pump directly to the steering cylinders. The increased flow of oil to the steering cylinders provides an accelerated steering action. When the steering ring is released the Turn Assist controller disengages the solenoid and the oil flow reverts to the conventional steering motor operation.

Fast steer system Control valve - Exploded view



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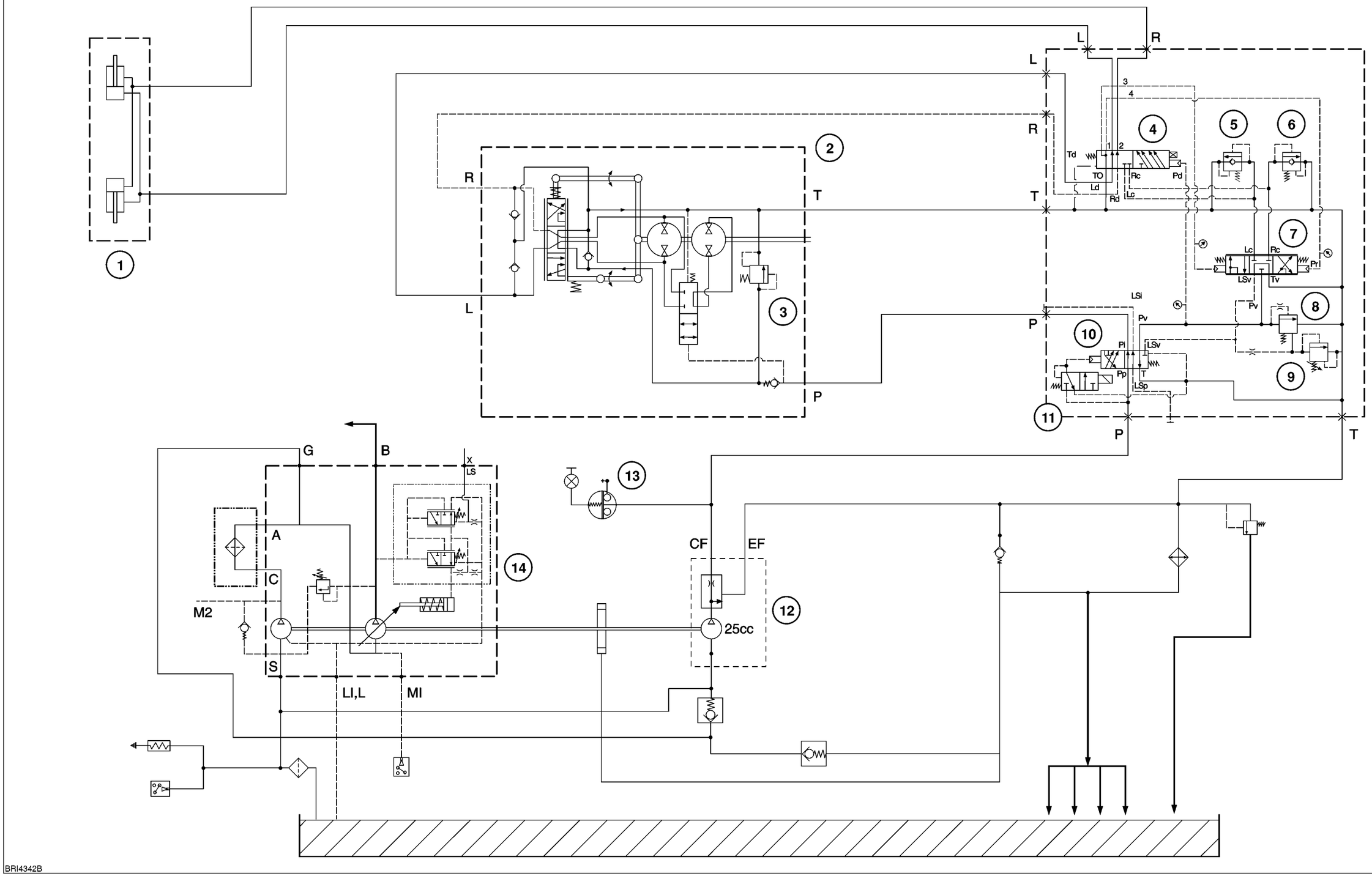
Turn Assist Valve Components

1. LVDT Valve (Linear variable differential transformer) (Linear Position Transducer)
2. Plug M18 X 1.5
3. LSD Valve (40-180 Bar)
4. Solenoid
5. Plug
6. Bushing
7. Bushing
8. Change Valve Spool
9. Change Valve Spring
10. 'O' Ring
11. 'O'Ring
12. Split Valve Spring
13. Distributor Spool
14. Distributor Spool
15. Plug M12 X 1.5
16. Valve Body
17. SDS Valve
18. SDS Valve
19. Screw
20. Plug
21. Plug M12 X 1.5
22. Plug M18 X 1.5
23. Compensator Spring
24. Compensator Spool
25. Bushing
26. Spring
27. Bushing
28. Distributor Pin
29. 'O'Ring

Fast steer system - Hydraulic schema

Turn Assist Hydraulic Operation - For operation description refer to : Fast steer system - Dynamic description (D.20.C)

1. Steering Cylinders
2. Steering Motor
3. Steering Motor Relief Valve
4. Split Valve/LVDT Valve (Linear Variable Differential Transformer)
5. Shock Valve (SDS)(225-245)
6. Shock Valve (SDS)(225-245)
7. Distributor Spool
8. Compensator Valve
9. LSD Valve (40-180 Bar)
10. Change Valve (Pilot Valve)
11. Solenoid
12. Steering pump
13. Steering Low Pressure Warning Switch
14. Main Hydraulic Pump



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Fast steer system - Dynamic description

Turn Assist Hydraulic Operation

Refer to: **Fast steer system - Hydraulic schema (D.20.C)**
Hydraulic oil is fed from the steering pump **(12)** to the change or pilot valve **(10)** . When the system is enabled by activating the Turn Assist switch, the solenoid **(11)** moves against the spring pressure to allow oil to activate the change or pilot valve **(10)**. The change valve spool overcomes the spring pressure and allows the oil to reach the distributor spool **(7)** this directs the oil flow from the steering motor directly to the distributor spool and split valve. If the steering wheel is rotated left for example, the pilot pressure is exerted on the distributor spool thus enabling oil to flow to the Split valve **(4)** which in turn allows the increased oil flow to activate the steering cylinder **(1)**.

Operating and Monitoring System

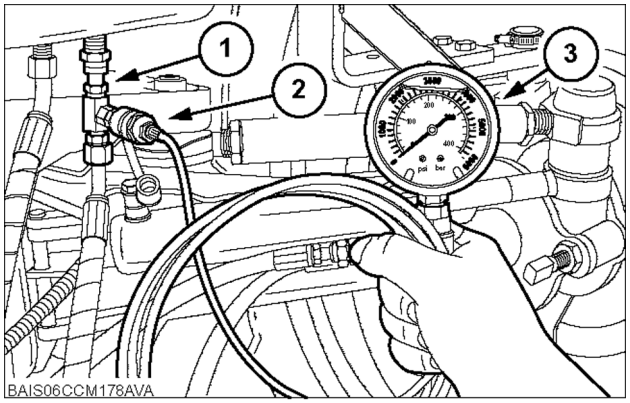
The electrical and hydraulic systems allow safe operation and monitoring of system in the following manner: When the system is enabled by using the Turn Assist switch, the electronics perform a functional and status check. The split valve spool is checked to ensure that it is not stuck in such a manner that would allow the Turn Assist system to be active or operate in a dangerous way which may cause loss of control of the tractor. Should such a state exist the system activates the critical stop audible and visual alarms to the operator. If there is an invalid state that does not endanger the operator, only the visual alarm is activated. If the split valve is stuck at the midpoint of travel, then the system is in between these two modes and will be unable to determine exactly which mode the tractor is in and the critical stop alarms are activated. If the distributor spool becomes stuck it will be forced back into place by hydraulic pressure and the system will revert to normal steering mode.
When the system has determined that the hydraulic components are functioning correctly the system then checks the operator inputs and verifies that the operator controls are working correctly. The solenoids, sensors, and switches are checked for correct operational voltage and current levels and any failure will cause the system to go into a fail-safe mode. If there is any problems with any of these components the system deactivates itself and prevents any electrical engagement of the system. If there are no problems with the components then the system goes into standby mode awaiting operator inputs. The system constantly monitors itself checking for failures and illegal logic combinations during fast steer operation and notifies the operator via the visual and audible alarms in the event of a system error or component failure.

STEERING Hydraulic - Pressure test

IMPORTANT: *Before performing any pressure or flow testing operate the tractor until the oil in the rear axle is at normal operating temperature.* ***65 °C*** *(* ***145 °F****).*

Steering Circuit Pressure Test

1. Install Tee adaptor **(1)** 380000573 and quick release fitting **(2) 380000492** , into hose to steering cylinder.
   Connect **0 - 250 bar** (**0 - 3600 lbf/in2**) pressure gauge **(3)** 380000553, with hose **380000545**, using quick release coupler **380000543** .
   Set engine speed to **1500 rev/min**.
   Turn steering wheel to full lock and hold in position.
   Pressure reading of **185 - 195 bar** (**2683 - 2828 lbf/in2**) should be recorded.



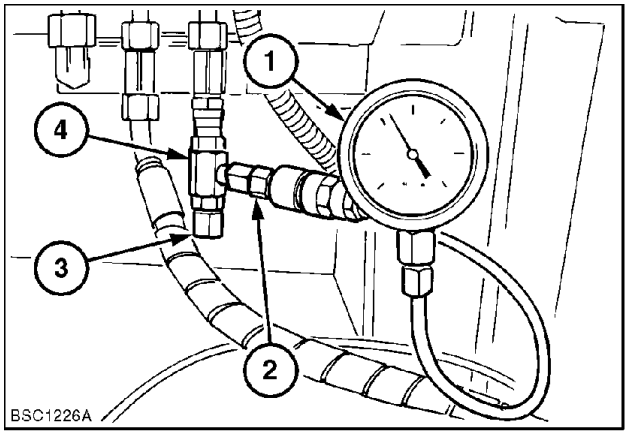
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NOTE: *If this test is carried out with cold hydraulic oil the pressure reading may be as high as* ***197 - 207 bar*** *(* ***2857 - 3002 lbf/in2****) due to back pressure.*

IMPORTANT: *There is no relief valve in the steering/low pressure pump and the following pressure test must only be performed as specified below. Failure to observe this precaution may result in severe damage to the hydraulic pump.*

Steering Relief Valve Pressure Test

2. Turn steering onto full left hand lock.
   Disconnect the left hand turn feed hose.
   Install Tee adaptor **(4)** 380000570 and quick release fitting **(2) 380000492** , into the solid tube. Cap the bottom of the Tee-piece with blanking cap, 380000599 or a standard No 6 cap (**11/16 in** ORFS female thread cap purchased locally **(3)**.
   Connect **0 - 250 bar** (**0 - 3600 lbf/in2**) pressure gauge, 380000553 **(1)**, with hose **380000545**, using quick release coupler **380000543** .
   Start tractor and set engine speed to **1450 rev/min**.
   Turn steering wheel to the left with a pull of approximately **22 N** (**2.25 kgf** , **5 lbf**) and observe the pressure reading.
   The pressure reading should be:–
   185 - 195 bar (**2683 - 2828 lbf/in2**).
   If the system pressure is not to specification adjust the relief valve located on the steering motor.



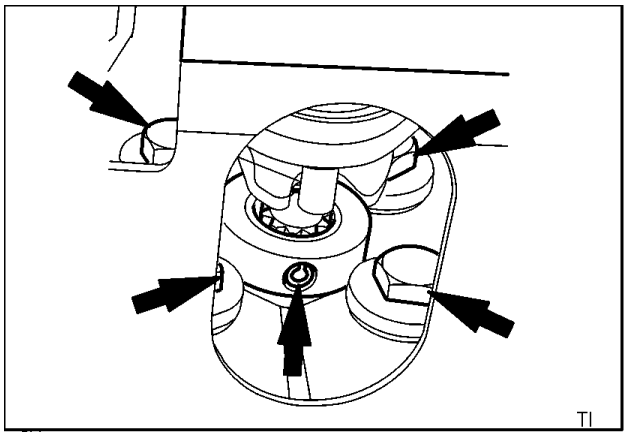
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NOTE: *To adjust the steering system relief valve it is necessary to remove the steering motor from the steering bracket, refer to* ***Control valve - Remove (D.20.C)****, to gain access to the 8mm hexagon headed adjustment screw. Half a turn on the adjuster equates to approximately* ***13.8 bar*** *(****200.1 psi****).*

NOTE: *The use of a greater force applied at the rim of the steering wheel will give a higher reading.*

Control valve - Remove

1. Position the tractor on a hard level surface and apply the parking brake.To gain access to the steering motor :-
   Raise the engine hood
   Remove left hand engine side cover
   Disconnect the four supply/return tubes and ‘O’ ring seals from the steering motor and cap the ends of the tubes.
   Remove the roll pin from the drive collar to separate the steering shaft, Figure **1**.
   Remove the four bolts at the base of the steering column and slide the steering motor from the upper section of the steering column, Figure **1**.
   Remove the steering motor from the front of the cab through the engine compartment.



60-41-018 1

Next operation:
Control valve - Disassemble (D.20.C)

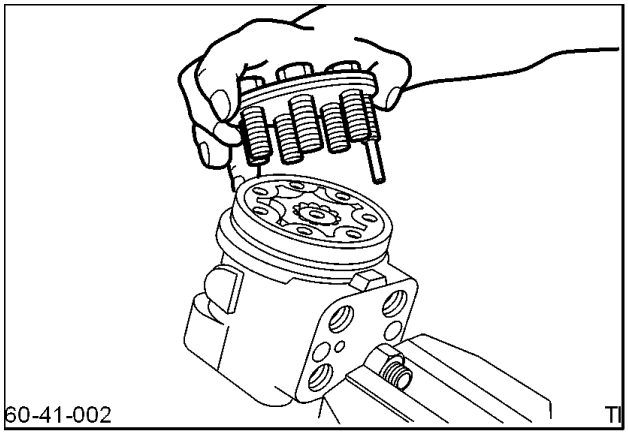
Control valve - Disassemble

Prior operation:
Control valve - Remove (D.20.C)

NOTE: *This disassembly procedure is a general procedure for this type of motor, there may be slight differences with the actual motor fitted to your vehicle.*

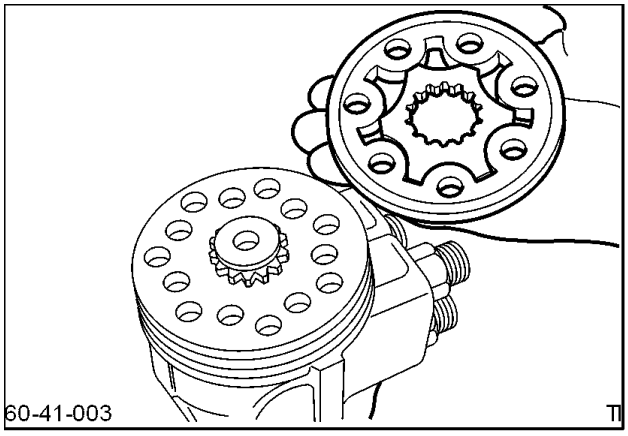
1. With the steering motor connectors removed note position of the non return valve.
   Hold the steering motor securely in a vice using a tube connector as shown in, Figure **1**.
   Remove the end plate bolts, end plate and 'O' ring, Figure **1**.

NOTE: *The position of the pin bolt must remain the same on re-assembly.*



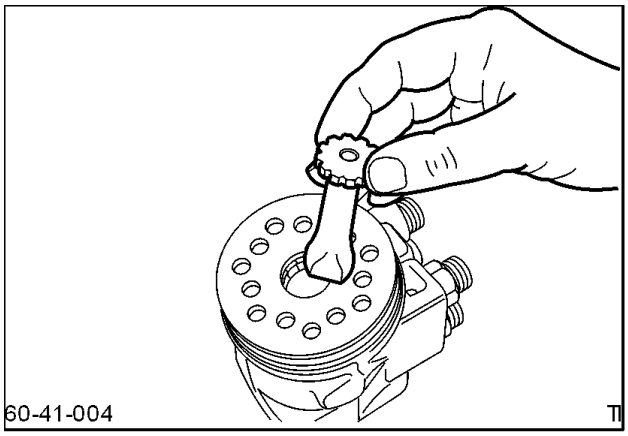
60-41-002 1

2. Remove metering unit, valve plate and 'O' ring seals, note mating surfaces for correct re-assembly, Figure **2**.



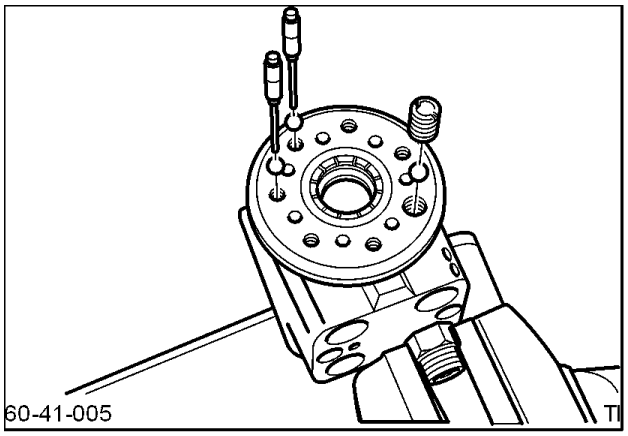
60-41-003 2

3. Lift out rotor drive-shaft, Figure **3**.



60-41-004 3

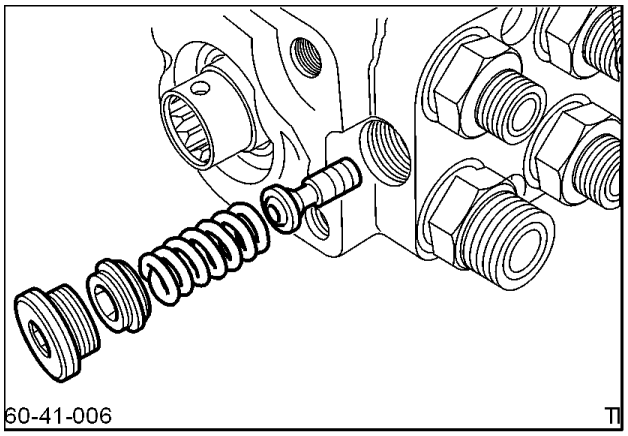
4. Unscrew the check valve retainer, Figure **4** and shake out the check and suction valves.



60-41-005 4

5. Remove the relief valve assembly, Figure **5**.

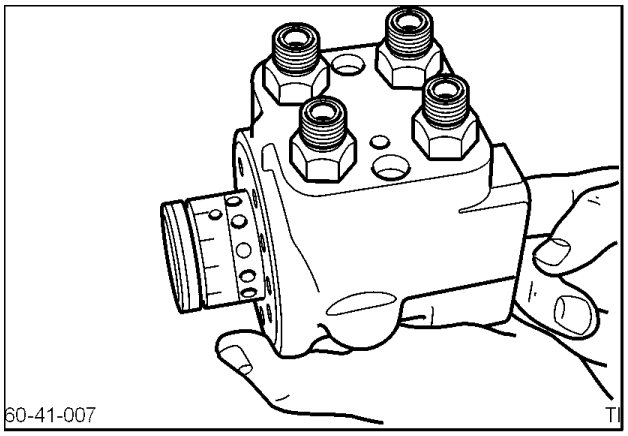
IMPORTANT: *The relief valve must be set to the correct pressure setting on re–assembly. Follow the correct procedure as detailed under the heading 'Pressure relief valve setting', of this Chapter.*



60-41-006 5

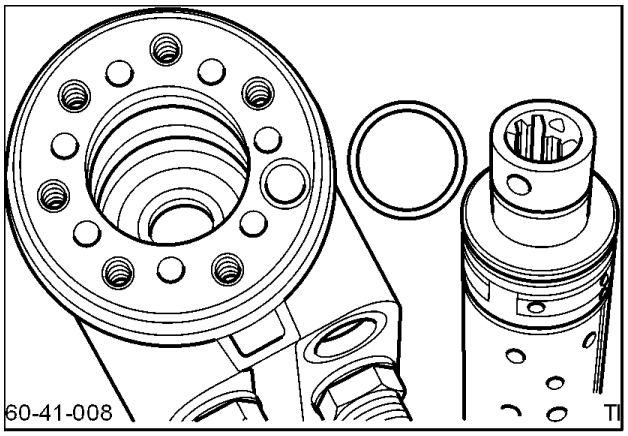
6. Remove the inner and outer valve sleeves, bearings and thrust washer, Figure **6**.

NOTE: *When removing spool and sleeve ensure drive pin is in a horizontal position so that it cannot fall into an internal gallery and make removal difficult.*



60-41-007 6

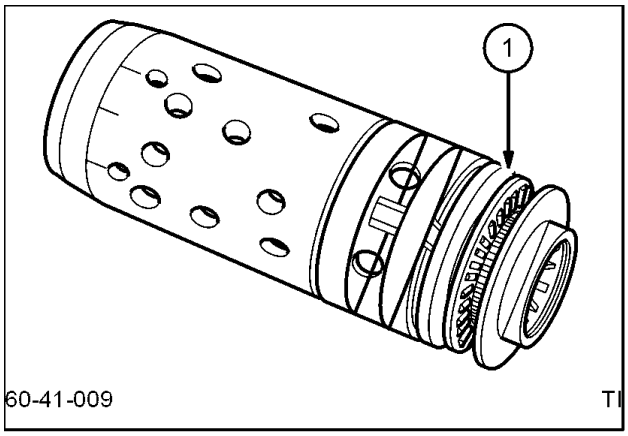
7. Once spool is disassembled from the body ensure oil seal is removed, Figure **7**.



60-41-008 7

8. Remove the control valve spool and sleeve, Figure **8**.

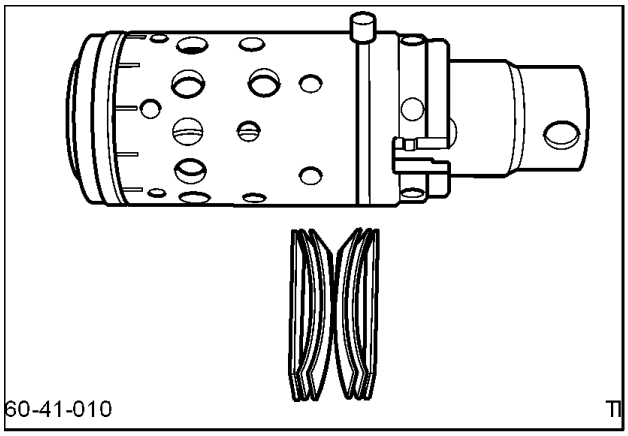
IMPORTANT: *Upon re–assembly ensure washer, item **(1)**, Figure **8** is installed with chamfer towards the valve sleeve.*



60-41-009 8

9. Remove centering springs, Figure **9**.
   Remove drive pin, Figure **9**.
   Push inner sleeve from outer sleeve.
   Remove ‘O’ ring and back-up ring.

NOTE: *Arrangement of the leaves must remain the same upon re-assembly.*



60-41-010 9

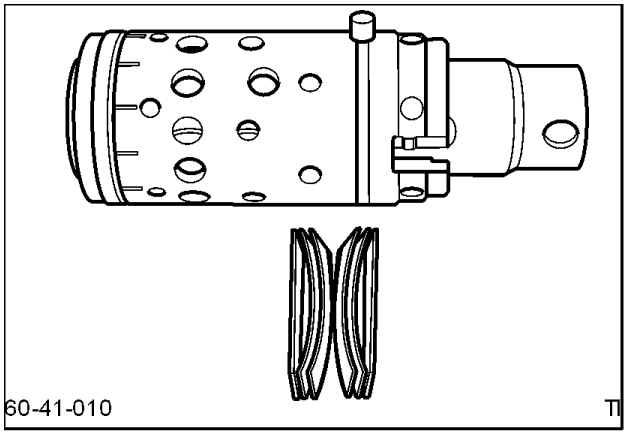
Next operation:
Control valve - Visual inspection (D.20.C)

Control valve - Assemble

Prior operation:
Control valve - Visual inspection (D.20.C)

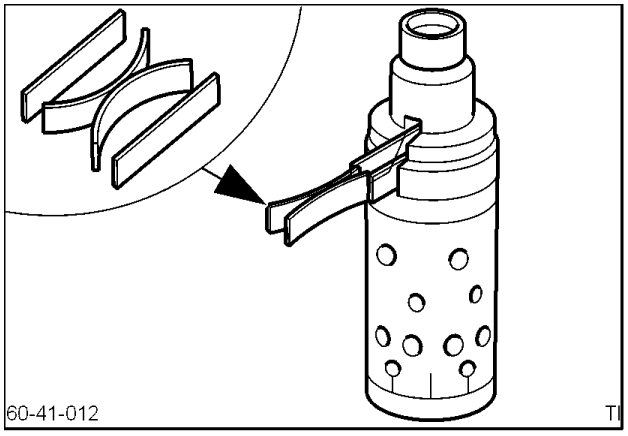
NOTE: *This assembly procedure is a general procedure for this type of motor, there may be slight differences with the actual motor fitted to your vehicle.*

1. Assemble inner and outer sleeves so that the leaf spring slots align.
   Install the drive pin, Figure **1**.



60-41-010_666 1

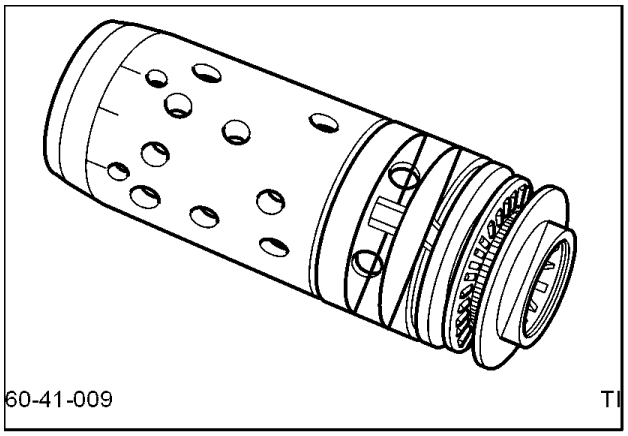
2. Install the leaf springs and push fully into position, Figure **2**.



60-41-012 2

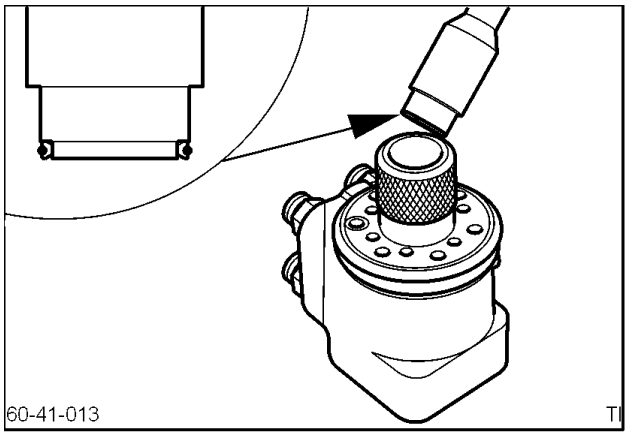
3. Install leaf spring retainer, and bearing, Figure **3**.

NOTE: *The inner bearing race must be positioned with the chamfer side facing the spool, **3**.*



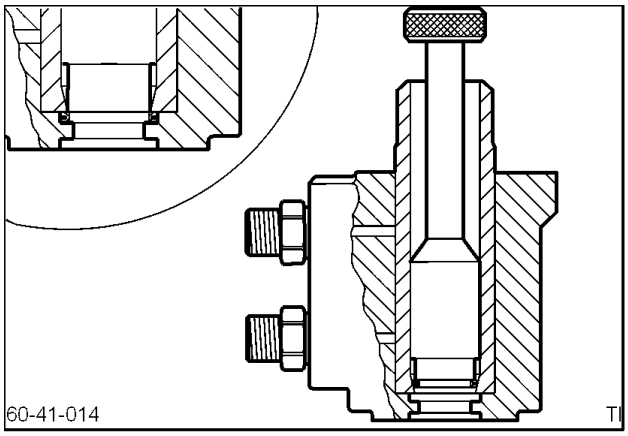
60-41-009_667 3

4. Apply a light coating of hydraulic oil onto the sleeve item **(2)** and insert into the steering motor body, item **(3)**, Figure **4**.
Coat the 'O' ring and back-up ring, item **(4)**, Figure **4**, with hydraulic fluid and position them onto the seal installer guide.
Use tool No. 380000305 to install oil seal type kin-ring.
Use tool No. 380000281 to install oil seal type roto-glyd.



60-41-013 4

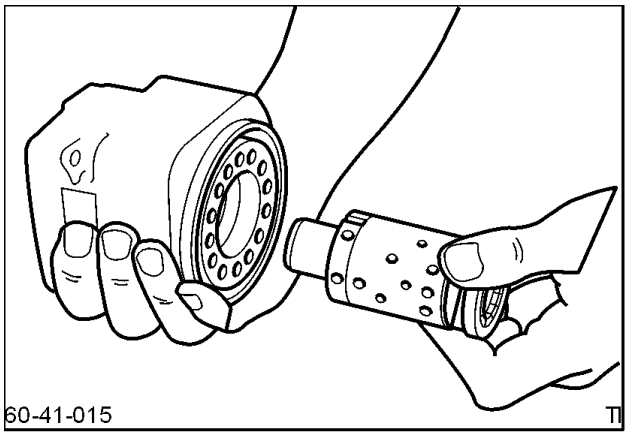
5. Position the seal guide tool into the sleeve and push down with a twisting action, Figure **5**.
Remove tools once the seal has seated.



60-41-014 5

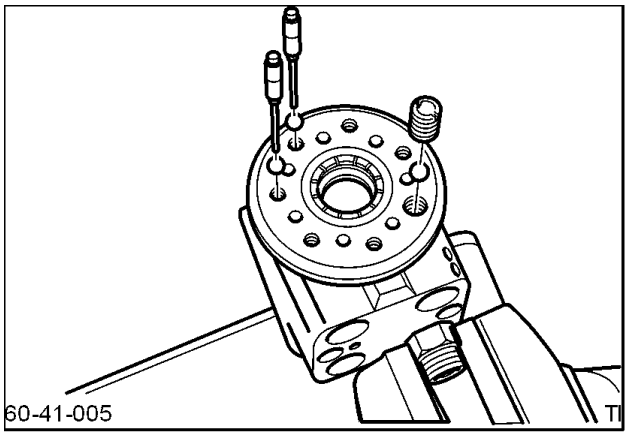
6. With the seal installed in the motor body refit control valve, Figure **6**.

NOTE: *Ensure that the Drive is in a horizontal position to aid re-assembly.*



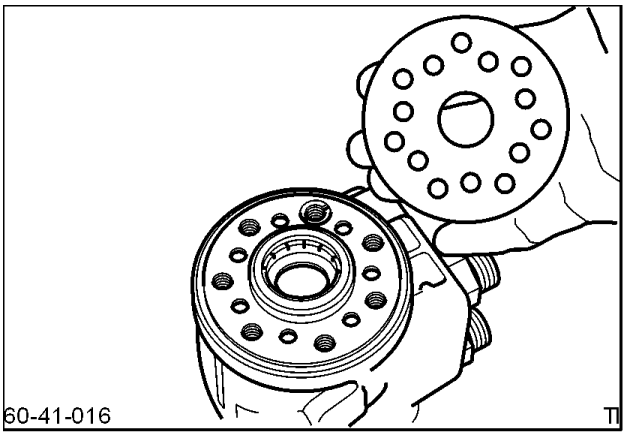
60-41-015 6

7. Once the control valve is seated correctly refit the check and suction valves, Figure **7**.
Screw the check valve down to just below the surface of the housing.



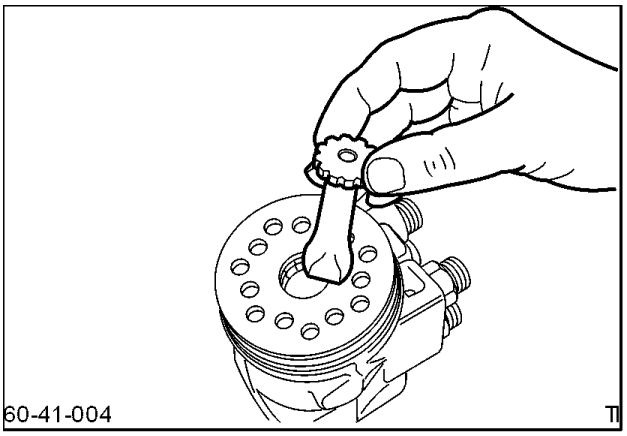
60-41-005_668 7

8. Refit the ‘O’ Ring and place the end plate in position.



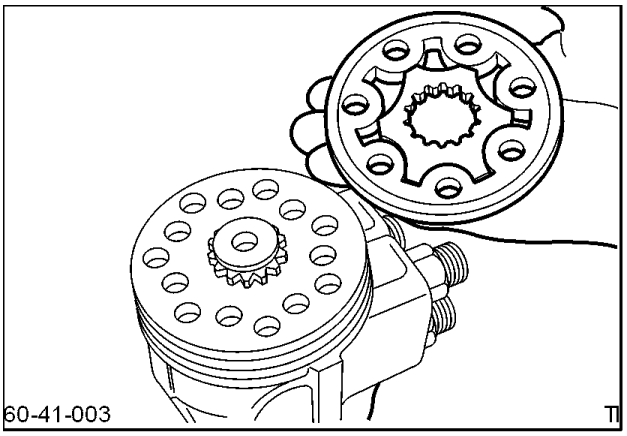
60-41-016 8

9. Metering Unit Reassembly
To aid reassembly install the control valve into the housing so that the drive pin is perpendicular to the front face of the housing.
Install drive link into the steering motor body, Figure **9**, ensuring that the link engages correctly over the drive pin.



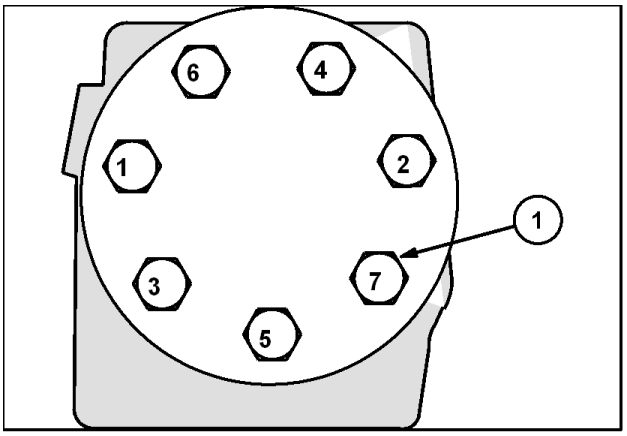
60-41-004_669 9

10. Assemble the metering unit rotor and stator and install new lightly greased ‘O’ rings to either side of the stator, Figure **10**.
Assemble the rotor and stator onto the drive link.



60-41-003_670 10

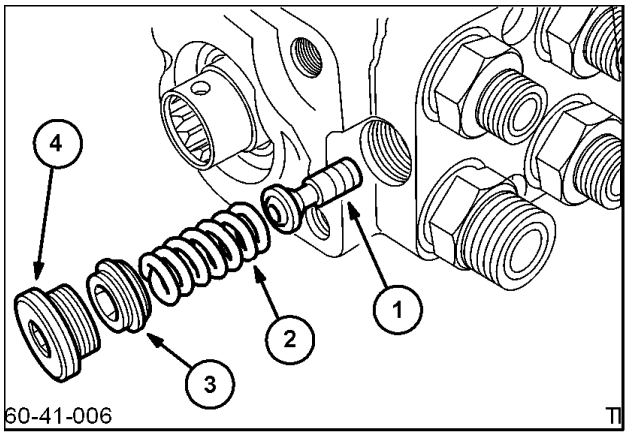
11. Install the end plate and bolts, ensure the pin bolt **(1)** is fitted in position ‘7’. Tighten the bolts in two steps, first to **8 lbf.ft** (**10.8 Nm**) and then to **21 lbf.ft** (**28.4 Nm**) in sequence as shown, Figure **11**.



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12. Install the relief valve assembly, items **(1)**, **(2)** and **(3)** Figure **12**., leaving the plug, item **(4)** out until after the relief valve has been adjusted.
    Check to ensure the motor turns freely without binding.
    After the relief valve has been correctly set re-install the steering motor onto the mounting bracket and tighten the securing bolts to a torque value of **10 - 15 lbf.ft**(**12 - 20 Nm**).
    Reconnect the steering hoses, tighten to a torque value of **10 - 15 lbf.ft** (**12 - 20 Nm**).
    Purge the air from the system by operating the steering system from lock to lock until the system functions correctly.

IMPORTANT: *The relief valve must be set to the correct pressure setting after the motor has been re-assembled. Follow the correct procedure as detailed under 'Pressure relief valve setting', of this Chapter.*

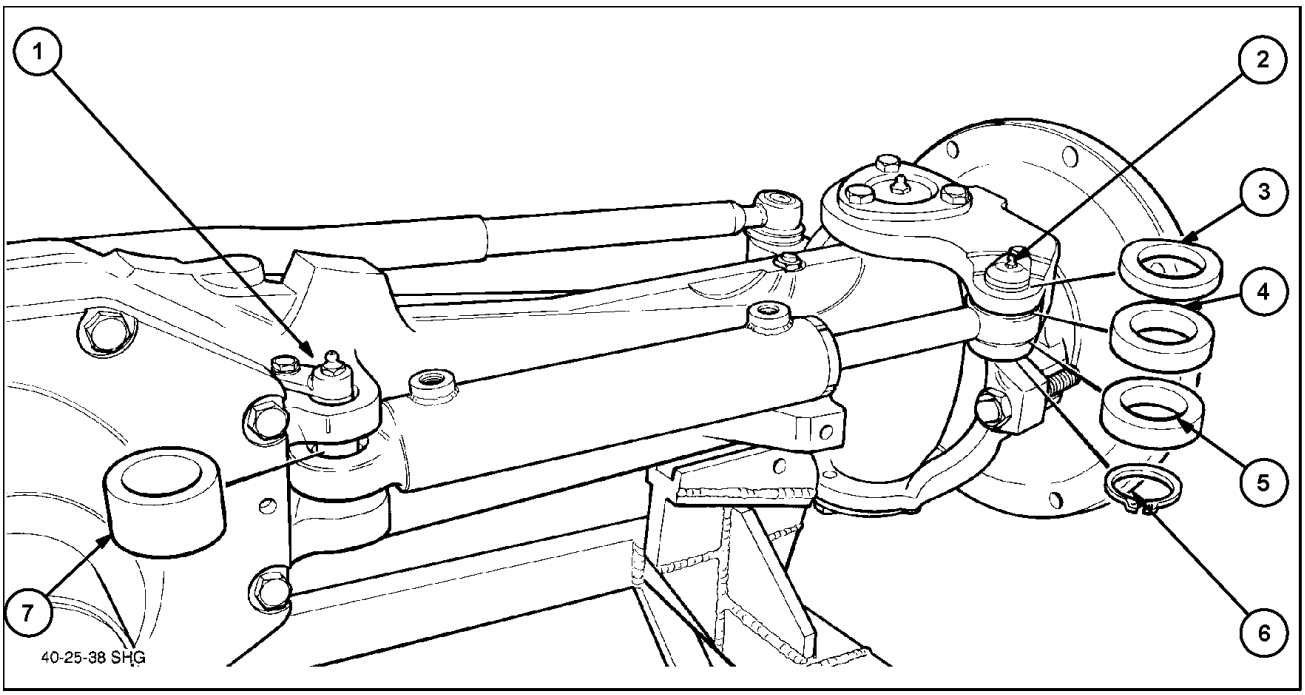


60-41-006_671 12

Control valve - Visual inspection

1. Wash all parts in a suitable solvent to remove any foreign particles and dry with a clean lint free cloth or compressed air.
2. Inspect valve sleeves for, damage or wear. Minor burrs or scratches can be removed with a fine abrasive. Ensure all parts are thoroughly cleaned prior to re-assembly.
3. Check leaf springs for damage. Replace if necessary.
4. Discard all ‘O’ ring seals and replace with new seals on re-assembly.

Steering cylinder - Remove

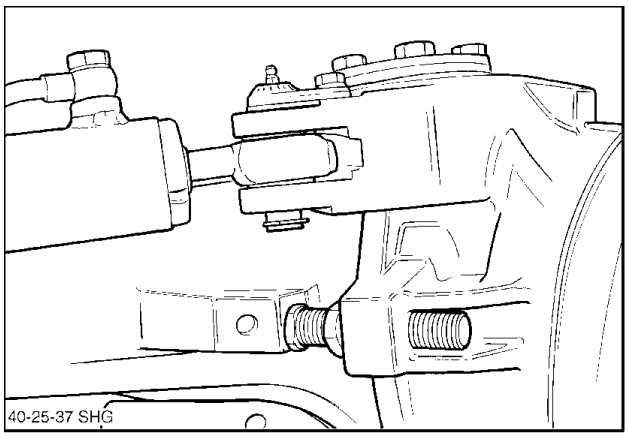


40-25-38 SHG 1

Steering Cylinder Installation – Four Wheel Drive

1 Pivot Pin
2 Pivot Pin
3 D Shaped Washer
4 Spacer
5 Spacer
6 Circlip
7 Spacer

1. Stand the unit on a hard level surface and position the front wheel in the straight ahead position.
   Disconnect flexible pipes, cap the open pipe ends and remove hose clamps.
   Remove the snap ring retaining the steering arm to the cylinder piston pivot pin, item **(6)**, Figure **1** and remove the pivot pin.
   Remove the steering cylinder fixed end pivot pin retaining bolt and withdraw the pivot pin, item **(1)**, Figure **1** . Remove the cylinder from the vehicle.
   Installation is the reversal of the removal procedure. Refer to Torque settings **STEERING Hydraulic - Torque (D.20.C)**



40-25-37 SHG 2

NOTE: *Position of flexible pipes and orientation of connectors must be the same upon re-assembly.*

2. Steering Stop Adjustment
   Turn the wheels to full lock and adjust steering stop to ensure tyres or mudguards do not touch the side of the tractor and that the steering cylinders have not reached the end of their travel.

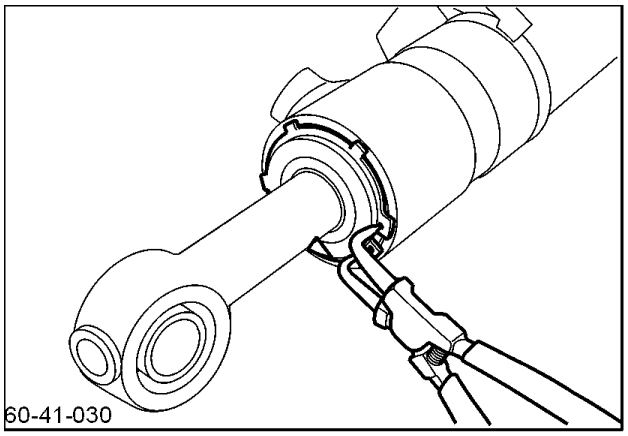
Steering cylinder - Overhaul Two Wheel Drive

PUMA 165, PUMA 180, PUMA 195, PUMA 210

Prior operation:
Steering cylinder - Remove (D.20.C)

1. Refer to **Steering cylinder - Exploded view (D.20.C)**

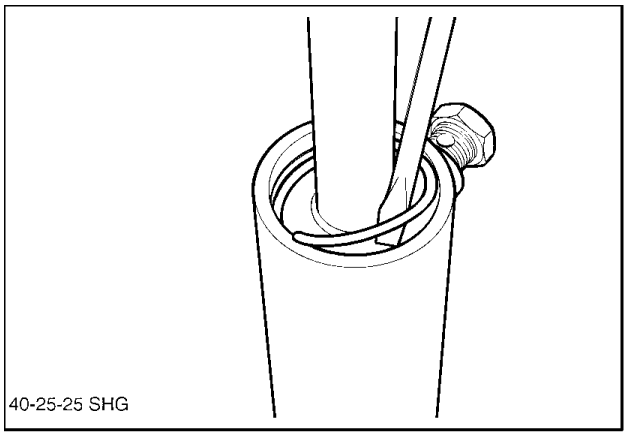
2. Using appropriate circlip pliers, remove the gland lockring.
   Using a punch, push the steering cylinder gland into the cylinder and remove the wire locking ring.
   Pull the rod and gland assembly from the cylinder.
   Remove the nut from the cylinder rod and disassemble to replace seals.



60-41-030 1

3. Inspect the bore of the cylinder and replace if scored. Reassemble the cylinder in the reverse to disassembly, lubricating all components as assembled. Replace all seals supplied in the service seal kit.

NOTE: *The seal located in the centre of the gland is replaceable.*

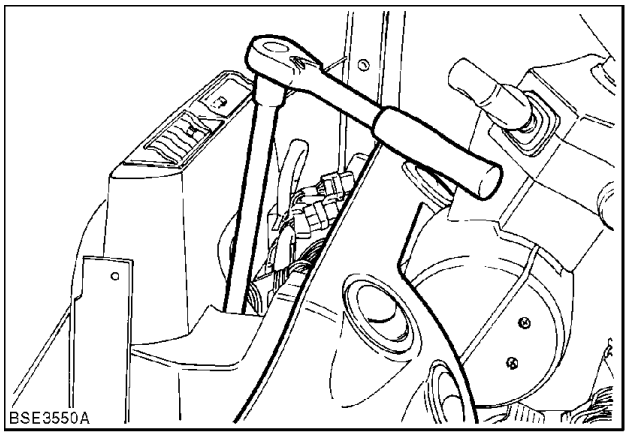


40-25-25 SHG_673 2

Steering column - Remove

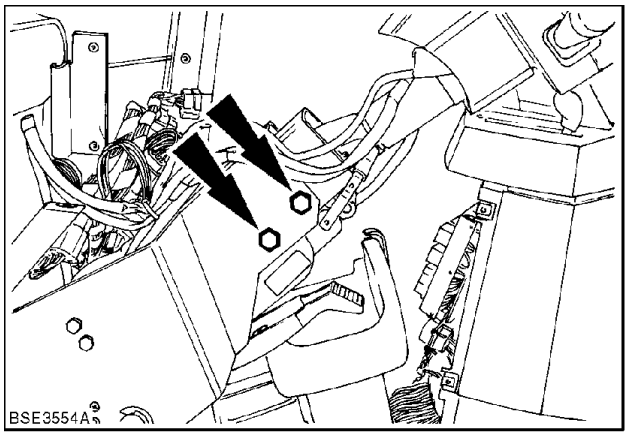
1. Removal
   Remove the steering wheel, if required.
   Remove the instrument panel. Undo the two mounting screws and remove the lower steering column cover.

NOTE: *The component parts of the steering column as listed are serviced separately.*



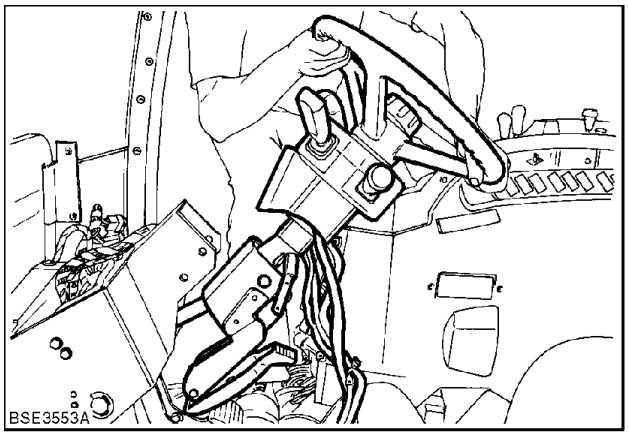
BSE3550A 1

2. Disconnect the multi-function switch wiring and shuttle lever switch wiring connectors.
   Remove the four securing bolts securing the column to the frame, Figure **2**.



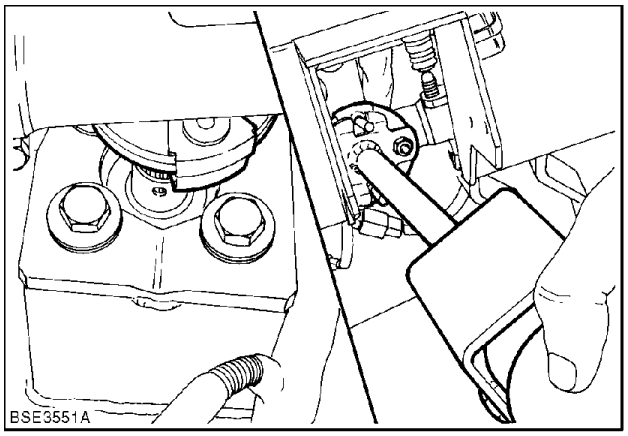
BSE3554A 2

3. Lift the column clear of the steering shaft and clear of the instrument console, Figure **3**.



BSE3553A 3

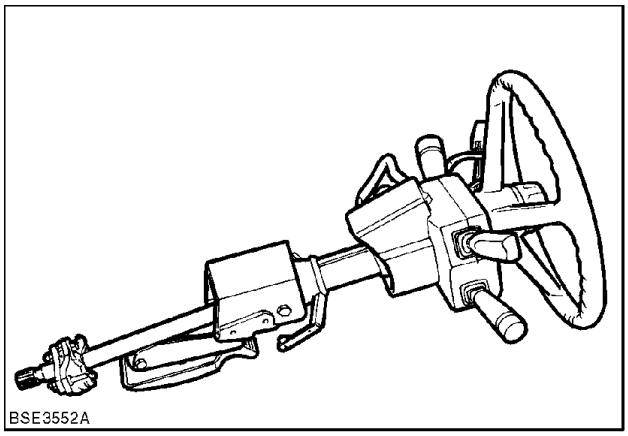
4. Ease the coupling from the steering motor shaft and remove the steering shaft, Figure **4**.



BSE3551A 4

Steering column - Install

1. Place spacer and steering shaft onto the steering motor and install pin.
   Carefully place the steering column through the instrument console and over the steering shaft, ensuring flat sides are aligned.
   Replace the securing bolts at the top of the column. Tighten to **23 Nm** (**17 lbf.ft**).
   Refit the upper and lower column covers and shuttle switch if fitted.
   Refit the instrument console panels.
   Refit the steering wheel.



BSE3552A 1

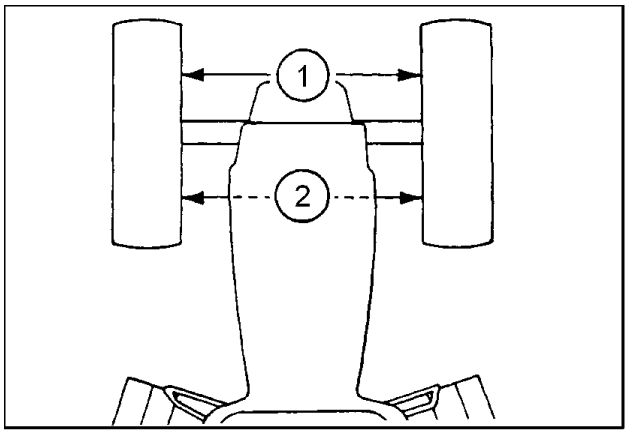
Steering column - Visual inspection

1. Inspect the steering shaft universal joint and lower rubber coupling. Replace if any free play is evident.
2. Inspect the column assembly, if damaged or the bushes are worn a new assembly will be required.

Tie rod - Toe in adjust

When travelling forward in a straight path, the wheels of four-wheel drive tractors must be parallel to the longitudinal axis of the tractor, alternatively a slight toe-in of the front wheels is permissible up to a maximum of 3 mm as measured at the edges of the wheel rims.
To check the exact value of the toe-in setting of four-wheel drive tractors, proceed as follows.

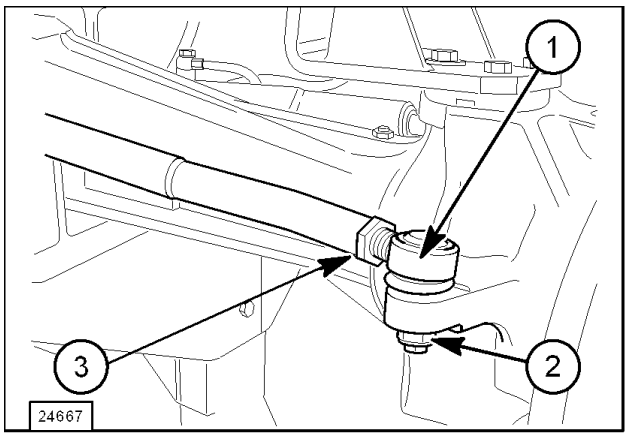
1. Inflate the front tyres to the specified pressure.
2. Position the steering at half-lock with a straight-edge along the longitudinal axis of the tractor.
3. Check that the wheels are parallel to the longitudinal axis of the tractor.
4. Measure the distance **(1)** between the front inside edges of the wheel rims, at the height of the wheel hub centers.
5. Turn both front wheels through **180 °** then measure, again at the height of the wheel hub centers, the distance **(2)** between the rear inside edges of the wheel rims, checking that this new measurement is equal to or greater than the distance **(1)** by a maximum of **± 3 mm**. The rotation of the wheels through **180 °** is necessary to eliminate the effect on the measurement of any wear of the rims.



1b0o2004061043 1

6. If it is necessary to correct the wheel alignment, remove nut **(2)** and pull the track rod end **(1)** out of its housing. Slacken off locknut **(3)** and screw the track rod end **(1)** in or out to increase or decrease the distance (2, fig. **1**).
   Install the track rod end (1) in its housing and re-check alignment as described in points **4** and **5**.
   After having adjusted the alignment to within the prescribed limits, tighten locknut (3) to the specified torque value of **180 Nm** (**183 kgm**) and nut **(2)** to **100 Nm** (**10.2 kgm**).

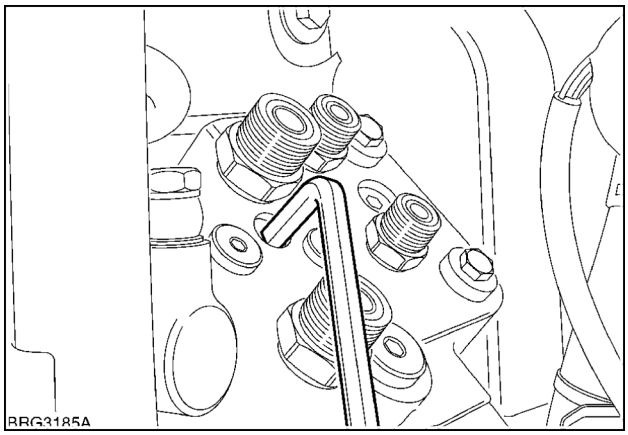
NOTE: *Self-locking nut **(2)** must be renewed each time it is removed or partially unscrewed.*



24667 2

Fast steer system Control valve - Remove

1. Position the tractor on a hard level surface and apply the parking brake.
2. To gain access to the Turn Assist valve
   Disconnect the negative cable from the battery and insulate. Refer to: **Battery - Disconnect (A.30.A)**
   Raise the engine hood
   Remove the steering column console
   Remove left hand engine side cover
3. Move the processor harness out of the way
4. Undo the brake reservoir and move to one side. (Do not disconnect hose)
5. Disconnect the four supply/return tubes and ‘O’ ring seals from the control valve and cap the ends of the tubes.
6. Disconnect the wiring to the solenoid and the LVDT sensor.
7. Remove the two allen headed bolts on the control valve with an 8mm Allen key



BAIL06CCM081ASA 1

8. Remove the control valve assembly from the front of the cab through the engine compartment.

Fast steer system Control valve - Disassemble

1. Remove the screws holding the solenoid in place and remove the solenoid. Refer to **Fast steer system Control valve - Exploded view (D.20.C)**
2. Carefully remove the four allen headed screws which hold the change valve flange in place. Remove the flange ,'O' ring, spring and spool **(8)** .
3. Remove the five allen headed screws and remove the flange which gives access to the split valve spool and the distributor spool. Remove the spools **(13)** & **(14)** , spring and 'O' rings.
4. On the opposite side of the valve remove the screws and flange which hold the distributor pin in position. Remove the pin **(28)**, bush, spring and 'O' rings.
5. Remove the plug, spring and compensator spool **(24)** ..
6. Remove the two SDS valves **(17)** and **(18)**,.
7. Remove the LVDT sensor **(1)** .
8. Remove the LSD valve **(3)**

Fast steer system Control valve - Overhaul

1. Wash all parts in a suitable solvent to remove any foreign particles and dry with a clean lint free cloth or compressed air.
2. Inspect valve sleeves for, damage or wear. Ensure all parts are thoroughly cleaned prior to re-assembly.
3. Discard all 'O' ring seals and replace with new seals on re-assembly.
4. If any of the spools (items 8,13, 14) , and SDS valves (items 17 & 18) are damaged a complete valve assembly will be required. (Refer to **Fast steer system Control valve - Exploded view (D.20.C)**)

Fast steer system Control valve - Assemble

1. Re- install all removed items as per **Fast steer system Control valve - Exploded view (D.20.C)**).
2. Ensure all screws and plugs are tightened to the correct torque settings. (Refer to **Fast steer system Control valve - Torque (D.20.C)**

Fast steer system Control valve - Install

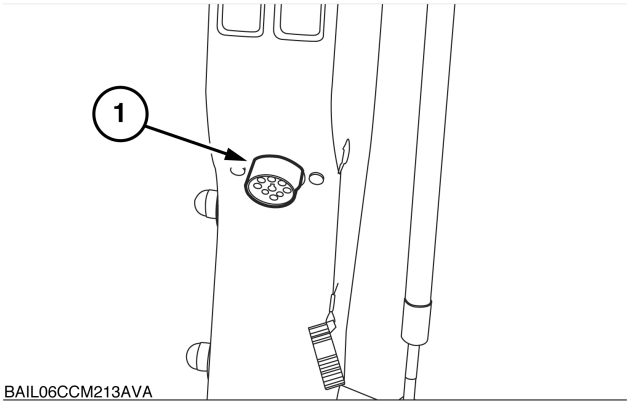
1. Make sure surfaces of steering motor and control valve are clean.
2. Ensure ’O’ rings are seated correctly on the valve.
3. Position control valve on the steering motor and fix with the two allen headed screws.
4. Tighten the screws to **45 Nm**(**33.19 Foot pounds**)

Fast steer system - Calibrate

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

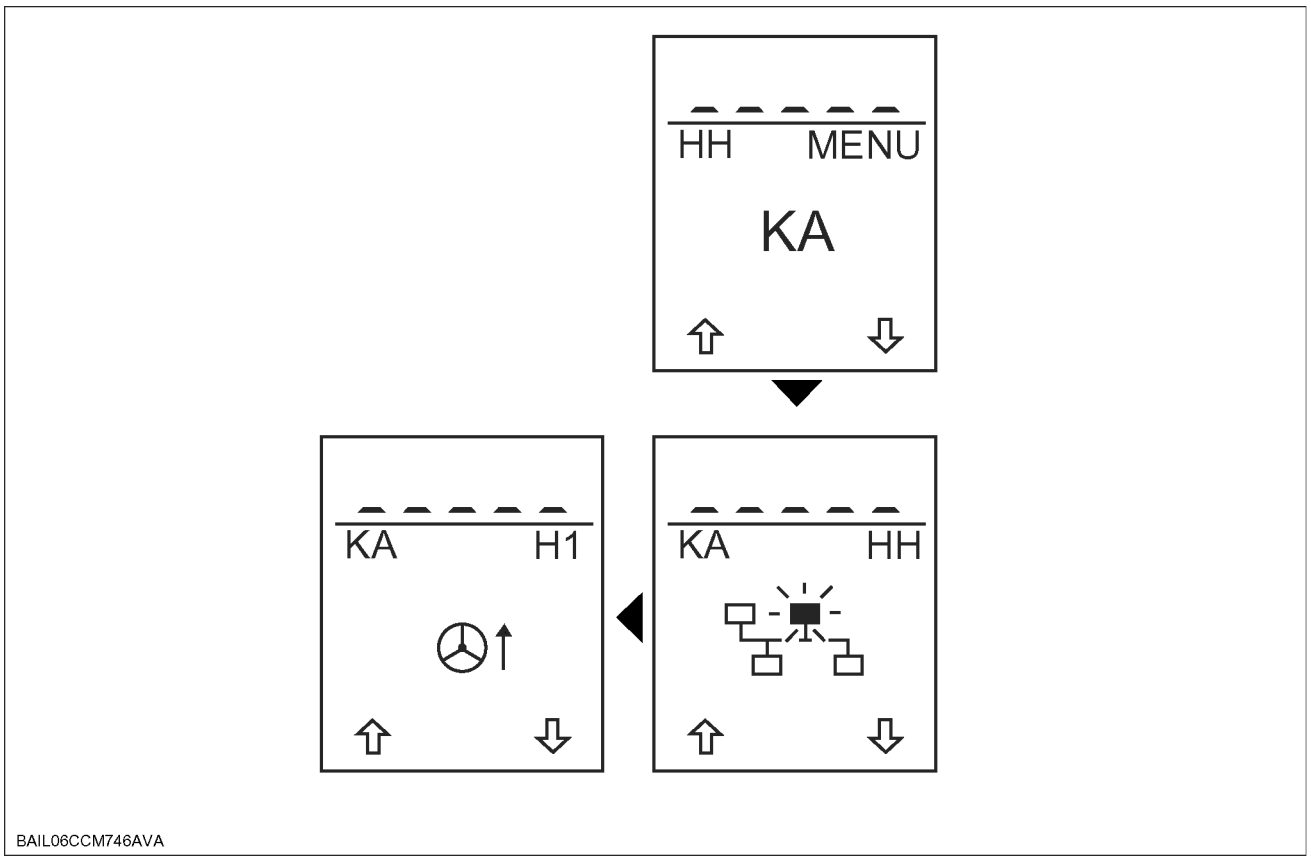
NOTE: *The calibration procedure is controlled by the electronic management system. To prevent inadvertent movement of the tractor, park the tractor away from any obstacles, firmly apply the parking brake and block the wheels, front and rear. Check that the Ground speed display is Zero before commencing.*

1. Install the diagnostic connector **380000843** into the diagnostic socket **(1)**.



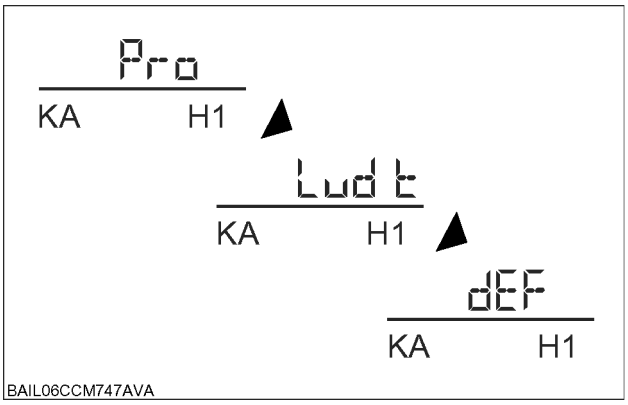
BAIL06CCM213AVA 1

2. Use the "up", "down" and "menu" keys on the ICU2 to navigate the HH menu's to H1 and the fast steer symbol on the KA controller.



BAIL06CCM746AVA 2

3. Scroll through the available options using the "up" and "down" keys.
   The three options are:
   - "Pro" - proximity sensor
   - "Lvdt" - LVDT sensor
   - "deF" - adopt the default values

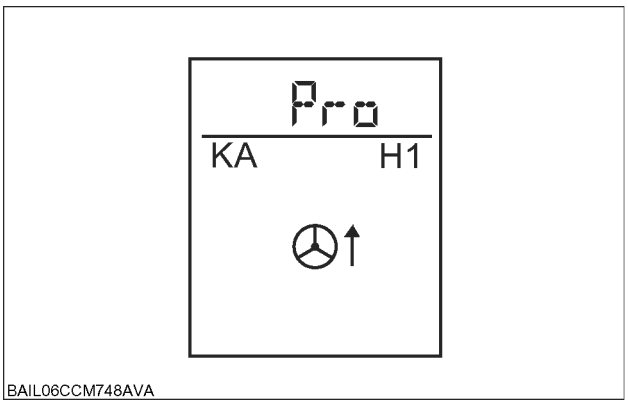


BAIL06CCM747AVA 3

4. Set the engine speed to **1300 RPM**.

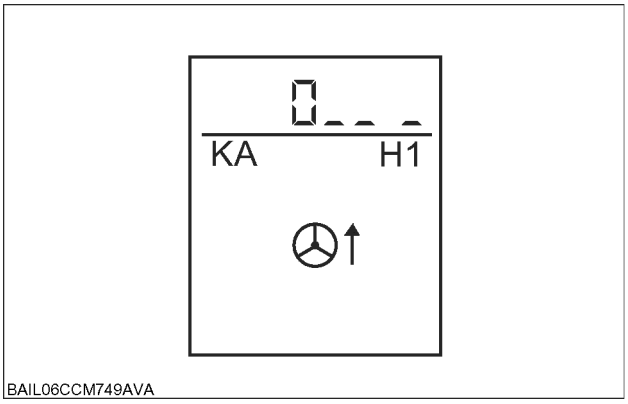
Proximity Sensor Calibration

5. Select the "Pro" option by depressing the "menu" key.



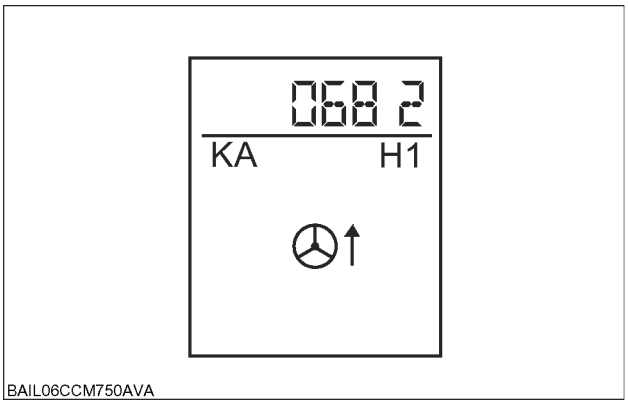
BAIL06CCM748AVA 4

6. The top section of the display will display "O _ _ _" for the steering wheel in the disengaged position.



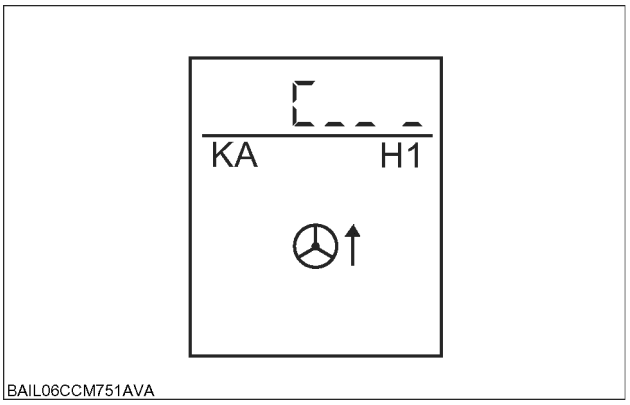
BAIL06CCM749AVA 5

7. Depress and hold the "down" key. When the signal has been stable for 2 seconds an audible beep will be heard and the display will change to "O xxx". "xxx" is the digital reading of the sensor voltage when the steering wheel is in the disengaged position.



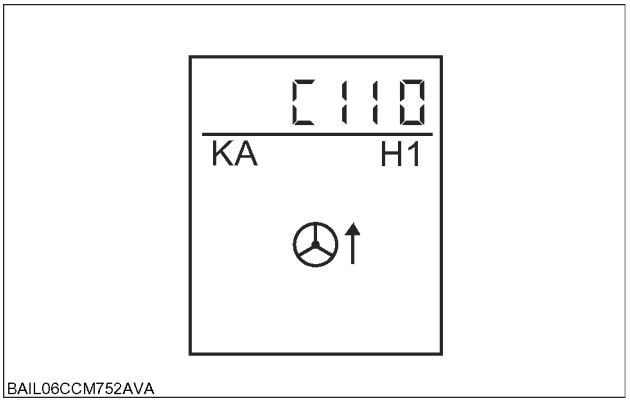
BAIL06CCM750AVA 6

8. The top section of the display will display "C _ _ _" for the steering wheel in the engaged position.



BAIL06CCM751AVA 7

9. Depress and hold the "down" key while the steering wheel is in the engage position. When the signal has been stable for 2 seconds an audible beep will be heard and the display will change to "C xxx". "xxx" is the digital reading of the sensor voltage when the steering wheel is in the engaged position.

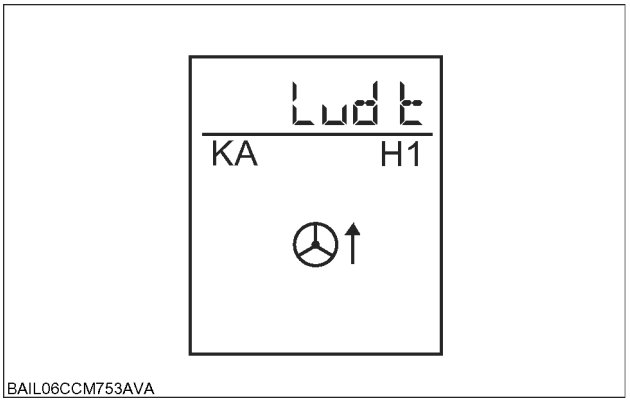


BAIL06CCM752AVA 8

10. After a short delay the display will return to the "H1" menu display.

Linear Variable Differential Transformer (LVDT) Sensor Calibration

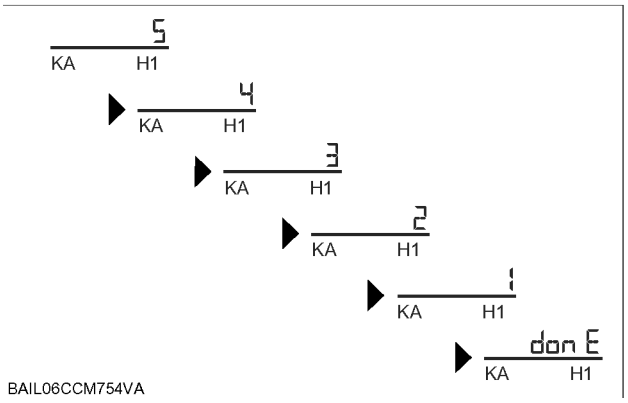
11. Select the "Lvdt" option by depressing the "menu" key.



BAIL06CCM753AVA 9

12. The system will then automatically pilot the solenoid and measure the LVDT values in both positions and overwrite the default values.

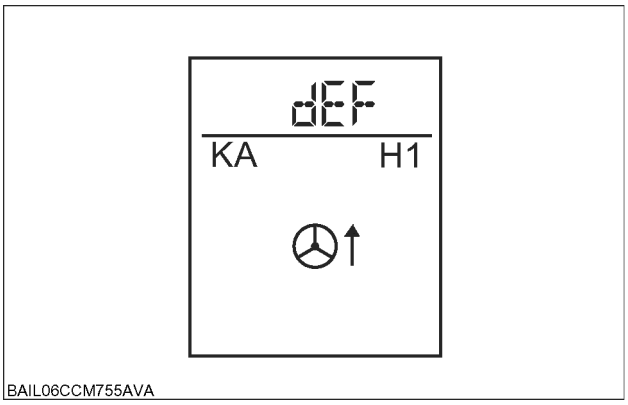
13. The top section of the display will show a countdown from "5" as the calibration is being performed. When the calibration is complete the display will change to "donE".



BAIL06CCM754AVA 10

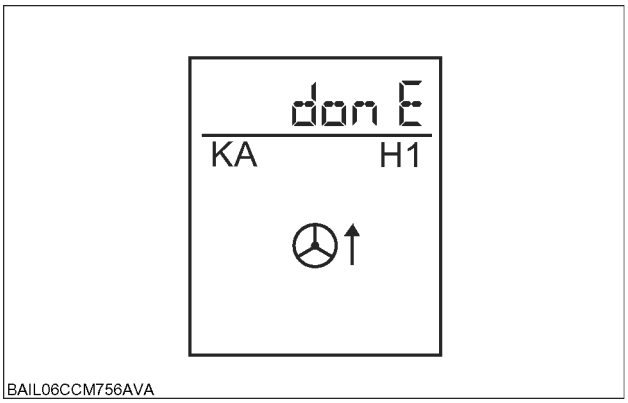
Adopting the Default Values

14. Select the "deF" option by depressing the "menu" key.



BAIL06CCM755AVA 11

15. Depress and hold the "down" key. After a short delay an audible beep will be heard to indicate that the calibration values have reset to their default values. The top section of the display will then show "donE".



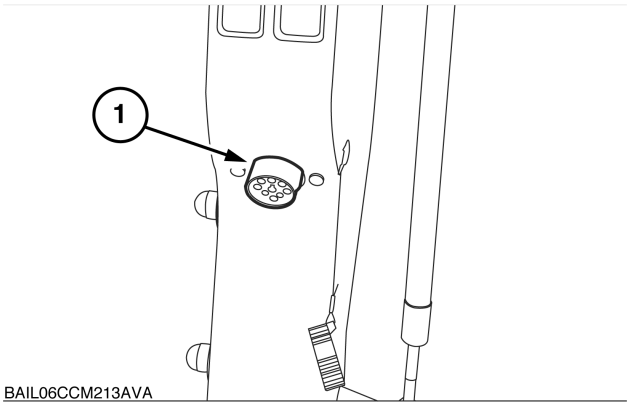
BAIL06CCM756AVA 12

Fast steer system - Calibrate

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

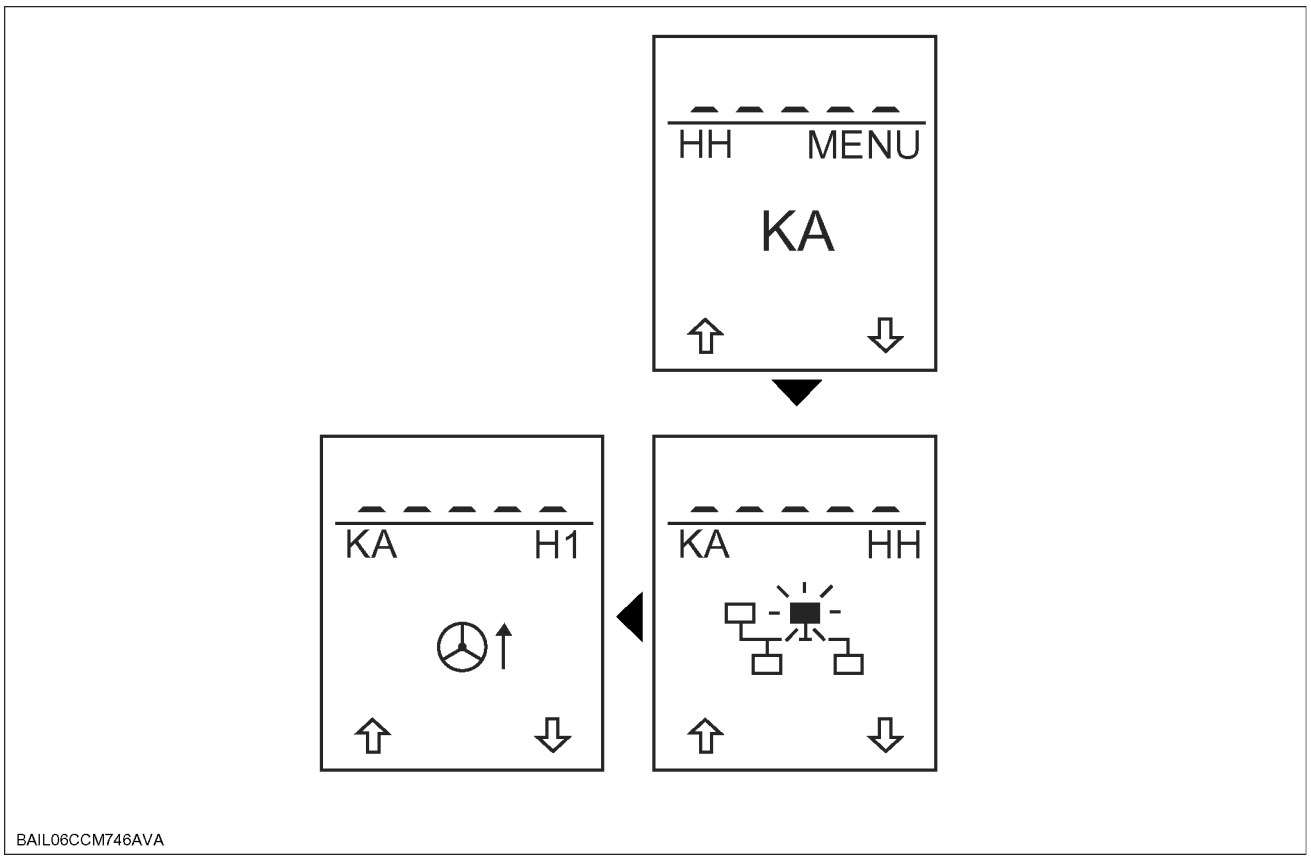
NOTE: *The calibration procedure is controlled by the electronic management system. To prevent inadvertent movement of the tractor, park the tractor away from any obstacles, firmly apply the parking brake and block the wheels, front and rear. Check that the Ground speed display is Zero before commencing.*

1. Install the diagnostic connector **380000843** into the diagnostic socket **(1)** and start the engine.



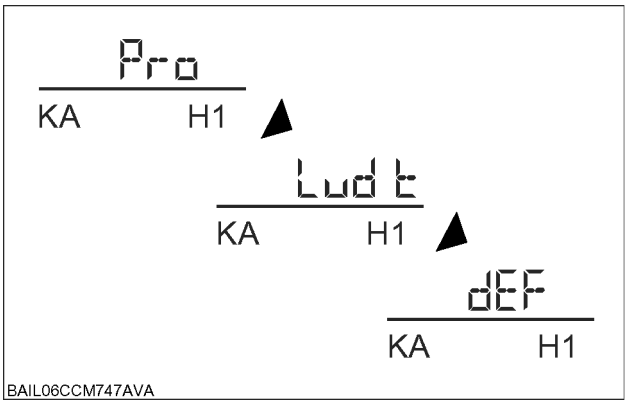
BAIL06CCM213AVA 1

2. Use the "up", "down" and "menu" keys on the ICU3 to navigate the HH menu's to H1 and the fast steer symbol on the KA controller.



BAIL06CCM746AVA 2

3. Scroll through the available options using the "up" and "down" keys.
   The three options are:
   - "Pro" - proximity sensor
   - "Lvdt" - LVDT sensor
   - "deF" - adopt the default values

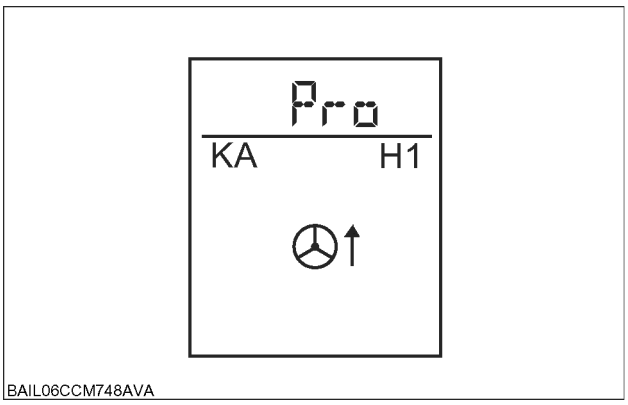


BAIL06CCM747AVA 3

4. Set the engine speed to **1300 RPM**.

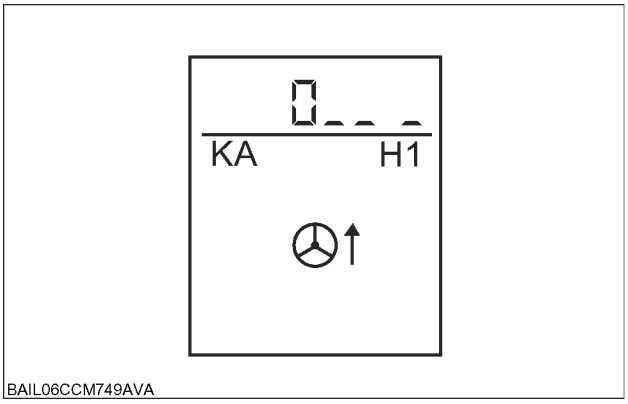
Proximity Sensor Calibration

5. Select the "Pro" option by depressing the "menu" key.



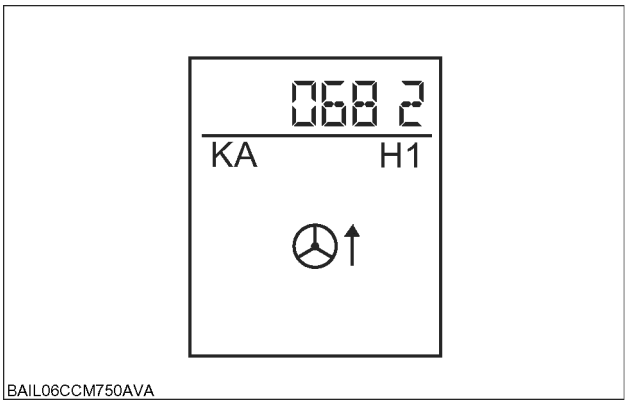
BAIL06CCM748AVA 4

6. The top section of the display will display "O _ _ _" for the steering wheel in the disengaged position.



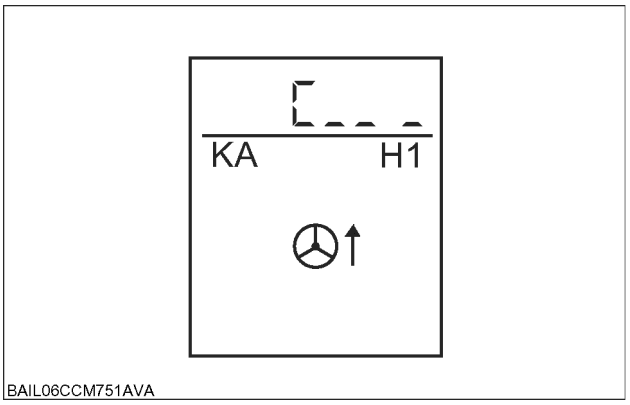
BAIL06CCM749AVA 5

7. Depress and hold the "down" key. When the signal has been stable for 2 seconds an audible beep will be heard and the display will change to "O xxx". "xxx" is the digital reading of the sensor voltage when the steering wheel is in the disengaged position.



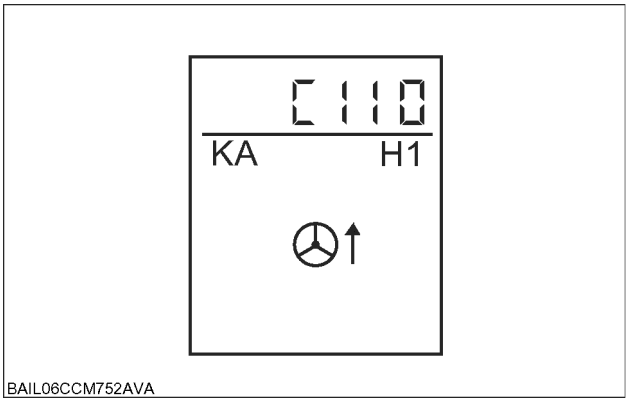
BAIL06CCM750AVA 6

8. The top section of the display will display "C _ _ _" for the steering wheel in the engaged position.



BAIL06CCM751AVA 7

9. Depress and hold the "down" key while the steering wheel is in the engage position. When the signal has been stable for 2 seconds an audible beep will be heard and the display will change to "C xxx". "xxx" is the digital reading of the sensor voltage when the steering wheel is in the engaged position.

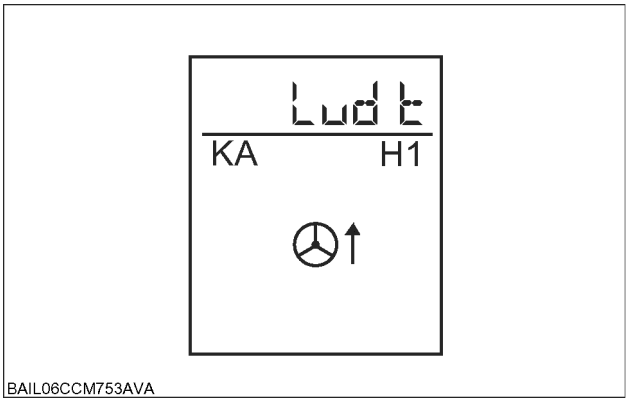


BAIL06CCM752AVA 8

10. After a short delay the display will return to the "H1" menu display.

Linear Variable Differential Transformer (LVDT) Sensor Calibration

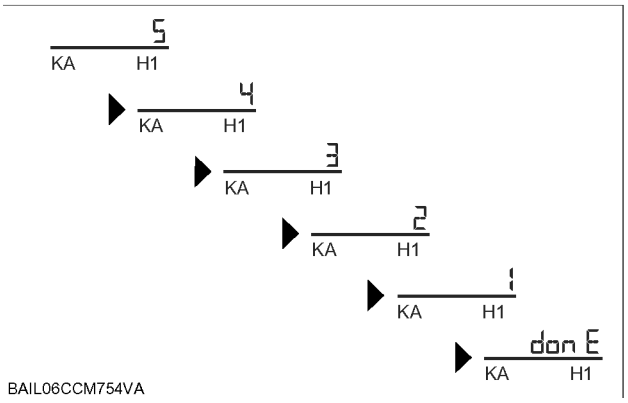
11. Select the "Lvdt" option by depressing the "menu" key.



BAIL06CCM753AVA 9

12. Press the "menu" key again to activate. The system will then automatically pilot the solenoid and measure the LVDT values in both positions and overwrite the default values.

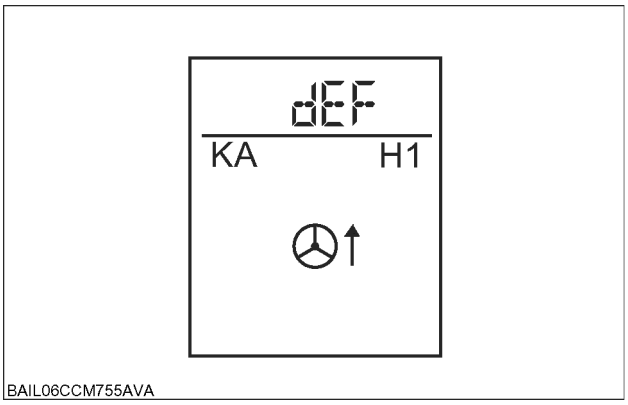
13. The top section of the display will show a countdown from "5" as the calibration is being performed. When the calibration is complete the display will change to "donE".



BAIL06CCM754AVA 10

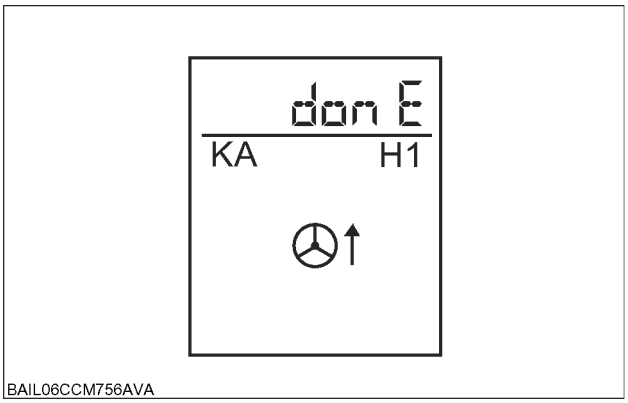
Adopting the Default Values

14. Select the "deF" option by depressing the "menu" key.



BAIL06CCM755AVA 11

15. Depress and hold the "down" key. After a short delay an audible beep will be heard to indicate that the calibration values have reset to their default values. The top section of the display will then show "donE".



BAIL06CCM756AVA 12

STEERING Hydraulic - Troubleshooting

IMPORTANT: *When effecting a repair the cause must be corrected to avoid a repeat failure.*

Problem	Possible Cause	Correction
Low steering pressure warning light illuminates	Faulty pump	Pressure test system, repair/replace pump as required.
	Fault in return to tank (back pressure) side	Check low pressure system (fixed displacement main hydraulic pump) or check lubrication system (variable displacement main hydraulic pump systems).
	Leak in system	Inspect feed and return lines to the pump. Replace damaged hoses as required.
No steering or excessive effort to steer	Air in system	Check for loose connections or damaged tubing. Purge system of air.
	Steering system relief valve sticking/faulty	Check system pressure.
	Worn pump	Inspect and repair.
	Leaking steering cylinder	Inspect and repair.
	Broken or damaged steering column coupling	Inspect and replace as required.
	Damaged or worn metering unit	Inspect and replace as required.
Steering wanders	Excessive play in steering linkage joints	Inspect and replace as required.
	Leaking steering cylinder	Inspect and repair.
	Damaged or worn metering unit	Inspect and replace as required.
Drift to Left, Two Wheel Drive only	Bias valve faulty	Replace or repair
Front wheels surge when steering	Leaking steering cylinder	Inspect and repair.
	Damaged or worn metering unit	Inspect and replace as required

Index

TRAVELLING - D

STEERING Hydraulic - 20.C

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STEERING AutoPilot - 20.E

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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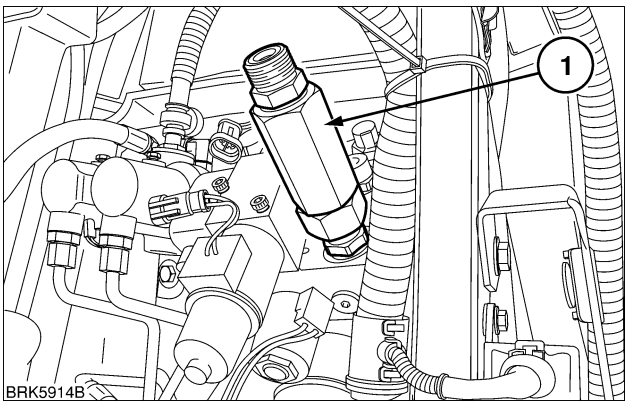
STEERING AutoPilot - Static description Auto guidance system

AccuGuide™System

The auto guidance system components are as follows:
Auto guidance valve Assembly
Steering Cylinders
Manual Steering Motor

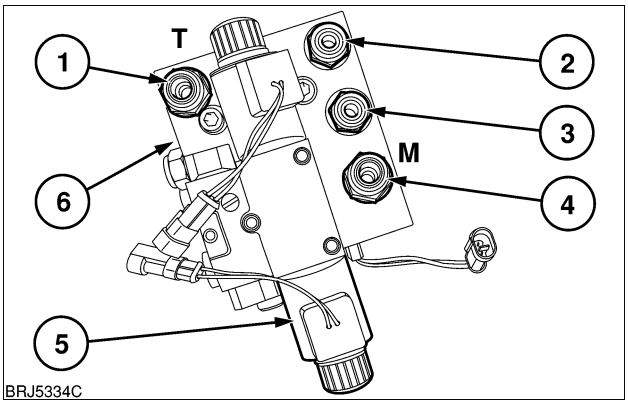
The system is fed from either a fixed displacement pump with priority flow divider, or from an axial piston pump with a priority valve.
The steering motor is similar to the unit used in a conventional steering system except the ports are configured to directly interface with the auto guidance valve and the unit is of the non reactive type. The steering motor is connected to the supply and tank lines in parallel with the auto guidance valve. The work ports of the steering motor are connected to the steering cylinders at all times. If there is manual intervention through the steering motor, the unit will override the auto guidance system and will return full control to the operator. When the auto guidance system is not in use , the auto guidance directional control valve is hydraulically isolated from the manual steering system by an isolation valve in the supply line and check valves in the steering work ports.

Inlet Filter
The inlet filter **(1)** is a 100 mesh stainless steel screen designed to prevent particle contamination of the other auto guidance components.



BAIL08CVT096ASA 1

Auto guidance valve assembly
The valve assembly consists of an aluminium manifold body in which the various hydraulic components are mounted. The manifold is mounted directly to the steering motor. All the hydraulic hose connections are made via the auto guidance valve manifold.

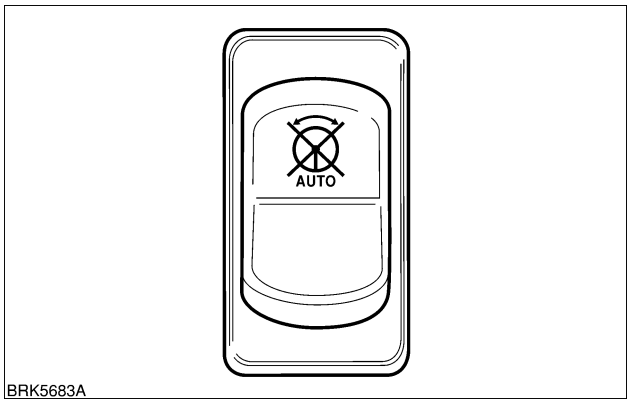


BAIL08CVT019ASA 2

1.Return to tank
2.Left steering cylinder supply hose
3.Right Steering cylinder supply hose
4.Pressure feed
5.Solenoid
6.Valve manifold

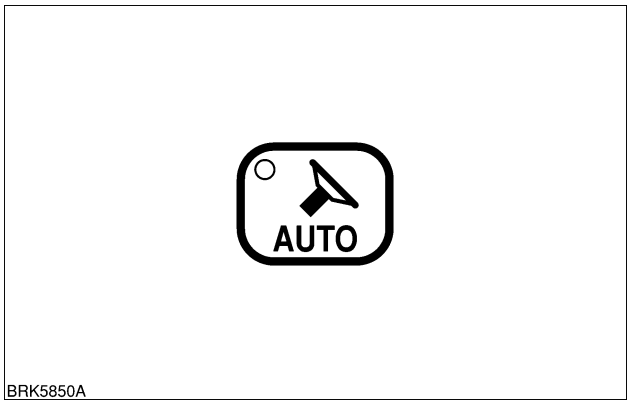
Controls

The auto guidance master switch is located on the ‘C‘ pillar on the right hand side of the cab. This switch energises the system ready for use.



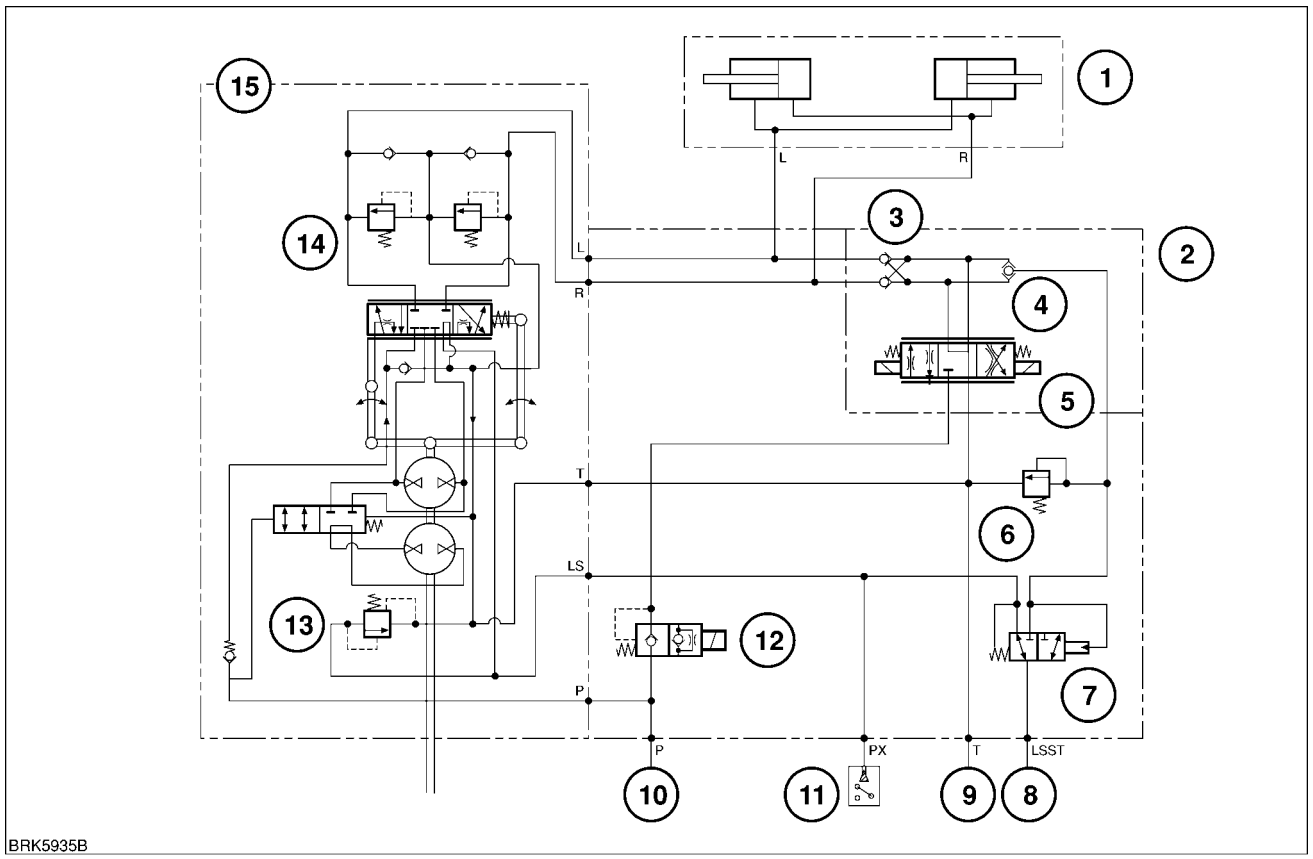
BAIL08CVT046ASA 3

The auto guidance activation switch is located on the integrated control panel. This is used in conjunction with the AFS AccuGuide™System and display screen.



BAIL08CVT095ASA 4

STEERING AutoPilot - Dynamic description Autoguidance system



BAIL08CVT094FSA 1

Auto guidance system schematic

1. Steering cylinders
2. Autoguidance valve assembly
3. Lock valves
4. Pilot line shuttle valve
5. Directional control valve
6. Relief valve **185 - 190 bar** (**2682.5 - 2755.0 psi**)
7. Load sensing pilot operated shuttle valve
8. Load sensing line
9. Pressure sensor
10. Pressure feed
11. Pressure sensor
12. Isolation valve
13. Relief valve **185 - 190 bar** (**2682.5 - 2755.0 psi**)
14. Shock relief valves **220 - 240 bar** (**3190.0 - 3480.0 psi**)
15. Steering control unit **190 bar** (**2755.0 psi**)

Autoguidance valve assembly (2)

The valve assembly consists of an aluminium manifold body in which the various hydraulic components are mounted. The manifold is mounted directly to the steering motor. All the hydraulic hose connections are made via the auto guidance valve manifold.

Hydraulic isolation valve (12)

This two way two position solenoid operated OFF-ON valve controls the flow of oil to the auto guidance directional control valve **(2)**. The auto guidance hydraulic isolation valve is spring biased to block flow supplied by the pump, while allowing free flow in the opposite direction. When the auto guidance is engaged in auto mode , the solenoid is energised and allows free flow from the pump to auto guidance directional control, but restricts flow in the opposite direction.

Load sense pilot operated shuttle valve (7)

The load sense pilot operated shuttle valve is a pilot operated two position spool valve (spring biased). In the neutral position the valve enables the steering dynamic load sensing signal to flow to the steering control unit from the priority

valve . During normal steering operation the valve is maintained in the neutral position by the oil pressure of the dynamic load sensing line and a mechanical spring acting on the end of the valve spool.
In auto guidance mode, when the auto guidance directional control valve is energised, pilot oil from the left or right steer ports (via the shuttle valve) acts on the opposite end of the shuttle valve spool. When sufficient pressure is raised in the pilot line the spool moves into the second (active) position. The steering dynamic load sensing signal can then flow from the variable displacement pump via the priority valve to the auto guidance directional control valve. If the hydraulic isolation solenoid is not energised it is not possible for the shuttle valve to move into the second (active) position, as the auto guidance directional control valve will be hydraulically isolated.

AutoGuidance directional control valve (5)

This valve is a three position (left turn, neutral, right turn) four way proportional valve. The valve is spring biased to the neutral position and is actuated by two opposing pulse width modulated (PWM) solenoids. While in the spring biased neutral state, the left and right steer ports of the auto guidance directional control **(5)** and the compensator pilot line are connected to the tank line . The high pressure line is disconnected from the left and right steer ports, ensuring steering control is provided manually from the steering control unit . A signal from the auto guidance controller to either PWM solenoid counteracts the spring bias and allows flow from the high pressure supply to the corresponding steering cylinder port. Simultaneously the opposite steering cylinder port is connected to the tank return. This valve is only activated while the auto guidance is engaged and an active turning command is being issued.

Pilot line shuttle valve (4)

This two position shuttle check valve isolates work port pressure from the left and right turn ports of the auto guidance directional control valve **(5)** and relays the higher of the two pressures for use in the pilot line to the load sense pilot operated shuttle valve circuit.

Lock valves (3)

The lock valves in the work ports of the auto guidance directional control valve are used to isolate the steering pressures of the steering control unit from the directional control valve when the vehicle is operated in manual steer mode.

Auto guidance relief valve (6)

This relief valve is employed to limit the maximum differential pressure to **185 - 190 bar** (**2682.5 - 2755.0 psi**) between the P and T ports of the auto guidance valve assembly. This valve is only used when the auto guidance directional control valve is controlling the left or right steering cylinders.

PX Pressure sensor (11)

This pressure sensor ensures steering priority resides with the steering control unit when input from the steering control is sensed. The pressure sensor monitors the pressure in the supply line to the steering control unit. If the pressure rises above a preset threshold, representing a manual steering input, the auto guidance system is disengaged. Furthermore, the auto guidance system cannot be reengaged until the PX pressure sensor output is below the specified threshold.

Steering control unit (15)

The manually operated steering control unit meters steering flow to the steering cylinders from the variable displacement pump. When the steering wheel is turned, the pressure signal is passed through the load sense line to the priority valve and on to the variable displacement pump. The oil demand required by the steering control unit is matched by the variable displacement pump. The oil is metered to the vehicle steering rams via the L or R steering ports, thus giving a change in vehicle direction. If hydraulic power is lost, for example, in the event of an engine or pump failure, the steering control unit acts as a hand-powered pump and will provide manual steering control. This unit is identical to that which is used in non auto guidance tractors apart from the following points. A port-face arrangement is used to interface with the auto guidance valve. The steering unit is of the non reactive type and therefore includes shock relief valves. **(14)**.

Shock relief valves (11)

These valves are used to protect the system from over pressurisation (relief at **220 - 240 bar** (**3190.0 - 3480.0 psi**)) due to external forces applied to the steering wheels of the tractor.

Steering control unit relief valve (13)

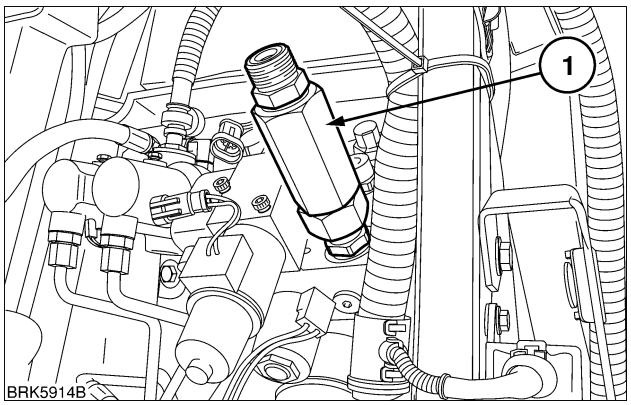
The relief valve within the Steering Control Unit is used to limit the maximum differential system pressure to **185 - 190 bar** (**2682.5 - 2755.0 psi**), between ports P and T.

Control valve - Remove

Prior operation:
Battery - Disconnect (A.30.A)

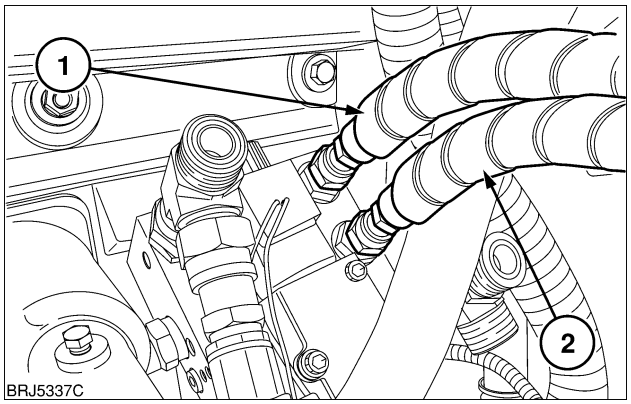
1. Disconnect the electrical connectors from the solenoids. Remove the pressure feed hose from the inlet filter **(1)**. Undo and remove the inlet filter **(1)**.

NOTE: *Drain oil from hoses into a suitable container*



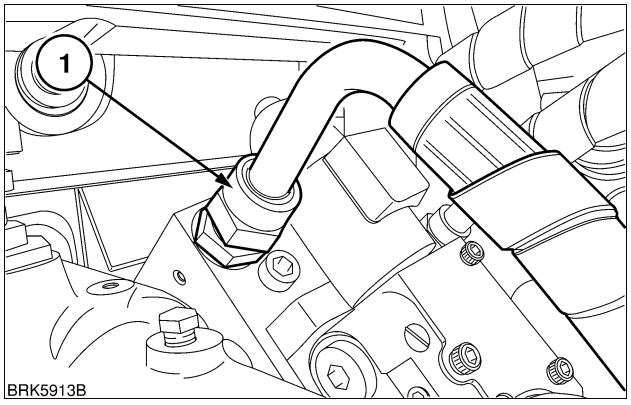
BAIL08CVT096ASA 1

2. Remove left **(1)** and right **(2)** steering cylinder supply hoses from the valve connectors.



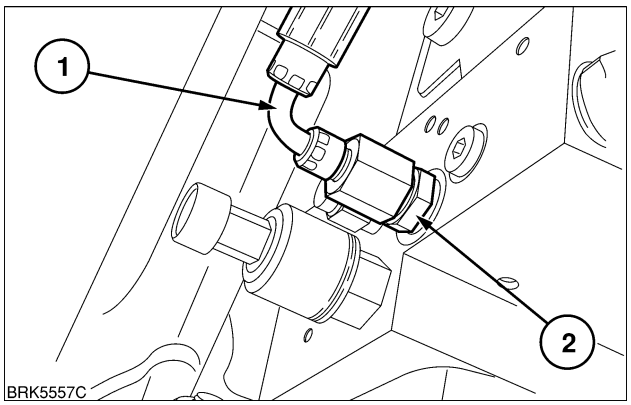
BAIL08CVT049ASA 2

3. Remove hose from the return port **(1)**.



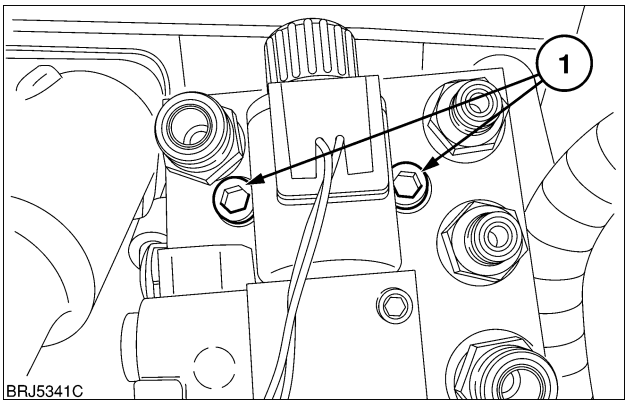
BAIL08CVT097ASA 3

4. Undo nut **(2)** and remove load sensing hose **(1)**.



BAIL08CVT052ASA 4

5. Undo and remove the hexagon headed retaining screws **(1)** and remove the control valve from the steering motor.



BAIL08CVT051ASA 5

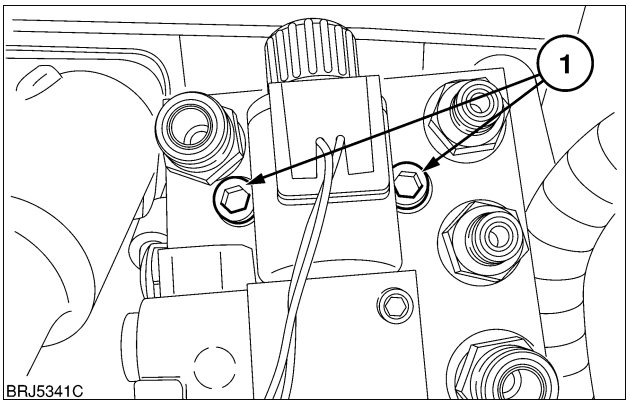
⚠ WARNING ⚠

The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944

Control valve - Install

1. Install valve to steering motor. Insert the hexagon headed retaining screws and tighten to **48 Nm** (**35.4 lb ft**)



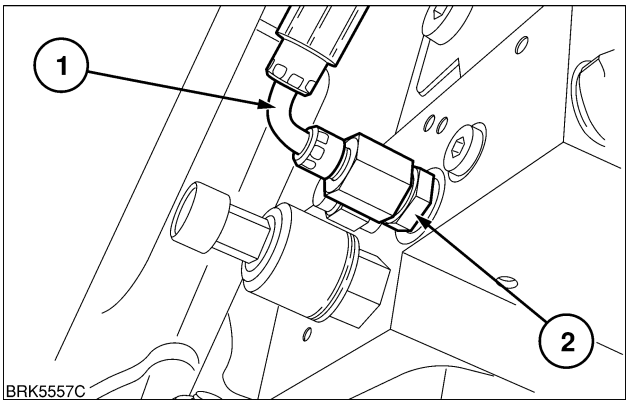
BAIL08CVT051ASA 1

⚠ WARNING ⚠

The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

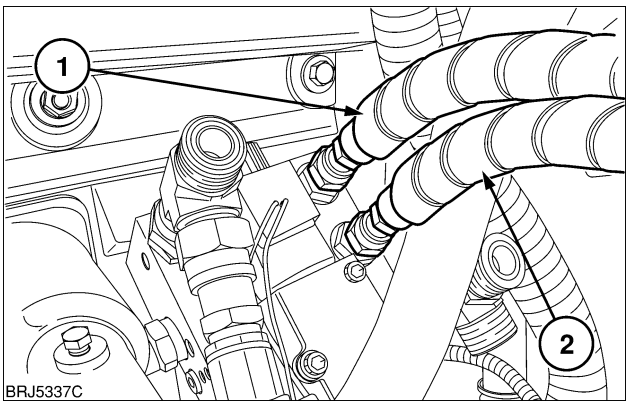
M944

2. Connect the load sensing hose **(1)** and tighten nut **(2)** .



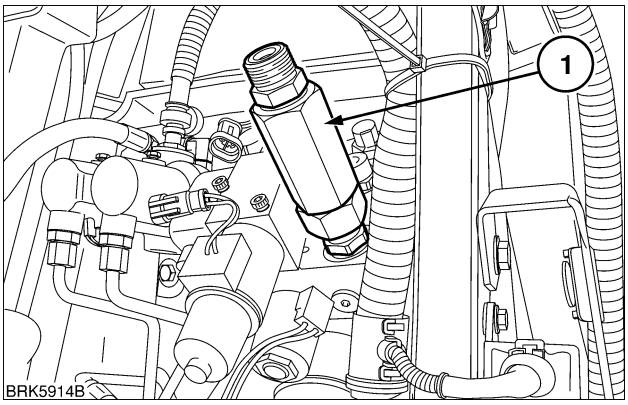
BAIL08CVT052ASA 2

3. Connect the left **(1)**and right **(2)** steering supply hoses



BAIL08CVT049ASA 3

4. Connect the filter fitting to the valve body and tighten to **60 Nm** (**44.3 lb ft**) . Hold the fitting and connect the inlet filter **(1)** to the fitting and tighten to **80 Nm** (**59.0 lb ft**). Connect feed hose.



BAIL08CVT096ASA 4

Next operation:
Battery - Connect (A.30.A)

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TRAVELLING - D

SERVICE BRAKE Mechanical - 30.B

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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Brake - Disassemble

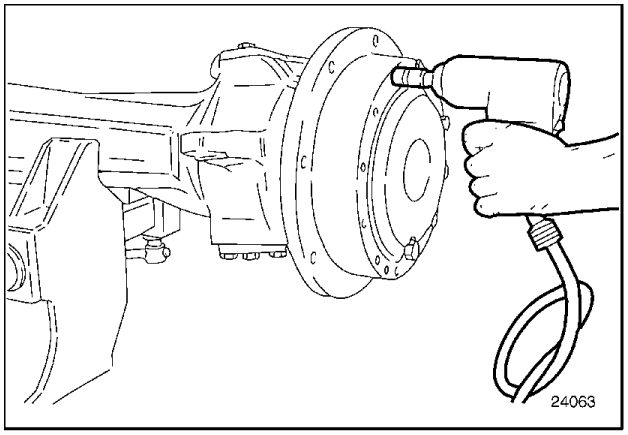
Prior operation:
Remove Battery, refer to, **Battery - Remove (A.30.A)**.

⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

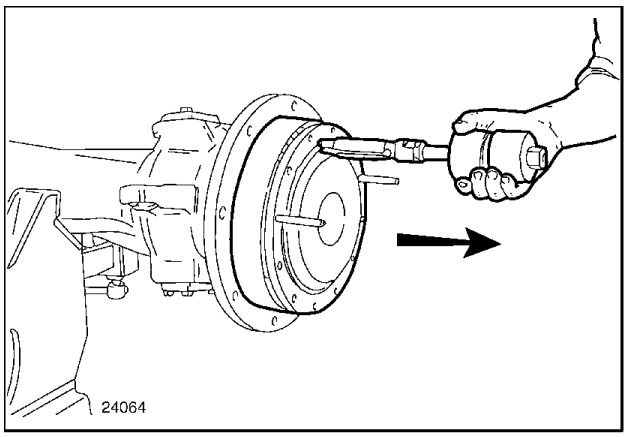
B026

1. For removal of front brakes carry out the operations as follows:
   Before carrying out any work on the braking system carry out the following operations.
   - Park the tractor on a level surface. Block the rear wheels to prevent the tractor moving.
   - Open and raise the hood.
2. Raise the front of the tractor, support the axle on suitable stands and remove the front wheels.
3. Drain oil from planetary hub.
   Remove the planetary carrier attaching bolts by screwing in two alignment pins tool no. **380000548**



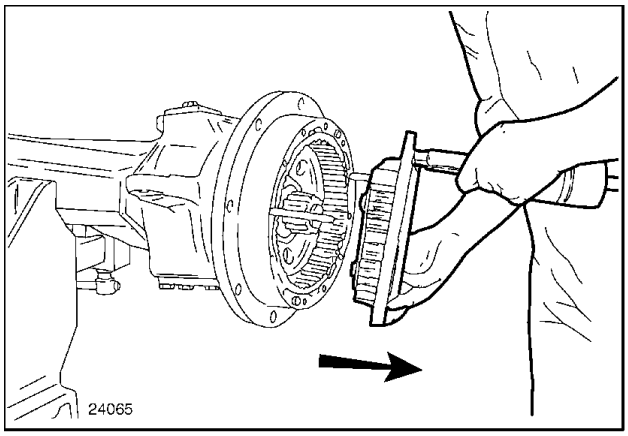
24063 1

4. Insert a slide puller into the drain plug hole and detach the planetary carrier.



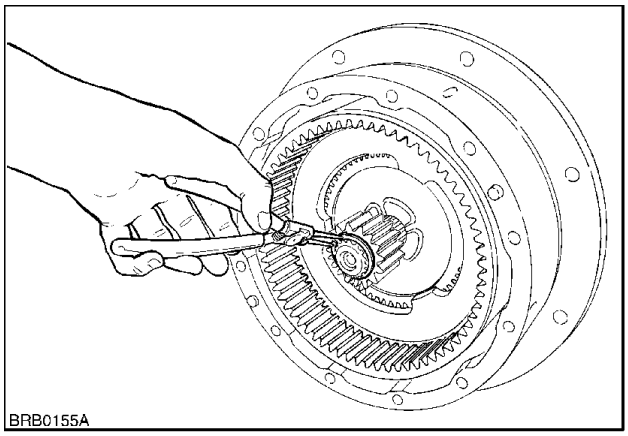
24064 2

5. Remove the planetary carrier and gears.



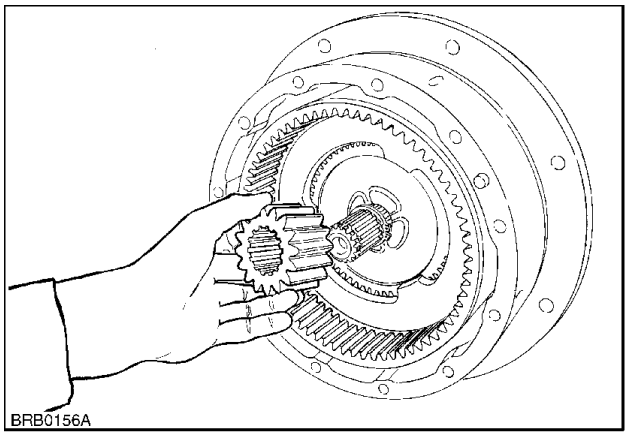
24065 3

6. Remove the sun gear retaining ring.



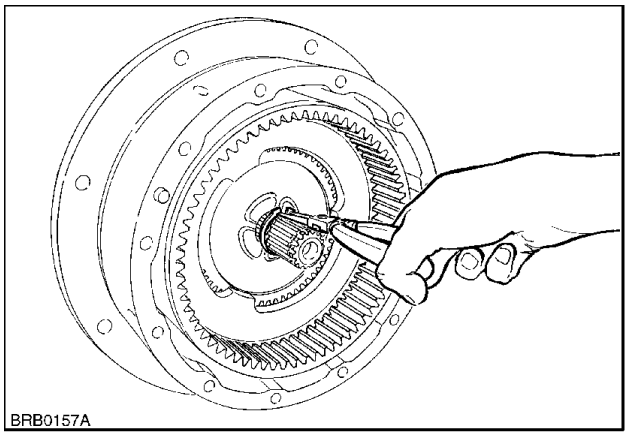
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7. Remove sun gear.



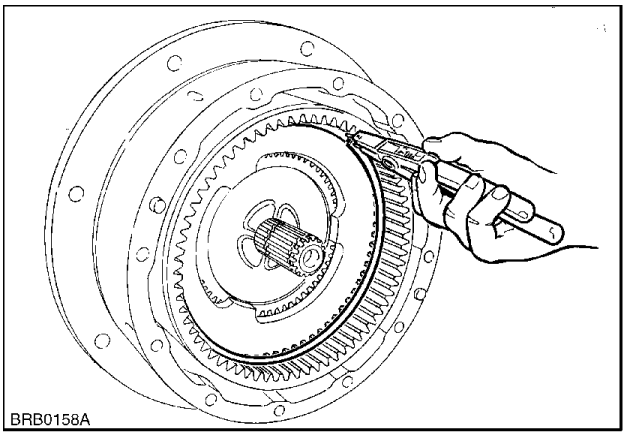
BRB0156A 5

8. Remove the rear sun gear retaining ring.



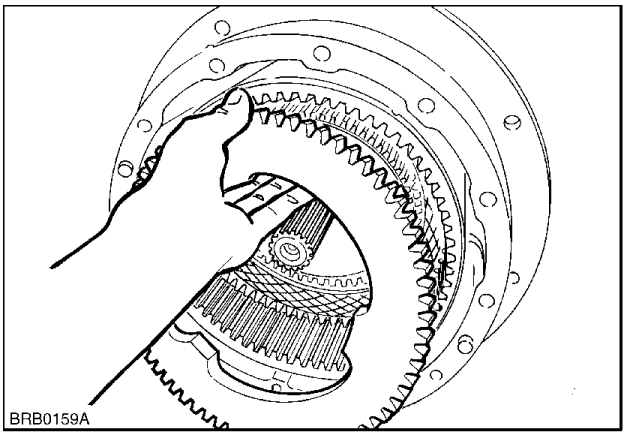
BRB0157A 6

9. Remove the snap ring retaining the outer brake disc.



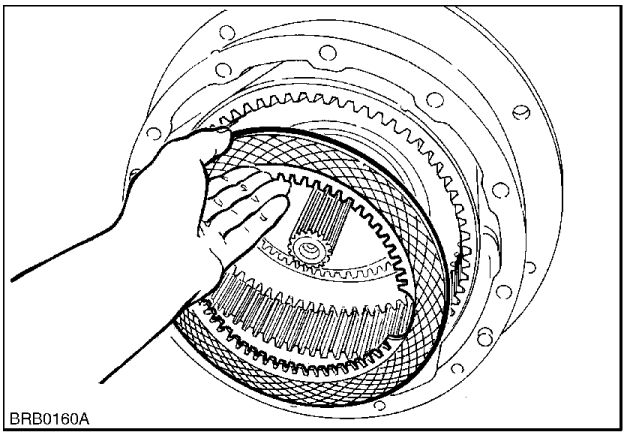
BRB0158A 7

10. Remove the brake disc from the ring gear.



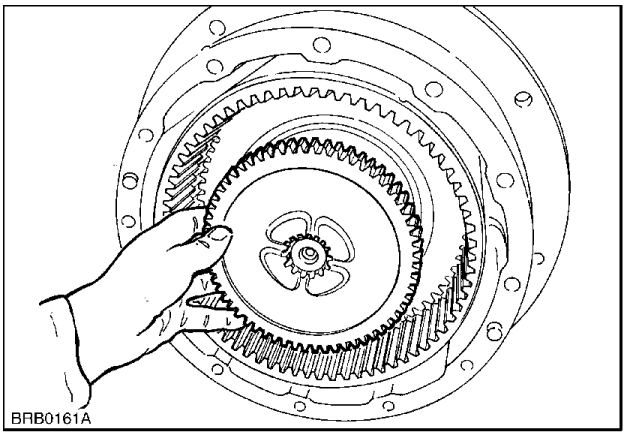
BRB0159A 8

11. Remove the friction disc.



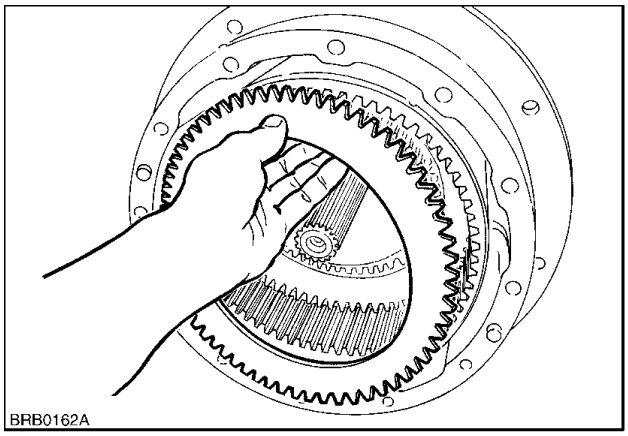
BRB0160A 9

12. Slide the friction disc to driveshaft plate off of the driveshaft spline.



BRB0161A 10

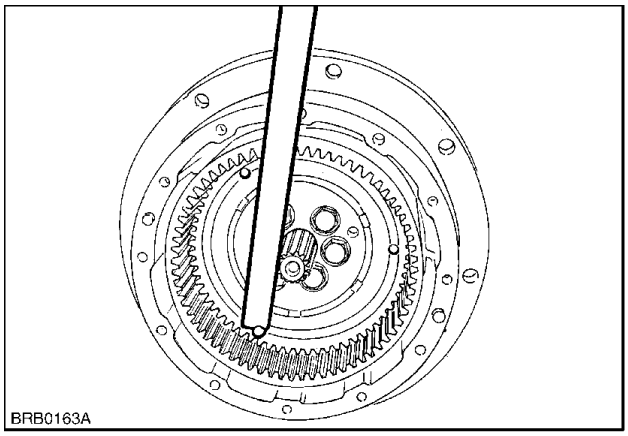
13. Remove the inner brake disc from the ring gear.



BRB0162A 11

14. Remove the piston from the backplate. Apply the footbrakes if necessary to aid removal.

NOTE: *There are* ***3.6 mm*** *threaded bolt holes in the piston. Bolts may be inserted and levered on to aid piston removal.*



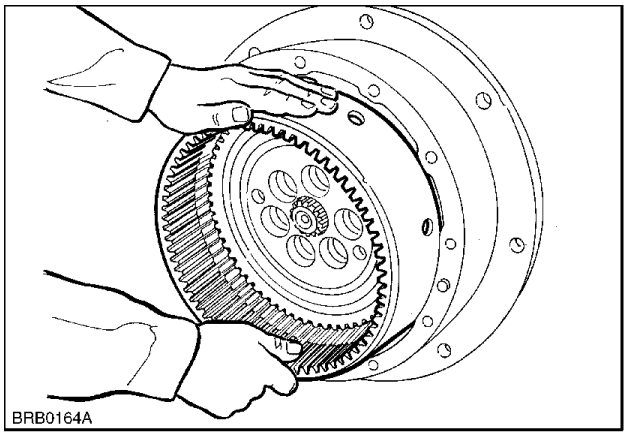
BRB0163A 12

Next operation:
Brake - Visual inspection (D.30.B)

Brake - Assemble Front Axle

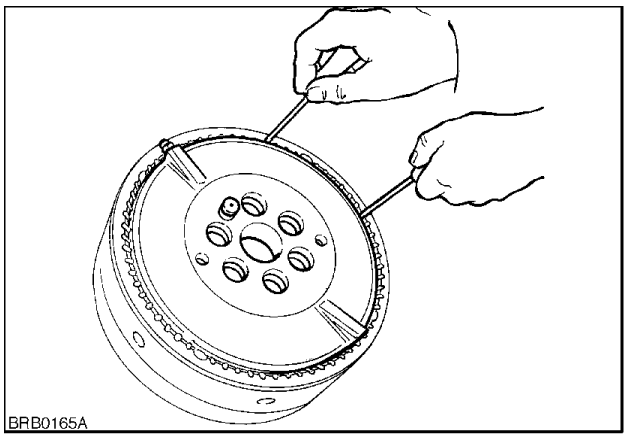
1. Support the hub using a suitable hoist and strap. Remove the six bolts securing the hub to the swivel housing and withdraw the ring gear.

NOTE: *It is advisable to replace the transfer tube O-rings located at the rear of the piston carrier plate, while the unit is at this stage of disassembly.*



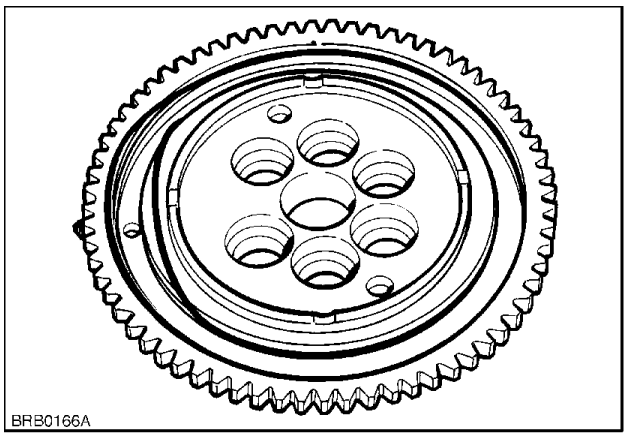
BRB0164A 1

2. Lift and remove the piston carrier plate from the rear of the ring gear by compressing the snap ring into the carrier with suitable screwdrivers.



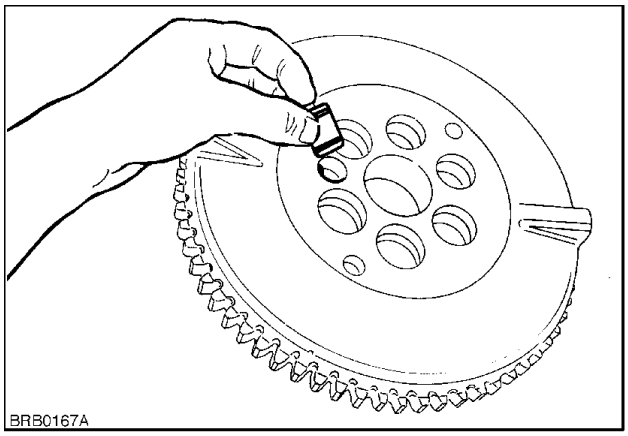
BRB0165A 2

3. Remove the inner and outer piston seals from the carrier. Ensure the carrier is free from any debris and carefully install the new seals, allow the seals to relax for a few minutes prior to installing the piston.



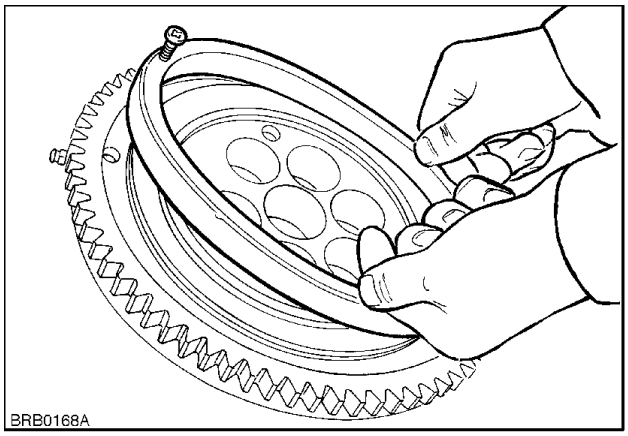
BRB0166A 3

4. Remove the transfer tube from the rear of the carrier and replace the O-rings.



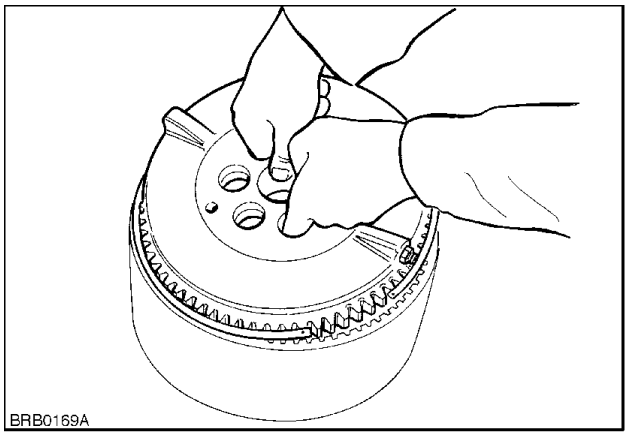
BRB0167A 4

5. Lubricate the piston with the specified brake oil and install the piston into the carrier.



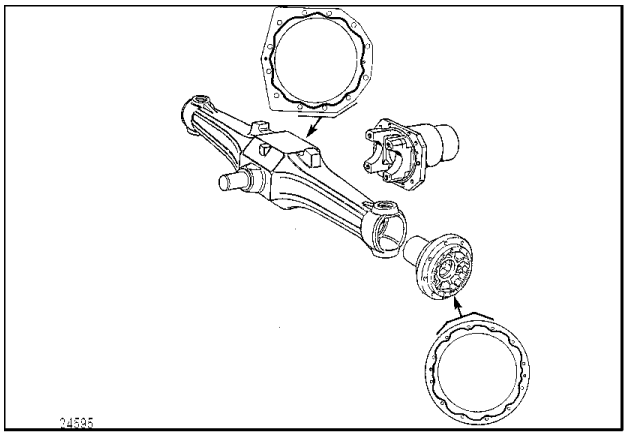
BRB0168A 5

6. Reassemble the piston carrier to the ring gear.



BRB0169A 6

7. Installation
   1. Install the ring gear and piston carrier plate assembly, inner brake disc, friction disc to driveshaft plate, friction disc, outer brake disc and retaining ring.
   2. Install the sun gear inner retaining ring, sun gear and outer retaining ring.
   3. Before installing the planetary carrier, thoroughly clean and degrease the mating surfaces and apply a **2 mm** bead of sealant as shown in Figure **7**. Install the planetary carrier and tighten the retaining bolts to the correct torque. Refer to **SERVICE BRAKE Hydraulic - Torque (D.30.C)**
   4. Refill the planetary hubs with oil of the correct specification and quantity.



24595 7

⚠ WARNING ⚠

Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

B020

Brake - Visual inspection Front Axle

Prior operation:
Brake - Disassemble (D.30.B)

1. Inspect the friction plate for wear and damage, replace as necessary.
2. Inspect the inner and outer brake discs, if badly scored, worn or cracked replace.
3. If the piston has been removed always install new seals before re-assembly.

Next operation:
Brake - Assemble (D.30.B)

Brake - Overhaul Rear Service Brake

Prior operation:
Disconnect the battery ground (earth) lead, for additional information refer to **Battery - Disconnect (A.30.A)**

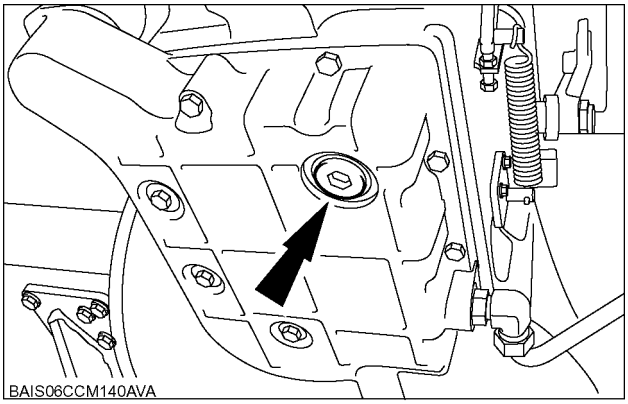
⚠ WARNING ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012

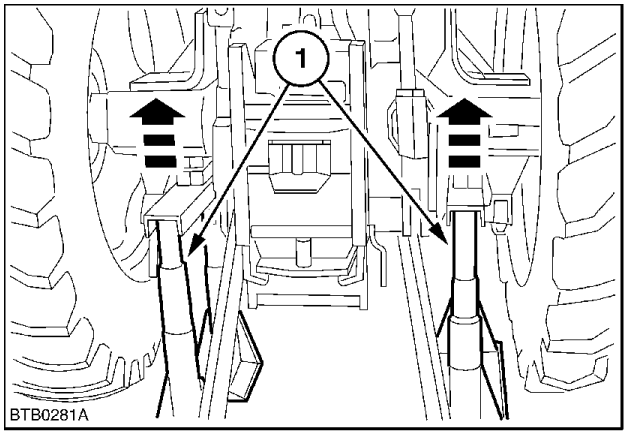
All Tractors

1. Remove the drain plug and drain oil into a suitable container.
   Reinstall the drain plug and tighten to **68 - 82 Nm** (**50 - 60 lbft**).



BAIS06CCM140AVA 1

2. Raise the rear of the tractor and place a suitable axle stand under the rear axle housing.



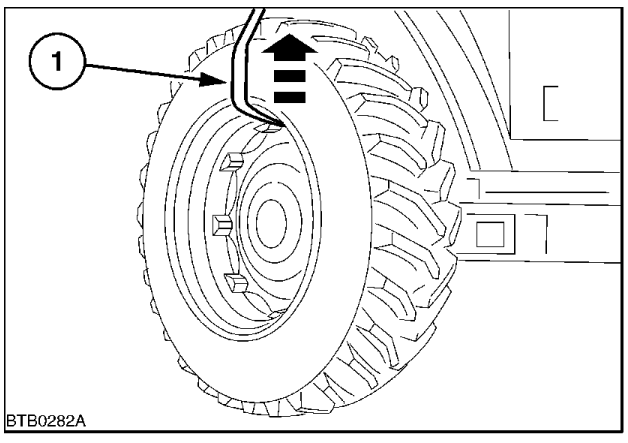
BTB0281A 2

3. Using a suitable sling **(1)**, connect the rear wheel to a hoist and remove the rear wheel.

⚠ WARNING ⚠

Tractor wheels are very heavy. Handle with care and ensure, when stored, that they cannot fall and cause injury. Never operate the tractor with a loose wheel rim or disc. Always tighten nuts to the specified torque and at the recommended intervals.

B105

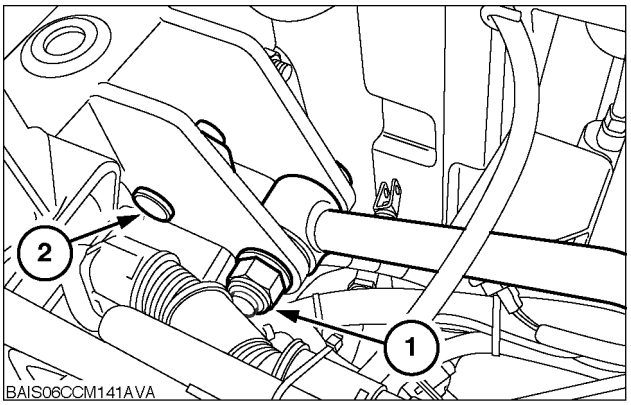


BTB0282A_370 3

4. Raise and support the cab, for additional information refer to **USER PLATFORM - Remove (E.34.A)**.

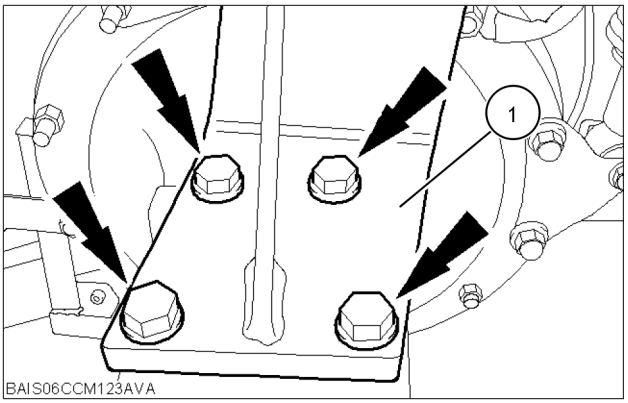
Tractors with Cab Suspension

5. Detach the panhard rod **(1)** and the strap retaining pin **(2)**.



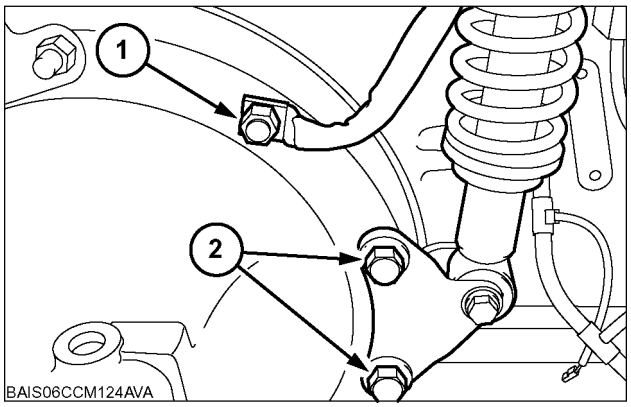
BAIS06CCM141AVA 4

6. Remove the cab support from the final drive housing.



BAIS06CCM123AVA 5

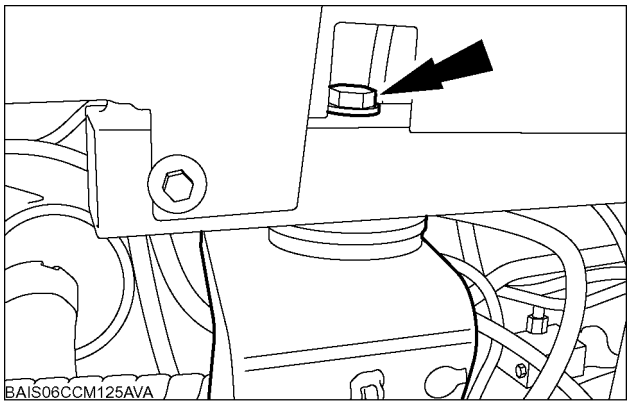
7. Remove the cab to chassis strap **(1)** and detach the cab suspension bracket **(2)**.



BAIS06CCM124AVA 6

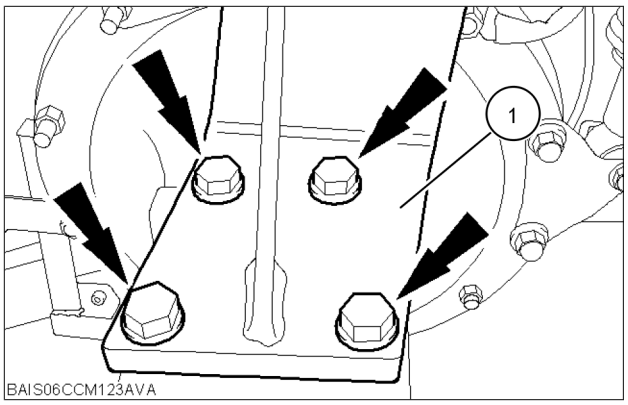
Tractors with Standard Cab

8. Remove the cab retaining bolt.



BAIS06CCM125AVA 7

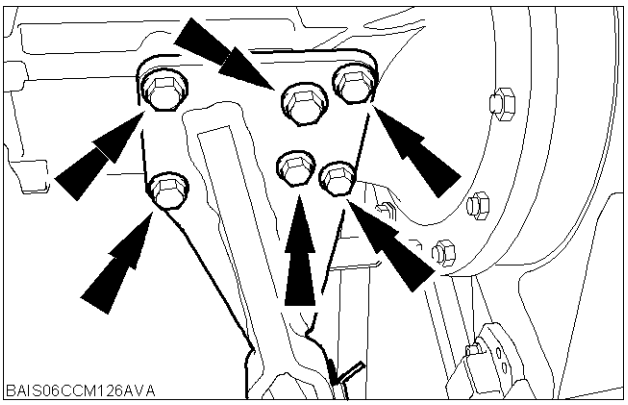
9. Remove the cab support from the final drive housing.



BAIS06CCM123AVA 8

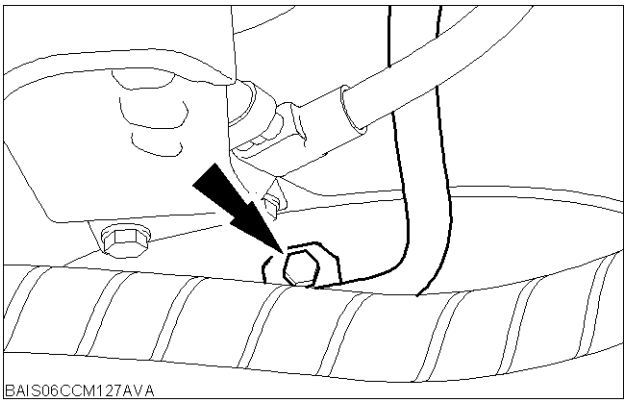
All Tractors

10. Remove the lift arm stabiliser bracket.



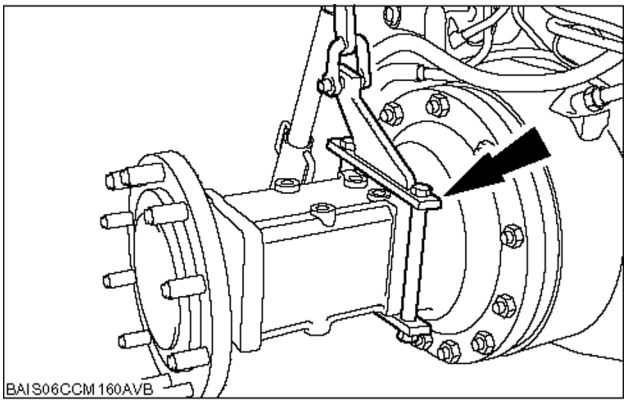
BAIS06CCM126AVA 9

11. Detach the lift arm cylinder supply hose.



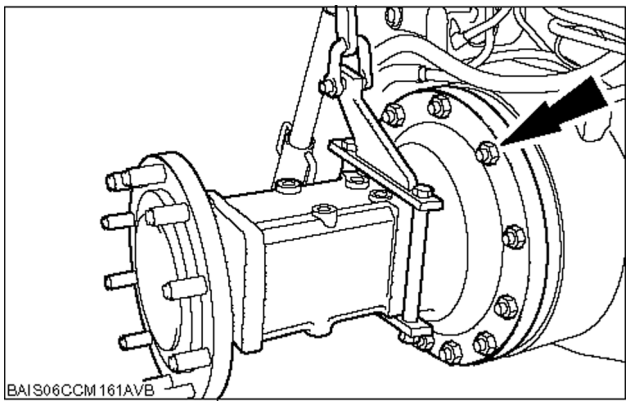
BAIS06CCM127AVA 10

12. Install special tools, **380001113** (50091) Lifting bracket with **38020004**, longer bracket bolts, and attach to suitable lifting equipment.



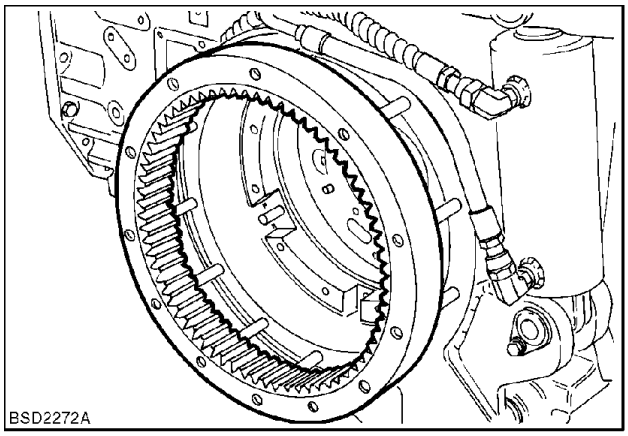
BAIS06CCM160AVB 11

13. Remove the final drive housing retaining nuts. Remove the final drive assembly together with the half shaft



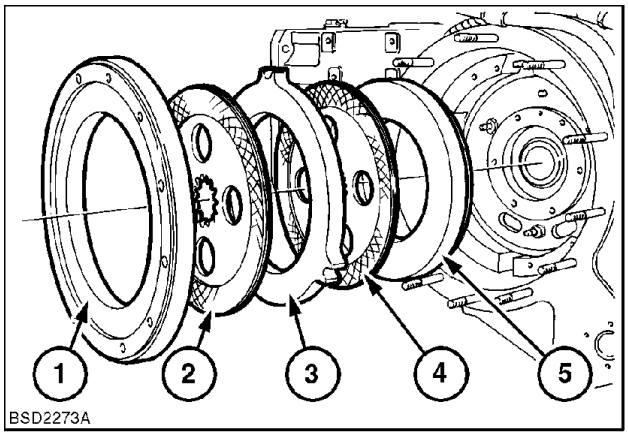
BAIS06CCM161AVB 12

14. Remove the outer ring gear.



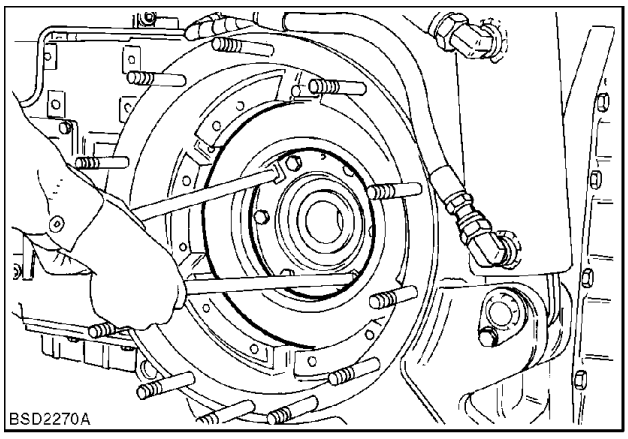
BSD2272A 13

15. Remove the outer steel plate **(1)**, friction disc **(2)**, intermediate steel disc **(3)**, friction disc **(4)** and draw out the brake piston **(5)**.



BSD2273A 14

16. If required, remove the piston using suitable pry bars.



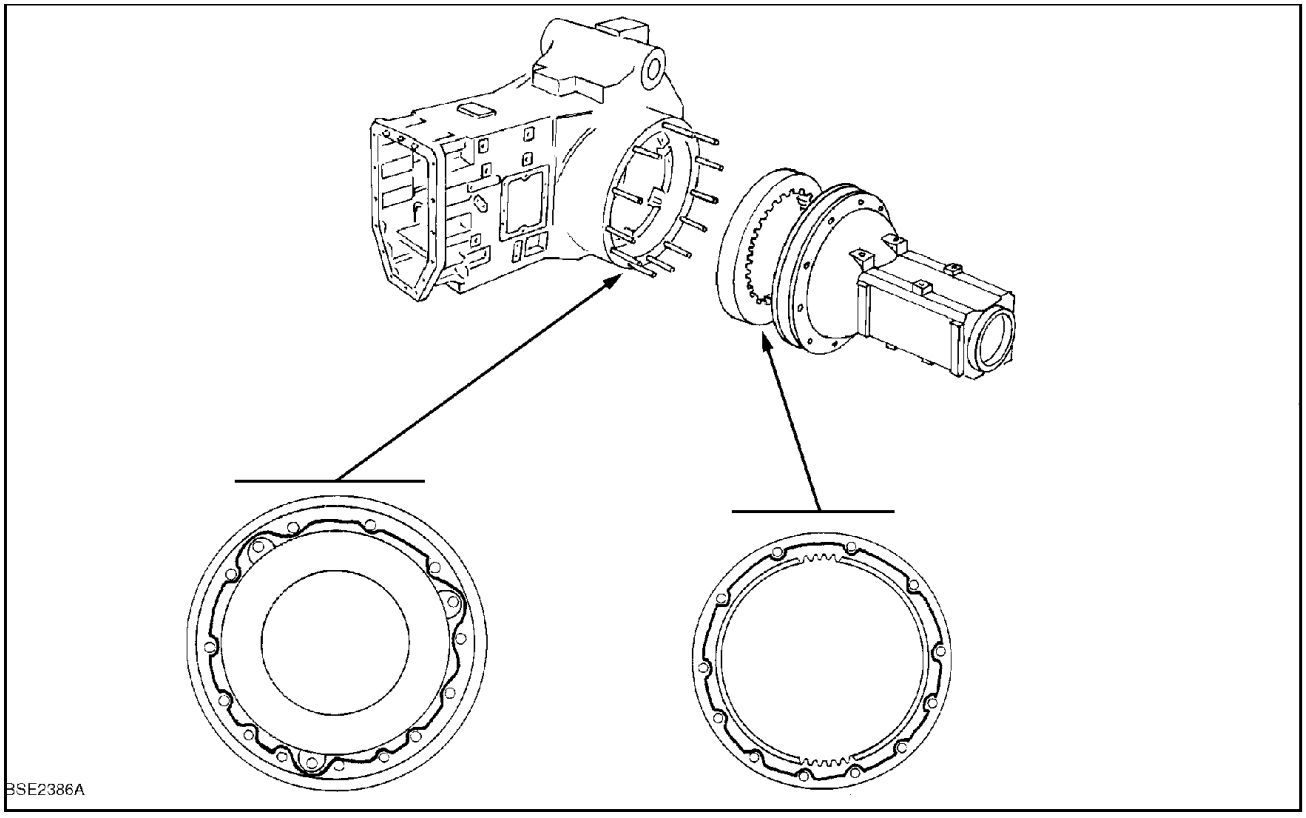
BSD2270A_150 15

17. Install the final drive case to the rear axle housing taking the following into consideration:
    - Thoroughly clean and degrease mating surfaces.
    - Check seals for wear or damages and replace if damaged.
    - Reassembly follows the disassembly procedure in reverse.
    - Refer to previous figures to orient the different parts.
    - Apply a bead of liquid gasket of approximately. **2 mm** of diameter following patterns shown in the figure below.
    - Tighten to correct torques as detailed on **SERVICE BRAKE Hydraulic - General specification (D.30.C)**.

⚠ WARNING ⚠

Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

B020



BSE2386A 16

Pattern for application of liquid gasket between the final drive case and rear axle housing.

18. Fill the transmission with oil.

Next operation:
Bleed the brakes, for further information refer to **SERVICE BRAKE Hydraulic - Bleed (D.30.C)**

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SERVICE BRAKE Mechanical - 30.B

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Brake - Disassemble 3
Brake - Overhaul Rear Service Brake 11
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TRAVELLING - D

SERVICE BRAKE Hydraulic - 30.C

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

Contents

TRAVELLING - D

SERVICE BRAKE Hydraulic - 30.C

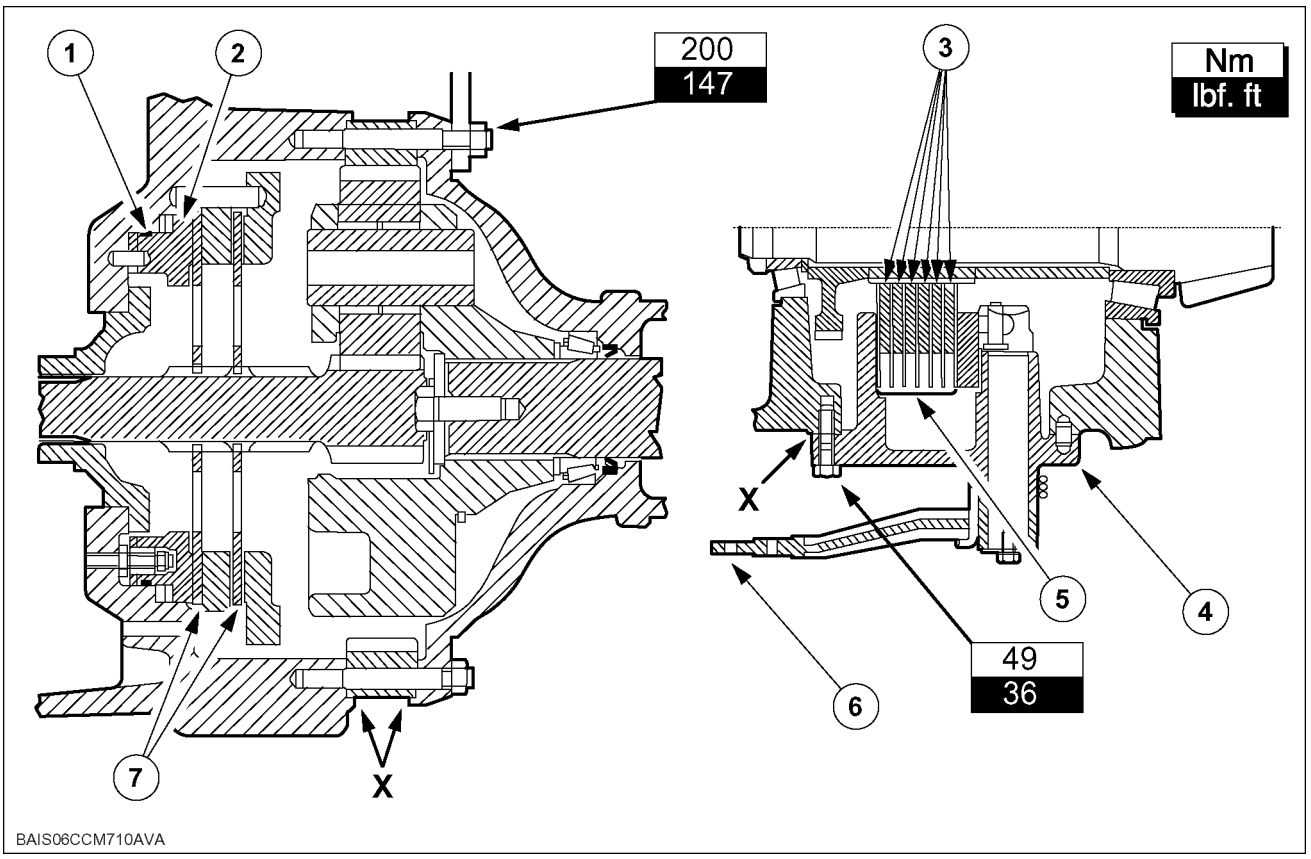
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SERVICE BRAKE Hydraulic - Torque



BAIS06CCM710AVA 1

PARKING AND SERVICE BRAKE SECTIONAL VIEW

1. Seal
2. Brake Control Piston
3. Parking Brake Discs
4. Friction Pad Assembly
5. Pads
6. Parking Brake Control Lever
7. Service Brake Discs

NOTE: *During installation apply liquid gasket Loctite 574 on surfaces marked with an X.*

SERVICE BRAKE Hydraulic - Special tools

⚠ CAUTION ⚠

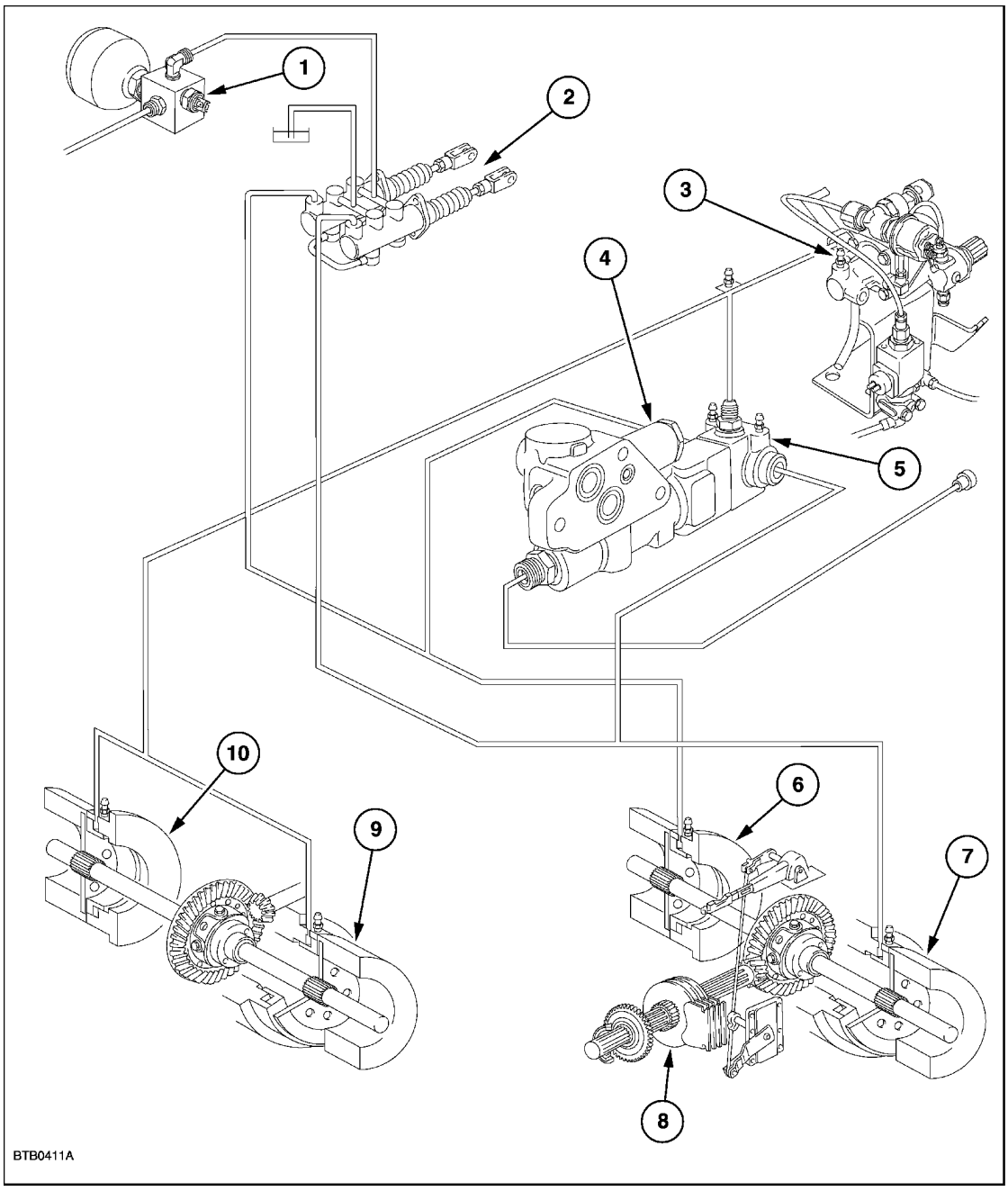
The operations described in this section can only be carried out with the ESSENTIAL tools indicated by an (X). To work safely and efficiently and obtain the best results, it is also necessary to use the recommended specific tools listed below and certain other tools, which are to be made according to the drawings included in this manual.

B008

SERVICE BRAKE Hydraulic - General specification

Type:	
- Service Brakes	Wet disc acting on differential axle shafts
- Parking Brake	Wet discs acting on pinion gear shaft
Controls:	
- Service Brakes	Hydraulic, independent pedals (or latched for joint operation) Front brakes power assisted
- Parking Brake	Mechanical through a hand lever
Brake Oil Specification:	Oil From Transmission
Service Brake Disc Material	resin/graphite
Static service Brake Disc Material	steel
Parking Brake Disc Material	steel
Parking Brake Lining Material	sintered or organic conglomerate
Disc Thickness:	
- Service Brakes	**10 mm**, min **8.6 mm**
Permissible Wear	**0.7 mm** per face
- Parking Brake	**5 mm**
Parking Brake Lining Thickness:	
- Side	**3.1 - 3.4 mm**
- Intermediate	**4.2 - 4.5 mm**
Hydraulic Actuation System	
Font Brake Booster Valve & Power Service Brakes Operating Pressure:	**20 - 24 bar**
Control Pedal Adjustment	see **Command - Adjust (D.30.C)**

SERVICE BRAKE Hydraulic - Overview



BTB0411A 1

Brake System Components

1 Accumulator / Top-up Reservoir
2 Master Cylinders
3 Pneumatic Trailer Brake Valve
4 Hydraulic Trailer Brake Control Valve
5 Logic Valve
6 Rear Service Brake Right Hand
7 Rear Service Brake Left Hand
8 Parking Brake
9 Front Service Brake Left Hand
10 Front Service Brake Right Hand

SERVICE BRAKE Hydraulic - Static description

CONTROL CIRCUIT
The two master cylinders, one for each pedal, are located at the front of the cab and are connected to the respective pedals by means of tie-rods. The cylinders can be operated individually or together when the pedals are latched by the pin. The cylinders are connected by a bridge pipe and provides balanced braking even if the brake discs on each side of the tractor are worn unevenly. Oil is supplied to both rear and front brakes from master cylinders when the pedals are depressed.
The master cylinders are fed from the tractor low pressure circuit via an accumulator top up reservoir located under the engine hood.

NOTE: *The accumulator top up reservoir holds a reserve of oil for use in the event of engine failure.*

The front brakes are supplied with oil either from the trailer brake logic head or from a separate logic valve. Either option requires two pedal operation to provide oil output.

NOTE: *The brake oil used is from the tractor low pressure circuit, and under no circumstances should a universal oil, i.e., DOT 4 type, be used.*

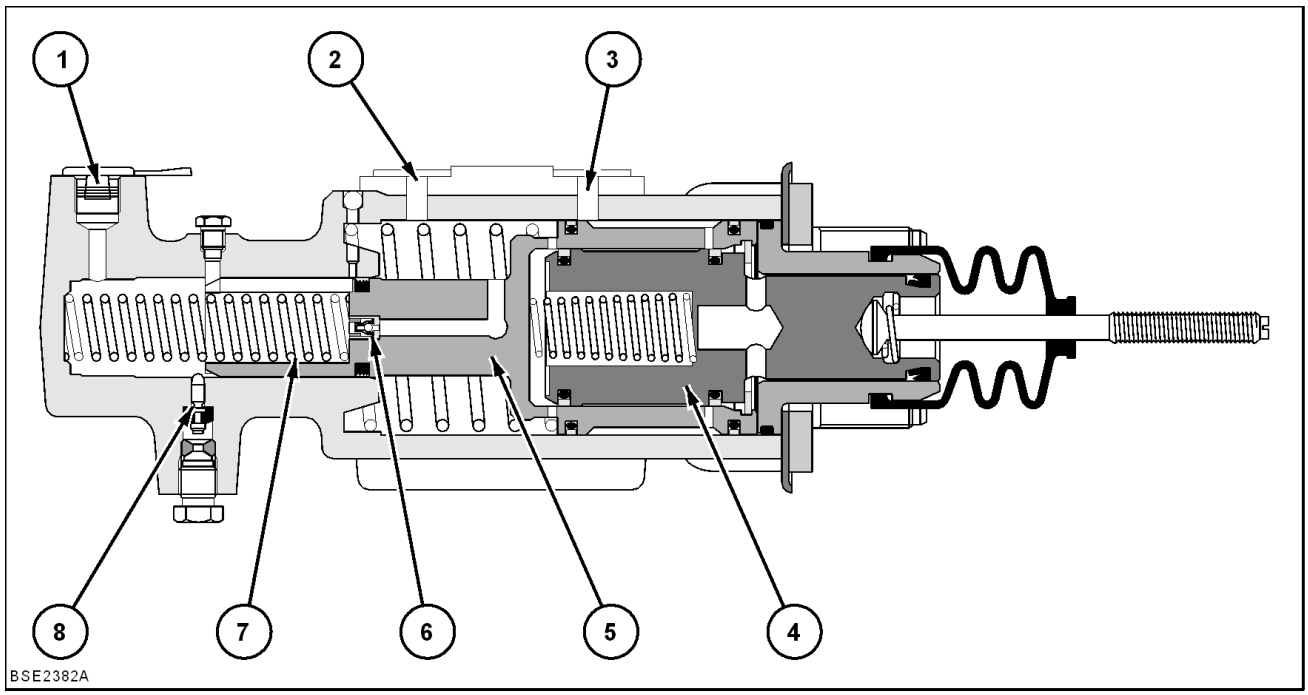
FRONT SERVICE BRAKES
The front service brakes are hydraulically operated wet disc type. They are located in the final drive cases of the front axle and are splined to the differential output axle shafts.

REAR SERVICE BRAKES
The rear service brakes are hydraulically operated wet disc type. They are located between the rear axle housing and final drive cases and are splined to the differential output axle shafts.

PARKING BRAKE
The parking brake is controlled mechanically. It acts on the rear pinion gear shaft and is controlled through a hand lever located at the left of the driver’s seat.
When the parking brake control lever is raised, the tensioning cable acts on the actuator forcing the pads against the six brake discs splined to the tractor rear pinion gear.

Refer to **SERVICE BRAKE Hydraulic - Overview (D.30.C)**

Master cylinder - Sectional view

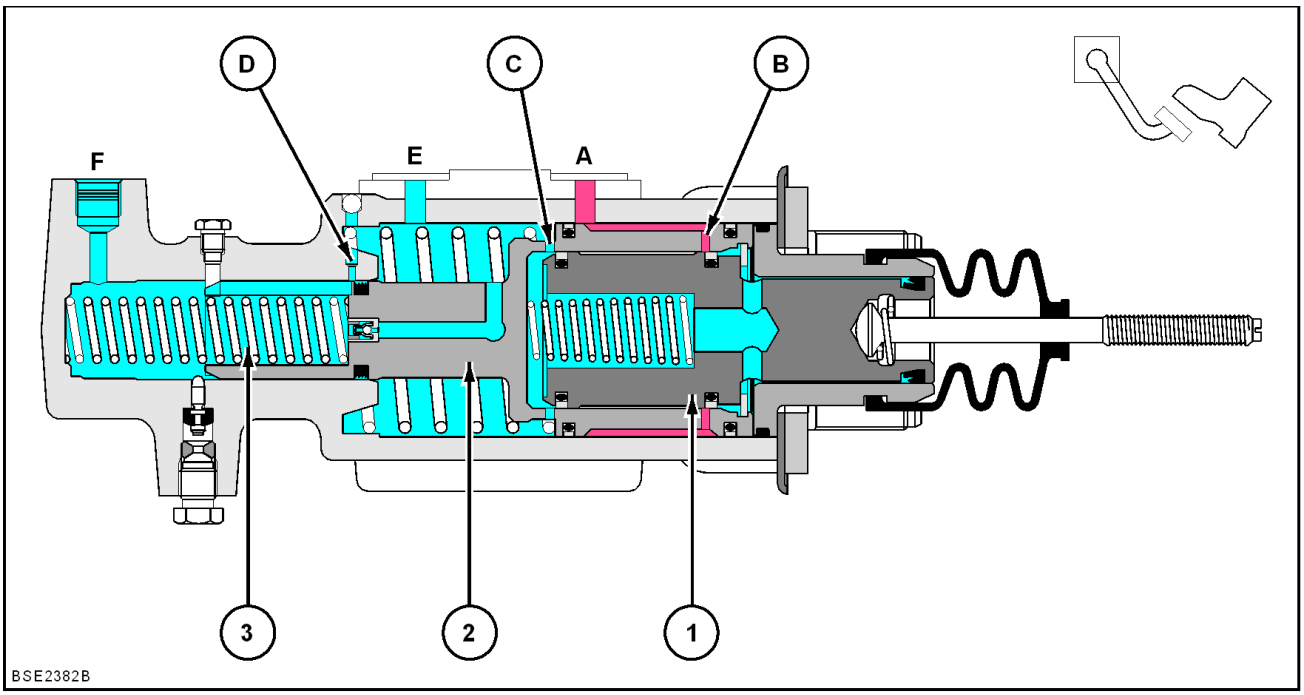


BSE2382A 1

REAR SERVICE BRAKE MASTER CYLINDER SECTIONAL VIEW

1 Outlet to Slave Cylinders
2 Low Pressure Oil Return to Sump
3 Low Pressure Oil Supply
4 Actuator Piston
5 Booster Piston
6 Bleed Top-up Valve
7 Master Cylinder
8 Balancing Valve

Master cylinder - Dynamic description



BSE2382B 1

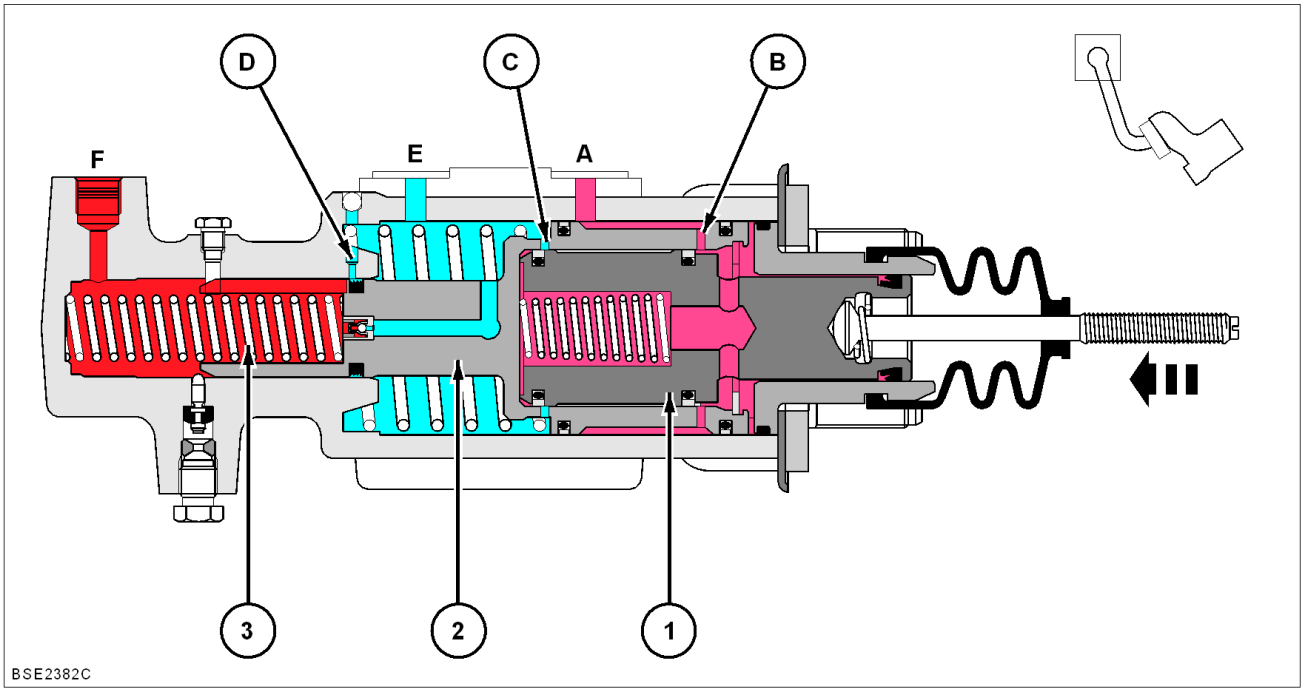
POWER BRAKES. Brakes Off

Low Pressure Oil **20 - 24 bar**

Reservoir/Sump Oil

Low pressure oil enters the valve at port A and is prevented from flowing through port ‘B’ by the actuator piston **(1)**. Oil behind the actuator piston **(1)**, booster piston **(2)** and in the master cylinder area **(3)** are open to the reservoir at port ‘E’.

POWER BRAKE OPERATION



BSE2382C 2

POWER BRAKES. Brakes Applying

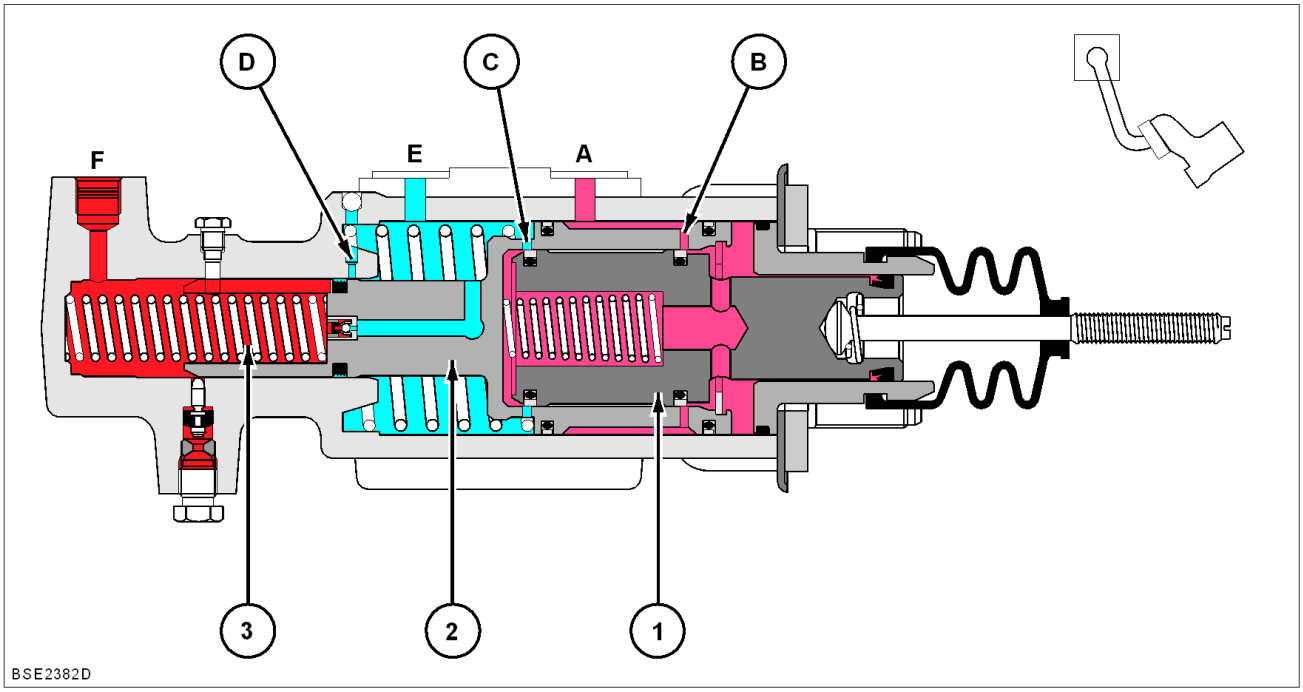
Master Cylinder Pressure Oil

Low Pressure Oil **20 - 24 bar**

Reservoir/Sump Oil

The actuator piston **(1)** moves inside the boost piston **(2)** and uncovers port ‘B’. Low pressure oil enters the valve at port ‘A’ and flows through port ‘B’ but is prevented from flowing to sump by port ‘C’ which is closed by the actuator piston. The pressure begins to act on the back of the booster piston **(2)**, assisting pedal pressure to the master cylinder. Port ‘D’ also closes and the master cylinder pressure **(3)** begins to increase and oil flows to the brakes at port ‘F’.

POWER BRAKE OPERATION



BSE2382D 3

POWER BRAKES. Brakes Applied

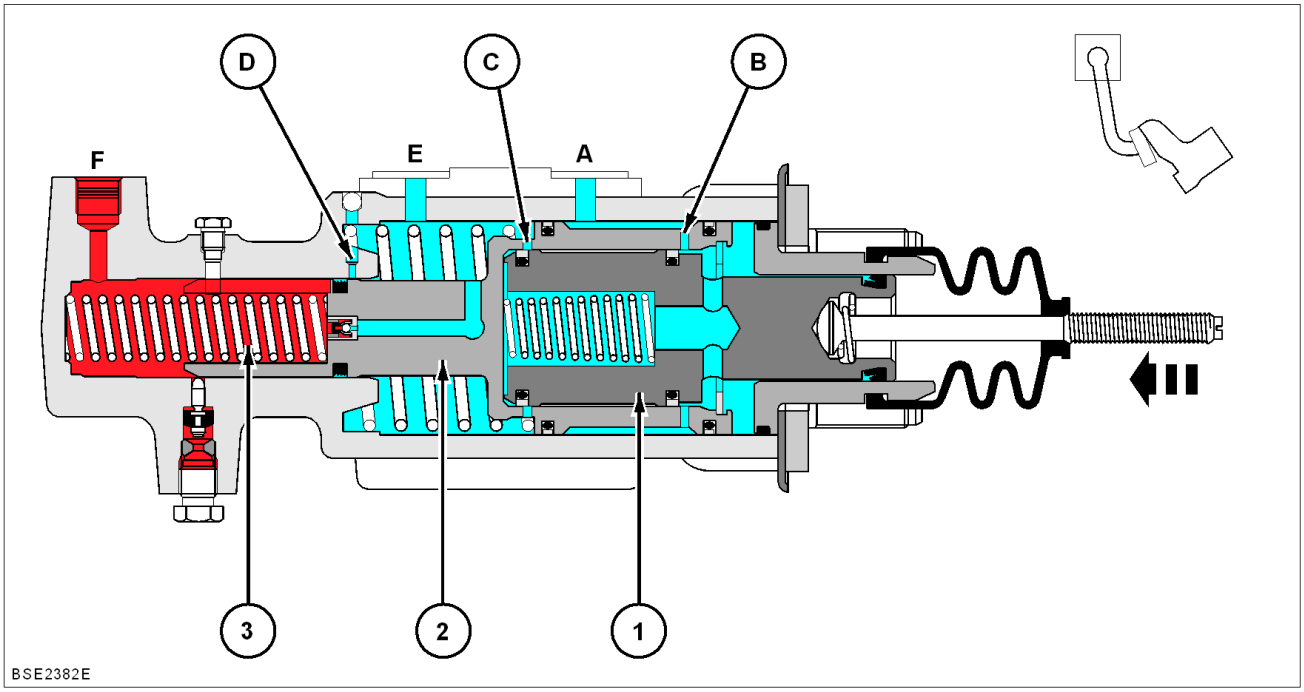
Master Cylinder Pressure Oil

Low Pressure Oil **20 - 24 bar**

Reservoir/Sump Oil

The actuator piston **(1)** stops moving inside the boost piston **(2)** but the booster piston continues to move until ports ‘B’ and ‘C’ are balanced. Port ‘D’ is also closed and the master cylinder **(3)** maintains braking pressure to the brakes at port ‘F’.

POWER BRAKE OPERATION



BSE2382E 4

POWER BRAKES. Brakes Manually Applied (ENGINE OFF)

Master Cylinder Pressure Oil

Reservoir/Sump Oil

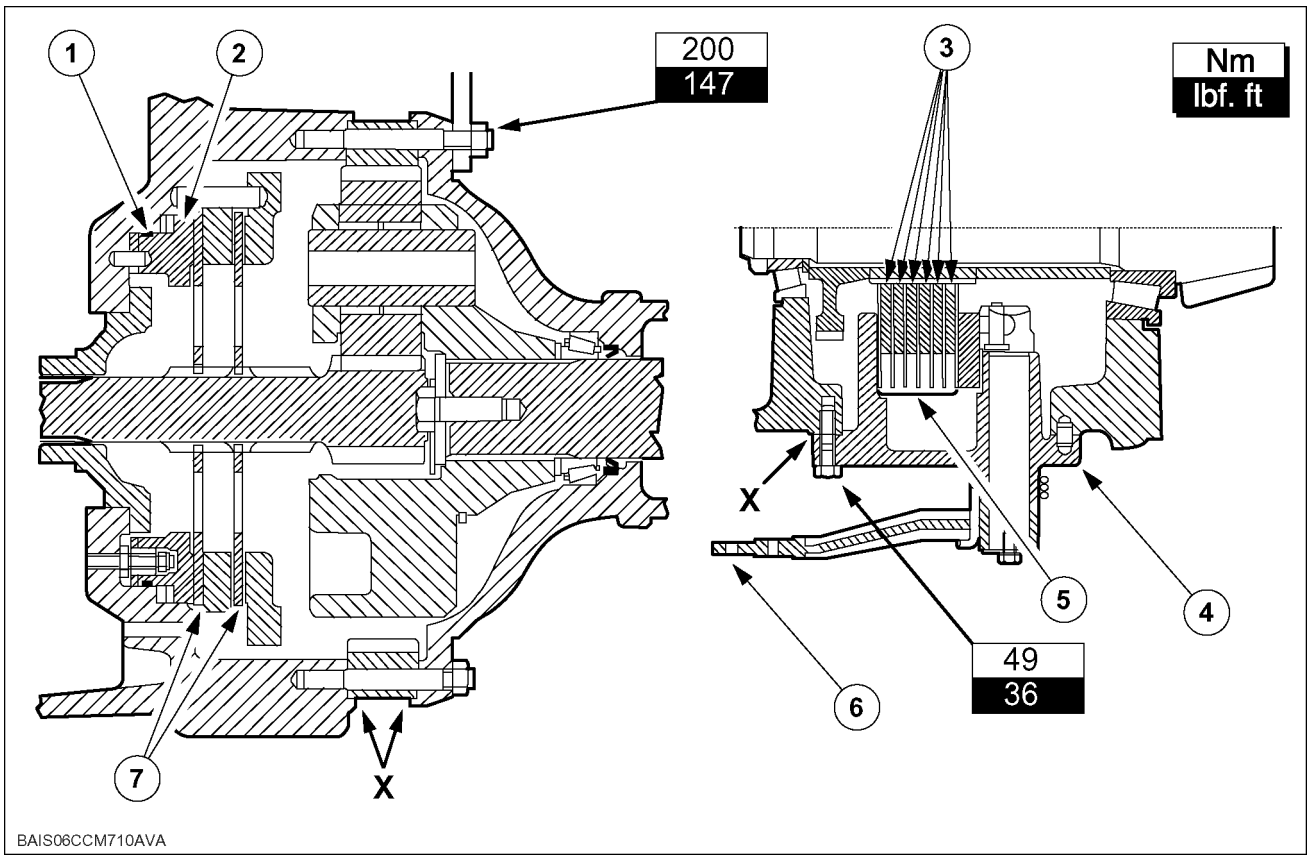
Because the engine is not running there is no low pressure oil entering the valve at port ‘A’. As the pedal is depressed the actuator piston **(1)** moves inside the booster piston **(2)** until it makes mechanical contact. Mechanical pressure is transferred to the booster piston **(2)** and therefore the master cylinder **(3)** and the brake pressure at port ‘F’ increases with no boosting pressure because the engine is not running.

Bleeding / System Top Up

NOTE: *refer to* ***Master cylinder - Sectional view (D.30.C)****.*

Depressing the pedal exhausts oil through the various bleed nipples. As the pedal pressure is released a partial vacuum is created in the master cylinder area, causing the top up valve in the centre of the booster valve to open. This allows reservoir/sump oil to top up the master cylinder area in preparation for the next downward stroke of the pedal.

Brake - Sectional view

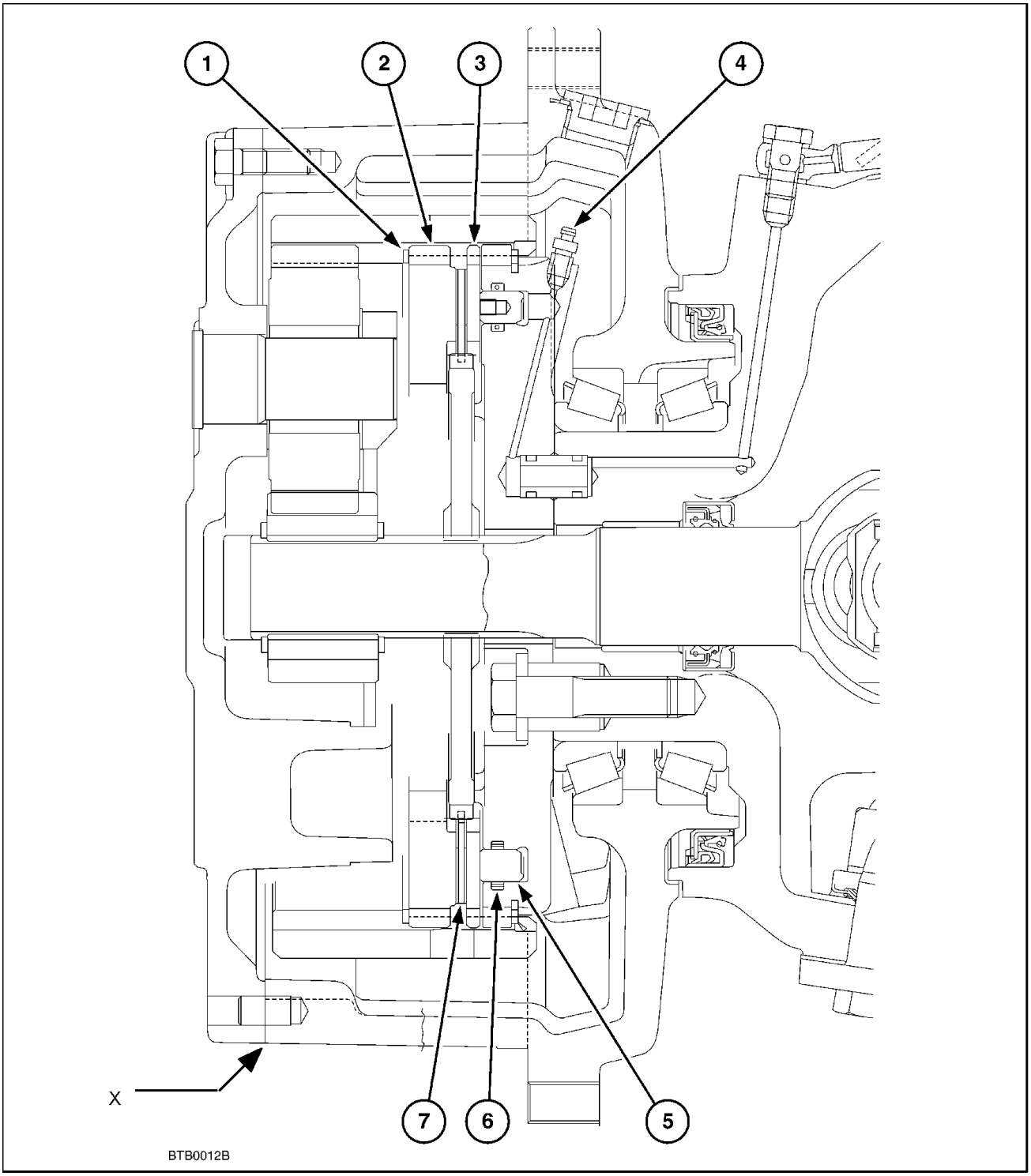


BAIS06CCM710AVA 1

PARKING AND SERVICE BRAKE SECTIONAL VIEW

1. Seal
2. Brake Control Piston
3. Parking Brake Discs
4. Friction Pad Assembly
5. Pads
6. Parking Brake Control Lever
7. Service Brake Discs

NOTE: *During installation apply liquid gasket Loctite 574 on surfaces marked with an X.*



BTB0012B 2

FRONT SERVICE BRAKE SECTIONAL VIEW

1 Outer Plate Retaining Ring
2 Outer Brake Plate
3 Inner Brake Plate
4 Brake Bleed Screw
5 Brake Piston
6 Piston Seal
7 Friction Disc

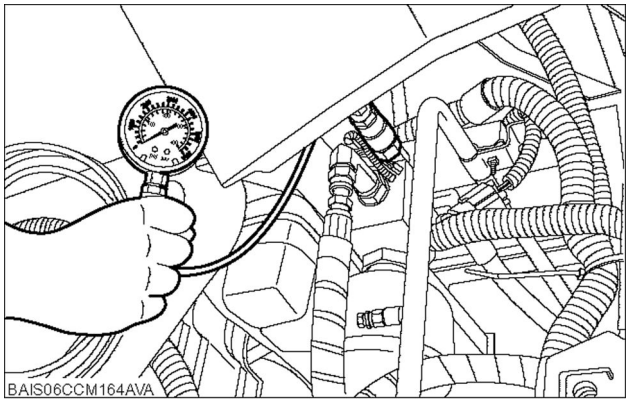
NOTE: *During installation apply liquid gasket Loctite 574 on surfaces marked with an X.*

SERVICE BRAKE Hydraulic - Pressure test

IMPORTANT: *Before performing any pressure or flow testing operate the tractor until the oil in the rear axle is at normal operating temperature.* ***65 °C*** *(* ***145 °F****).*

Power Brake Supply and Accumulator Test

1. The supply to the power brake system, the accumulator and system check valve can be checked for correct operation using the following procedure.
   Remove the low brake pressure warning switch from the manifold and install adaptor 380000577 with quick release fitting **380000492** .
   Attach a **40 bar** (**600 lbf.in2**) gauge **(1)** 380000552 using quick release coupler **380000543** and hose **380000545** .
   Start and run the engine at **1500 rev/min**. Operate the brake pedal and observe the gauge, the pressure may fluctuate slightly but should remain at approximately **23±1 bar** (**334±15 lbf.in2**).
   Turn the engine OFF and observe the gauge. If the manifold check valve is operating correctly the pressure should remain at approximately **23±1 bar** (**334±15 lbf.in2**)
   With the engine OFF, operate the brake pedals, if the accumulator is working correctly the system will lose approximately **1 bar** (**15 lbf.in2**) with every application of the brake pedals.



BAIS06CCM164AVA 1

NOTE: *If a gradual drop in pressure is indicated the master cylinder may have an internal leak or a sticking piston assembly. To confirm if a fault is within the master cylinder, cap the supply to the master cylinder from the accumulator/manifold assembly and repeat the test. If the pressure remains constant with the feed tube capped then this indicates that the master cylinder has a fault.*

NOTE: *The low brake pressure warning switch is set at* ***15 bar*** *(* ***218 lbf.in2****), therefore after approximately 7-9 applications the instrument cluster warning lamp will illuminate when the engine is not running.*

SERVICE BRAKE Hydraulic - Bleed

⚠ WARNING ⚠

Air bleeding must be carried out any time the brake hydraulic system has been opened.

B016

⚠ CAUTION ⚠

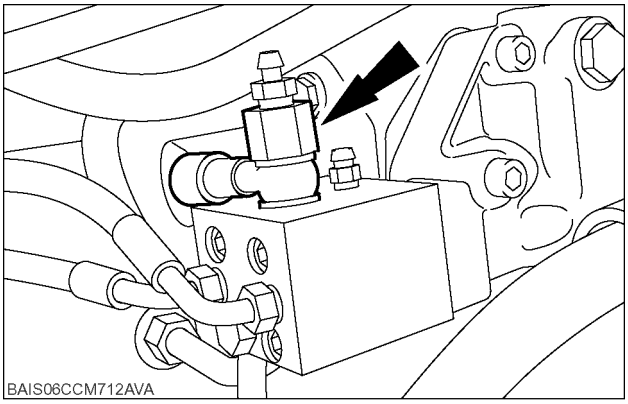
The brake accumulator can have a maximum charge pressure of 850 psi. Check for pressure in the accumulator. Remove the pressure in the accumulator before accumulator line is disconnected. Apply the brakes with the pedal approximately 40 times when the engine is off. Loosen the special fitting for removing air from the brakes and push on the brake pedal. If oil flow does not flow from the special fitting, the accumulator is not charged.

M670

All tractors

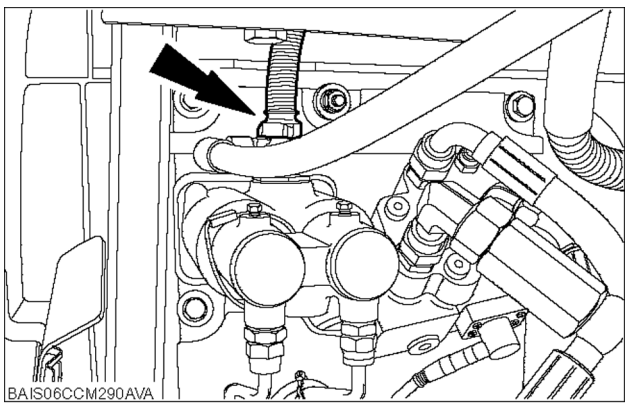
1. If fitted, remove and discard the Schrader valve assembly from the logic head.
   The valve is only used for initial filling, removal reduces possible air ingression points.
   Replace the copper washers with bonded seals (part no. 5183780).

NOTE: *Tractors without pneumatic trailer brakes shown.*



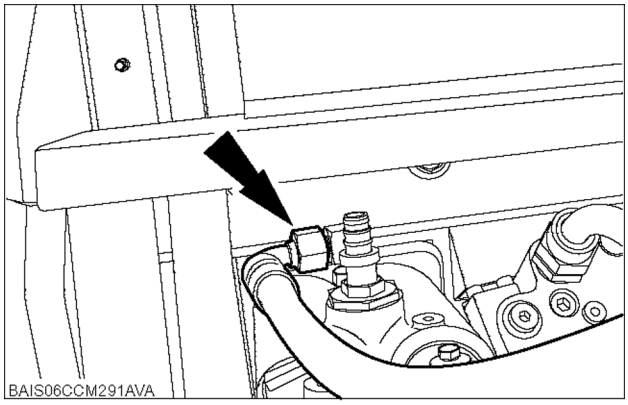
BAIS06CCM712AVA 1

2. Disconnect the master cylinder vent hose.



BAIS06CCM290AVA 2

3. Disconnect the master cylinder supply hose and fill with LHM brake oil.

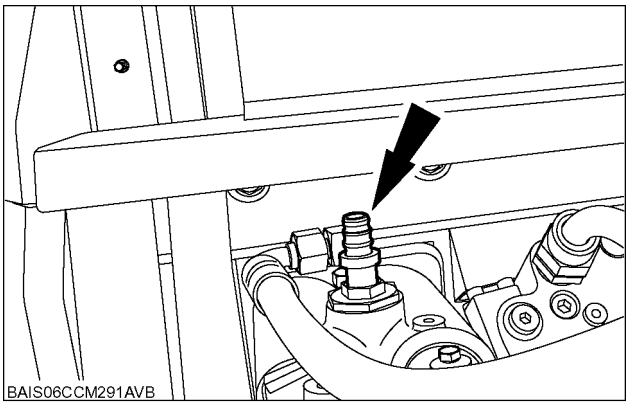


BAIS06CCM291AVA 3

4. Fabricate a temporary reservoir and connect it to the master cylinder return port.
   Fill the reservoir with LHM brake oil.

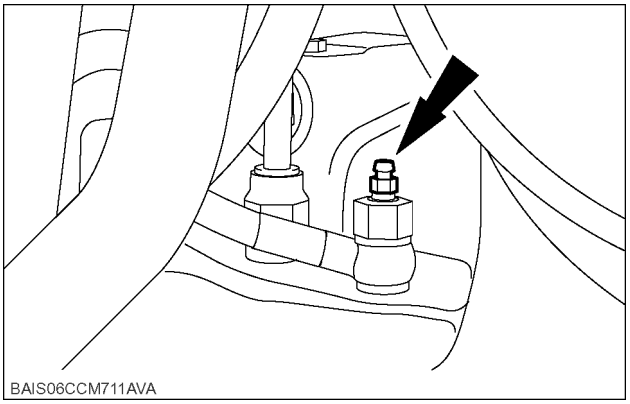
NOTE: *Ensure that the connection is air tight.*

IMPORTANT: *Ensure that the reservoir is kept topped up with oil throughout bleeding.*



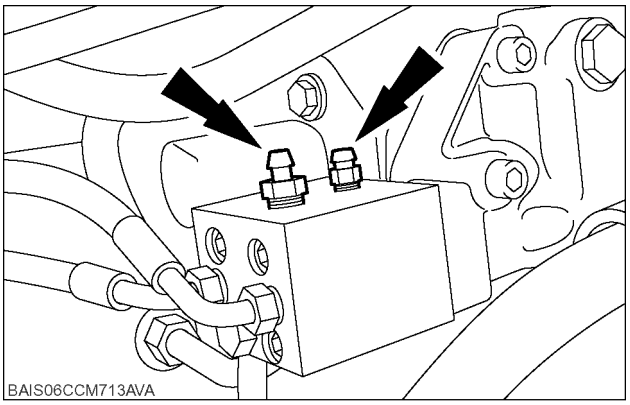
BAIS06CCM291AVB 4

5. Uncouple the brake pedals and slowly depress the left hand brake pedal to pressurize the oil.
   Attach a suitable bleed tube with a one-way valve action to the left hand bleed screw. With the brake pedal held down, unscrew the bleed screw by half a turn. Let the oil drain with any air bubbles.
   Repeat this step until the brakes are completely filled with LHM oil and free of air.
   Repeat for right hand side.



BAIS06CCM711AVA 5

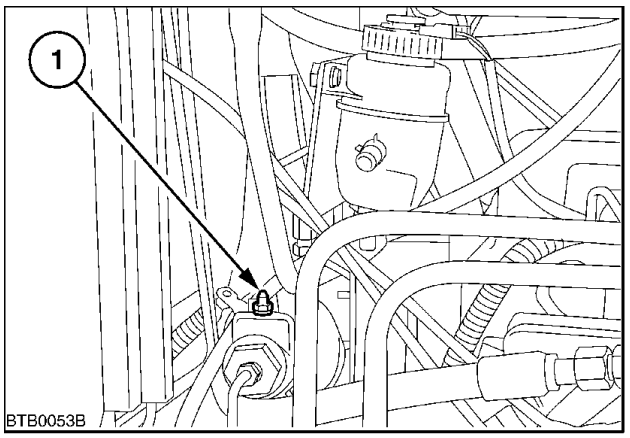
6. Couple the brake pedals together.
   Bleed the logic head.



BAIS06CCM713AVA 6

Tractors with front Brakes

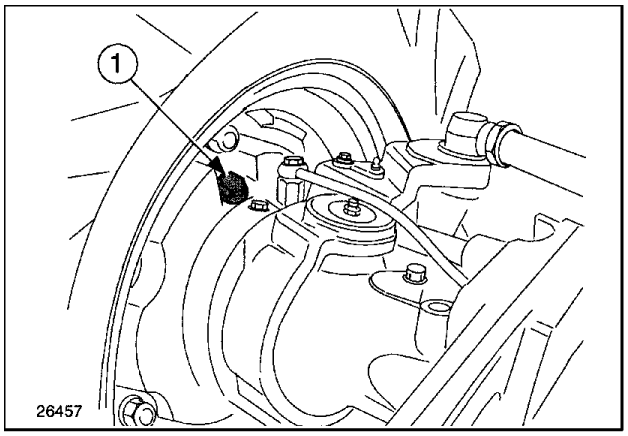
7. If the tractor is fitted with front axle brakes, perform bleeding as for the standard tractor. Couple the brake pedals then bleed air from bleed screw **(1)** at the booster unit, top up the oil reservoir after completion of bleeding.



BTB0053B 7

8. Rotate the hubs to position the plug **(1)** in the vertical position. Remove the plug and ensure the bleed screw is aligned with the hole.

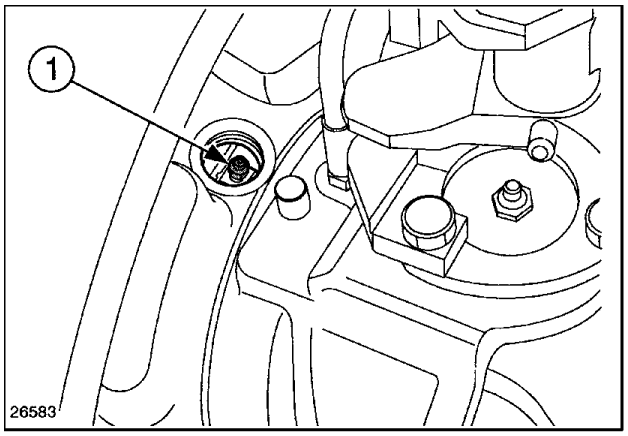
NOTE: *With some wheel options it may be necessary to bleed the brakes with the wheels removed.*



26457 8

9. Loosen the screw and attach a suitable bleeding tube with a one-way valve action. Pump the latched brake pedals until the fluid expelled is free from bubbles. Hold the brake pedals down and remove the tube and tighten the bleed screw. Repeat for the other wheel. On completion of the procedure refit the axle plug and ensure the oil level in the reservoir is at the correct level.

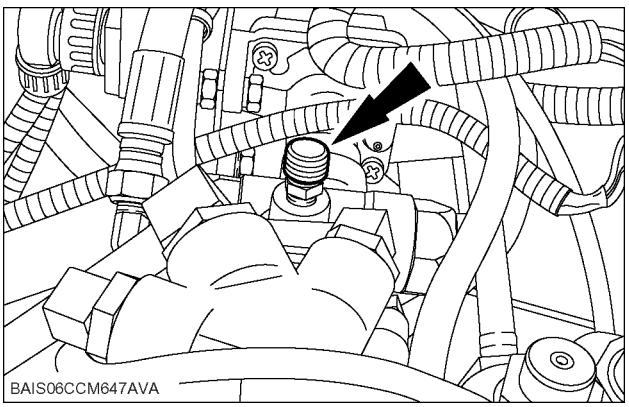
NOTE: *If the brake oil has escaped into the hub the hub should be drained and refilled with the correctly specified front axle oil,* ***CASE AKCELA HY-TRAN ULTRA*** *.*



26583 9

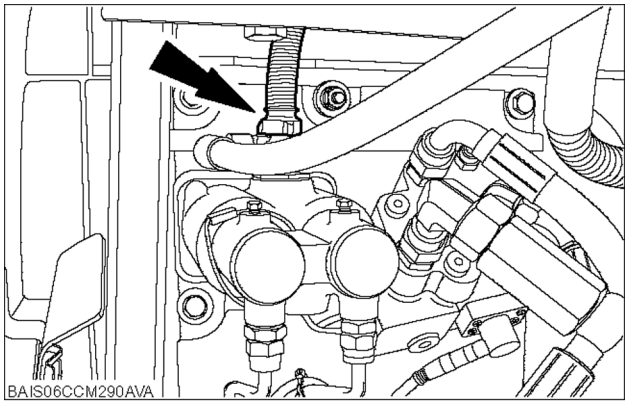
Tractors with pneumatic trailer brakes.

10. Bleed the dual line airbrake control valve.



BAIS06CCM647AVB 10

11. Disconnect and remove the temporary reservoir. Connect the master cylinder vent hose.

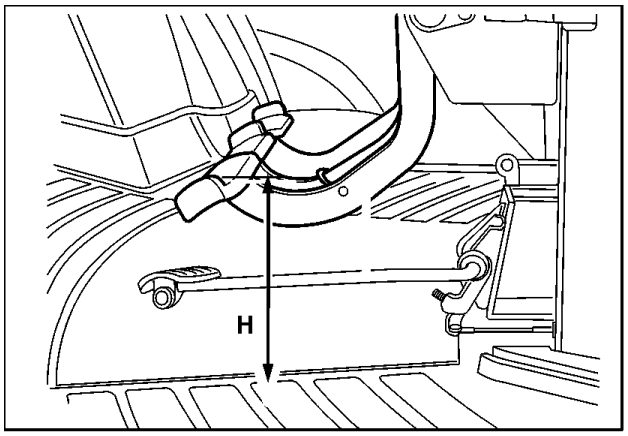


BAIS06CCM290AVA 11

Next operation:
Start the engine, press and hold the brake pedals, check there are is no pedal creep down.
Next operation:
Visually check all fittings, components and pipes for leaks.

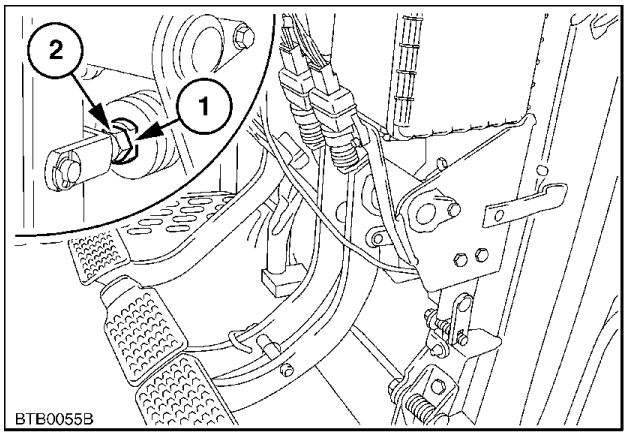
Command - Adjust

1. With the brake pedals connected to the master cylinder pushrods and the latching pin disconnected, check the distance **(H)** from pedal centre to the floor mat. It should be approximately **185 mm**.



1b0o2004106423 1

2. If this is not the case, release the locknuts **(2)** and screw in or out the adjust screw **(1)** to obtain the specified distance. Tighten the locknuts.



BTB0055B 2

3. Brake Pedal Switches Adjustment
   After installing new master cylinders or adjusting the pedal height check that the brake switches are correctly adjusted:-
   1. Locate a **2.5 mm** (0.10 inch) thick gauge bar between the switch and brake pedal. Loosen the switch retaining screws.
   2. Push the switch towards the brake pedal to the limit of the plunger travel whilst ensuring that the pedal remains stationary. Tighten the retaining screws and remove the gauge. Repeat for the other switch.

   After adjustment ensure that both switches can be heard operating and operating simultaneously.

Control valve - Remove

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

B026

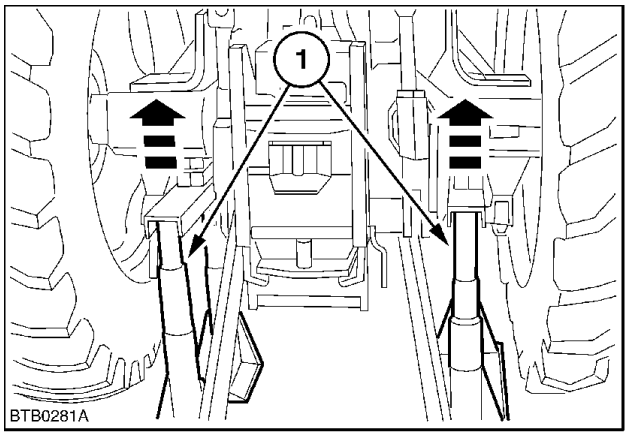
⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012

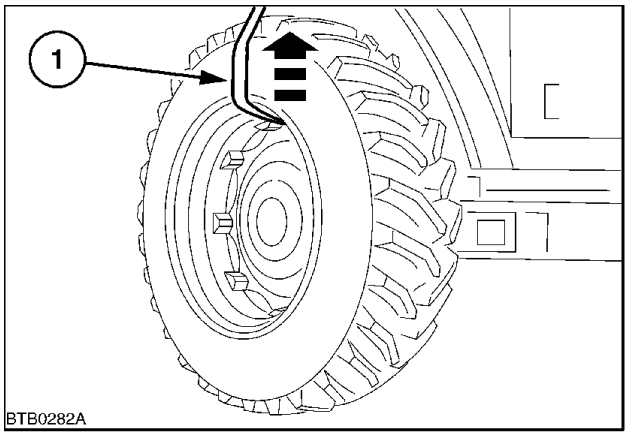
1. Ensure that the tractor is parked on a level surface.
2. Chock the front wheels using suitable wheels stops.
3. Raise the rear of the tractor and place two suitable axle stands **(1)** under the final drive cases.

NOTE: *If required, detach the lift rods from the lower links.*



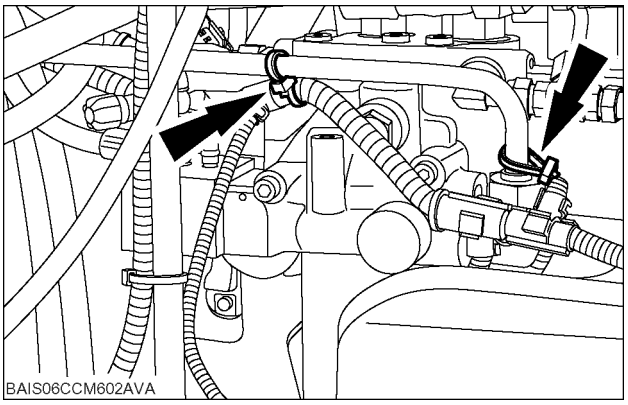
BTB0281A 1

4. Using a suitable sling **(1)** connect the rear wheel to a hoist and remove the rear wheel.



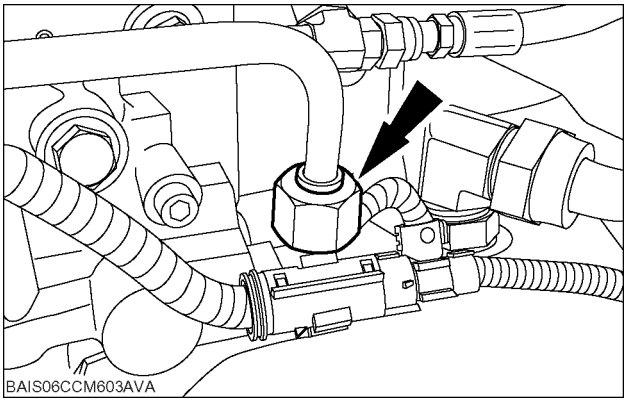
BTB0282A 2

5. Cut the cable ties and detach the wiring harness.



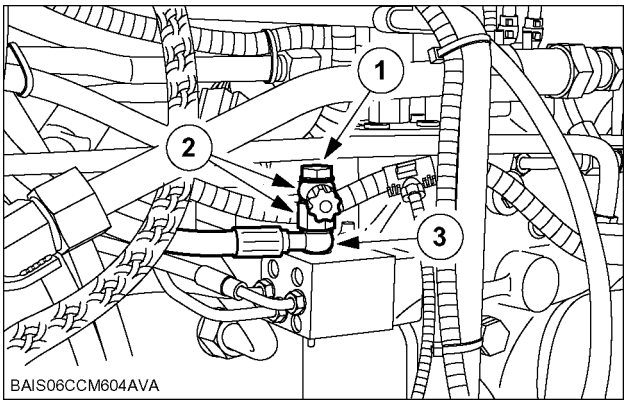
BAIS06CCM602AVA 3

6. Disconnect the coupler pipe retaining nut.



BAIS06CCM603AVA 4

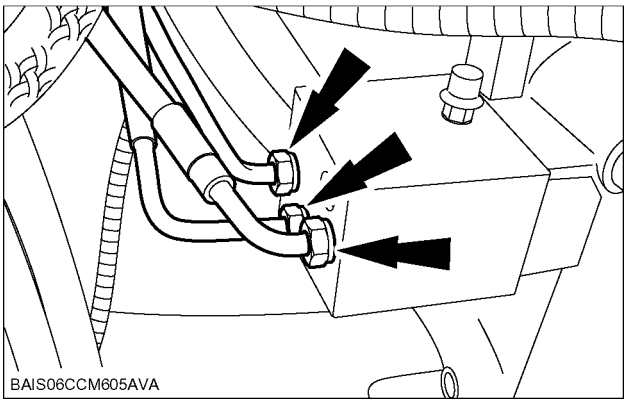
7. Remove the banjo bolt **(1)**. Remove and discard the schrader valve and adaptor **(2)**. Disconnect the brake pipe union from the control valve **(3)**.



BAIS06CCM604AVA 5

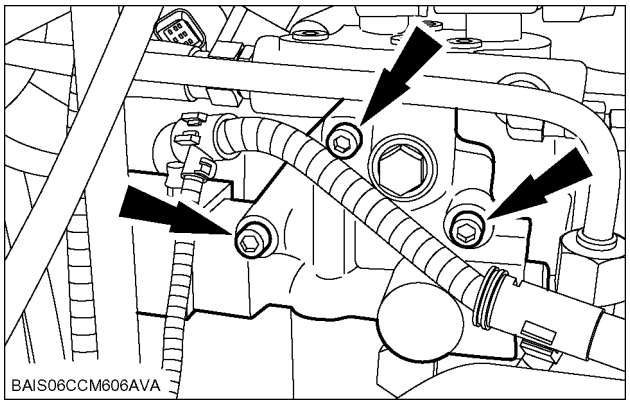
8. Disconnect the brake pipes.

NOTE: *Make a note of the postion of the brake pipes to aid installation.*



BAIS06CCM605AVA 6

9. Remove the control valve.



BAIS06CCM606AVA 7

Control valve - Install

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

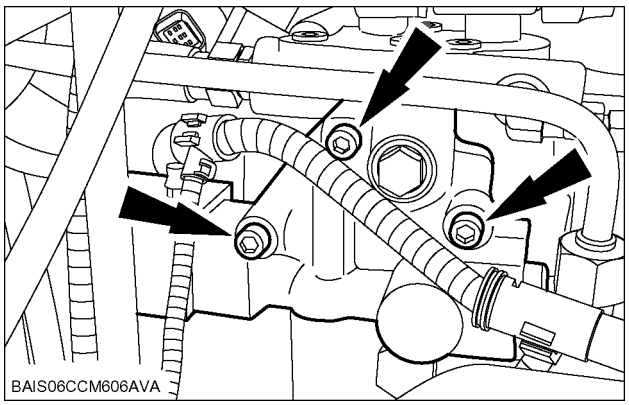
B026

⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

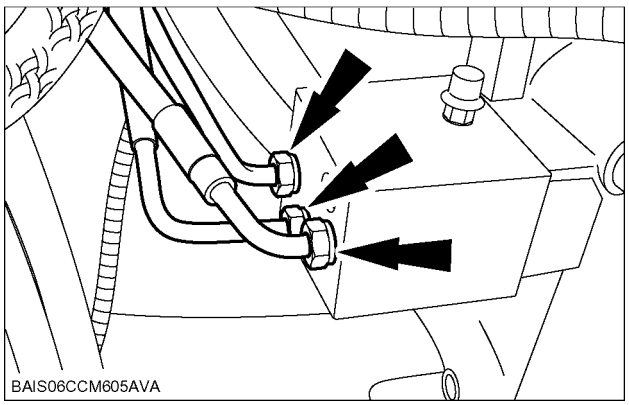
B012

1. Install the control valve.



BAIS06CCM606AVA 1

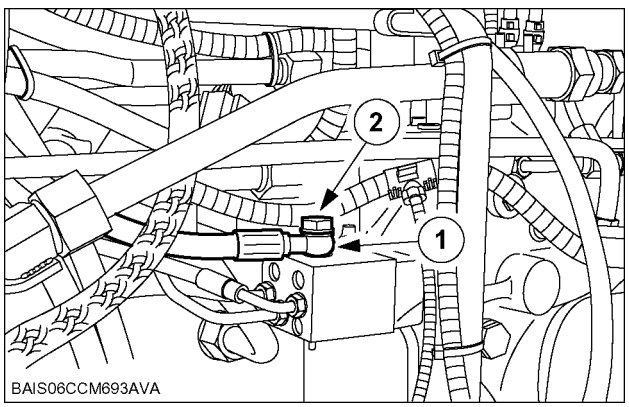
2. Install the brake pipes to their noted removal positions.



BAIS06CCM605AVA 2

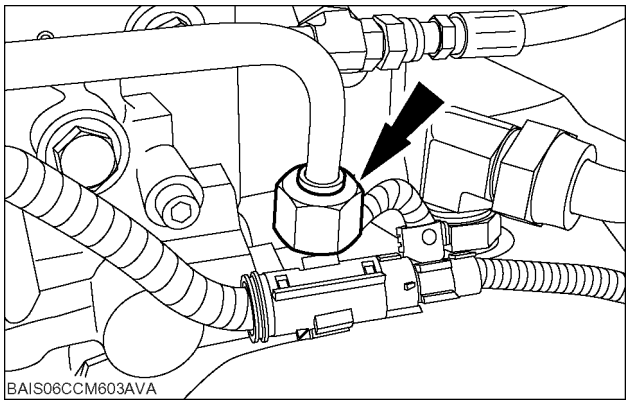
3. Install the brake pipe union **(1)** and the banjo bolt **(2)**.

NOTE: *Replace the copper washers with bonded seals (part no 5183780).*



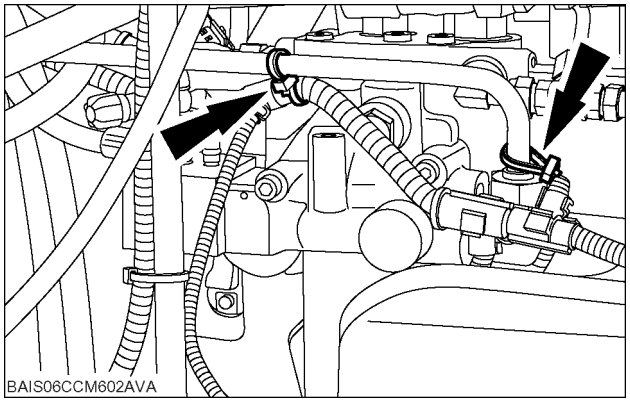
BAIS06CCM693AVA 3

4. Install the coupler pipe retaining nut.



BAIS06CCM603AVA 4

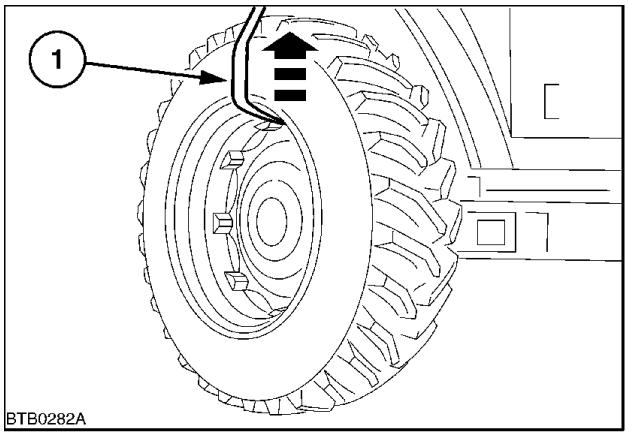
5. Cable tie the wiring harness to the control valve.



BAIS06CCM602AVA 5

6. Bleed the brakes as described in **SERVICE BRAKE Hydraulic - Bleed (D.30.C)**.

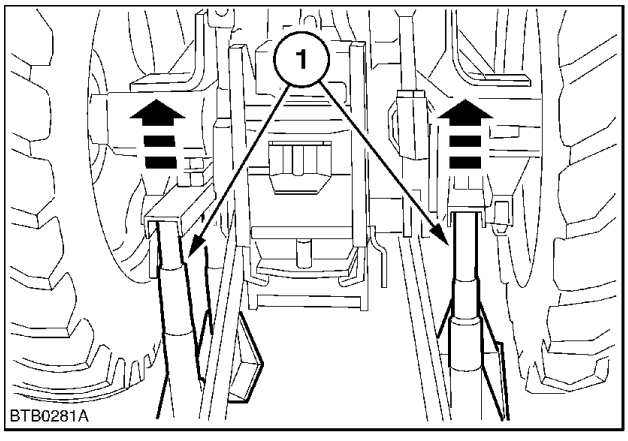
7. Using a suitable sling **(1)** connect the rear wheel to a hoist and install the rear wheel.
For correct torques, refer to **Rear wheel - Torque (D.50.C)**



BTB0282A 6

8. Remove the axle stands **(1)**.

NOTE: *If required, attach the lift rods to the lower links.*



BTB0281A 7

Master cylinder - Remove

Prior operation:
Before carrying out any work on the braking system carry out the following operations.
- Park the tractor on a level surface. Block the wheels to prevent the tractor moving.
- Detach the negative cable from the battery and insulate.

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

B026

⚠ WARNING ⚠

The master cylinder is not a serviceable item. If it is showing signs of leakage, damage or suspected of malfunctioning, the complete unit must be replaced. DO NOT attempt to disassemble and reassemble as seal damage will occur, rendering the unit inoperative with a resultant loss of brake performance.

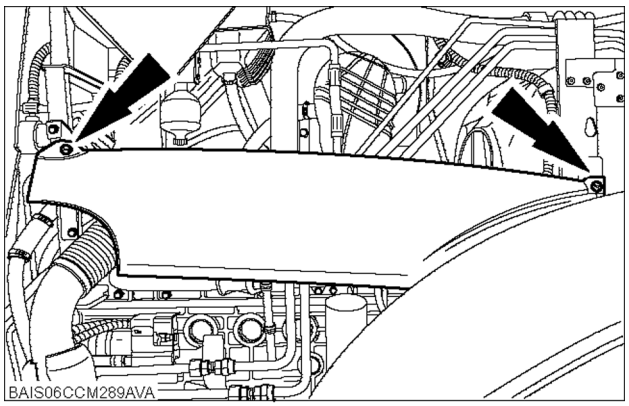
B034

⚠ CAUTION ⚠

The brake accumulator can have a maximum charge pressure of 850 psi. Check for pressure in the accumulator. Remove the pressure in the accumulator before accumulator line is disconnected. Apply the brakes with the pedal approximately 40 times when the engine is off. Loosen the special fitting for removing air from the brakes and push on the brake pedal. If oil flow does not flow from the special fitting, the accumulator is not charged.

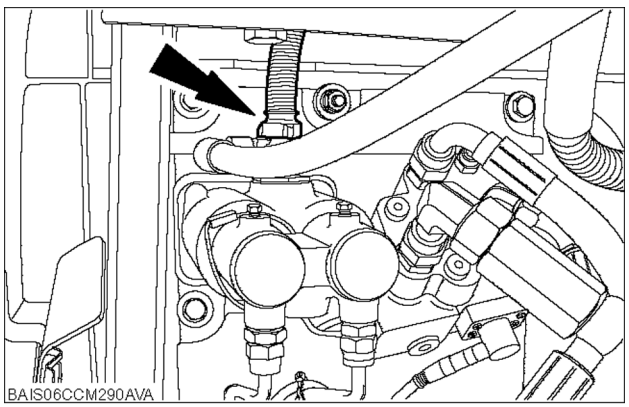
M670

1. Remove the right hand engine side panel.



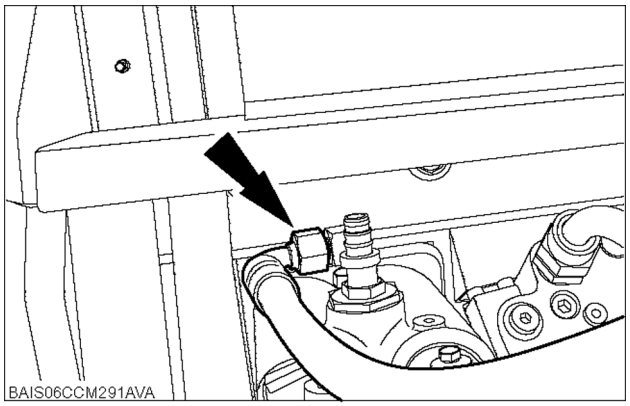
BAIS06CCM289AVA 1

2. Disconnect the master cylinder vent hose.



BAIS06CCM290AVA 2

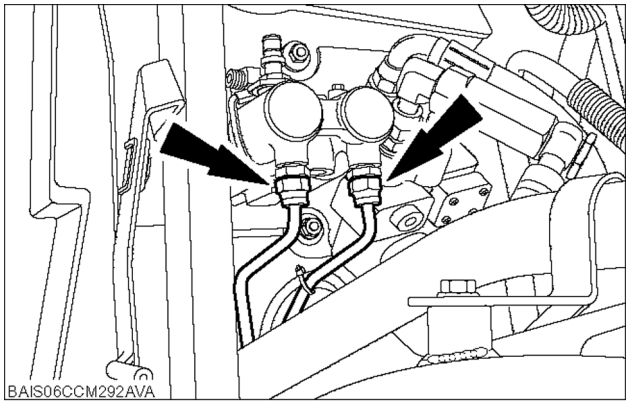
3. Disconnect the master cylinder supply hose.



BAIS06CCM291AVA 3

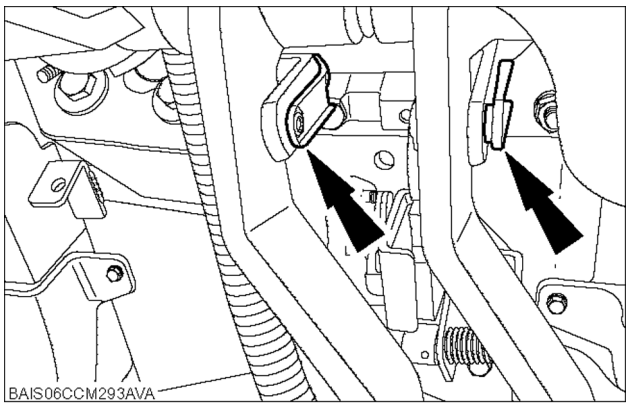
4. Disconnect the master cylinder outlet pipes.

NOTE: *Place a suitable container under the master cylinder to collect drained out fluid.*



BAIS06CCM292AVA 4

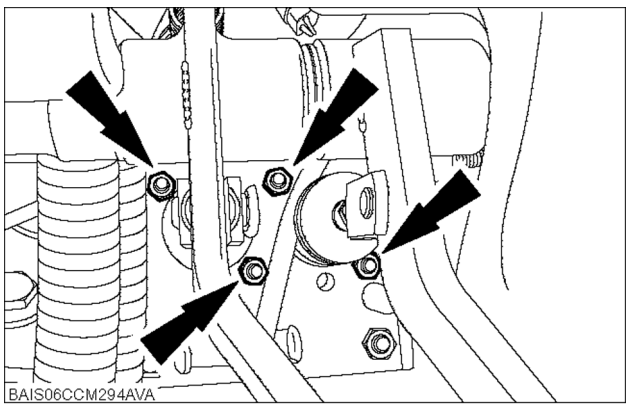
5. Unlock and slide out the cotter pins connecting the clevis on the master cylinder push rod to the pedals.



BAIS06CCM293AVA 5

6. Remove the four master cylinder retaining bolts. Remove the master cylinder from the tractor from the engine side.

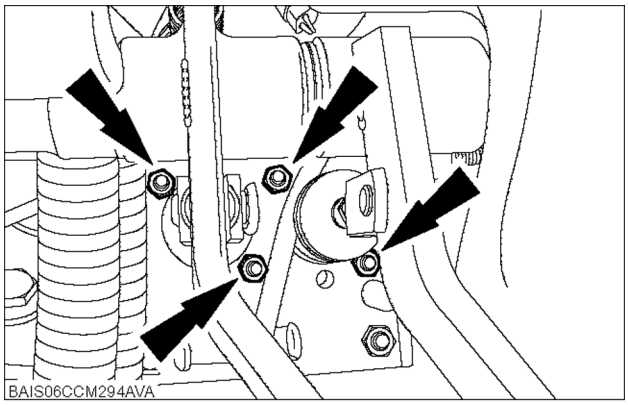
NOTE: *Lubricate the grommets to assist removal.*



BAIS06CCM294AVA 6

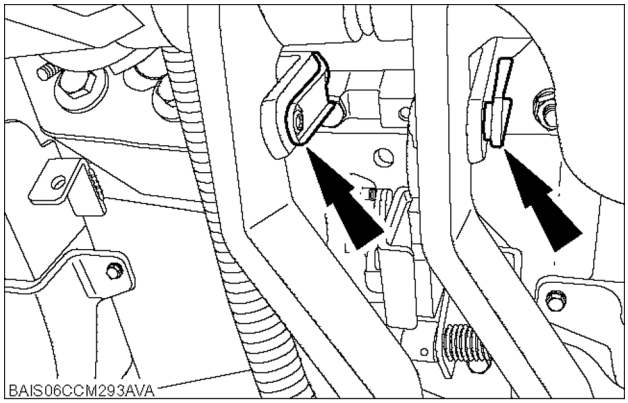
Master cylinder - Install

1. From the engine side, locate the master cylinder. Install the four master cylinder retaining bolts.



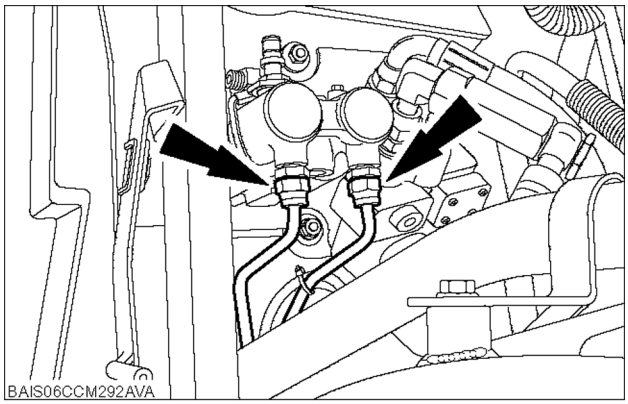
BAIS06CCM294AVA 1

2. Install the cotter pins connecting the clevis on the master cylinder push rod to the pedals.



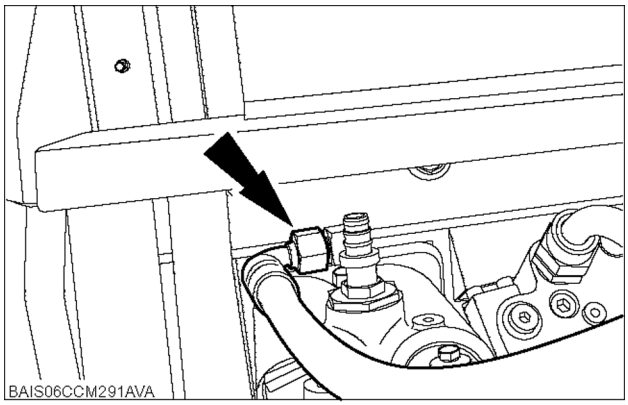
BAIS06CCM293AVA 2

3. Connect the master cylinder outlet pipes.



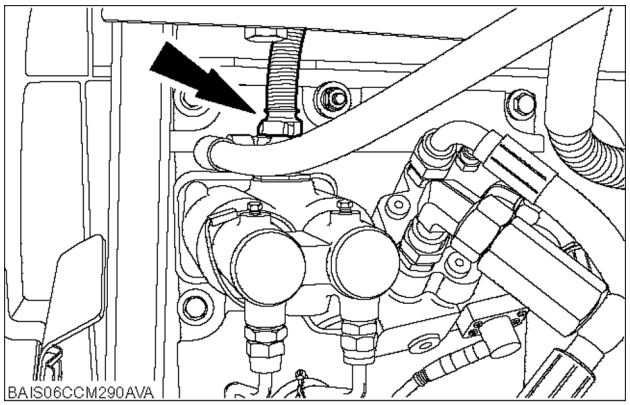
BAIS06CCM292AVA 3

4. Connect the master cylinder supply hose.



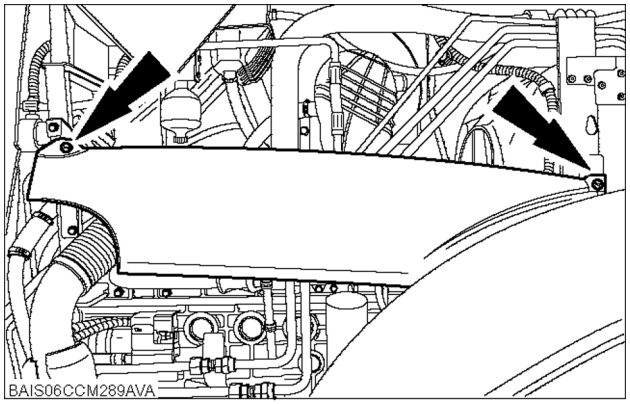
BAIS06CCM291AVA 4

5. Connect the master cylinder vent hose.



BAIS06CCM290AVA 5

6. Install the right hand engine side panel.



BAIS06CCM289AVA 6

Next operation:
Adjust pedal height if required.
Bleed the hydraulic brake system, for further information refer to **SERVICE BRAKE Hydraulic - Bleed (D.30.C)**

Hydraulic line - Remove

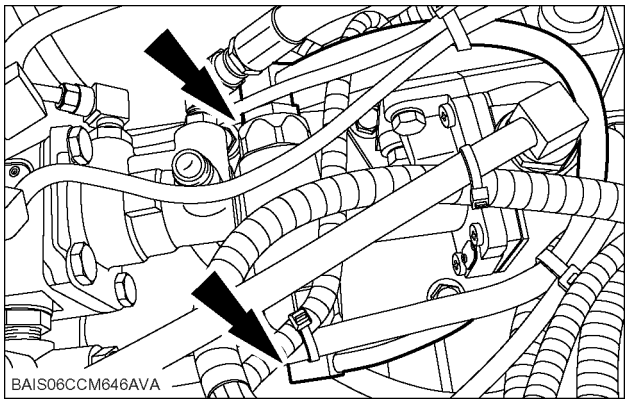
⚠ WARNING ⚠

Before removing any air system component make sure that there is no air pressure in the system. This can be achieved by depressing and releasing the brake pedal several times with the engine off and draining the air reservoirs. Also make sure that the wheels of the vehicle are chocked.

B022

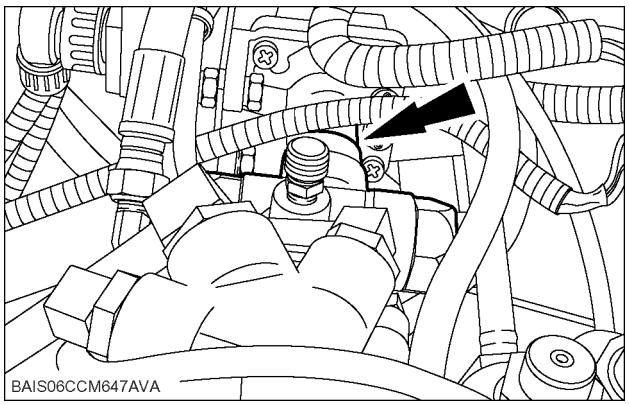
Pilot Head Valve Assembly

1. Disconnect the two tubes from the braking system. Cap the ends of the tubes to prevent dirt ingress.



BAIS06CCM646AVA 1

2. Remove the pilot head valve.



BAIS06CCM647AVA 2

3. Reassembly is the reversal of removal procedure.

Next operation:
Bleed the brake system. For further information refer to **SERVICE BRAKE Hydraulic - Bleed (D.30.C)**.

SERVICE BRAKE Hydraulic - Troubleshooting

Problem	Possible Cause	Correction
Brake pedals are difficult to operate	Seized hydraulic master cylinder.	Replace the master cylinder.
	Blocked or flattened brake control lines.	Clean or replace the brake control lines.
Brakes remain applied when the brake pedals are released	Seized master cylinder pistons.	Replace the master cylinder.
	Seized master cylinder operating linkage.	Clean and lubricate the linkage. Make sure water and dirt ingress is not possible.
Brake noise	Worn brake discs.	Replace brake discs.
Excessive brake pedal travel	Air in the brake system.	Bleed the air form the brake system.
	Worn brake master cylinders	Replace the brake master cylinders.
	Oil leakage from the brake system.	Repair the leakage.
	Rear service brake self adjusters loose in the brake piston.	Replace the brake self adjusters.
Unbalanced braking	Wrong tyre pressure.	Inflate tyres to correct pressure.
	Worn brake master cylinder.	Replace brake master cylinder.
	Blocked or flattened master cylinder balance tube.	Clean or replace the balance tube.
	Blocked or flattened brake control lines.	Clean or replace the brake control lines.
	Worn or broken master cylinder oil seals.	Replace the master cylinder.
	Worn brake discs on one side.	Replace brake discs.
Poor braking action - No/low front brake assistance	Worn brake discs.	Replace brake discs.
	Worn brake master cylinder.	Replace brake master cylinder.
	Air in the brake system.	Bleed the air form the brake system.
	Oil leakage from the brake system.	Repair the leakage.
	Front brake valve faulty.	Repair or replace the front brake valve.
	Logic head faulty.	Repair or replace the logic head.
	Air in the front brake circuit.	Bleed the air form the front brake circuit.
	Faulty low pressure circuit.	Pressure test the low pressure circuit.
Parking brake does not operate correctly	Parking brake cable incorrectly adjusted.	Adjust the parking brake cable.
	Worn brake pads.	Replace brake pads.
Parking brake will not release	Restricted parking brake lever travel.	Repair as necessary.
	Seized brake pads on the brake discs.	Replace damaged parts.

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SERVICE BRAKE Pneumatic - 30.E

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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SERVICE BRAKE Pneumatic - 30.E

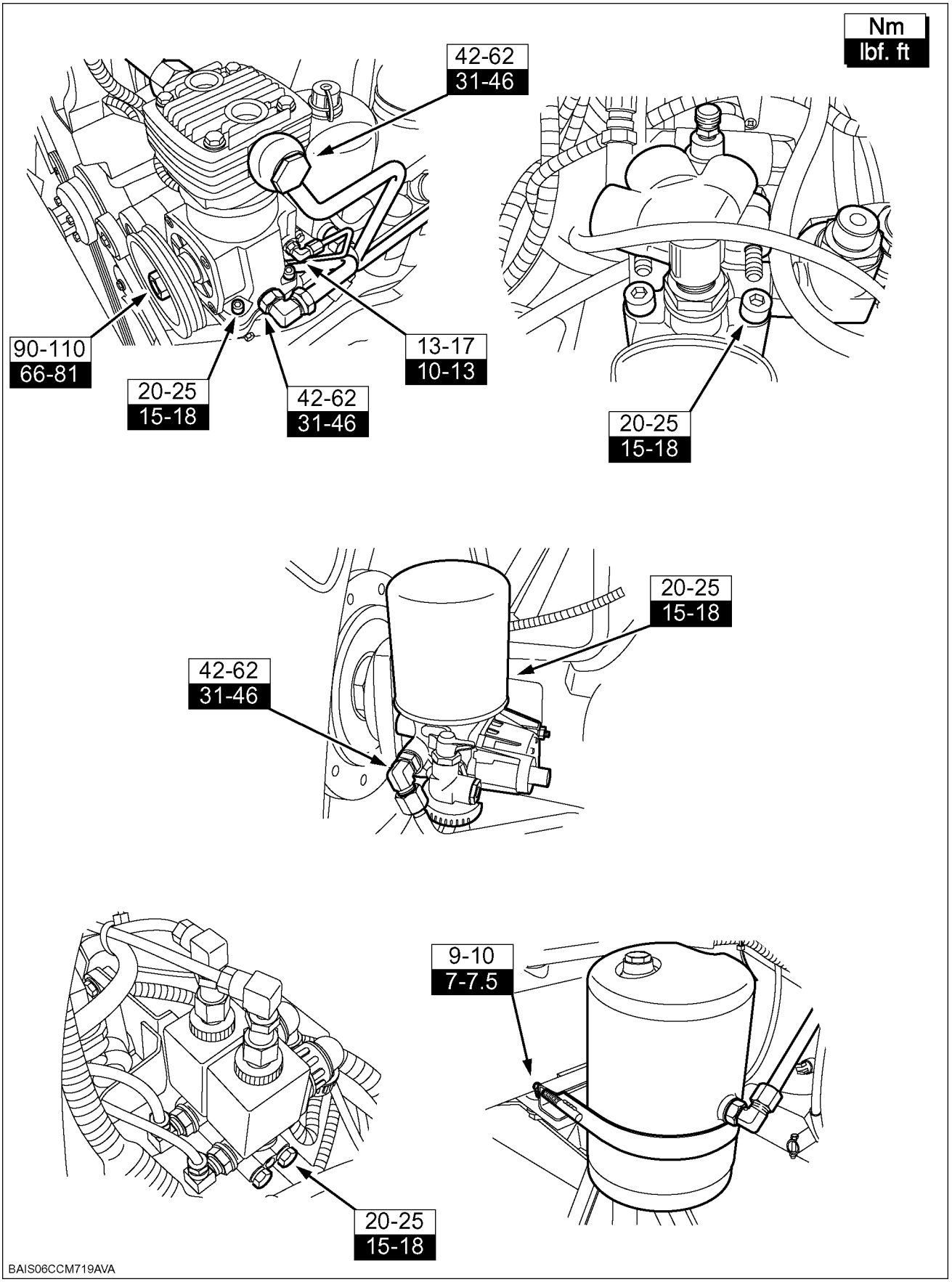
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SERVICE BRAKE Pneumatic - General specification

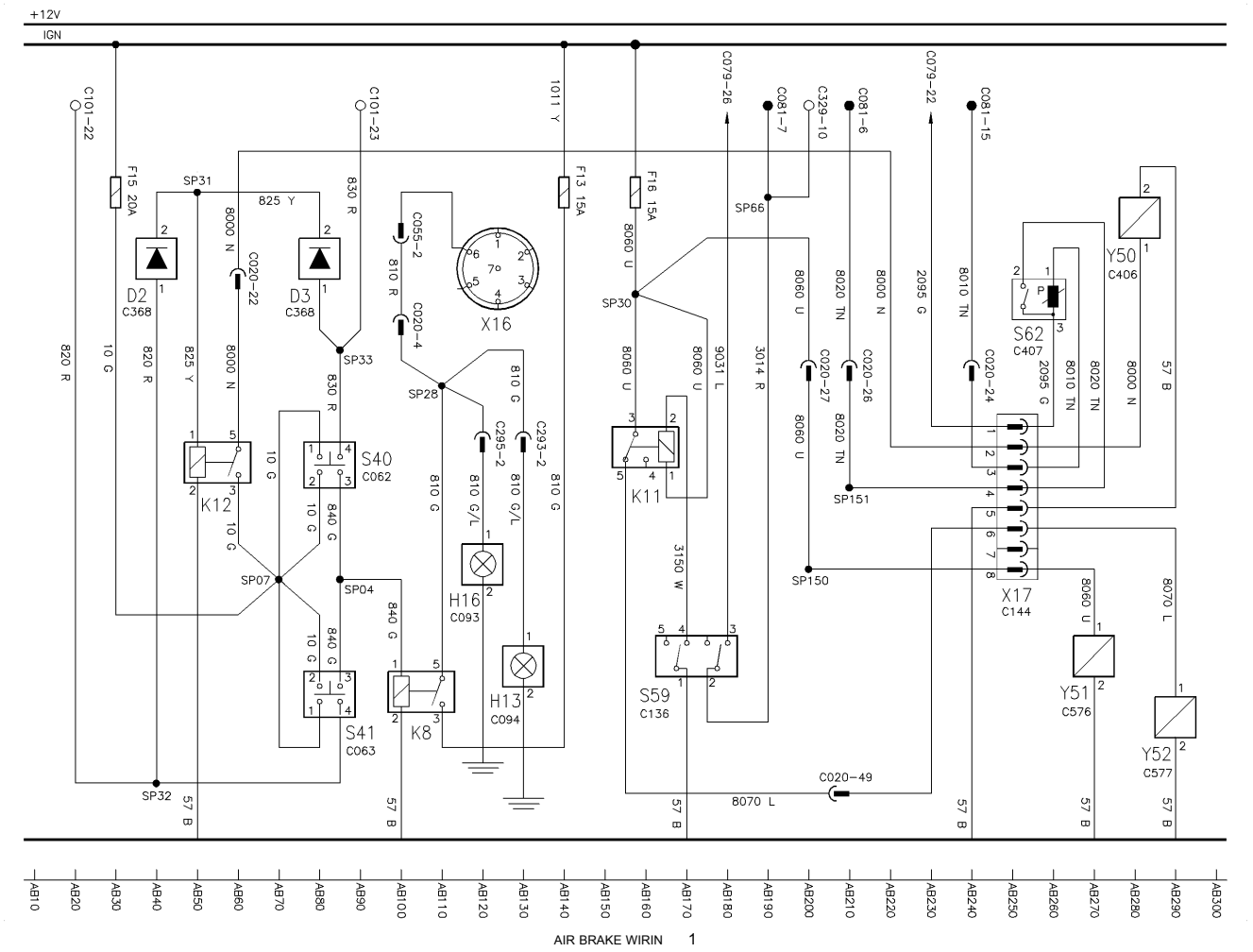
Air Compressor:	
Location	Left hand side of engine, above the alternator
Drive	Belt driven via crankshaft/water pump
Type	Single cylinder air cooled
Speed	**3,000 rev/min**
Lubrication	Pressure fed from engine
Bore / Stroke	**75 mm** x **36 mm**
Displacement	**159 cm3**
Operating Pressure	**18 bar** (**261 lbf.in2**) Maximum
System Operating Pressure	**7.8 - 8.3 bar** (**113 - 120 lbf.in2**)
Unload (relief) Valve Setting	**12 bar 174 lbf.in2**)
Low Pressure Warning Switch Operates at,	**4.5 - 5.0 bar** (**65 - 73 lbf.in2**)

Pressure Sender	Pressure (bars)	0	2	6	10
	Ohms	10	52	124	184

Maintenance

Drain Reservoir Tanks	Daily
Compressor Drive Belt Tension	Every **300 hours**

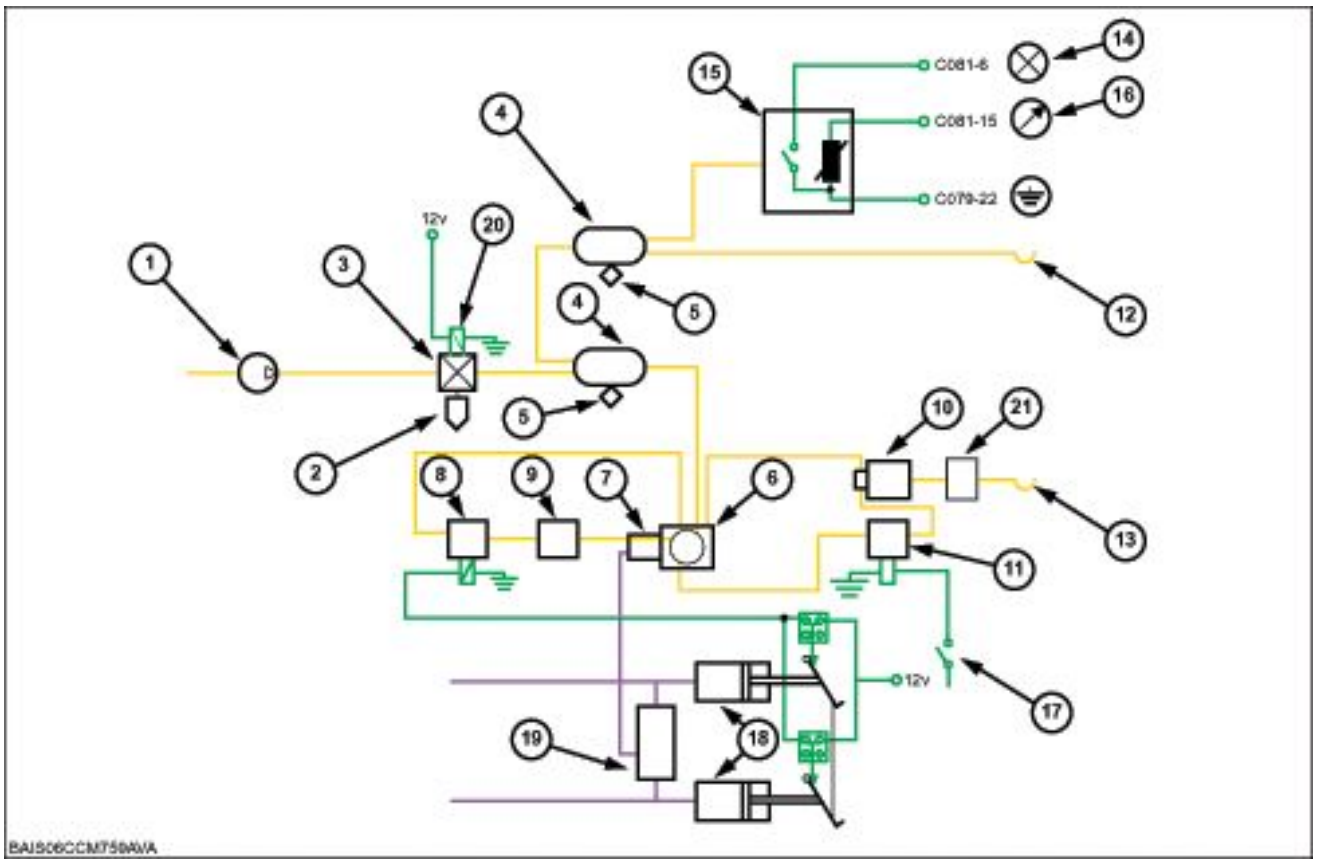
SERVICE BRAKE Pneumatic - Electrical schema



Air Brake Electrical System

K8 Stoplamp relay
K11 Park brake solenoid relay
K12 Stoplamp switch and air brake relay
S40 Stoplamp switch - RH
S41 Stoplamp switch - LH
S59 Handbrake Switch
S62 Air brake pressure switch
H13 Brake light - RH
H16 Brake light - LH
Y50 Air brake solenoid
Y51 Air brake drier unit - De icer (heater)
Y52 Park brake solenoid
X16 Trailer socket (electrical)

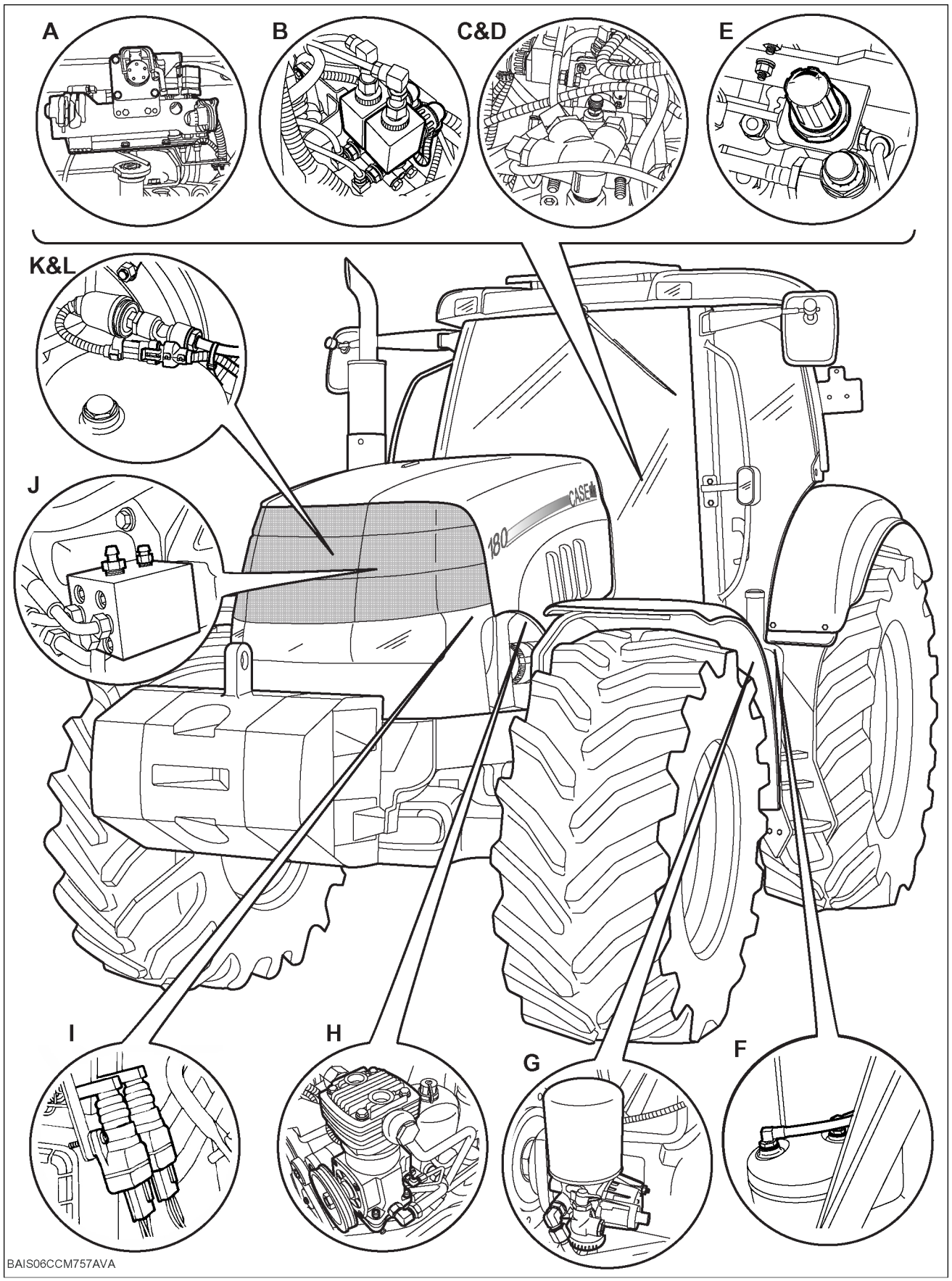
SERVICE BRAKE Pneumatic - Dynamic description



BAIS06CCM759AVA 1

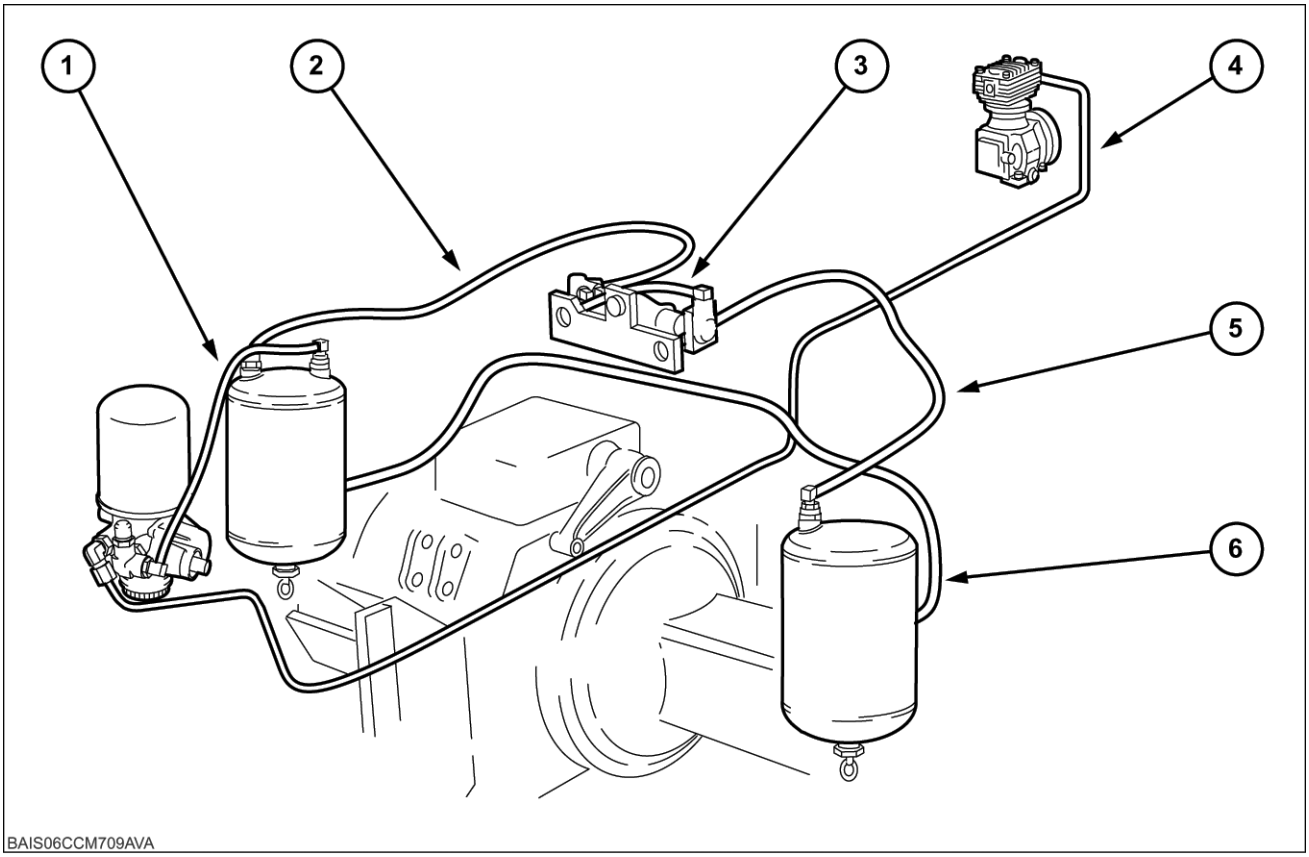
Air Brake Schematic Diagram

1 Compressor
2 Unload Valve (**8 bar**)
3 Filter Drier
4 Air Tank (2 x **10 litres**)
5 Drain Valve
6 Air Supply Manifold
7 Dual Line Control Valve
8 Solenoid Valve
9 Pressure Regulator
10 Two Way Valve
11 Park Brake Solenoid
12 Coupler Dual Line (Supply) Red
13 Coupler Dual Line (Control) Yellow
14 Low Pressure Warning Lamp
15 Pressure Sender Unit
16 Pressure Guage
17 Handbrake Switch
18 Brake Master Cylinder
19 Brake Logic Valve
20 Filter Drier - Heater Unit
21 Quick Release Valve



BAIS06CCM757AVA 2

Description	Diagram Ref.	Function
Couplers	A	Red and yellow couplers for dual line systems. Red is the supply coupler with full pressure available all the time.The yellow coupler is the control line. Air pressure at the coupler is increased as the brake pedal is depressed.The black coupler is for single line systems. Pressure is available at the coupler with the brake pedal released, pressure decreases as the pedal is depressed.
Dual Line Control Valve Solenoid Parking brake solenoid	B	Operated via the brake pedal switch, supplies air pressure to the dual line control valve to establish the trailer brake pressure before the tractor brakes become effective, thereby preventing any delay in operation. The parking brake solenoid is activated by the parking brake switch, providing full trailer braking when the parking brake is applied.
Dual Line Control Valve	C	Provides control of the two line braking system in conjunction with the hydraulic pressure supplied from the brake master cylinder.
Air Supply Manifold	D	Controls the single line trailer brake system in conjunction with the dual line control valve and brake master cylinder pressure.
Regulating Valve	E	Provides a means for the operator to “Fine Tune" the pressure supplied from the solenoid to the control valve dependant upon the characteristics of the trailers brakes.
Air Tanks	F & K	Provides storage for the compressed air generated by the compressor.
Unload (relief) Valve	G	Controls the operating pressure within the system to prevent system damage from excess pressure. Also removes any contamination from the system during unloading.
Compressor	H	Belt driven via the crankshaft. Takes filtered air and compresses it to supply the air tankwith pressurized air. The compressor is lubricated from the engine lube system.
Brake Pedal Switch	I	When both brake pedal switches are operated, (both brake pedals depressed), relay ‘A’ becomes de-energised, this cuts the voltage to the dual line control valve solenoid.
Brake Logic Valve	J	Ensures that trailer braking only occurs when both brake pedals are depressed simultaneously. Hydraulic pressure from both brake master cylinders act on a ball and plunger arrangement which then allows pressure oil out to act on the control valve.
Pressure Switch/ sender Assembly	K	Connected directly to the right hand air tank, when the pressure drops to **4.5-5.0 bar** (**65 - 73 lbf.in2**) or lower the switch closes and completes the circuit to illuminate the warning lamp on the instrument cluster.



BAIS06CCM709AVA 3

Universal Air Brake - Tube Connections

1 Control valve to left hand reservoir tube
2 Left hand air tank to dual line control valve
3 Yellow coupler tube
4 Compressor to unload valve
5 Red coupler tube
6 Air tank balance pipe

Universal Air Brake Option
Brakes Disengaged

Air from the Compressor is supplied to the Unload Valve which regulates system pressure stored in the Reservoir . This pressure is supplied to the trailer via the Red Supply Line Coupler to disengage the brakes.
The air in the system also acts on the Pressure Sender Unit which supplies a variable electrical signal to the Pressure Gauge to indicate the pressure in the system.
If the pressure drops below specified limits, the sender incorporates a switch to illuminate the Warning Lamp .

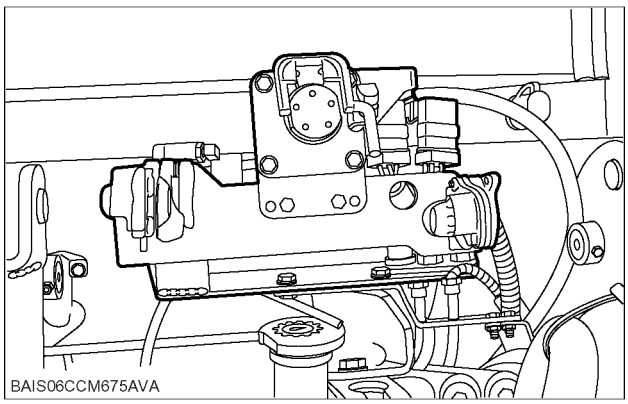
Brakes Engaged

Operating the brake pedal closes the Brake Switches which sends a signal to the Solenoid Valve . When energised this supplies air via the Pressure Regulator to the Control Valve as pilot pressure to initiate operation of the trailer's brakes via the Yellow Control Line Coupler .
As the tractor's brakes are applied, Hydraulic Pressure from the Master Cylinders is transferred via the Brake Logic Valve to the Control Valve to progressively increase pressure in the Yellow Control Line to the trailer's brake control valve to engage the brakes in line with the tractor brakes.

SERVICE BRAKE Pneumatic - Static description

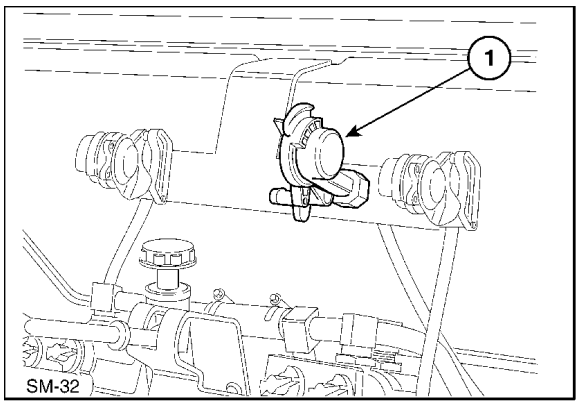
There are three versions of the air trailer brake available.
These can be easily identified by the coupler configuration at the rear of the cab.
Universal
A generally accepted air brake providing a dual line system. The universal system is available with side mounting type couplers.

Universal with Side mounting couplers.



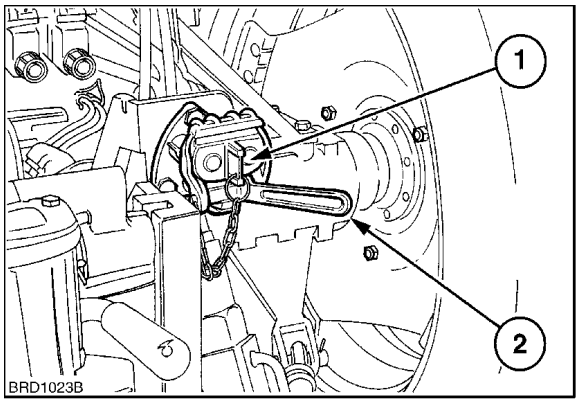
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“German"
An air brake system designed in accordance with German TUV specifications providing both single and dual line operation.



SM-32 2

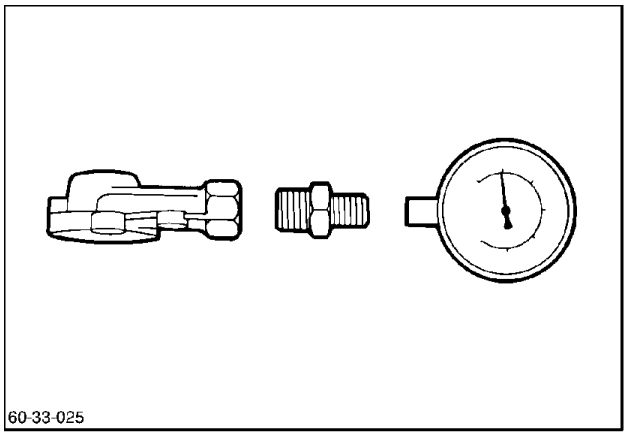
“Italian"
An air brake system designed to meet Italian legislation and providing dual line operation.



BRD1023B 3

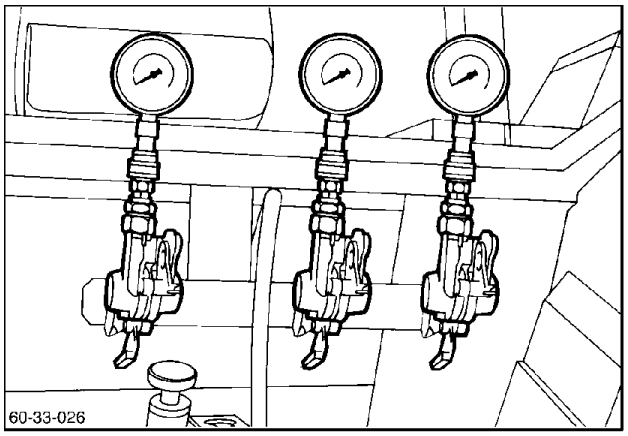
SERVICE BRAKE Pneumatic - Pressure test

1. Tractor Preparation
   Position the tractor on a flat, level surface and in a suitable location to allow the engine to run during the testing.
   Chock the wheels and ensure the parking brake is in the OFF position.
   To perform the test it will be necessary to obtain the correct trailer side couplers for the system, to couple up to the tractor connectors.



60-33-025 1

2. Use suitable fittings to connect to each trailer side coupler a **0 - 10 bar**, undamped (**100 mm**), pressure gauge. Connect the appropriately coloured couplers to the corresponding tractor coupler.
   - “Italian" trailer brake
   - “German" trailer brake
   - "Universal" trailer brake

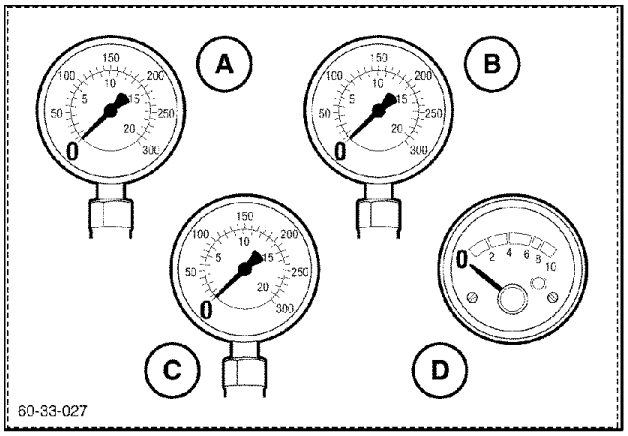


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3. Pre-Test Procedure
   A = Dual line control (Yellow)
   B = Single line supply (Black
   C = Dual line supply (Red)
   D = Cab Gauge
   Switch tractor ignition on.
   All test gauges, including vehicle gauge located on the left hand ’B’ pillar, must read zero pressure (drain tanks if required).

NOTE: *Tractor ’B’ pillar gauge reads line pressure which is the same as that shown on the red line coupler gauge.*

NOTE: *For all pressure testing illustrations the gauges represent the following coupler colours:*



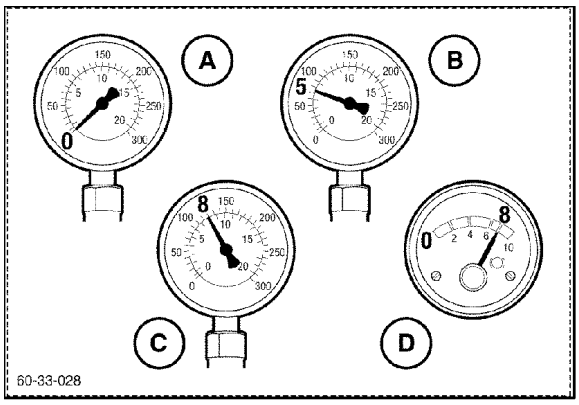
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4. Low pressure warning indicator for the air brake system must be illuminated on the instrument cluster. Warning light located in top right hand corner of the instrument cluster.

NOTE: *All figures in ( ) refer to the Italian trailer brake pressures, where they differ.*

5. Start the tractor
   System should be fully pressurised within **40 - 60 seconds** depending on engine rev setting (a maximum period of **3 minutes** is permitted for the system to reach operating pressure). When the system is fully pressurised the gauges must read as follows:

NOTE: *Cab gauge reads 8.0 (7.0) bar in the green segment.*

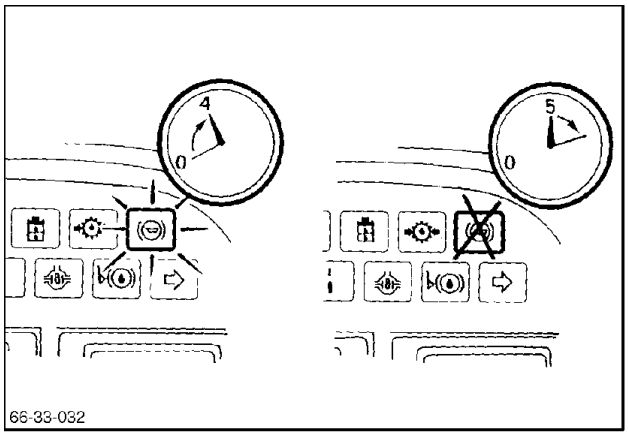


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Gauges			Pressure
Dual Line Control	(Yellow)	(A)	0
Single Line Supply	(Black)	(B)	**5.0 - 6.0 bar**
Dual Line Supply	(Red)	(C)	**7.5 - 8.5 bar** (**6.5 - 7.5 bar**)
Cab		(D)	8.0 (7.0)

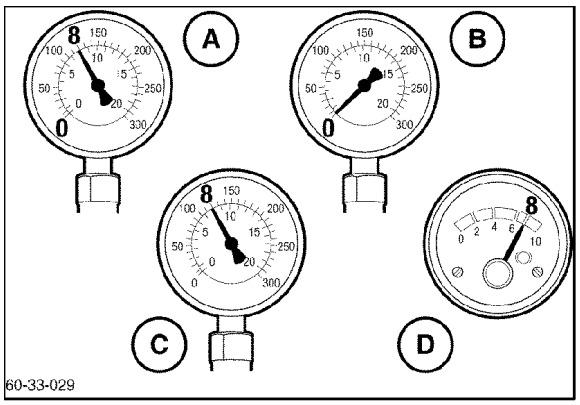
6. As the system is being pressurised, the air brake low pressure warning light on the instrument cluster should extinguish between **4.5 - 5.5 bar**.

NOTE: *Indication of malfunctioning must be investigated and the defect rectified before continuing with the test.*



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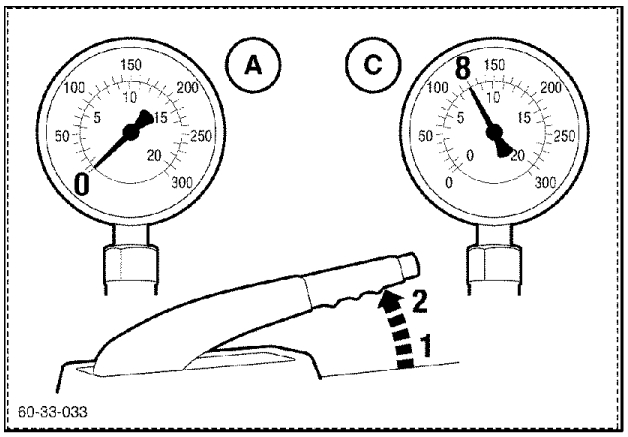
7. Apply tractor parking brake
   The gauges must now read the following values:
   In cases where the gauges do not exhibit the above values, adjust the handbrake cable to the dual line control valve as described on the following page.



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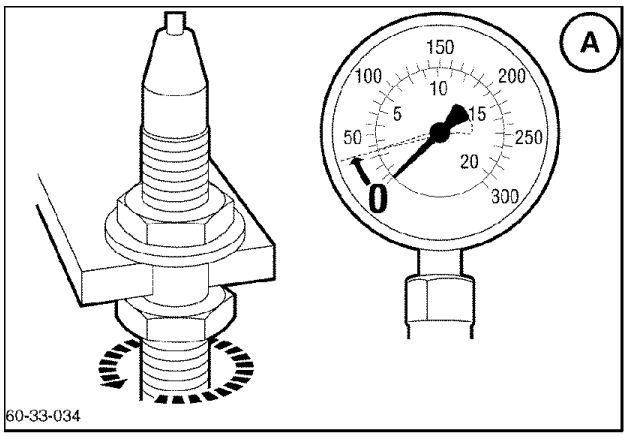
Gauges			Pressure
Dual Line Control	(Yellow)	(A)	**7.5 - 8.5 bar** (**6.5 - 7.5 bar**)
Single Line Supply	(Black)	(B)	0
Dual Line Supply	(Red)	(C)	**7.5 - 8.5 bar** (**6.5 - 7.5 bar**)
Cab		(D)	8.0 (7.0)

8. Handbrake Control Cable Adjustment
Handbrake off, system (red), **(C)**, at full pressure 8 (7) bar (ignition on - engine off). Check yellow gauge **(A)** is on zero.
Handbrake up four clicks - slacken dual valve operating cable top nut.



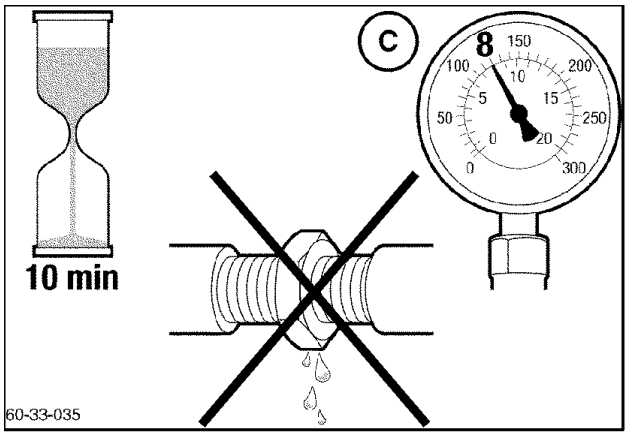
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9. Adjust cable (by tightening the bottom nut first on the cable assembly) until needle on yellow gauge **(A)** just starts to move, lock up top nut.
Check operation of handbrake.
Handbrake On = 8 (7) bar yellow
Handbrake Off = 0 bar yellow



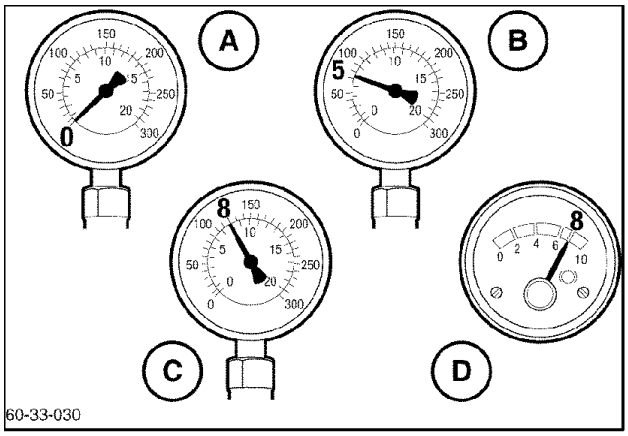
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10. Leak Test
Engine off - tractor parking brake applied.
No deterioration of the red line pressure (8 (7) bar) must occur over a **10 minute** period. Indication of any leakage must be investigated, the defect rectified and the test repeated.



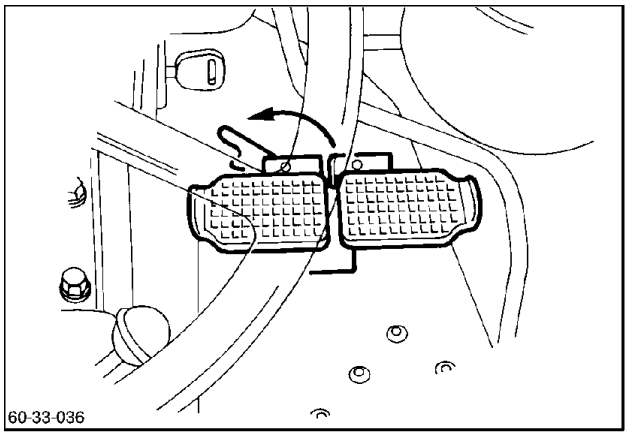
60-33-035 9

11. Brake Pedal Test Procedure
Start the tractor. Engine revs not to exceed **1000 rev/min**.
Do NOT apply tractor parking brake.



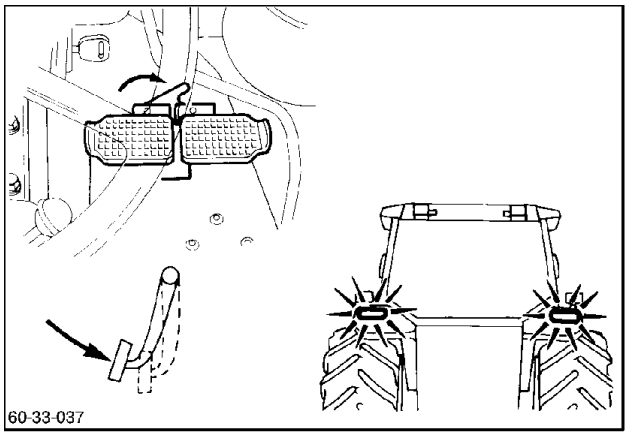
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12. Release brake pedal link pin so that pedals will work individually.
Apply left hand and right hand brake pedals individually. No change in pressure readings on test gauges must occur.

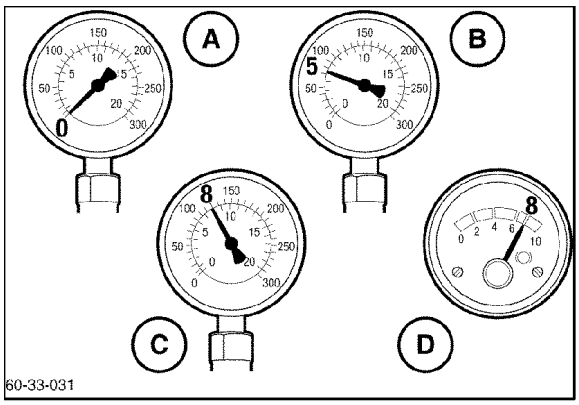


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13. Reconnect brake pedal link pin, apply brake pedals fully several operations until red system pressure below 7 (6) bar - vehicle compressor will come back on load - allow system to reach full pressure 8 (7) bar (loud 'pop' will be heard as unload valve opens). Gently apply pressure to linked pedals until both brake light switches have just clicked on, brake lights on and 4WD indicator on dash is illuminated. The gauges will now record the following values:



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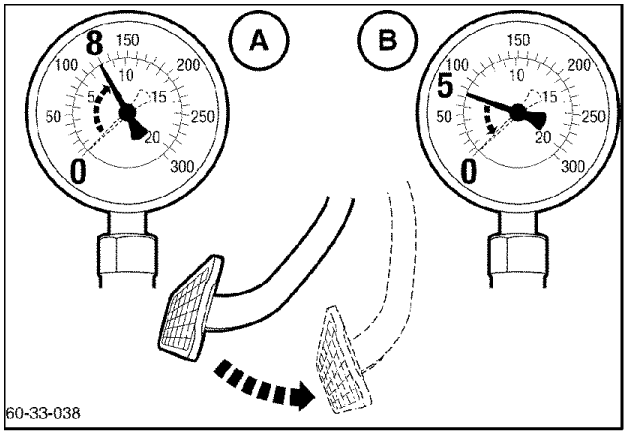
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*** slight drop in pressure must occur**

Gauges			Pressure
Dual Line Control	(Yellow)	(A)	**0.5 - 1.0 bar**
Single Line Supply	(Black)	(B)	**4.5 - 5.0* bar**
Dual Line Supply	(Red)	(C)	**7.5 - 8.5 bar** (**6.5 - 7.5 bar**)
Cab		(D)	8.0 (7.0)

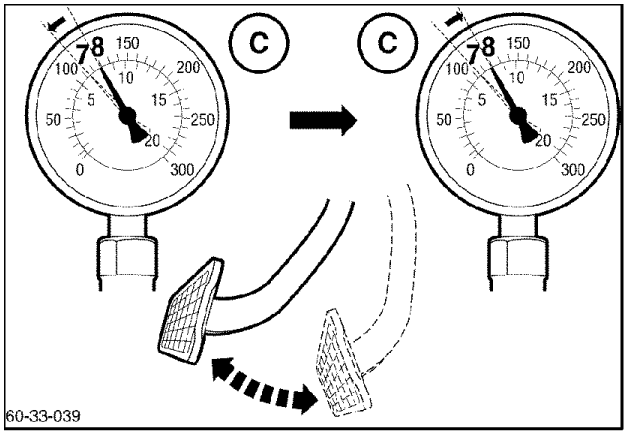
14. Single Line System
Fully apply brake pedal effort with graduated effort. Yellow line **(A)**, pressure must increase evenly to a maximum of **7-8 bar**. Black line **(B)**, pressure must decrease evenly to zero bar.

NOTE: *If the brake lights operate late into the braking process, i.e. pedals are depressed more than* ***20 mm*** *before the brake switches are switched on, no advance braking on the air brake system will occur. The brake switches must be reset and the brake test performed again.*



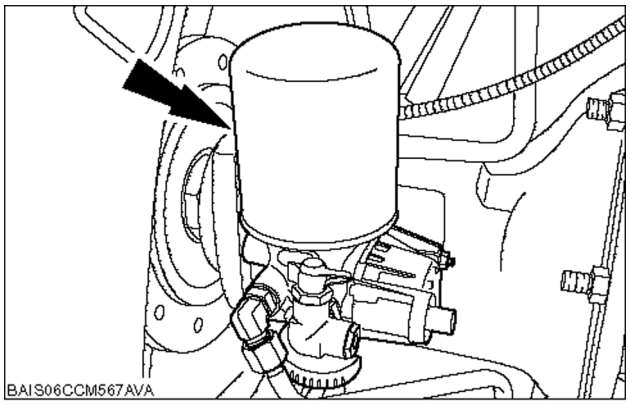
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15. Pressure Regulator ON/OFF Test Procedure
Set engine at idle revs.
Do NOT apply tractor parking brake.
With the system fully pressurised 8 (7) bar, depress the brake pedals several times until the pressure drops below 7 (6) bar on Red system gauge **(C)** and gauge in cab.



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16. The unload valve, located on the left hand side of the rear axle must recharge the system to 8 (7) bar.
In cases where an unload valve is found to be faulty, a new unload valve must be fitted and the test repeated.



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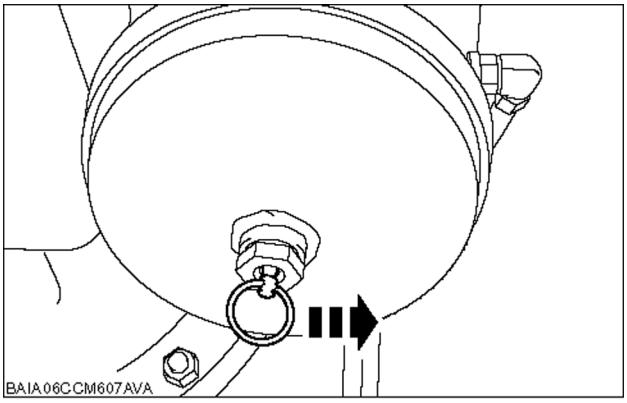
Air valve Dual line - Remove

⚠ WARNING ⚠

Before removing any air system component make sure that there is no air pressure in the system. This can be achieved by depressing and releasing the brake pedal several times with the engine off and draining the air reservoirs. Also make sure that the wheels of the vehicle are chocked.

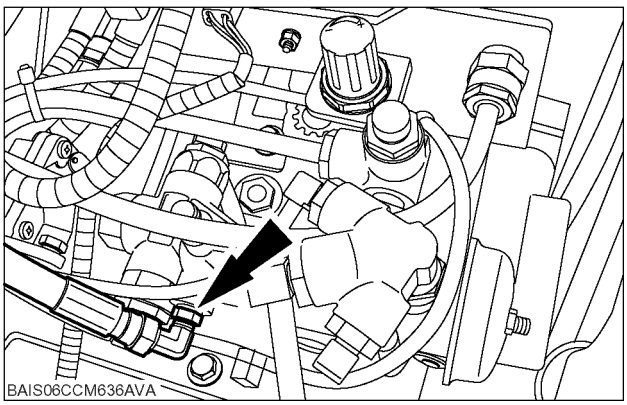
B022

1. Release the trailer brake system pressure from the trailer brake air tanks.



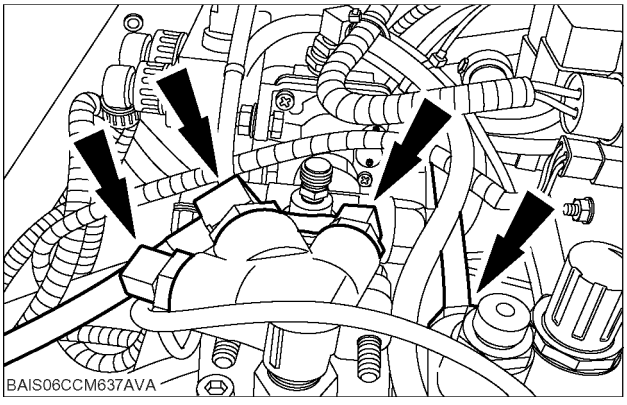
BAIS06CCM607AVA 1

2. Disconnect the hydraulic brake connection, cap the end of the tube to prevent contamination and excessive loss of brake oil.



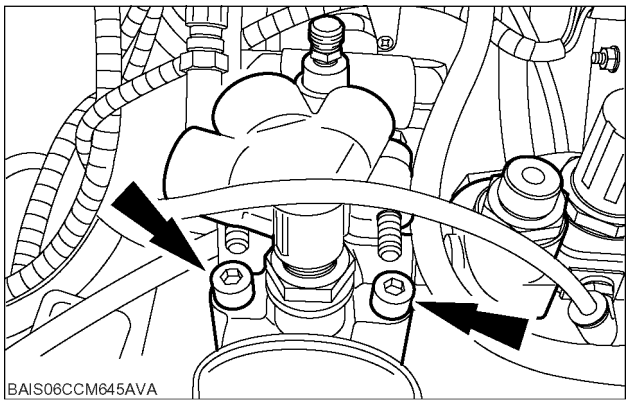
BAIS06CCM636AVA 2

3. Disconnect the air lines.



BAIS06CCM637AVA 3

4. Remove the retaining bolts and remove the dual line control valve.



BAIS06CCM645AVA 4

5. Reassembly is the reversal of removal.

Next operation:
Bleed the brake system. For further information refer to **SERVICE BRAKE Hydraulic - Bleed (D.30.C)**.

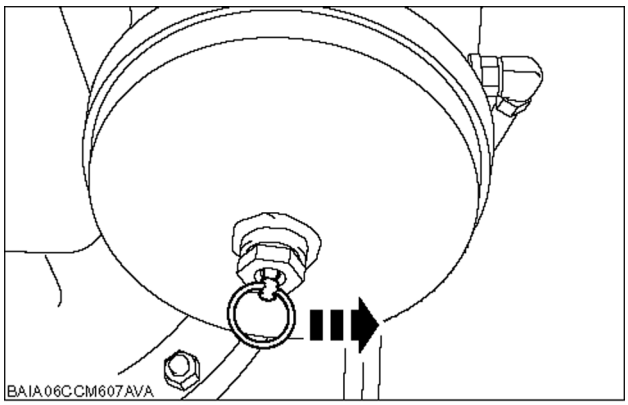
Air valve Single line - Remove

⚠ WARNING ⚠

Before removing any air system component make sure that there is no air pressure in the system. This can be achieved by depressing and releasing the brake pedal several times with the engine off and draining the air reservoirs. Also make sure that the wheels of the vehicle are chocked.

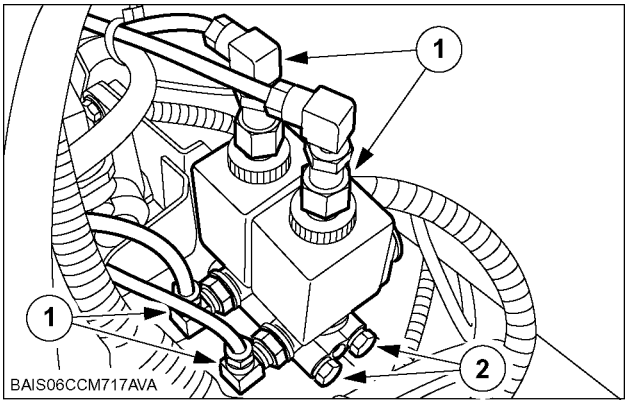
B022

1. Release the trailer brake system pressure from the trailer brake air tanks.



BAIS06CCM607AVA 1

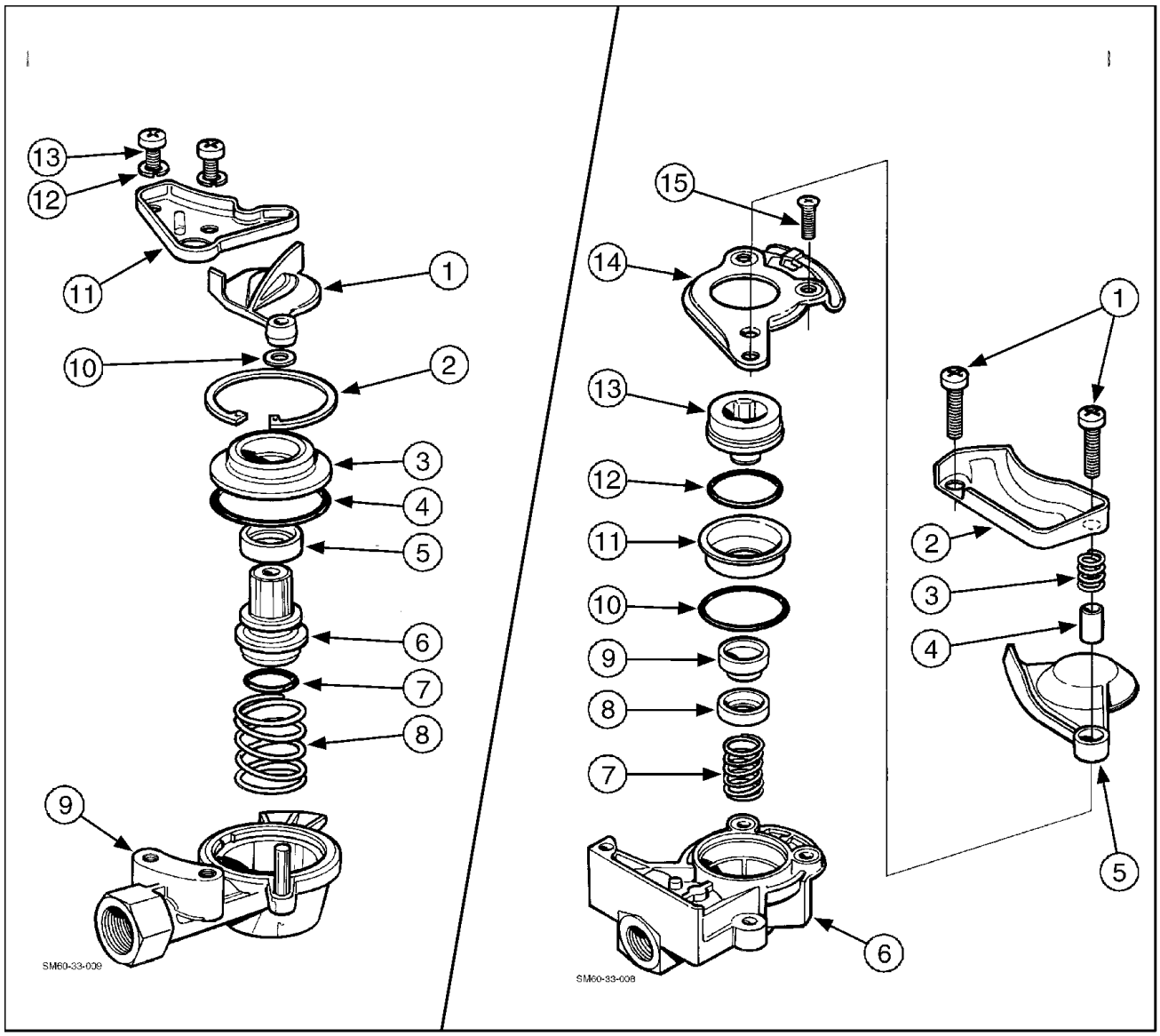
2. Disconnect the air lines to the single line control valve and to the solenoids **(1)**. Remove the retaining bolts **(2)** and remove the single line control valve.



BAIS06CCM717AVA 2

3. Reassembly is the reversal of removal.

Pneumatic connector - Overhaul



SM60-33-008 1

Couplers

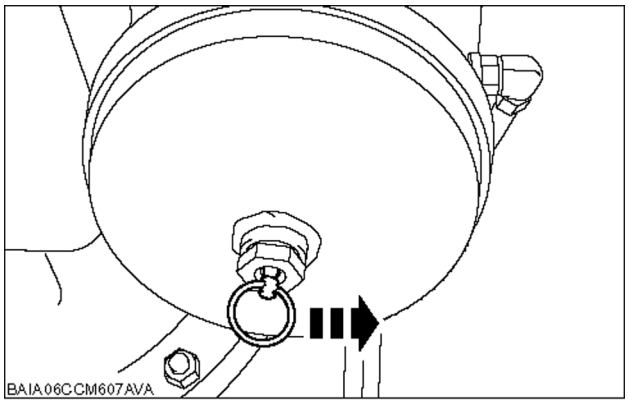
Key to Components - Figure 1.

A. Single Line Coupler
1. Cover
2. Circlip
3. Bush
4. ‘O’ Ring
5. Valve Ring
6. Valve Body
7. ‘O’ Ring
8. Spring
9. Housing
10. Washer
11. Guide Piece
12. Washer
13. Screw

B. Supply and Control Line Couplers
1. Screw
2. Guide Piece
3. Spring
4. Tube
5. Cover
6. Housing
7. Spring
8. Cap
9. Valve
10. ‘O’ Ring
11. Cap
12. ‘O’ Ring
13. Thrust Piece
14. Guide
15. Screw

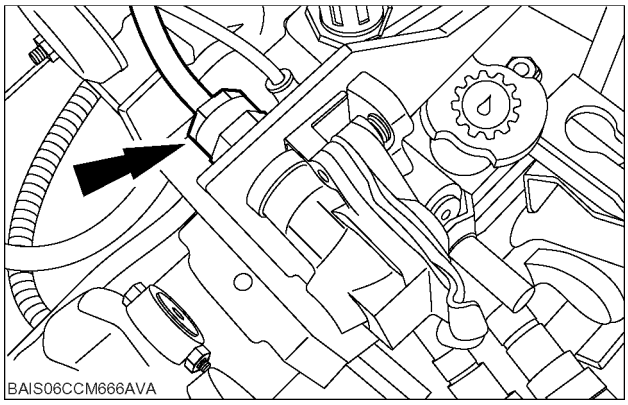
Pneumatic connector - Remove

1. Release the trailer brake system pressure from the trailer brake air tanks.



BAIS06CCM607AVA 1

2. Disconnect the pneumatic connector supply pipe. Remove the retaining nut and remove the trailer brake pneumatic connector.



BAIS06CCM666AVA 2

SERVICE BRAKE Pneumatic - Troubleshooting

Problem	Possible Cause	Correction
Instrument cluster light illuminates when system is running.	System pressure below **4.5/3.5 bar**.	Compressor drive belt broken Check system for leaks Relief valve failed, stuck open Compressor fault Reservoir drain tap faulty
	Faulty switch or switch wiring	Disconnect wiring to switch. If light extinguishes replace switch. If light remains illuminated check wiring for short to earth.
Trailer brakes not functioning (system air pressure okay)	Air in braking system	Bleed brakes. Refer to **SERVICE BRAKE Hydraulic - Bleed (D.30.C)**
	Faulty pilot valve	Disconnect supply line to control valve from pilot valve assembly. Operate the brakes, if oil is expelled, pilot valve is okay. If no oil expelled remove and inspect pilot valve.
	Control valve faulty	Repair/replace as required
Delay in trailer brake operation	Dual line solenoid failed closed or permanently energised.	Disconnect wiring to solenoid. If brakes operate normally inspect wiring for short to **+12 v**. If still a delay in operation after wire disconnection replace solenoid assembly. Faulty brake switch
System pressure too high (exceeds 12 bar +/- 2)	Faulty Relief valve	Remove valve clean/replace. refer to **Relief valve - Remove (A.20.A)**

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SERVICE BRAKE Pneumatic - 30.E

Air valve Dual line - Remove 17
Air valve Single line - Remove 19
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SERVICE BRAKE Pneumatic - Electrical schema 5
SERVICE BRAKE Pneumatic - General specification 4
SERVICE BRAKE Pneumatic - Pressure test 11
SERVICE BRAKE Pneumatic - Static description 10
SERVICE BRAKE Pneumatic - Torque 3
SERVICE BRAKE Pneumatic - Troubleshooting 22

TRAVELLING - D

PARKING BRAKE Mechanical - 32.B

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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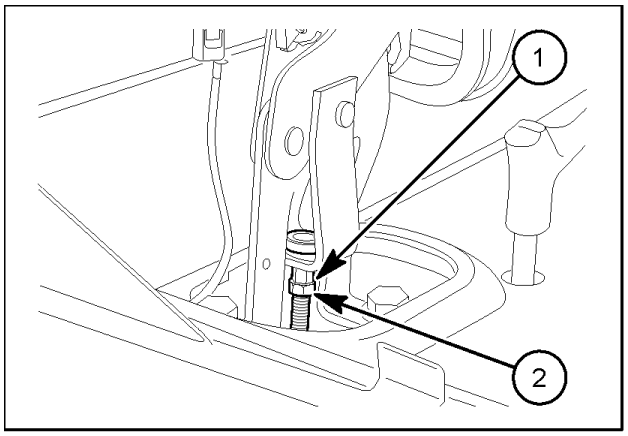
TRAVELLING - D

PARKING BRAKE Mechanical - 32.B

SERVICE
Mechanical linkage
Travel adjust 3
Brake
Overhaul Park Brake 4

Mechanical linkage - Travel adjust

1. Adjustment of the parking brake control lever travel should be performed each time the parking brake is serviced or repaired and when the idle travel of the lever is excessive.
   Proceed as follows:
   1. Block front wheels using suitable means.
   2. Jack up the tractor rear end using a suitable means until the wheels are slightly off the ground.
   3. Raise the parking brake control lever to the third notch on the quadrant.
   4. Release the locknut **(2)** and screw in the adjust screw **(1)** until the wheels lock.
   5. Lower the parking brake control lever and ensure that the wheels can rotate freely.
   6. Apply the parking brake several times to check that the assembly does not get blocked or operate abnormally.
   7. Tighten the locknut **(2)** and lower the tractor.



1b0o2004106451 1

Brake - Overhaul Park Brake

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

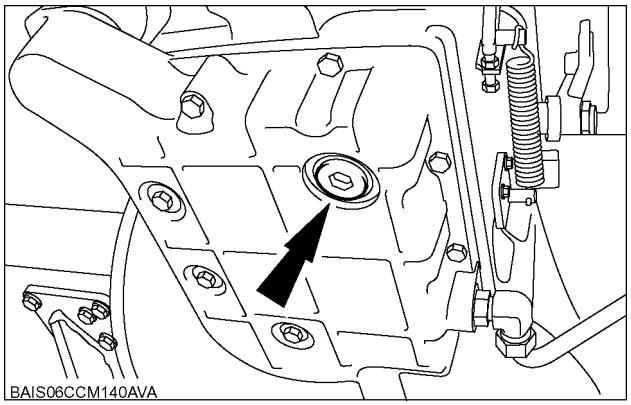
B026

⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012

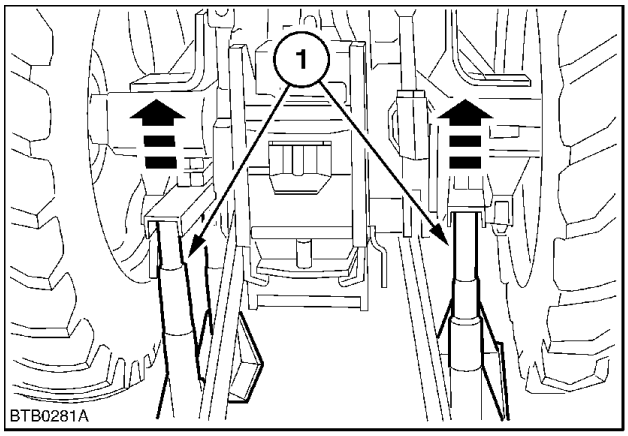
1. Ensure that the tractor is parked on a level surface.
2. Remove the drain plug and drain the transmission oil into a suitable container. Install the drain plug once the oil has drained.
   Tighten to **68-82 Nm** (**50-60 lb ft**).



BAIS06CCM140AVA 1

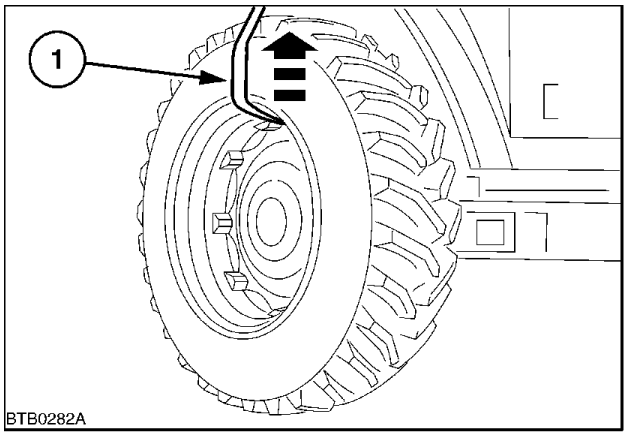
3. Chock the front wheels using suitable wheels stops.
4. Raise the rear of the tractor and place two suitable axle stands **(1)** under the final drive cases.

NOTE: *If required, detach the lift rods from the lower links.*



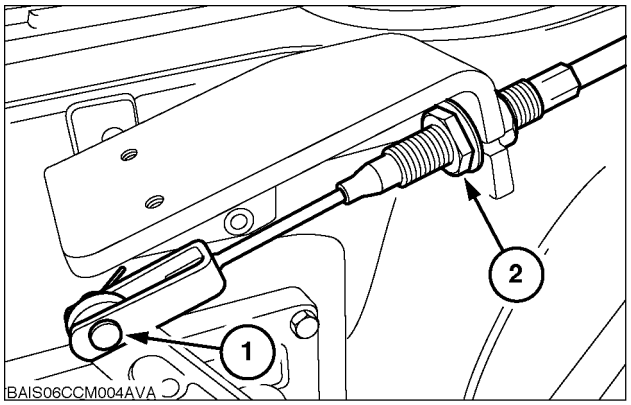
BTB0281A 2

5. Using a suitable sling **(1)** connect the left rear wheel to a hoist and remove the wheel.



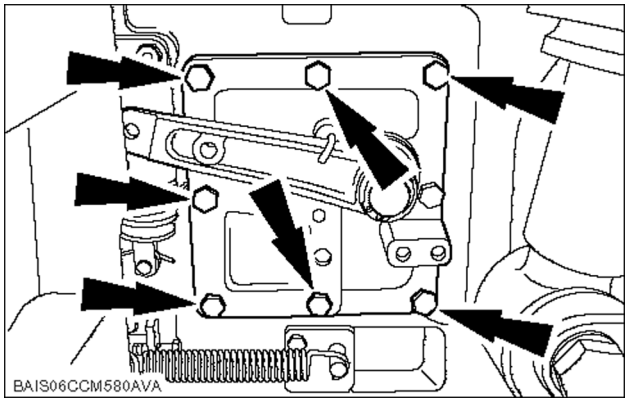
BTB0282A 3

6. Remove the split pin and the cotter pin **(1)** from the parking brake lever. Detach the parking brake cable **(2)**.



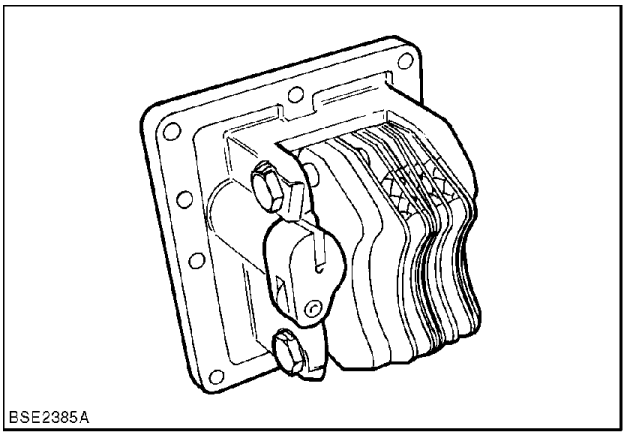
BAIS06CCM004AVA 4

7. Remove the parking brake control assembly.



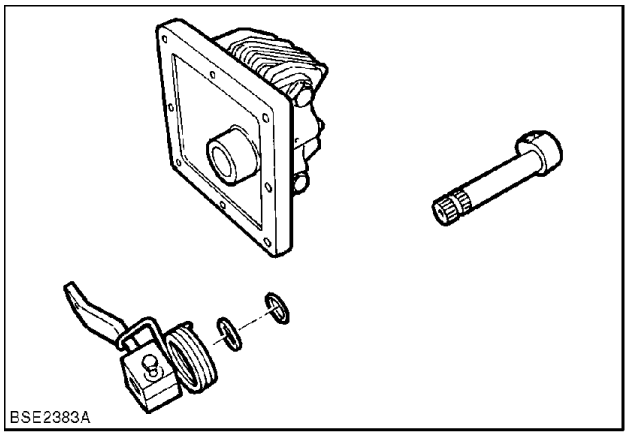
BAIS06CCM580AVA 5

8. Disassemble parking brake assembly and remove friction pads.



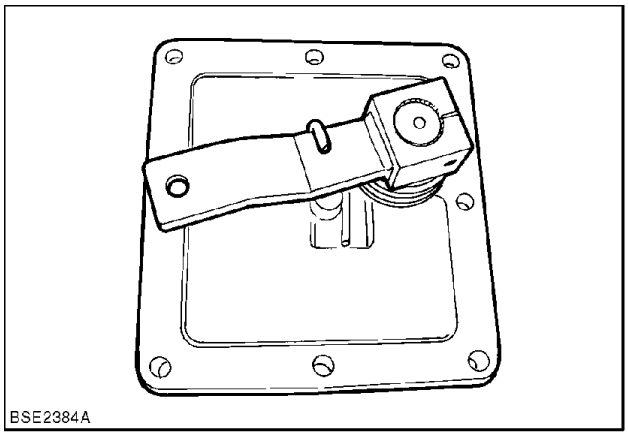
BSE2385A 6

9. Disassemble lever assembly to replace seal.
   - Check lever and shaft are marked.
   - Loosen lever clamp bolt.
   - Remove lever, spring.
   - Remove shaft.
   - Remove washer and seal.



BSE2383A 7

10. On re-assembly
    - Install shaft.
    - Install new seal with washer.
    - Install spring and shaft ensuring alignment of assembly marks.



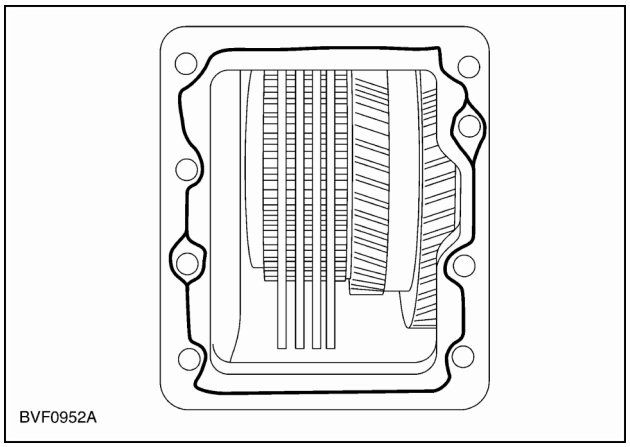
BSE2384A 8

11. Before installing the parking brake control assembly unit to the rear axle housing, thoroughly clean and degrease mating surfaces and apply a bead of liquid gasket of approximately **2 mm** of diameter following pattern shown.

⚠ WARNING ⚠

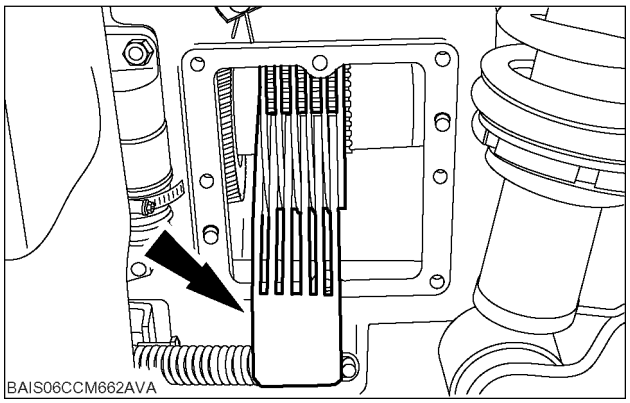
Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

B020



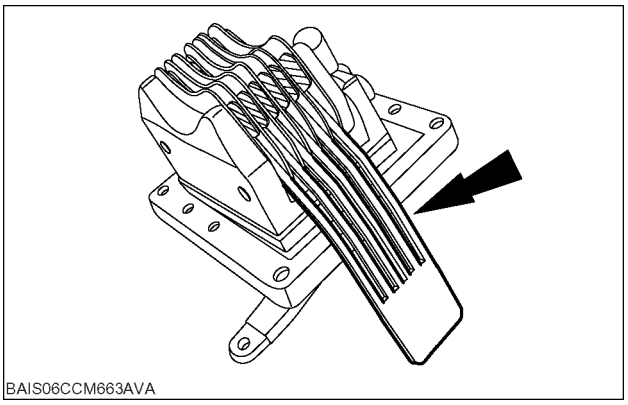
bvf0952Apng 9

12. Using special tool **380200002**, align the brake discs on the pinion shaft.



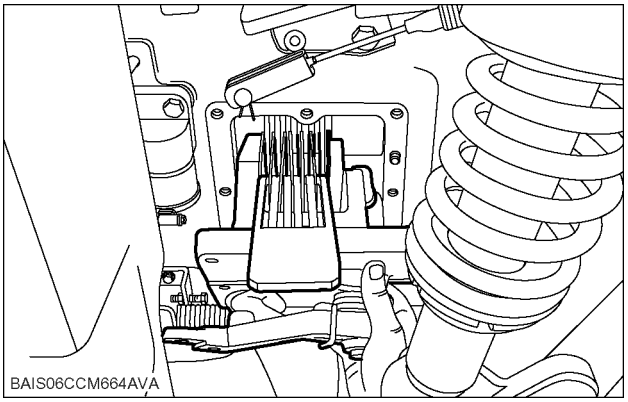
BAIS06CCM662AVA 10

13. Install the special tool **380200002**, between the brake pads.



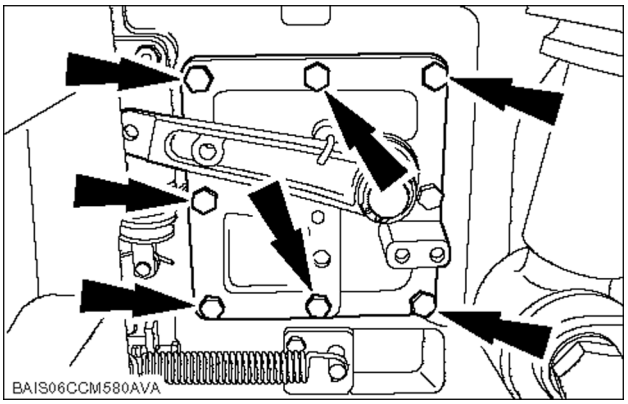
BAIS06CCM663AVA 11

14. Position the parking brake assembly complete with the special tool **380200002**, between the brake discs on the pinion shaft. Remove the special tool while installing the parking brake assembly.



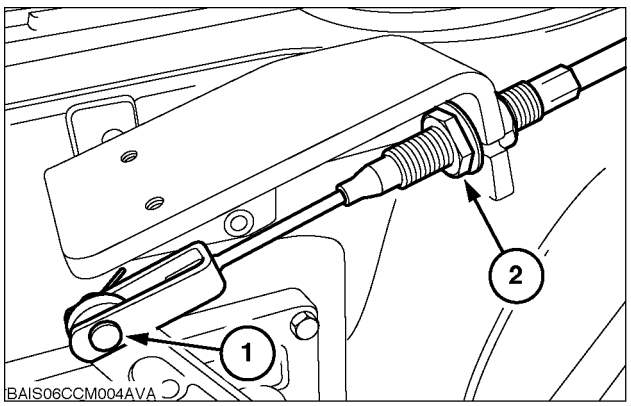
BAIS06CCM664AVA 12

15. Tighten the retaining bolts to **49 Nm** (**36 lb ft**).



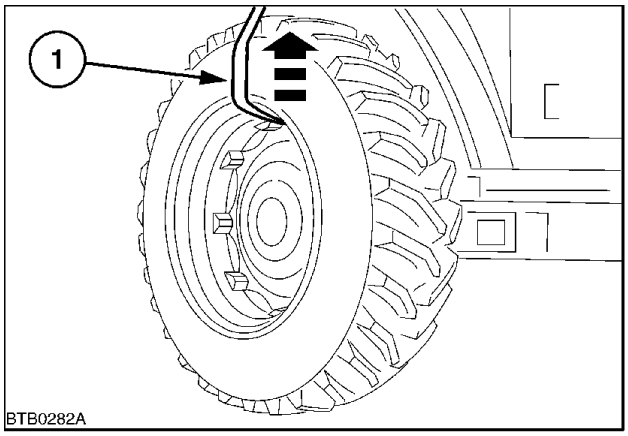
BAIS06CCM580AVA 13

16. Attach the parking brake cable. **(2)**. Install the cotter pin and split pin **(1)**



BAIS06CCM004AVA 14

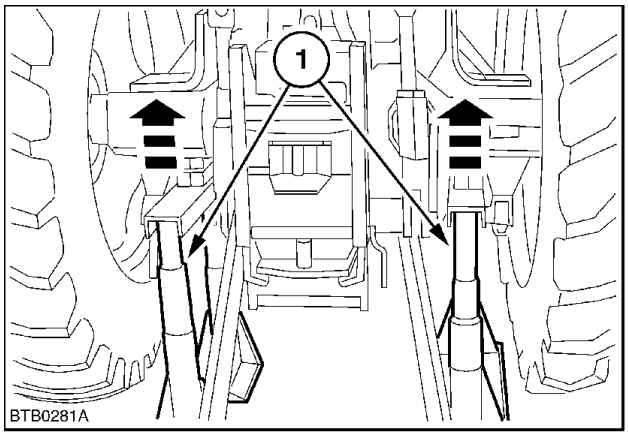
17. Using a suitable sling **(1)** connect the left rear wheel to a hoist and install the wheel.
For correct torques, refer to **Rear wheel - Torque (D.50.C)**



BTB0282A 15

18. Remove the axle stands **(1)**.

NOTE: *If required, attach the lift rods to the lower links.*



BTB0281A 16

19. Fill the transmission with oil

Next operation:
Adjust the parking brake, for further information refer to **Mechanical linkage - Travel adjust (D.32.B)**

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TRAVELLING - D

PARKING BRAKE Mechanical - 32.B

Brake - Overhaul Park Brake 4
Mechanical linkage - Travel adjust 3

TRAVELLING - D

PARKING BRAKE Electronic - 32.D

PUMA 165 [Z9BH40001 -] , PUMA 165 [Z9BH60001 -] , PUMA 180 [Z9BH40001 -] , PUMA 180 [Z9BH60001 -] , PUMA 195 [Z9BH40001 -] , PUMA 195 [Z9BH60001 -] , PUMA 210 [Z9BH40001 -] , PUMA 210 [Z9BH60001 -]

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PARKING BRAKE Electronic - 32.D

SERVICE

PARKING BRAKE Electronic

Remove 3

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Install 5

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Adjust 7

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

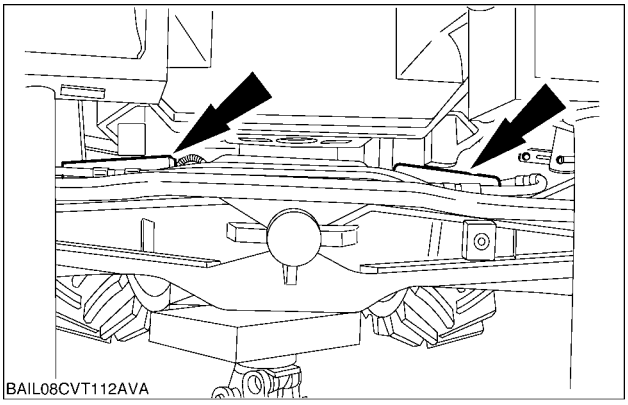
Calibrate 8

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

PARKING BRAKE Electronic - Remove

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

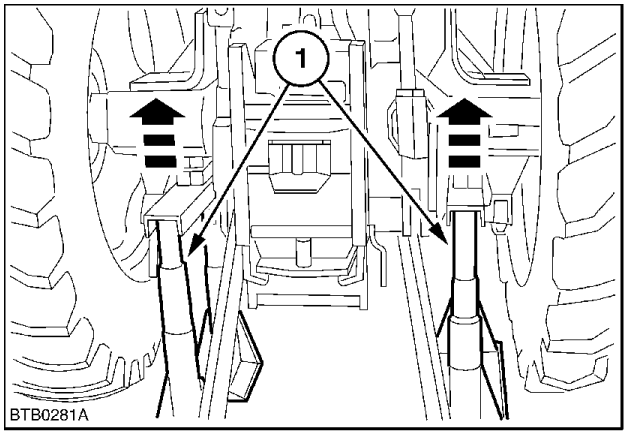
1. Make sure the vehicle is parked on a level surface.
2. Chock the front wheels using suitable wheel stops.
3. Position wooden wedges between the front axle and front support. These prevent articulation of the axle.



BAIL08CVT112AVA 1

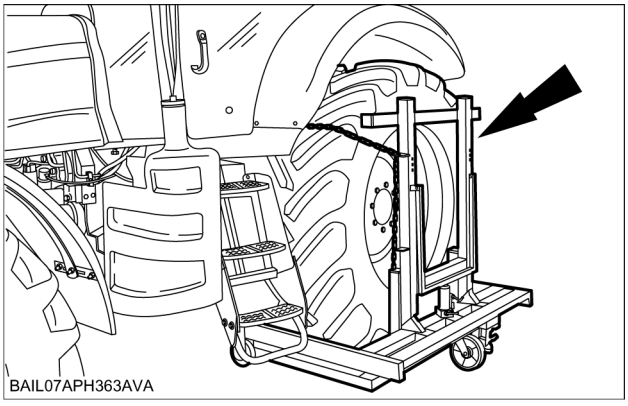
4. Raise the rear of the vehicle and place two suitable axle stands **(1)** under the final drive cases.

NOTE: *If required, detach the lift rods from the lower links.*



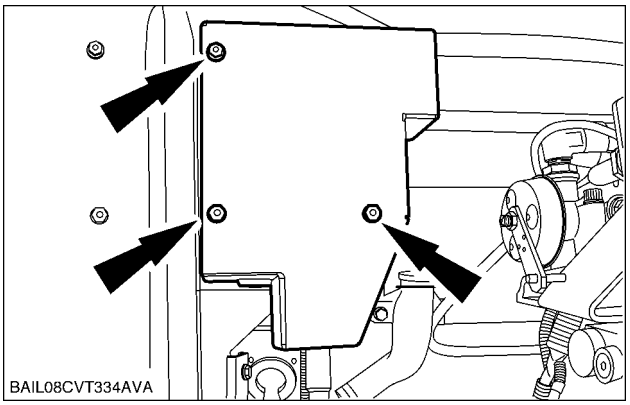
BTB0281A 2

5. Remove the rear left wheel.



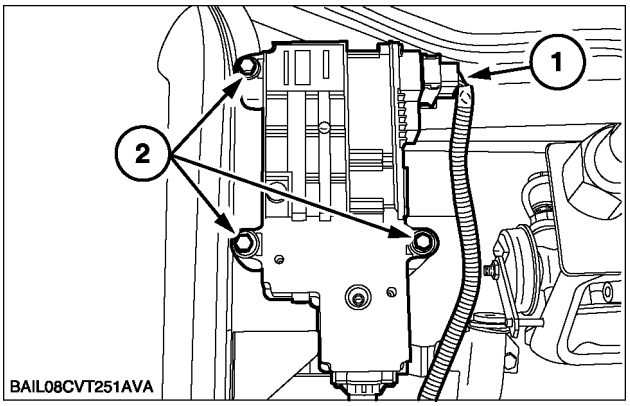
BAIL07APH363AVA 3

6. Remove the electronic park lock (EPL) cover.



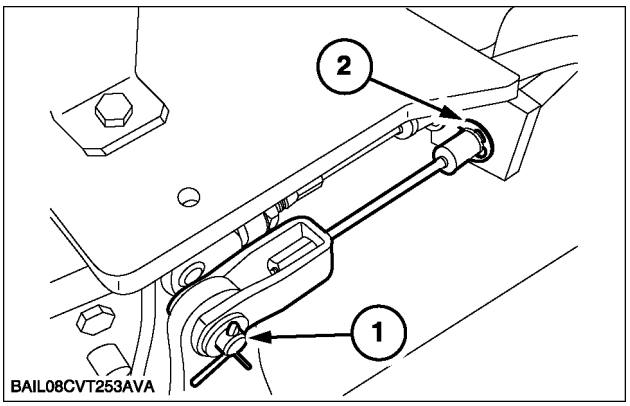
BAIL08CVT334AVA 4

7. Disconnect the EPL electrical connector **(1)** and detach the EPL from the cab **(2)**.



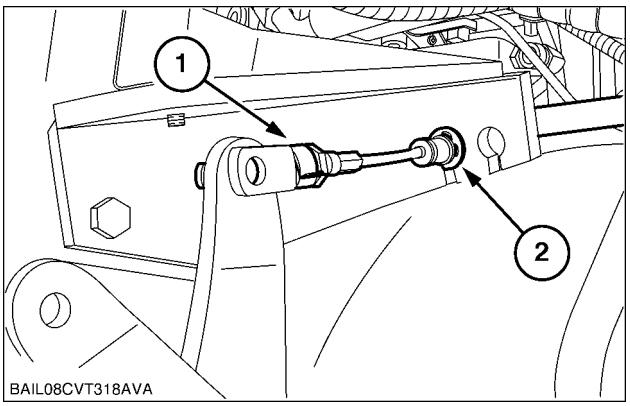
BAIL08CVT251AVA 5

8. Remove the split pin and the clevis pin **(1)** from the parking brake lever. Detach the parking brake cable **(2)**.



BAIL08CVT253AVA 6

9. Remove the speed clip and the clevis pin **(1)** from the EPL lever (if fitted) and detach the EPL cable **(2)**.



BAIL08CVT318AVA 7

PARKING BRAKE Electronic - Install

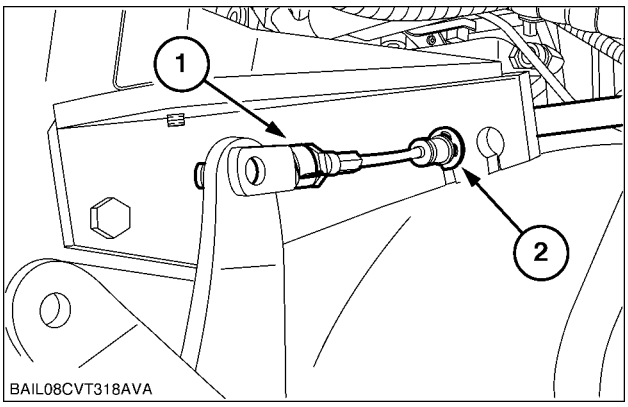
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

⚠ WARNING ⚠

Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

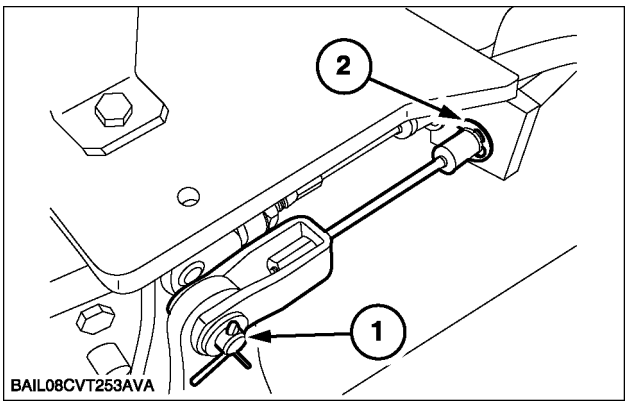
B020

1. Attach the EPL cable **(2)** and install the clevis pin and speed clip **(1)**.



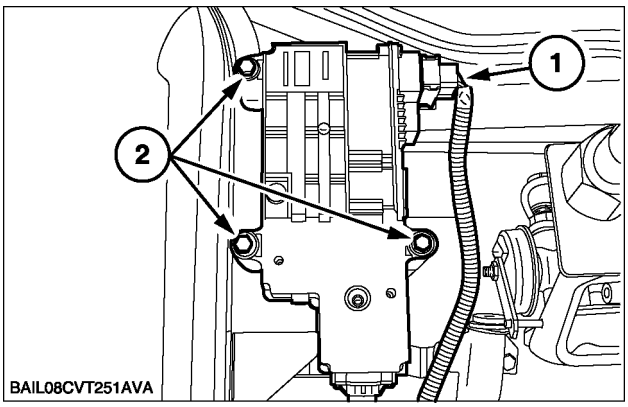
BAIL08CVT318AVA 1

2. Attach the parking brake cable **(2)** and install the clevis pin and split pin **(1)**.



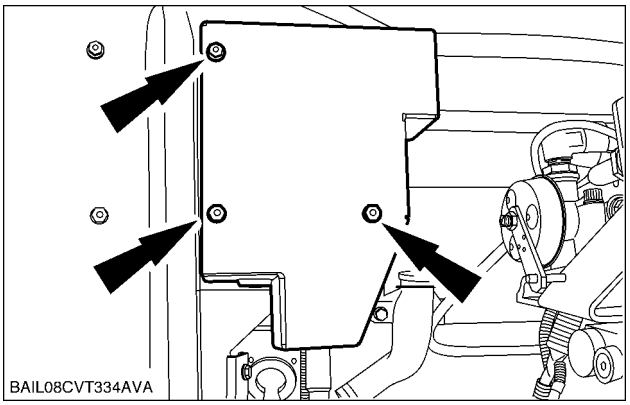
BAIL08CVT253AVA 2

3. Install the EPL **(2)** and connect the EPL electrical connector **(1)**.



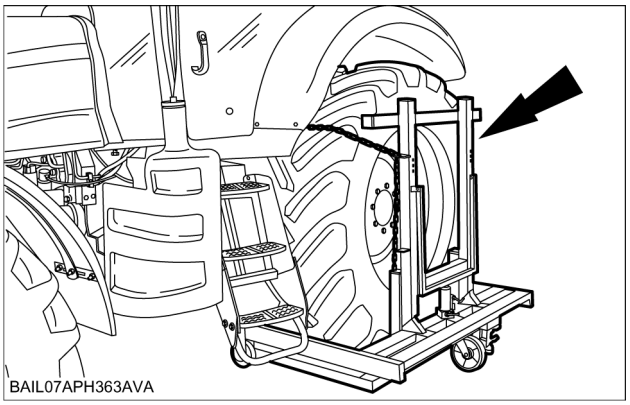
BAIL08CVT251AVA 3

4. Install the EPL cover.



BAIL08CVT334AVA 4

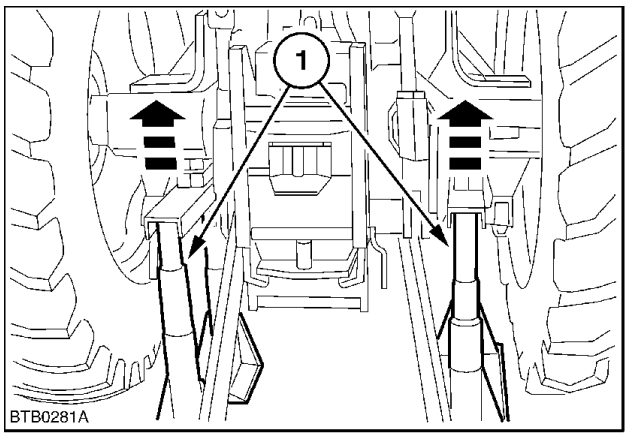
5. Install the rear left-hand wheel.
Tighten to specified torque, for further information refer to **Rear wheel - Torque (D.50.C)**.



BAIL07APH363AVA 5

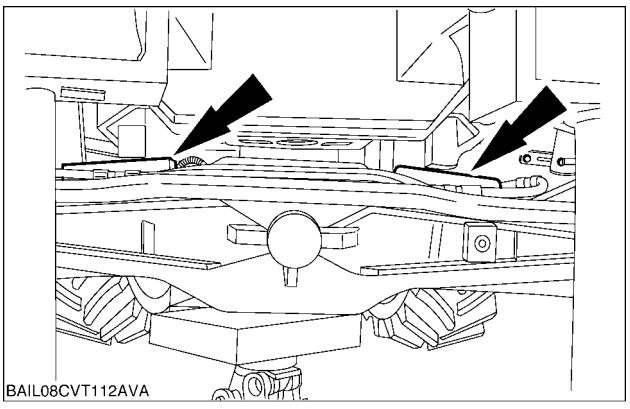
6. Raise the rear of the vehicle and remove the axle stands **(1)**.

NOTE: *If detached during removal, reattach the lift rods to the lower links.*



BTB0281A 6

7. Remove the wooden wedges from between the front axle and front support.



BAIL08CVT112AVA 7

Next operation:
Adjust the EPL, for further information refer to **PARKING BRAKE Electronic - Adjust (D.32.D)**

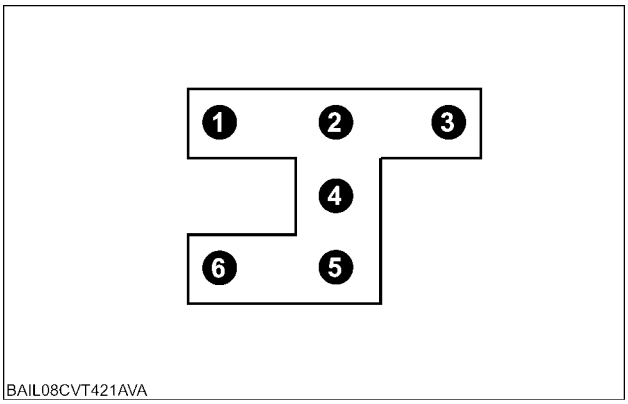
PARKING BRAKE Electronic - Adjust

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

IMPORTANT: *Manual adjustment of the EPL should only be carried out if the brake pads / brake discs have been renewed.*

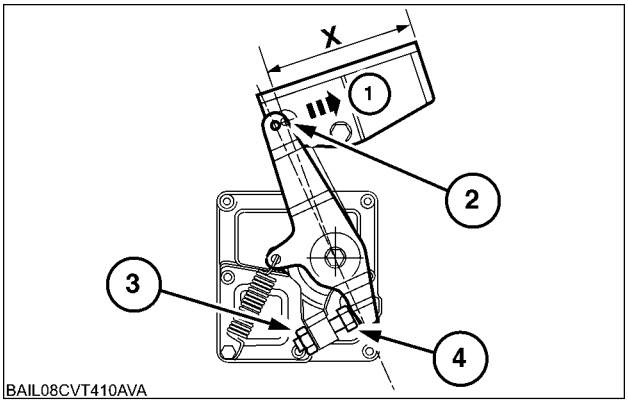
NOTE: *The manual park brake should be correctly adjusted prior to adjusting the EPL.*

1. Disengage the EPL, using either of the methods described below:
2. Electronically:
   - Turn the ignition on.
   - Move the shuttle lever to position 5 whilst depressing both the shuttle lever neutral button and both brake pedals for more than 3 seconds.
   - The EPL and park brake warning lamps will be illuminated on the cluster.
   - Turn the ignition off and the EPL will remain disengaged.



BAIL08CVT421AVA 1

3. Mechanically:
   - Using the special tool supplied in the cab, remove the EPL cover and manually disengage the EPL.
4. Block the front wheels, raise the rear wheels just clear of the ground.
5. Apply a force of **250 - 350 Nm** (**184 - 258 lb ft**) five times at the end of the EPL lever **(1)**.
6. Adjust the EPL as follows:
   - Release the locking nut **(3)**.
   - Apply a force of **250 - 350 Nm** (**184 - 258 lb ft**) and under load adjust the bolt **(4)** to achieve a measurement **174 - 176 mm** between point **(2)** and the front bracket installed as shown **(X)**.
   - Tighten the locking nut **(3)** and recheck the measurement **(X)**.



BAIL08CVT410AVA 2

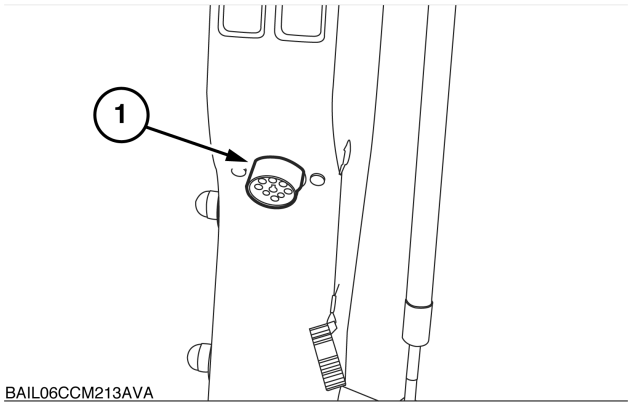
PARKING BRAKE Electronic - Calibrate

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

NOTE: *This procedure calibrates the EPL (Electronic Park Lock) applied and released positions and the accelerometer.*

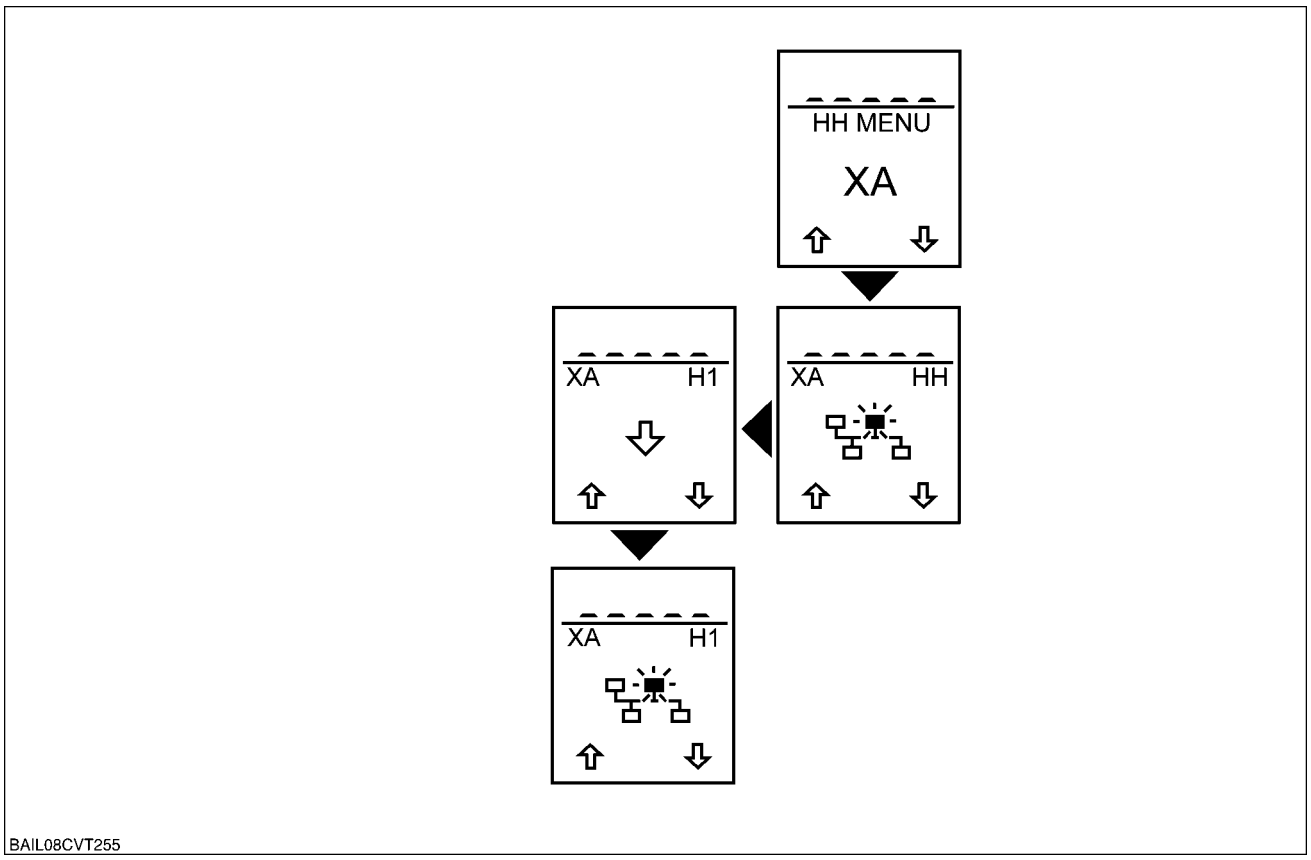
NOTE: *The calibration procedure is controlled by the electronic management system and during the calibration procedure the system is functional. Park the tractor on a flat surface away from any obstacles. The handbrake must be released and the shuttle lever in the park position.*
If required during the calibration procedure use the service brakes to prevent the tractor from moving.

1. Install the diagnostic connector **380000843** into the left hand diagnostic socket **(1)**.



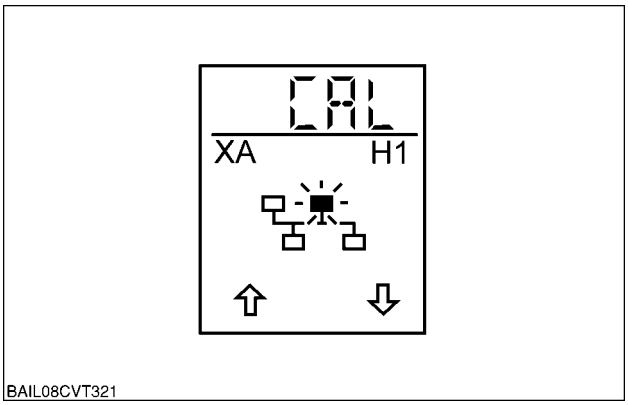
BAIL06CCM213AVA 1

2. Use the "up", "down" and "menu" keys on the ICU3 to navigate the HH menu's to H1 on the XA controller.



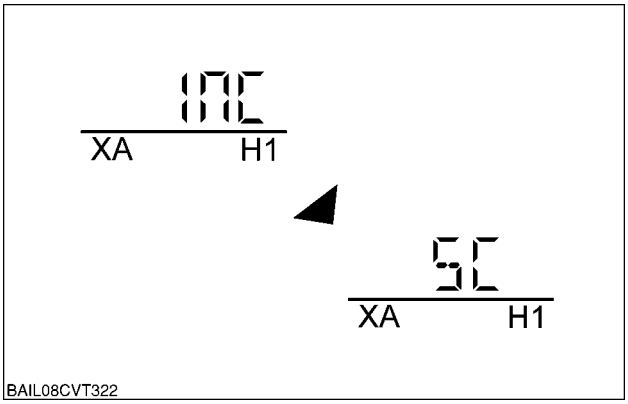
BAIL08CVT255 2

3. To start the calibration procedure press the 'menu' button, Cal will be shown on the display.



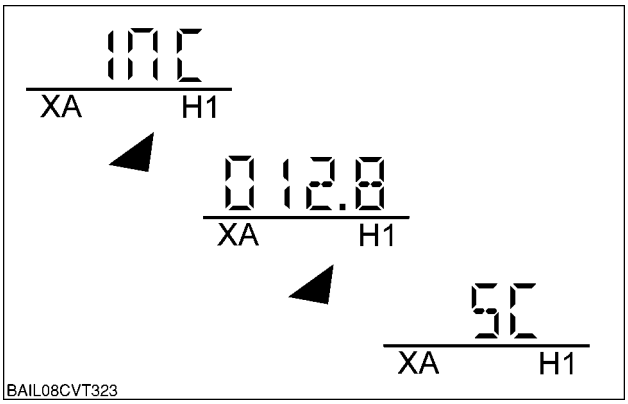
BAIL08CVT321 3

4. Depress the 'up' button , the display will show 'Inc' for the accelerometer calibration or 'SC' for the stroke calibration, use the 'up' and 'down' buttons to switch between the options.



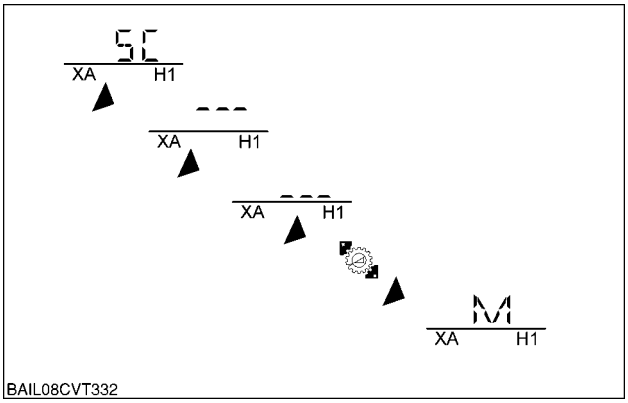
BAIL08CVT322 4

5. To calibrate the accelerometer:
Use the 'up/down" buttons to select 'Inc' on the display, Press the 'down' button to enter the accelerometer calibration routine.
The display will alternate between the calibrated value and 'Inc'.
When the calibration is complete the display will show 'SC'.



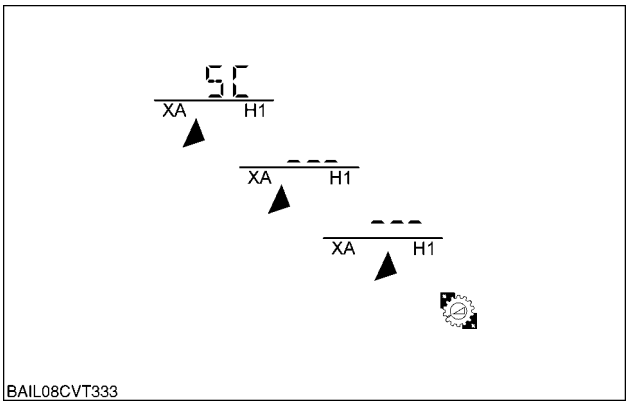
BAIL08CVT323 5

6. To calibrate the applied and released positions use the 'up/down" buttons to select 'SC' on the display, Press and hold the 'down' button to calibrate the released position.
During the calibration procedure the display will show a horizontal line which will move downwards while calibrating the released position and then the EPL release symbol will be displayed.
When the released position has been calibrated the display will show 'M', release the 'down' button.



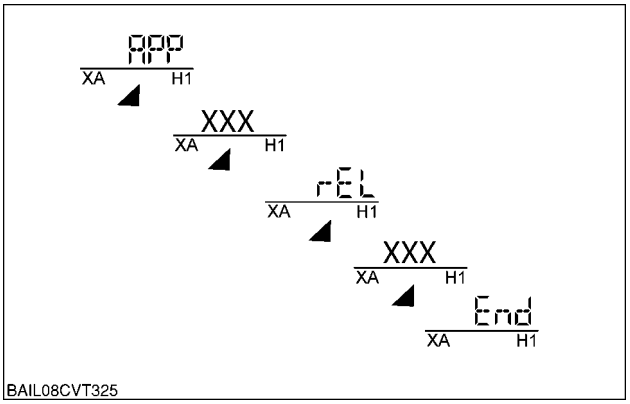
BAIL08CVT332 6

7. Press and hold the 'down' button to calibrate the applied position. The display will show a horizontal line which will move upwards and the 'EPL applied' symbol will be displayed.



BAIL08CVT333 7

8. When the calibration is complete the display will show 'APP' followed by the applied position and then 'REL' followed by the released position.



BAIL08CVT325 8

9. Key OFF to store the calibration values.

NOTE: *If an error occurs during calibration a "U" code will be displayed and the procedure will need to be repeated. Refer to the "U" code listing in* ***Control module - Fault code index (A.50.A)****.*

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PARKING BRAKE Electronic - Adjust 7
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PARKING BRAKE Electronic - Calibrate 8
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
PARKING BRAKE Electronic - Install 5
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
PARKING BRAKE Electronic - Remove 3
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

TRAVELLING - D

BRAKE CONNECTION Hydraulic - 34.C

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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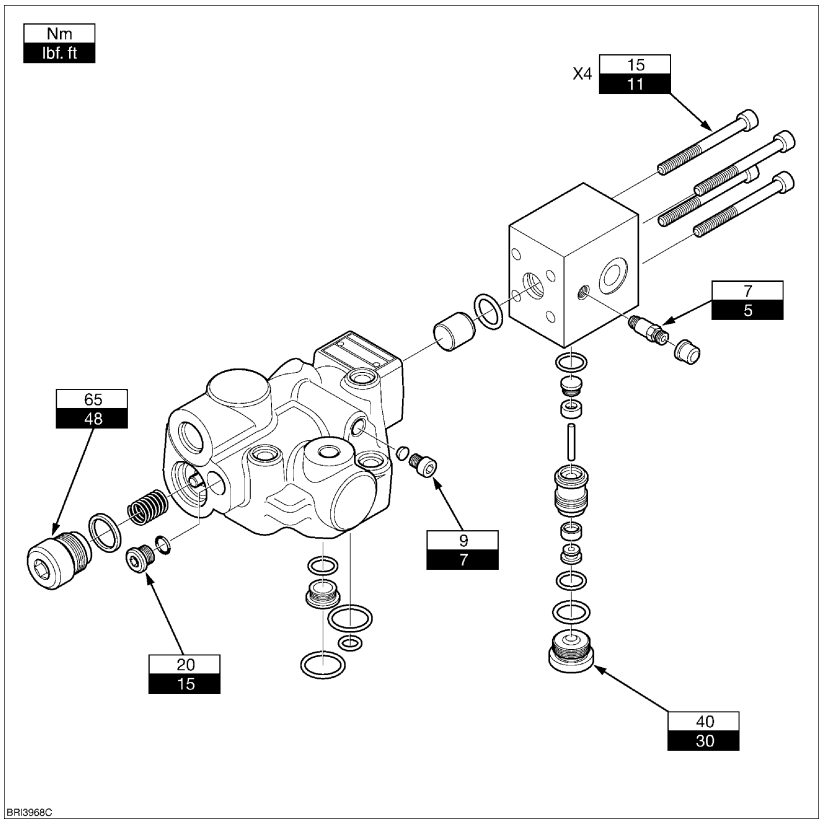
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Trailer brake valve - Torque

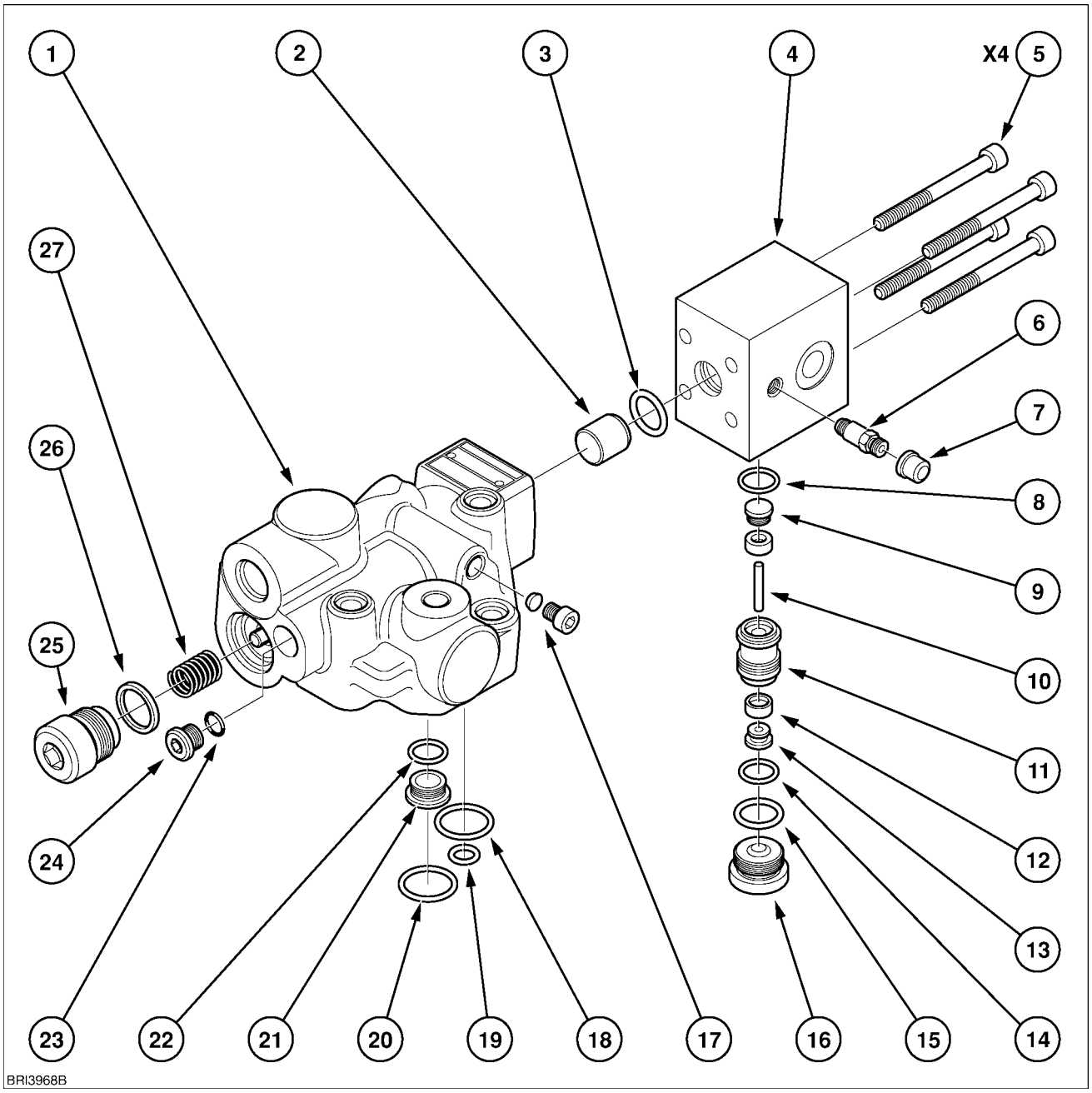


BAIL06CCM045GSA 1

Trailer brake valve - Special tools

Trailer Brake Fitting	380000550
Pressure Gauge	**250 bar** (**3600 lbf/in2**)
Pressure Gauge	**40 bar** (**600 lbf/in2**)

Trailer brake valve - Exploded view



BAIL06CCM046GSA 1

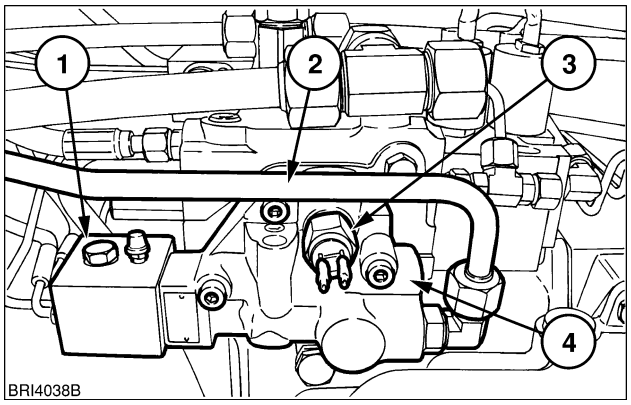
Trailer Brake Valve Components

1.Valve Manifold
2.Piston
3.'O' Ring
4.Pilot Head
5.Pilot Head Bolts
6.Bleed Valve
7.Dust Cap
8.'O' Ring
9.End Cap
10.Pin
11.Spool
12.Sleeve
13.'O' Ring
14.'O' Ring
15.'O' Ring
16.Plug
17.Screw
18.'O' Ring
19.Load Sensing Port 'O' Ring
20.'O' Ring
21.Plug
22.'O' Ring
23.'O' Ring
24.Plug
25.Plug
26.Seal

27.Spring

Trailer brake valve - Static description

Tractors may be fitted with a hydraulically operated trailer brake valve which operates the trailer brakes whenever the brake system is activated by depressing the footbrake.
Oil flows from the hydraulic pump through the priority valve manifold and into the trailer brake valve and then returns to the priority valve manifold. The position of the trailer brake valve in the circuit ensures that the trailer brake circuit has priority flow over the remote valves and other hydraulic high pressure circuits. Trailer braking is proportional to the effort on the tractor brake pedal. Feedback is provided by the trailer brake valve to give a sense of feel to the operator which aids precise braking.



BAIL06CCM066ASA 1

1. Pilot Head
2. Pipe to coupler
3. Pressure Switch (Italian Trailer Brake only)
4. Trailer Brake Valve

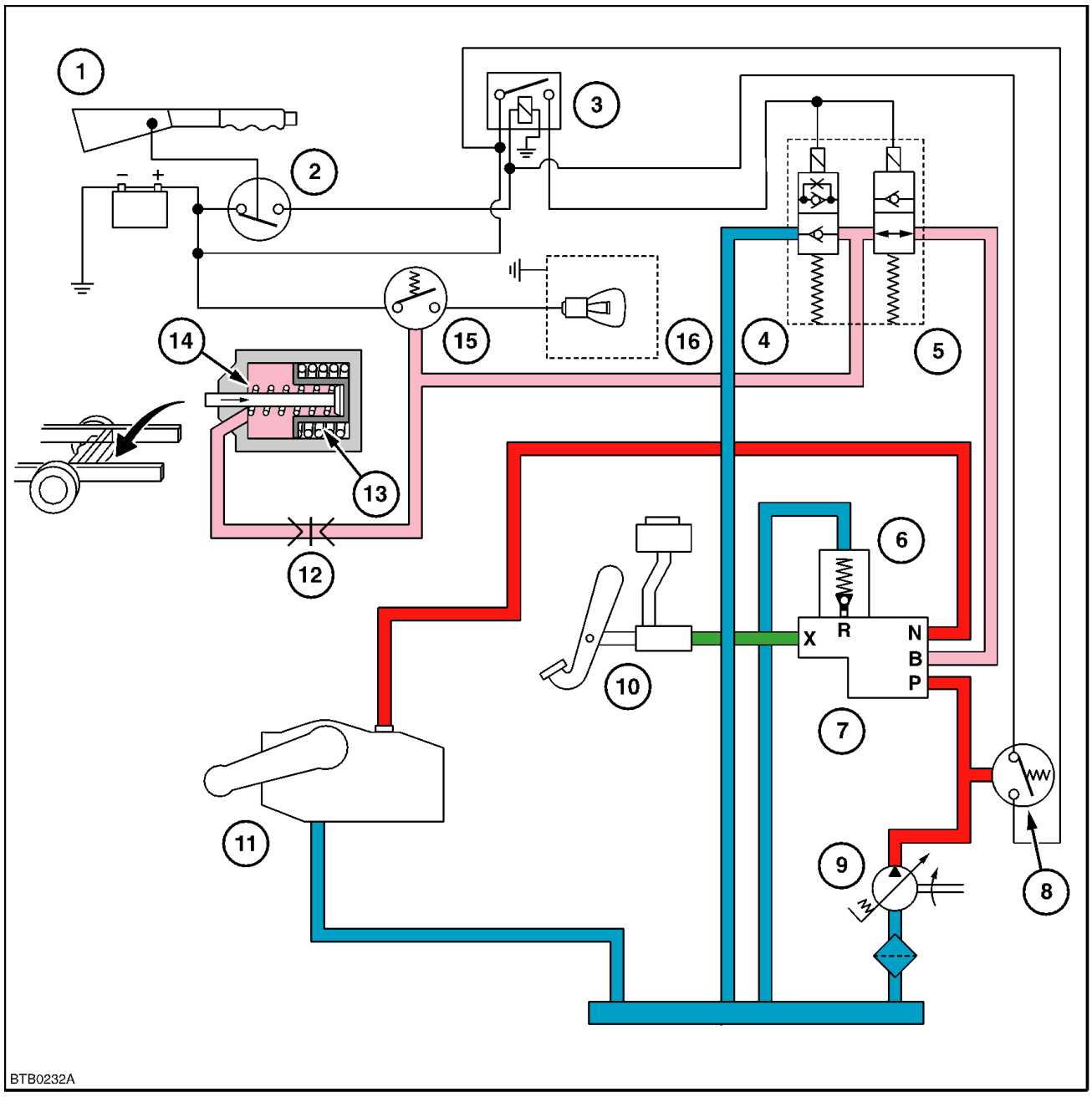
Trailer brake valve - Dynamic description

Italian Trailer Brake Valve - Engine Running Brakes Not Applied

To release the trailer braking mechanism a pressure of **11 - 12 bar** (**160 - 174 -lbf/in2**) is required at the trailer brake coupling whenever the handbrake is released while the engine is running and the footbrake is not being applied.
This pressure is controlled by the oil discharge valve **(6)** which is attached to the trailer brake return to reservoir port **(R)**.
Oil from the implement pump flows to the trailer brake valve **(7)** port 'P'. When the brakes are not applied a small flow of oil returns to reservoir through port **(R)** with the remaining flow passing from port **(P)** to the implement valves and hydraulic lift through port N.
The **11 - 12 bar** pressure created by the oil discharge valve flows from the trailer brake line **(B)**, through the solenoid valves (4 and 5) to the trailer brake coupler **(12)**.

This pressure is sufficient to overcome spring **(13)** of the Italian brake actuating mechanism. As the spring is compressed, spring **(14)** retracts the actuating pin to disengage the braking mechanism on the trailer.

NOTE: *At engine start-up the trailer brake indicator light **(6)** will remain illuminated until the **11 bar** pressure necessary to disengage the braking mechanism has been created. To reduce the time necessary to reach trailer brake release pressure depress the brake pedal with the parking brake lever in the off position.*



BTB0232A 1

Italian Trailer Brake Valve Schematic- Engine Running Brakes Not Applied

Pump Pressure

Brake Pedal Pressure

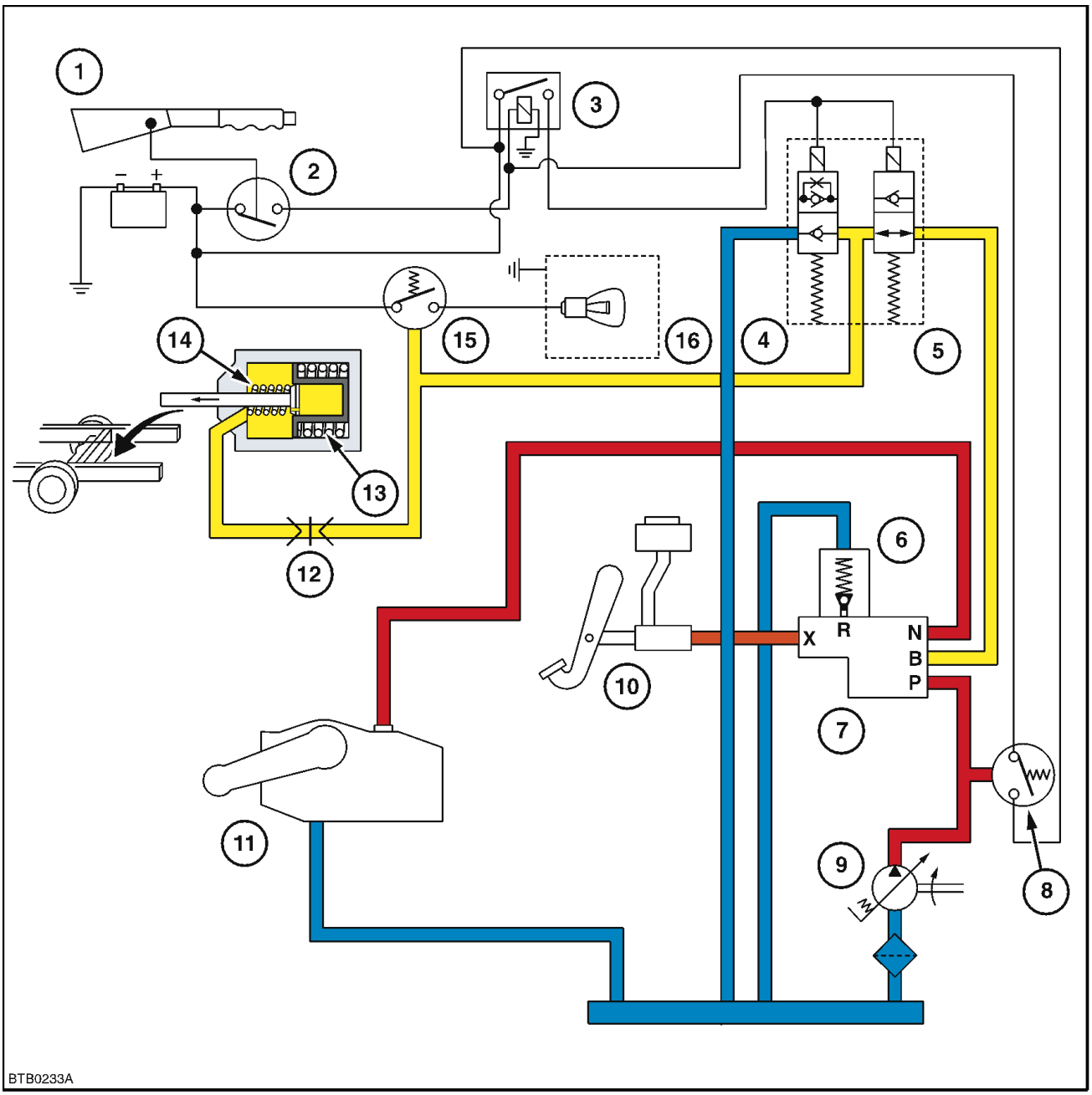
Trailer Brake Release Pressure (**11 bar**)

Return to Reservoir

1 Parking Brake
2 Parking Brake Switch
3 Relay
4 Discharge Solenoid
5 Delivery Solenoid
6 **11 bar** Pressure Regulating Valve
7 Trailer Brake Valve
8 Low Pressure Switch
9 Hydraulic Pump
10 Brake Pedal and Master Cylinder
11 Implement Valves and Hydraulic Lift
12 Trailer Brake Coupler
13 Spring
14 Spring
15 Trailer Brake Engaged Warning Lamp Switch
16 Trailer Brake Engaged Warning Lamp

Italian Trailer Brake Valve - Engine Running Brakes Applied

When the tractor brake pedal is depressed the control of oil flow through the trailer brake valve **(7)** is the same as described for tractors with the standard trailer brake system, refer to **Trailer brake valve - Dynamic description (D.34.C)** and the outlet pressure through port 'B' will be **12 - 150 bar**(**174 - 2180 lbf/in 2**) depending on the pressure applied to the brake pedal.
The delivery solenoid **(5)** is open and the discharge solenoid **(4)** is closed. Oil exiting port 'B' flows through the 'Open' delivery solenoid valve **(5)** to the trailer brake coupler **(12)**.
When a trailer is connected to the coupler the pressure passing through the coupling to the trailer braking mechanism overcomes the spring force (**(13)** and **(14)**) and moves the actuating pin forward to apply the brakes on the trailer.



BTB0233A 2

Italian Trailer Brake Valve Schematic- Engine Running Brakes Applied

Pump Pressure

Brake Pedal Pressure

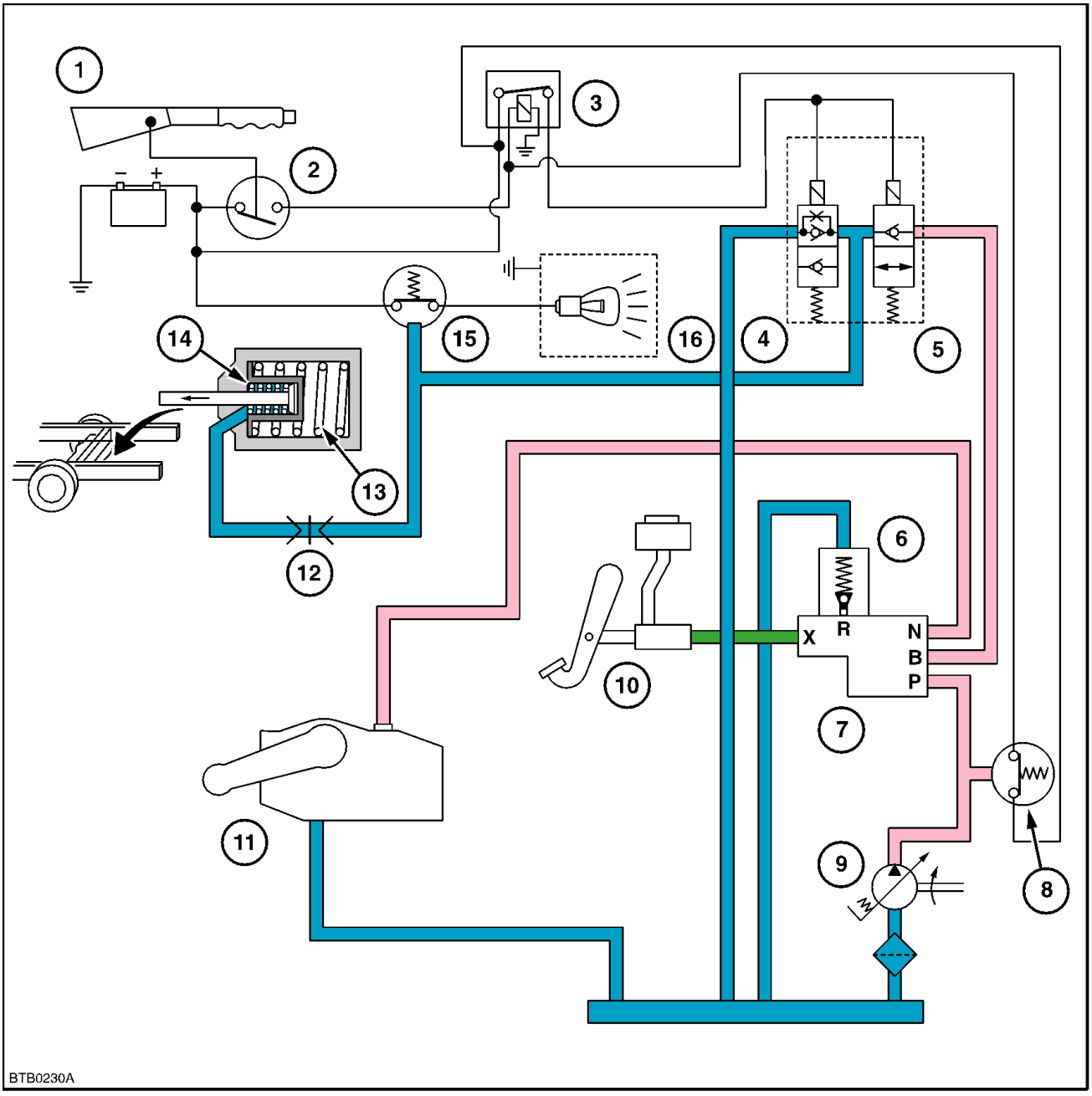
Trailer Braking Pressure **11 bar**)

Return to Reservoir

1 Parking Brake
2 Parking Brake Switch
3 Relay
4 Discharge Solenoid
5 Delivery Solenoid
6 **11 bar** Pressure Regulating Valve
7 Trailer Brake Valve
8 Low Pressure Switch
9 Hydraulic Pump
10 Brake Pedal and Master Cylinder
11 Implement Valves and Hydraulic Lift
12 Trailer Brake Coupler
13 Spring
14 Spring
15 Trailer Brake Engaged Warning Lamp Switch
16 Trailer Brake Engaged Warning Lamp

Italian Trailer Brake Valve - Engine Stopped or Running but with Low Hydraulic Pump Flow.

When the engine has stopped or the output from the hydraulic implement pump is very low the pressure switch **(8)** closes. With the switch closed the current energizes the relay **(3)**. The relay closes and current reaches and energizes the solenoid valves **(4)** and **(5)**. The delivery solenoid **(5)** is now closed and discharge solenoid **(4)** is open. In this condition the oil in the trailer brake line discharges to reservoir through solenoid **(4)**. Their is now insufficient pressure to overcome the spring **(13)** and therefore the actuating pin moves forward to apply the brakes. Low pressure in the trailer brake line causes the switch **(15)** to close and illuminate the warning lamp **(16)**.



BTB0230A 3

Italian Trailer Brake Valve Schematic- Engine Stopped or Running With Low Hydraulic Pump Flow

Pump Pressure (Less than **10 bar**)

Return to Reservoir

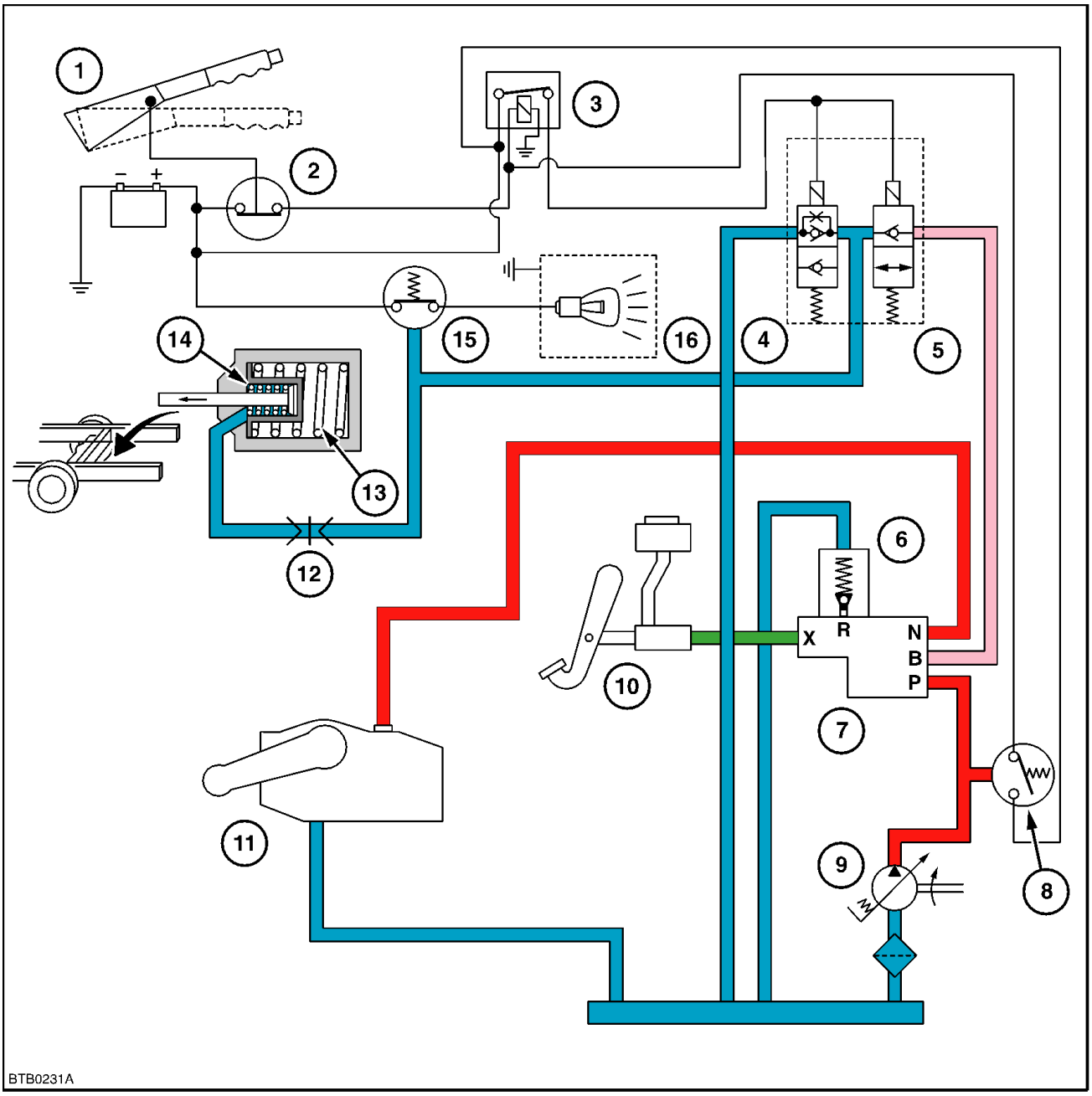
Brake Pedal Pressure

1 Parking Brake
2 Parking Brake Switch
3 Relay
4 Discharge Solenoid
5 Delivery Solenoid
6 **11 bar** Pressure Regulating Valve
7 Trailer Brake Valve
8 Low Pressure Switch
9 Hydraulic Pump
10 Brake Pedal and Master Cylinder
11 Implement Valves and Hydraulic Lift
12 Trailer Brake Coupler
13 Spring
14 Spring
15 Trailer Brake Engaged Warning Lamp Switch
16 Trailer Brake Engaged Warning Lamp

Italian Trailer Brake Valve - Engine Running and Parking Brake Applied

When the parking brake is applied the switch **(2)** is closed. With the switch closed the current energizes the relay **(3)**. The relay closes and current reaches and energizes the solenoid valves **(4)** and **(5)**.
The delivery solenoid valve **(5)** is now closed and discharge solenoid valve **(4)** is open. The **11 bar** pressure oil at port 'B' is blocked by delivery solenoid valve **(5)** and the pressure in the trailer brake coupler line is discharged to reservoir through discharge solenoid valve **(4)**.
Because there is insufficient pressure to overcome spring **(13)** the actuating pin is pushed forward to apply the brakes. The low pressure in the trailer brake coupler line causes the trailer brake warning lamp switch **(15)** to close and the in cab warning lamp will illuminate.

NOTE: *After applying the parking brake, wait approximately* ***10 seconds*** *before stopping the engine. This will allow complete discharge of the oil pressure in the trailer brake line to obtain full application of the trailer brakes.*



BTB0231A 4

Italian Trailer Brake Valve Schematic- Engine Running and Parking Brake Applied



Pump Pressure



Release Pressure **11 bar**)



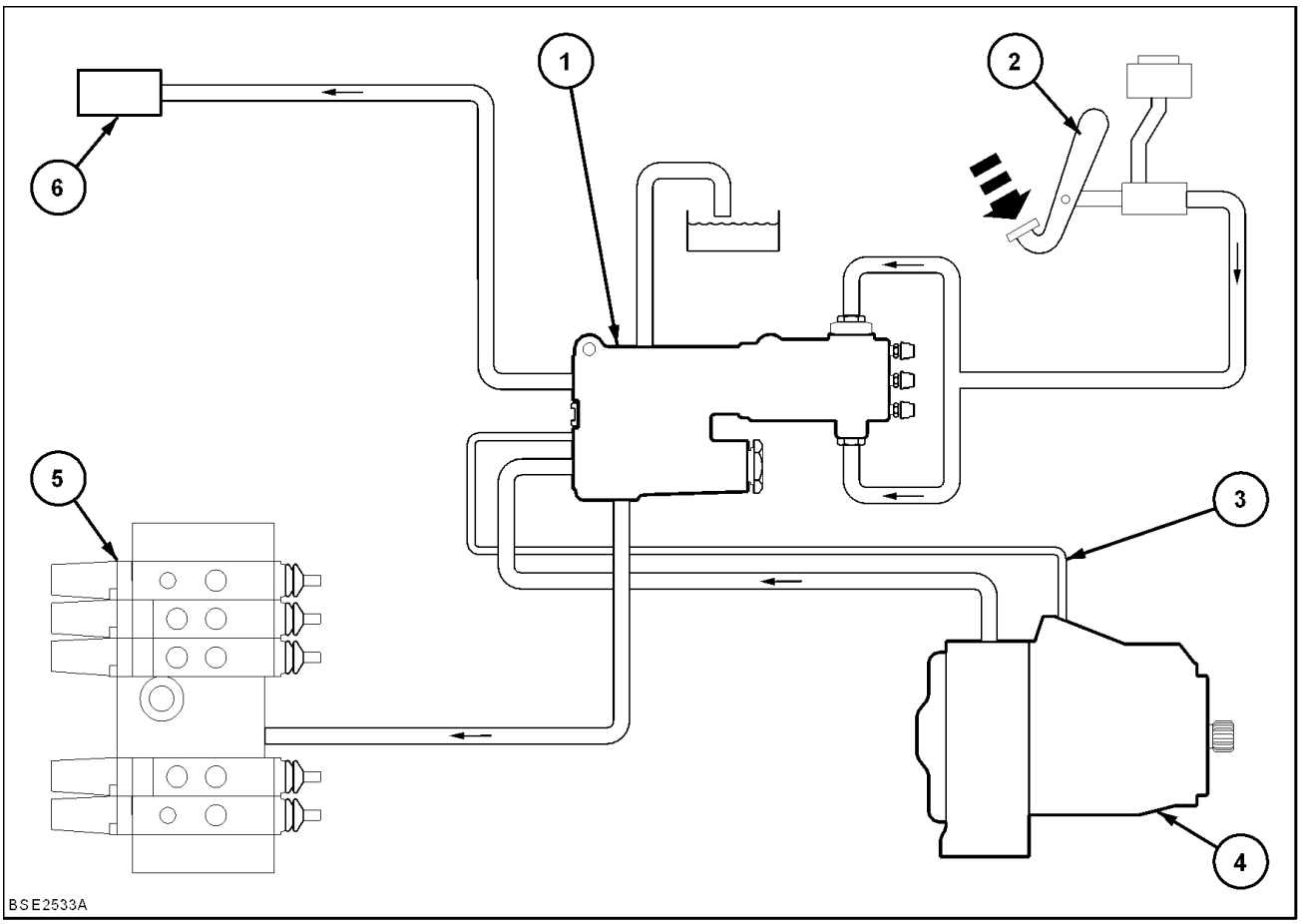
Zero Brake Pedal Pressure



Return to Reservoir

1 Parking Brake
2 Parking Brake Switch
3 Relay
4 Discharge Solenoid
5 Delivery Solenoid
6 **11 bar** Pressure Regulating Valve
7 Trailer Brake Valve
8 Low Pressure Switch
9 Hydraulic Pump
10 Brake Pedal and Master Cylinder
11 Implement Valves and Hydraulic Lift
12 Trailer Brake Coupler
13 Spring
14 Spring
15 Trailer Brake Engaged Warning Lamp Switch
16 Trailer Brake Engaged Warning Lamp

Trailer brake valve - Hydraulic schema

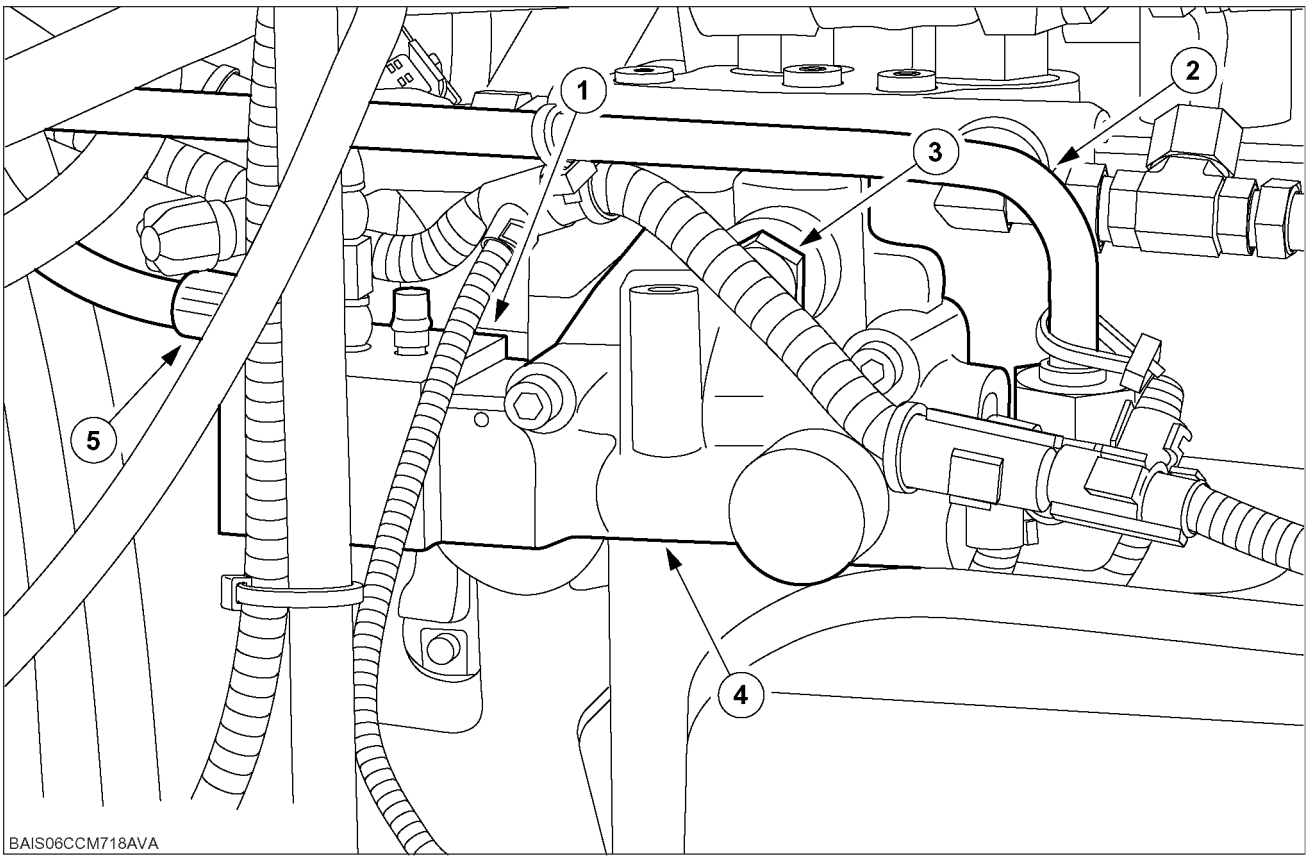


BSE2533A 1

Trailer Brake Circuit

1 Trailer Brake Valve
2 Braking Pressure
3 Load Sense Line
4 Variable Displacement Hydraulic Pump
5 Remote Valves
6 Trailer Brakes

Trailer brake valve - External view



BAIS06CCM718AVA 1

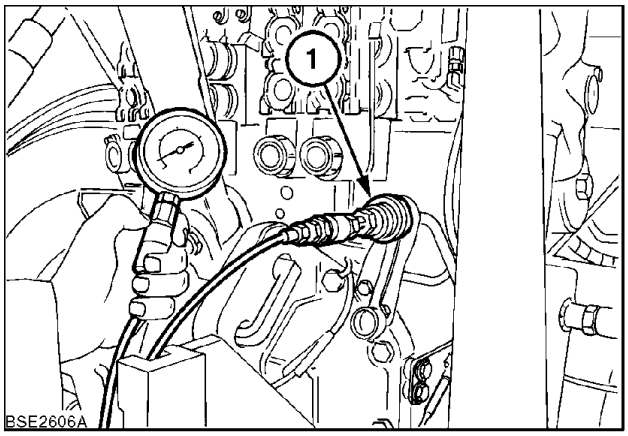
1. Trailer Brake Control Valve Logic Head
2. Pipe To Coupler
3. Pressure Switch (Italian Trailer Brakes Only)
4. Trailer Brake Valve
5. Trailer Brake Valve Supply line

Trailer brake valve - Pressure test

1. Notice – After parking brake engagement, wait approximately. **10 seconds** before stopping the engine to permit complete oil discharge from trailer brake cylinder and obtain optimal braking action.

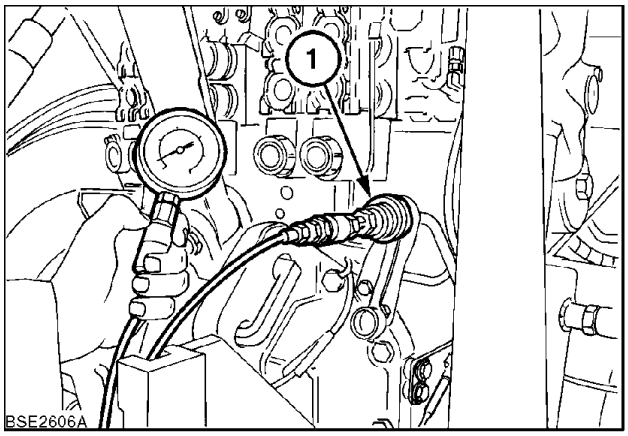
2. TEST CONDITIONS.
   Oil temperature **40 - 50 °C**
   Engine speed **1000 rpm**.
   Electrical system powered.
   Parking brake disengaged.

3. TRAILER BRAKE DISENGAGEMENT PRESSURE TEST (ITALIAN TRAILER BRAKES ONLY)
   Proceed as follows:
   Insert fitting no. 380000550 **(1)** into the trailer brake coupler and connect it to a **0 - 40 bar** pressure gauge **380000552** .
   With engine and oil as detailed above, pressure should be **11 - 12 bar** (**160 - 174 lbf/in2**).
   Make sure the trailer brake engaged light indicator is off.
   Engage parking brake and the pressure should be **0 bar** (**0 lbf/in2**), disconnect pressure gauge and fitting no. 380000550 **(1)**.



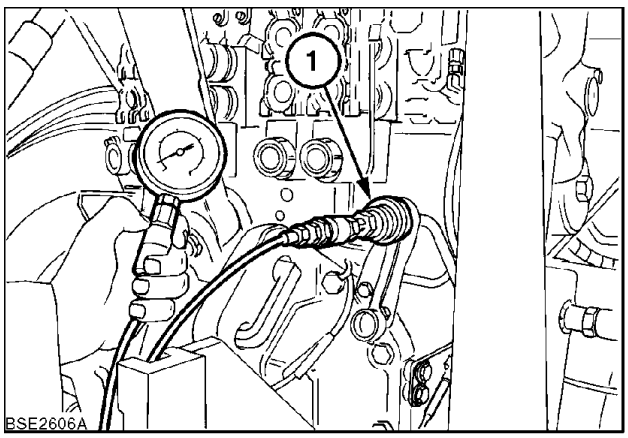
BSE2606A 1

4. TRAILER BRAKING SYSTEM PRESSURE TEST (ALL MODELS)
   Proceed as follows:
   Insert fitting no. 380000550 **(1)** in trailer brake coupler and connect it to a **0 - 250 bar** pressure gauge 380000553.
   Couple both brake pedals together and with engine and oil in the conditions described in **2**, apply the foot brake. The pressure gauge reading should increase depending on pedal effort up to **120 - 140 bar** (**1740 - 2031 lbf/in2**).
   Engage parking brake, disconnect pressure gauge and fitting no. 380000550 **(1)**.



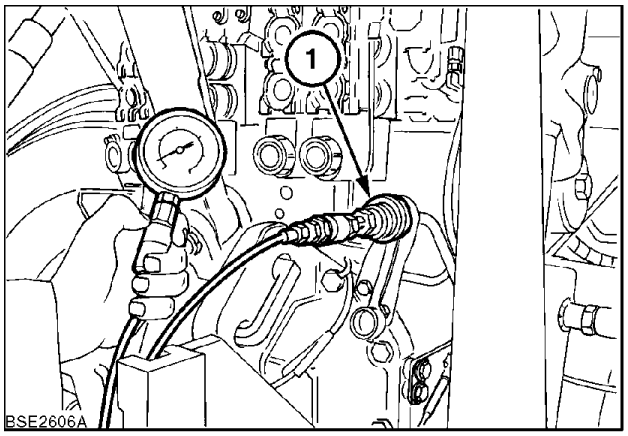
BSE2606A 2

5. HYDRAULIC SYSTEM LEAK TEST (ALL MODELS)
   Proceed as follows:
   Insert fitting no. 380000550 **(1)** in trailer brake coupler and connect it to a **0 - 250 bar** pressure gauge 380000553.
   Couple both brake pedals together and with engine and oil in the conditions described in **2** apply the foot brakes for a minimum of **10 seconds**. The pressure gauge reading should increase up to **120 - 140 bar** (**1740 - 2031 lbf/in2**) and remain constant.
   Engage parking brake, disconnect pressure gauge and fitting no. 380000550 **(1)**.



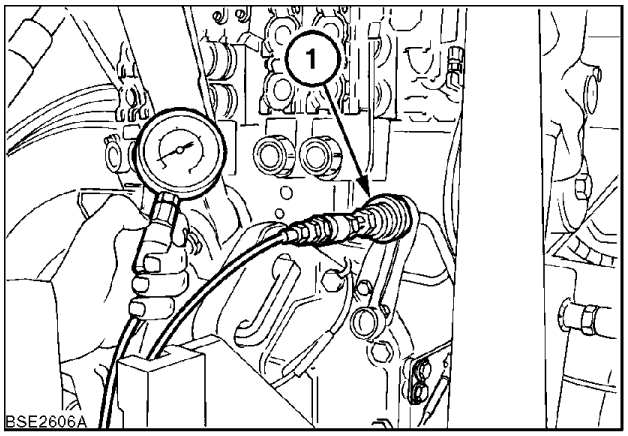
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6. PARKING BRAKE ENGAGEMENT TEST
(ITALIAN TRAILER BRAKES ONLY)
Proceed as follows:
Insert fitting no. 380000550 **(1)** in trailer brake coupler and connect it to a **0 - 40 bar** pressure gauge **380000552** .
With engine and oil in the conditions described in **2**, fully raise parking brake control lever .
Check if pressure is **0 bar** and the trailer brake engaged light indicator is on.
With parking brake engaged disconnect pressure gauge and fitting no. 380000550 **(1)**.



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7. TRAILER BRAKE CIRCUIT SAFETY SWITCH TEST
(ITALIAN TRAILER BRAKES ONLY)
Proceed as follows:
Insert fitting no. 380000550 in trailer brake coupler and connect it to a **0 - 40 bar** pressure gauge **380000552** .
With parking brake 'Off' and tractor brakes not applied, operate and hold the remote control valve lever and allow the system pressure relief valve to operate. Keep this position for a few seconds and quickly release the control lever.
Check if parking brake disengagement pressure remains at the specified value: **11 - 12 bar** (**160 - 174 lbf/in2**).
Engage parking brake, disconnect pressure gauge and fitting no. 380000550 **(1)**.



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BRAKE CONNECTION Hydraulic - Testing

NOTE: *Trailer Brakes Not Working*

N°	Test Point	Expected Result	Other Result (Possible Cause)
1	**Condition** Has all air been bled from trailer brakes	**Result** YES **Action** Go to test **2**	**Action** NO Bleed trailer brakes refer to **SERVICE BRAKE Hydraulic - Bleed (D.30.C)**
2	**Condition** Pressure test trailer brakes. Fault confirmed?	**Result** YES **Action** Go to test **3**	**Action**
3	**Condition** Is hydraulic lift working satisfactorily? Test maximum system pressure at remote valve coupler. Pressure **2900 - 3000 lbf/in2** (**200 - 207 bar**)?	**Result** YES **Action** Go to test **4**	**Action** NO Go to test **5**
4	**Condition** Operate and hold remote valve to generate maximum system pressure and at the same time operate tractor brakes Trailer brake valve functions correctly?	**Result** YES **Action** Go to test **6**	**Action** NO Replace trailer brake valve
5	**Condition** Adjust flow/pressure compensating valve Fault cleared?	**Result**	**Action** NO Go to test **7**
6	**Condition** Examine shuttle valve in load sensing line between trailer brake and pressure/flow compensating valve Valve sticking?	**Result** YES **Action** Clean/replace shuttle valve to trailer brake valve	**Action**
7	**Condition** Examine flow/pressure compensating valve for sticking Fault cleared?	**Result**	**Action** NO Disassemble variable flow pump and check swash plate piston for sticking

Trailer brake valve - Troubleshooting

Problem	Possible Cause	Correction
Pressure higher or lower than specified.	Faulty trailer braking auxiliary valve pressure regulating valve.	Replace trailer braking auxiliary valve.
	Faulty hydraulic pump.	Replace pump.
Excess pressure peaks are observed when applying the brake pedals for 10 seconds.	Oil leaks from hydraulic system.	Locate leaks and repair.
	Solenoid valve leak.	Replace solenoid valve.
	Trailer brake auxiliary valve leaks.	Replace trailer brake auxiliary valve.
Trailer brake disengagement pressure = 0 - 11 bar (0 - 160 lbf/in2)	Trailer brake disengagement pressure valve incorrectly adjusted.	Test/Replace valve.
Trailer brake disengagement pressure = 0 - 11 bar (0 - 160 lbf/in2)	Trailer brake disengagement pressure valve incorrectly adjusted.	Test/Replace valve.
Correct trailer brake disengagement pressure but light indicator item (22), is on.	Faulty trailer brake engaged indicator switch.	Test/Replace switch.
Trailer brake disengagement pressure not correct but light indicator is off.	Faulty indicator lamp.	Test/Replace lamp.
	Faulty trailer brake engaged indicator switch.	Test/Replace switch.
Trailer brake disengagement pressure does not zero when parking brake is applied.	Faulty parking brake engaged switch.	Test/Replace switch.
	Faulty parking brake indicator circuit relay.	Test/Replace relay.
	Discharge solenoid valve faulty or stuck closed.	Test/Repair or replace solenoid valve.
Trailer brake disengagement pressure is permanently zeroed when operating the levers described in Trailer brake valve - Pressure test (D.34.C).	Trailer brake circuit safety switch (**Wiring harness - Component diagram 40 (A.30.A)**) adjustment exceeding rated value **2.5 - 3.5 bar** (**36 - 51 lbf/in2**).	Replace switch.
	Switches (**Trailer brake valve - Pressure test (D.34.C)**) reversed in the specified positions or with exchanged power supply cables.	Move switches to correct positions or reverse power supply cables.

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TRAVELLING - D

SUSPENSION Hydraulic - 40.C

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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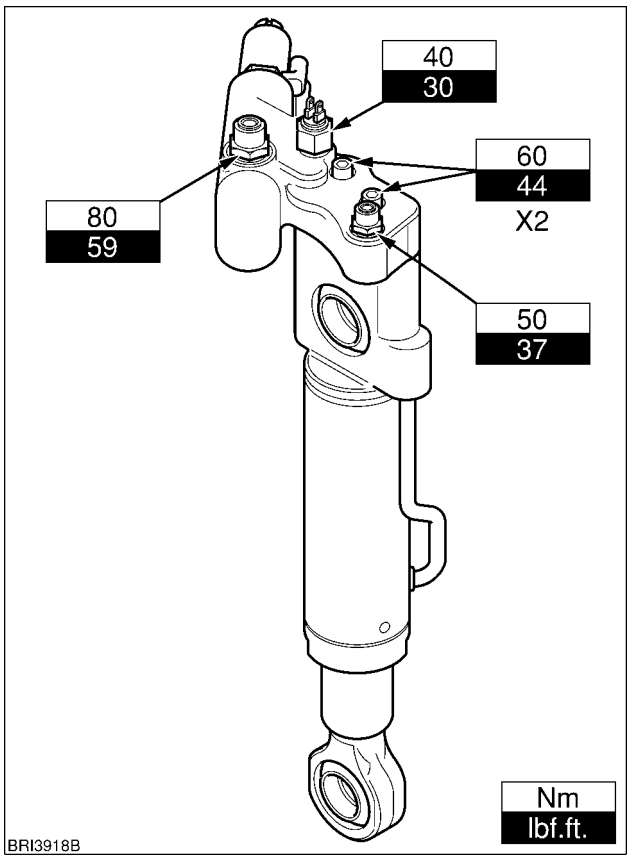
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SUSPENSION Hydraulic - General specification

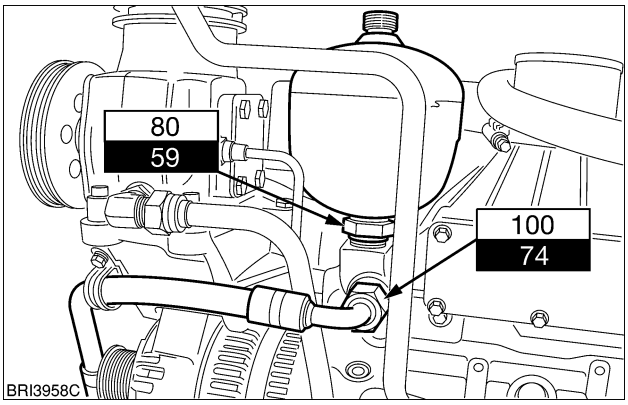
System Relief Valve	**210 bar**.

Cylinder - Torque



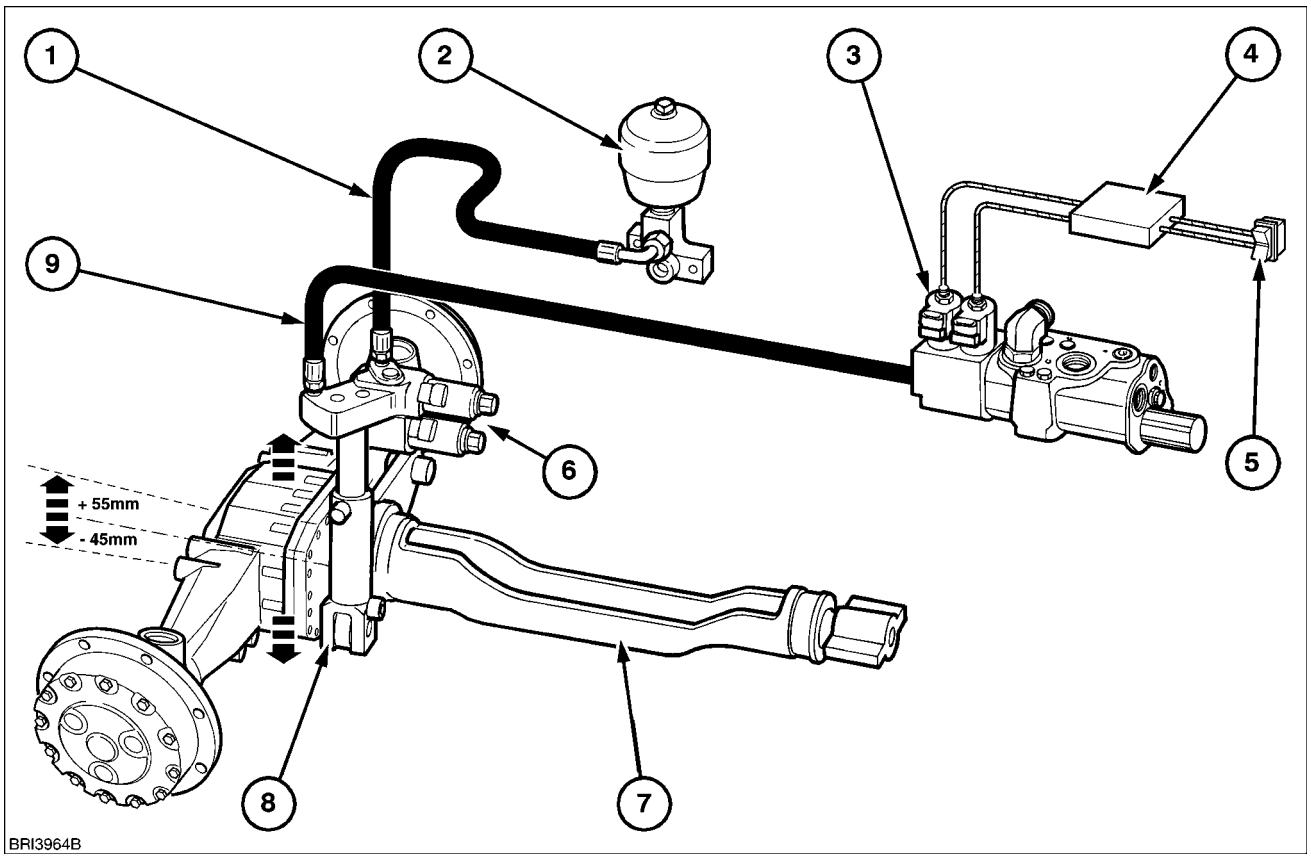
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Accumulator - Torque



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SUSPENSION Hydraulic - Static description



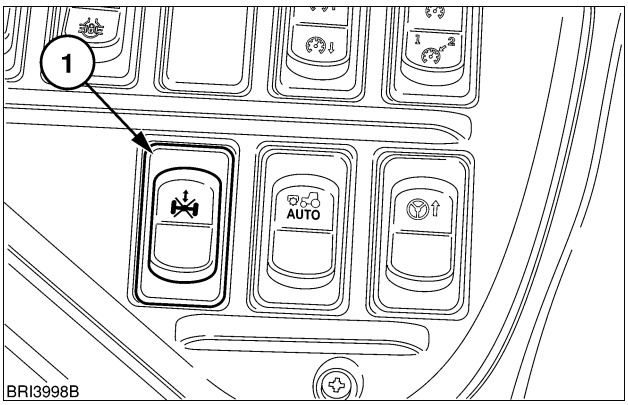
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Front axle suspension system

1 Pressure oil to the accumulator
2 Accumulator
3 Levelling valve
4 Electronics box
5 Suspension On/Off switch
6 Valve block of the transmission control
7 Suspension link
8 Suspension cylinder
9 Pressure oil to the control valve

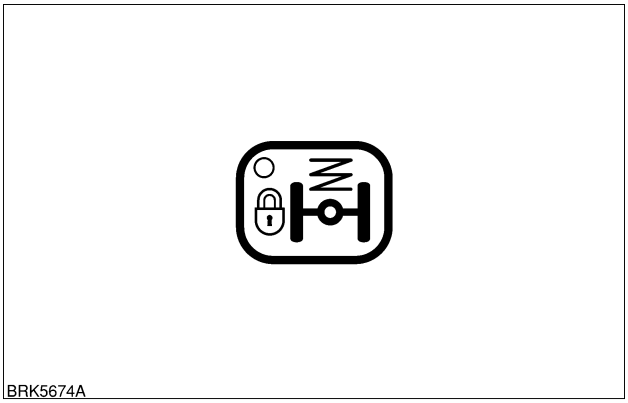
INTRODUCTION

The front axle suspension can be supplied in an optional version as a hydraulic suspension with electronic regulation integrated in the front axle, which lifts or lowers the front axle to equalise shock loads and holds the body of the tractor horizontal, if force is introduced to the front wheels.
The suspension system reduces the bending vibrations, holds the front wheels in contact with the ground and increases the stability of the tractor when travelling on the road, when the nature of the road surface affects the vehicle's stable position. This is especially important when the tractor transports heavy mounted implements on the three-point linkage with light front axle load.
The suspension is automatically switched on when the engine is started, but when the tractor is stationary or travelling speed is below **1 kmh** automatically 'locked' after 1.5 seconds so that mounted implements or ballast weights can be attached safely.
At travelling speeds between **1 - 12 kmh**, the driver can switch the suspension off with the switch **(1)** on the bar of the cab. This setting is intended for situations where an exact working depth regulation is required for front-mounted implements or when bulldozing with a front loader.
At travelling speeds above **12 kmh**, the system is automatically switched on.



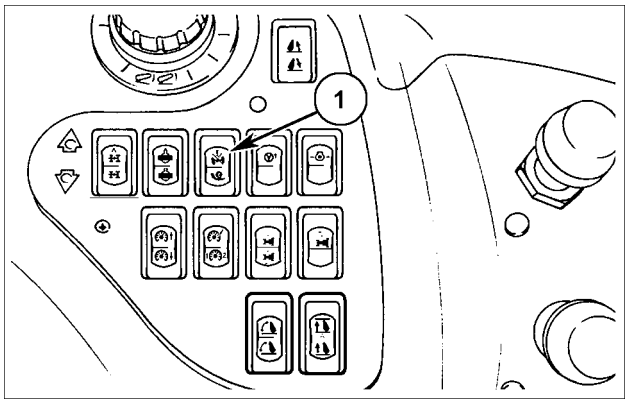
BAIL06CCM121ASA 2

PUMA Standard



BAIL09CCM318ASA 3

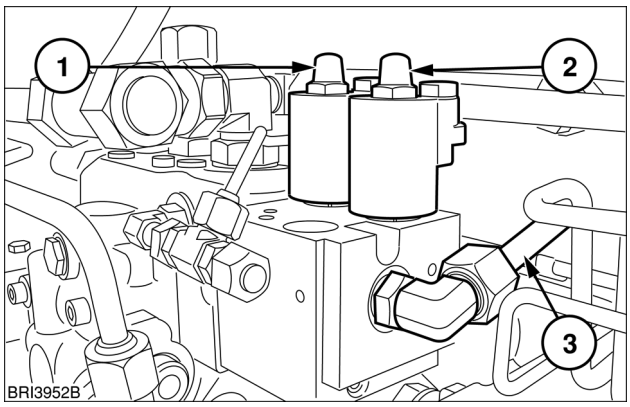
Puma from Serial no. Z9BHH40001-



SS07F174 4

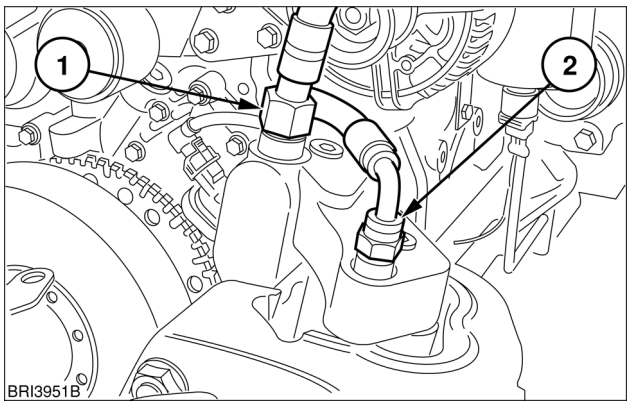
PUMA Multicontroller

The pressure oil of the pump flows through the levelling valve in the suspension system. This valve controls the raising and the lowering of the cylinder by operating the Raise solenoid valve **(1)** and Lower solenoid valve **(2)**. The oil flow is guided from a supply line to the suspension control valve. **(3)**



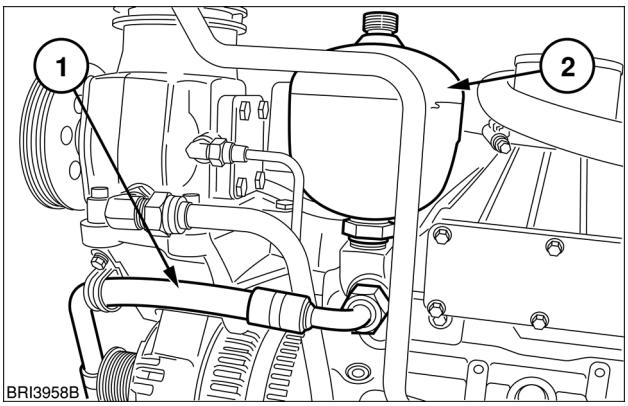
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The suspension control valve is located directly above the suspension cylinder. The oil flows from the line of the levelling valve **(2)** through the valve and back through the accumulator pressure oil line **(1)**.



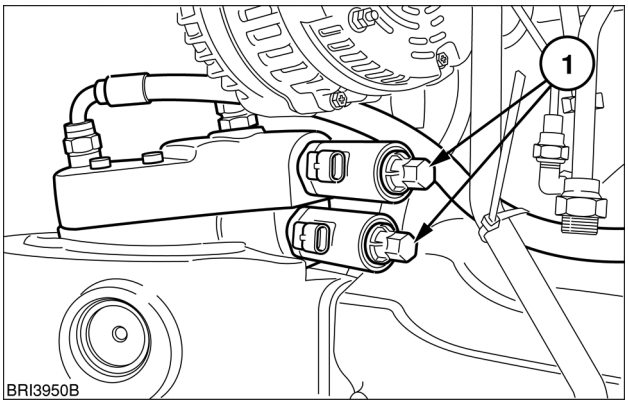
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The accumulator **(2)** which acts like a spring is located on the left-hand side of the engine and is supplied with oil through line **(1)** from the suspension control valve.



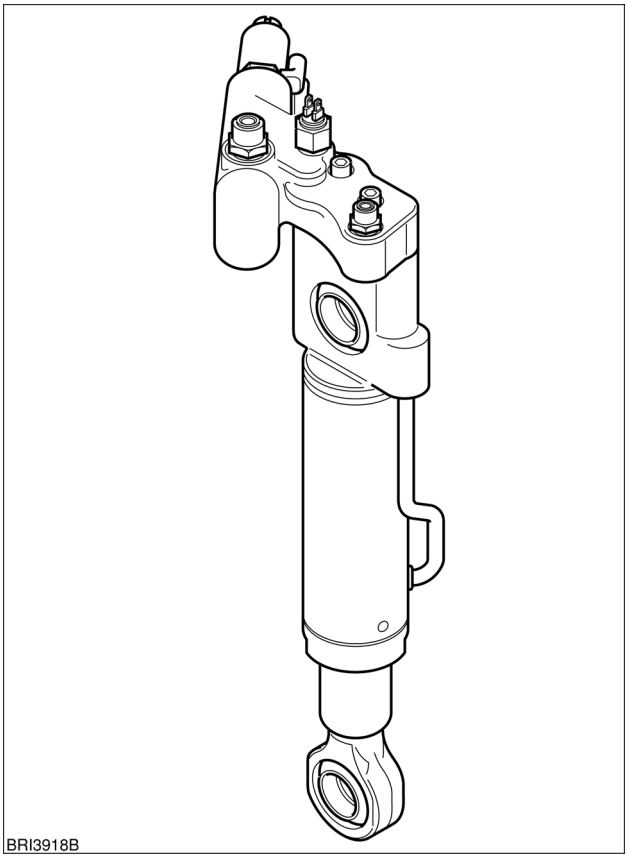
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The suspension control valve is operated with solenoid valves **(1)**, which react to control signals from the electronic control unit.



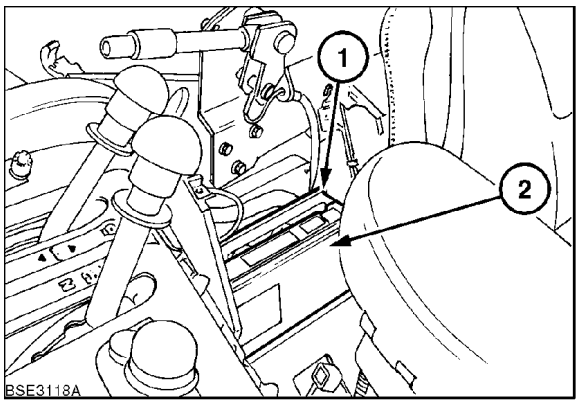
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The suspension cylinder is installed in the front axle bearing block.



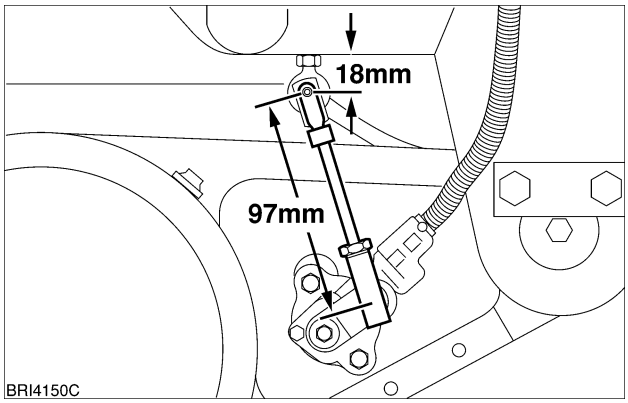
BAIL06CCM038BSA 9

The electronic control unit, which controls the hydraulic control valve, is located behind the driver's seat.
To support fault diagnostics and to optimise performance, the electronic control unit has an in-built self-diagnostics function and electronic calibration.
All error codes and calibration values are displayed on the instrument cluster on the digital displays.
Further details about the calibration procedure can be found in **Control valve - Calibrate (D.40.C)**.



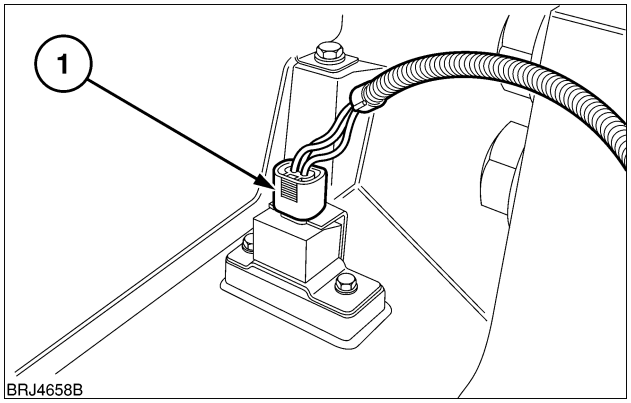
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The front axle position is sensed via a potentiometer mounted on the axle.

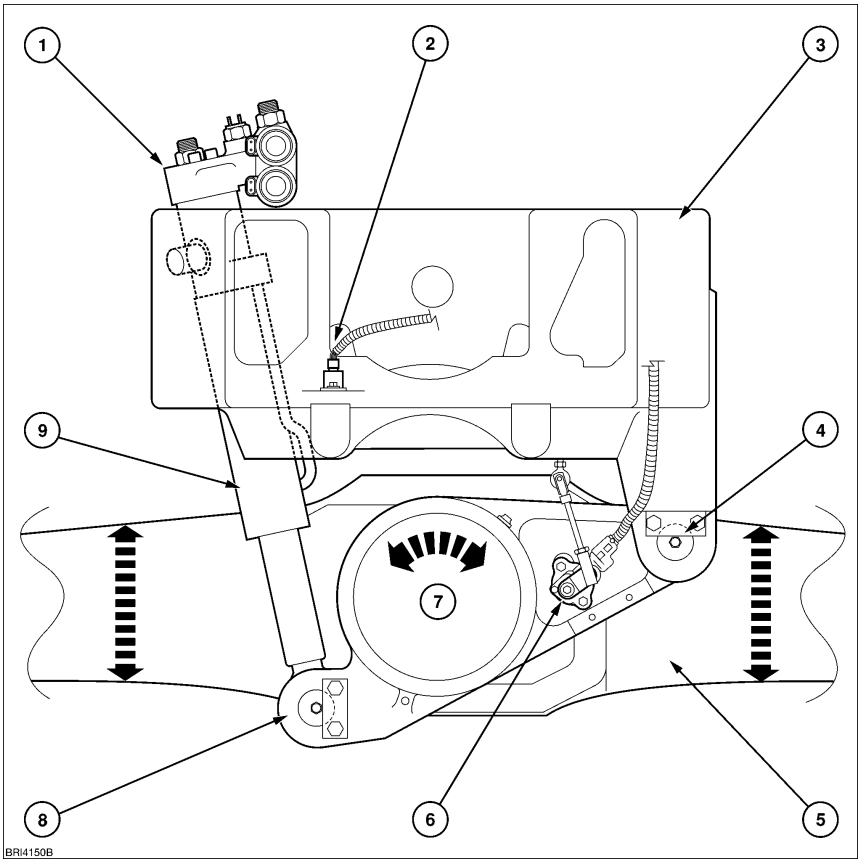


BAIL06CCM174ASA 11

An accelerometer is installed in the front axle bearing block. This measures the ground speed. By means of this value and the information from the position sensor potentiometer from the front axle, the control unit microprocessor matches the extent of the suspension to give optimum driving comfort.



BAIL07CCM268ASA 12



BAIL07CCM267ASA 13

Front axle suspension system

1 Suspension control valve
2 Accelerometer
3 Front axle bearing block
4 Turning knuckle
5 Axle
6 Potentiometer
7 Front axle pendulum joint
8 Link (Panhard rod)
9 Hydraulic cylinder

The suspension system links the front axle **(5)** and the tractor's front axle suspension **(3)** via a motion link called a "Panhard rod" **(8)** and a hydraulic cylinder **(9)**.
As soon as shock loads, vibrations or changes in the weight on the front powerlift affect the front axle, the Panhard rod turns in the turning knuckle **(4)**, while at the same time the axle pivots around the pivot point **(7)**. This movement means that the front axle moves up or down in relation to the tractor's front axle suspension.
The vertical movement of the axle in relation to the speed of the front axle suspension is sensed by the potentiometer **(5)** and accelerometer **(2)**, which transmit the appropriate signals to the electronic control unit.
Depending on the extent of the shock load and the vertical lift recorded by the electronic control unit, the hydraulic system reacts accordingly to absorb the shock loads and to correct the vertical position of the axle such that the tractor continues to work horizontally.

SUSPENSION Hydraulic - Dynamic description

The hydraulic control system incorporates several modes of operation.
Front axle suspension mode
Anti bang function
Brake function
Accelerator pedal function
Gear change function
EDC function

Front axle suspension mode

Front axle suspension mode is the default mode when the tractor is started . In this mode the lamp on the suspension switch and the warning lamp on the instrument cluster will not be illuminated. The damping of the suspension is controlled by the software. The system calculates the optimal damping force for the suspension using the velocity of the chassis and the relative velocity of the suspension. The chassis velocity is calculated by integrating the chassis acceleration as measured by the vertical chassis accelerometer and the relative suspension velocity as calculated from the front axle position sensor. (Refer to **SUSPENSION Hydraulic - Static description (D.40.C)**.
The calculated damping force and the relative suspension velocity are then used to determine the current to be applied to the two damping control valves.
If the suspension cylinder is in an extended position (rebound) the damping will be controlled by valve **(5)**. Valve **(3)** (Refer to Figure **1**) does not influence the damping is maintained at the optimal passive current.
If the suspension is in compression the damping will be controlled by valve **(3)** and valve **(5)** does not influence the damping but is maintained at the optimal passive current.

Anti Bang Function

When the tractor is off-road and the suspension position reaches its maximum or minimum calibrated positions then the operator comfort is affected. In order to reduce this problem once the suspension reaches the extremes of its operating range the system will command the damping control valves **(3)** and **(5)** to close. If the suspension is approaching the maximum position the system will command valve **(5)** to close. The current applied to the valve will depend on the current position of the suspension in relation to the maximum position. The same situation will occur when the suspension is within the limit of its minimum position . The current to valve **(3)** will be reduced as the suspension reaches the minimum position

Brake Function

When the operator brakes, the tractor will pitch forward causing the suspension to be shortened. To reduce this effect the brake function will command valves **(3)** and **(5)** to close. The status of the left and right brake pedal switches are sent to the control module which will then reduce the current supplied to valve **(3)**. Once either brake pedal is released the current is returned to its passive value. At the same time the function will apply the same logic to valve **(5)**.

Accelerator Pedal function

When the operator accelerates or decelerates the tractor will pitch. Under acceleration the suspension will be lengthened and under deceleration the suspension will shorten. To reduce this effect the accelerator pedal will cause the damping valves **(3)** and **(5)** to close

Gear change function

When the operator changes gear the tractor will pitch. During a gear change this function will cause the damping valves **(3)** and **(5)** to close in order to improve operator comfort. The gear change function is triggered when a shift in progress is detected.

Electronic Draft control function

When the electronic draft control system is controlling the position of the rear hitch the front suspension will extend as the hitch is lifted with an implement fitted. The EDC function of the suspension system monitors the demand signal to the rear hitch and will lock the suspension when the EDC raises the hitch. The status of the dynamic ride control feature of the EDC is also monitored, and if the dynamic ride control is active then the EDC function will not affect the operation of the suspension. The EDC function will not affect valve **(3)**.

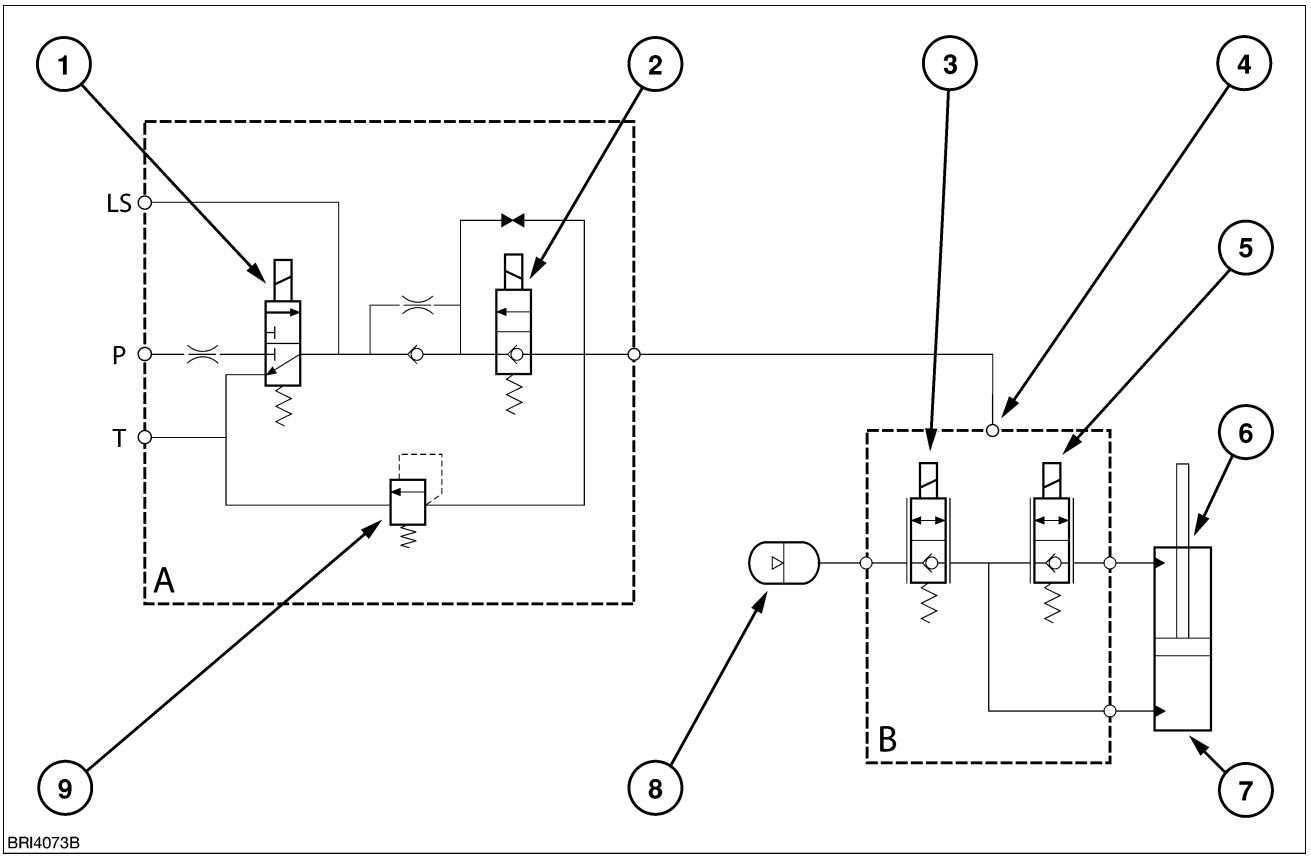
NOTE: *Ride control and the levelling system only operate when the suspension is switched on and the tractor is being driven at speeds above* ***1 kph****.*

The location of those specific components referenced in the circuit diagrams which are externally visible on the control valve are identified in **SUSPENSION Hydraulic - Static description (D.40.C)**.

.

Suspension Control System Switched OFF

When the suspension system is 'OFF' (Speed under **1 Khm**), the raise valve **(1)** and lower valve **(2)** are de-energised as are the lockout valves (**(3)** and **(5)**). Oil is then trapped in the circuit by and the accumulator **(8)** acts like a spring. If excessive pressure above **210 bar** occurs in the system in this state the system relief valve **(9)** will open.



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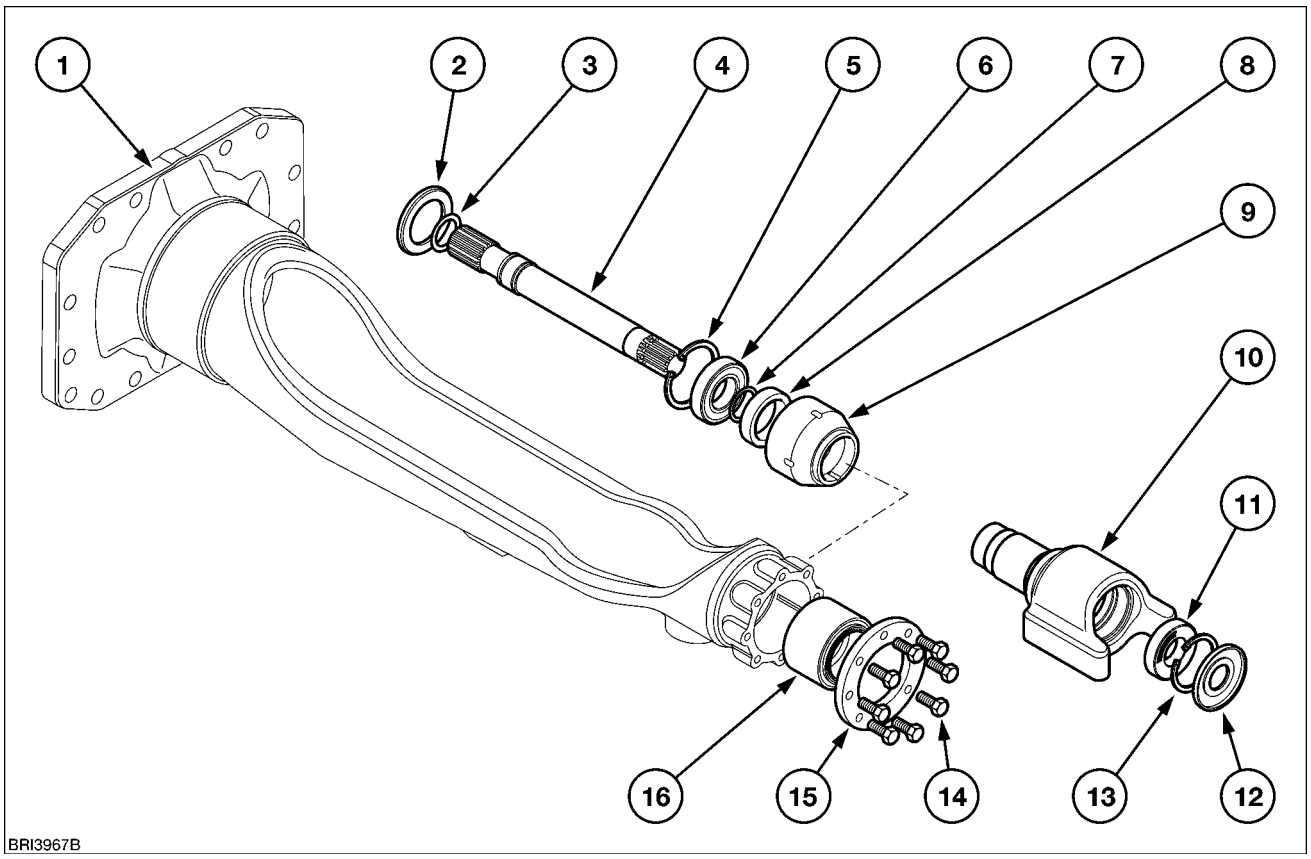
Semi Active Front Axle With Remote Levelling

A Load Levelling Valve

B Suspension Control Valve

1. Raise Valve
2. Lower Valve
3. Oil Flow control Valve
4. Inlet Port
5. Rebound control Valve
6. Rod End
7. Cylinder End
8. Accumulator
9. Relief Valve

SUSPENSION Hydraulic - Exploded view Suspension Arm



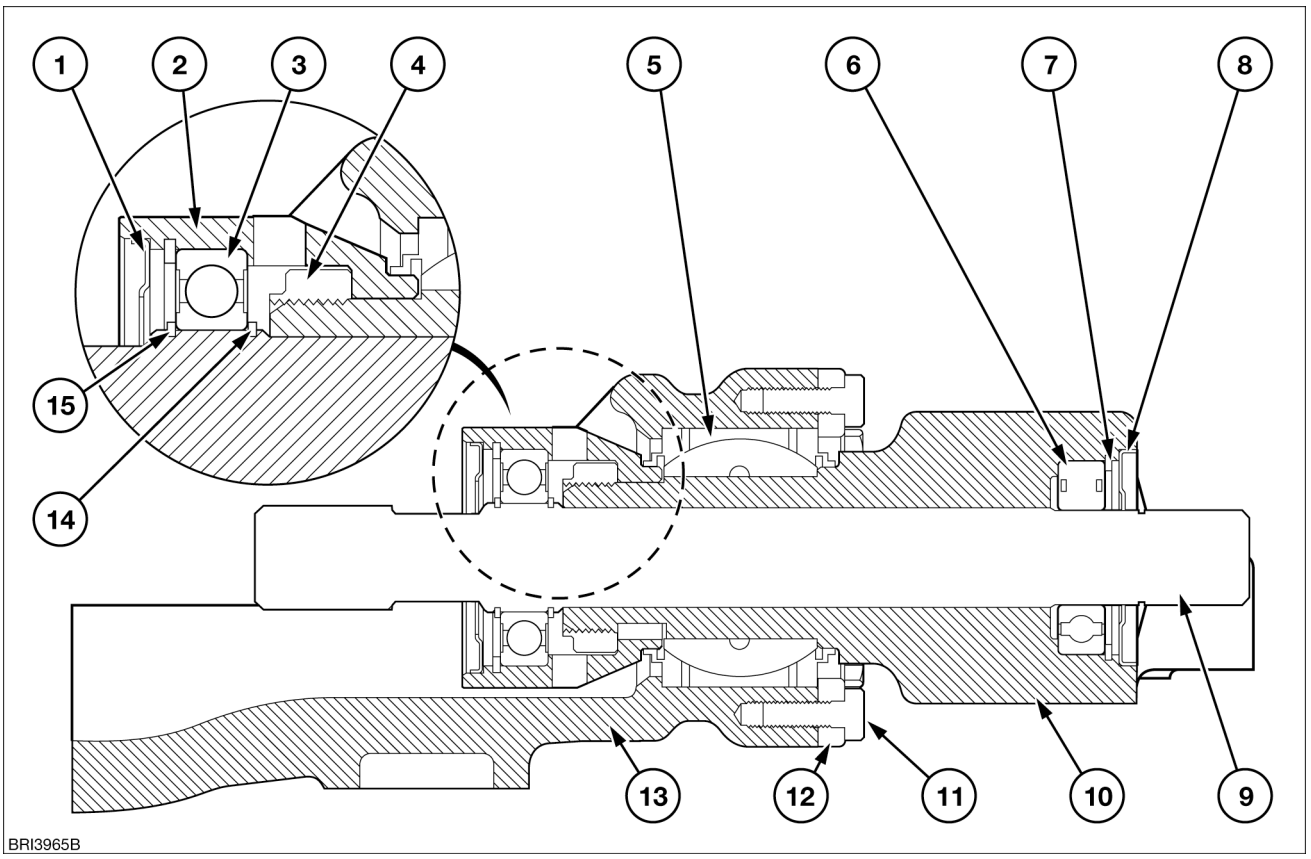
BAIL06CCM243FSA 1

Suspension Arm Assembly

1. Suspension Arm
2. Disc
3. Retaining Ring
4. Intermediate Shaft
5. Retaining Ring
6. Bearing
7. Retaining ring
8. Stake Nut
9. Bearing Housing
10. Mounting Block
11. Bearing
12. Disc
13. Retaining Ring
14. Bolt (Torque = **60 Nm** (**44.3 lbft**))
15. Plate
16. Bearing

Refer to : **SUSPENSION Hydraulic - Sectional view (D.40.C)**

SUSPENSION Hydraulic - Sectional view Suspension Arm



BAIL06CCM244FSA 1

Suspension Arm Intermediate Shaft and Bearing Assembly

1. Retaining Ring
2. Bearing housing
3. Bearing
4. Stake Nut
5. Spherical Bearing
6. Bearing
7. Retaining Ring
8. Disc
9. Intermediate Shaft
10. Mounting Block
11. Bolt
12. Plate
13. Suspension Arm
14. Retaining Ring
15. Retaining Ring

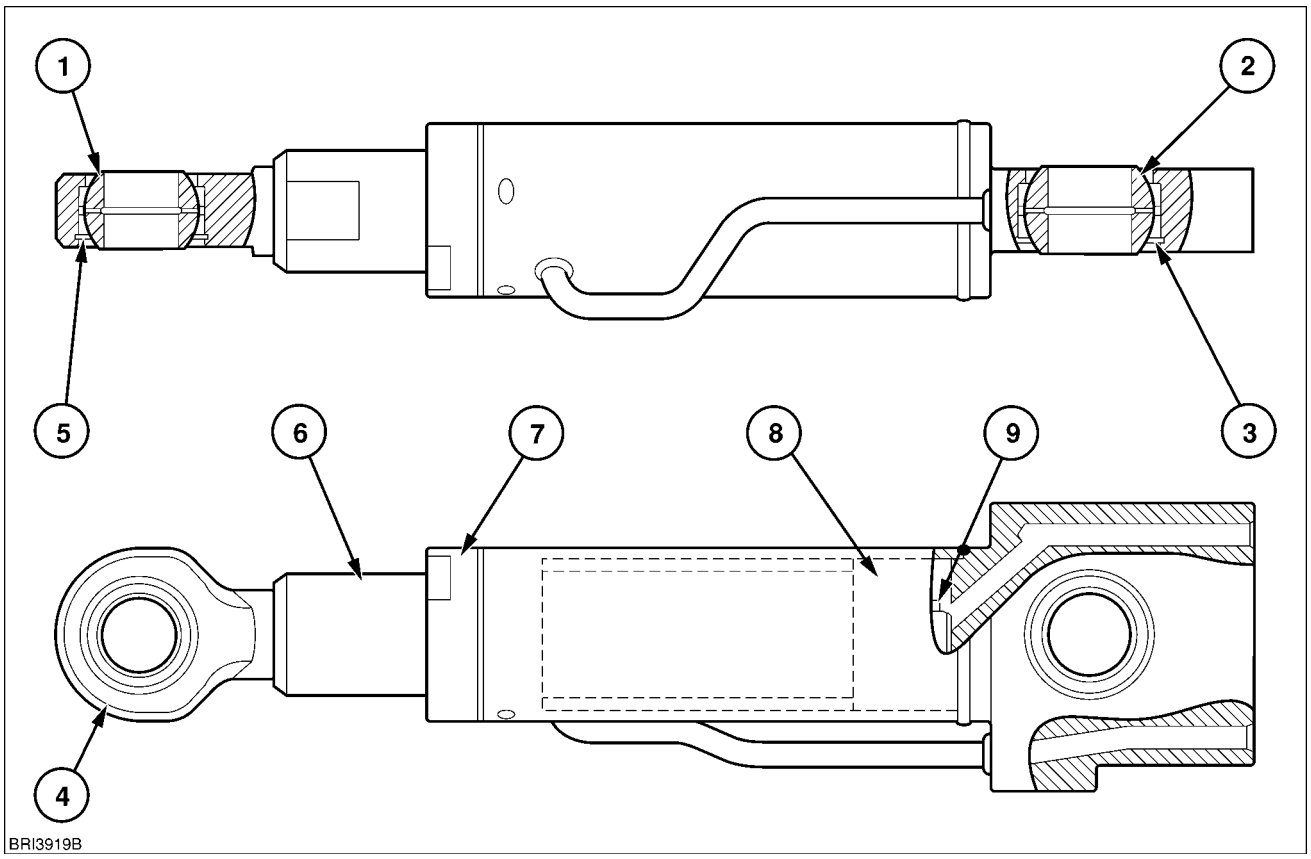
NOTE: *The two halves of the spherical bearing **(5)** must be assembled with the split line horizontal.*

Tighten stake nut **(4)** until it clamps bearing housing **(2)** and spherical bearing **(5)** to mounting block **(10)** and all end float is removed.
Then torque nut to **325 Nm** (**239.7 lbft**) .
Stake nut in four places

NOTE: *There must be a minimum of two stakes at all times.*

Refer to : **SUSPENSION Hydraulic - Exploded view (D.40.C)**

Cylinder - Sectional view



BAIL06CCM251FSA 1

Suspension Cylinder Assembly

1. Ball Joint
2. Ball Joint
3. Retaining Ring
4. Rod Connection (Torque **280 - 320 Nm** (**206.5 - 236.0 lbft**))
5. Retaining Ring
6. Rod
7. Cylinder Head
8. Piston
9. Piston Retaining Nut (Torque **280 - 320 Nm** (**206.5 - 236.0 lbft**))

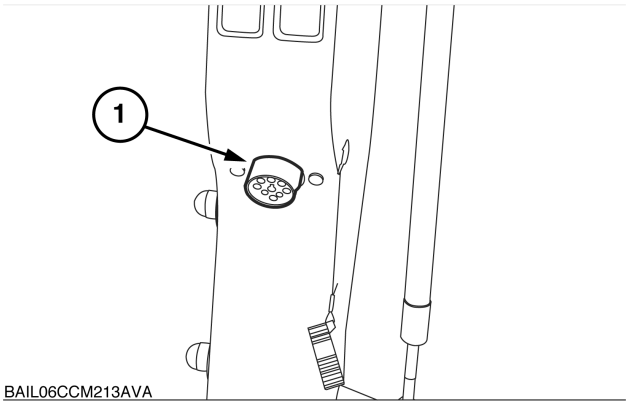
Control valve - Calibrate Front axle suspension

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

NOTE: *The calibration is controlled by the electronic control unit. To prevent the tractor from rolling away inadvertently, do not park the tractor in the vicinity of obstacles, apply the parking brake and chock the front and rear wheels. Before undertaking any work, ensure that the ground speed display is on zero.*

NOTE: *Depending on the fault, the automatic calibration procedure may need to be repeated two or three times to vent all the air from the hydraulic system.*

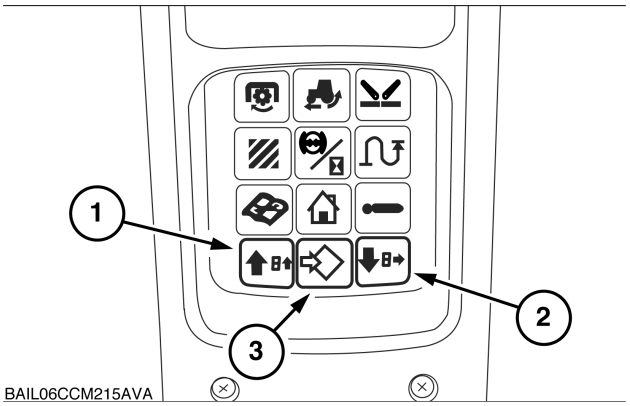
1. Connect the diagnostics plug **380000843** to the diagnostics socket **(1)**.



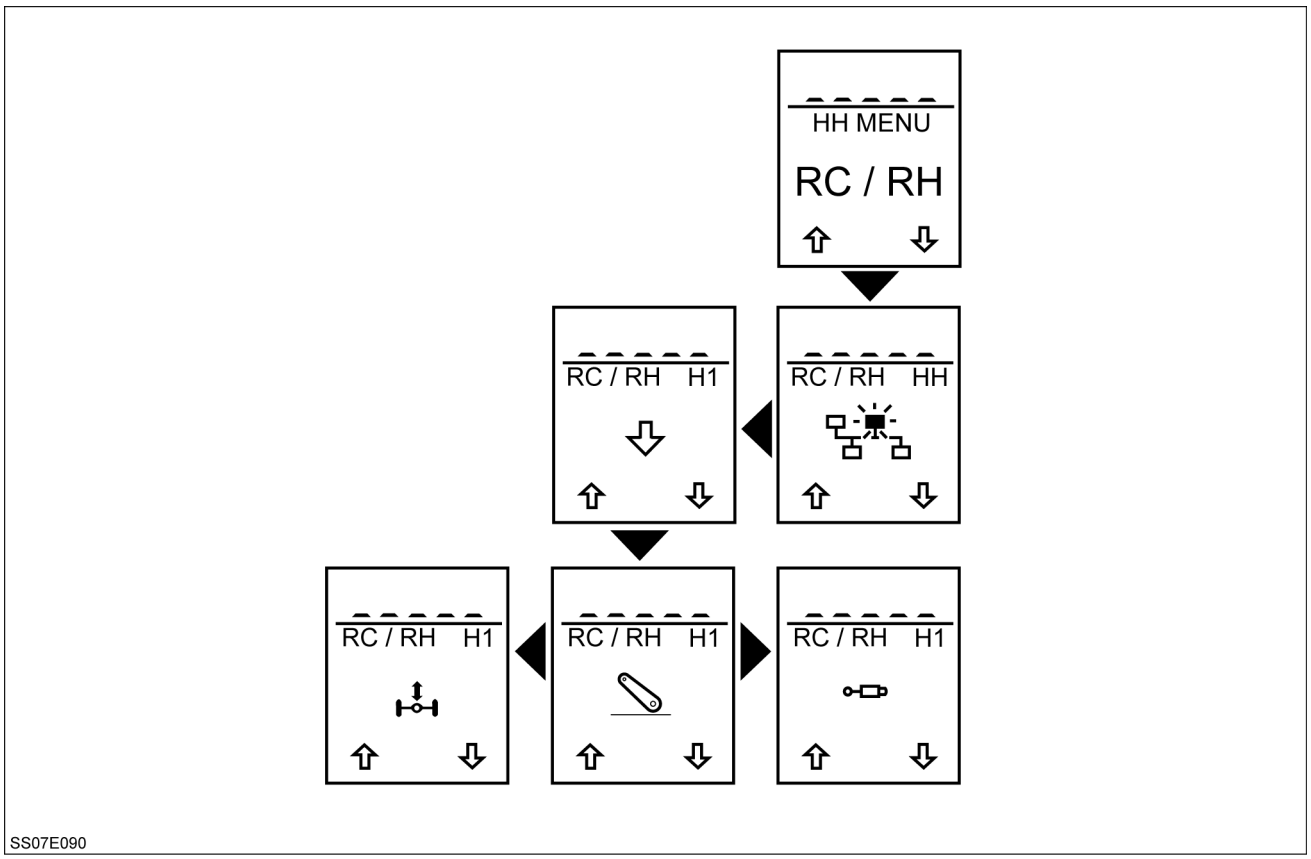
BAIL06CCM213AVA 1

2. Use the "Up" **(1)** button, "Down" **(2)** button and the "Menu" button **(3)** on the ICU2 instrument cluster to scroll through the HH menu until the option H1 and the suspension symbol appear on the RC/RH control unit.

NOTE: *If a new control unit has been installed or a H8 procedure has been carried out, the control unit puts the vehicle on "NO" - no suspension installed as standard. Set the option in H3 menu mode to "Yes".*



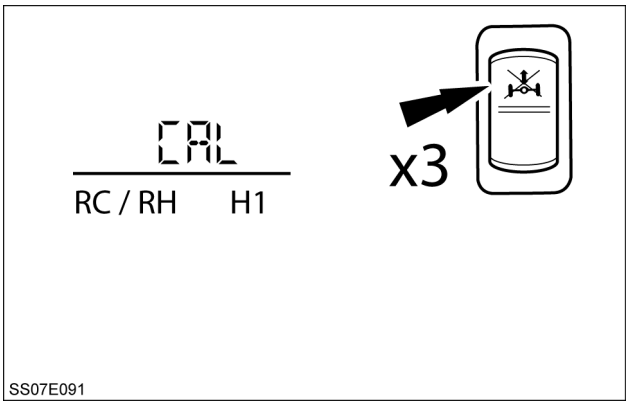
BAIL06CCM215AVA 2



SS07E090 3

3. Start the engine and set the engine speed to **1200 rev/min**.

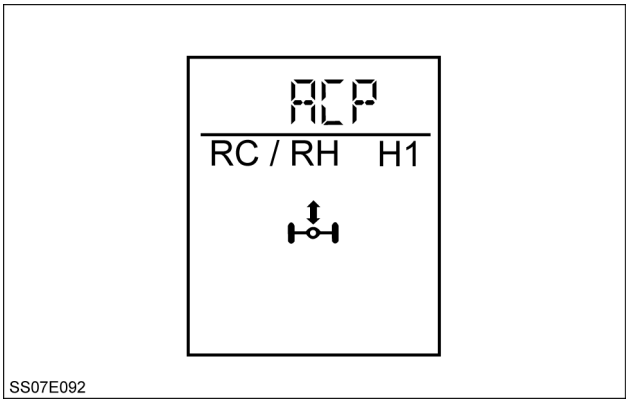
4. On the upper section of the display "CAL" is displayed.
   Switch the suspension On/Off switch three times within four seconds to call up the suspension calibration.



SS07E091 4

5. On the upper section of the display "ACP" is displayed to indicate that the automatic calibration has been activated.
   The lamp in the suspension On/Off switch also flashes.

NOTE: *If the calibration has to be interrupted at any time, press the suspension On/Off switch.*



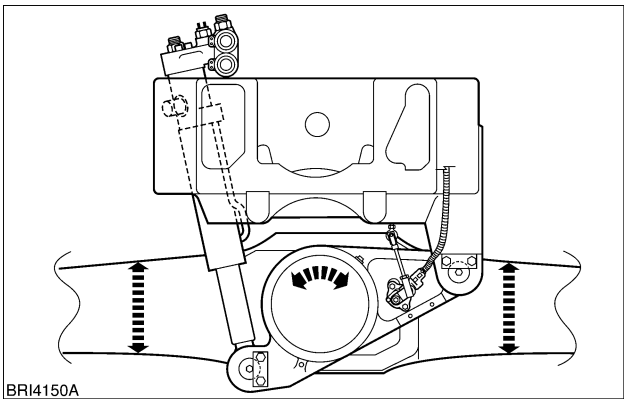
SS07E092 5

6. The automatic calibration switches the levelling pressure valve on for 10 seconds, at the same time the axle height is indicated by a three-figure number (0-999) on the instrument cluster.

7. The automatic calibration activates the Raise valve and the levelling relief valve until the front axle reaches the maximum height for 4 seconds.
   The potentiometer value at this maximum height is then stored.

NOTE: *When the axle reaches its maximum position, the pump is in high pressure standby.*

8. The automatic calibration activates the levelling relief valve, until the front axle reaches the minimum height for 4 seconds.
   The potentiometer value at this minimum height is then stored.



BAIL06CCM142ASA 6

9. The automatic calibration activates the Raise valve and the levelling relief valve until the front axle reaches the required position.

10. On the upper section of the display "END" is displayed, when the automatic calibration is completed.

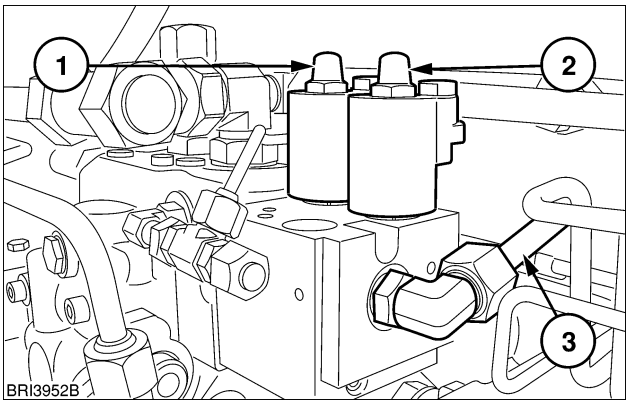
11. All components of the suspension system are now calibrated.

12. Reduce the engine speed to the reduced idling speed and switch the starter switch to OFF to store the calibration values.

NOTE: *If a fault occurs during calibration, a U code is displayed and the process must be repeated. See the list of the U codes in* ***ELECTRONIC SYSTEM - Calibration (A.50.A)****.*

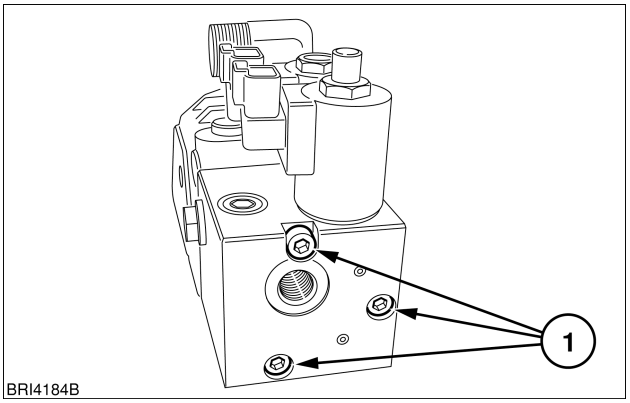
Control valve - Remove Load Levelling Valve

1. Disconnect the wiring harness from the solenoids **(1)** and **(2)** . Remove cylinder supply pipe **(3)** .



BAIL06CCM250ASA 1

2. Undo the three allen headed screws **(1)** holding the load levelling valve onto the priority valve. Separate the two valves.



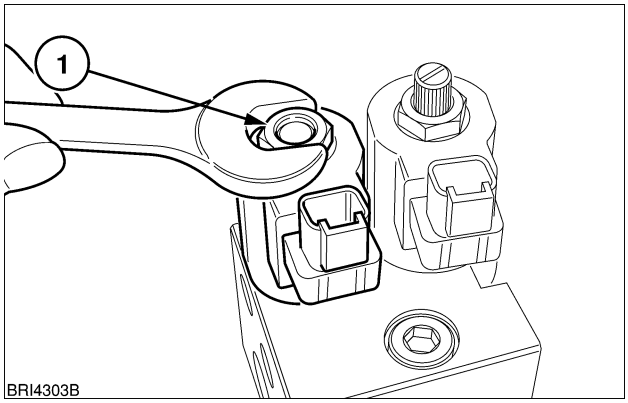
BAIL06CCM149ASA 2

Next operation:
Control valve - Disassemble (D.40.C)

Control valve - Disassemble Load Levelling Valve

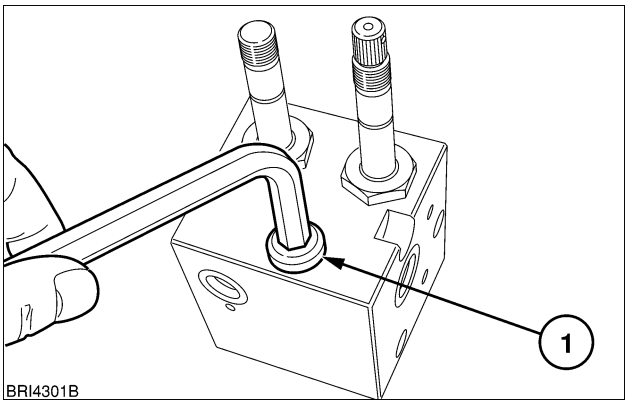
Prior operation:
Control valve - Remove (D.40.C)

1. Undo retaining nut **(1)**and remove solenoid body



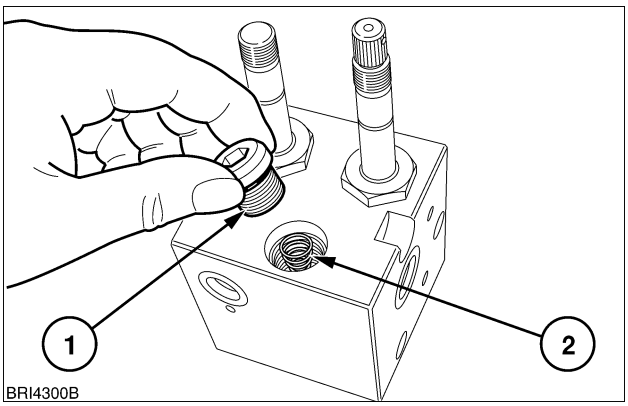
BAIL06CCM202ASA-3 1

2. Using an allen key loosen plug **(1)**



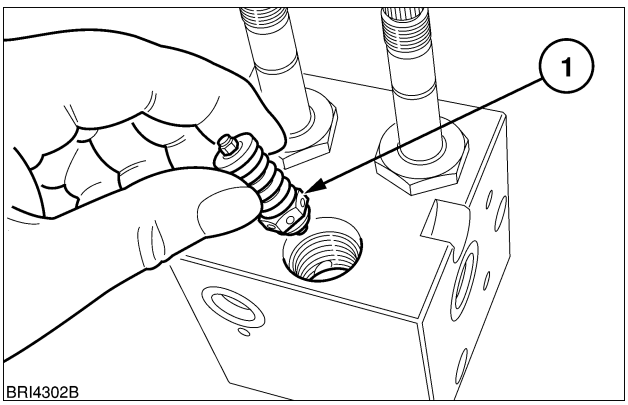
BAIL06CCM203ASA 2

3. Remove the retaining plug **(1)** and spring **(2)** .



BAIL06CCM204ASA 3

4. Remove valve **(1)**using long nosed pliers



BAIL06CCM205ASA 4

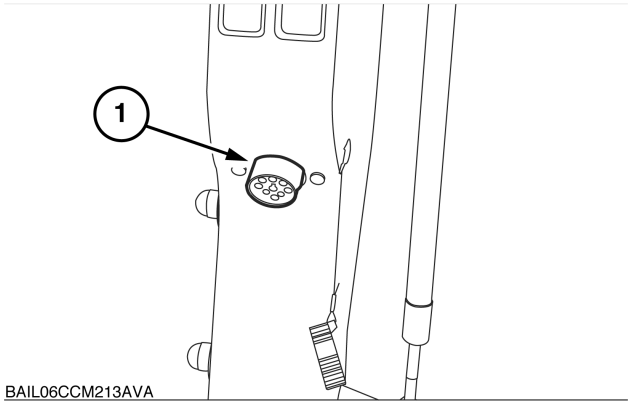
Control valve - Calibrate Front suspended axle

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

NOTE: *The calibration procedure is controlled by the electronic management system. To prevent inadvertent movement of the tractor, park the tractor away from any obstacles, firmly apply the parking brake and block the wheels, front and rear. Disconnect all implements and set the shuttle lever to neutral. Check that the Ground speed display is Zero before commencing.*

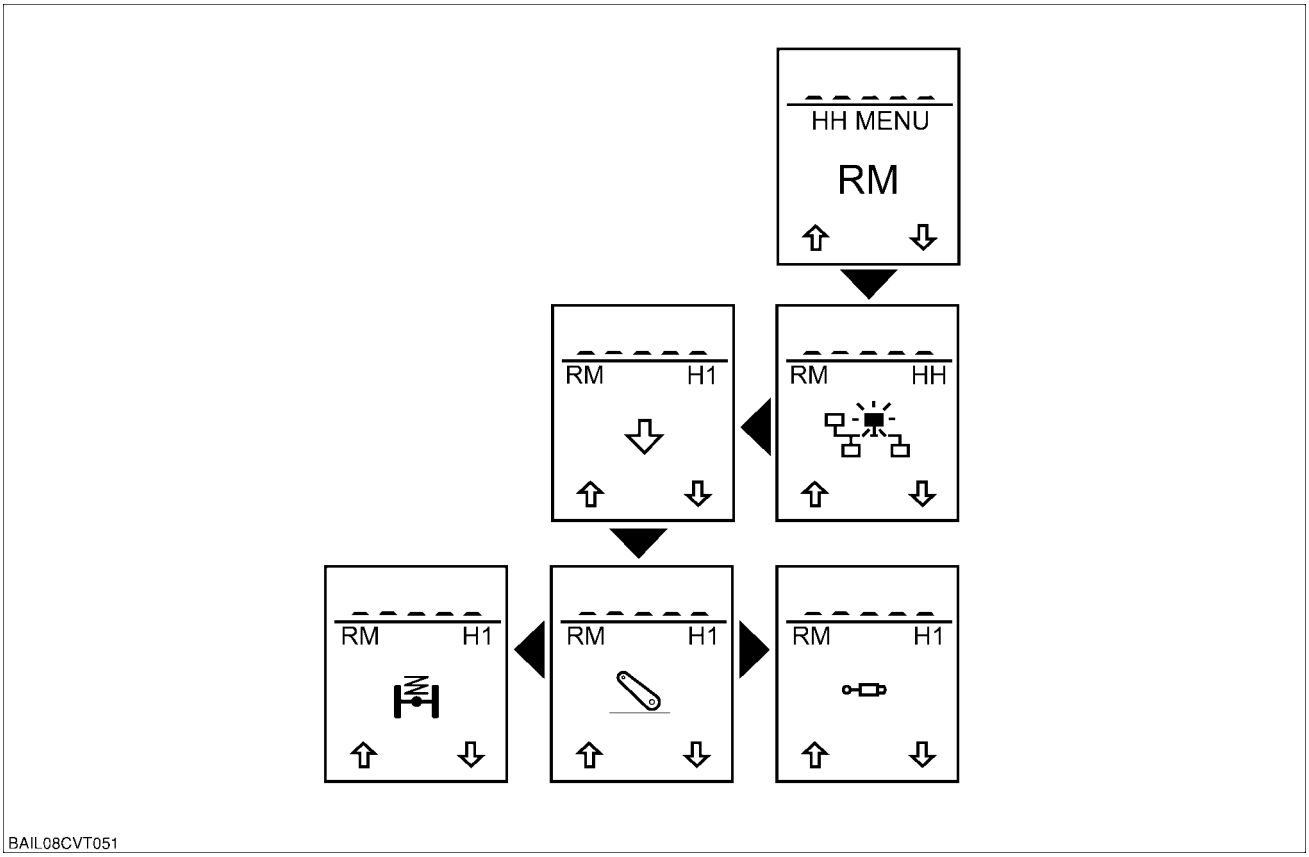
NOTE: *Dependent on the failure, the Automatic Calibration procedure may have to be repeated two or three times to vent all the air out of the hydraulics*

1. On a new module or following a H8, clear module settings procedure, the front suspension is defaulted to 'Not enabled'. The suspension needs to be enabled in the H3 menu mode otherwise the suspension will not calibrate.
2. Install the diagnostic connector **380000843** into the diagnostic socket **(1)** and start the engine.



BAIL06CCM213AVA 1

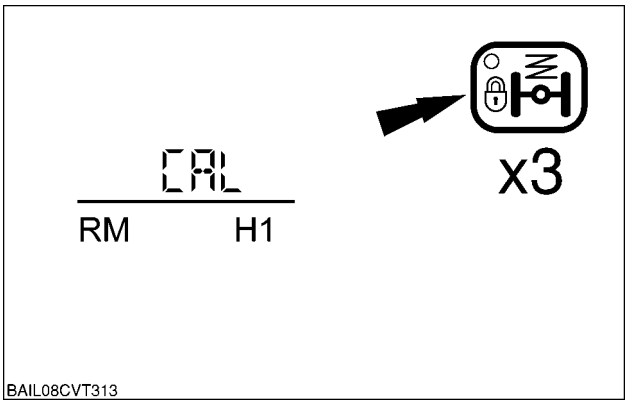
3. Use the "up", "down" and "menu" keys on the ICU3 to navigate the HH menu's to H1 and the suspension symbol on the RM controller.



BAIL08CVT051A 2

4. Set the engine speed to **1200 rev/min**.

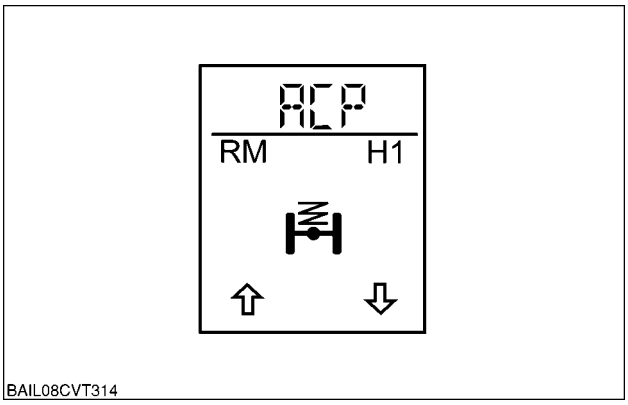
5. The top section of the display will display "CAL". Toggle the suspension switch, **(1)**, ON/OFF three times within four seconds to enter the suspension calibration mode.



BAIL08CVT313 3

6. The top section of the display will display "ACP" indicating that the Automatic Calibration Procedure has been activated.
   The indicator lamp in the suspension switch will also flash.

NOTE: *If the calibration procedure needs to be stopped at any time, depress the suspension switch once.*

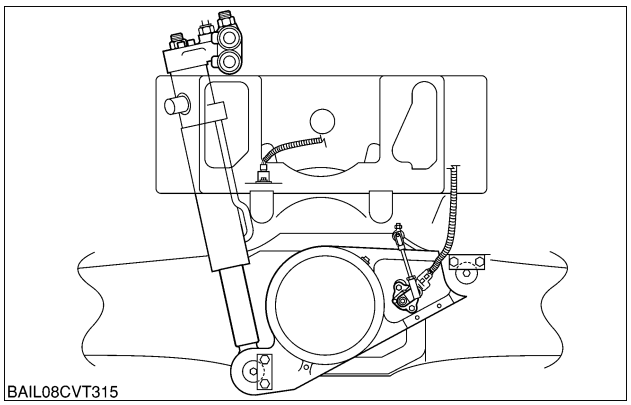


BAIL08CVT314 4

7. The ACP will activate the load levelling valve for 10 seconds, at the same time the axle height position will be displayed by a three figure number on the instrument cluster (0-999).
8. The ACP will activate the raise valve and the unload levelling valve until the front axle reaches the maximum height for a period of 4 seconds.
   The potentiometer value at this maximum height will then be stored.

NOTE: *When the axle reaches the maximum position the hydraulic pump will reach the high pressure standby pressure.*

9. The ACP will activate the unload levelling valve until the front axle reaches the minimum height for a period of 4 seconds.
   The potentiometer value at this minimum height will then be stored.



BAIL08CVT315 5

10. The ACP will activate the raise and unload levelling valves until the front axle reaches the nominal position.
11. The top section of the display will display "END" when the ACP has finished.
12. All components of the suspension system are now calibrated.
13. Set engine to low idle and key OFF to store the calibration values.

NOTE: *If an error occurs during calibration a "U" code will be displayed and the procedure will need to be repeated. Refer to the "U" code listing in* ***Control module - Fault code index (A.50.A)****.*

Cylinder - Remove

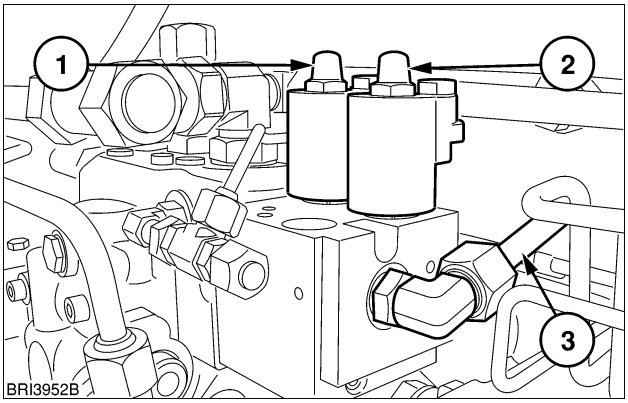
⚠ **DANGER** ⚠

Exercise extreme caution when performing tasks on the front suspension system. ALWAYS ensure that the system is depressurised and that the axle is at rest on the support stops.

B011

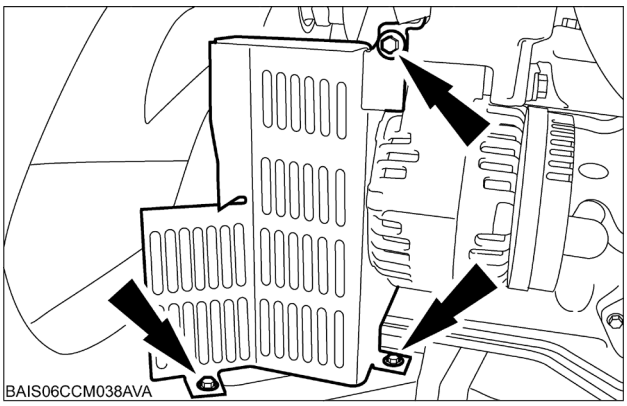
1. Disconnect the battery **(1)** to prevent accidental tractor start up. Refer to **Battery - Disconnect (A.30.A)**

2. Depressurise the suspension system. by unscrewing knurled knob on the lower solenoid **(2)** , allow the tractor to lower completely onto the stops then rotate the screw clockwise to return to normal operation.



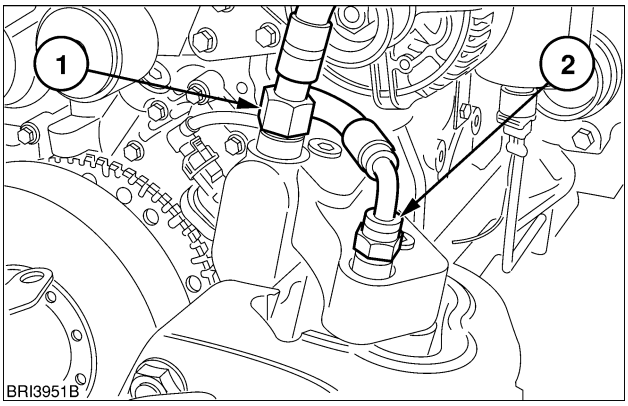
BAIL06CCM250ASA 1

3. Remove left hand engine side panel. Undo retaining bolts and remove guard . Remove engine side rails (where fitted).



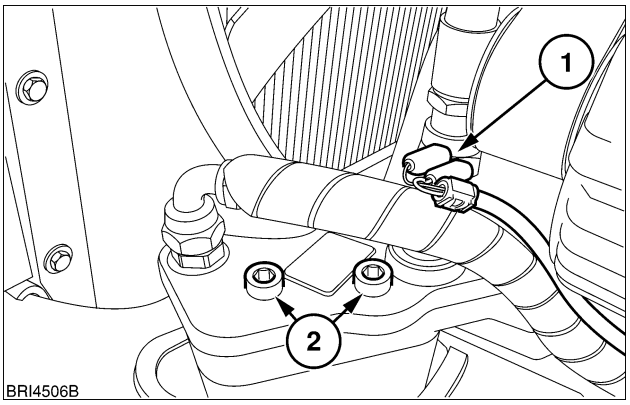
BAIS06CCM038AVA 2

4. Place a suitable oil collecting container under the pipe connections and disconnect the pipes **(1)** and **(2)** from the cylinder.



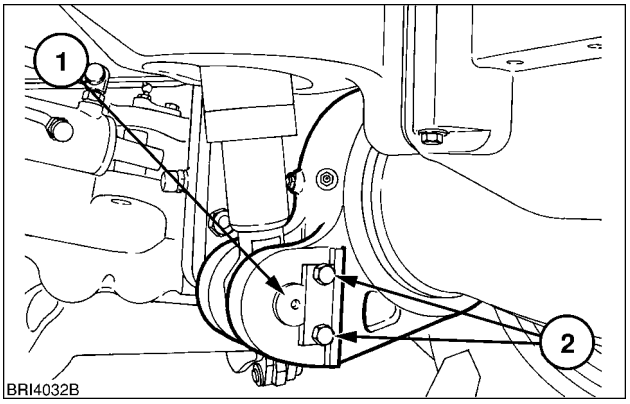
BAIL06CCM251ASA 3

5. Disconnect wiring harness connectors from the solenoids and pressure switch **(1)**. Undo retaining bolts **(2)** and remove control valve assembly.



BAIL06CCM256ASA 4

6. Undo and remove retaining plate bolts **(2)**- Remove the retaining plate.



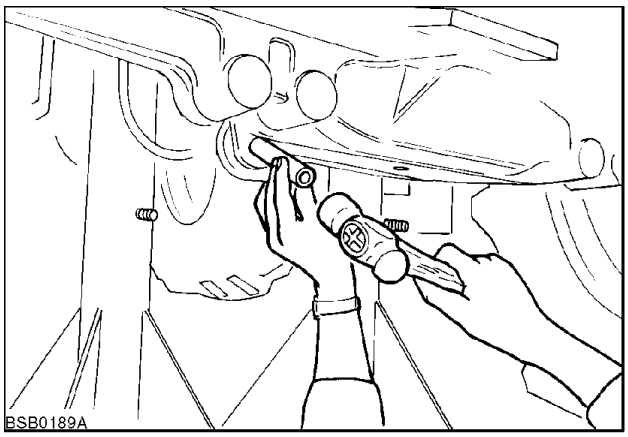
BAIL06CCM048ASA 5

7. If necessary use a suitable hoist and cable around the front support and raise the tractor until access is gained to the lower pin. Remove the retaining plate and drift the pin out from the front of the tractor.

⚠ WARNING ⚠

The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944



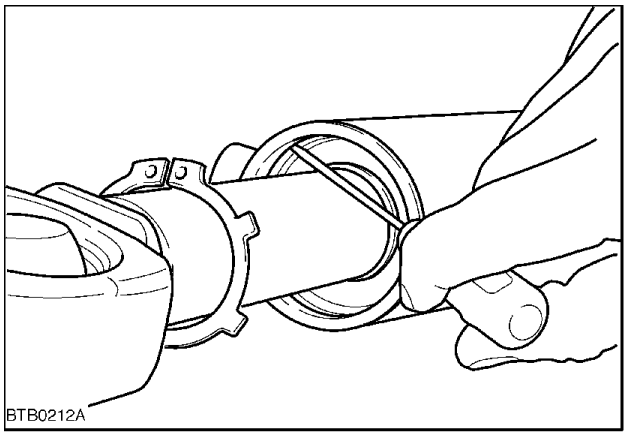
BSB0189A_709 6

8. Remove the bolt from the top pin and using a suitable slide hammer with an M10 thread, remove the top pin and lower the cylinder assembly away from the tractor using a suitable support..

9. Ensure the O-rings are installed on the O-Ring Face Seal connectors of the cylinder.
   - Lubricate the rod end bearings with the specified grease after installation.

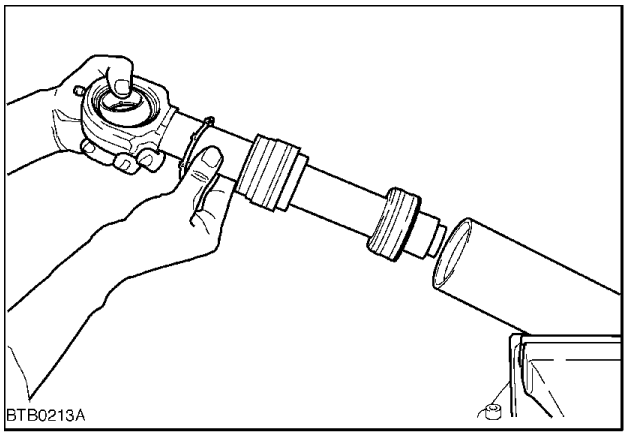
Cylinder - Overhaul

1. Fully stroke the piston several times to remove as much oil as possible and ensure that the cylinder is cleaned externally before overhaul.
   Remove the end cap using an appropriate tool. Push the rod gland into the cylinder and remove the retaining ring from the cylinder bore.



BTB0212A 1

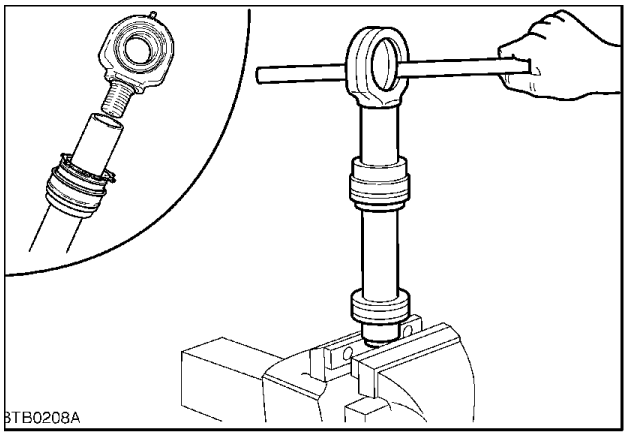
2. Pull the rod assembly from the cylinder.



BTB0213A 2

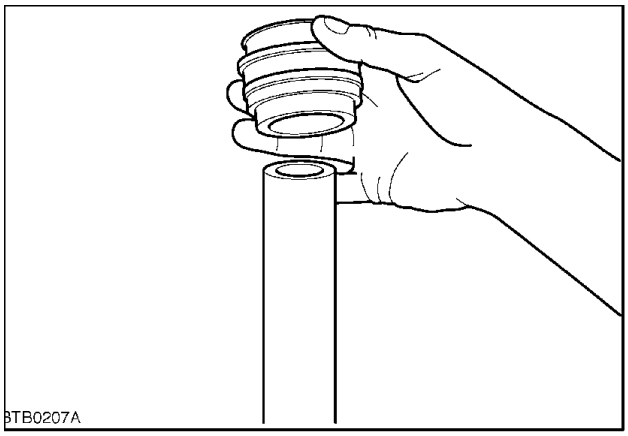
3. Using the flats on the rod end, secure the rod in a vice. Using a suitable bar, remove the rod end.

NOTE: *The rod end has a thread locking compound applied and will require considerable force to loosen.*



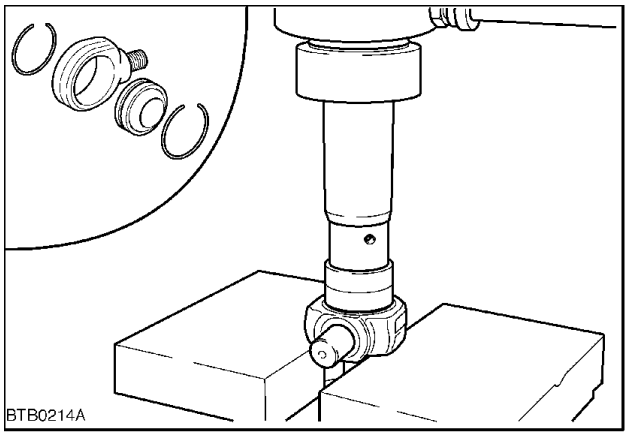
BTB0208A 3

4. Remove the gland assembly from the rod.



BTB0207A 4

5. If necessary, the rod end bearing can be replaced. Remove the two circlips and using a suitable press, press the bearing from the rod end.



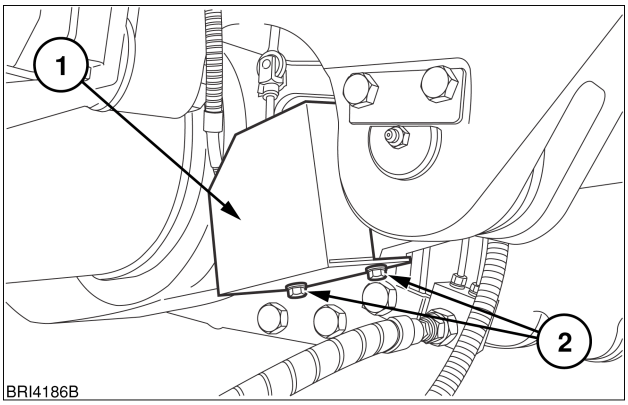
BTB0214A 5

6. Inspection
   Inspect the cylinder bore, if scored or damaged in any way replace the cylinder.
   Inspect the rod for scoring and ensure that it is perfectly straight, replace if damaged.
   It is recommended at this stage to obtain a seal kit and replace the seals prior to reassembly.

7. Reassembly
   Reassembly is the reversal of the disassembly procedure, noting the following points:
   - Coat all seals with clean hydraulic oil prior to assembly.
   - Apply a suitable thread Lock and Seal adhesive, to the rod end and tighten to **200 Nm** (**147 lbf.ft**).

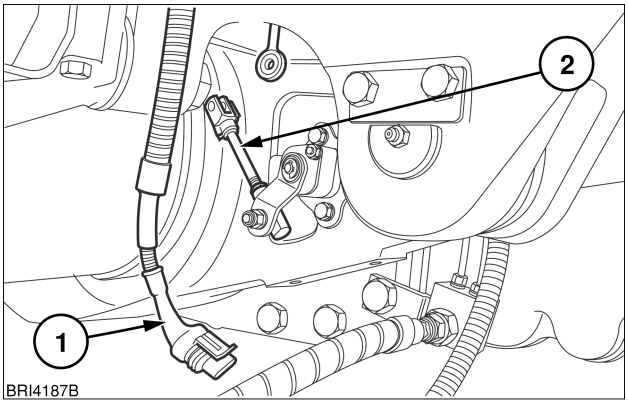
Sensing system Position sensor - Remove

1. Unscrew and remove the potentiometer guard retaining screws **(2)** and remove the guard **(1)**.



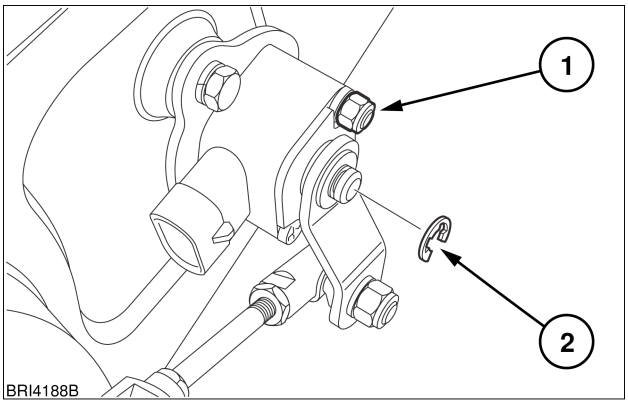
BAIL06CCM144ASA 1

2. Disconnect the harness plug **(1)** from the potentiometer and remove retaining clip from rod **(2)** .



BAIL06CCM145ASA 2

3. Remove the circlip **(2)** from the arm. Undo the potentiometer retaining nut **(1)** and slide the potentiometer off the bracket .



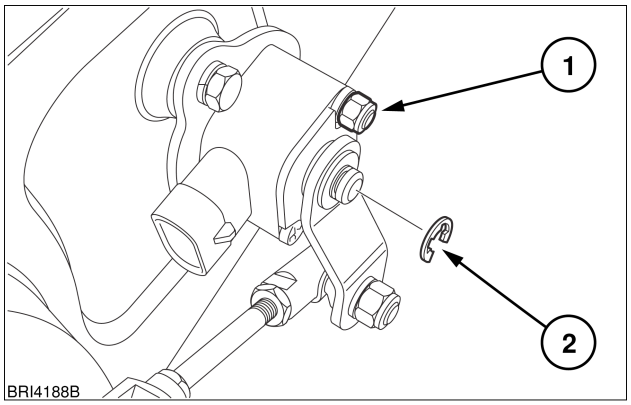
BAIL06CCM146ASA 3

Next operation:
Sensing system Position sensor - Install (D.40.C)

Sensing system Position sensor - Install

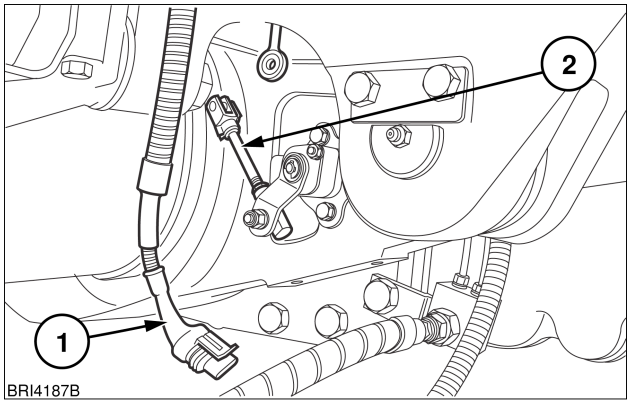
Prior operation:
Sensing system Position sensor - Remove (D.40.C)

1. Slide the potentiometer onto the bracket. Tighten the retaining nut **(1)**and locate the circlip **(2)** into groove on the pin.



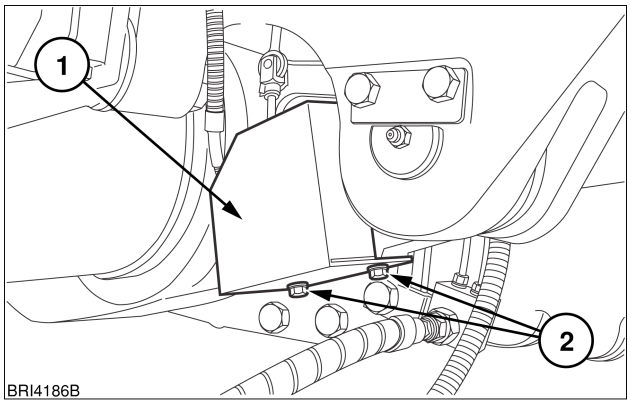
BAIL06CCM146ASA 1

2. Fix the linkage rod **(2)** to the eyelet using the retaining clip . Refer to **Sensing system Position sensor - Adjust (D.40.C)** for correct adjustment. Reconnect the harness **(1)**.



BAIL06CCM145ASA 2

3. Locate the potentiometer guard **(1)** and secure with the retaining screws **(2)** .

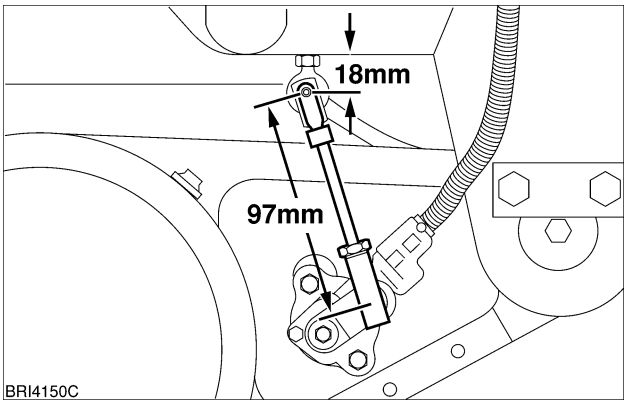


BAIL06CCM144ASA 3

Sensing system Position sensor - Adjust

Prior operation:
Sensing system Position sensor - Install (D.40.C)

1. To ensure the front axle suspension is operating correctly, the front axle position potentiometer linkage must be set up correctly. Refer to Figure **1** for the adjustment dimensions.



BAIL06CCM174ASA 1

Index

TRAVELLING - D

SUSPENSION Hydraulic - 40.C

Accumulator - Torque 5

Control valve - Calibrate Front axle suspension 17
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

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WHEELS AND TRACKS Wheels - 50.C

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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WHEELS AND TRACKS Wheels - 50.C

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Rear wheel
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Front wheel - Torque

	Description	Bolt/Nut Torque - Nm	Bolt/Nut Torque - lb.ft
Front 2WD	Fixed Wheel Assembly Steel disc to Hub	314	232
Front 4WD	Manual Adjust Wheel assembly Steel Disc To Hub	211	155
	Power Adjust Wheel Assembly	211	155
	Cast Disc To Hub	245	180
	Cast Disc To Rim		

Rear wheel - Torque

Rear Wheel Flange Type Axle

Description	Bolt/Nut Torque - Nm (lb ft)
Rear disc to hub nuts	**250 Nm** (**184.4 lb ft**)
Rear disc to rim nuts (M16 nuts)	**250 Nm** (**184.4 lb ft**)

Bar Axle - Wheels with Steel Centre Disc (welded and bolted to rim types)

Description	Bolt/Nut Torque - Nm (lb ft)
Disc to hub fixings (10 x M22 Bolts)	**500 Nm** (**368.8 lb ft**)
Disc to rim nuts (M16)	**250 Nm** (**184.4 lb ft**)
Split wedge bolts (6 x M22)	**500 Nm** (**368.8 lb ft**)

Bar Axle - Wheels with Cast Centre Disc

Description	Bolt/Nut Torque - Nm (lb ft)
Disc to rim nuts (M16 nuts)	**250 Nm** (**184.4 lb ft**)
Split Wedge bolts (6 x M20)	**300 Nm** (**221.3 lb ft**)

Dual Rear Wheels

Description	Bolt/Nut Torque - Nm (lb ft)
Disc to hub fixings (10 x M22 bolt)	**500 Nm** (**368.8 lb ft**)
Split wedge bolts (4 x M22 bolt)	**500 Nm** (**368.8 lb ft**)
Disc to rim bolts (M16 nuts)	**250 Nm** (**184.4 lb ft**)

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WHEELS AND TRACKS Wheels - 50.C

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CNH U.K. Ltd. Cranes Farm Road Basildon Essex United Kingdom SS14 3AD

SERVICE - Technical Publications & Tools



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SERVICE MANUAL

BODY AND STRUCTURE



PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

87628095_C 18/08/2009
E

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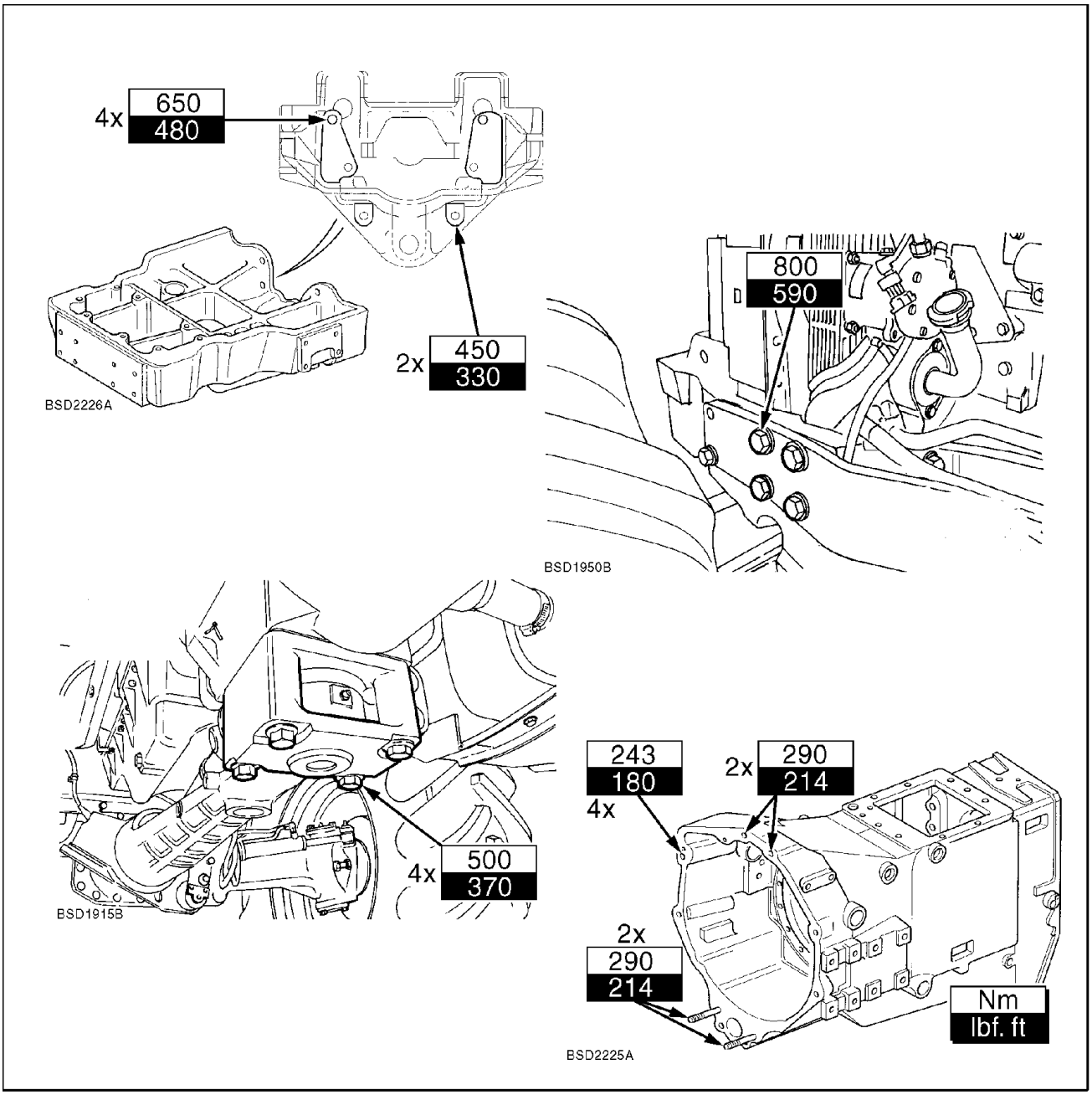
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Front - Torque



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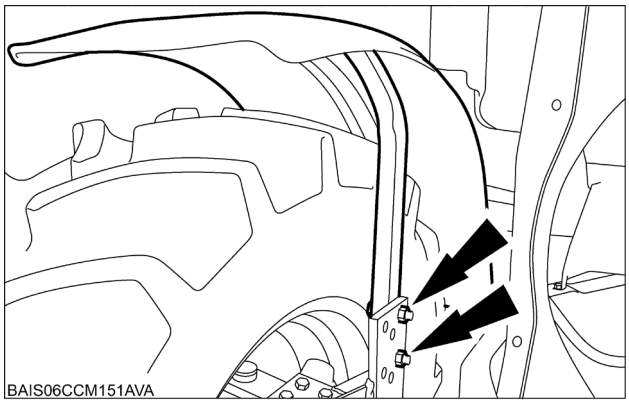
Front - Special tools

Description	Tool Number
Engine Lifting Brackets	82932534 and 82852825
Engine revolving stand	380000301
Engine overhaul brackets kit -Use with 380000301	380000313
Tractor splitting kit	CAS.30009A
Engine support brackets (for use with tractor splitting kit)	380000500

Front - Remove

Prior operation:
Remove the radiator. For additional information, refer to **Radiator - Remove (B.50.A)**.

1. Remove the front fenders (if equipped)

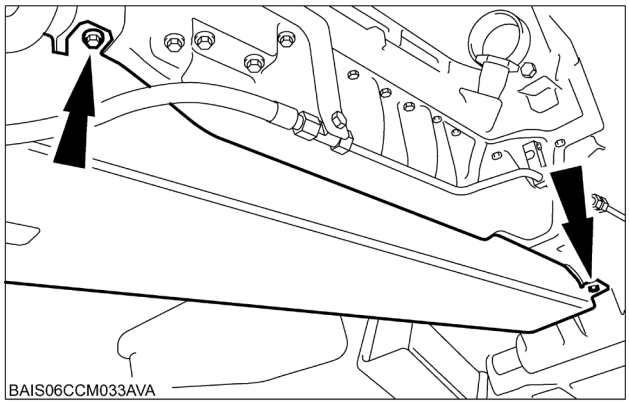


BAIS06CCM151AVA 1

2. Remove the four-wheel drive shaft guard retaining bolts.

NOTE: *Repeat the operation on both sides of the tractor.*

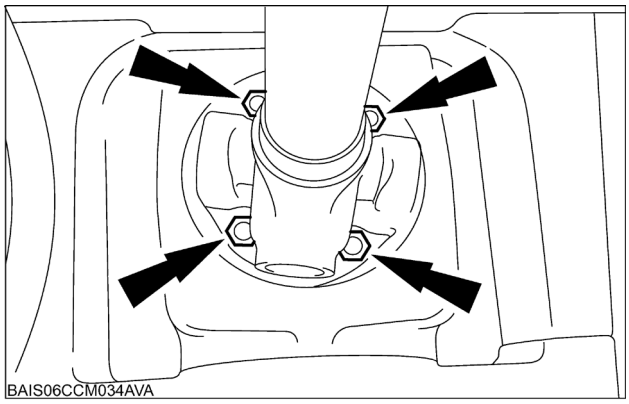
NOTE: *SuperSteer™ axle shown.*



BAIS06CCM033AVA 2

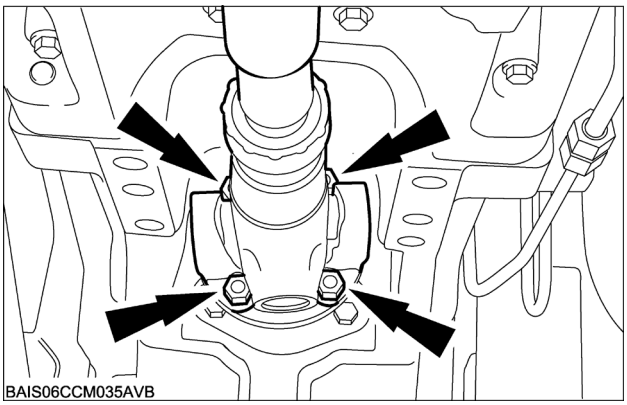
3. Remove the four-wheel drive shaft guard.
4. Remove the four-wheel drive shaft front retaining nuts.

NOTE: *Support the four-wheel drive shaft.*



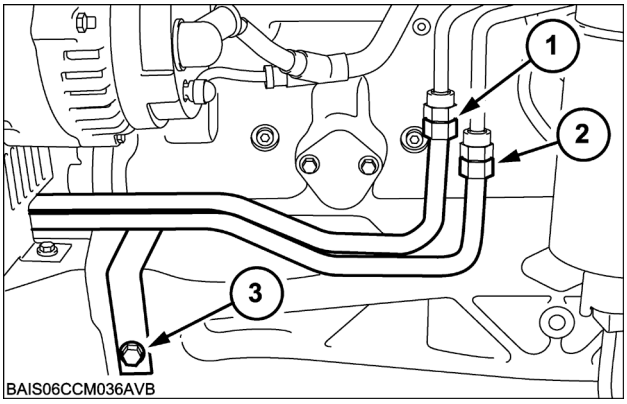
BAIS06CCM034AVA 3

5. Remove the four-wheel drive shaft.



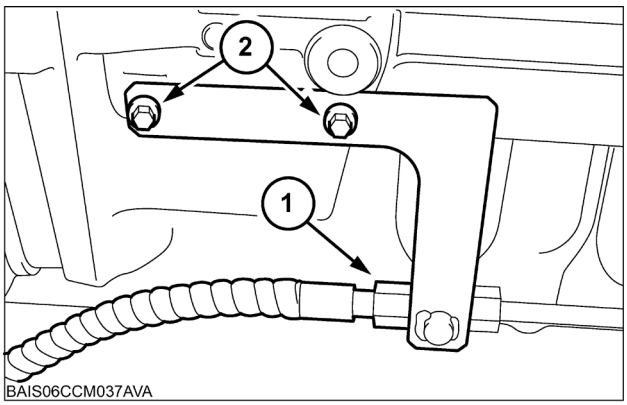
BAIS06CCM035AVB 4

6. Disconnect the steering supply **(1)** and return pipes **(2)**.
Detach the steering pipe support bracket **(3)**.



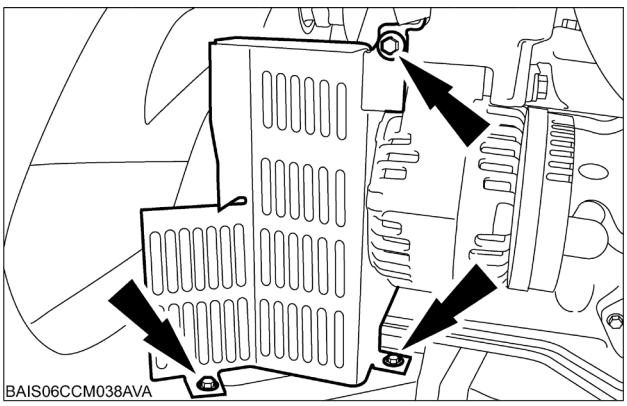
BAIS06CCM036AVB 5

7. Disconnect the differential lock supply hose **(1)** and detach the hose retaining bracket **(2)**.



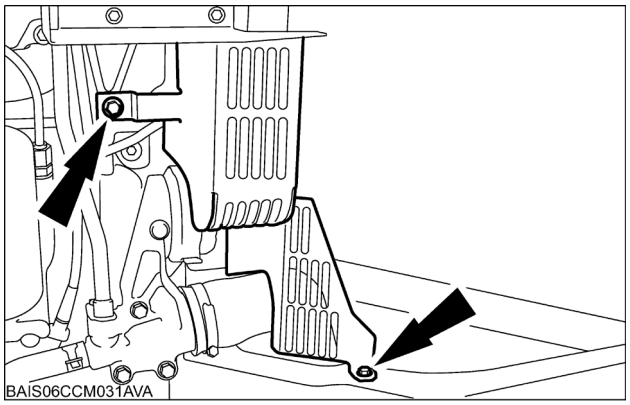
BAIS06CCM037AVA 6

8. Remove the right-hand side accessory drive belt guard.



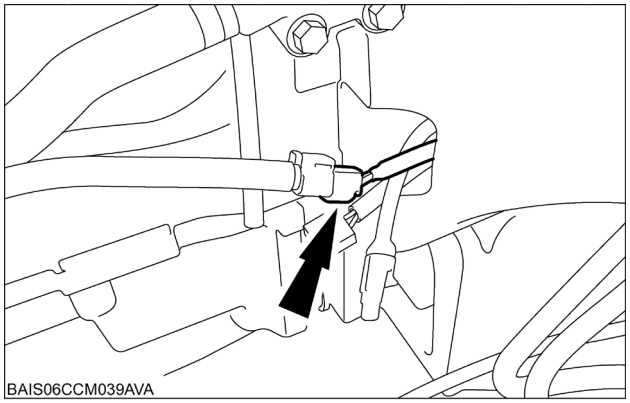
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9. Remove the left-hand side accessory drive belt guard.



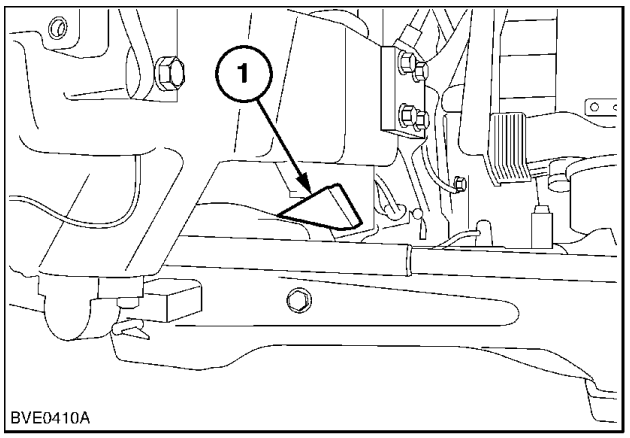
BAIS06CCM031AVA 8

10. Disconnect the steering sensor electrical connector.



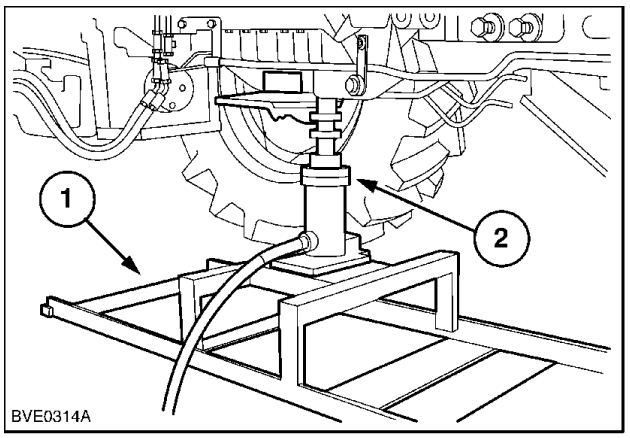
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11. Position wooden wedges **(1)** between the front axle and the front support. These prevent articulation of the of the axle.



BVE0410A 10

12. Position the tractor splitting kit **(1) 297471** beneath the tractor.
Use the support **(2)** in the splitting kit to support the engine on the splitting stand.



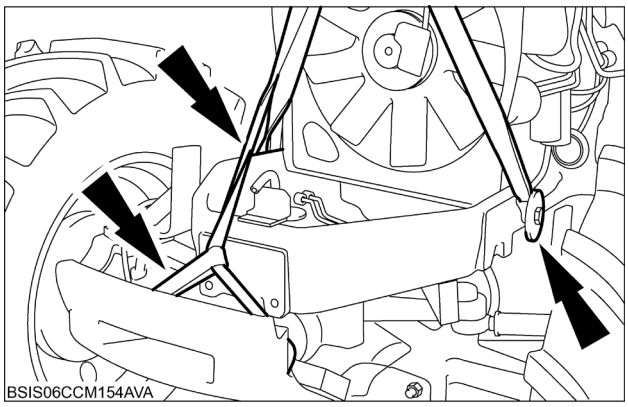
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13. Using suitable slings or chains attach the front and rear of the support assembly to a moveable overhead hoist.

⚠ WARNING ⚠

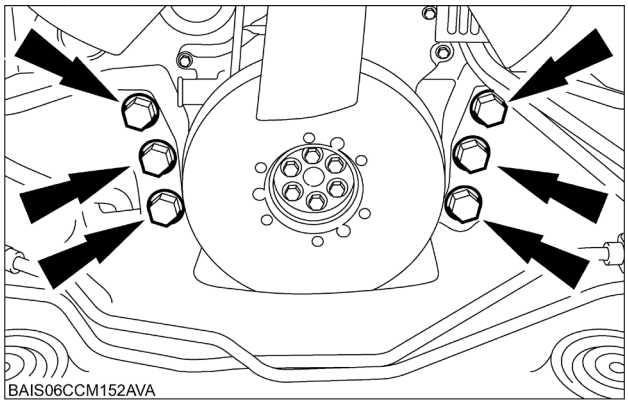
Always ensure the support is adequately supported and will remain stable when seperated from the engine. Failure to provide adequate support may cause the assembly to be unstable with possible personal injury if the support tips forwards or backwards.

B017



BAIS06CCM154AVA 12

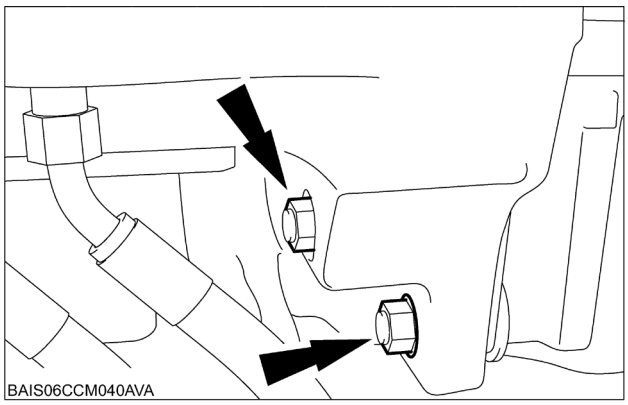
14. Remove the front support to engine upper retaining bolts.



BAIS06CCM152AVA 13

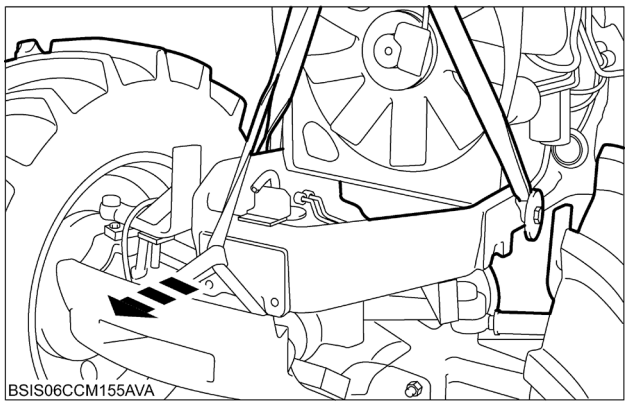
15. Remove the front support to engine lower retaining nuts.

NOTE: *Repeat this step for both sides of the tractor.*



BAIS06CCM040AVA 14

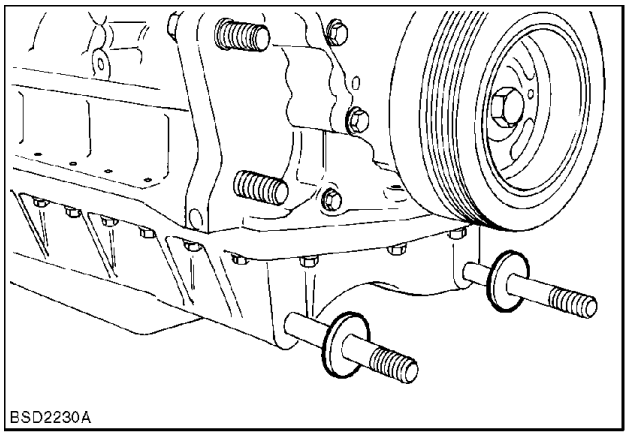
16. Separate the front support from the engine.



BAIS06CCM155AVA 15

17. Support the assembly on axle stands at front and rear of the support.

18. Identify for use during installation the two shims positioned between the engine sump and front support.



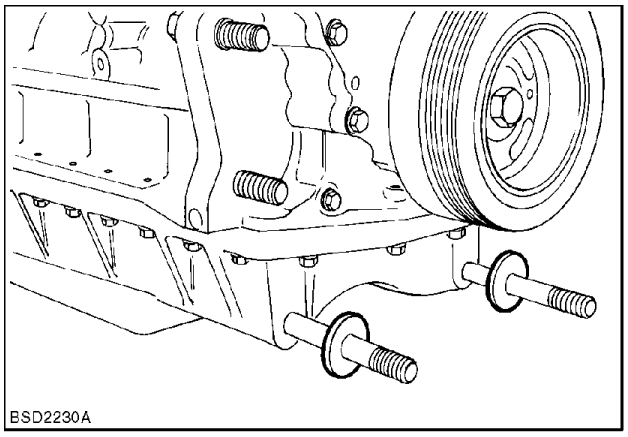
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Front - Install

Prior operation:
Front - Remove (E.10.B).

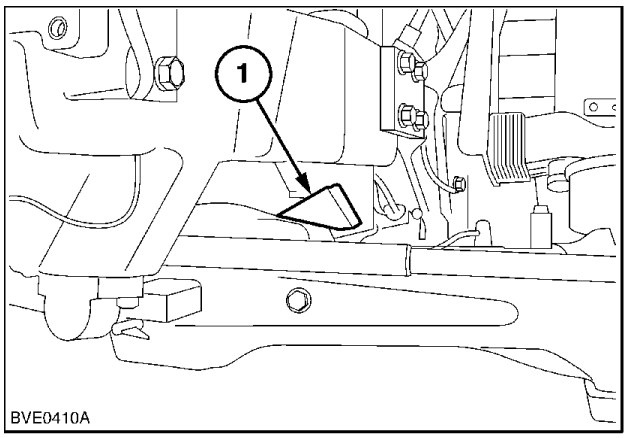
1. Ensure the shims removed during disassembly are re-positioned in the same location as when disassembled.

NOTE: *If a new front end or engine sump have been renewed during overhaul it is necessary to recalculate the new shim thickness to be installed. For further information refer to* ***Front - Clearance (E.10.B)****.*



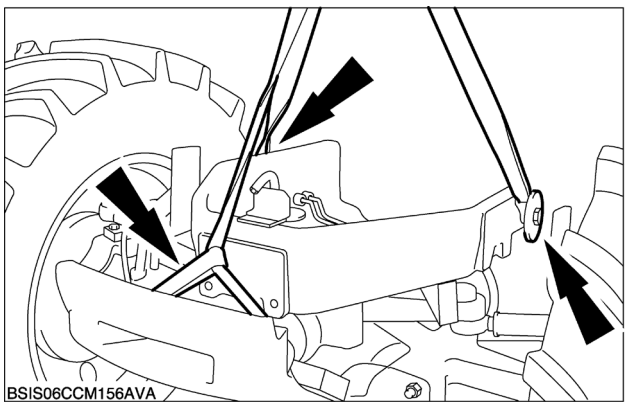
BSD2230A 1

2. Position wooden wedges **(1)** between the front axle and the front support. These prevent articulation of the of the axle.



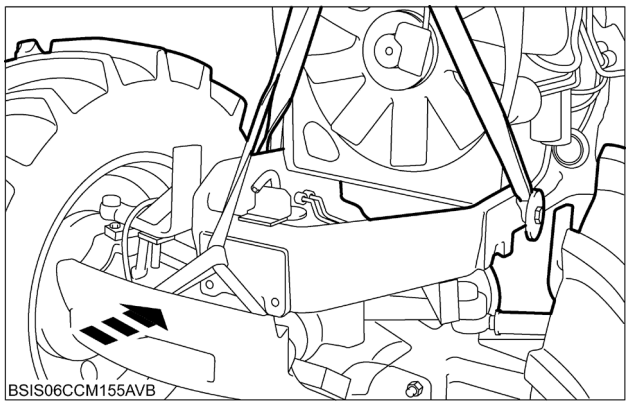
BVE0410A 2

3. Using suitable slings or chains attach the front and rear of the support assembly to a moveable overhead hoist.



BAIS06CCM156AVA 3

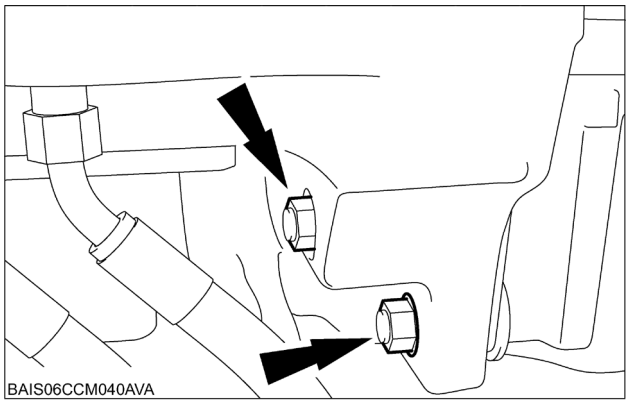
4. Align the front support to the engine.



BAIS06CCM155AVB 4

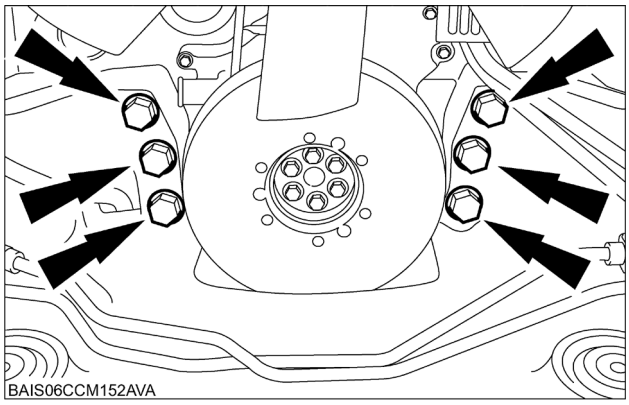
5. Install the front support to engine lower retaining nuts.
   Tighten to **475 Nm** (**350.3 lb ft**).

NOTE: *Repeat this step for both sides of the tractor.*



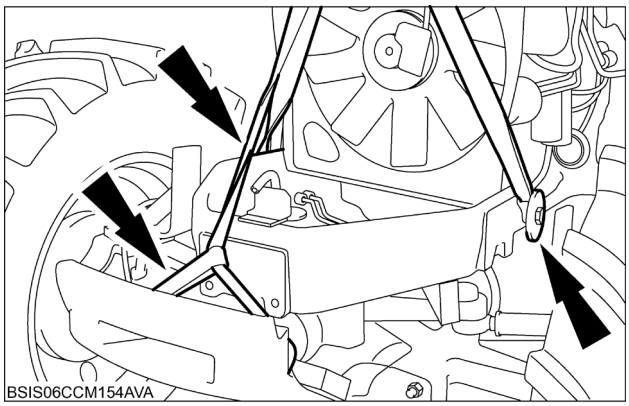
BAIS06CCM040AVA 5

6. Install the front support to engine upper retaining bolts.
   Tighten to **650 - 700 Nm** (**480 - 516 lbft**).



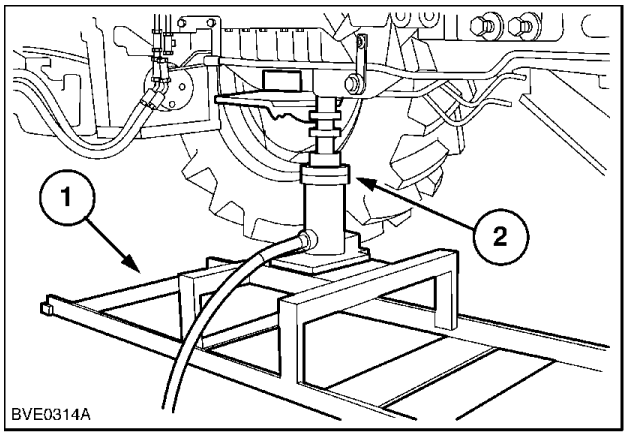
BAIS06CCM152AVA 6

7. Remove the slings or chains from the front support.



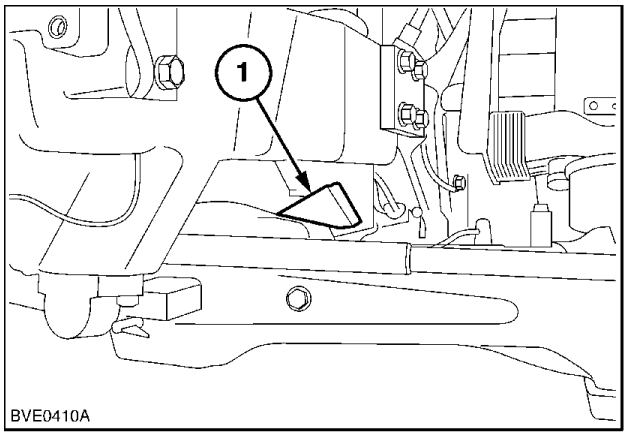
BAIS06CCM154AVA 7

8. Remove the support **(2)** and the splitting kit **(1)**.



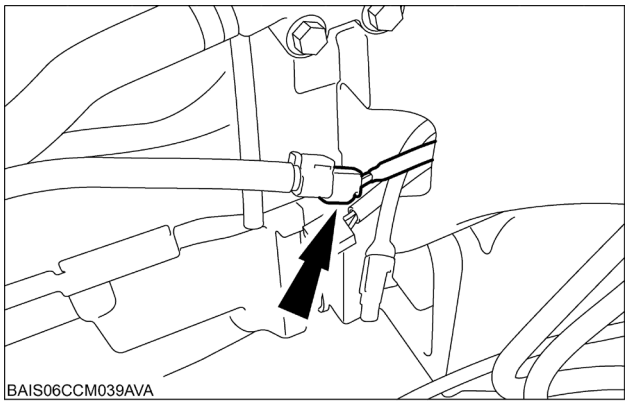
BVE0314A_358 8

9. Remove the wooden wedges **(1)** from between the front axle and front support.



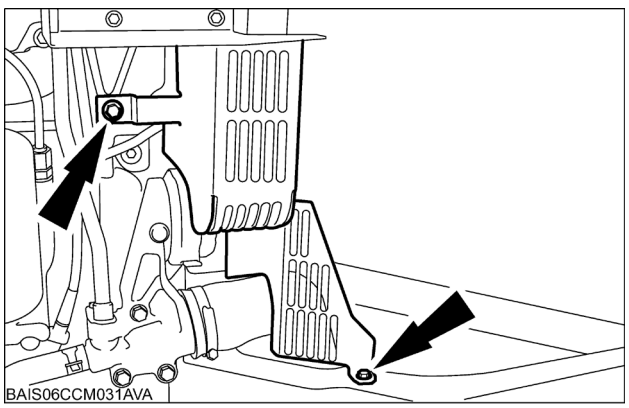
BVE0410A_25 9

10. Connect the steering sensor electrical connector.



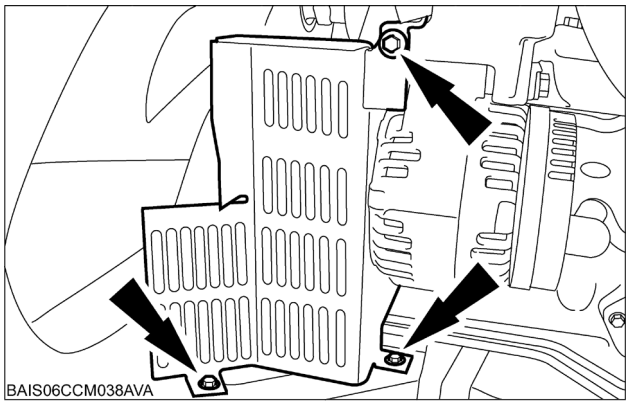
BAIS06CCM039AVA 10

11. Install the left-hand side accessory drive belt guard.



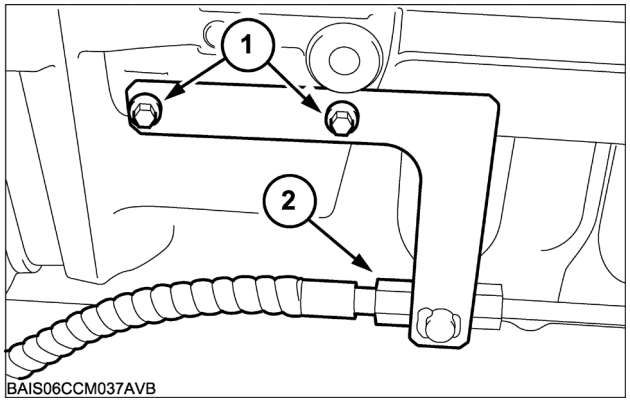
BAIS06CCM031AVA 11

12. Install the right-hand side accessory drive belt guard.



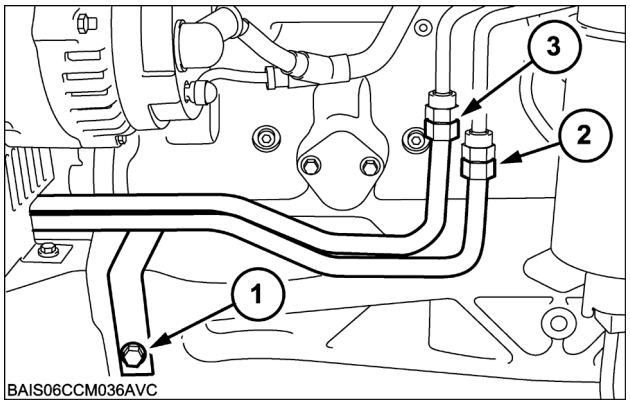
BAIS06CCM038AVA 12

13. Attach the differential lock supply hose bracket **(1)** and connect the hose **(2)**.



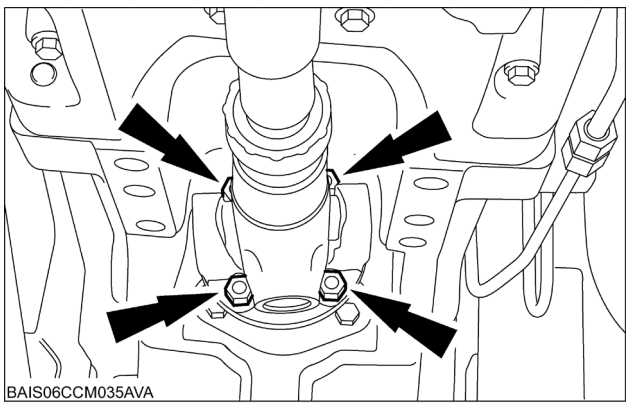
BAIS06CCM037AVB 13

14. Attach the steering pipe support bracket **(1)**. Connect the steering return **(2)** and supply pipes **(3)**.



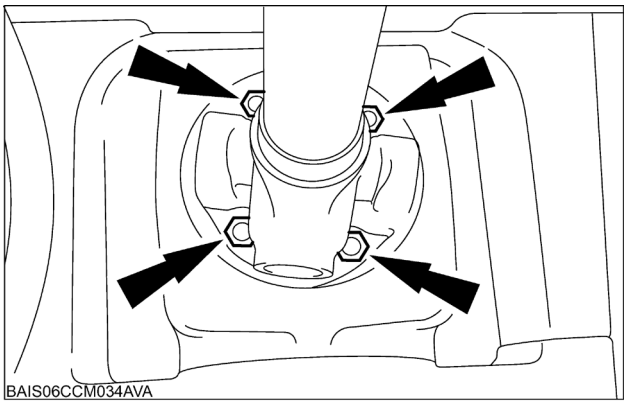
BAIS06CCM036AVC 14

15. Install the four-wheel drive shaft rear retaining nuts. Tighten to **65 - 86 Nm** (**48 - 65 lbft**).



BAIS06CCM035AVA 15

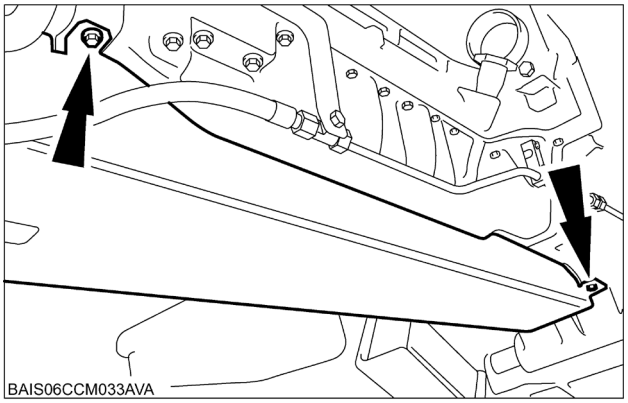
16. Install the four-wheel drive shaft front retaining nuts. Tighten to **65 - 86 Nm** (**48 - 65 lbft**).



BAIS06CCM034AVA 16

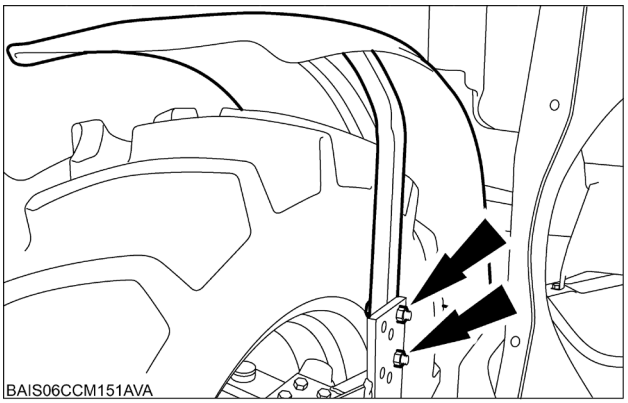
17. Install the four-wheel drive shaft guard.
18. Install the four-wheel drive shaft guard retaining bolts.

NOTE: *Repeat the operation on both sides of the tractor.*



BAIS06CCM033AVA 17

19. Install the front fenders (if equipped).

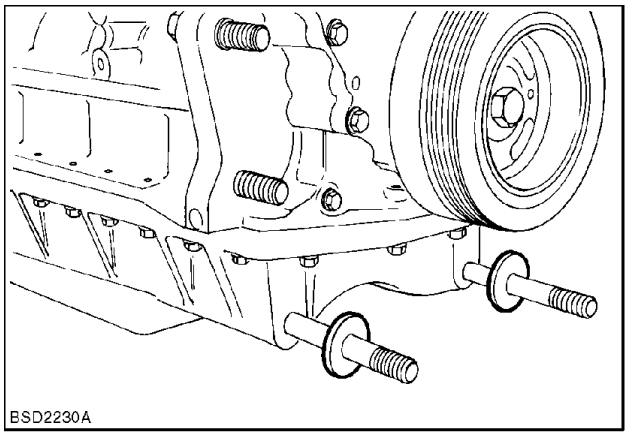


BAIS06CCM151AVA 18

Next operation:
Install the radiator, for further information refer to **Radiator - Install (B.50.A)**.

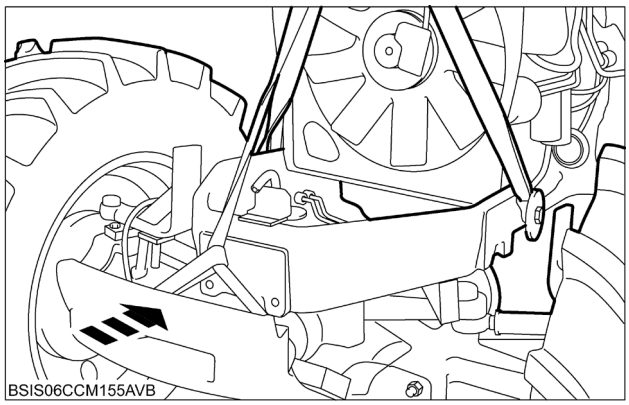
Front - Clearance

1. Install a 4.5 mm yellow shim, part number 82026240, onto each of the engine sump mounting studs.



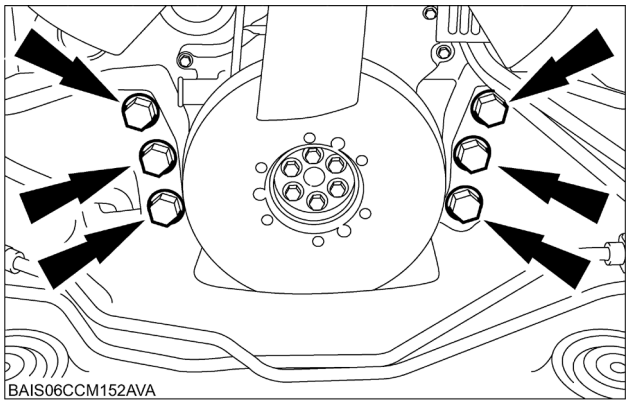
BSD2230A 1

2. Align the front support to the engine.



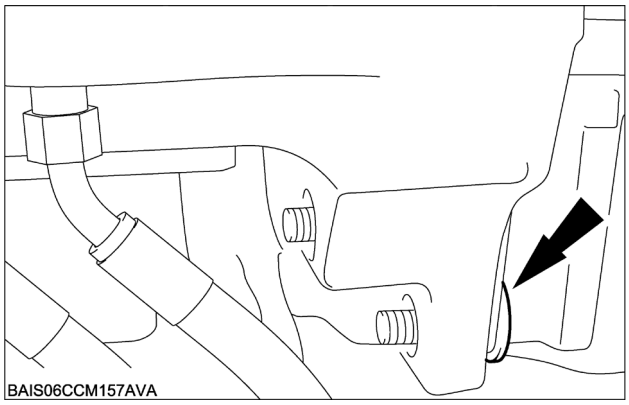
BAIS06CCM155AVB 2

3. Install the front support to engine upper retaining bolts.
   Tighten to the specified torque value.



BAIS06CCM152AVA 3

4. Using feeler gauges measure the gap between each shim and the front support.



BAIS06CCM157AVA 4

5. Add the feeler gauge measurement to the 4.5 mm shim thickness already installed and select the appropriate shim(s) from the following list.

Colour Code	Shim Thickness	Part Number
Yellow	4.5 mm	82026240
Green	4.8 mm	82026241
Red	5.1 mm	82026242
Blue	5.4 mm	82026243
White	5.7 mm	82026244
Black	6.0 mm	82026245
Pink	6.3 mm	82026246
Light Blue	6.6 mm	82026247
Gold	6.9 mm	82026248
Lime	7.2 mm	82026249
Orange	7.5 mm	82026250
Blue/Grey	7.8 mm	82026251

6. Separate the front support from the engine, remove the 4.5 mm shims and replace with new ones of the appropriate thickness.

7. Reinstall the front support.
Tighten the retaining bolts to the specified torque value.

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BODY AND STRUCTURE - E

USER PLATFORM - 34.A

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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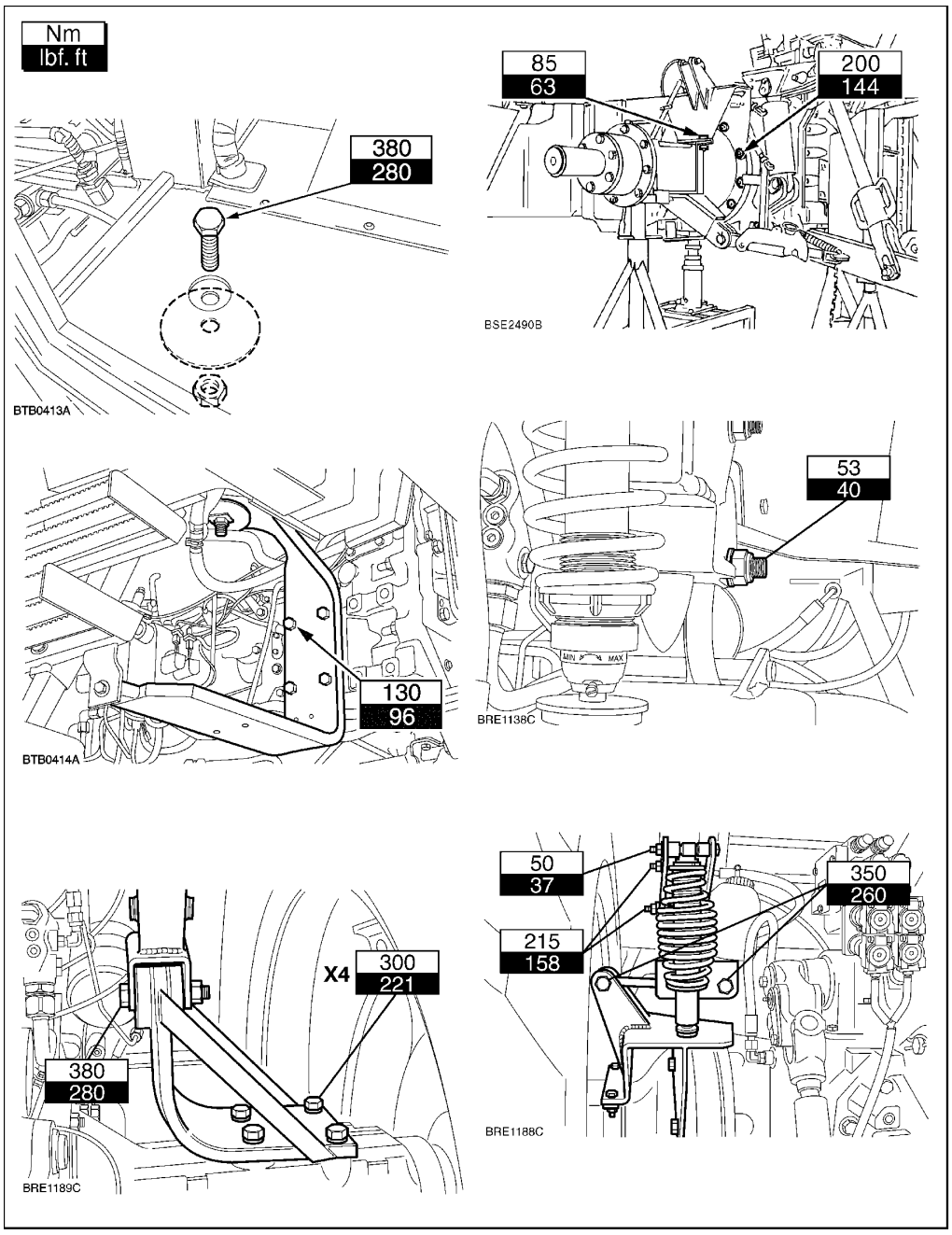
BODY AND STRUCTURE - E

USER PLATFORM - 34.A

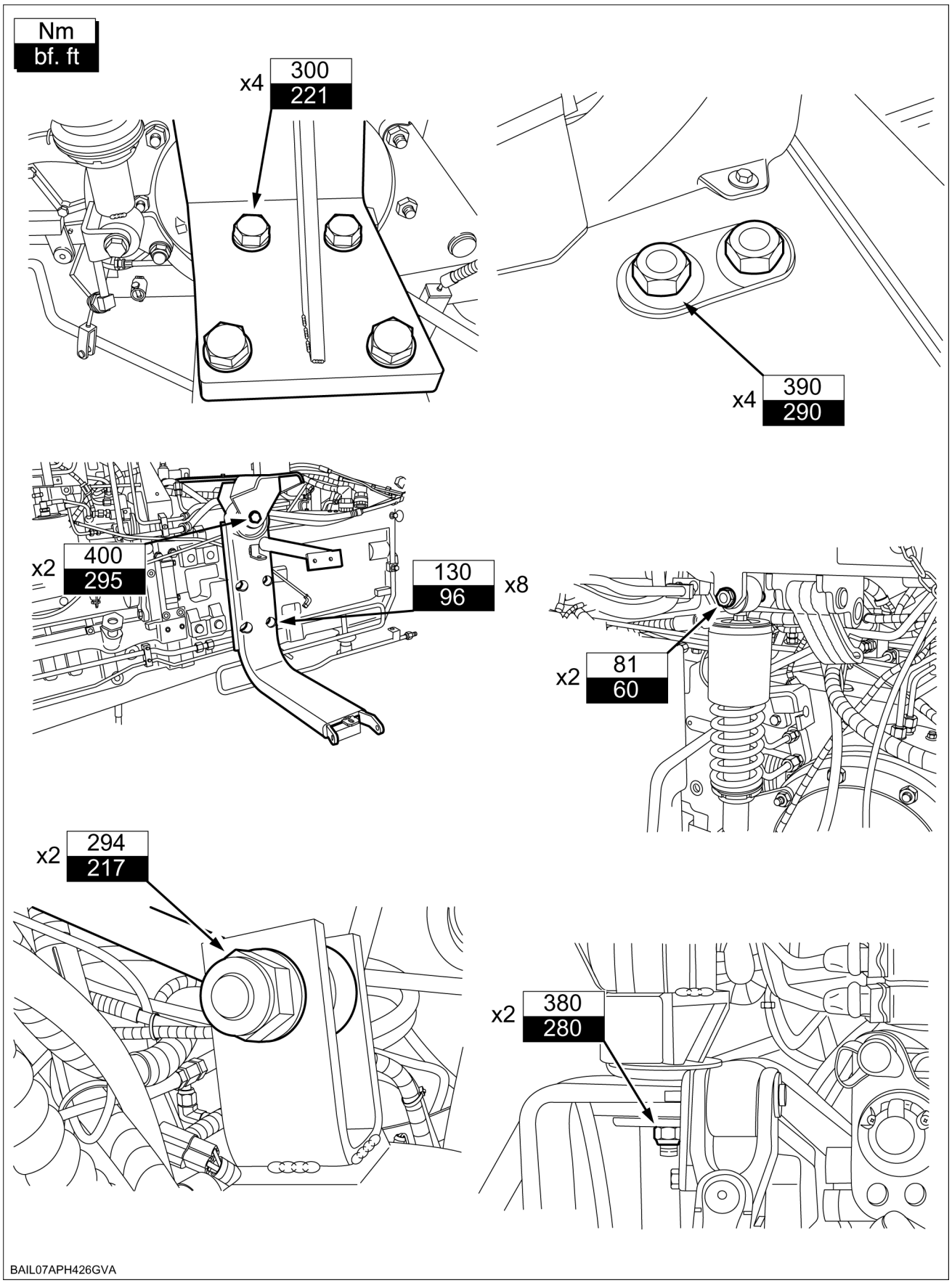
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BRE1189C 1



BAIL07APH426GVA 2

USER PLATFORM - Remove

Prior operation:
Remove the battery. For additional information, refer to **Battery - Remove (A.30.A)**.

⚠ DANGER ⚠

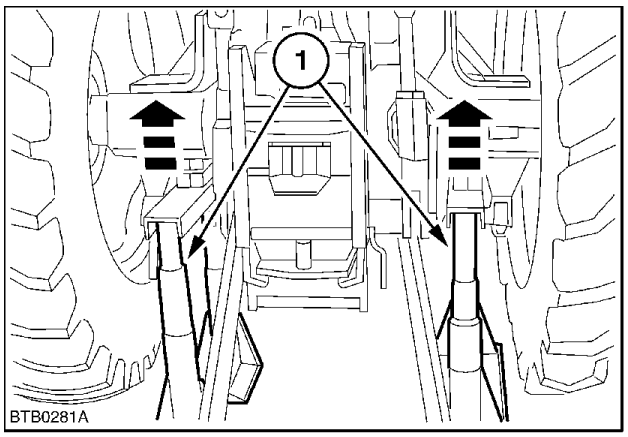
Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012

All Tractors

1. Ensure that the tractor is parked on a level surface.
2. Chock the front wheels using suitable wheel stops.
3. Raise the rear of the tractor and place two suitable axle stands **(1)** under the final drive cases.

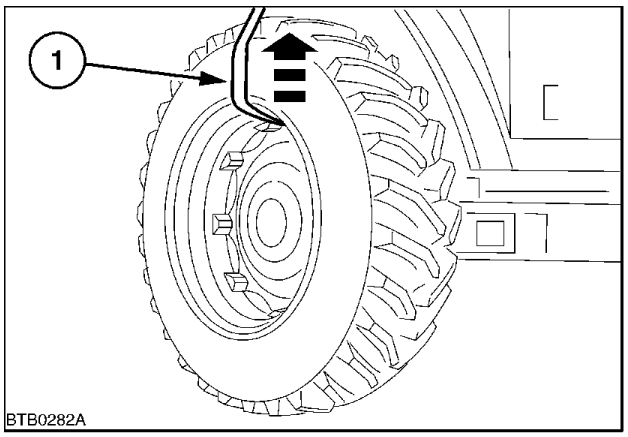
NOTE: *If required, detach the lift rods from the lower links.*



BTB0281A 1

4. Using a suitable sling **(1)**, connect the rear right-hand wheel to a hoist and remove the rear right-hand wheel.

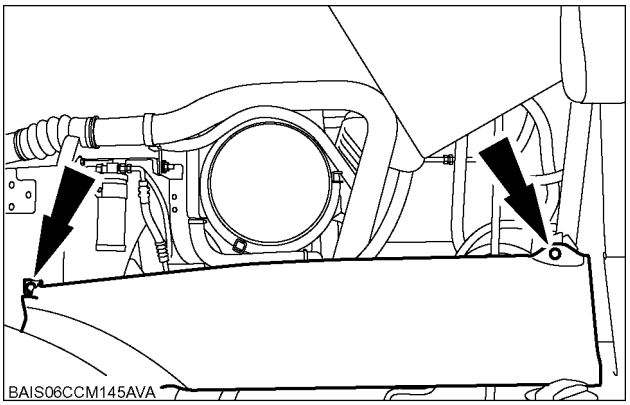
NOTE: *Repeat this step for the rear left-hand wheel.*



BTB0282A 2

5. Remove the engine side panels.

NOTE: *Repeat the operation on both sides of the tractor.*



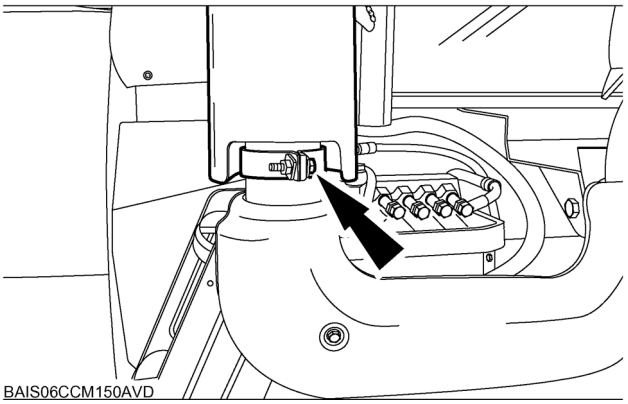
BAIS06CCM145AVA 3

6. Loosen the exhaust clamp and remove the exhaust muffler.

⚠ WARNING ⚠

The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

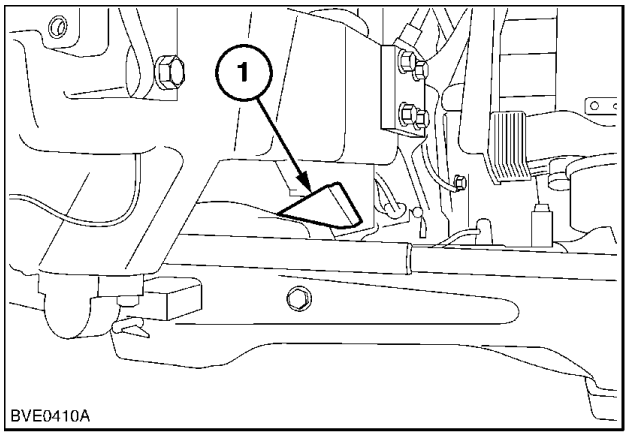
M944



BAIS06CCM150AVD 4

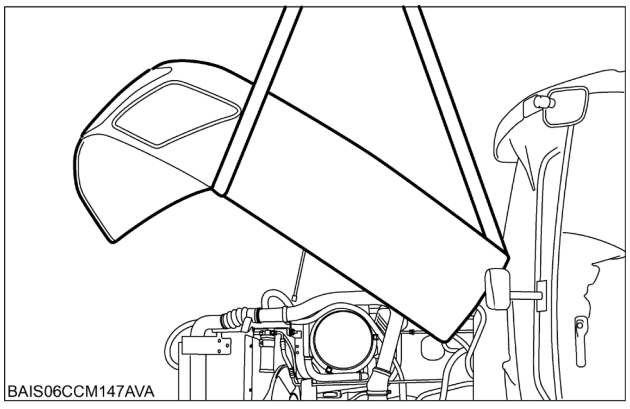
7. Position wooden wedges **(1)** between the front axle and front support. These prevent articulation of the axle.

NOTE: *Repeat this operation on both sides of the tractor.*



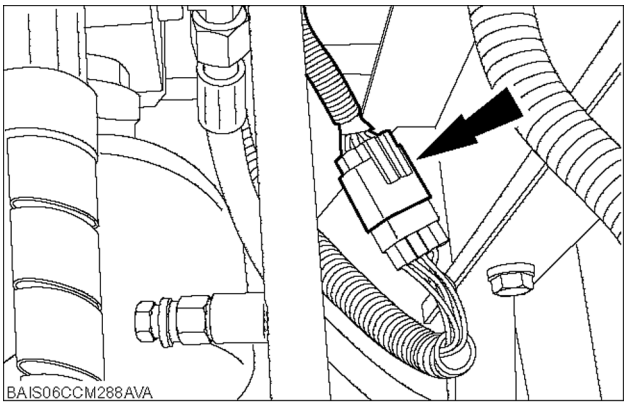
BVE0410A 5

8. Connect the engine hood to a hoist using a suitable nylon cable.



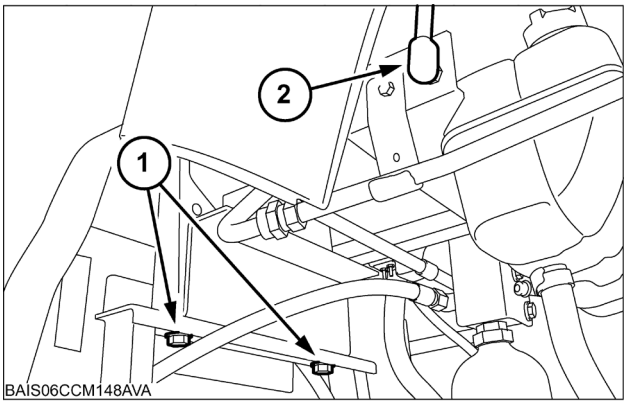
BAIS06CCM147AVA 6

9. Disconnect the lighting harness electrical connector **(1)**.



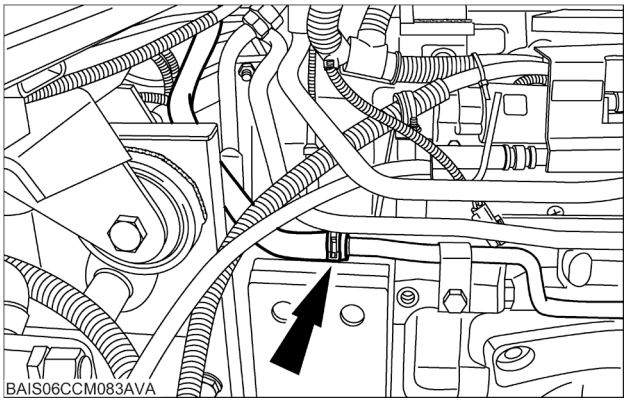
BAIS06CCM288AVA 7

10. Remove the engine hood retaining bolts **(1)**. Disconnect the strut **(2)** and repeat for the left-hand side of the hood.
Remove the engine hood.



BAIS06CCM148AVA 8

11. Disconnect the coolant hose.

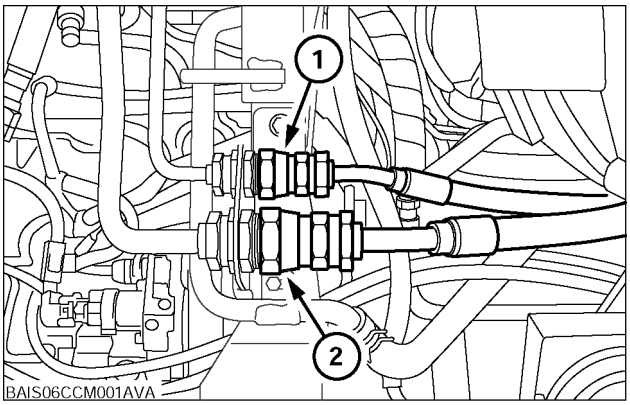


BAIS06CCM083AVA 9

Tractors with Air Conditioning

12. Discharge and reclaim refrigerant gas using certified recovery systems. For additional information, refer to ENVIRONMENTAL CONTROL, Heating, ventilation and air-conditioning - Discharging (E.40.D - F.35.A.31).

13. Disconnect the air conditioning high pressure hose **(1)** and low pressure hose **(2)**.

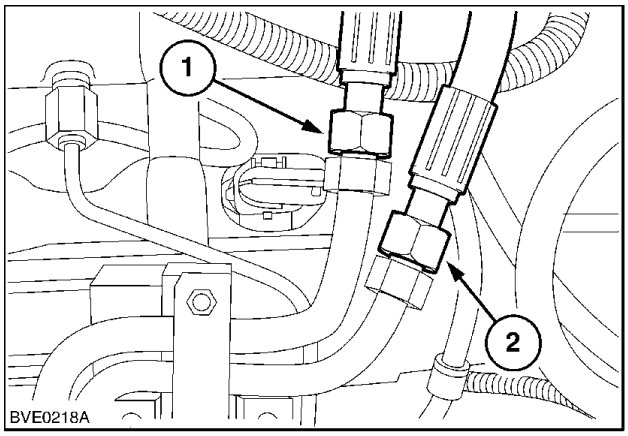


BAIS06CCM001AVA 10

All Tractors

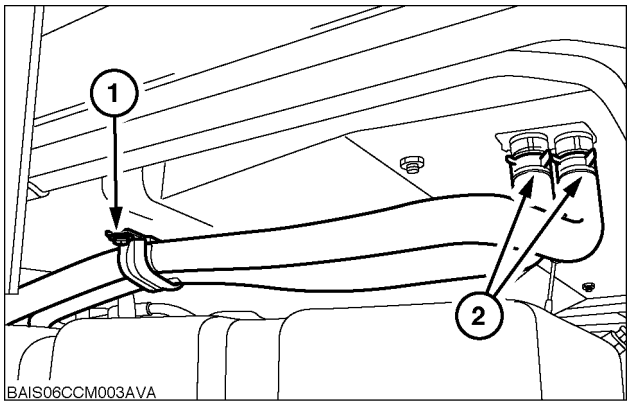
14. Disconnect the steering cylinder oil supply hoses **(1)** and **(2)**.

NOTE: *Make a note of the position of the hoses to aid installation.*



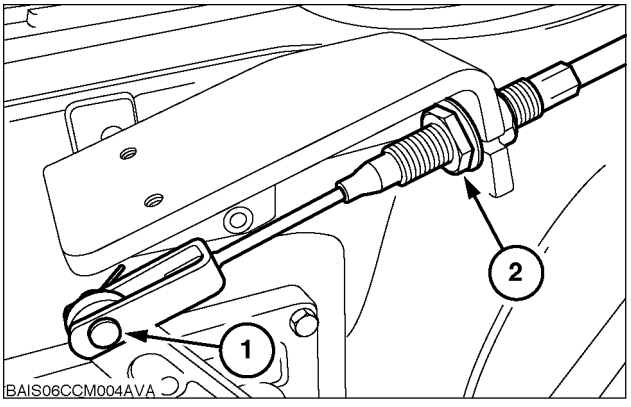
BVE0218A 11

15. Install suitable clamps to the cab heater hoses. Detach the hose retaining bracket **(1)** and disconnect the cab heater hoses **(2)**.



BAIS06CCM003AVA 12

16. Remove the split pin and the cotter pin **(1)** from the parking brake lever. Detach the parking brake cable **(2)**.



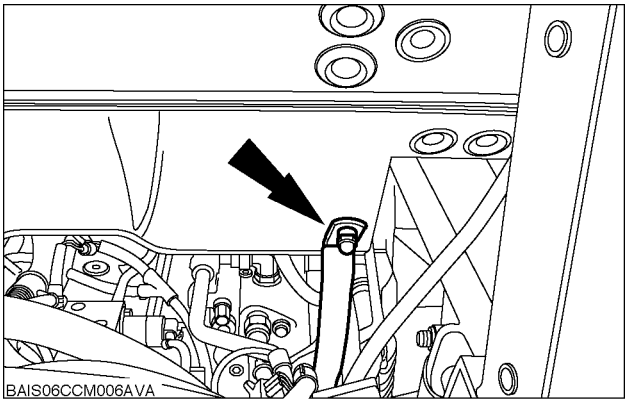
BAIS06CCM004AVA 13

17. Detach the rear axle housing vent pipe



BAIS06CCM005AVA 14

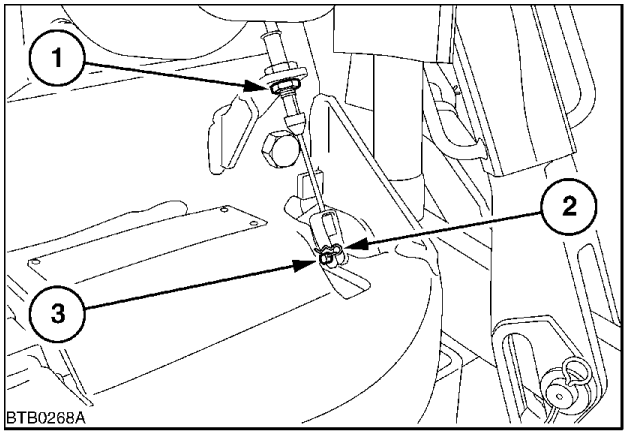
18. Disconnect the cab to chassis earth strap.



BAIS06CCM006AVA 15

Tractors with Automatic Pick-up Hitch

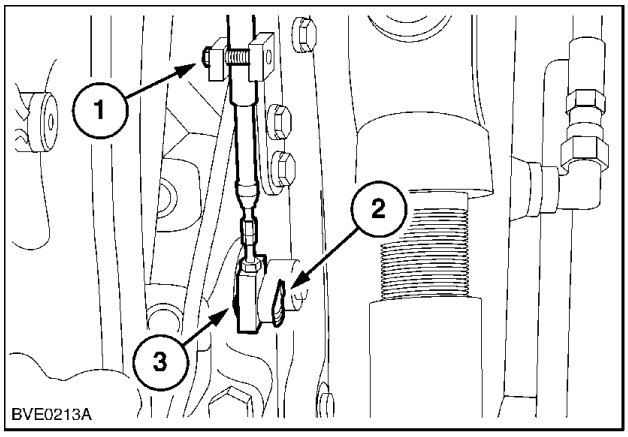
19. Loosen the retaining nut **(1)**, remove the "R" clip **(2)** and the clevis pin **(3)**.
Detach the pick-up hitch release cable.



BTB0268A 16

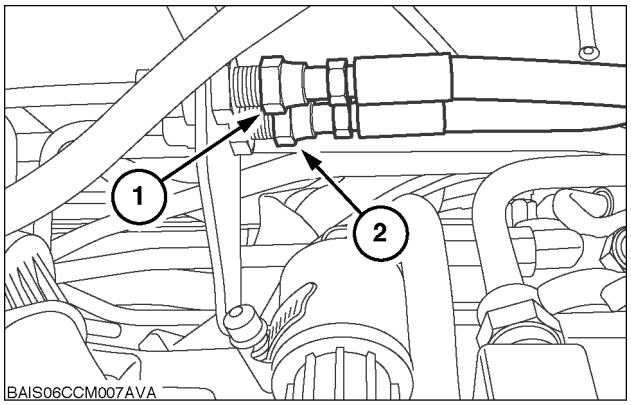
All Tractors

20. Remove the retaining bolt **(1)**, retaining clip **(2)** and the cotter pin **(3)**.
Detach the Power Take Off (PTO) cable.



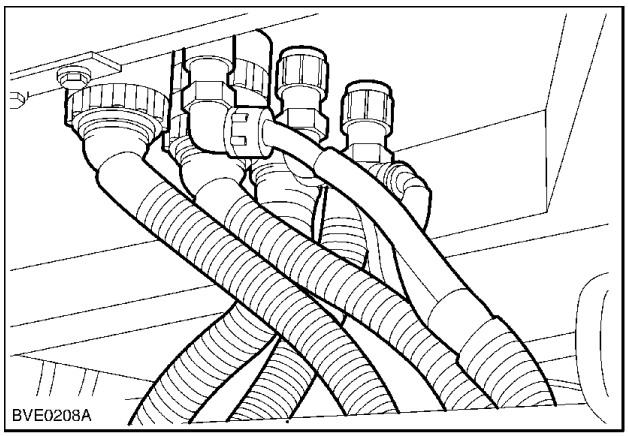
BVE0213A 17

21. Disconnect the right-hand **(1)** and left-hand **(2)** power brake lines.



BAIS06CCM007AVA 18

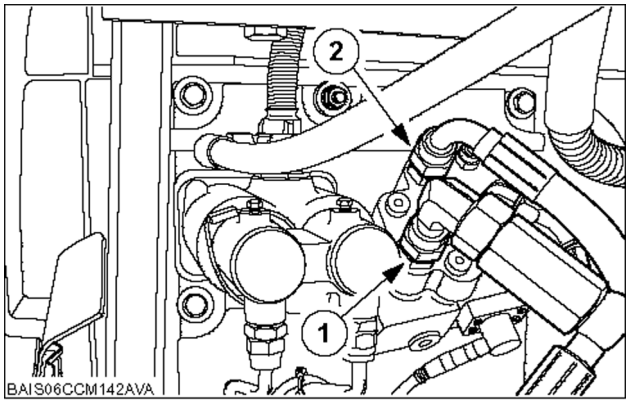
22. Disconnect the cab electrical connectors.



BVE0208A 19

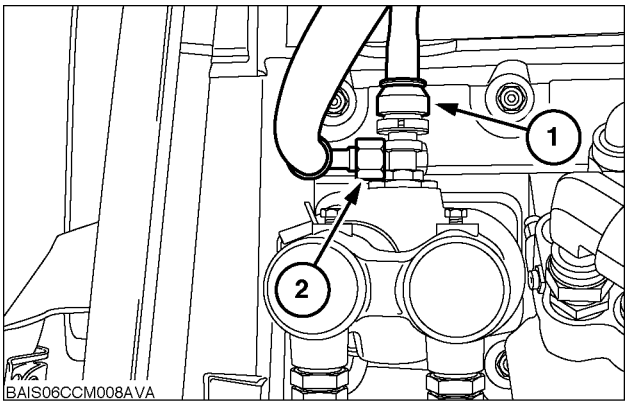
23. Disconnect the steering supply and return hoses.

NOTE: *Tractor with Turn Assist shown.*



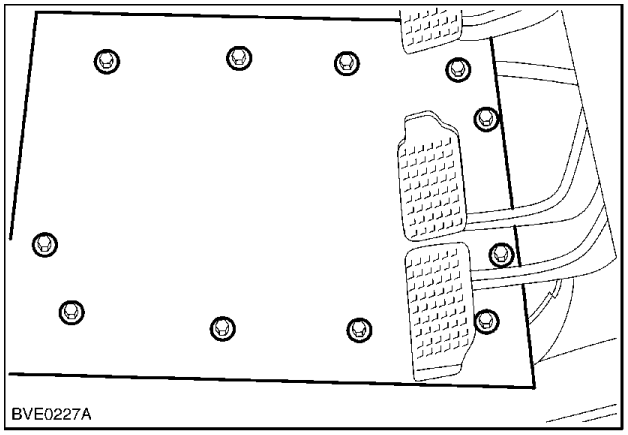
BAIS06CCM142AVA 20

24. Disconnect the master cylinder vent hose **(1)** and the master cylinder supply hose **(2)**.



BAIS06CCM008AVA 21

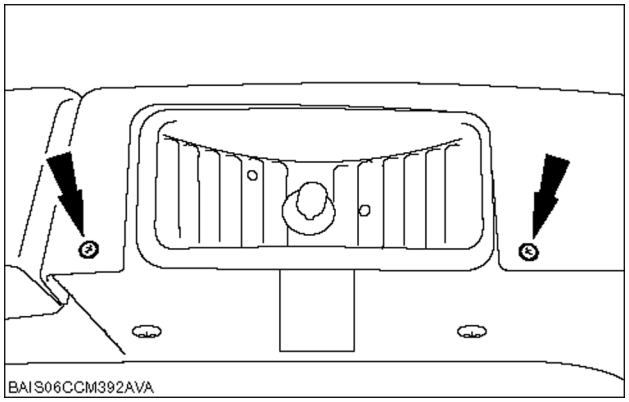
25. Slide the operator seat fully rearward.
Remove the rubber mat from the cab floor.
Remove the cab floor panel from the cab.



BVE0227A 22

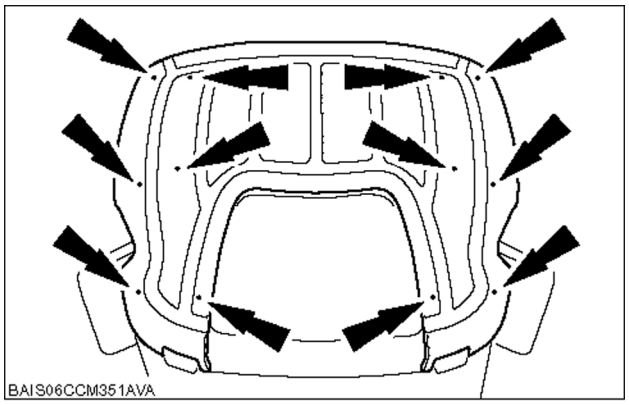
26. Remove the two retaining screws from either side of the roof lights.

NOTE: *Repeat this step for both sides front and rear.*



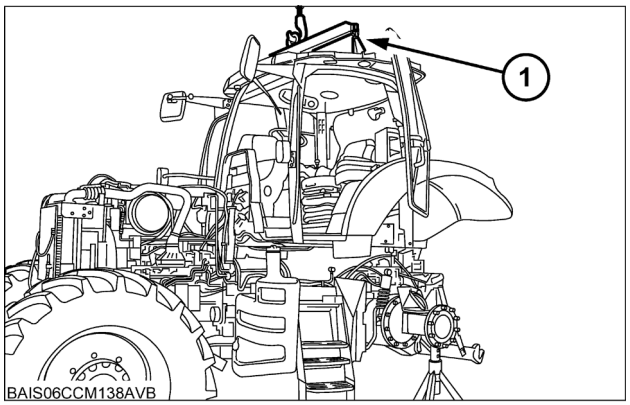
BAIS06CCM392AVA 23

27. Remove the 12 retaining screws.
Remove the cab roof panel.



BAIS06CCM351AVA 24

28. Install the cab lifting bracket **(1) 380001157** .
Using a suitable chain, attach the cab to a hoist.

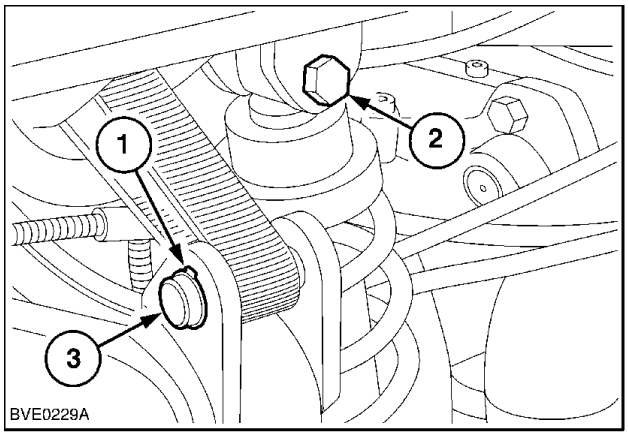


BAIS06CCM138AVB 25

Tractors with Cab Suspension

29. Remove the circlip **(1)** and the cab strap retaining pin **(3)**.
Remove the damper/spring assembly upper retaining nut **(2)**.

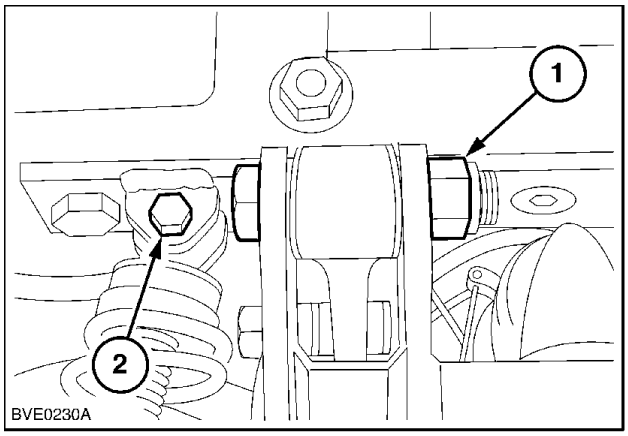
NOTE: *It may not be possible to remove the damper/spring assembly upper bolt until the cab is being raised.*



BVE0229A 26

30. Remove the retaining nut **(1)** and the bolt from the panhard rod.
Remove the damper/spring assembly upper retaining nut **(2)**.

NOTE: *It may not be possible to remove the damper/spring assembly upper bolt **(2)** until the cab is being raised.*

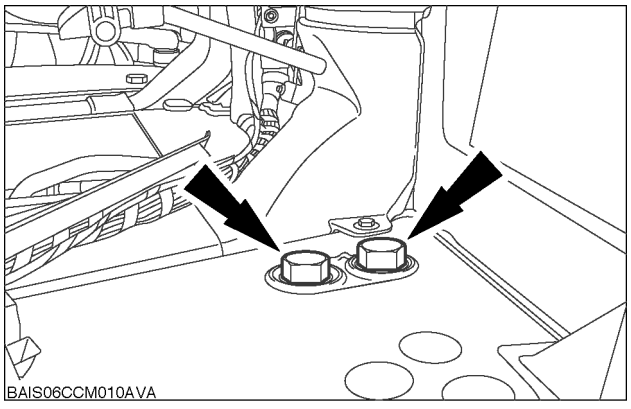


BVE0230A 27

31. Remove the right-hand side front cab mounting bolts.
Repeat this step for the left-hand side of the cab.
Raise the cab and remove the cab front mounting bolts and the rear damper/spring assembly bolts.
Raise the cab slowly.
Remove the cab and place on a secure stand.

NOTE: *It may not be possible to remove the cab mounting bolts until the cab is being raised.*

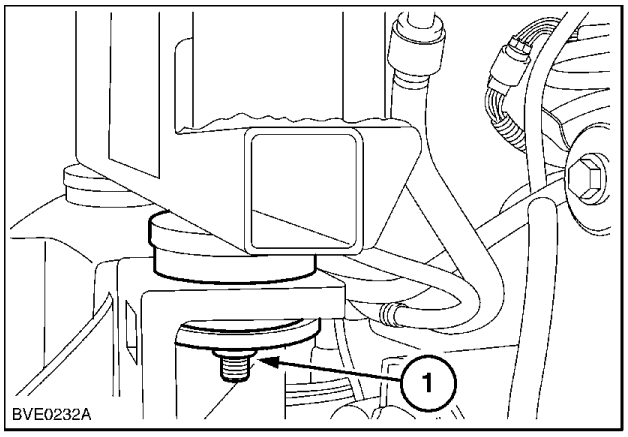
NOTE: *Make sure that all cables and hydraulic hoses are free from obstruction.*



BAIS06CCM010AVA 28

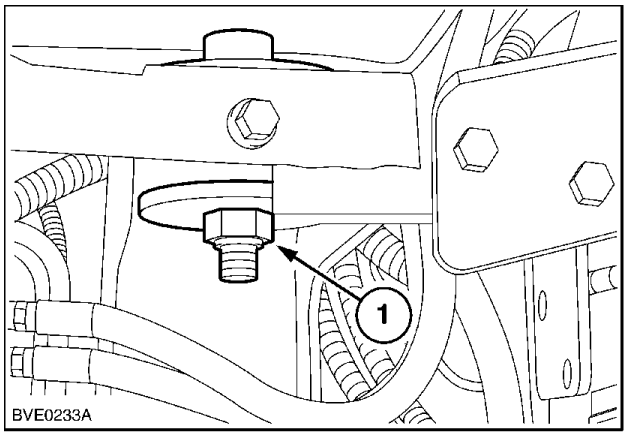
Tractors with Standard Cab

32. Remove the left-hand side cab rear mounting nut **(1)** while holding the bolt in the cab frame. Repeat this step for the right-hand side of the cab.



BVE0232A 29

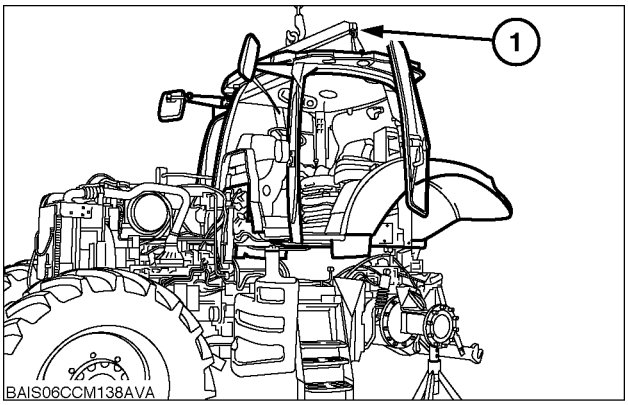
33. Loosen the cab front mounting bolt while holding the nut **(1)** under the cab floor. Remove the bolt and washers. Repeat this step for the left-hand side of the cab.



BVE0233A_59 30

34. Raise the cab slowly. Remove the cab and place on a secure stand.

NOTE: *Make sure that all cables and hydraulic hoses are free from obstruction.*



BAIS06CCM138AVA 31

USER PLATFORM - Install

Prior operation:
USER PLATFORM - Remove (E.34.A).

⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012

⚠ WARNING ⚠

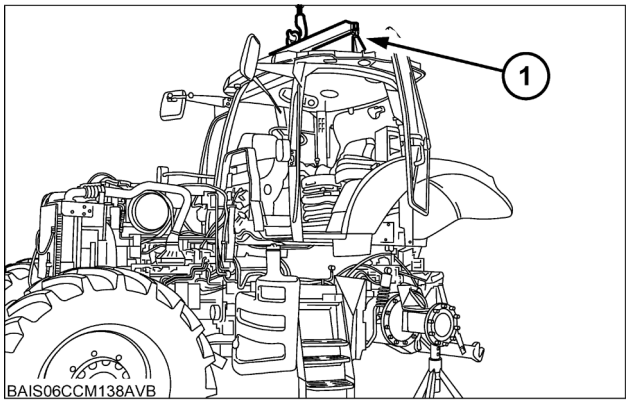
Always use suitable tools to align holes. DO NOT USE HAND OR FINGERS.

B020

All Tractors

1. Install the cab using the cab lifting bracket **(1)** **380001157**.

NOTE: *Make sure that all cables and hydraulic hoses are not trapped.*



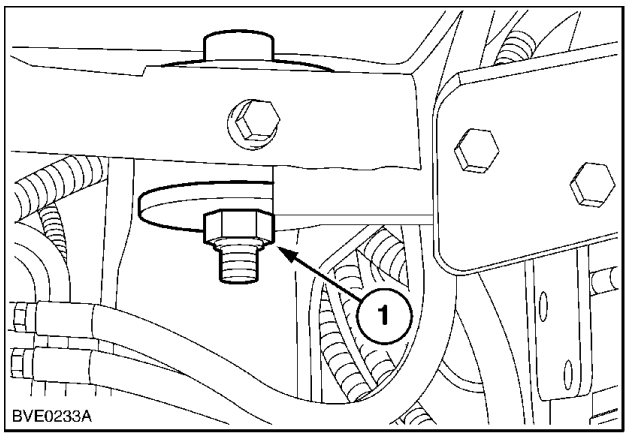
BAIS06CCM138AVB 1

Tractors with Standard Cab

2. Position the cab to the tractor and lower the cab slowly.
   Install the cab front mounting bolt, washers and nut. Tighten **(1)** to **380 Nm** (**280 lb ft**).

NOTE: *Make sure that all cables and hydraulic hoses are free from obstruction.*

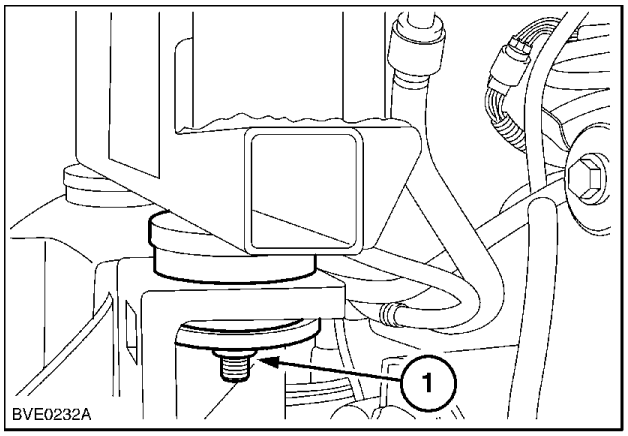
NOTE: *Repeat this step for both sides of the tractor.*



BVE0233A 2

3. Install the left-hand side cab rear mounting nut while holding the bolt in the cab frame.
   Tighten **(1)** to **380 Nm** (**280 lb ft**).

NOTE: *Repeat this step for both sides of the tractor.*



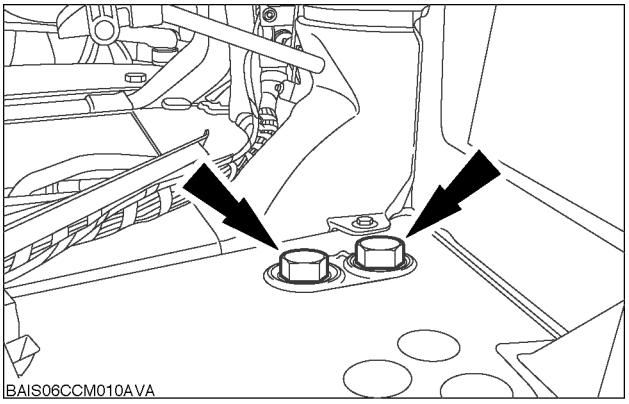
BVE0232A 3

Tractors with Cab Suspension

4. Position the cab to the tractor and lower the cab slowly.
   Install the front cab mounting bolts.
   Tighten to **390 - 430 Nm** (**288 - 317 lbft**).

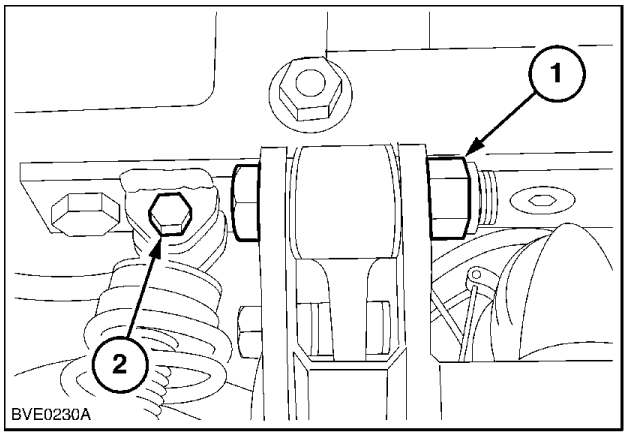
NOTE: *Make sure that all cables and hydraulic hoses are free from obstruction.*

NOTE: *Repeat this step for both sides of the tractor.*



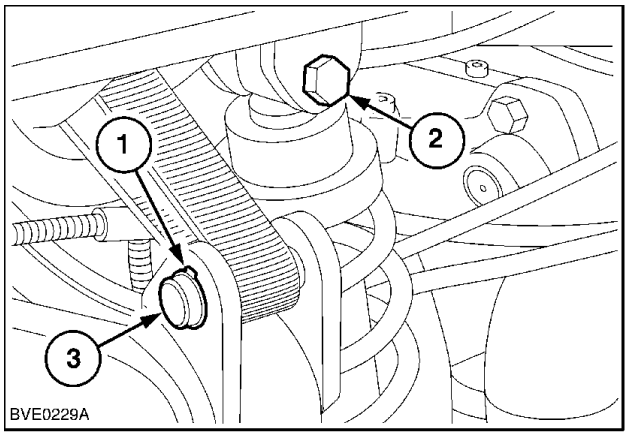
BAIS06CCM010AVA 4

5. Install the left-hand side damper/spring assembly upper retaining bolt and nut. Tighten to the specified torque value.
   Install the panhard rod retaining bolt and nut.
   Tighten **(1)** to **294 Nm** (**217 lb ft**).
   Tighten **(2)** to **81 Nm** (**60 lb ft**).



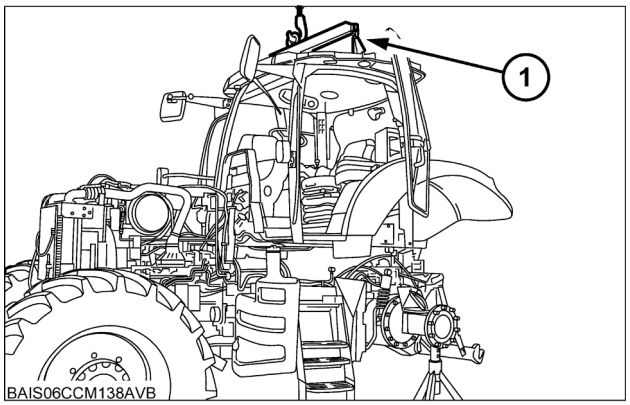
BVE0230A 5

6. Install the right-hand side damper/spring assembly upper retaining bolt and nut **(2)**. Install the cab strap, cab strap retaining pin **(3)** and the circlip **(1)**.
Tighten **(2)** to **81 Nm** (**60 lb ft**).



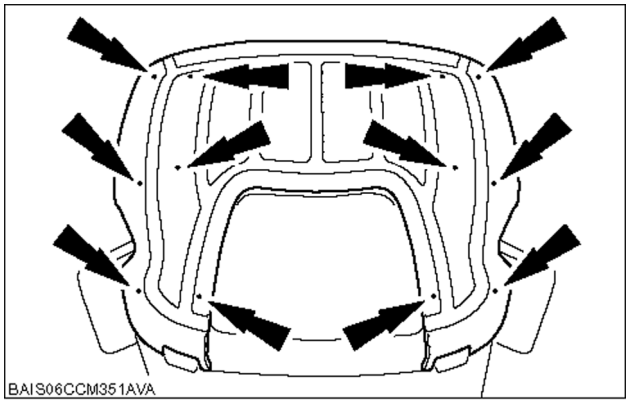
BVE0229A 6

7. Remove the cab lifting bracket **(1) 380001157**.



BAIS06CCM138AVB 7

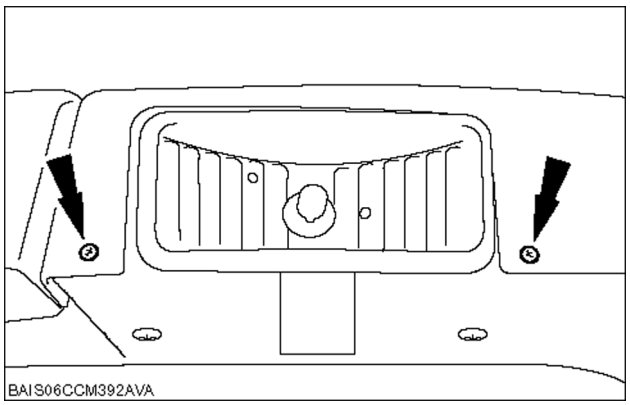
8. Install the cab roof panel.
Install the 12 retaining screws.



BAIS06CCM351AVA 8

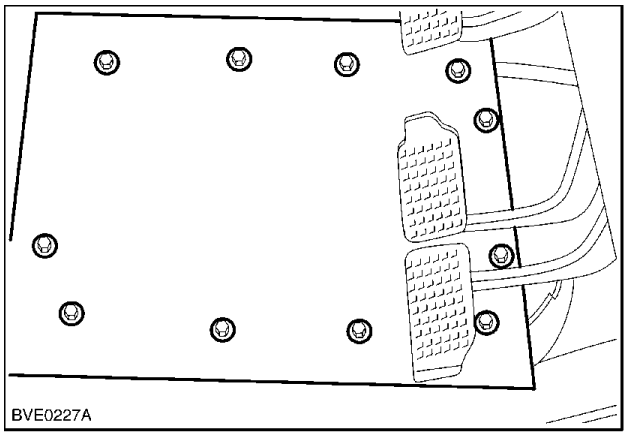
9. Install the two retaining screws either side of the roof lights.

NOTE: *Repeat this step for both sides front and rear.*



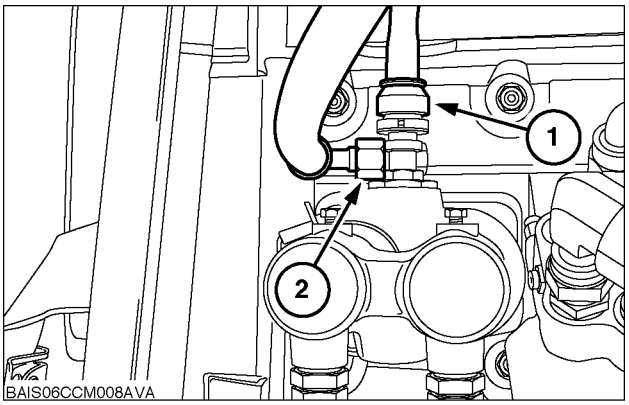
BAIS06CCM392AVA 9

10. Install the cab floor panel to the cab.
Install the cab floor rubber mat.



BVE0227A 10

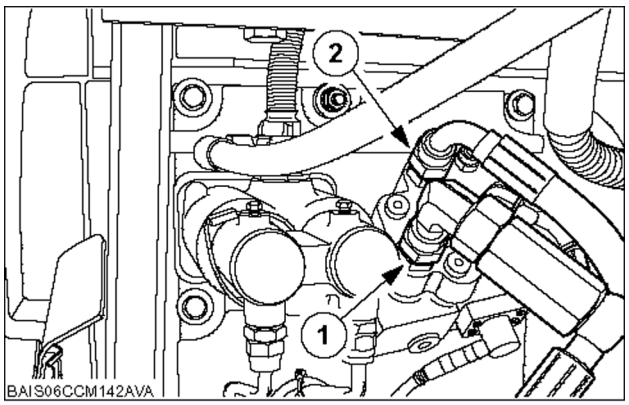
11. Connect the master cylinder vent hose **(1)** and the master cylinder supply hose **(2)**.



BAIS06CCM008AVA 11

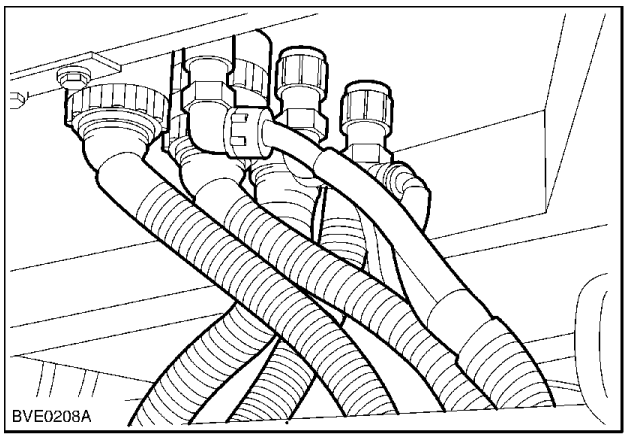
12. Connect the steering supply **(2)** and return **(1)** hoses.

NOTE: *Tractor with Turn Assist shown.*



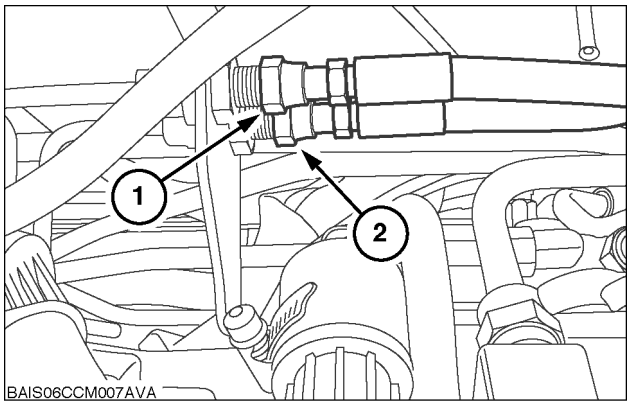
BAIS06CCM142AVA 12

13. Connect the cab electrical connectors.



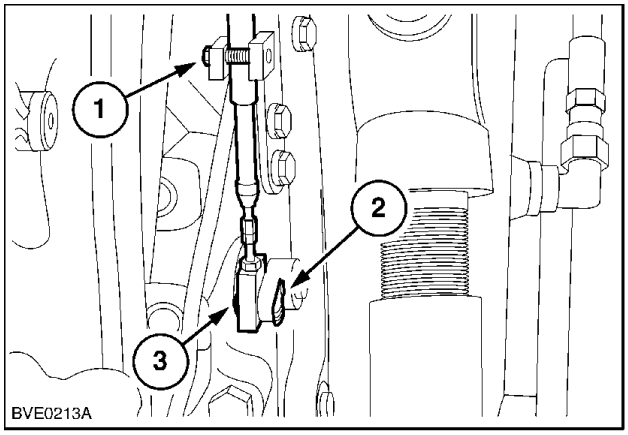
BVE0208A 13

14. Connect the right-hand **(1)** and left-hand **(2)** power brake lines.



BAIS06CCM007AVA 14

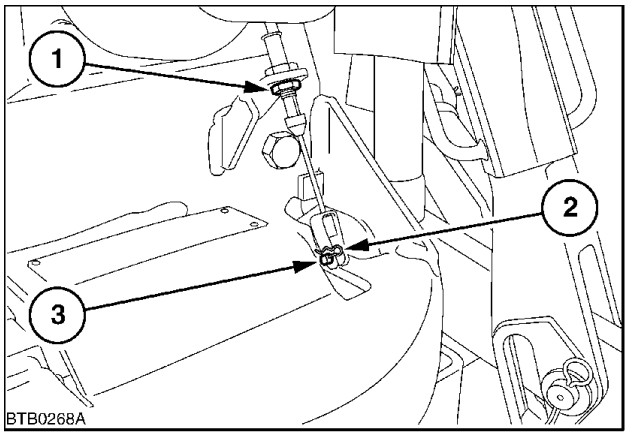
15. Install the Power Take Off (PTO) cable.
Install the cotter pin **(3)**, retaining clip **(2)** and tighten the retaining bolt **(1)**.



BVE0213A 15

Tractors with Automatic Pick-up Hitch

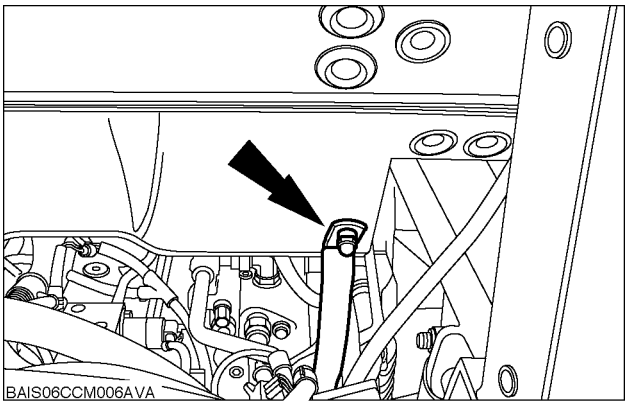
16. Install the pick up hitch release cable.
Install the cotter pin **(3)**, R-clip **(2)** and tighten the retaining nut **(1)**.



BTB0268A 16

All Tractors

17. Connect the cab to chassis earth strap.



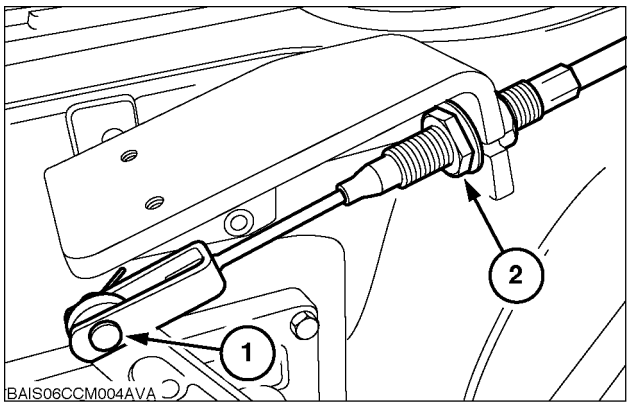
BAIS06CCM006AVA 17

18. Install the rear axle housing vent pipe.



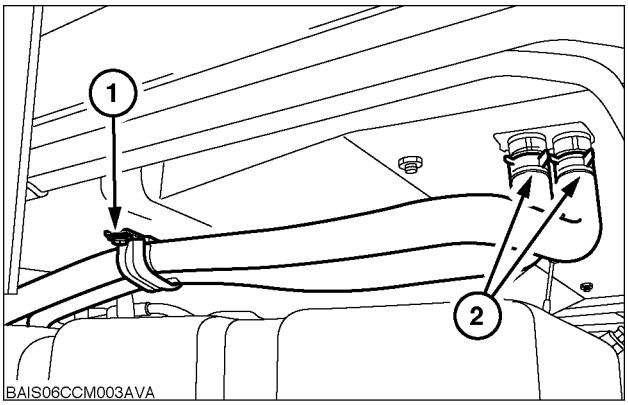
BAIS06CCM005AVA 18

19. Install the parking brake cable **(2)** and install the parking brake cable cotter pin **(1)** and split pin.
Adjust the parking brake cable **(2)**.



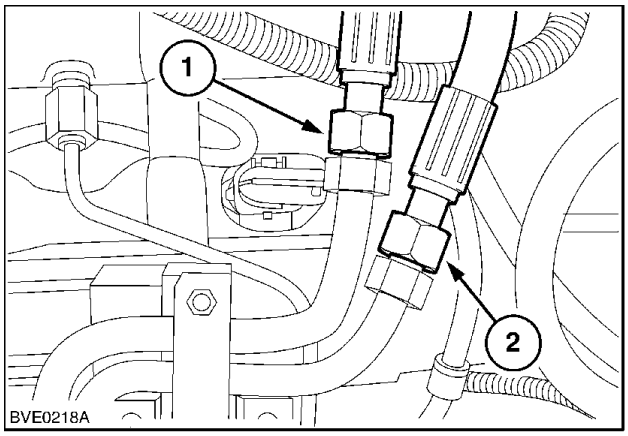
BAIS06CCM004AVA 19

20. Connect the cab heater hoses **(1)** and install the hose retaining bracket **(2)**.
Remove the hose clamps.



BAIS06CCM003AVA 20

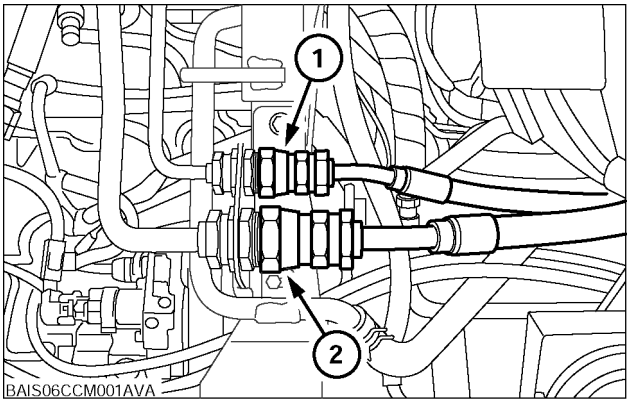
21. Connect the steering cylinder oil supply hoses **(1)** and **(2)**.



BVE0218A 21

Tractors with Air Conditioning

22. Connect the air conditioning high pressure hose **(1)** and low pressure hose **(2)**.

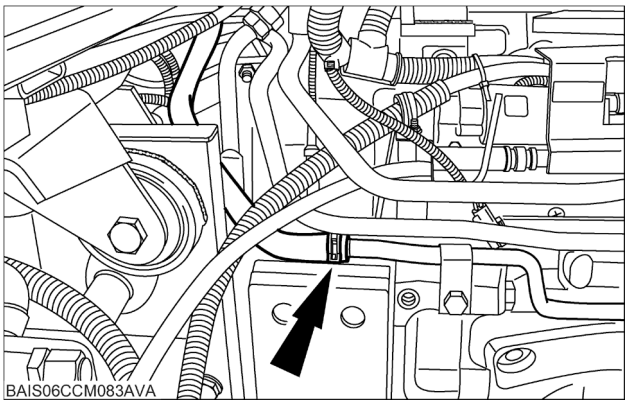


BAIS06CCM001AVA 22

23. Evacuate and recharge the refrigerant gas using certified recovery systems. For additional information, refer to ENVIRONMENTAL CONTROL, Heating, ventilation and air-conditioning - Evacuate (E.40.D - F.35.A.35) and - Charging (E.40.D - F.60.A.30).

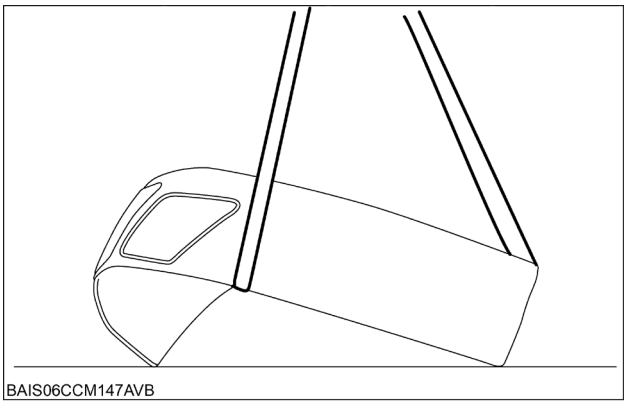
All Tractors

24. Connect the coolant hose.



BAIS06CCM083AVA 23

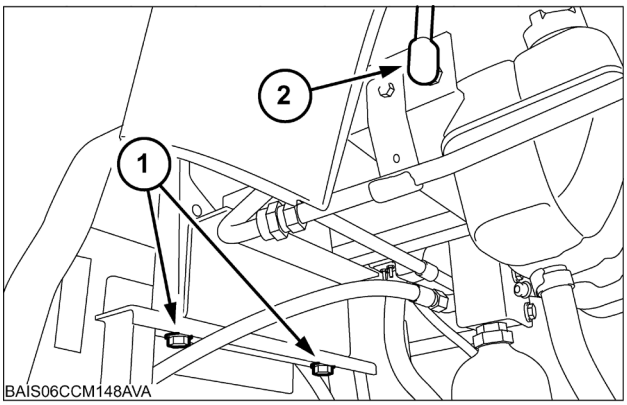
25. Connect the engine hood to a hoist using a suitable nylon cable.



BAIS06CCM147AVB 24

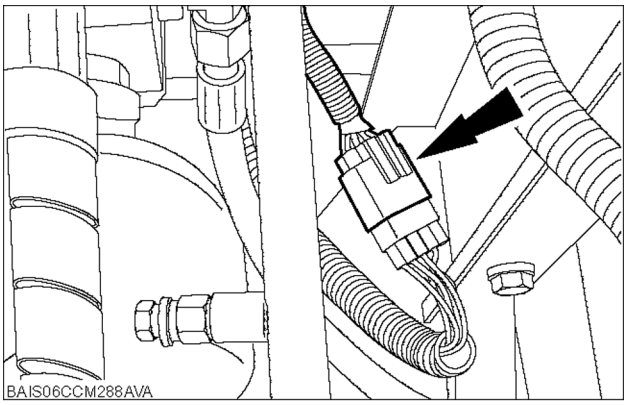
26. Install the engine hood retaining bolts **(1)**. Connect the strut **(2)**.

NOTE: *Repeat this step for both sides of the tractor.*



BAIS06CCM148AVA 25

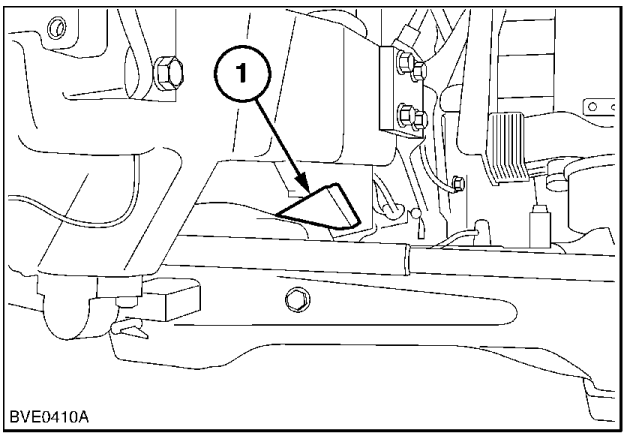
27. Connect the lighting harness electrical connector **(1)**.



BAIS06CCM288AVA 26

28. Remove the wooden wedge **(1)** from between the front axle and front support.

NOTE: *Repeat this step for both sides of the tractor.*



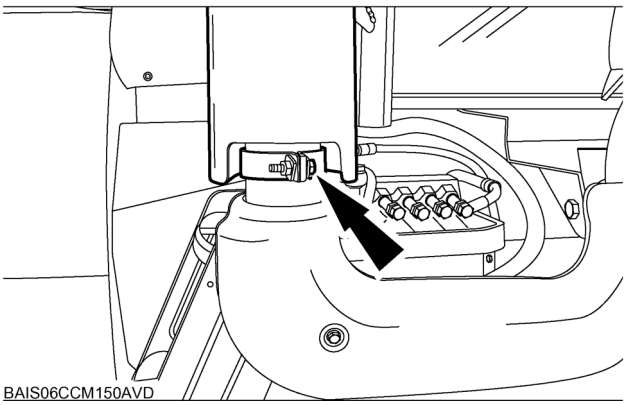
BVE0410A 27

29. Install the exhaust muffler and tighten the exhaust clamp.

⚠ WARNING ⚠

The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

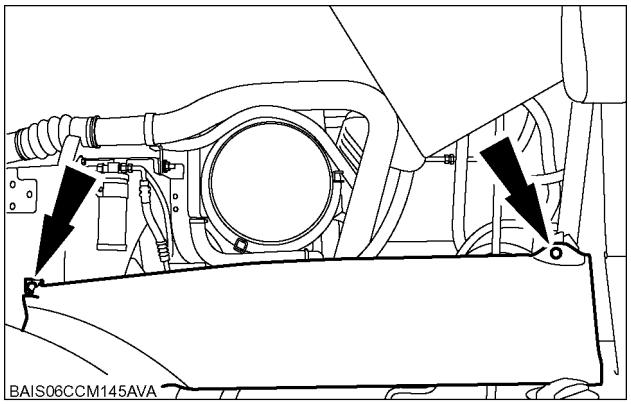
M944



BAIS06CCM150AVD 28

30. Install the engine side panels.

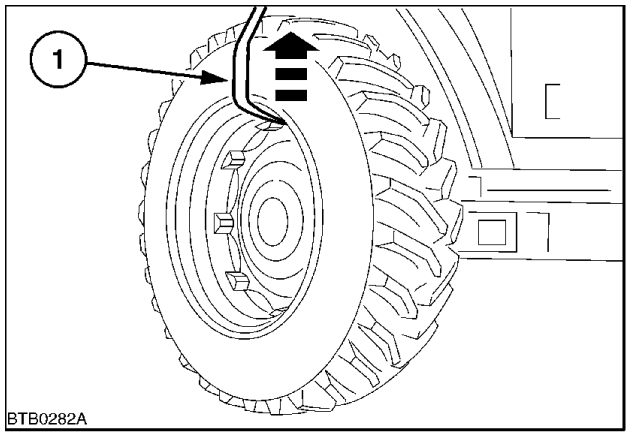
NOTE: *Repeat this step for both sides of the tractor.*



BAIS06CCM145AVA 29

31. Using a suitable sling **(1)**, connect the rear right hand wheel to a hoist and install the rear right-hand wheel. For correct torque refer to **Rear wheel - Torque (D.50.C)**.

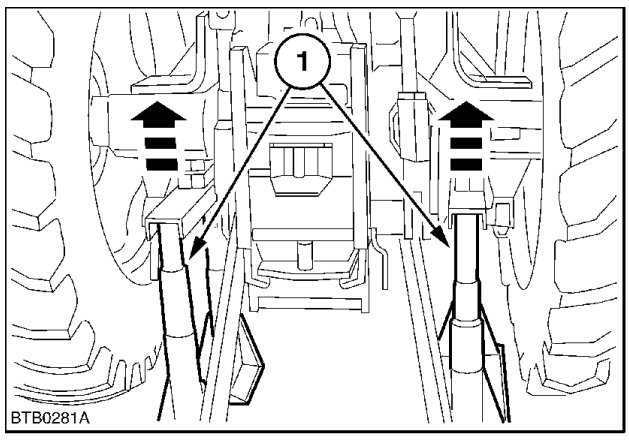
NOTE: *Repeat this step for the rear left-hand wheel.*



BTB0282A 30

32. Raise the rear of the tractor and remove the axle stands **(1)**.

NOTE: *If detached during removal, reattach the lift rods to the lower links.*



BTB0281A 31

33. Install the battery. For additional information, refer to **Battery - Install (A.30.A)**.

34. Fill the engine coolant system. For additional information, refer to **ENGINE COOLANT SYSTEM - Filling (B.50.A)**.
35. Bleed the brake system. For additional information, refer to SERVICE BRAKE Hydraulic - Bleed **SERVICE BRAKE Hydraulic - Bleed (D.30.C)**.
36. Refill the driveline with the correct specification oil.
37. Remove the wheel stops from the front wheels.

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BODY AND STRUCTURE - E

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PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Torque

Cylinder head screws of the air conditioning compressor	**24.5-26.5 Nm** (**18-19.5 lbf.ft**)
Retaining screw of the compressor clutch front plate	**11.0-14.0 Nm** (**8-10 lbf.ft**)
Retaining screws of the air conditioning compressor	**20.5-25.5 Nm** (**15-19 lbf.ft**)

ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Special tools

Certified Refrigerant Recover, Recycling and Recharge Equipment suitable for the type of refrigerant gas used on tractor are required when servicing air conditioning systems.
This special equipment is available through recognised suppliers of air conditioning equipment. Refer to the Tool supplier for details on the latest equipment available for servicing the air conditioning system.

Vacuum/charge Portable system	Tool No. 380000558
Recovery/recharge Portable system	**380000315**
Evaporator and condenser cleaner	**380000312**
Electronic Gas Leak Detector	**380000314**
Manifold Gauge Set (Where required)	**380000239**
COMPRESSOR TOOLS: Sanden SDH715 Kit	**380000333**

ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - General specification

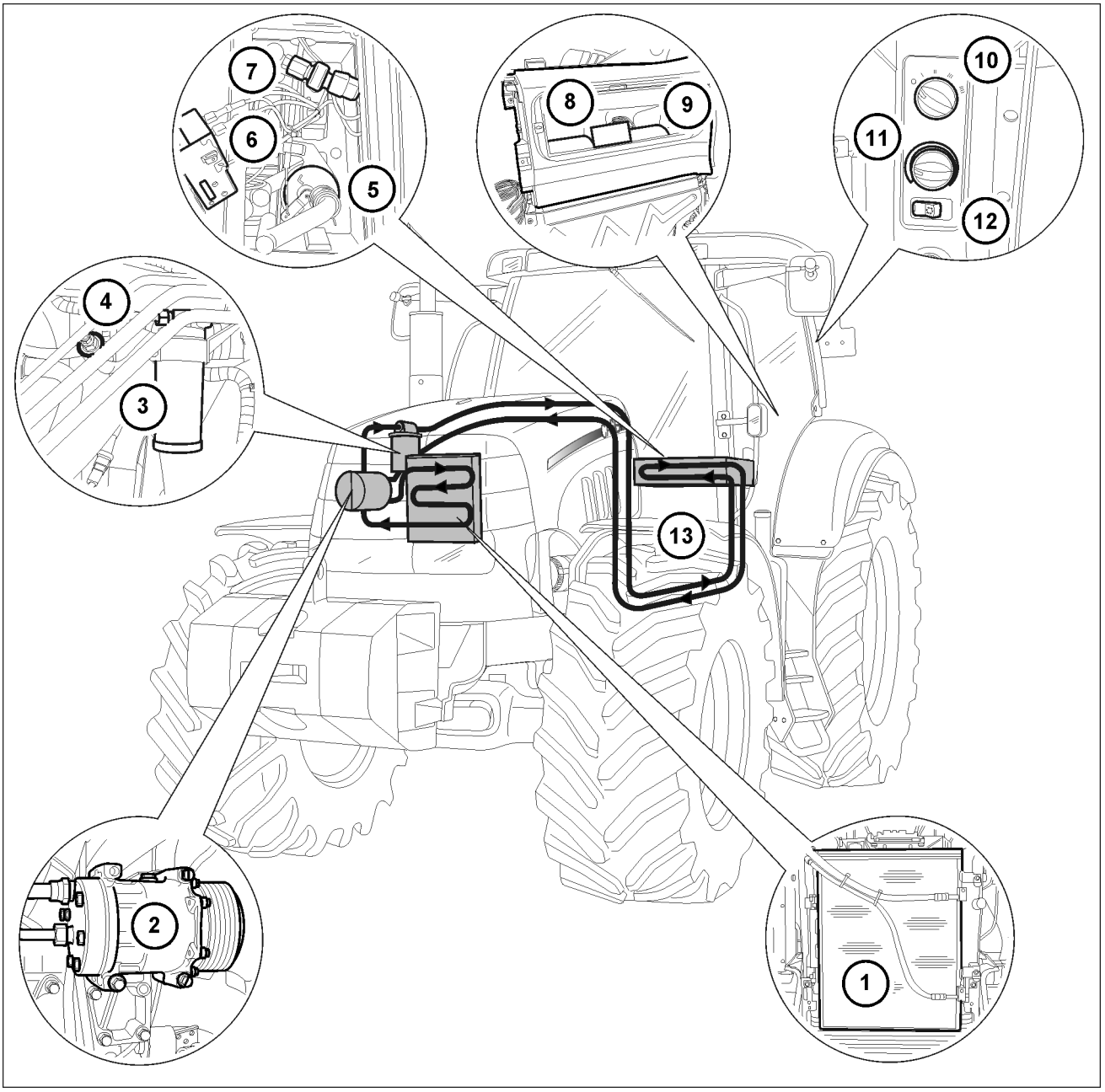
Refrigerant specifications	R134a
Refrigerant filling	**0.9 kg** (**1.98 lb**)
Refrigerant oil specifications	PAG type (ISO 46 viscosity) Sanden SP10
Refrigerant oil filling quantity (air conditioning compressor and system)	**186 - 228 cm³**
Air conditioning compressor Manufacturer and type	Sanden SD7H15

At an ambient temperature of **22 - 49 °C** (**75 - 120 °F**) the cooling power is approximately. **4.5 kW**.

NOTE: *The actual cooling power depends on the setting made by the driver.*

ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Overview

PUMA 165 Standard Climate Control, PUMA 180 Standard Climate Control, PUMA 195 Standard Climate Control, PUMA 210 Standard Climate Control, PUMA 165 Multicontroller Standard Climate Control, PUMA 180 Multicontroller Standard Climate Control, PUMA 195 Multicontroller Standard Climate Control, PUMA 210 Multicontroller Standard Climate Control

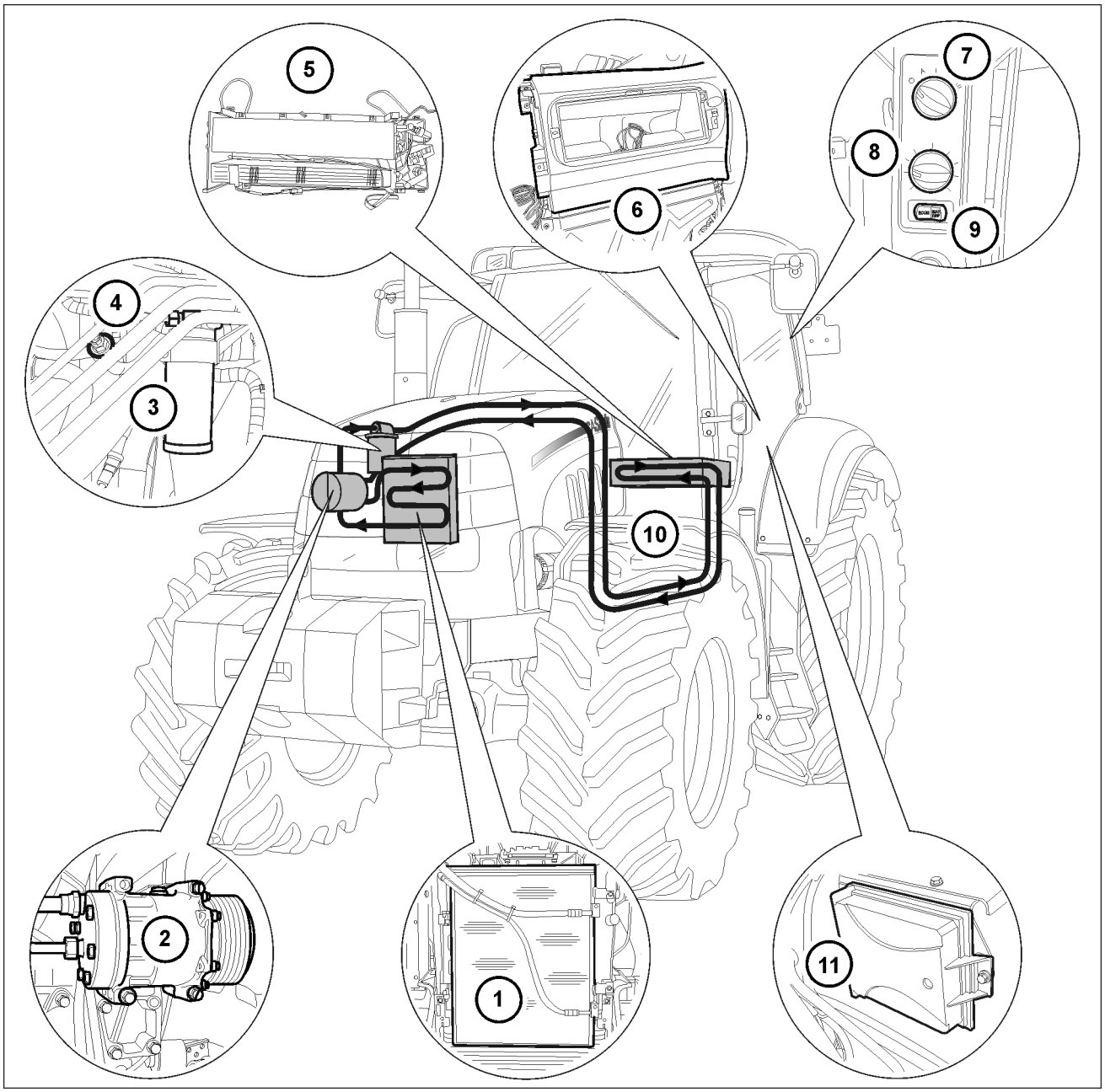


SS08E032 1

1.	Condenser	2.	Compressor
3.	Drier	4.	High pressure- low pressure switch
5.	Heating valve	6.	Evaporator temperature sensor
7.	Low pressure switch	8.	Voltage divider
9.	Blower motor	10.	Blower speed switch
11.	Heating regulator	12.	Air conditioner "ON / OFF" switch
13.	Air conditioner connecting lines		

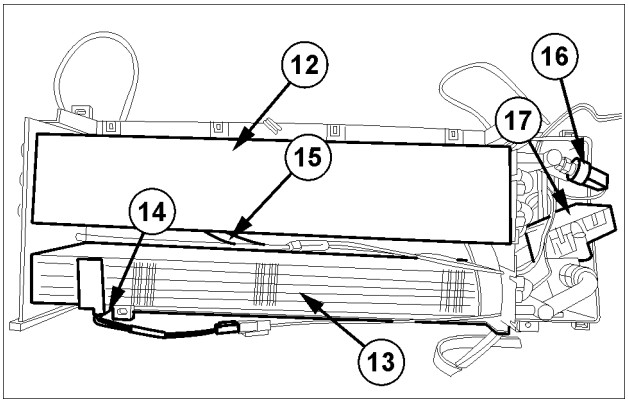
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Overview

PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)



SS08E034 1

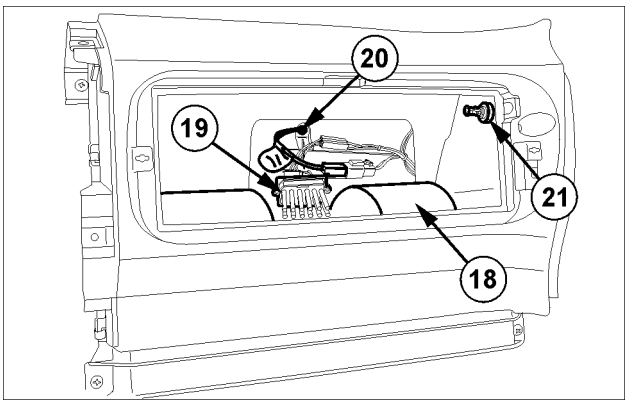
1.	Condenser	2.	Compressor
3.	Drier	4.	High pressure- low pressure switch
5.	Heating and air conditioning unit - see diagram **2**	6.	Blower box - see diagram **3**
7.	Blower speed switch	8.	Temperature control potentiometer
9.	Operating mode switch	10.	Air conditioner connecting lines
11.	Control unit (ATC)		



SS08E043 2

Heating and air conditioning unit

12.	Evaporator	13.	Heating cooler
14.	Outlet temperature sensor	15.	Evaporator temperature sensor
16.	Low pressure switch	17.	Heating valve (ATC)



SS08E044 3

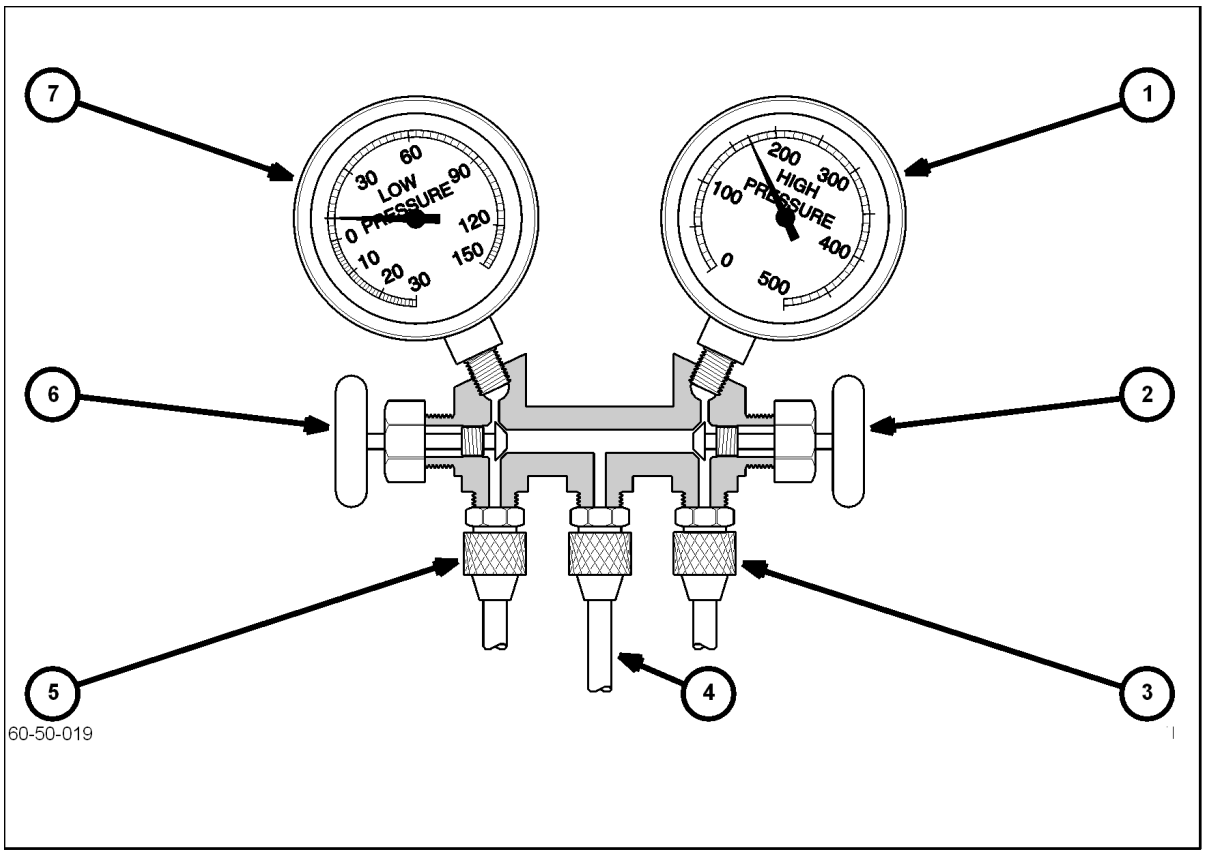
Blower box

18.	Blower motor	19.	Voltage regulator
20.	Outside temperature sensor	21.	Cab temperature sensor

ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description

The following examples show typical low and high pressure gauge readings obtained when performance testing the air conditioning system with an ambient temperature of **35 ° C** (**95 ° F**).
The recommended corrective action is based on a similar fault as identified in the performance test diagnosis charts.

PERFORMANCE TEST EXAMPLE 1



60-50-019 1

Performance Test Example 1

1 High Side Low
2 High Side Hand Valve Closed
3 High Side Hose Connected to High Side Service Connector
4 Not Used
5 Low Side Hose Connected to Low Side Service Connector
6 Low Side Hand Valve Closed
7 Low Side Low

PROBLEM:

Little or no cooling.

CAUSE:

Refrigerant slightly low.

CONDITIONS*

Low side pressure too low. Gauge should read **1 - 2 bar** (**15 - 30 lbf/in2**).
High side pressure too low. Gauge should read **16 - 18 bar** (**194 - 215 lbf/in2**).
Evaporator air not cold.

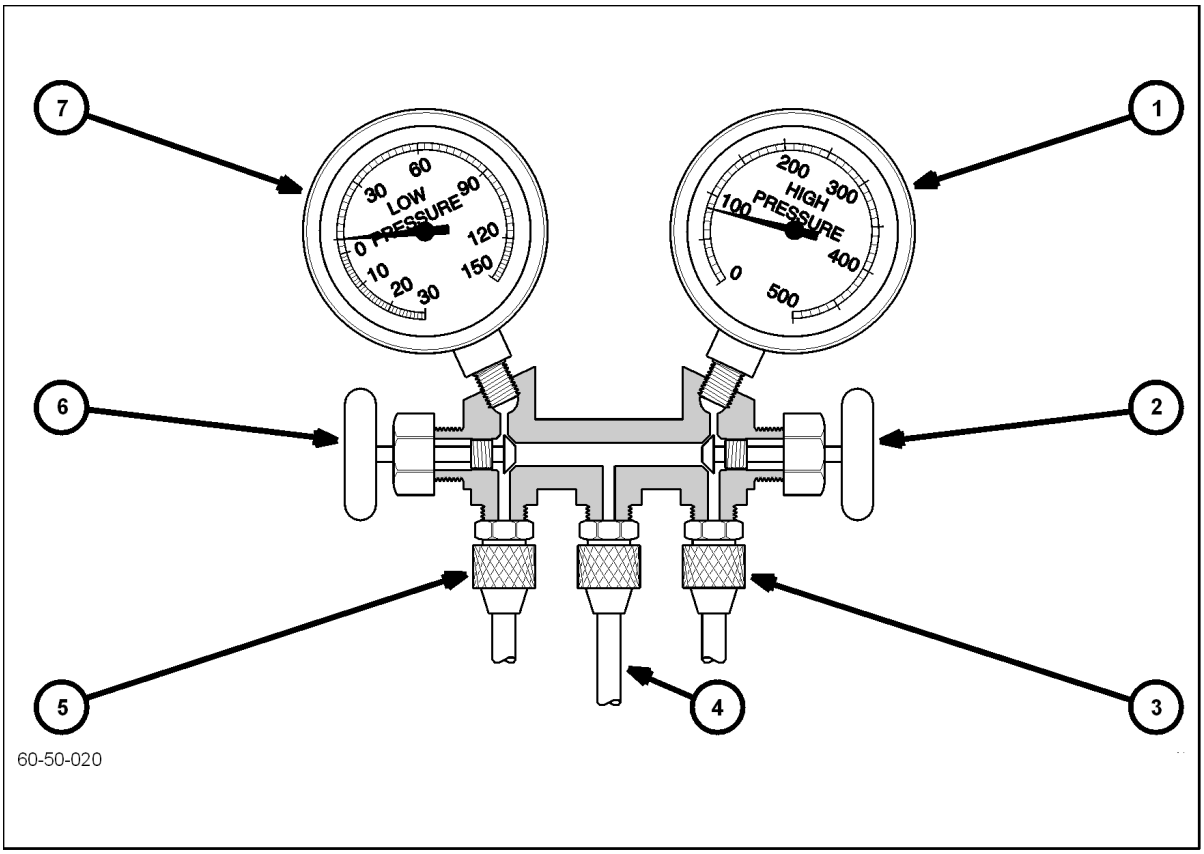
CORRECTIVE PROCEDURES

1. Leak test the system.
2. Repair leaks. (Discharge and recover the refrigerant from the system; replace lines or components).
3. Check compressor oil to ensure no loss.
4. Evacuate the system.
5. Charge the system.
6. Performance test the system.

DIAGNOSIS: System refrigerant is low. May be caused by a small leak

NOTE: *Test procedure based upon ambient temperature of* ***35 °C*** *(* ***95 ° F****). For proper high side gauge reading for other ambient temperatures, refer to the pressure temperature chart* ***ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction (E.40.D)****.*

PERFORMANCE TEST EXAMPLE 2



60-50-020 2

Performance Test Example 2

1 High Side Low
2 High Side Hand Valve Closed
3 High Side Hose Connected to High Side Service Connector
4 Not Used
5 Low Side Hose Connected t Low Side Service Connector
6 Low Side Hand Valve Closed
7 Low Side Low

PROBLEM:

Insufficient cooling.

CAUSE:

Refrigerant excessively low.

CONDITIONS*

Low side pressure very low.
Gauge should read **1 - 2 bar** (**15 - 30 lbf/in2**)
High side pressure too low.
Gauge should read **16 - 18 bar** (**230 - 260 lbf/in2**).
Evaporator air warm.
Low pressure switch cutting out

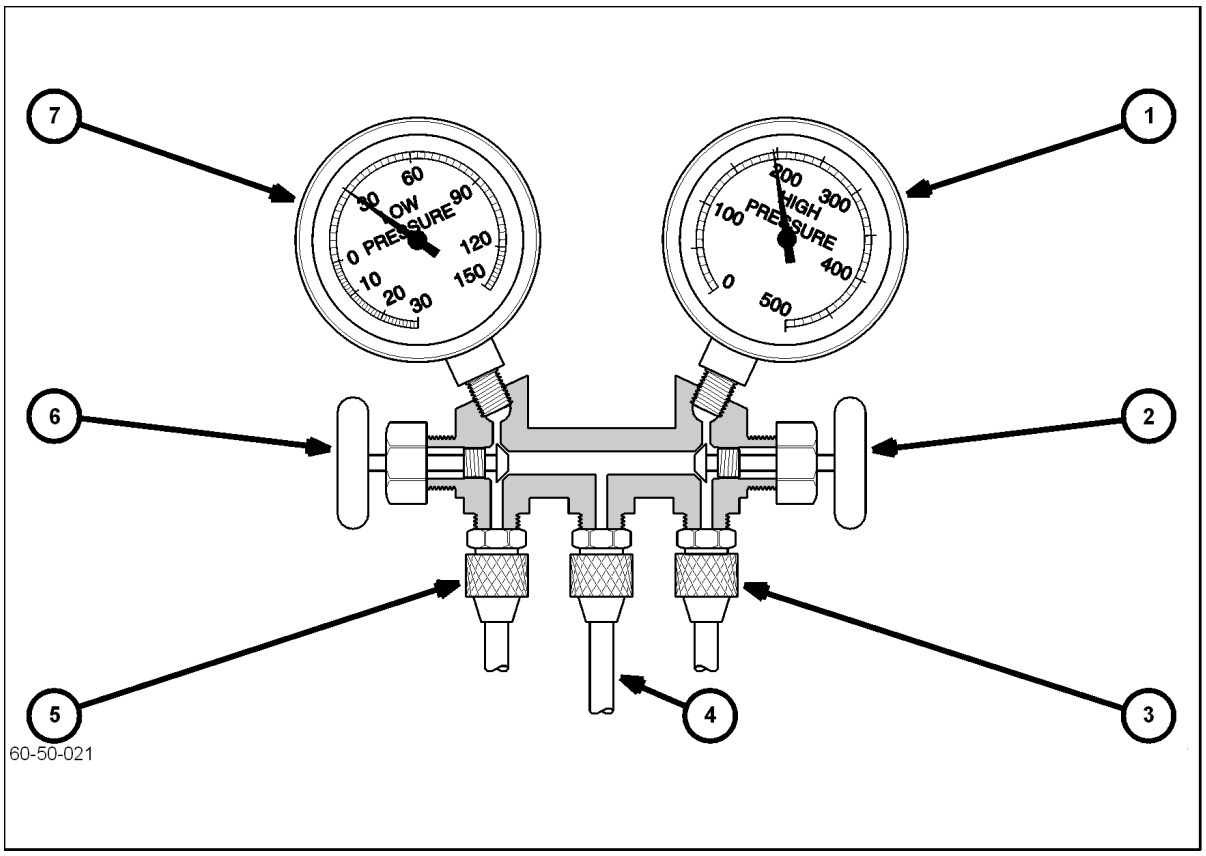
CORRECTIVE PROCEDURES

1. Leak test the system.
2. Discharge and recover the refrigerant from the system.
3. Repair leaks.
4. Check compressor oil to ensure no loss.
5. Evacuate the system.
6. Charge the system.
7. Performance test the system.

DIAGNOSIS: System refrigerant is extremely low. A serious leak is indicated.

NOTE: *Test procedure based upon ambient temperature of* ***95 ° F****. For proper high side gauge reading for other ambient temperatures, refer to the pressure temperature chart* ***ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction (E.40.D)****.*

PERFORMANCE TEST EXAMPLE 3



60-50-021 3

Performance Test Example 3

1 High Side Normal
2 High Side Hand Valve Closed
3 High Side Hose Connected to High Side Service Connector
4 Not Used
5 Low Side Hose Connected to Low Side Service Connector
6 Low Side Hand Valve Closed

7 Low Side Low

PROBLEM:

Insufficient cooling.

CAUSE:

Air in system.

CONDITIONS*

Low side pressure reading does not change when compressor cycles “on" and “off".
High side pressure slightly high or slightly low. Gauge should read **16 - 18 bar** (**230 - 260 lbf/in2**).
Evaporator air not cold.

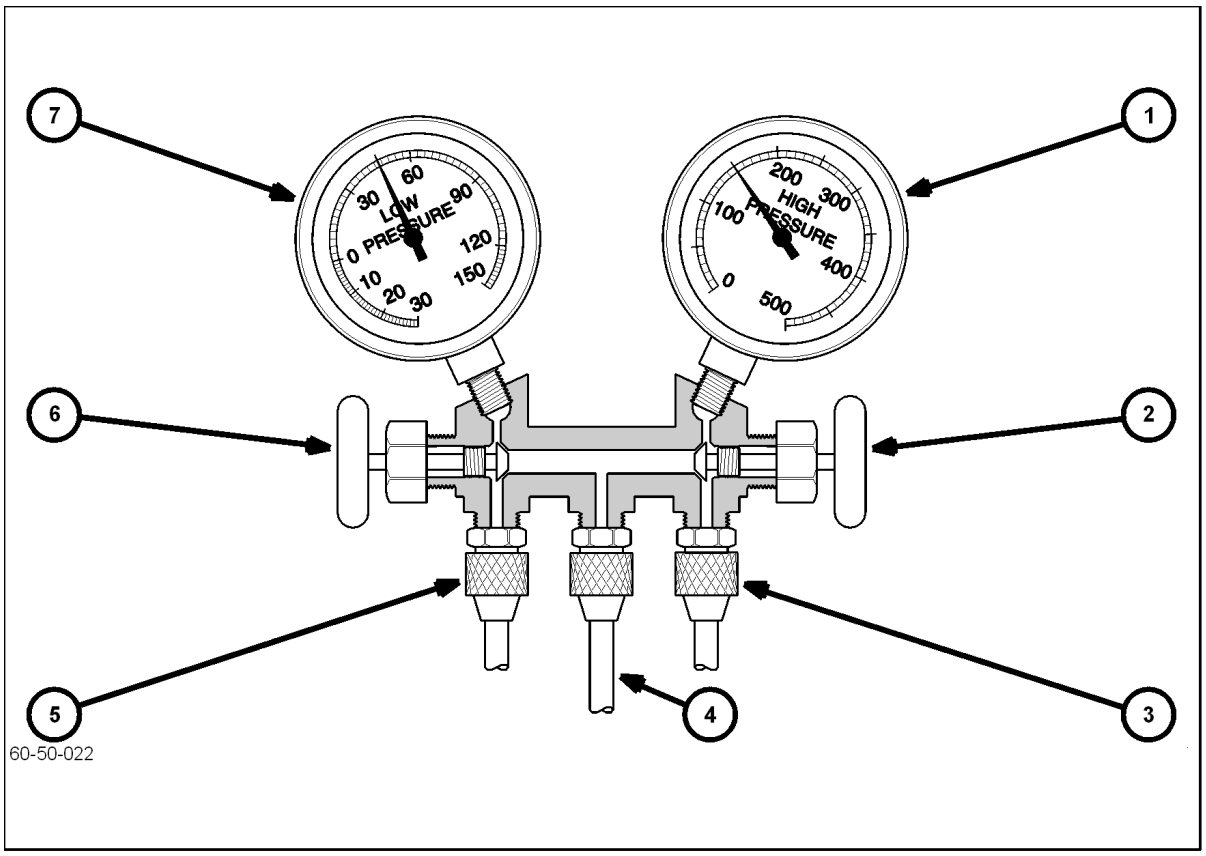
CORRECTIVE PROCEDURES

1. Leak test the system. Give special attention to the compressor seal area.
2. Discharge and recover the refrigerant from the system.
3. Repair leaks.
4. Replace the receiver/dryer.
5. Check compressor oil to ensure no loss.
6. Evacuate the system.
7. Charge the system.
8. Performance test the system.

DIAGNOSIS: Air or moisture in system. System not fully charged.

NOTE: *Test procedure based upon ambient temperature of **35 °C** (**95 ° F**). For proper high side gauge reading for other ambient temperatures, refer to the pressure temperature chart **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction (E.40.D)**.*

PERFORMANCE TEST EXAMPLE 4



60-50-022 4

Performance Test Example 4

1 High Side Low
2 High Side Hand Valve Closed
3 High Side Hose Connected to High Side Service Connector
4 Not Used
5 Low Side Hose Connected to Low Side Service Connector
6 Low Side Hand Valve Closed
7 Low Side High

PROBLEM:

Insufficient cooling.

CAUSE:

Compressor malfunction.

CONDITIONS*

Low side pressure too high. Gauge should read **1 - 2 bar** (**15 - 30 lbf/in2**).
High side pressure too low. Gauge should read **16 - 18 bar** (**230 - 260 lbf/in2**).
Evaporator air not cold.

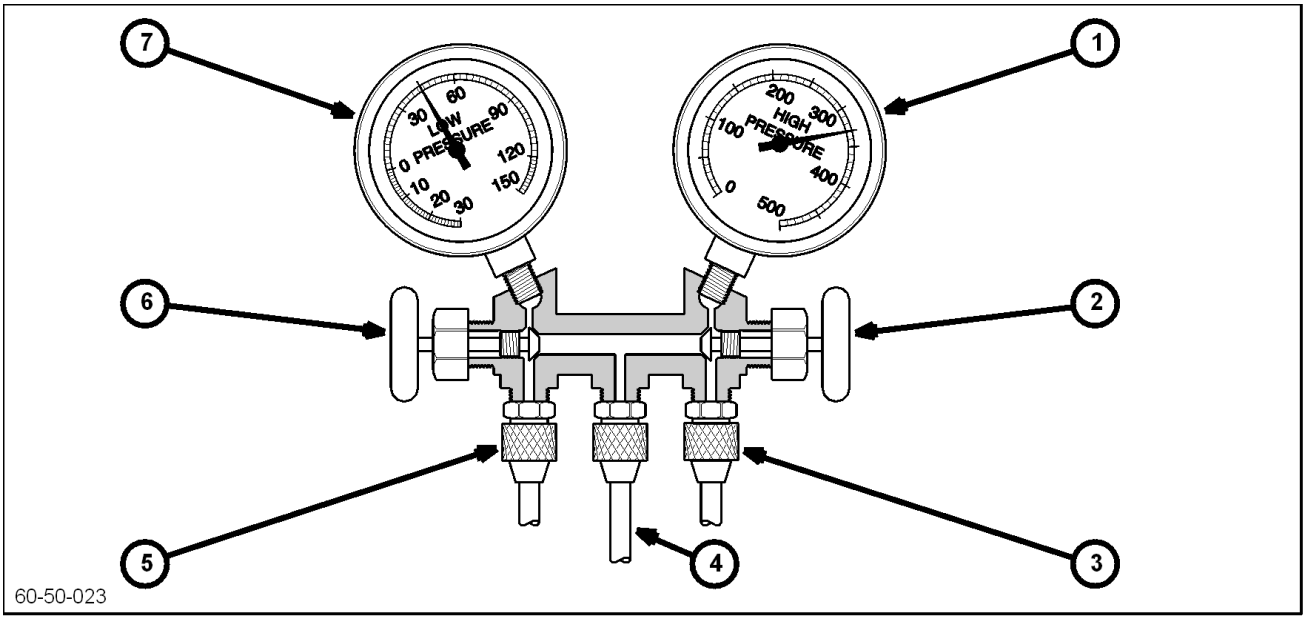
CORRECTIVE PROCEDURES

1. Replace the compressor.

DIAGNOSIS: Internal leak in compressor caused by worn or scored pistons, rings, or cylinders .

NOTE: *Test procedure based upon ambient temperature of* ***35 °C*** *(* ***95 ° F****). For proper high side gauge reading for other ambient temperatures, refer to the pressure temperature chart* ***ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction (E.40.D)****.*

PERFORMANCE TEST EXAMPLE 5



60-50-023 5

Performance Test Example 5

1 High Side High
2 High Side Hand Valve Closed
3 High Side Hose Connected to High Side Service Connector
4 Not Used
5 Low Side Hose Connected to Low Side Service Connector
6 Low Side Hand Valve Closed
7 Low Side High

PROBLEM:

Insufficient or no cooling. Engine overheats in some cases.

CAUSE:

Condenser not functioning properly.

CONDITIONS*

Low side pressure too high. Gauge should read **1 - 2 bar** (**15 - 30 lbf/in2**).
High side pressure too high. Gauge should read **16 - 18 bar** (**230 - 260 lbf/in2**).
Liquid line hot.
Evaporator air warm.
High pressure switch cutting out.

CORRECTIVE PROCEDURES

1. Check belt. Loose or worn drive belts could cause excessive pressures in the compressor head.
2. Look for clogged passages between the condenser fins and coil, or other obstructions that could reduce condenser airflow.
3. If engine is overheating replace engine thermostat and radiator pressure cap.

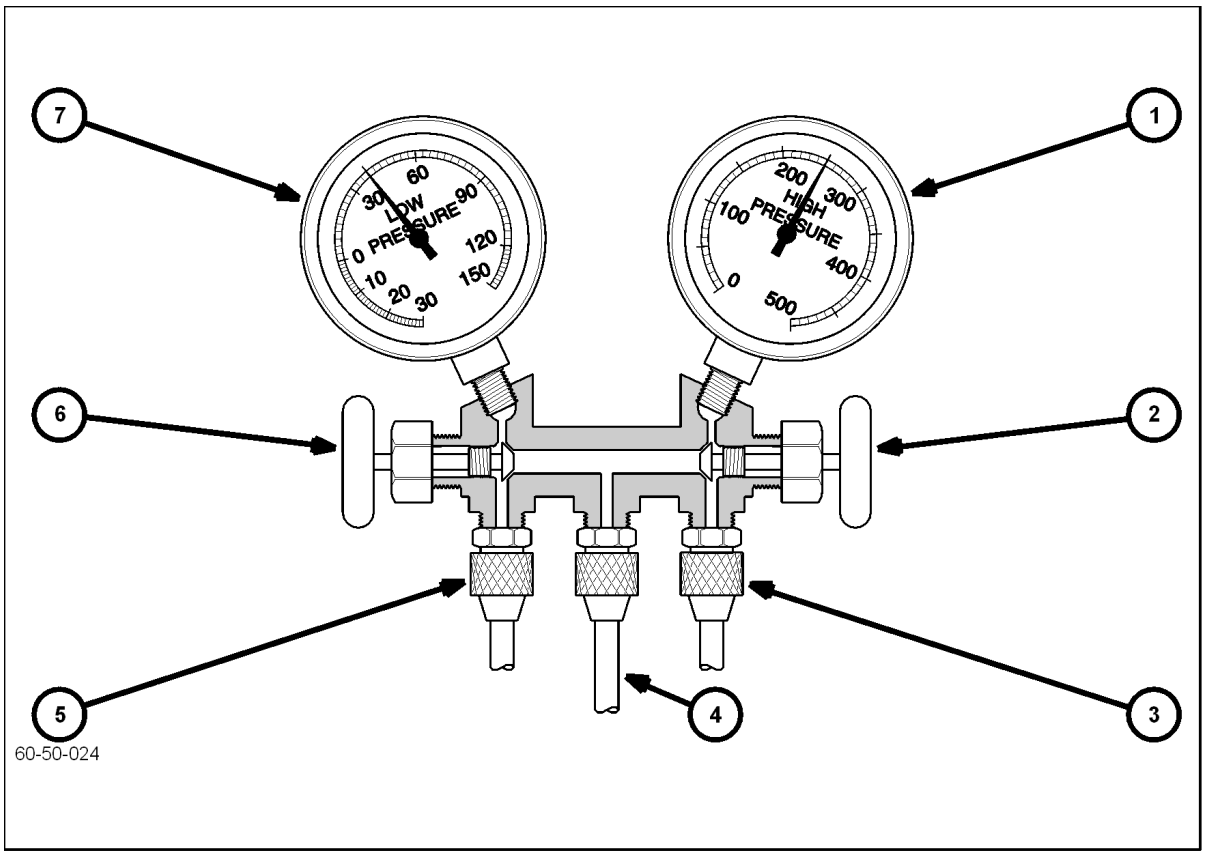
At this point, operate the system and check its performance. If still unsatisfactory, proceed as follows:-

1. Discharge and recover the refrigerant from the system.
2. Remove the condenser and clean and flush it to ensure a free flow of refrigerant. Or, if the condenser appears to be unduly dirty or plugged, replace it.
3. Replace the receiver/dryer.
4. Evacuate the system, and recharge it with the correct quantity of refrigerant.
5. Performance test the system.

DIAGNOSIS: Lack of cooling caused by pressure that is too high on the high side, resulting from improper operation of condenser. (Refrigerant charge may be normal or excessive).

NOTE: *Test procedure based upon ambient temperature of* ***35 °C*** *(* ***95 ° F****). For proper high side gauge reading for other ambient temperatures, refer to the pressure temperature chart* ***ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction (E.40.D)****.*

PERFORMANCE TEST EXAMPLE 6



60-50-024 6

Performance Test Example 6

1 High Side Normal
2 High Side Hand Valve Closed
3 High Side Hose Connected to High Side Service Connector
4 Not Used
5 Low Side Hose Connected to Low Side Service Connector
6 Low Side Hand Valve Closed
7 Low Side Normal

PROBLEM:

Insufficient or no cooling.

CAUSE:

Large amount of air in system.

CONDITIONS*

Low side pressure too high. Gauge should read **1 - 2 bar** (**15 - 30 lbf/in2**).
High side pressure too high. Gauge should read **16 - 18 bar** (**230 - 260 lbf/in2**).
Evaporator air not cool.

CORRECTIVE PROCEDURES

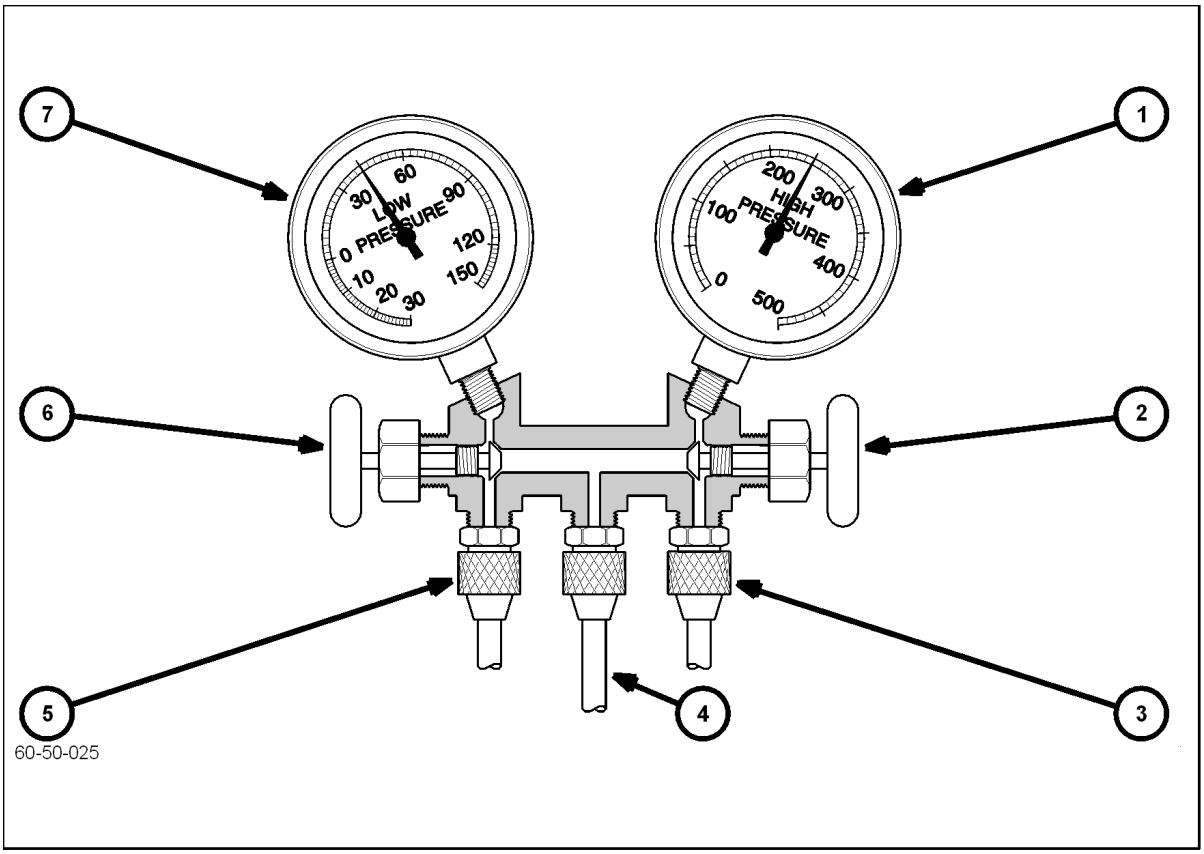
1. Discharge and recover the refrigerant from the system.

2. Replace the receiver/dryer.
3. Evacuate the system.
4. Charge the system.
5. Performance test the system.

DIAGNOSIS: Air in system. This, and the moisture in the air, is contaminating the refrigerant, causing the system to operate improperly.

NOTE: *Test procedure based upon ambient temperature of* ***35 °C*** *(* ***95 ° F****). For proper high side gauge reading for other ambient temperatures, refer to the pressure temperature chart* ***ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction (E.40.D)****.*

PERFORMANCE TEST EXAMPLE 7



60-50-025 7

Performance Test Example 7

1 High Side High	2 High Side Hand Valve Closed
3 High Side Hose Connected to High Side Service Connector	4 Not Used
5 Low Side Hose Connected to Low Side Service Connector	6 Low Side Hand Valve Closed
7 Low Side Hide	

PROBLEM:

Insufficient or no cooling.

CAUSE:

Improper operation of thermostatic expansion valve (stuck open)

CONDITIONS*

Low side pressure too high. gauge should read **1 - 2 bar** (**15 - 30 lbf/in2**).

High side pressure too high. Gauge should read **16 - 18 bar** (**230 - 260 lbf/in2**).
Evaporator air warm.
Evaporator and suction hose (to compressor) surfaces show considerable moisture.

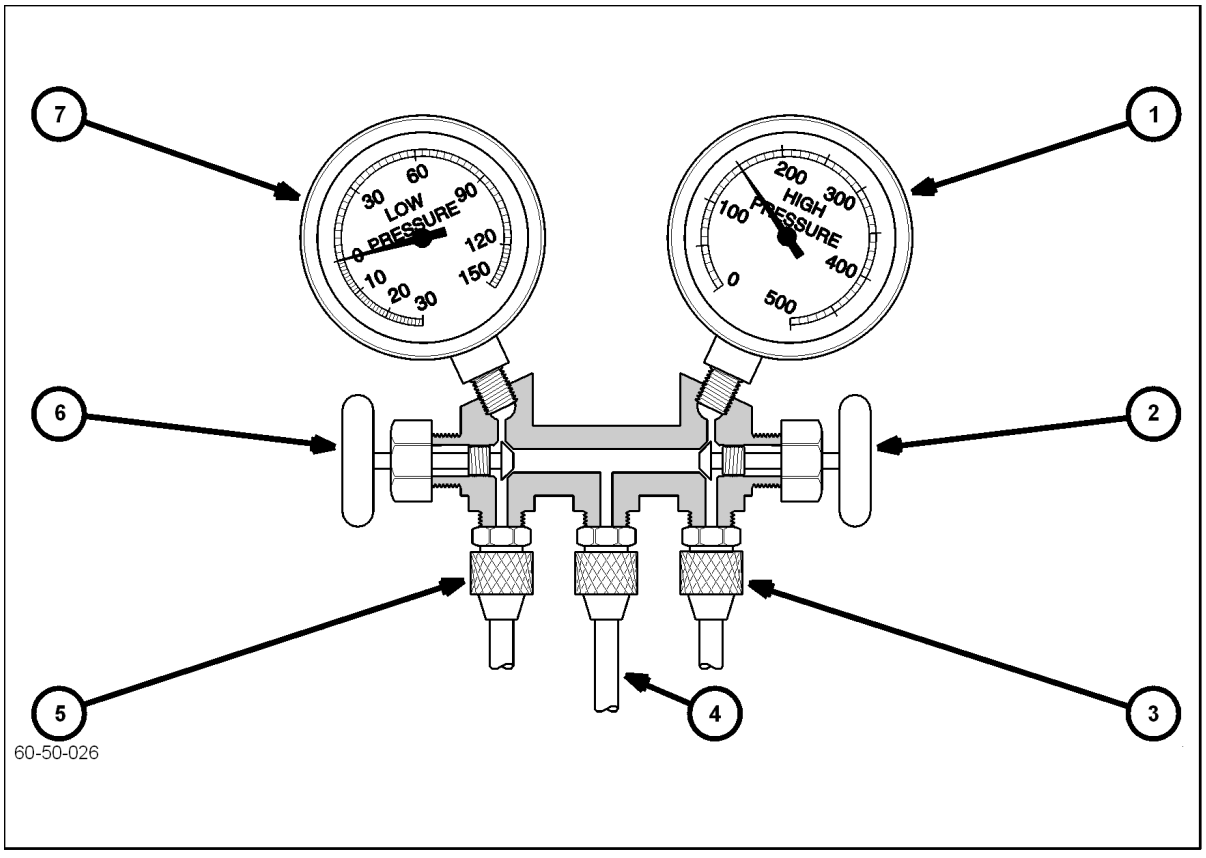
CORRECTIVE PROCEDURES

1. Check for sticking expansion valve as follows:-
   Operate the system at maximum cooling.
   Check the low side gauge. The pressure should drop slowly.
2. If the test indicates that the expansion valve is defective, proceed as follows:
   Discharge and recover the refrigerant from the system.
   Replace the expansion valve.
   Evacuate the system.
   Charge the system.
   Performance test the system.

DIAGNOSIS: Thermostatic expansion valve is allowing too much refrigerant to flow through the evaporator coils. Valve may be stuck open.

NOTE: *Test procedure based upon ambient temperature of* ***35 °C*** *(* ***95 ° F****). For proper high side gauge reading for other ambient temperatures, refer to the pressure temperature chart* ***ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction (E.40.D)****.*

PERFORMANCE TEST EXAMPLE 8



60-50-026 8

Performance Test Example 8

1 High Side Low
2 High Side Hand Valve Closed
3 High Side Hose Connected to High Side Service Connector
4 Not Used
5 Low Side Hose Connected to Low Side Service Connector
6 Low Side Hand Valve Closed
7 Low Side Low

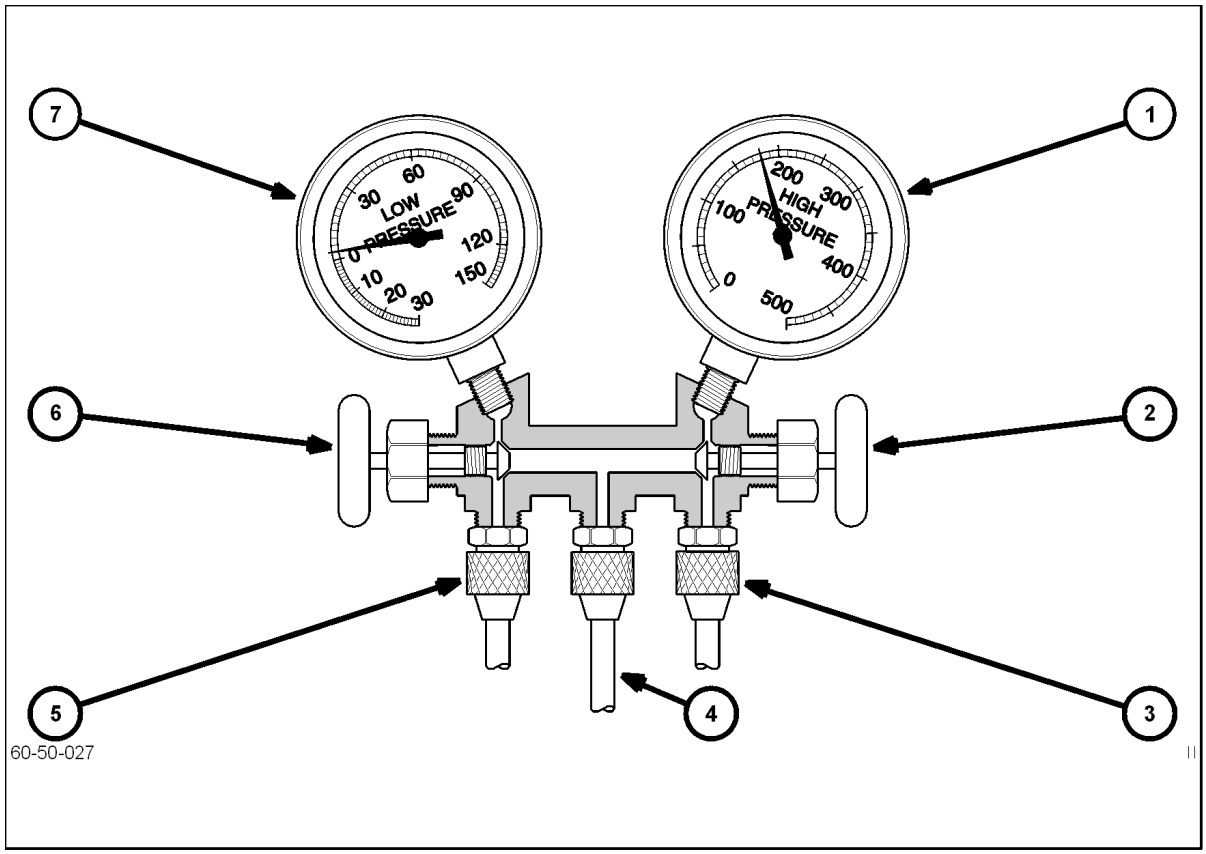
PROBLEM: Insufficient cooling.
CAUSE: Improper operation of thermostatic expansion valve (stuck closed).
CONDITIONS*
Low side pressure too low (zero or vacuum). Gauge should read **1 - 2 bar** (**15 - 30 lbf/in2**).
High side pressure low. Gauge should read **16 - 18 bar** (**230 - 260 lbf/in2**).
Evaporator air cool, but not sufficiently cold.
Evaporator inlet pipe surface shows considerable moisture or frost.
Low pressure switch cutting out.
CORRECTIVE PROCEDURES

1. Place finger on expansion valve to evaporator tube. If too cold to touch, proceed as follows:
   Operate the system at maximum cooling.
   Check the low side gauge. The pressure should drop slowly.
2. If the procedure outlined in Step 1 shows that the expansion valve is defective, proceed as follows:
   Discharge system
   Replace expansion valve
   Evacuate the system.
   Charge the system.
   Performance test the system.

DIAGNOSIS: Expansion valve is not permitting a sufficient flow of refrigerant. May be caused by valve stuck in restricted or closed position.

NOTE: *Test procedure based upon ambient temperature of* ***35 °C*** *(* ***95 ° F****). For proper high side gauge reading for other ambient temperatures, refer to the pressure temperature chart* ***ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction (E.40.D)****.*

PERFORMANCE TEST EXAMPLE 9



60-50-027 9

Performance Test Example 9

1 High Side Low
2 High Side Hand Valve Closed
3 High Side Hose Connected to High Side Service Connector
4 Not Used

5 Low Side Hose Connected to Low Side Service Connector
6 Low Side Hand Valve Closed
7 Low Side Low

PROBLEM:

Insufficient cooling.

CAUSE:

Restriction in high side of system.

CONDITIONS*

Low side pressure too low. Gauge should read **1 - 2 bar** (**15 - 30 lbf/in2**).
High side pressure too low. Gauge should read **16 - 18 bar** (**230 - 260 lbf/in2**).

NOTE: *A normal or high reading of the high side pressure gauge under these conditions indicates the system is overcharged or the condenser or receiver/dryer is too small.*

Evaporator only slightly cool.
Liquid line and receiver/dryer are cool to touch and show frost or considerable moisture.

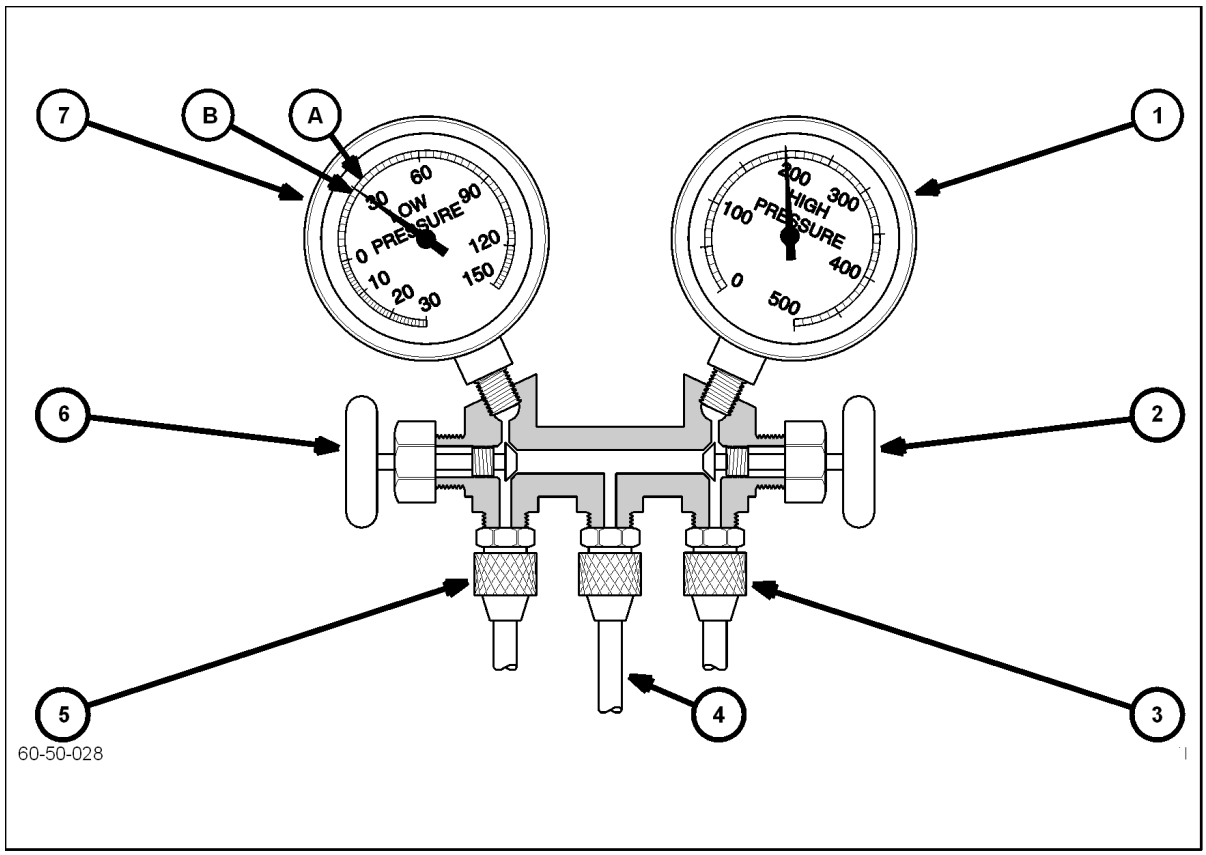
CORRECTIVE PROCEDURES

1. Discharge and recover the refrigerant from the system.
2. Replace the liquid lines, receiver/dryer, or other obstructed components.
3. Evacuate the system.
4. Charge the system.
5. Performance test the system.

DIAGNOSIS: Restriction in the liquid line and/or receiver/dryer resulting in a “starved" evaporator (compressor moving refrigerant from the evaporator faster than it can enter).

NOTE: *Test procedure based upon ambient temperature of **95 ° F**. For proper high side gauge reading for other ambient temperatures, refer to the pressure temperature chart **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction (E.40.D)**.*

PERFORMANCE TEST EXAMPLE 10



60-50-028 10

Performance Test Example 10

1 High Side Normal
2 High Side Hand Valve Closed
3 High Side Hose Connected to High Side Service Connector
4 Not Used
5 Low Side Hose Connected to Low Side Service Connector
6 Low Side Hand Valve Closed
7 Low Side Gauge Compressor Cycles on at **34 lbf/in2** (**2.3 bar**) Compressor Cycles off at **28 lbf/in2** (**1.9 bar**)

PROBLEM:

Compressor cycles (cuts in and out) too rapidly.

CAUSE:

Thermostatic switch defective.

CONDITIONS*

Low side pressure readings too high during both “on" and “off" compressor cycles and between cycles. Readings should be:
0.8 - 1.0 bar (**12 - 15 lbf/in2**) - cycle "off"
2.5 - 2.7 bar (**36 - 39 lbf/in2**) - cycle "on"
1.7 - 1.9 bar (**24 - 27 lbf/in2**) - between cycles
High side pressure normal. Gauge should read **16 - 18 bar** (**230 - 260 lbf/in2**).

CORRECTIVE PROCEDURES

1. Stop the engine and shut off A/C system.
2. Replace thermostatic switch with switch of same type.
3. Make sure the switch’s temperature sensor is installed in the same position and depth (in evaporator core) as previous.

4. Performance test the system.

DIAGNOSIS: Defective thermostatic switch.

NOTE: *Test procedure based upon ambient temperature of* ***35 °C*** *(* ***95 ° F****). For proper high side gauge reading for other ambient temperatures, refer to the pressure temperature chart* ***ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction (E.40.D)****.*

ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description

PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)

The ATC control unit is a control unit with a control cycle that obtains data from various sources and issues commands to other devices. The control parameter of the system is the inner temperature of the cab. The driver selects the desired cab temperature with the help of the temperature control potentiometer. The control unit controls the compressor, the heating valve and the blower speed in order to reach or maintain the desired value.

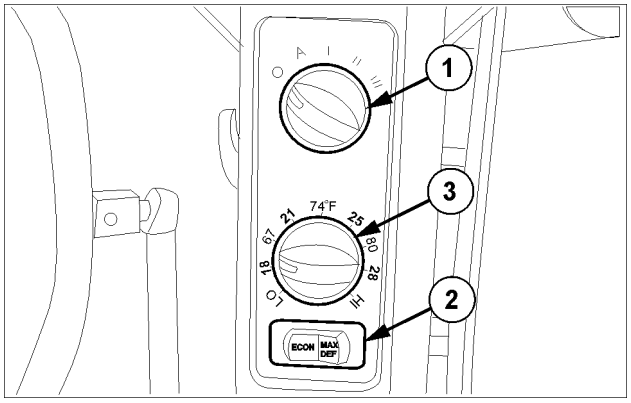
The control unit receives information from the following switches and sensors:

- The modes of operation switch in the positions "ECON", "OFF" and "MAX DEF" supplies information about the desired system operating mode: Economy mode, air conditioner switched off or dehumidify/defrost.
- The cab temperature sensor, which is located in the return line of the air circulation filter, sends the current cab temperature.
- The temperature desired by the driver and that which is set by the temperature control potentiometer is the desired value.
- The outlet temperature sensor in the heating air conditioning unit sends the current cooling or heating temperature.
- The low pressure switch sends information if abnormal system pressures occur on the low pressure side in the evaporator.
- The high pressure/low pressure switch sends information if abnormal system pressures occur on the high pressure side.
- The blower speed switch sends information relevant to the setting selected by the driver. The settings are "OFF" and "A" (automatic) or speed levels I-III. If the driver has left the "A" position, the blower speed determined by the controller is overridden by the driver’s selection.
- The temperature control potentiometer sends the desired temperature (°F/°C) to the control unit.

In order to realize the heating/cooling functions the control unit controls the following output devices:

- The compressor clutch via the clutch relay: The control unit determines whether the compressor is switched on or off in order to attain the desired cooling value in the cab.
- In the case of the heating valve the valve opening is varied in order to attain the desired temperature value in the cab.
- The blower speed is set via the blower speed switch: The conditioned air is delivered from the heating and air conditioning unit at a speed which is proportional to the difference between the existing cab temperature and the desired value.
- The display on the instrument cluster shows information for any error codes that may have occurred.

Control elements



SS08D105 1

Blower speed switch **(1)**	Selecting the blower speed manually overrides the selection made by the control unit.	Position "0": Blower switched off Position "A": Blower speed is automatically controlled by the controller. Position "I": Slow blower speed Position "II": Middle blower speed Position "III": Fast blower speed
Operating mode switch **(2)**	Determines the operating mode.	Position "ECON": Air conditioner is switched off Position "Middle": Air conditioner is switched on Position "MAX DEF": Dehumidifier/defroster mode
Temperature control potentiometer **(3)**	Determines the desired value of the cab temperature.	Position "LO": Maximum cooling power temperature range position 18-28. Desired cab temperature in °C/°F. Position "HI": Maximum heating power

"AUTOMATIC" control mode

The automatic mode is selected by moving the blower speed switch **(1)** to position "A" automatic and the operating mode switch **(2)** to the middle position. Use the temperature control potentiometer **(3)** to set the desired temperature. In this mode the system attempts to maintain the desired temperature value selected by the driver (from **16 °C** (**61 °F**) to **32 °C** (**90 °F**) using the temperature control (ATC) and in order to do this varies the air temperature and the blower speed.

"MANUAL" control mode

The manual mode can be selected by moving the blower speed switch **(1)** to the position "I, II or III" and using the temperature control potentiometer **(3)** to set the desired temperature. The blower speed is varied to reach the set value and then remains constant. In this case the system attempts to attain the desired temperature in the cab simply by changing the air temperature and the blower speed selected by the driver remains unchanged. If you would like to return to the automatic control mode switch the blower speed switch **(1)** to position "A" (automatic).

You can set the maximum cooling power by setting the temperature control potentiometer **(3)** to "LO" (turn all the way to the left). The air conditioner works at maximum cooling power in this mode.

The blower can be switched on in two ways:

- Turn the blower speed switch **(1)** to position “A”. In this operating mode the blower is set to maximum speed.
- The blower speed is set manually to position "I, II or III".

You can set the maximum heating power by setting the temperature control potentiometer **(3)** to "HI" (turn all the way to the right). The heating system works at maximum power in this mode.

The blower can be switched on in two ways:

- Turn the blower speed switch **(1)** to position “A”. In this operating mode the blower is set to maximum speed.
- The blower speed is set manually to position "I, II or III".

"ECONOMY" air conditioner mode.

The economy mode can be selected by moving the operating mode switch **(2)** to the position "ECON" (left position) and moving the blower speed switch **(1)** to position "A". Use the temperature control potentiometer **(3)** to set the desired temperature. If the outside temperature is low the air conditioner does not have to be running in order to maintain a constant cab temperature. In this mode the unit attempts to keep the desired value constant by regulating the heating valve and the blower speed. If the outside air temperature rises above the desired value selected, (cab temperature) the air conditioner must be switched on in order to attain the desired value.

"MAX DEF" mode.

The purpose of the "MAX DEF" mode is to remove moisture that collects on the windows of the cab in the form of fog or ice. Use the operating mode switch **(2)** to select the "MAX DEF" position and move the blower speed switch **(1)** to position "A". In this mode the heating system and the air conditioner are running; the blower runs at maximum speed. The blower speed can also be set manually. If this mode is used to defrost the windows, the temperature control potentiometer **(3)** should be turned to the "HI" position. In this position an air outlet temperature is attained which is as high as possible when the air conditioner is running in order to defrost the windows. If the windows are heavily fogged with moisture it is not necessary to change the set temperature (desired value) using the temperature control potentiometer **(3)**. In order to exit the "MAX DEF" mode and enter another operating mode. Move the operating mode switch **(2)** to the middle position (air conditioner "ON") or to the "ECON" position (air conditioner "OFF")

Summary of automatic operation

<table>
<tr><td colspan="3">The operating mode switch (2) is in the middle position, and the blower speed switch (1) is in position "A" (automatic). No error codes active.</td></tr>
<tr><td>Temperature criteria</td><td colspan="2">The control unit only reacts when there is a difference of 1 °C (2 °F) between the desired value and the temperature recorded by the cab sensor. Then the compressor is switched on and the heating valve is opened. The driver can therefore also adjust the temperature a degree cooler or warmer than originally selected to ensure a pleasant environment in the cab.</td></tr>
<tr><td rowspan="8">Blower speed</td><td>The difference between the cab temperature and the desired value is...</td><td>Then the control unit sets the blower speed to...</td></tr>
<tr><td>≤ 1 °C (2 °F)</td><td>25 %</td></tr>
<tr><td>> 1 °C (2 °F) but ≤ 2 °C (4 °F)</td><td>35 %*</td></tr>
<tr><td>> 2 °C (4 °F) but ≤ 6 °C (3 °F)</td><td>45 %*</td></tr>
<tr><td>> 3 °C (6 °F) but ≤ 4 °C (8 °F)</td><td>55 %*</td></tr>
<tr><td>> 4 °C (8 °F) but ≤ 5 °C (10 °F)</td><td>65 %*</td></tr>
<tr><td>> 5 °C (10 °F) but ≤ 6 °C (12 °F)</td><td>75 %*</td></tr>
<tr><td>> 6 °C (12 °F)</td><td>100 %*</td></tr>
<tr><td>Switching the compressor clutch on and off.</td><td colspan="2">The compressor clutch is activated or deactivated by the control unit in order to attain or maintain the desired temperature value in the cab.</td></tr>
<tr><td>Heating valve</td><td colspan="2">The heating valve is opened or closed by the control unit in order to attain or maintain the desired temperature value in the cab.</td></tr>
<tr><td>Manual regulation of blower speed position "I, II or III"</td><td colspan="2">• Blower level remains at the level selected by the driver.
• The temperature continues to be regulated automatically but the control unit cannot change the selected blower speed in order to attain the desired temperature value.
• You can restore the fully automatic mode by moving the blower speed switch (1) to position "A" (automatic).</td></tr>
<tr><td>Maximum cooling is selected "LO"</td><td colspan="2">• Blower speed 100 %
• The clutch is only deactivated when the frost setting 0 °C (32 °F) on the evaporator temperature sensor is attained. It is reactivated when the recorded temperature increases to 3 °C (37 °F).
• If the temperature regulator is taken out of the maximum range for "LO", the system returns to automatic regulation of the compressor and the blower.</td></tr>
<tr><td>Maximum heating is selected "HI"</td><td colspan="2">• Blower speed 100 %
• The heating valve is completely open.
• If the temperature control potentiometer is adjusted from the maximum range for "HI", the system returns to automatic regulation of the heating valve and the blower speed.</td></tr>
<tr><td>Exception</td><td colspan="2">* When the heating function is selected the blower retains the speed level 25 % until the temperature recorded at the evaporator exceeds 12,8 °C (55 °F).</td></tr>
</table>

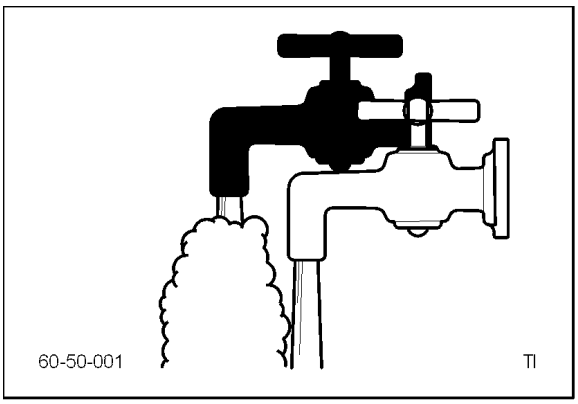
Summary of "MAX DEF" dehumidifier/defroster operation

<table>
<tr><td colspan="3">The operating mode switch (2) is in the position "MAX DEF", and the blower speed switch (1) is in position "A" (automatic). No error codes active.</td></tr>
<tr><td>Temperature criteria</td><td colspan="2">The control unit only reacts when there is a difference of 1 °C (2 °F) between the desired value and the temperature recorded by the cab temperature sensor. Then the compressor is switched on and the heating valve is opened. The driver can therefore also adjust the temperature a degree cooler or warmer than originally selected to ensure a pleasant environment in the cab.</td></tr>
<tr><td rowspan="8">Blower speed</td><td>The difference between the cab temperature and the desired value is...</td><td>Then the control unit sets the blower speed to...</td></tr>
<tr><td>≤ 1 °C (2 °F)</td><td>25 %</td></tr>
<tr><td>> 1 °C (2 °F) but ≤ 2 °C (4 °F)</td><td>35 %</td></tr>
<tr><td>> 2 °C (4 °F) but ≤ 6 °C (3 °F)</td><td>45 %</td></tr>
<tr><td>> 3 °C (6 °F) but ≤ 4 °C (8 °F)</td><td>55 %</td></tr>
<tr><td>> 4 °C (8 °F) but ≤ 5 °C (10 °F)</td><td>65 %</td></tr>
<tr><td>> 5 °C (10 °F) but ≤ 6 °C (12 °F)</td><td>75 %</td></tr>
<tr><td>> 6 °C (12 °F)</td><td>100 %</td></tr>
<tr><td>Switching the compressor clutch on and off.</td><td colspan="2">** The compressor is permanently on to eliminate moisture from the cab. The clutch is only deactivated when the frost setting 0 °C (32 °F) on the evaporator temperature sensor is attained. It is reactivated when the recorded temperature increases to 3 °C (37 °F).</td></tr>
<tr><td>Heating valve</td><td colspan="2">The heating valve is opened or closed by the control unit in order to attain or maintain the desired temperature value in the cab.</td></tr>
<tr><td>Manual regulation of blower speed position "I, II or III"</td><td colspan="2">• Blower level remains at the level selected by the driver.
• The temperature continues to be regulated automatically but the control unit cannot change the selected blower speed in order to attain the desired temperature value.
• You can restore the standard air conditioning operation mode by shifting the operating mode switch (2) to the middle position.</td></tr>
<tr><td>Maximum cooling is selected "LO"</td><td colspan="2">Using the system in this manner makes little sense as the compressor runs continuously. The temperature control potentiometer should be in the heating range to attain good dehumidifying or defrosting performance in the cab.</td></tr>
<tr><td>Maximum heating is selected "HI"</td><td colspan="2">• Blower speed 100 %
• The heating valve is completely open.
• If the temperature control potentiometer is adjusted from the maximum range for "HI", the system returns to automatic regulation of the heating valve and the blower speed.</td></tr>
<tr><td>Exception</td><td colspan="2">** On very cold days the compressor does switch on until the temperature at the evaporator temperature sensor exceeds 0 °C (32 °F).</td></tr>
</table>

ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Static description

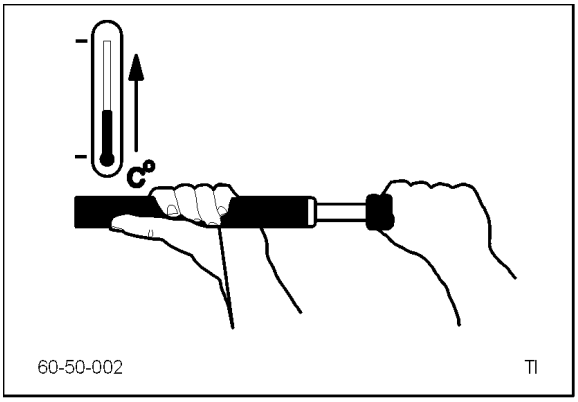
The function of the air conditioning system is to improve the operator's comfort by cooling the air temperature inside the cab and reducing the humidity level.
This temperature control is achieved by absorbing the heat within the cab into a refrigerant and then allowing the heat absorbed by the refrigerant to be transferred to the outside air
In order to achieve this heat transfer the following principals of heat generation and transfer are applied within the air conditioning system.

1. When two bodies of different temperature come together heat is transferred from one to another. On air conditioning systems an evaporator is used to hold the low temperature refrigerant which absorbs the heat from the air within the cab.



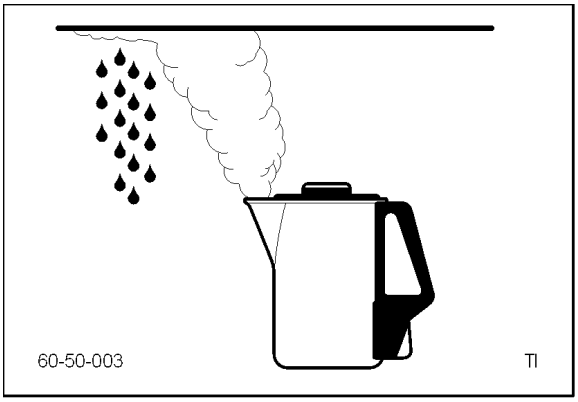
60-50-001 1

2. When a gas is pressurised the temperature of the gas will rise. In air conditioning systems the increase in pressure is achieved using a compressor.



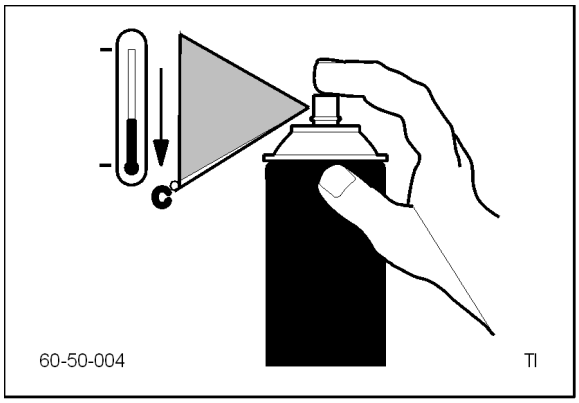
60-50-002 2

3. When a gas is cooled it will condense into a liquid. In the air conditioning system a condenser is used to cool the gas and the resulting liquid is stored in a receiver dryer.



60-50-003 3

4. When a liquid is atomized through an orifice, the temperature of the resultant vapour will drop. The low temperature of the atomized liquid will then absorb heat from its surroundings. On air conditioning systems the refrigerant is atomized using an expansion valve.

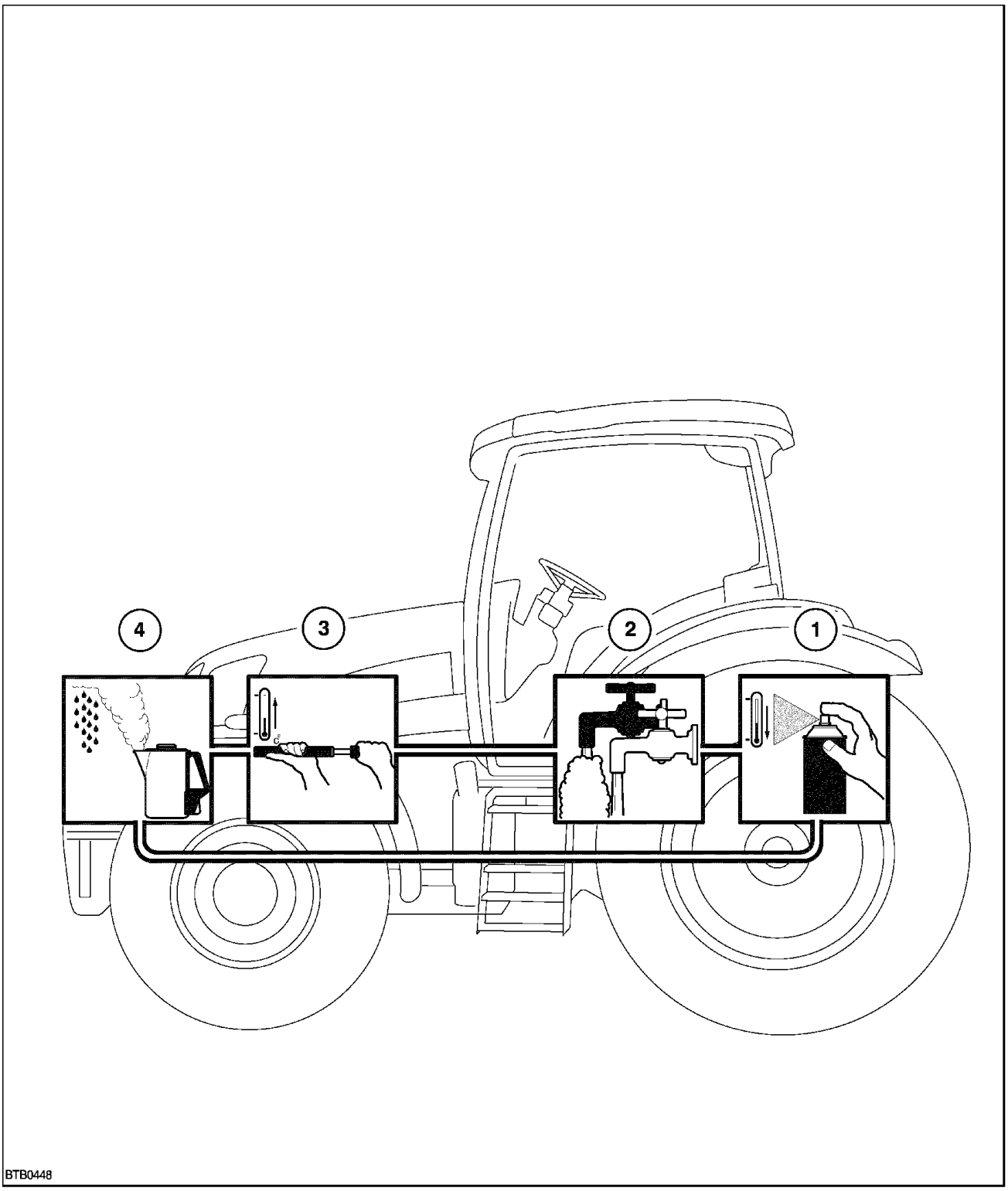


60-50-004 4

It can now be seen that the principal components of an air conditioning system are:-

- Refrigerant
- Evaporator
- Compressor
- Condenser
- Receiver Dryer
- Expansion Valve

Figure **5**, uses the examples above to illustrate the air conditioning cycle.



BTB0448 5

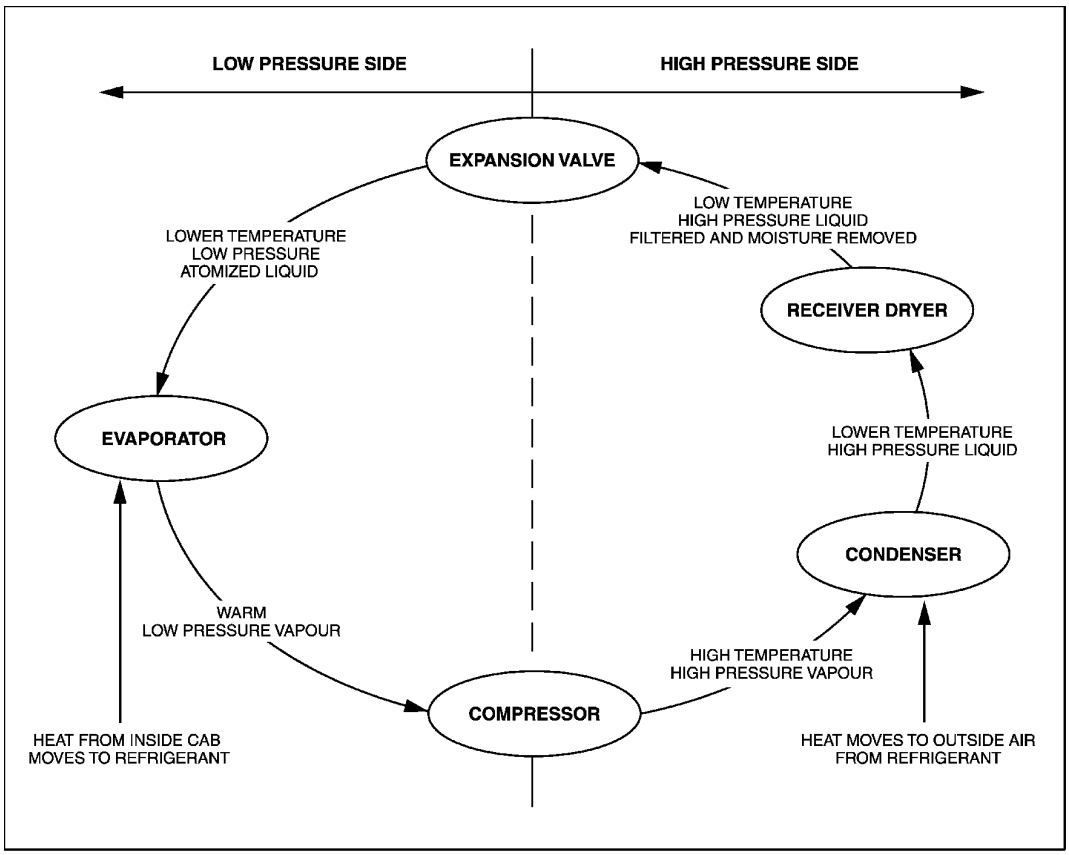
Air Conditioning Principal of Operation

1 Expansion Valve - Atomizes Liquid Refrigerant Before Passing to Evaporator

2 Evaporator- Absorbs Heat From Air In Cab

3 Compressor - Compresses and Raises Temperature Of Refrigerant Gas

4 Condenser, Evaporator and Dryer - Converts Refrigerant from Gas to a Liquid



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Air Conditioning Flow Diagram

Figure **6**, shows in schematic form the flow of refrigerant through the five major components of an air conditioning system. Refer to, Figure **6**, for the location of these components on the tractor.
Refrigerant is drawn into the compressor as a cool, low pressure vapor which is compressed and then pumped out as a hot, high pressure vapor to the condenser.
As the hot, high pressure vapor passes through the condenser core it gives off heat to the cooler outside air, being drawn past the fins by the engine cooling fan.
By giving off heat to the outside air, the vapor is condensed to a liquid which moves under high pressure to the receiver dryer where it is stored until released to the evaporator by the temperature sensing expansion valve.
As liquid refrigerant passes through the metered orifice in the expansion valve the refrigerant changes from a high pressure liquid to a low pressure atomized liquid with a lower temperature.
This low pressure, low temperature, atomized liquid enters the evaporator coils and absorbs heat from the cab warm air blown across the coils and fins by the cab blower motor. The refrigerant now changes from a cold low pressure atomized liquid to a warm low pressure vapor and leaves the evaporator outlet, moving to the suction (low pressure) side of the compressor to repeat the cycle.
As this heat loss is taking place, moisture (humidity) in the cab air will condense on the outside of the evaporator and drain off as water through the drain hoses attached to the evaporator drain pan, thereby reducing the humidity level of the cab.

Refrigerant

To achieve the absorption and the release of heat which is, in essence, the function of an air conditioning system, requires the use of a suitable “refrigerant" - a liquid that has a relatively low temperature boiling point, plus certain desirable safety and stability features.
The refrigerant used in the air conditioning system is refrigerant R-134a.

NOTE: *To help protect the environment legislation has been introduced in most territories banning the release into the atmosphere of refrigerants, including R134a. All service procedures contained in this manual can be carried out without the need to release refrigerant into the atmosphere.*

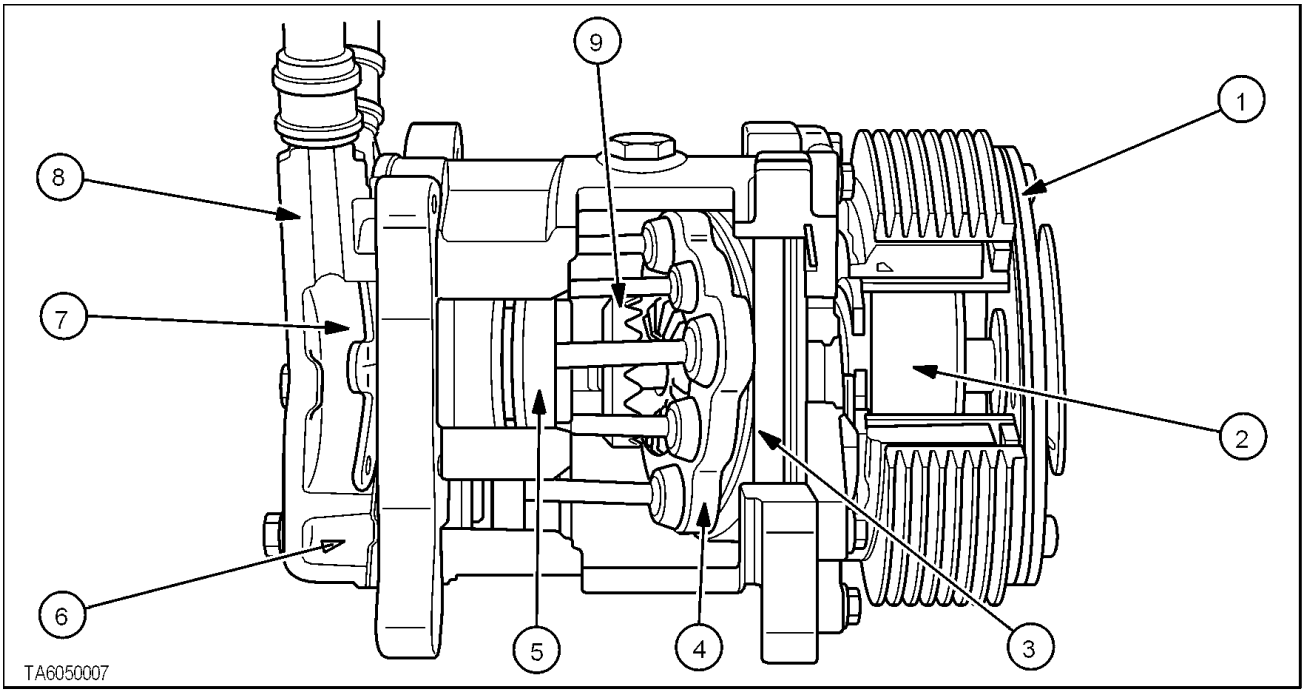
In order to prevent the incorrect type of refrigerant being charged to the system the service valves fitted to the tractor and necessary to connect up refrigerant recovery, evacuation and recycling/recharging equipment will be of two different sizes as recognised and specified by the air conditioning industry.

⚠ WARNING ⚠

R-134a refrigerant is not compatible with R-12 refrigerant. Do not attempt to replace R134a refrigerant with R-12 refrigerant or test the system using gauges or equipment previously used with R12 as damage to the system will result.

B031

R-134a refrigerant is stable at all operating temperatures and able to absorb great quantities of heat.
The boiling point of R-134a is - **22 ° C** (- **15 ° F**) at atmospheric pressure.
If the pressure is increased, R-134a will readily vaporize to absorb heat at temperatures between - **11.7 ° C** (**11 ° F**) at **1.9 bar** (**27.5 lbf/in2**) and **0 °C** (**32 ° F**) at **42 lbf/in2** (**2.9 bar**) in the evaporator.
At higher pressures, R-134a will condense and give off heat at temperatures between **48 ° C** (**118 ° F**) at **12.4 bar** (**180 lbf/in2**) and **58 ° C** (**136 ° F**) at **15.85 bar** (**230 lbf/in2**) in the condenser.



TA6050007 7

Air Conditioning Refrigerant Compressor

1. Electro-magnetic Clutch
2. Clutch Bearing
3. Cam Rotor
4. Wobble Plate
5. Piston
6. Suction Chamber
7. Discharge Chamber
8. Cylinder Head
9. Static Gear

Compressor

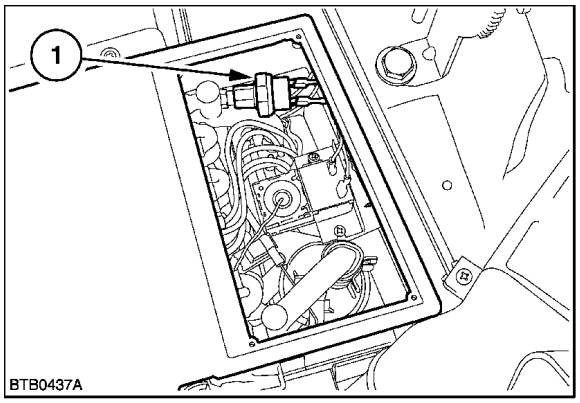
The tractor air conditioning unit compressor is mounted on the right hand side of the engine and is belt driven by the crankshaft pulley.

The compressor separates the low and high pressure sides of the system and is basically a pump which has two functions:
(1) To raise the refrigerant temperature by compression to a higher degree of temperature than the ambient (outside air) temperature.
(2) To circulate the required volume of refrigerant through the system.
The refrigerant compressor is a seven cylinder wobble plate unit housed in a die cast aluminium housing.
Drive to the wobble plate is from the pulley, through the electro magnetic clutch to the main driveshaft. Attached to the driveshaft is a cam rotor which oscillates the wobble plate. The wobble plate is prevented from rotating by a static gear engaging with teeth formed in the face of the plate. The seven pistons are connected to the wobble plate by rods located in ball sockets.
Refrigerant is drawn in on the downward stroke of a piston through the reed valves located either end of the cylinder assembly. Refrigerant enters the cylinder assembly through a gallery in the outer circumference of the cylinder assembly.
The upwards stroke of the piston compresses the refrigerant and expels it through another reed valve into an inner gallery in the cylinder assembly and out into the refrigerant circuit.
The compressor is lubricated with a Polyalklene Glycol (PAG) oil. This oil is totally miscible with the refrigerant and is carried around the refrigerant circuit.
The compressor is activated by an electro-magnetic clutch which functions to engage or disengage the compressor as required in the operation of the air conditioning system.
The clutch is primarily activated by the:-

- Temperature cycling control switch
- Combined high/low pressure cut-out switch
- Low pressure cut-out switch

Low Pressure Cut-out Switch

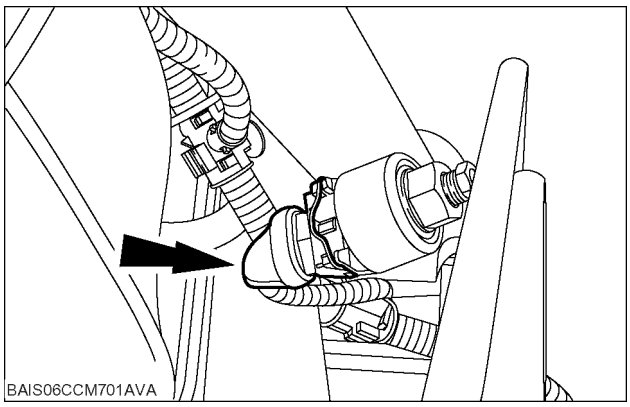
The low pressure switch **(1)** Figure **8** is in the evaporator outlet line and is located under a lid in the evaporator housing under the rear floor.
The purpose of the switch is to shut off the compressor pump in the event of low pressure in the refrigerant system. Low refrigerant pressure may occur due to a faulty expansion valve, icing up of the expansion valve orifice or refrigerant loss. Low refrigerant pressure may result in damage to the compressor pump.
The low pressure switch is factory set and cannot be adjusted.



BTB0437A_509 8

Combined High/Low Pressure Cut-out Switch

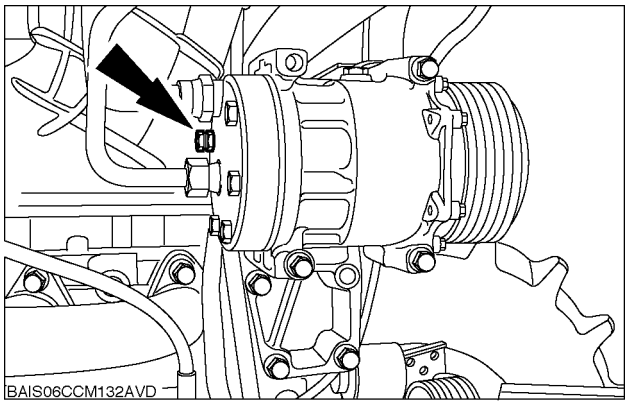
The combined high/low pressure switch, **(1)** is located in the condenser inlet line from the compressor. The switch shuts off the compressor pump in the event of a restriction in the high pressure line or excessively low pressure due to lack of refrigerant in the system.
Loss of refrigerant in the system will result in insufficient cooling and lubrication and continuous operation will cause damage to the compressor pump.



BAIS06CCM701AVA 9

System Pressure Relief Valve

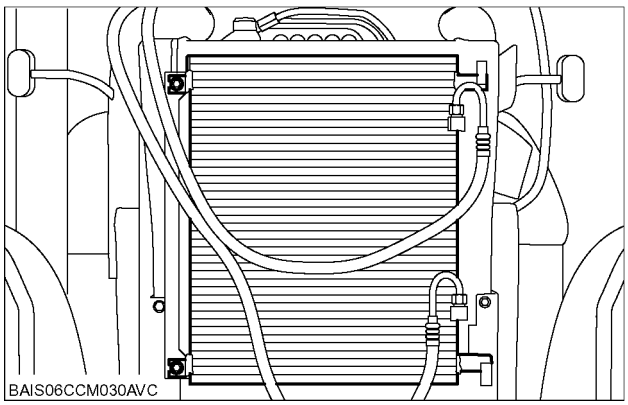
A relief valve is located at the discharge port on the compressor, **(1)** Figure **10**. This allows the system refrigerant to be discharged into the engine bay (atmosphere) instead of in the cab, if the system pressure became such that a hose might fail in the cab and cause injury to the operator. This secondary safety feature will only operate in extreme conditions, for example, if the high pressure cut out switch were to fail, or in the event of an engine fire.



BAIS06CCM132AVD 10

Condenser And Receiver Dryer

The condenser, located at the front of the tractor, Figure **11**, consists of a number of turns of continuous coil mounted in a series of thin cooling fins to provide a maximum of heat transfer in a minimum amount of space.
The condenser receives the hot, high pressure refrigerant vapour from the compressor. The hot vapour passes through the condenser coils and outside air is pulled through the condenser by the engine cooling fan.



BAIS06CCM030AVC 11

Heat moves from the hot refrigerant vapour into the cooler outside air flowing across the condenser coils and fins.
When the refrigerant vapour reaches the pressure and temperature that will induce a change of state, a large quantity of heat is transferred to the outside air and the refrigerant changes to a high pressure warm liquid.
The warm liquid refrigerant continues onto the receiver/drier where it is filtered and desiccated, to remove any moisture, before passing through an outlet line to the thermostatic expansion valve.

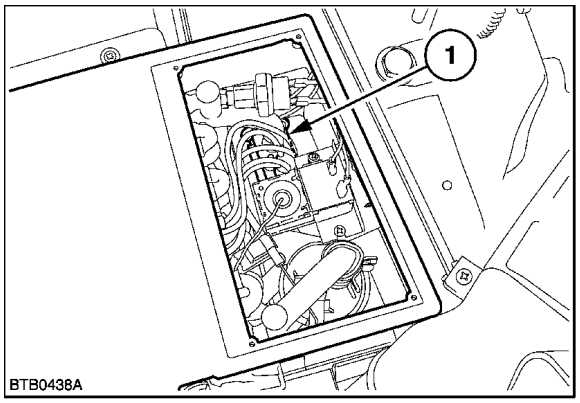
The receiver/dryer stores the liquid refrigerant to be sure a steady flow to the thermostatic expansion valve is maintained under widely different operating conditions.
The drier section contains a desiccant (Molecular sieve) to absorb any moisture within the system and a filter prevents the entry of foreign particles.

NOTE: *Any moisture in the air conditioning system is extremely harmful. Moisture not absorbed by the dehydrator will circulate with the refrigerant and droplets may collect and freeze in the thermostatic expansion valve orifice. This action will block the refrigerant flow and stop the cooling action. Moisture will also react with refrigerant R-134a and the lubricant to form a corrosive acid.*

The desiccant can only absorb a limited amount of moisture before reaching saturation point. Because of this, after any system component replacement or repairs requiring entry into the system, the receiver/dryer should be replaced.

Expansion Valve

The expansion valve **(1)** Figure **12**, is located next to the evaporator, in the pressure line leading from the receiver/dryer and performs the following functions:



BTB0438A 12

1 METERING ACTION - A metered orifice changes the liquid refrigerant from a high pressure low temperature liquid to a low pressure, lower temperature atomized liquid.

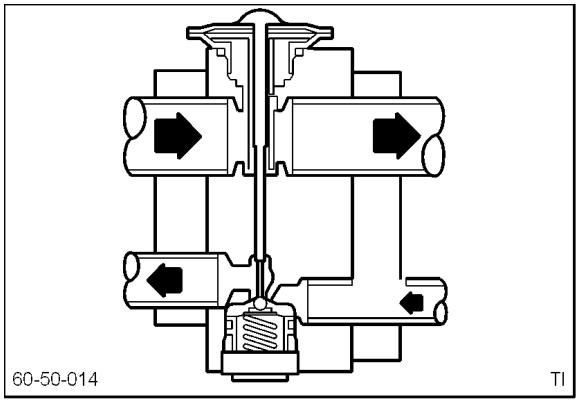
2 MODULATING ACTION - A thermostatically controlled valve within the expansion valve body controls the volume of liquid refrigerant passing through the orifice and makes sure the refrigerant is fully vaporized within the evaporator. Liquid refrigerant would damage the compressor reed valves or freeze the pistons.

3 CONTROLLING ACTION - The valve responds to changes in the cooling requirements. When increased cooling is required, the valve opens to increase the refrigerant flow and when less cooling is required the valve closes and decreases the refrigerant flow.

Expansion Valve - Operation

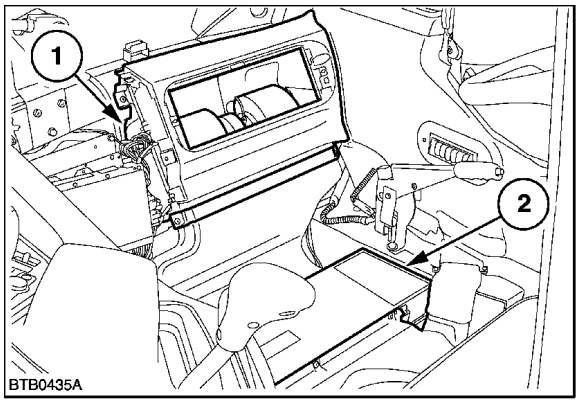
All of the needed temperature sensing and pressure sensing functions are consolidated into this basic unit and no external tubes are required for these purposes.
The refrigerant from the condenser and receiver dryer enters the thermostatic expansion valve as a high pressure warm liquid. Upon passing through the ball and spring controlled metering orifice, the pressure and temperature of the refrigerant is reduced and the refrigerant leaves the thermostatic expansion valve as a low pressure, lower temperature atomized liquid.
The atomized liquid now passes through the evaporator where it absorbs heat before returning via the expansion valve to the compressor as a warm Low pressure vapour.
There are two refrigerant passages in the valve. One passage is in the refrigerant line from the condenser to the evaporator and contains the ball and spring type orifice valve. The other passage is in the refrigerant line from the evaporator to the compressor and contains the valve's temperature sensing element.
Liquid refrigerant flow from the condenser and receiver dryer is controlled by a push-rod forcing the orifice valve ball off its seat and the spring exerting pressure on the ball to keep it on its seat.
During stabilized (vehicle shutdown) conditions, the pressure on the bottom of the expansion valve diaphragm rises above the pressure on the top of the diaphragm allowing the valve spring to close the orifice.

When the system is started, the pressure on the bottom of the diaphragm drops rapidly, allowing the orifice to open and meter atomized liquid refrigerant to the evaporator where it begins to vaporize.
Suction from the compressor draws the vaporized refrigerant out of the evaporator and back through a gallery in the top of the valve which passes the temperature sensor.



60-50-014 13

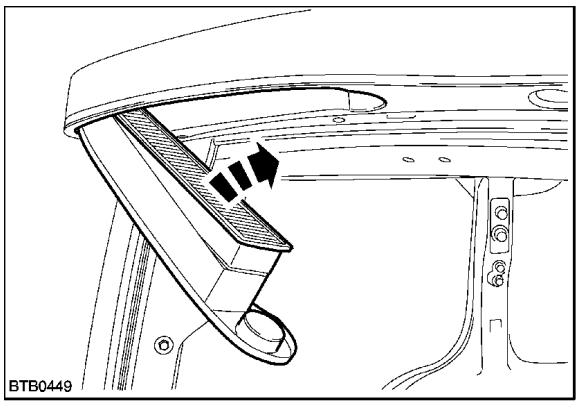
The temperature sensor reacts to variations in refrigerant gas pressure returning from the evaporator. When heat from the passenger compartment is absorbed by the refrigerant the pressure of the gas increases causing a differential pressure above and below the temperature sensor diaphragm. The diaphragm reacts to this pressure differential and a push rod forces the ball in the expansion valve orifice further off its seat. This reaction allows an increase in the atomized refrigerant to flow through the valve, to the evaporator, so that more heat can be absorbed by the air conditioning system.
Similarly when the temperature of the gas returning from the evaporator decreases the pressure of the gas decreases. This causes the diaphragm to react accordingly and allow the ball in the orifice to move closer towards its seat thus reducing the flow of refrigerant through the valve to the evaporator.



BTB0435A 14

Evaporator

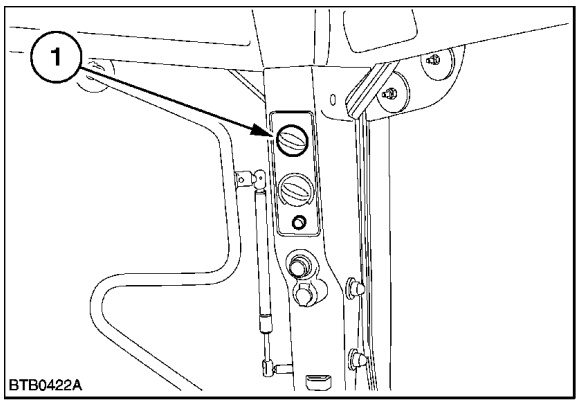
The evaporator, **(2)** Figure **14**, is located under the rear seat floor and consists of a number of turns of continuous coils mounted in a series of thin cooling fins to provide a maximum of heat transfer in a minimum amount of space.
Low temperature refrigerant in the evaporator absorbs heat from the hotter air in the operator’s compartment, thereby cooling the air.



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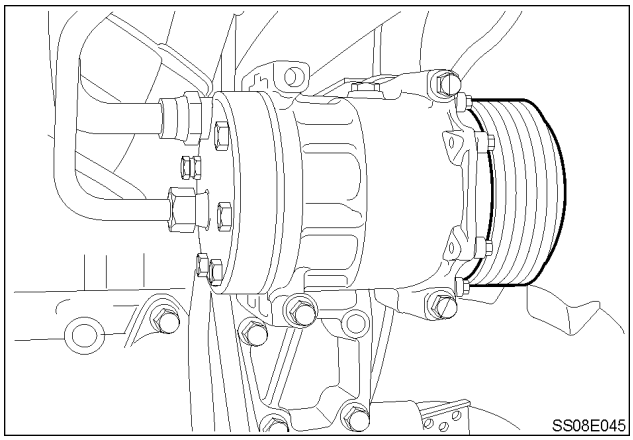
Blower Fan

The blower fan, **(1)** Figure **14**, draws warm air from outside the cab through the intake filters, Figure **15** and forces it across the evaporator before entering the cab through louvered vents.
The blower motor is controlled by a four-speed switch **(1)**, Figure **16**. The switch uses a variable resistor to change the fan speed.
The coldest air will be obtained at the slowest fan speed but the greatest cooling capacity is obtained at the highest fan speed.

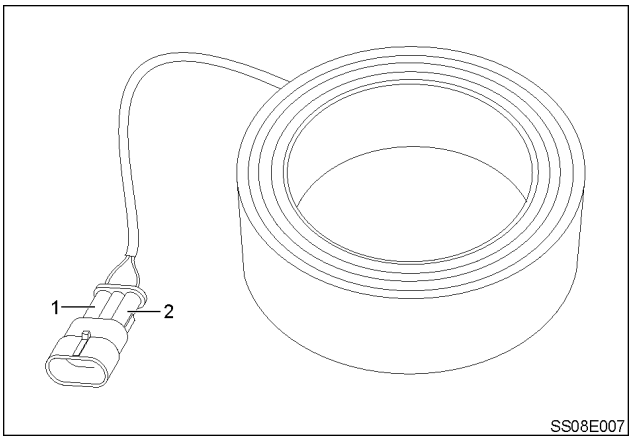


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Compressor Magnetic clutch - Overview



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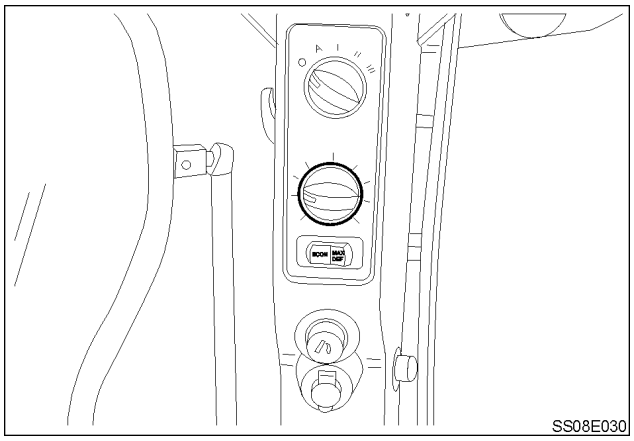


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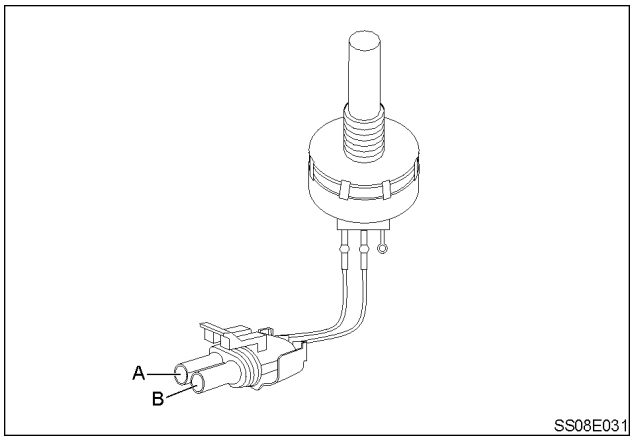
Nominal voltage	**12 V**
Intake voltage min.	**7,5 V**
Power consumption	**3,6 - 4,2 A**
Power	**43 W**
Resistance	**2,9 - 3,6 Ω**
Coupling gap	**0.4 - 0.8 mm** (**0.016 - 0.031 in**)

Electrical control Temperature control potentiometer - Overview

PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)



SS08E030 1

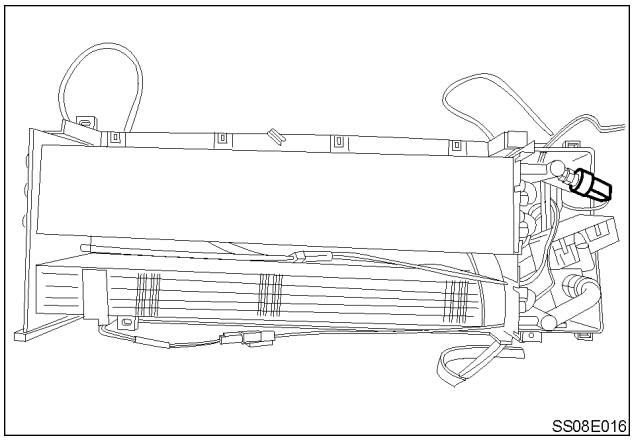


SS08E031 2

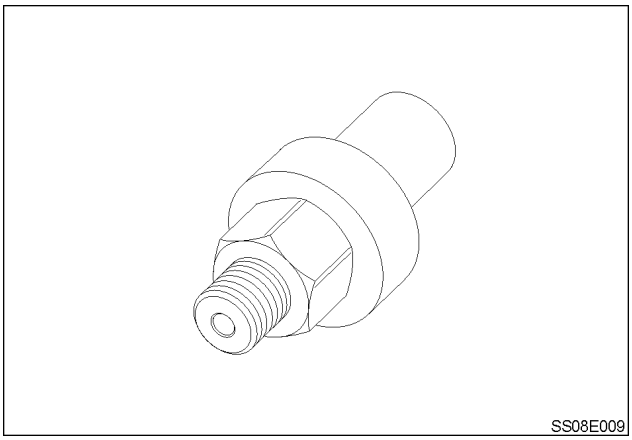
Position: On the left C-pillar

Characteristic curve	linear
resistance	**0 - 10 k Ω ± 10 %**

Sensing system Low pressure switch - Overview



SS08E016 1

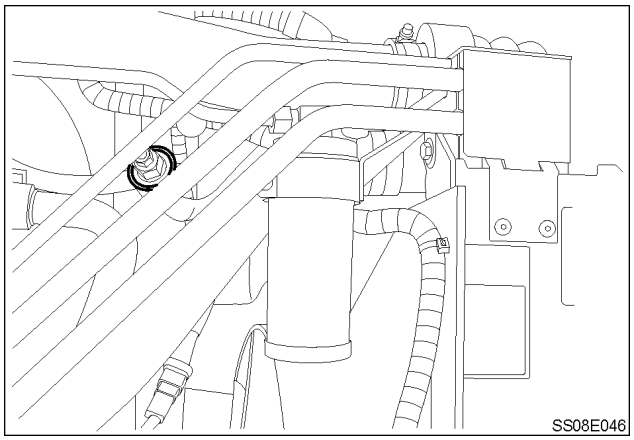


SS08E009 2

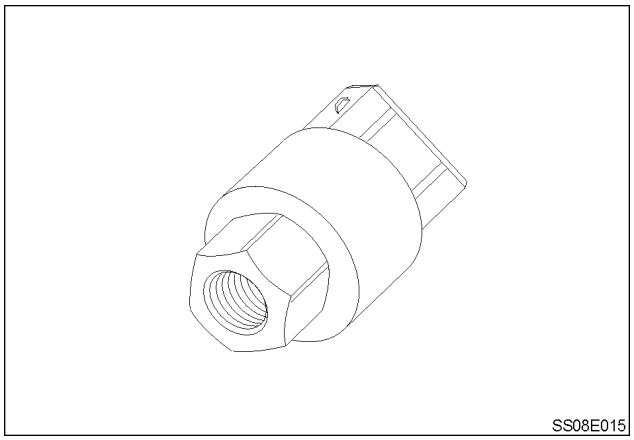
Position: Under the driver's seat in the heating air conditioning unit

Contact	Make contact
On (switch closed)	**1.5 bar** (**21.8 psi**)
Off (switch open)	**0.4 bar** (**5.8 psi**)
Current max.	**5 A**
Temperature range	**-30 - (+120) °C** (**-22 - (+248) °F**)
Tightening torque	**5 - 7 Nm** (**44.25 - 61.96 lb in**)

Sensing system - Overview (High pressure- low pressure switch)



SS08E046 1



SS08E015 2

Position: On the right side of the engine

High pressure switch

Contact (PIN 1-2)	Break contact
On (switch closed)	**20 ±2 bar** (**290 lbf/in2**)
Off (switch open)	**28 ±2 bar** (**406 lbf/in2**)
Current max.	**5 A**

Low pressure switch

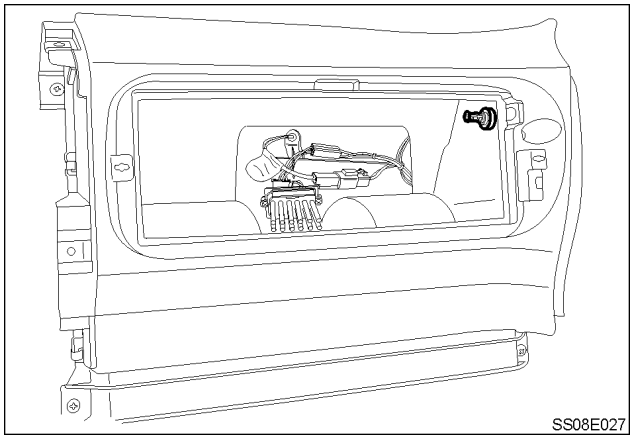
Contact (PIN 1-2)	Make contact
On (switch closed)	**2.6 ±0.1 bar** (**37 ±1.5 lbf/in2**)
Off (switch open)	**1.8 ±0.5 bar** (**26 ±7 lbf/in2**)
Current max.	**5 A**

Medium pressure switch

Contact (PIN 3-4)	Make contact
On (switch closed)	**18 ±1 bar** (**261 lbf/in2**)
Off (switch open)	**15 ±1 bar** (**217 lbf/in2**)
Current max.	**1 A**

Sensing system Temperature sensor - Overview (Cab temperature)

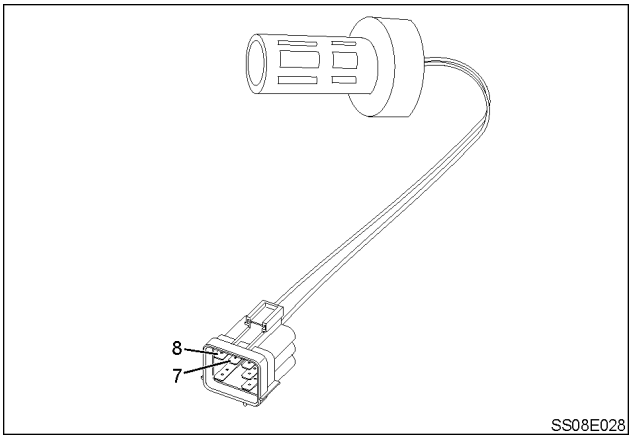
PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)



SS08E027 1

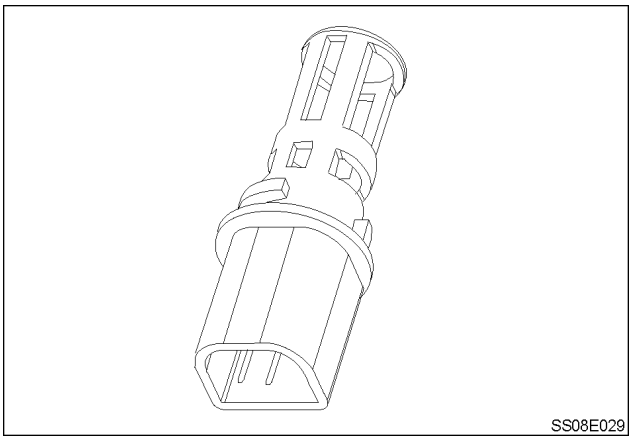
Position: Behind the driver's seat in blower box

valid → .....



SS08E028 2

valid ..... →



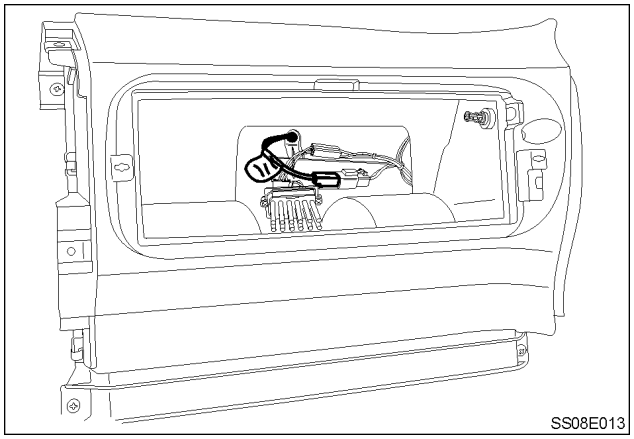
SS08E029 3

System type	NTC

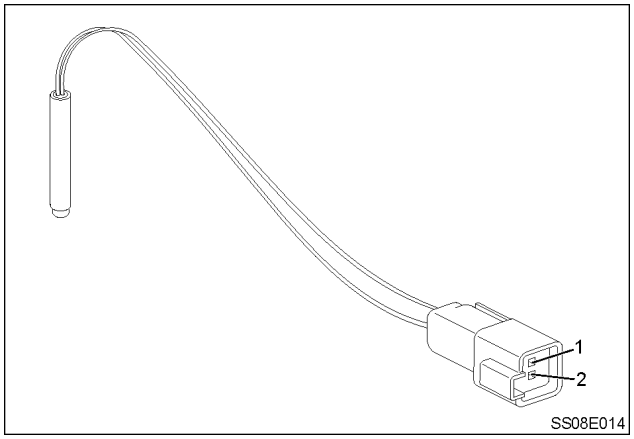
Temperature	Resistance
-10 °C (**14.0 °F**)	**16120 Ω**
0 °C (**32.0 °F**)	**9399 Ω**
10 °C (**50.0 °F**)	**5658 Ω**
15 °C (**59.0 °F**)	**4441 Ω**
20 °C (**68.0 °F**)	**3511 Ω**
25 °C (**77.0 °F**)	**2795 Ω**
30 °C (**86.0 °F**)	**2240 Ω**
40 °C (**104.0 °F**)	**1465 Ω**

Sensing system Temperature sensor - Overview (Outside temperature)

PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)



SS08E013 1



SS08E014 2

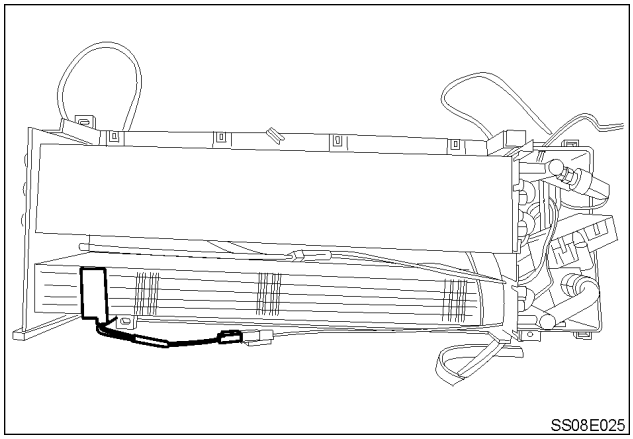
Position: Behind the driver's seat in blower box

System type	NTC

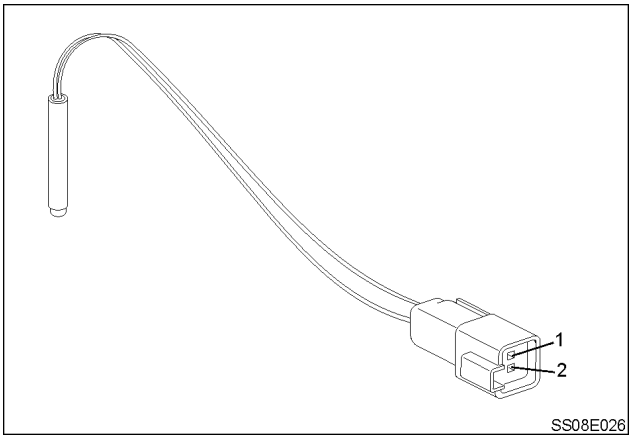
Temperature	Resistance
-10 °C (14.0 °F)	**22120 Ω**
0 °C (32.0 °F)	**13061 Ω**
10 °C (50.0 °F)	**7962 Ω**
15 °C (59.0 °F)	**6286 Ω**
20 °C (68.0 °F)	**4997 Ω**
25 °C (77.0 °F)	**4000 Ω**
30 °C (86.0 °F)	**3222 Ω**
40 °C (104.0 °F)	**2130 Ω**

Sensing system Temperature sensor - Overview (Outlet temperature)

PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)



SS08E025 1



SS08E026 2

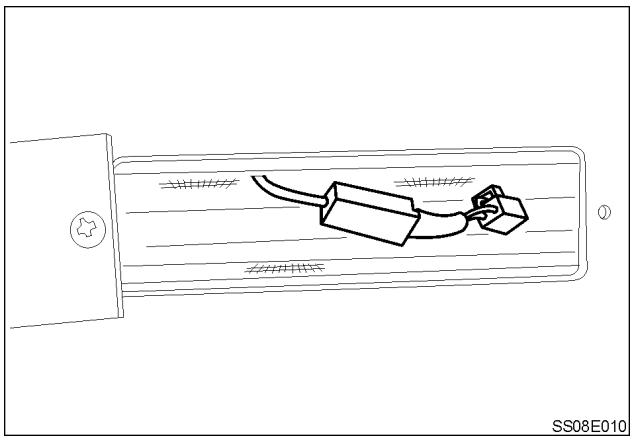
Position: Under the driver's seat in the heating and air conditioning unit

System type	NTC

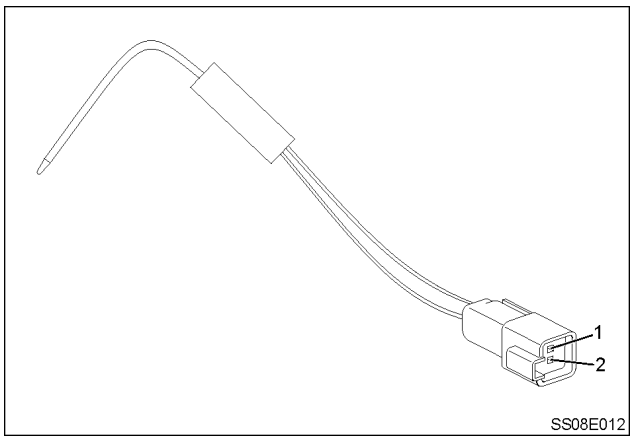
Temperature	Resistance
-10 °C (**14.0 °F**)	**22120 Ω**
0 °C (**32.0 °F**)	**13061 Ω**
10 °C (**50.0 °F**)	**7962 Ω**
15 °C (**59.0 °F**)	**6286 Ω**
20 °C (**68.0 °F**)	**4997 Ω**
25 °C (**77.0 °F**)	**4000 Ω**
30 °C (**86.0 °F**)	**3222 Ω**
40 °C (**104.0 °F**)	**2130 Ω**

Sensing system Evaporator temperature sensor - Overview

PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)



SS08E010 1



SS08E012 2

Position: Under the driver's seat in the heating air conditioning unit

System type	NTC

Temperature	Resistance
0 °C (**32.0 °F**)	**66000 Ω**
4.44 °C (**40.0 °F**)	**52625 Ω**
10 °C (**50.0 °F**)	**40011 Ω**
15.56 °C (**60.0 °F**)	**30713 Ω**
21.11 °C (**70.0 °F**)	**23791 Ω**
25 °C (**77.0 °F**)	**20000 Ω**
30.56 °C (**87.0 °F**)	**15736 Ω**
36.11 °C (**97.0 °F**)	**12475 Ω**

ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction

⚠ **WARNING** ⚠

Before overhauling an air conditioning system read and observe the following Safety PrecautionsIf a repair or replacement becomes necessary, ensure that only certified Air Conditioning technicians are employed, using approved equipment to effect repairs. Do not attempt to disassemble the air conditioning system, It is possible to be severely frostbitten or injured by escaping refrigerant.

B042

IMPORTANT: *Do not allow refrigerant to escape into the atmosphere.*

1. Refrigerant must be handled with care in order to AVOID HAZARDS.
   Undue direct contact with liquid refrigerant can produce freezing of skin and eyes.
   Keep the refrigerant container and air conditioning system away from flame or heat sources, the resulting pressure increase can cause the container or system to explode.
   If in direct contact with open flames or heated metal surfaces, the refrigerant will decompose and produce products that are toxic and acidic.
   Make sure to comply with the following indications and simple precautions to avoid any risk of injury:
   Never discharge refrigerant into the atmosphere.
   When servicing air conditioning units a certified refrigerant recovery unit operated by a certified technician must be used.
2. When discharging the refrigerant in the system make sure you are operating in well-ventilated premises with good air circulation and far away from open flames.
3. When charging and discharging the system always wear goggles and take suitable precautions to protect the face in general and the eyes in particular, from accidental spillage of the refrigerant fluid.
4. The oil and refrigerant mixture inside the air conditioning system is pressurized. Consequently, never loosen fittings or tamper with lines unless the system has been properly discharged.
5. Before loosening any connection, cover the fitting in question with a cloth and wear gloves and goggles in order to prevent refrigerant from reaching the skin or eyes.
6. In the event of an accident, proceed as follows:-
   If the refrigerant has reached the eyes, wash them immediately with copious amounts of sterilised water or mains pressure tap water and transfer to hospital for immediate medical help.
   If the refrigerant has touched the skin, wash with cold water and transfer to hospital for immediate medical help.

ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction

General information
All servicing of the air conditioning system must be undertaken by a qualified refrigeration specialist who possesses the appropriate test devices, including a leak detector for R 134a refrigerant.
Impurities are prevented from entering the system as follows:
Ensure that all tools, measurement devices, hoses and spare parts are stored in a perfectly clean and dry place and ensure that the refrigerant used is permitted for use in the system.
Clean all hoses and fittings prior to removal. Seal all openings with plugs or screw caps after removal.
When filling the system with refrigerant oil, only open the oil container just before use and then close it again straight away. It is very important that you ensure the oil cannot absorb any humidity.

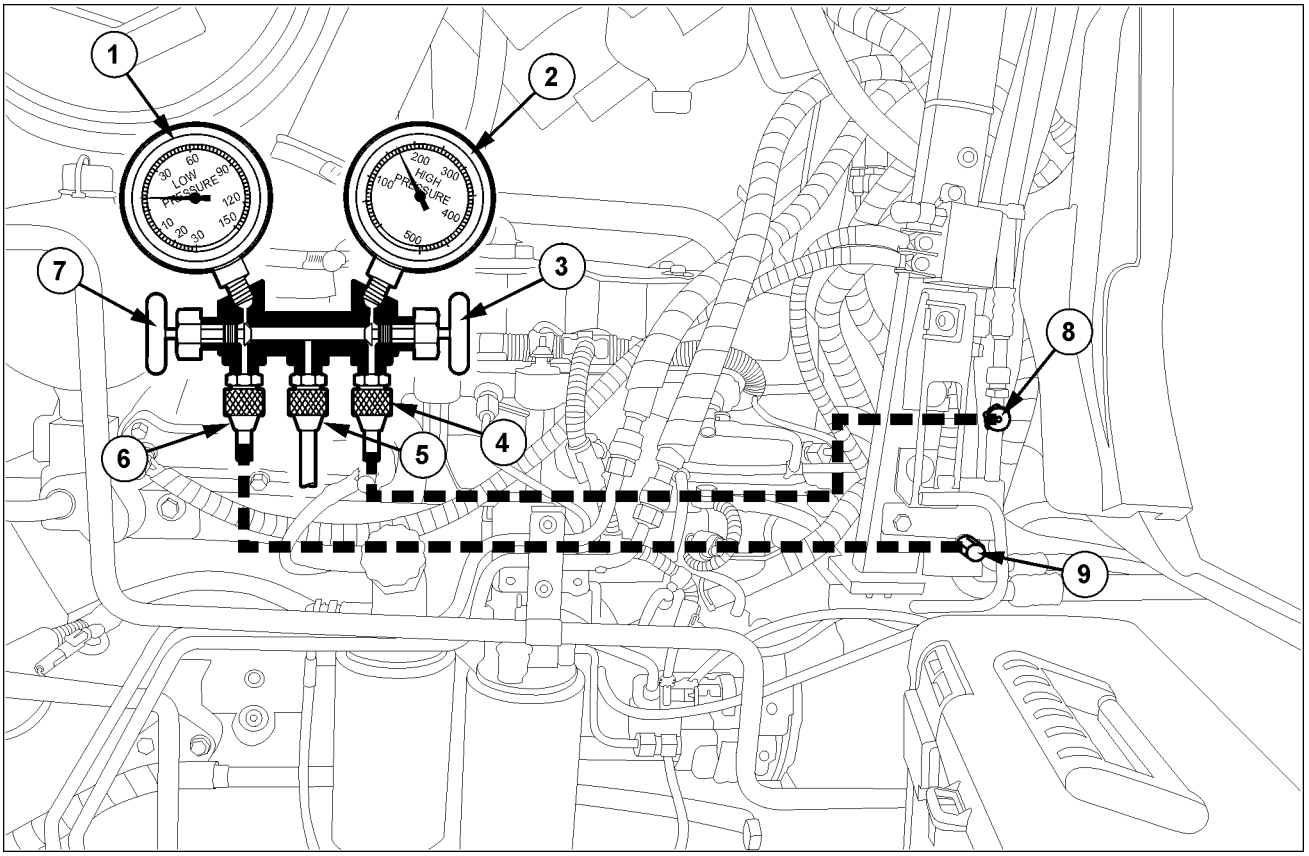
⚠ WARNING ⚠

Before dismantling an air conditioning system for repair the gas within the system must be discharged and recovered using a certified recovery unit designed for the type of refrigerant gas used in the system.NEVER release refrigerant gas into the atmosphere.ALWAYS wear safety goggles and gloves when servicing any part of the air conditioning system.

B043

General troubleshooting

1. Prior to performing troubleshooting in the system always first conduct a general functional check.
   Leave the engine to run for 10 minutes at **1000 - 1200 rev/min** with the air conditioning system set to maximum cooling and the blower set to the highest speed setting.
2. Ensure that the temperature switch of the heating system is switched OFF.
3. Check that the fan motor works at all speed levels.
4. Establish whether the compressor coupling engages when the air conditioner switch is pressed. If the coupling does not work it may be that the pressure switches on the intake and pressure side are faulty or the electro-magnetic coupling of the cooling compressor is not working.
5. Check whether the motor cooler ventilator is drawing in cold air through the condenser.
6. Check the belt tension of the cooling compressor drive belt.
7. Check that the condenser is clean inside and out and allows an unobstructed flow of air.
8. Ensure that the cab air filter is clean and not blocked.
9. Check whether the evaporator blades are stuck or heavily soiled.



SS08F102 1

Connection of pressure gauge battery to the vehicle

1. Suction side pressure gauge
2. Pressure side pressure gauge
3. Shut-off valve
4. Hose to pressure side connection valve
5. Centre hose (not in use)
6. Hose to suction side connection valve
7. Shut-off valve
8. Pressure side connection valve (high pressure part)
9. Suction side connection valve (low pressure part)

Approximate display value of the high pressure gauge

Temperature of ambient air		Display value of the high pressure gauge		
59 °F	**15 °C**	**9,5 bar**	9.7 kgf/cm2	140 lbf/in2
68 °F	**20 °C**	**13 bar**	13.3 kgf/cm2	191 lbf/in2
77 °F	**25 °C**	**15 bar**	15.3 kgf/cm2	221 lbf/in2
86 °F	**30 °C**	**18 bar**	18.4 kgf/cm2	265 lbf/in2
95 °F	**35 °C**	**20 bar**	20.5 kgf/cm2	294 lbf/in2
104 °F	**40 °C**	**22 bar**	22.5 kgf/cm2	323 lbf/in2
113 °F	**45 °C**	**23 bar**	23.5 kgf/cm2	338 lbf/in2

10. Checking the function of the air conditioning system
    The pressure gauge battery is the most important tool when checking and performing maintenance on the air conditioning system.
    If the workshop has a modern automatic suction, evacuation, recycling and filling device the pressure gauges are already installed inside it.
    The following instructions for checking the function of the air conditioning system apply to the **1** pressure gauge battery shown in the diagram. The system check using a suction and filling device with pressure gauges fitted basically follows the same process.
    When using such devices, always note the operating instructions provided by the manufacturer.

11. Notes for accident prevention
    In the closed valves the refrigerant flows around the valve stems to the pressure gauges. As a result, after connecting the pressure battery the pressure is shown by both pressure gauges.
    NEVER screw open the manual shut-off valve on the PRESSURE SIDE while the system is in operation.
    ALWAYS screw open the manual shut-off valve on the SUCTION SIDE when the refrigerant is being topped up.

IMPORTANT: *Always ensure that the manual shut-off valves are screwed shut at all stages of testing. (clockwise, to the stop)*

12. Connection of pressure gauge battery to vehicle
    Always ensure that the manual shut-off valves of the pressure gauge battery are screwed shut (clockwise, to the stop).

⚠ WARNING ⚠

To avoid personal injury, stop the tractor engine during connection of the manifold gauge set.

B044

13. Connect the hose of the high pressure gauge (usually red) to the pressure side shut-off valve, and the hose of the low pressure gauge (usually blue) to the suction side connection valve at the vehicle, see diagram **1**. Check whether all hose connections are screwed tight.

IMPORTANT: *Prior to connecting the pressure gauge battery determine the assignment of the connections for the high pressure gauge (pressure side) and the low pressure gauge (suction side). The pressure side connection valve always sits in the line from the air conditioner compressor to the condenser.*

14. The connection valves for the high pressure and low pressure sides on the vehicle are spring-loaded valves and open automatically when the pressure testing hose is connected.
    The connection valves are closed with a protective cap. Remove this cap prior to connecting the pressure gauge and fit it again when the servicing of the vehicle is complete.

NOTE: *A suitable pressure pin must be inserted into the pressure testing pipe to actuate this type of valve.*

15. Testing procedure
    After connecting the pressure gauge battery - and before the functional test is able to be carried out - shift the system into a stable operating state as follows:
    Check again whether the manual shut-off valves on the suction and pressure sides of the pressure gauge battery are completely screwed shut.
16. Actuate the parking brake and check that all gear levers are in neutral and all windows and doors of the driver cab are shut.
17. Let the engine run at **1000 - 1200 rev/min**.
18. Switch the temperature switch of the heating system to OFF.
19. Switch the temperature stabilisation function of the air conditioning system to maximum cooling and switch the fan motor to the highest speed setting for **10 minutes** minutes.
20. Check whether the display of the high pressure gauges is in the specified range of approx. **4 - 36 lbf/in2** (**0.28 - 2.48 bar**) (**0.28 - 2.53 kgf/cm2**).
21. Read the high pressure gauge and compare the display value with the values in the pressure/temperature table provided above.
22. Compare the temperature of the air-conditioned air flowing out of the air vents into the cab with the temperature of the intake air at the cab air filters outside the cab.
    If the system is functioning properly the air-conditioned air flowing into the cab should be **6 - 9 ° C** (**10 - 15 ° F**) cooler than the outside air that is drawn in.

23. If you determine as a result that the system is not functioning properly, proceed with troubleshooting using the troubleshooting tables and the examples in **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Troubleshooting (E.40.D)** and remedy as required.

⚠ WARNING ⚠

A significant amount of refrigerant vapour may have condensed to a liquid at the service fitting at the high side of the compressor. Use a cloth or other protective material when disconnecting the manifold hose from this fitting to prevent personal injury to hands and face.

B045

ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Overhaul

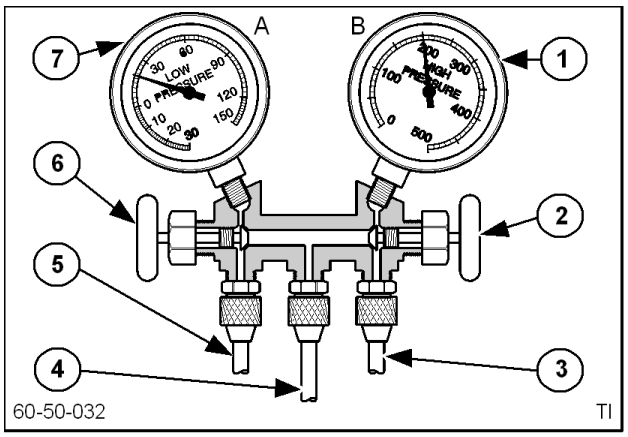
NOTE: *Before disconnecting components in the air conditioning system the refrigerant gas must be discharged and recovered using a certified recovery system. Refer to* ***ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Discharging (E.40.D)****. Do Not discharge the gas into the atmosphere*

1. If an air conditioning component is to be replaced during a system overhaul it is necessary to drain any refrigerant oil that has collected in the component being replaced into a clean calibrated container.
   A volume of clean refrigerant oil equivalent to that removed from the replaced component must then be added to the new item before being installed onto the tractor.
   Upon completion of the repair evacuate, recharge, leak test and performance test the system to ensure correct operation.

ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Decontaminating

Air conditioning systems may occasionally become contaminated with solid particles. This contamination may be the result of allowing dirt to enter the system while it was open, from aluminum corrosion or sludge, or from disintegrated compressor reed plates. Contamination of this nature can result in plugged evaporators, condensers and expansion valves.

1. Contaminated systems must be flushed with a special flushing solvent to remove the unwanted material. Prior to flushing, the system must be discharged as described in **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Discharging (E.40.D)**.
   Each individual component must be flushed after disconnecting every hose fitting.
   The compressor and expansion valve can not be flushed, therefore, the compressor should be disassembled and cleaned or replaced and the expansion valve should be replaced. When flushing the system always replace the receiver/drier.

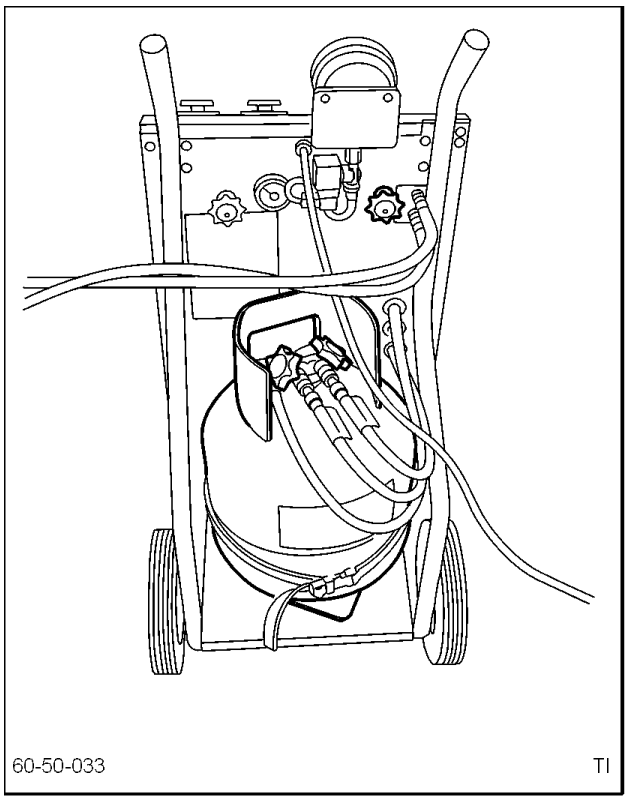


60-50-032 1

   Manifold Gauge Set (Fig. 1)
   1. High Side Gauge
   2. High Side Shut off Valve
   3. High Side hose
   4. Centre Service hose
   5. Low Side hose
   6. Low Side Shut off Valve
   7. Low Side Gauge

2. Re-assemble and evacuate the system to remove air and moisture as described in **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Evacuate (E.40.D)**.

NOTE: *Never use any solvent for flushing an air conditioning system other than a special flush solvent made specifically for air conditioning systems. Always follow the manufacturer's recommendations and directions for using the flushing equipment and solvent.*



60-50-033 2

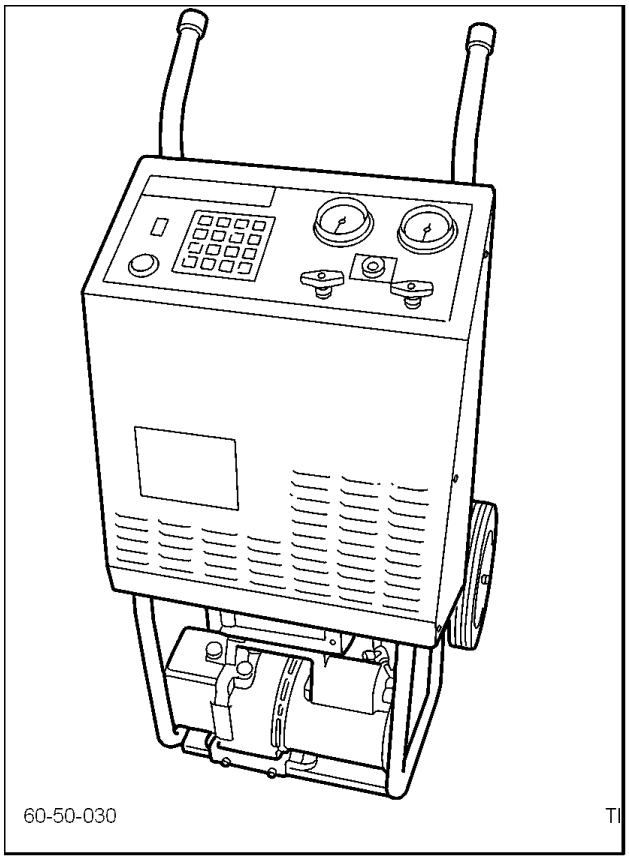
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Discharging

⚠ WARNING ⚠

Never discharge refrigerant gas into the atmosphere. Always where safety goggles and gloves when working with refrigerant. Only use authorised refrigerant tanks.

B030

If the air conditioning system is to be overhauled or other interventions are to be made which require the air conditioning system to be disassembled, the refrigerant must first be extracted.
Before the air conditioning system is dismantled, the refrigerant must be fully extracted using a using a type-tested extraction device in accordance with the manufacturer's instructions and recycled.
The illustration **1** shows a combined extraction, evacuation, recycling and filling device. This device extracts R 134a refrigerant from the air conditioning system, recycles it and refills it in one cycle. The device is designed for operations with the pressure gauge battery inserted in its control panel.



60-50-030 1

With other extraction devices the pressure gauges are not part of the device. If such devices are used a separate pressure gauge battery must be connected.

IMPORTANT: *Thoroughly read the manufacturer's instructions prior to using extraction devices.*

An overview of the worksteps when emptying the system using a suction/recycling device is provided below.

1. Allow the vehicle's air conditioner to run for several minutes.

2. Connect the extraction device in accordance with the manufacturer's instructions. Ensure that the device's red hose (high pressure side) is connected to the high pressure side connection valve **(1)** and the blue hose (low pressure side) is connected to the low pressure side connection valve **(2)**.

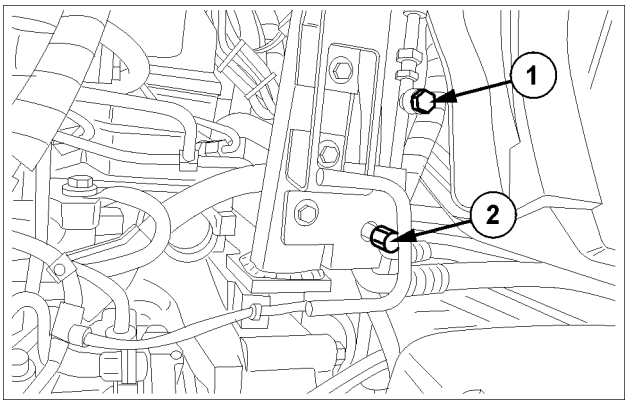
NOTE: *If the device requires a separate pressure gauge battery, connect the relevant hoses from the high and low pressure side of the pressure gauge to the high and low pressure side of the air conditioning system. Then connect the hose of the extraction device to the middle connection of the pressure gauge battery - see* ***ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Decontaminating (E.40.D)****.*

3. To extract the refrigerant screw open the valves for the high and low pressure sides at the operating field (or the valves concerned at the pressure gauge battery), see **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Decontaminating (E.40.D)**.

4. Screw open the valves marked "gas" and "liquid" on the extraction device refrigerant tank, see **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Decontaminating (E.40.D)**.

5. Connect the device's power cable.

6. Operate the extraction device in accordance with the manufacturer's instructions.
   The compressor switches off automatically as soon as the extraction procedure has finished.



SS08F061 2

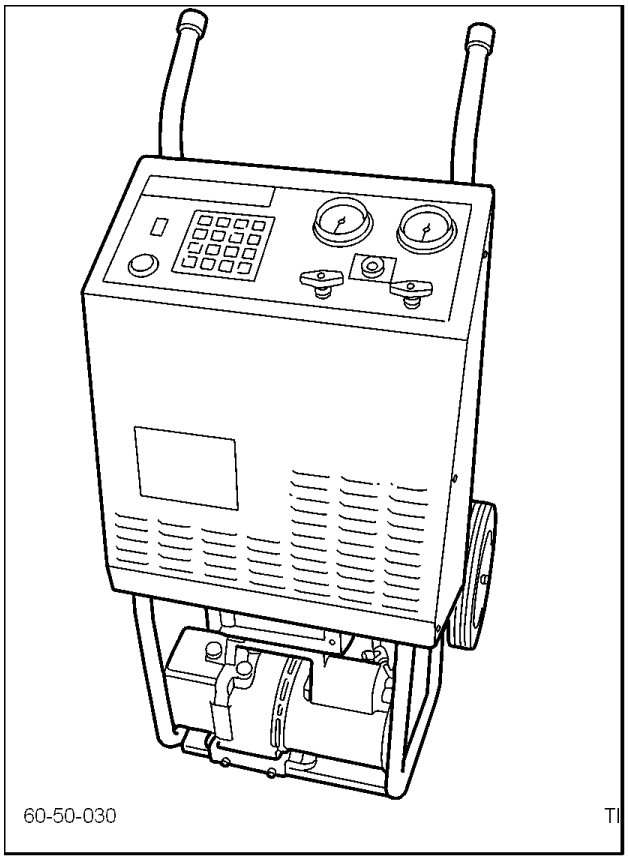
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Evacuate

IMPORTANT: *A system in which the refrigerant has been recovered to facilitate repairs, must be evacuated before new refrigerant is installed.*

NOTE: *Air and moisture are removed by evacuating the system using a vacuum pump.*
The automatic recycling, recharge and evacuation stations or evacuating and charging stations available throughout the air conditioning industry incorporate a vacuum pump within the assembly. If this type of equipment is not available a separate vacuum pump and manifold gauge set must be used.
As the system is evacuated the boiling point of any moisture within the system is similarly lowered. As the vacuum increases the boiling reduces to below that of the ambient temperate and the moisture is subsequently boiled away.
The relationship of system vacuum to the boiling temperature at which the water vapor is removed from the system is as follows:

NOTE: *For every **1000 feet** (**305 m**) above sea level, the vacuum gauge reading must be corrected by adding 1 (**2.54 cm**) of mercury to compensate for the change in atmospheric pressure.*

IMPORTANT: *Be sure the system is completely discharged as refrigerant will damage the vacuum pump.*



60-50-030 1

System Vacuum		Temperature	
In Mercury	Cm. of Mercury	°F	°C
28.0	71.0	100	37
28.9	73.4	80	27
29.4	74.6	60	16
29.7	75.4	40	5
29.8	75.7	20	-7
29.9	75.9	0	-18

1. If the manifold gauge set is being used connect the low and high sides of the manifold to the low and high sides of the tractor air conditioning system as described for discharging the system in **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Discharging (E.40.D)**.
   Connect the manifold centre hose to the vacuum pump suction port as per the manufacturers instructions.
   Fully open both the low and high side gauge shutoff valves.
2. If a combined recovery/evacuation unit is to be used attach the unit to the air conditioning system in accordance with the manufacturers instructions. Be sure to read all installation and operating instructions carefully before starting the unit.
3. After starting the evacuation cycle, note the low side gauge to be sure the system pulls down into a vacuum.
4. Time the evacuation for a minimum of **20 minutes** from the point when lowest vacuum is attained.
5. When the low side gauge attains the lowest steady vacuum, stop the evacuation process.

NOTE: *The vacuum pump achieves ultimate vacuum with the vented exhaust valve closed.*

6. Check the system by closing the gauge shut-off valves, turning the vacuum pump off and noting the low side gauge reading. A loss of more than **2 in** (**5 cm**) of vacuum in **5 minutes** indicates either a leak or moisture in the system.
7. If the gauge needle remains stationary and the vacuum is maintained for **3 - 5 minutes**, close both the high and low side manifold hand valves, turn off and disconnect the center hose from the pump. The system is now ready for charging.
8. If a leak is detected, charge the system with approximately **14 oz** (**400 g**) of refrigerant, see charging the system in **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Charging (E.40.D)** and identify leak using a leak detector.
9. Once the leak is located discharge and recover the refrigerant in the system, repair the leak, then repeat the evacuation procedure.

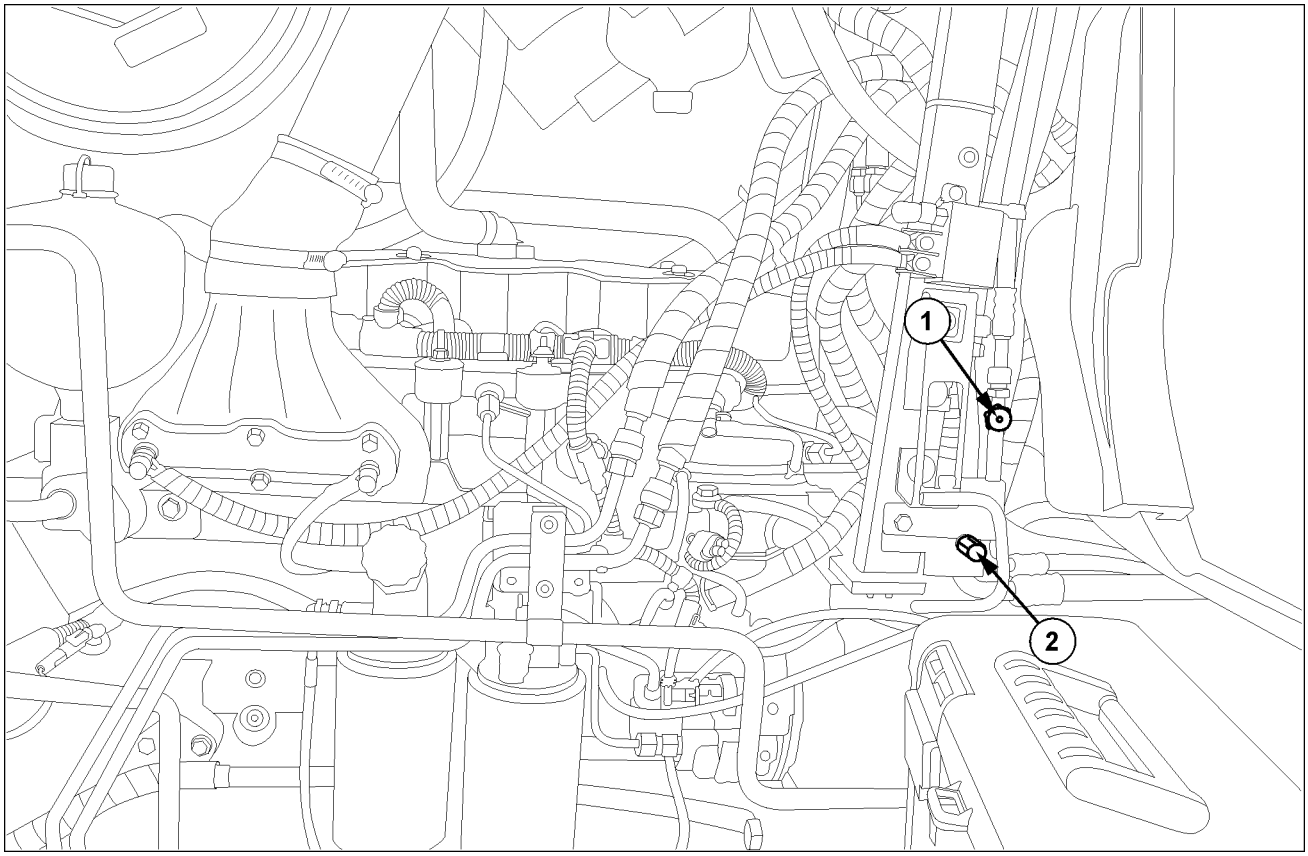
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Charging

IMPORTANT: *Ensure that the system has no leaks and that the evacuation has taken place without correctly. When dealing with refrigerant R 134a be sure to comply with all relevant safety regulations out of the equipment - see* ***ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction (E.40.D)****.*

1. Ensure that the filling device is connected to the vehicle air conditioning system exactly in accordance with the manufacturer's instructions.
2. If a filling device is used in combination with a pressure gauge battery, unscrew the manual shut-off valves from the pressure and suction pressure gauge.
3. Fill the system with refrigerant in accordance with the manufacturer's instructions **0.9 kg** (**1.98 lbs**).
4. If the volumetric flow of refrigerant has fallen greatly, close the shut-off valve of the high pressure end, start the engine and run at idling speed. Switch on the air conditioning system so that the air conditioner compressor can suction the remaining refrigerant into the system.
5. If the refrigerant in the filling cylinder is not all drawn into the air conditioning system, drain the system again and repeat the filling process.
6. Close the shut-off valves of the high and low pressure ends on the device's control panel (or on the pressure gauge battery) and check the function of the air conditioning system - see **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Service instruction (E.40.D)**.

NOTE: *Once the system has been filled, check the following points in order to ensure that the refrigerator oil is perfectly distributed in the system:*

7. Check that the air conditioning system is switched OFF.
8. Start the engine and leave to idle.
9. Switch on the air conditioning system and leave to idle for at least one minute before increasing the engine speed.



SS08F103 1

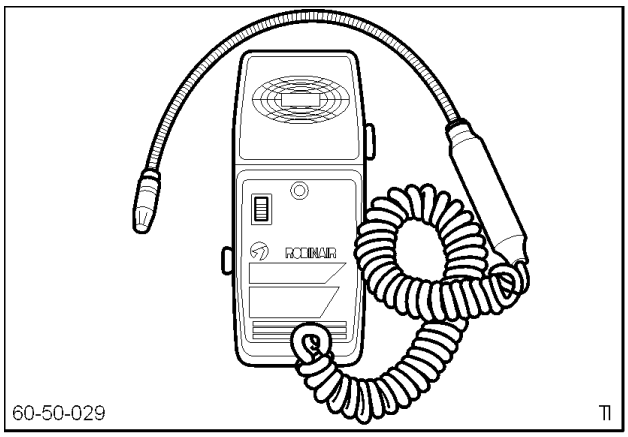
Connecting the extraction, evacuation, recycling and filling device to the vehicle

1. High pressure side connection valve (red pipe)
2. Low pressure side connection valve (blue pipe)

ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Leakage test

To perform a leak test if refrigerant leakage is suspected, use an electronic leak detector, Figure **1** following manufacturer's instructions.
Electronic leak detectors use flashing lights or sound to alert the operator to a leak. If the leak detector's sensitivity is adjustable, be sure you calibrate the detector according to the manufacturer's instructions before use.
When using a leak detector, keep in mind that a very slight amount of leakage in the compressor pulley area is normal and does not necessarily indicate a repair is required.
When a leak is located, follow these steps.

1. Discharge the system using a certified freon recovery system.
   Repair the leak.
   Evacuate the system.
   Partially charge system with **400 grammes** (**14 ozs**) of refrigerant.
   Check system for leaks.
   Fully charge the system.
   Always check the system for leaks as a final test after evacuating and before recharging. Refer to **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Evacuate (E.40.D)**

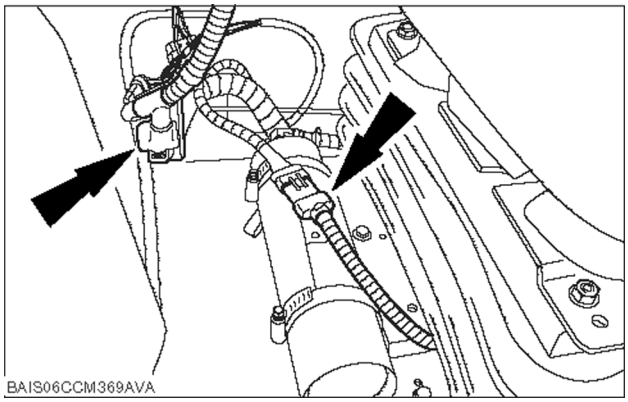


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ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Remove (Heating and air conditioning device)

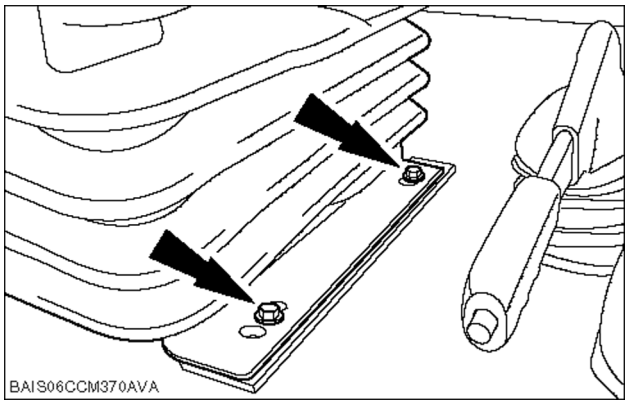
Prior operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Discharging (E.40.D)

1. Turn the starter switch to the “OFF” position.
   Disconnect the electrical plug connection for the driver’s seat and the armrest.



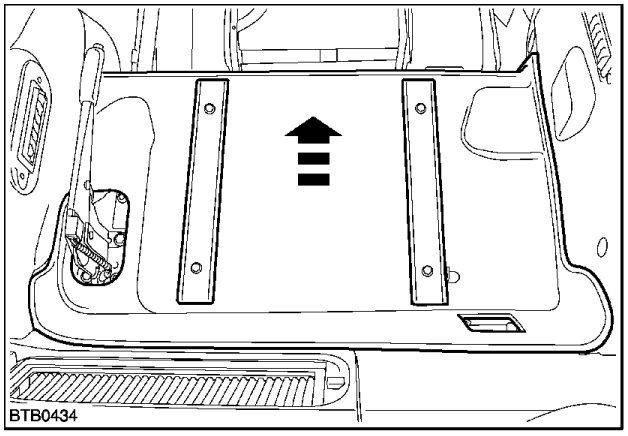
BAIS06CCM369AVA 1

2. Unscrew the retaining screws of the driver’s seat.
   Remove the driver’s seat.



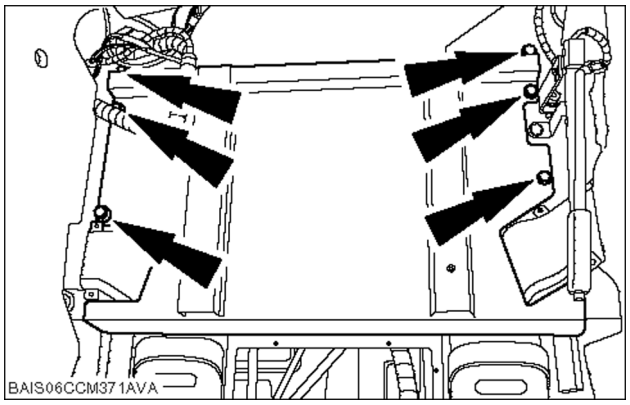
BAIS06CCM370AVA 2

3. Take the floor mats out of the cab to obtain access to the front and rear floor plates.



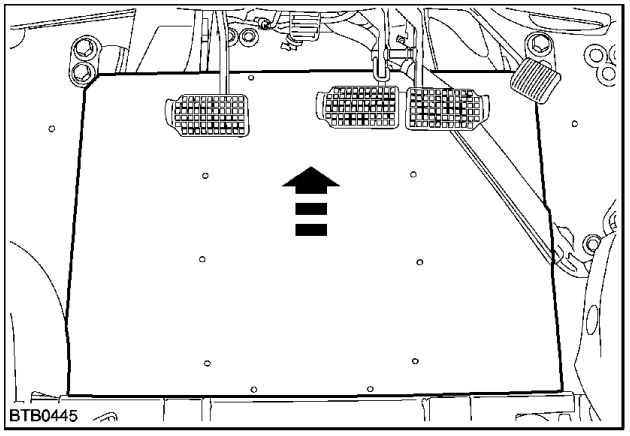
BTB0434 3

4. Remove the rear floor plate.



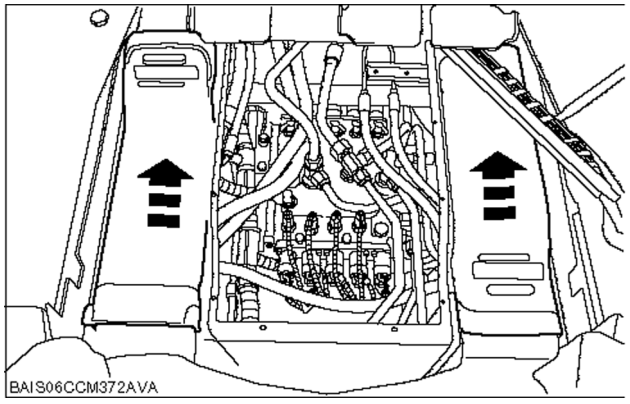
BAIS06CCM371AVA 4

5. Remove the front floor plate.



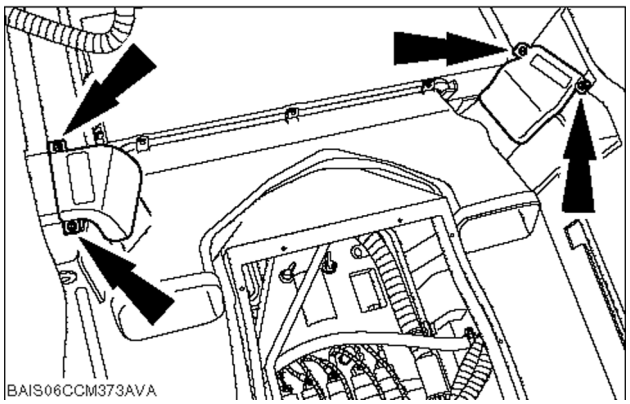
BTB0445 5

6. Remove the front air ducts.



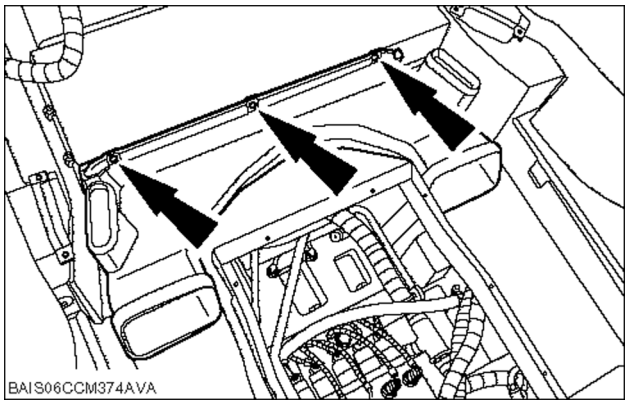
BAIS06CCM372AVA 6

7. Remove the lower side air ducts.



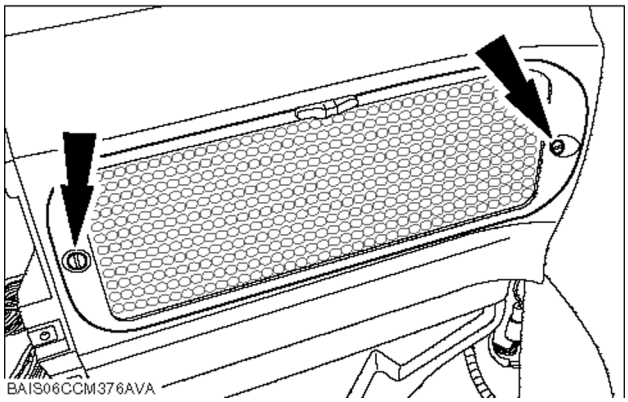
BAIS06CCM373AVA 7

8. Remove the exhaust duct from the front side of the heating and air conditioning unit.



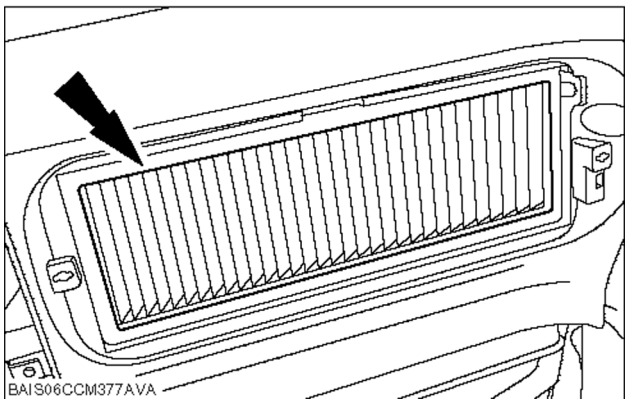
BAIS06CCM374AVA 8

9. Remove the air circulation grating.



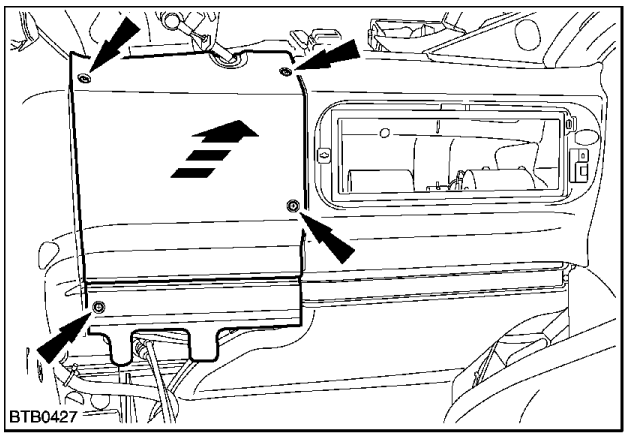
BAIS06CCM376AVA 9

10. Remove the air circulation filter element.



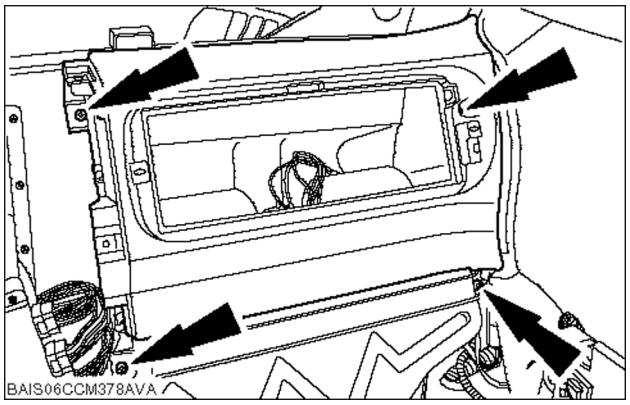
BAIS06CCM377AVA 10

11. Remove the cover next to the fan box.



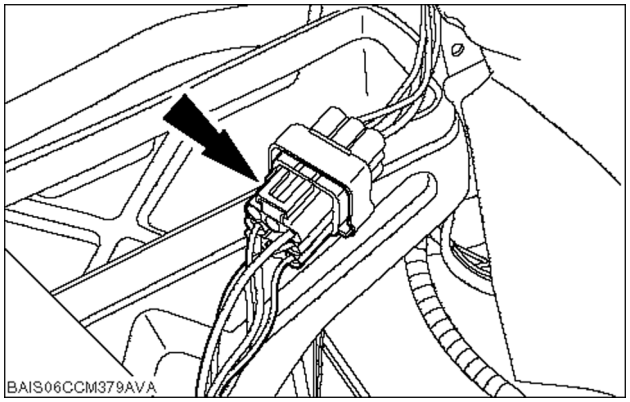
BTB0427 11

12. Unscrew the retaining screws of the fan housing.



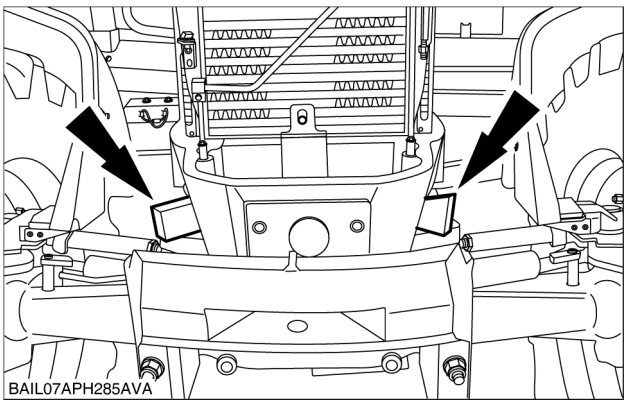
BAIS06CCM378AVA 12

13. Remove the electrical connector of the fan motor and remove the fan box.



BAIS06CCM379AVA 13

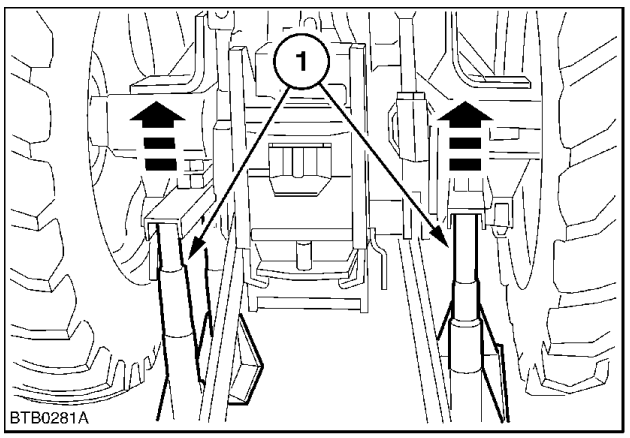
14. Ensure that the vehicle is standing on even ground.
15. Place chocks under the front wheels.
16. Drive timber wedges between the front axle and front axle bearing block. The wedges prevent the front axle from swinging.



BAIL07APH285AVA 14

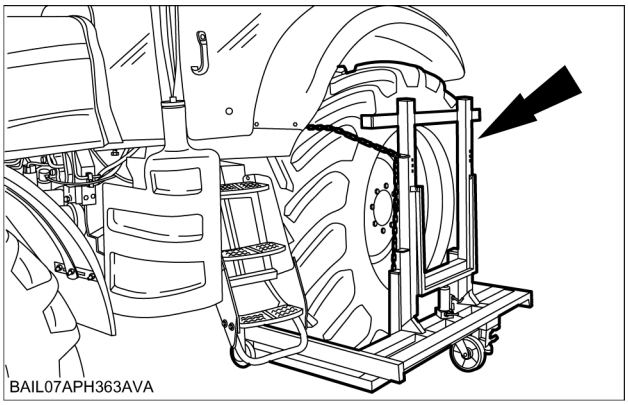
17. Raise the rear of the vehicle and place two suitable support frames **(1)** under the end drive housing.

NOTE: *Remove the supports if required.*



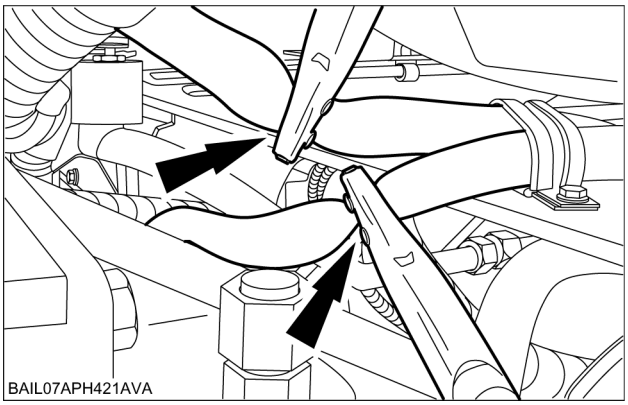
BTB0281A 15

18. Remove the rear left wheel.



BAIL07APH363AVA 16

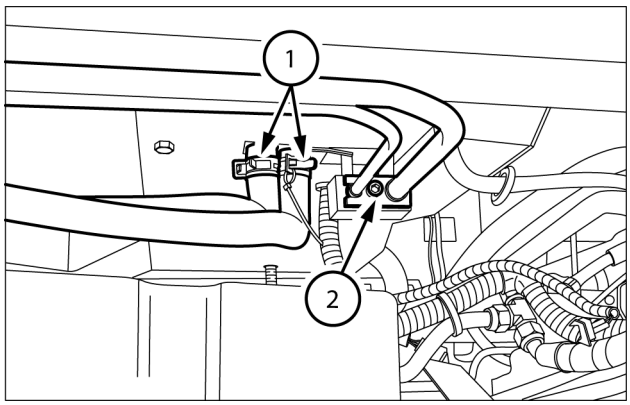
19. Attach peristaltic devices to the feed and return lines of the heating cooler.



BAIL07APH421AVA 17

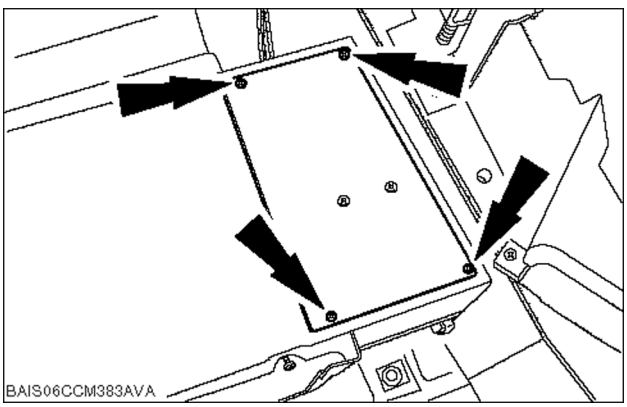
20. Remove the hoses of the cab heating system **(1)** and the air conditioner lines **(2)**.

ATTENTION: *Risk of burns due to hot coolant.*



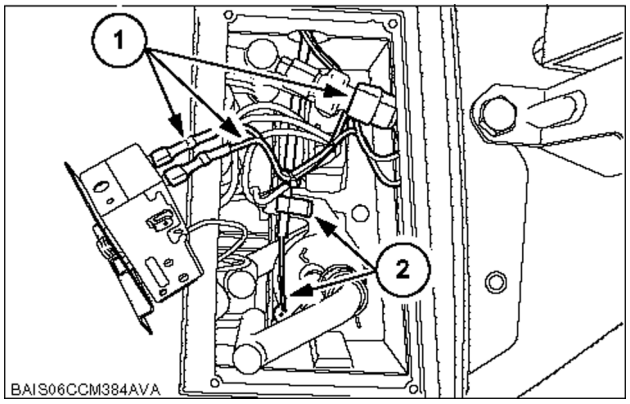
SS08D111 18

21. Remove the cover plate from the heating and air conditioning unit.



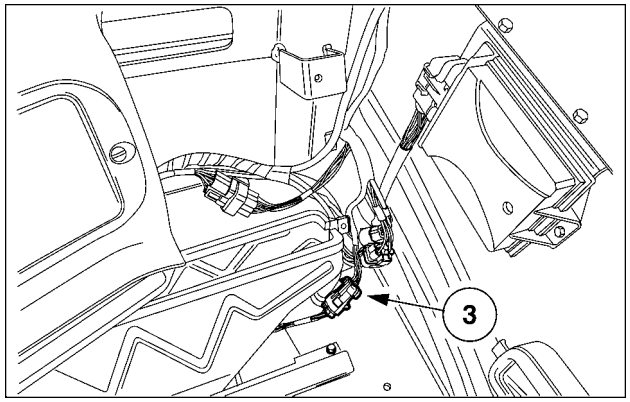
BAIS06CCM383AVA 19

22. Standard air conditioner design:
Remove the electrical plug-in connector **(1)**.
Unclip the Bowden cable of the heating regulator **(2)**.



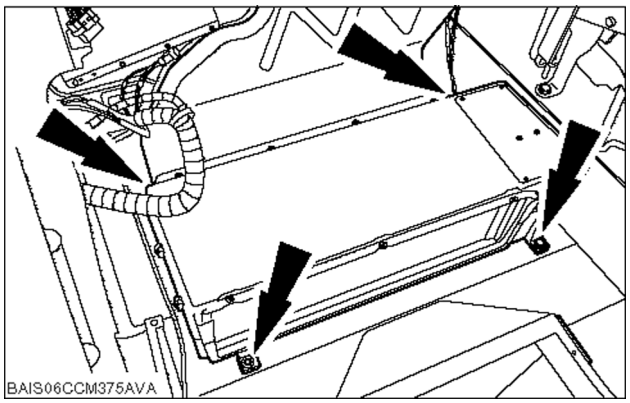
BAIS06CCM384AVA 20

Automatic air conditioner (ATC) design:
Disconnect the electrical plug-in connector **(3)** from the heating/air conditioning device.



SS08D112 21

23. Remove the heating and air conditioning unit together with the rear air ducts.



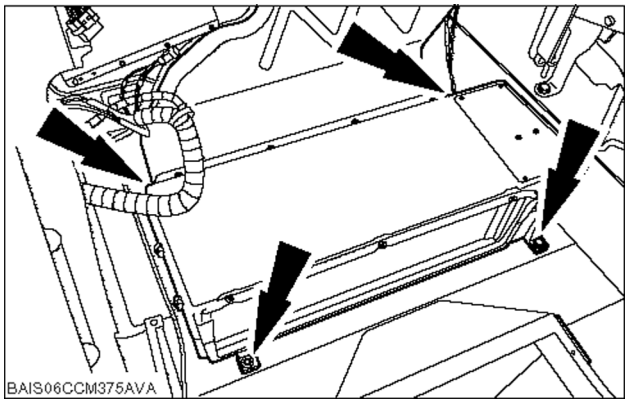
BAIS06CCM375AVA 22

Next operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Install (Heating and air conditioning device) (E.40.D)

ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Install (Heating and air conditioning device)

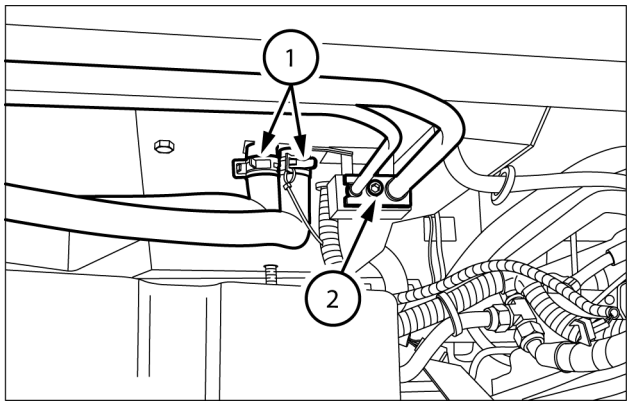
Prior operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Remove (Heating and air conditioning device) (E.40.D)

1. Attach the rear air duct to the heating and air conditioning unit.
2. Install the heating and air conditioning unit together with the rear air duct.



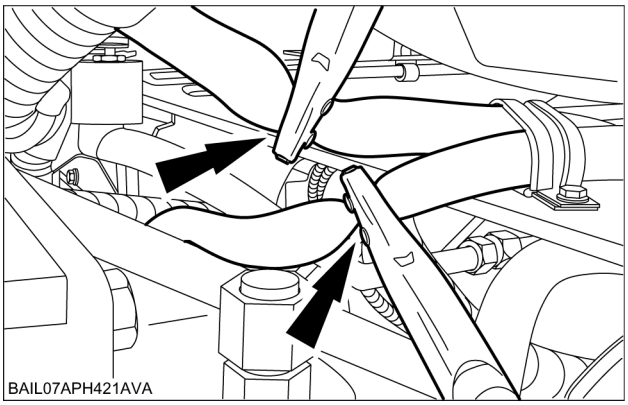
BAIS06CCM375AVA 1

3. Connect the hoses of the cab heating system **(1)** and the air conditioner lines **(2)**.



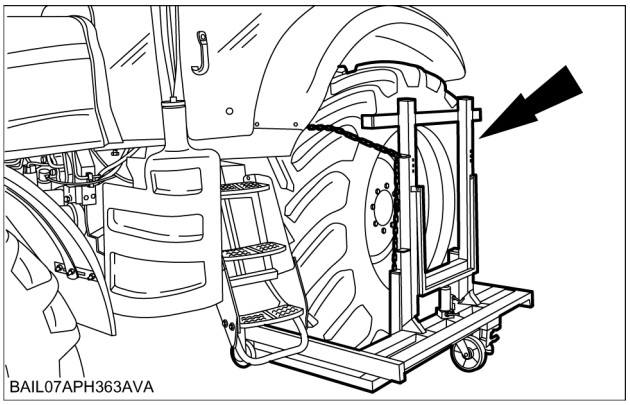
SS08D111 2

4. Remove the peristaltic devices from the heating hoses.



BAIL07APH421AVA 3

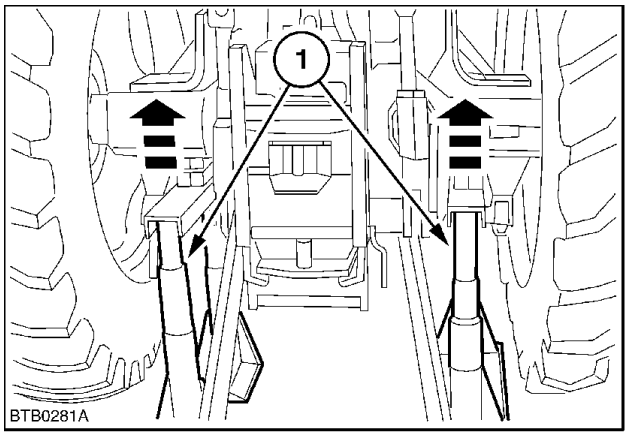
5. Mount the rear left wheel and tighten the wheel nuts to the specified torque - see **Rear wheel - Torque (D.50.C)**.



BAIL07APH363AVA 4

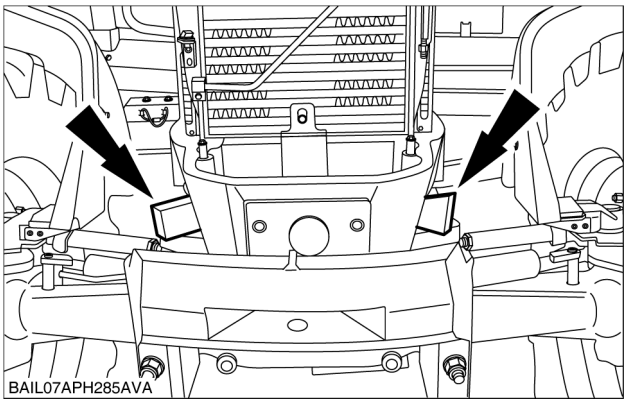
6. Raise the rear of the vehicle and remove the support frames **(1)**.

NOTE: *If the supports have been removed, fit them again.*



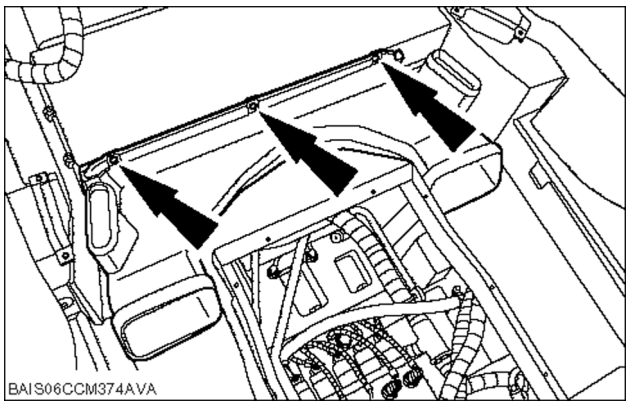
BTB0281A 5

7. Remove the timber wedges from between the front axle and front axle bearing block.



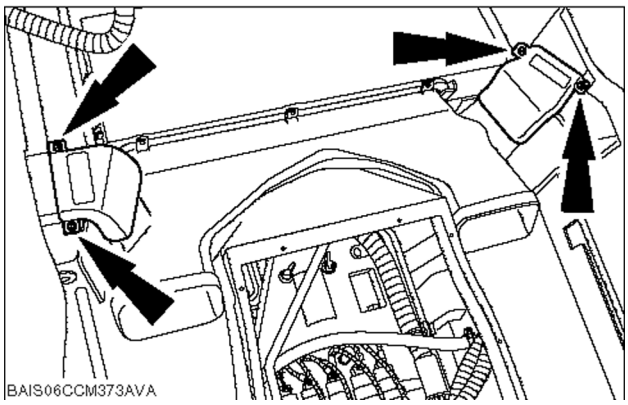
BAIL07APH285AVA 6

8. Remove the wedges from the front wheels.
9. Attach the exhaust duct to the front side of the heating and air conditioning unit.



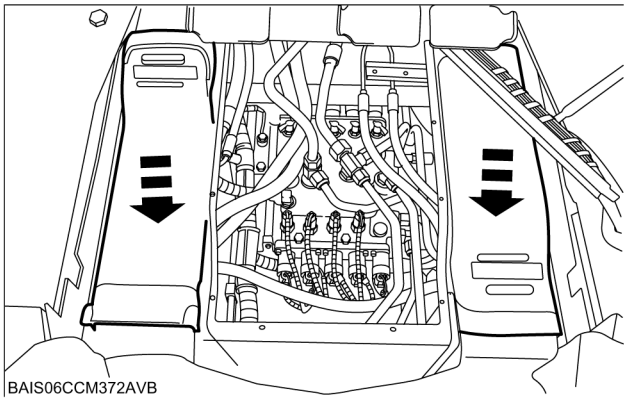
BAIS06CCM374AVA 7

10. Attach the lower side air ducts.



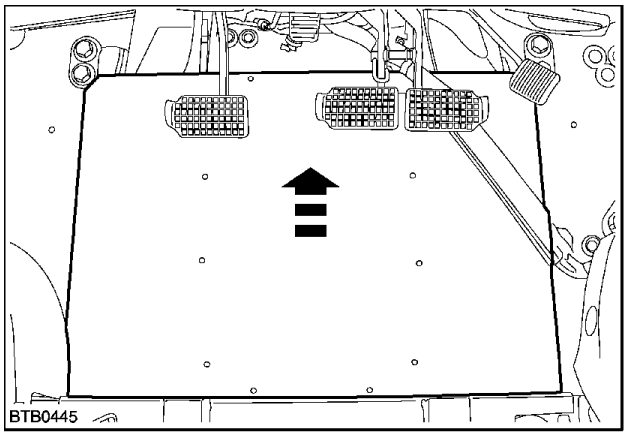
BAIS06CCM373AVA 8

11. Attach the front air ducts.



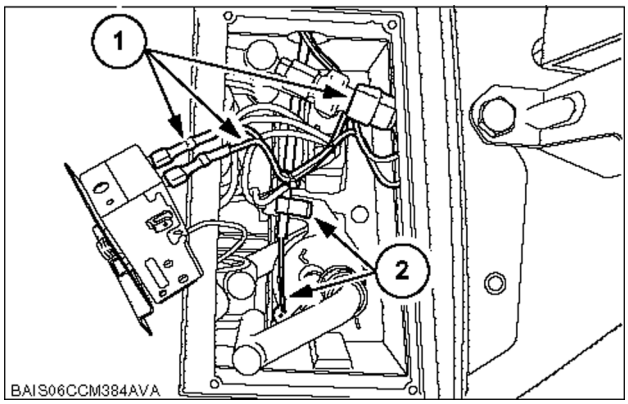
BAIS06CCM372AVB 9

12. Install the front floor plate.



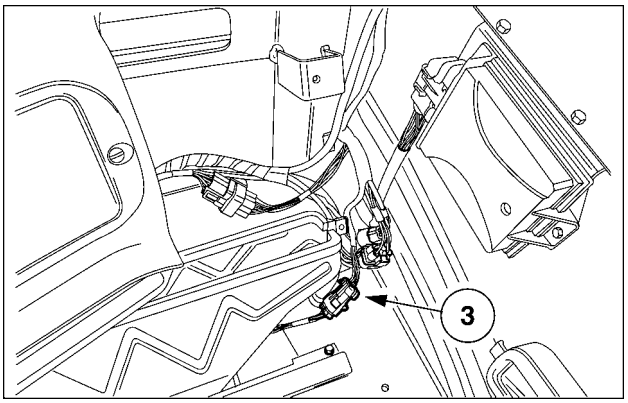
BTB0445 10

13. Standard air conditioner design:
Connect the electrical plug-in connector **(1)**.
Attach the Bowden cable of the heating regulator **(2)**.



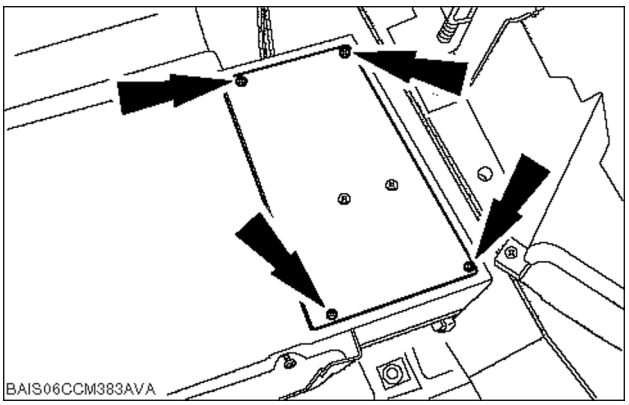
BAIS06CCM384AVA 11

Automatic air conditioner (ATC) design:
Connect the electrical plug-in connector **(3)** of the heating/ air conditioning device.



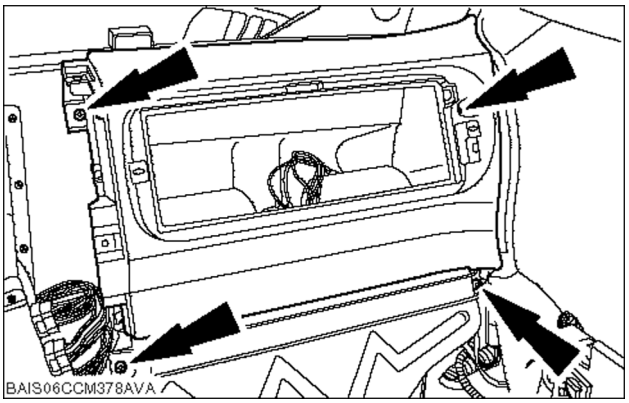
SS08D112 12

14. Attach the cover plate to the top of the heating and air conditioning unit.



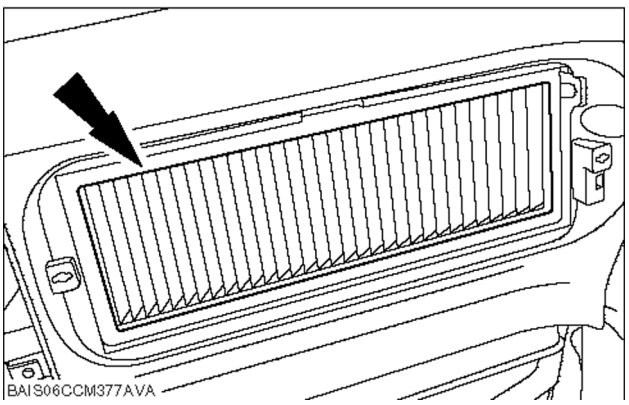
BAIS06CCM383AVA 13

15. Insert the blower box and screw in the blower box retaining screws.



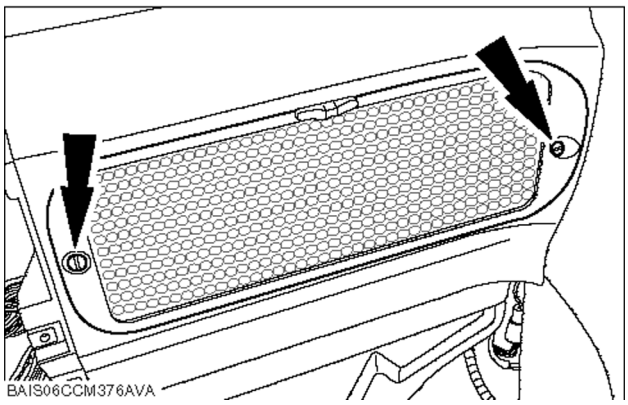
BAIS06CCM378AVA 14

16. Fit the air circulation filter element.



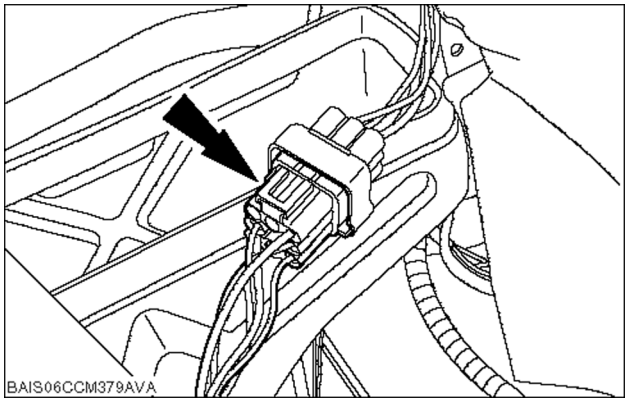
BAIS06CCM377AVA 15

17. Attach the air circulation grating.



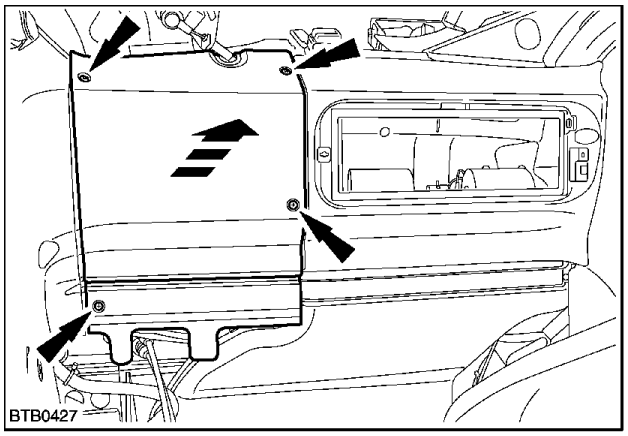
BAIS06CCM376AVA 16

18. Connect the electrical connector to the fan motor.



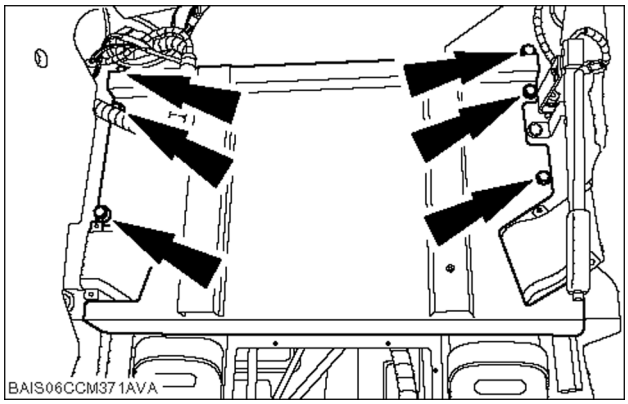
BAIS06CCM379AVA 17

19. Attach the cover.



BTB0427 18

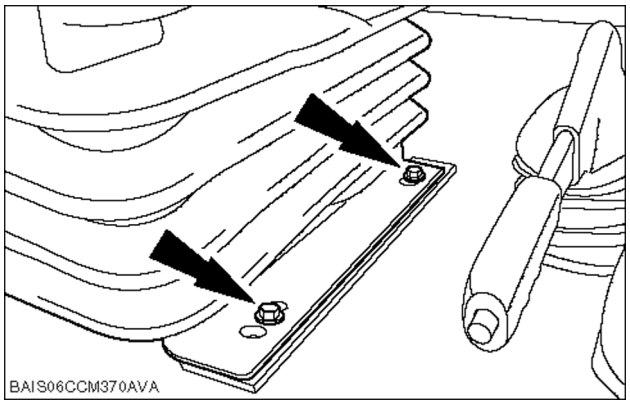
20. Install the rear floor plate.



BAIS06CCM371AVA 19

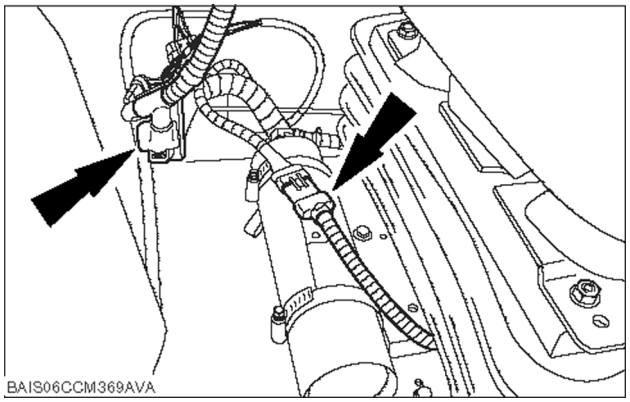
21. Fit the front and rear cab floor mats.

22. Install the driver's seat.
Screw in the retaining bolts.



BAIS06CCM370AVA 20

23. Connect the electrical plug connection for the driver's seat and the armrest.

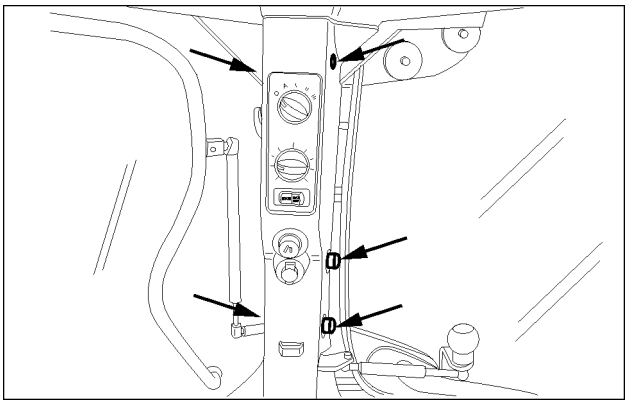


BAIS06CCM369AVA 21

Next operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Evacuate (E.40.D)
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Charging (E.40.D)
Compressor - Filling (E.40.D)
ENGINE COOLANT SYSTEM - Filling (B.50.A)

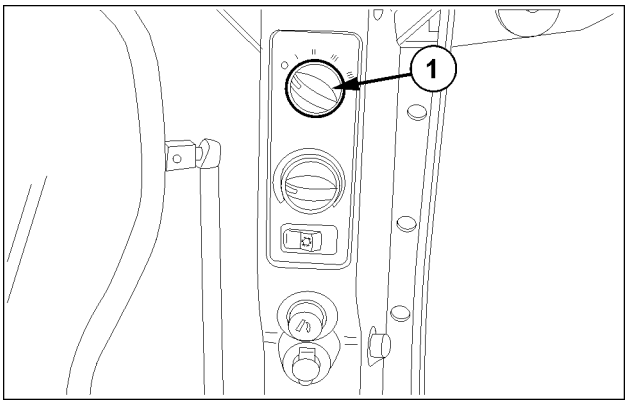
Command Switch - Replace (Blower speed)

1. Turn the starter switch to the “OFF” position.
   Remove the facing.



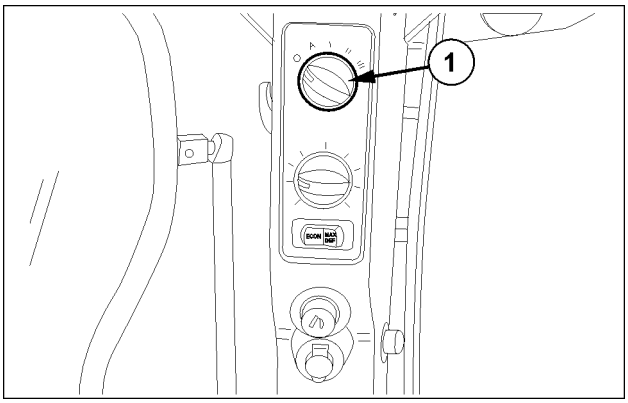
SS08D010 1

2. Standard air conditioner design:
   Remove the turning knob **(1)** and unscrew the cap nut located behind it.
   Disconnect the plug connection.
   Replace the switch.



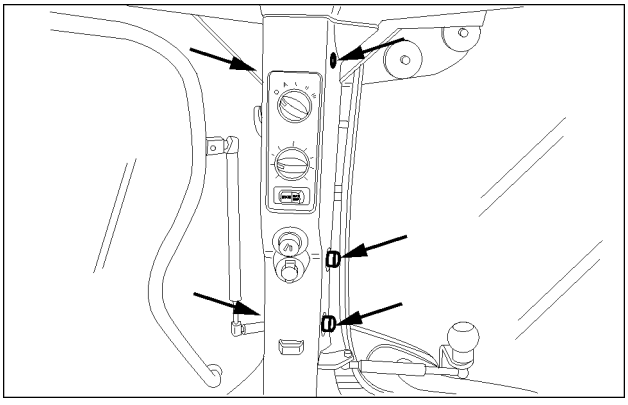
SS08D103 2

Automatic air conditioner (ATC) design:
Remove the turning knob **(1)** and unscrew the cap nut located behind it.
Disconnect the plug connection.
Replace the switch.



SS08D104 3

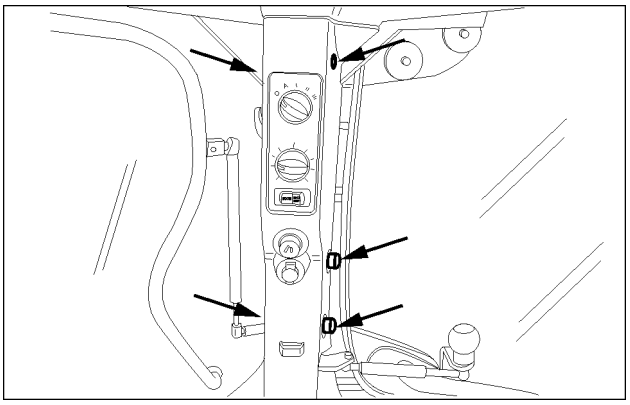
3. Tighten the cap nut and fit the turning knob **(1)**.
   Connect the connector.
4. Re-install the facing.



SS08D010 4

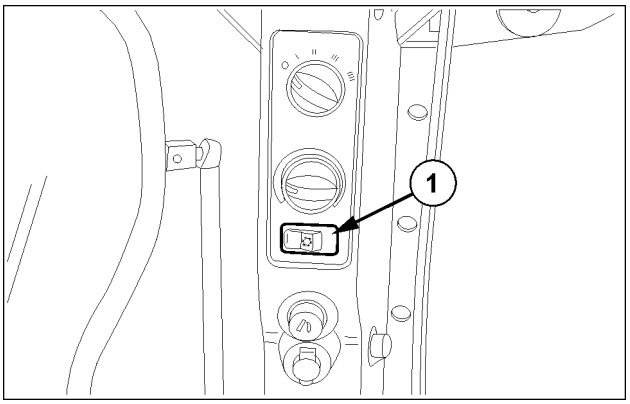
Command Switch - Replace (Modes of operation)

1. Turn the starter switch to the “OFF” position.
   Remove the facing.



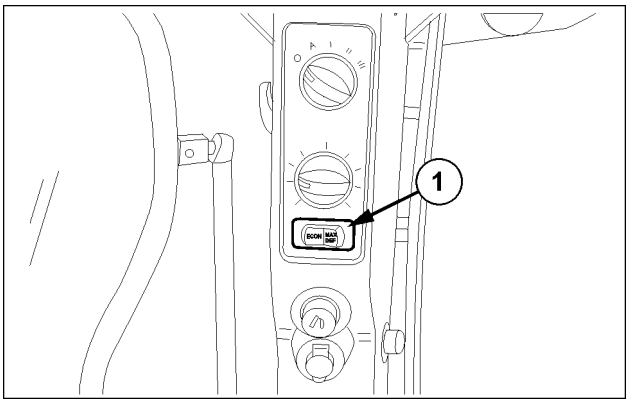
SS08D010 1

2. Standard air conditioner design:
   Remove the plug at the switch.
   Replace the switch **(1)**.



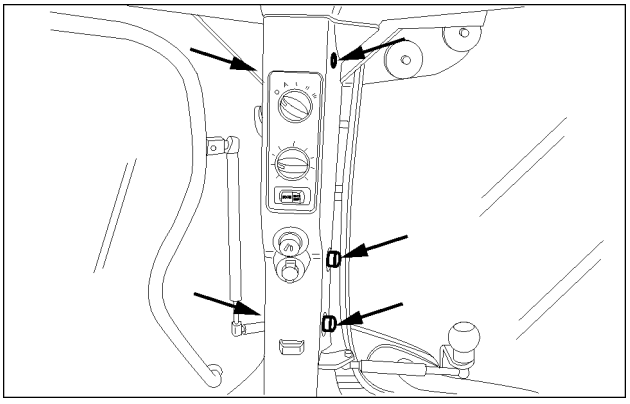
SS08D013 2

Automatic air conditioner (ATC) design:
Remove the plug at the switch.
Replace the switch **(1)**.



SS08D012 3

3. Insert the plug at the switch **(1)**.
4. Install the facing.



SS08D010 4

Heater valve - Replace

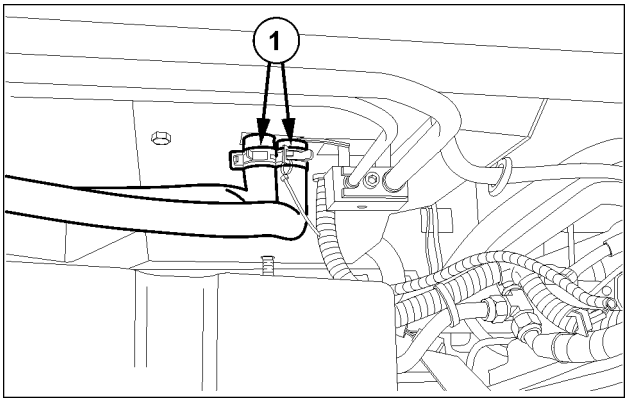
PUMA 165 Standard Climate Control, PUMA 180 Standard Climate Control, PUMA 195 Standard Climate Control, PUMA 210 Standard Climate Control, PUMA 165 Multicontroller Standard Climate Control, PUMA 180 Multicontroller Standard Climate Control, PUMA 195 Multicontroller Standard Climate Control, PUMA 210 Multicontroller Standard Climate Control

Prior operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Remove (Heating and air conditioning device) (E.40.D) Step 1 to step 4 and step 14 to step 19

NOTE: *The refrigerant does not have to be siphoned out of the unit in order to replace the heating valve.*

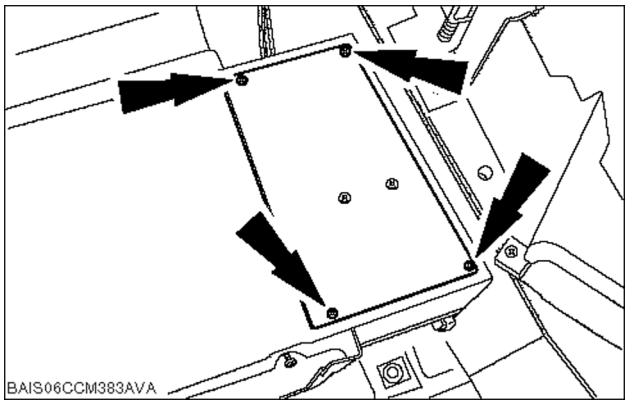
Removal

1. Pull off the hoses for the cab heating **(1)**.



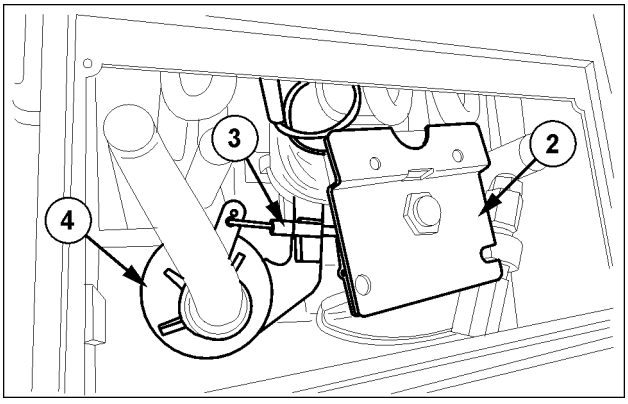
SS08D110 1

2. Remove the cover plate from the heating and air conditioning unit.



BAIS06CCM383AVA 2

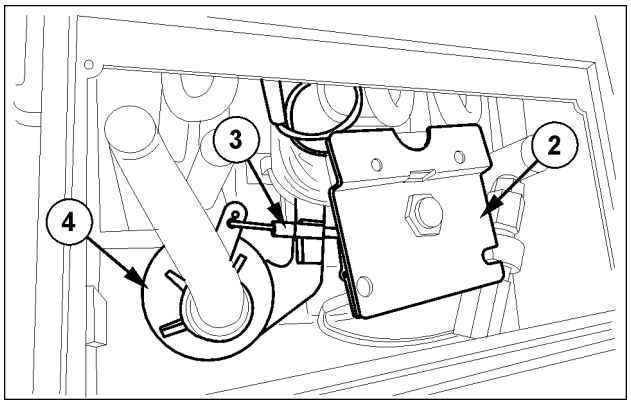
3. Carefully move the evaporator temperature sensor **(2)** to the right. Remove the Bowden cable **(3)** for actuating the heating valve. Remove the hose clips **(4)** and remove the heating valve.



SS08D018 3

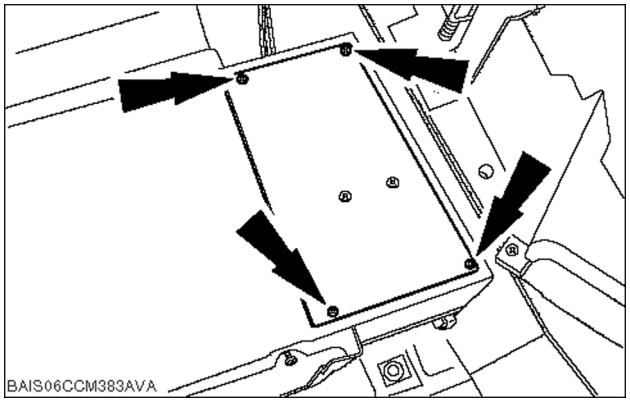
Assembly

4. Install the heating valve. Fit the hose clips **(4)**. Fit the Bowden cable **(3)** used for actuation. Carefully move the evaporator temperature sensor **(2)** to the correct position.



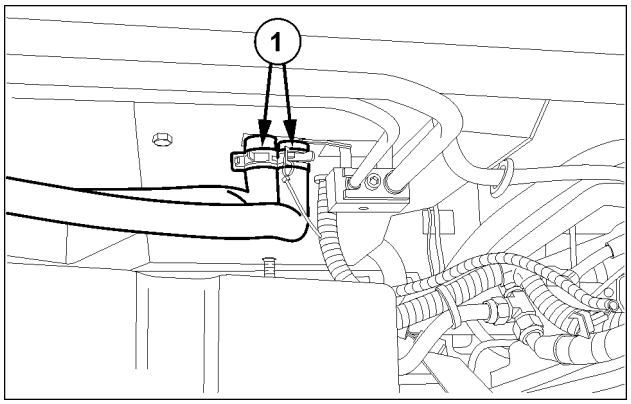
SS08D018 4

5. Fit the cover plate to the heating and air conditioning unit.



BAIS06CCM383AVA 5

6. Fit the hoses for the cab heating **(1)**.



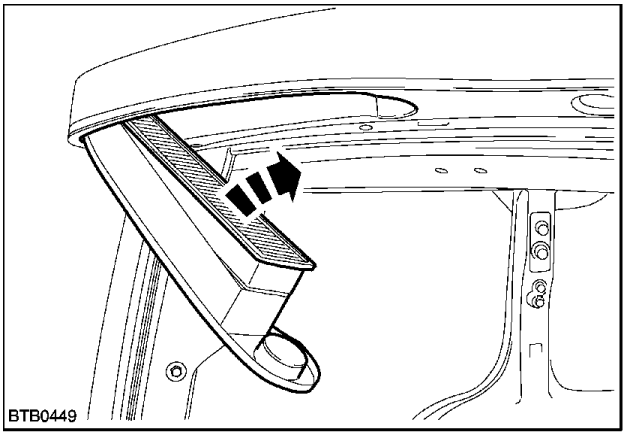
SS08D110 6

Next operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Install (Heating and air conditioning device) (E.40.D) Step 4 to step 8 and step 20 to step 23

Air filter - Cleaning

Prior to carrying out maintenance on the air filter switch off the fan and close the roof opening, all windows and one door. Slam the other door closed. The counter-pressure thus created loosens the majority of the dirt that has been stuck to the underside of the filter.
Remove the filter elements:

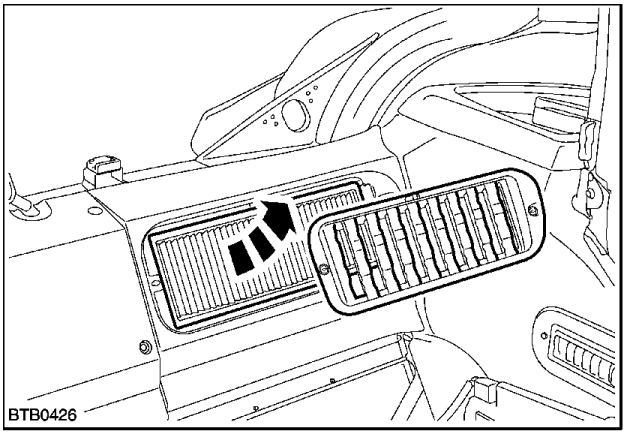
The cab filters have a built-in pre-filter element that catches most of the dust and husks. This pre-filter is part of the filter. It must be removed downwards prior to cleaning the main filter and then pushed back in again.



BTB0449 1

The circulation filter has a strap. This should be used to remove the filter.

NOTE: *Never remove the filter by the paper layers as this will damage the filter.*



BTB0426_505 2

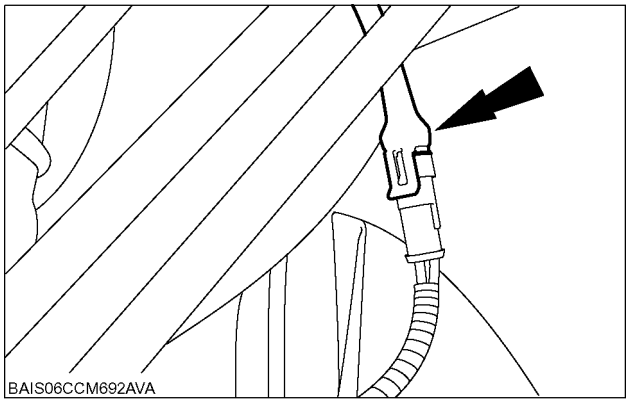
Blow the dust through the filter element from the top side to the bottom side. Clean the elements by blowing with compressed air not exceeding **2 bar** (30 lbf/in2). Keep the jet at a distance of at least **300 mm** (**12 in**) to the filter element in order not to damage the paper layers.

Clean all filter boxes with a damp lint-free cloth.
Insert the filter elements with the rubber seal upwards and attach the cover again.

Compressor - Remove

Prior operation:
Discharge the air conditioning system, for further information refer to **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Discharging (E.40.D)**

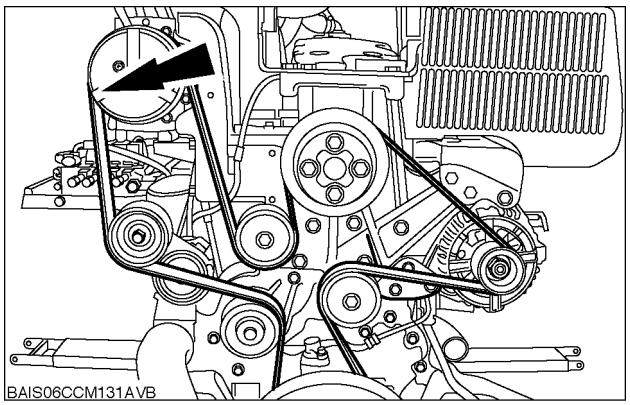
1. Disconnect the compressor electrical connector.



BAIS06CCM692AVA 1

2. Release the accessory drive belt tensioner and remove the drive belt from the compressor pulley.

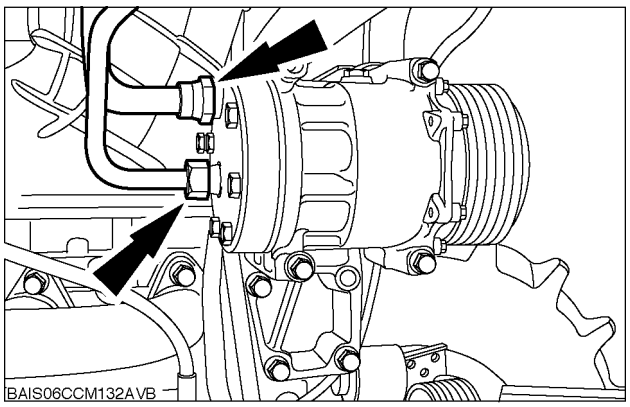
NOTE: *Radiator shown removed for clarity.*



BAIS06CCM131AVB 2

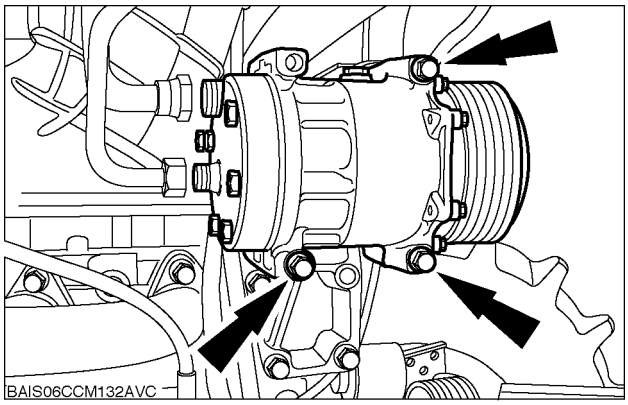
3. Disconnect the compressor supply and return pipes.

NOTE: *Cap and plug all fittings to prevent any dirt entering the system.*



BAIS06CCM132AVB 3

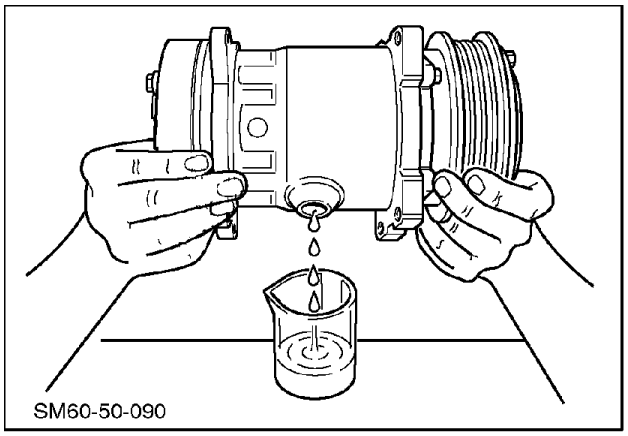
4. Remove the air conditioning compressor.



BAIS06CCM132AVC 4

5. Drain the refrigerant oil from the old compressor into a clean calibrated container. Measure and record the quantity of oil as **(Y)**. This information is required during installation.

NOTE: *It is necessary to rotate the compressor drive shaft several times to completely expel all the oil.*

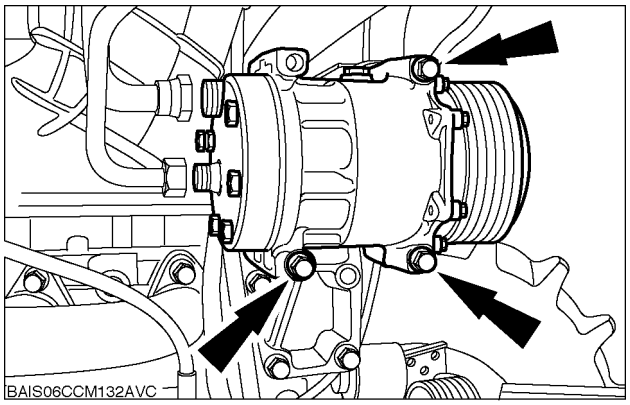


SM60-50-090 5

Compressor - Install

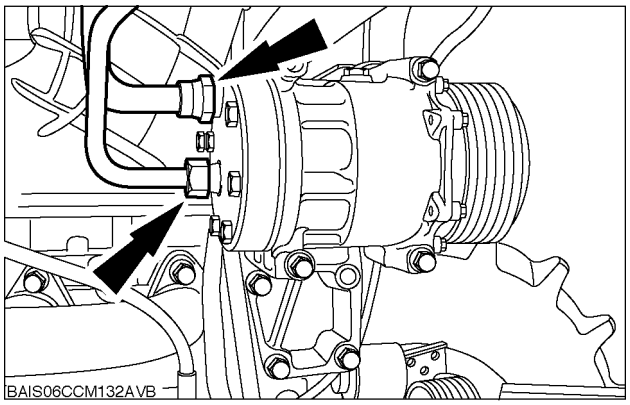
Prior operation:
Refill the compressor with new oil, for further information refer to **Compressor - Filling (E.40.D)**

1. Install the compressor.
   Tighten to **40 - 51 Nm** (**29 - 38 lbf.ft**).



BAIS06CCM132AVC 1

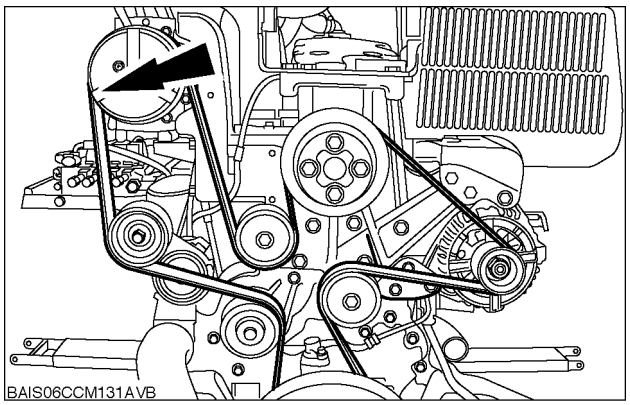
2. Connect the compressor supply and return pipes.



BAIS06CCM132AVB 2

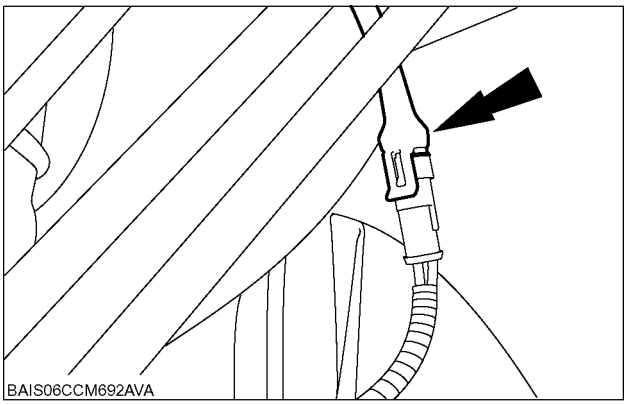
3. Install the accessory drive belt on the compressor pulley.

NOTE: *Radiator shown removed for clarity.*



BAIS06CCM131AVB 3

4. Connect the compressor electrical connector.



BAIS06CCM692AVA 4

5. Evacuate and recharge the system, for further information refer to **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Evacuate (E.40.D) ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Charging (E.40.D)**

6. After charging a system use the following start up procedure to ensure the lubricating oil is properly dispersed around the system:
   Ensure air conditioning is switched OFF.
   Start the engine and bring speed down to idle.
   Turn the air conditioning ON and allow system to operate for at least five minutes before increasing engine speed.

NOTE: *It is recommended that a new receiver / drier assembly is installed after any system component replacement or any repair that requires entry into the system.*

Next operation:
Re-check the level of oil in the system, for further information refer to **Compressor - Filling (E.40.D)**

Compressor Magnetic clutch - Disassemble

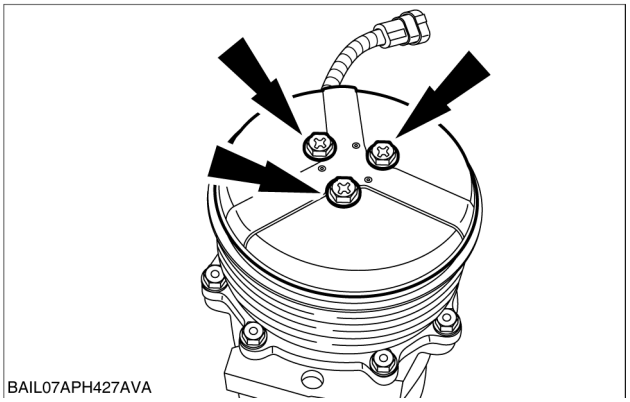
380000333 Air conditioning compressor toolkit

Prior operation:
Compressor - Remove (E.40.D)

1. Clamp the compressor into a vice with protective jaws.

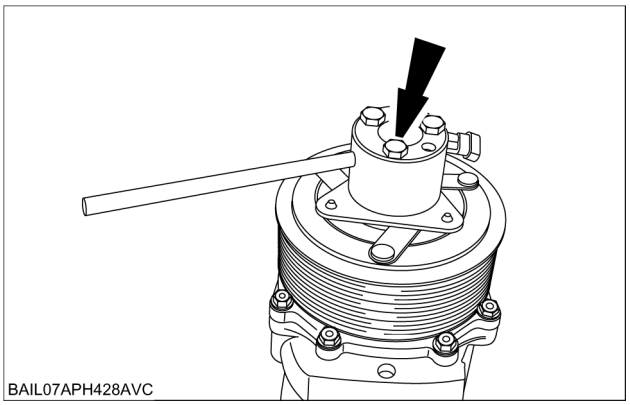
NOTE: *Do not position clamp at housing circumference.*

2. Remove the three screws and take the cover off of the coupling.



BAIL07APH427AVA 1

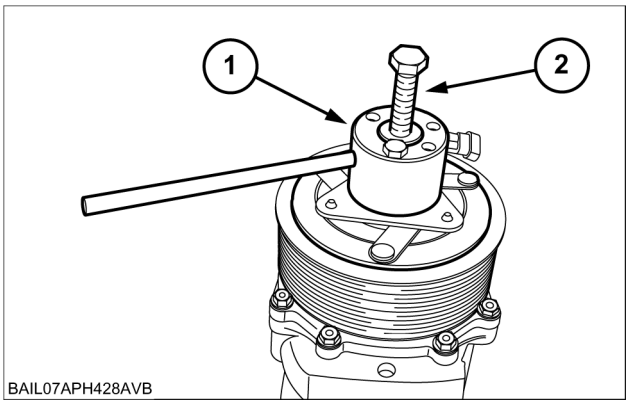
3. Attach the special tool (211-153/1, 211-153/2) to secure the coupling plate. Unscrew the locknut on the compressor shaft.



BAIL07APH428AVC 2

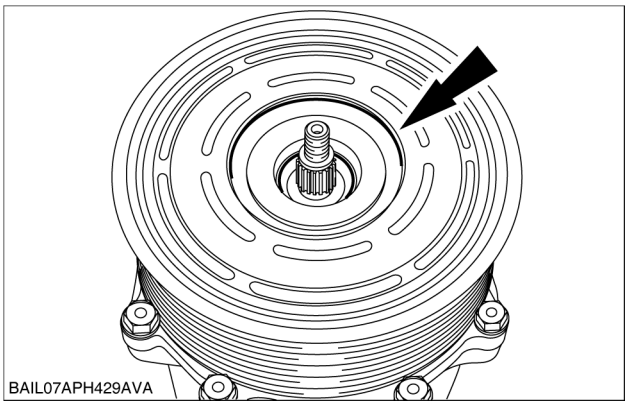
4. Place the special tool (211-153/6) on the end of the compressor shaft.
   Fit special tool **(2)** (211-153/3, 211-153/4) inside special tool **(1)** (211-153/1) and remove the coupling plate.

NOTE: *From .....→ the coupling plate is attached to the compressor shaft by means of the spring washer.*



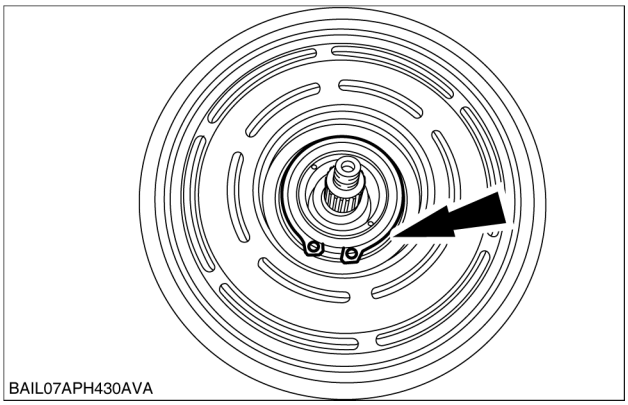
BAIL07APH428AVB 3

5. Remove and dispose of the dust protection ring for the bearing.



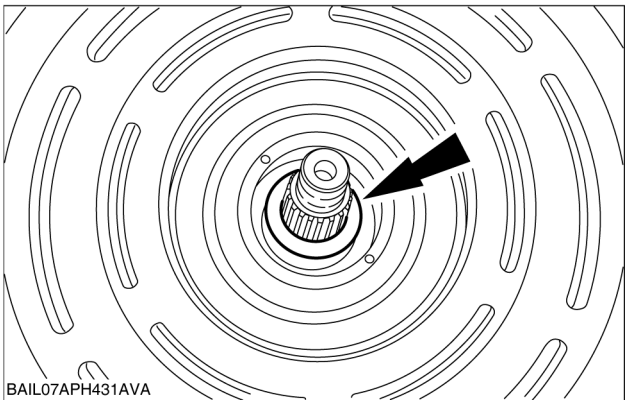
BAIL07APH429AVA 4

6. Remove belt pulley bearing's circlip.



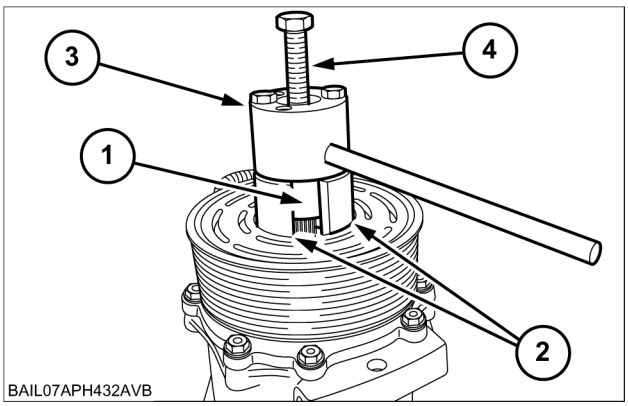
BAIL07APH430AVA 5

7. Remove the adjusting shims.



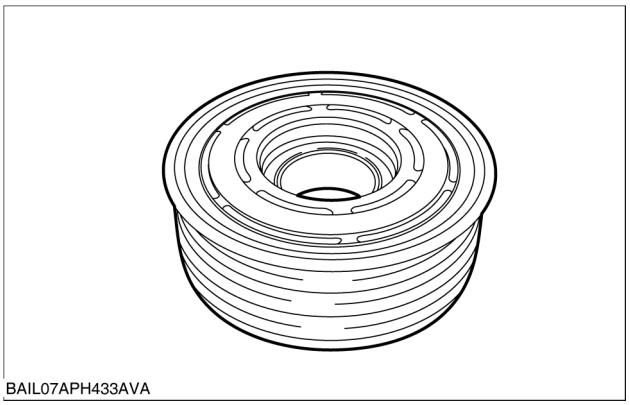
BAIL07APH431AVA 6

8. Place the special tool **(1)** (211-153/6) on the end of the compressor shaft.
Place the belt pulley chuck tool **(2)** (211-153/5) inside the groove.
Mount the pullers **(3)** (211-153/1, 211-153/2) and **(4)** (211-153/3, 211-153/4).
Pull off the coupling's belt pulley.



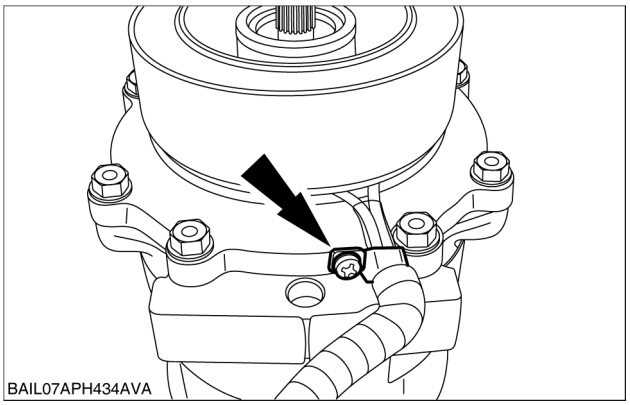
BAIL07APH432AVB 7

9. Check the belt pulley bearing for wear and replace if needed.



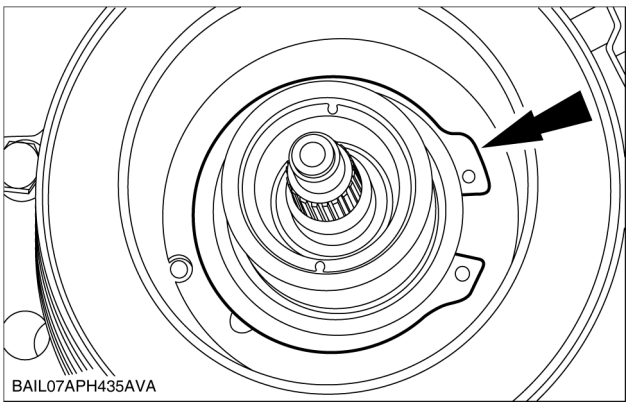
BAIL07APH433AVA 8

10. Remove cable clamp.



BAIL07APH434AVA 9

11. Remove circlip and remove exciter winding.



BAIL07APH435AVA 10

Next operation:
Compressor Magnetic clutch - Assemble (E.40.D)

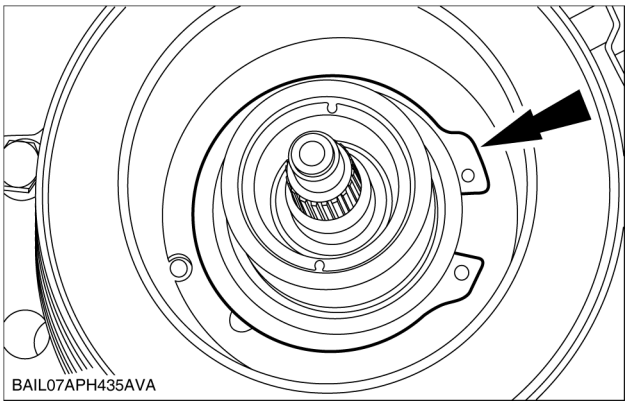
Compressor Magnetic clutch - Assemble

380000333 Air conditioning compressor toolkit

Prior operation:
Compressor Magnetic clutch - Disassemble (E.40.D)

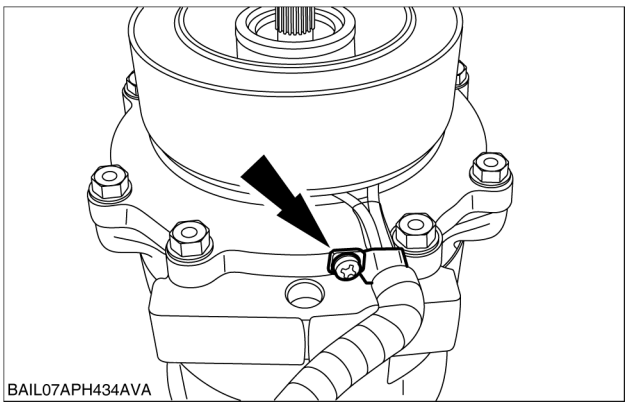
1. Fit the exciter winding.
   Secure the exciter winding using the circlip.

NOTE: *The nose of the exciter winding must be seated in the hole of the compressor housing.*



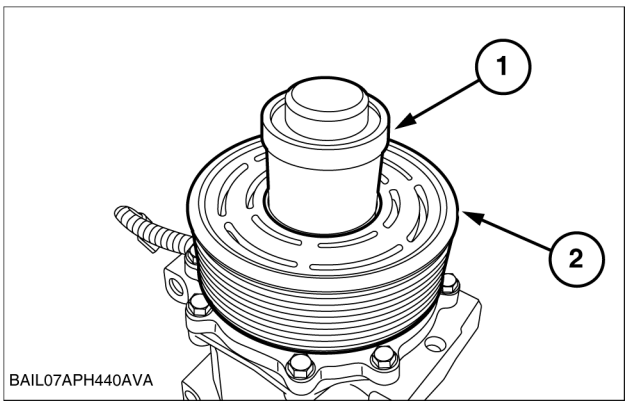
BAIL07APH435AVA 1

2. Fit cable clamp.



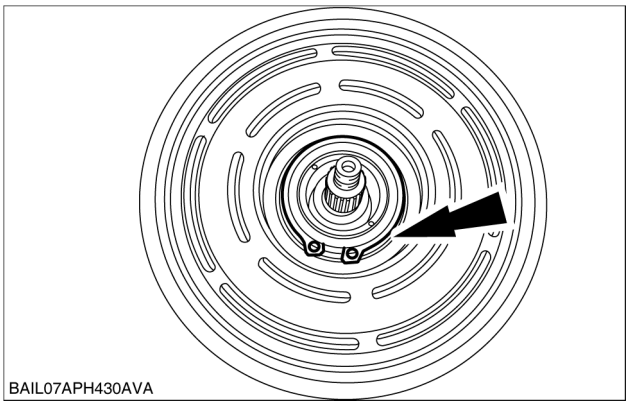
BAIL07APH434AVA 2

3. Use the special tool **(1)** (211-153/7) to drive the belt pulley bearing and the belt pulley **(2)** onto the hub of the compressor.



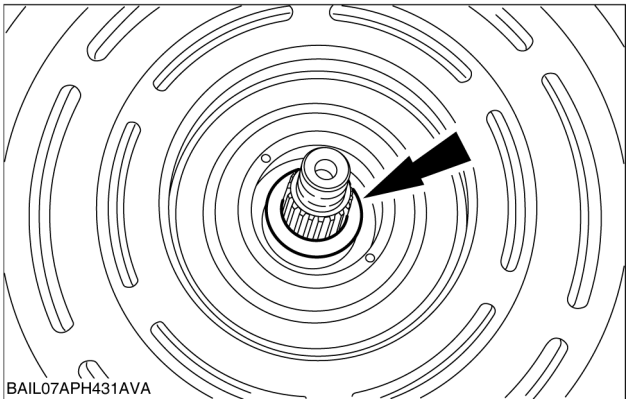
BAIL07APH440AVA 3

4. Insert bearing's circlip.



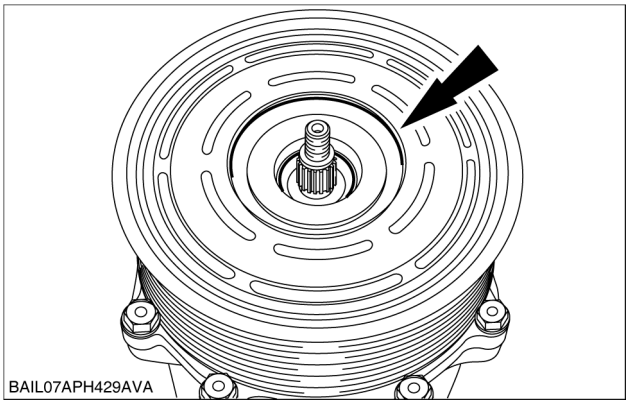
BAIL07APH430AVA 4

5. Place shims on compressor shaft.



BAIL07APH431AVA 5

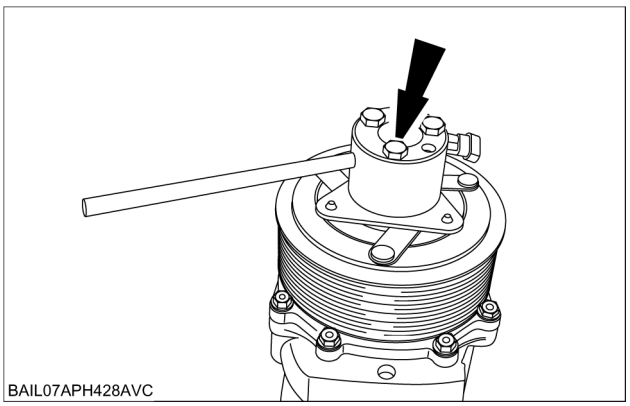
6. Insert a new dust protection ring.



BAIL07APH429AVA 6

7. Attach coupling plate.
Attach the special tool (211-153/1, 211-153/2) to secure the coupling plate. Screw the locknut onto the drive shaft and tighten to **18 Nm** (**13 lb in**).

NOTE: *From .....→ take care of the spring washer.*

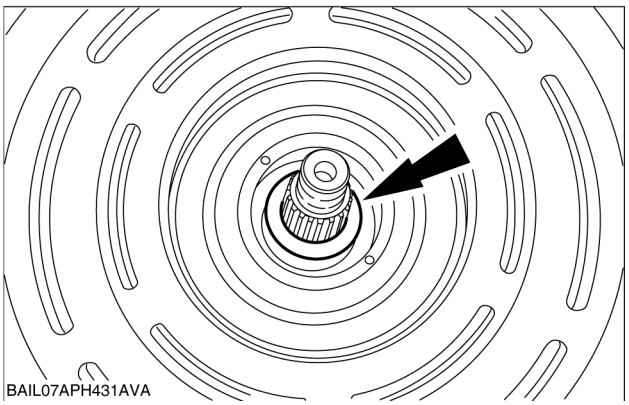


BAIL07APH428AVC 7

8. Measure the gap between the coupling plate and the belt pulley. The gap must be the same over the entire area and measure **0.4 - 0.8 mm** (**0.0164 - 0.031 in**).

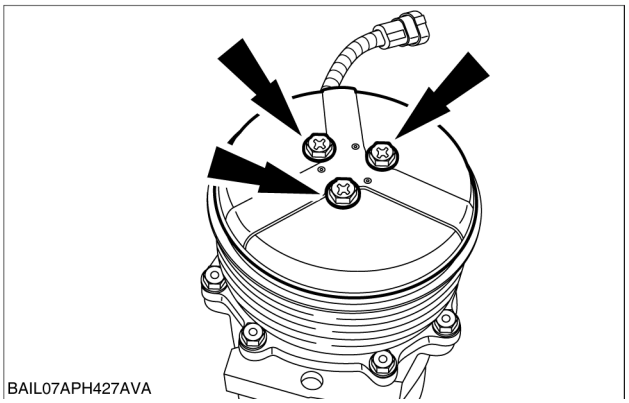
9. If the gap size is not achieved, adjusting shims must be added or removed until the prescribed gap size is achieved.

NOTE: *New shims are available in sizes 1.00,* ***0.50 - 0.13 mm****, (0.040,* ***0.020 - 0.005 in****).*



BAIL07APH431AVA 8

10. Attach the cover to the coupling plate and fit the screws.



BAIL07APH427AVA 9

Next operation:
Compressor - Install (E.40.D)

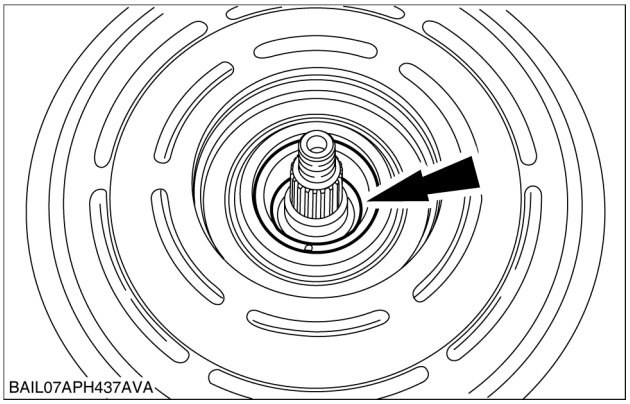
Compressor Shaft seal - Replace

380000333 Air conditioning compressor toolkit

Prior operation:
Compressor - Remove (E.40.D)
Compressor Magnetic clutch - Disassemble (E.40.D) Step 1 to step 5

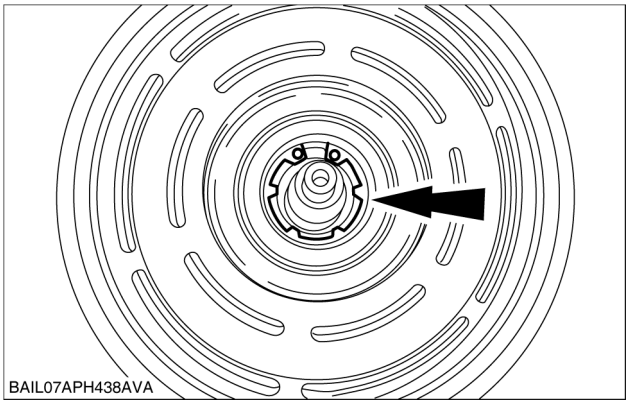
Removal

1. Remove and dispose of the felt ring.



BAIL07APH437AVA 1

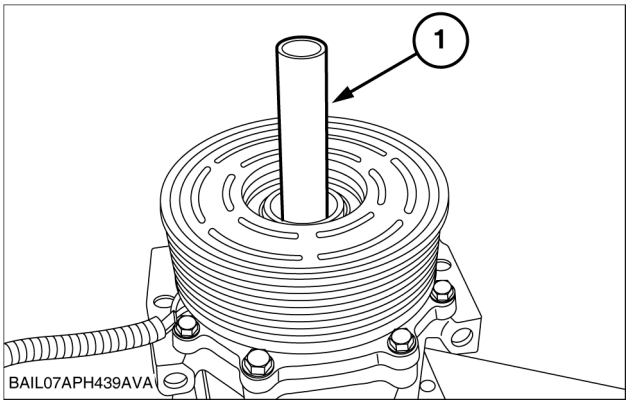
2. Remove sealing ring circlip.



BAIL07APH438AVA 2

3. Mount the assembly/disassembly tool for sealing rings **(1)** (211-154) remove and dispose of the sealing ring.

NOTE: *From .....→ the assembly/disassembly tool* ***(1)*** *(211-154) cannot be used any longer. (sealing ring changed) Remove the sealing ring using a suitable tool.*



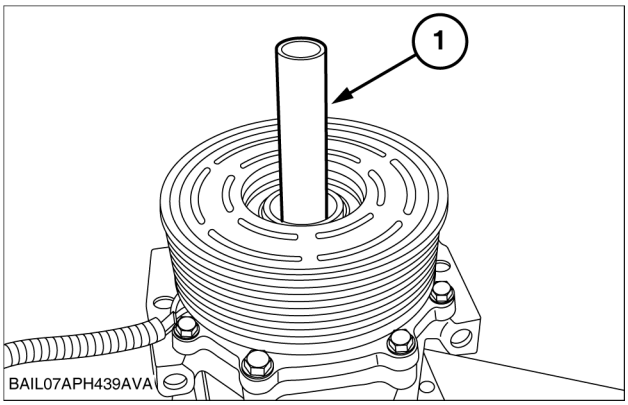
BAIL07APH439AVA 3

Installation

4. Thoroughly clean seal groove in hub. A lint-free cloth must be used.

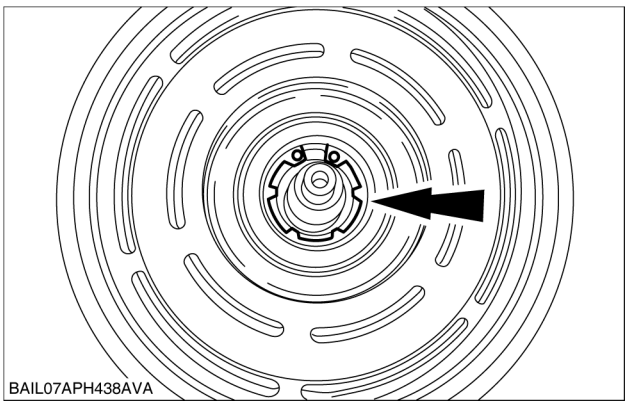
5. Spray a new sealing ring with fresh refrigerator oil. Use the assembly/disassembly tool for sealing rings **(1)** (211-154) to fit the new sealing ring.

NOTE: *Ab .....→ fit the new sealing ring using the assembly/disassembly tool (211-155). (sealing ring changed)*



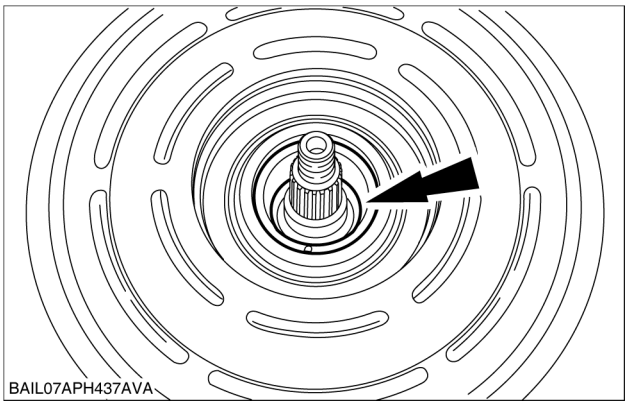
BAIL07APH439AVA 4

6. Fit sealing ring circlip.



BAIL07APH438AVA 5

7. Insert a new felt ring.



BAIL07APH437AVA 6

Next operation:
Compressor Magnetic clutch - Assemble (E.40.D) step 5 to step 10
Compressor - Install (E.40.D)

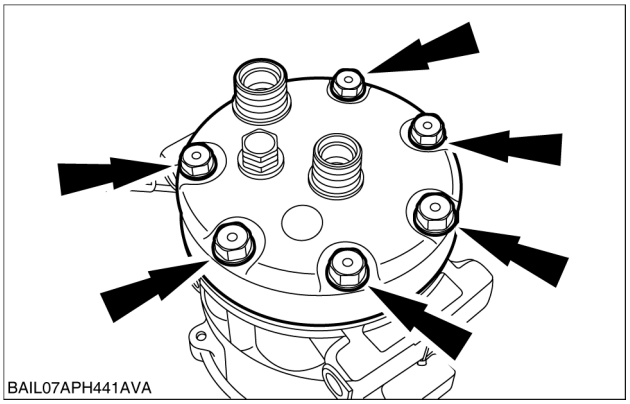
Compressor Cylinder head - Disassemble

Prior operation:
Compressor - Remove (E.40.D)

1. Clamp the compressor into a vice with protective jaws.

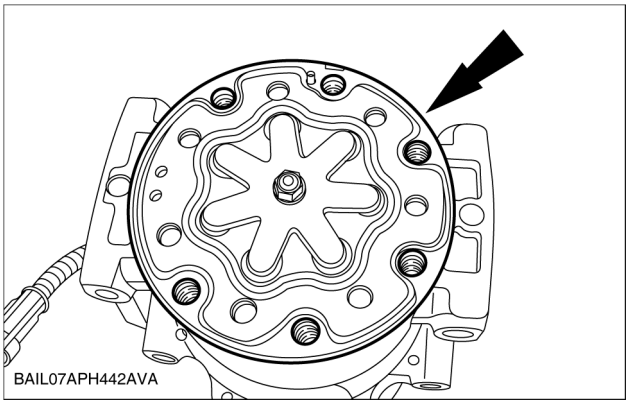
NOTE: *Do not position clamp at housing circumference.*

2. Remove the cylinder head screws. Remove the cylinder head.



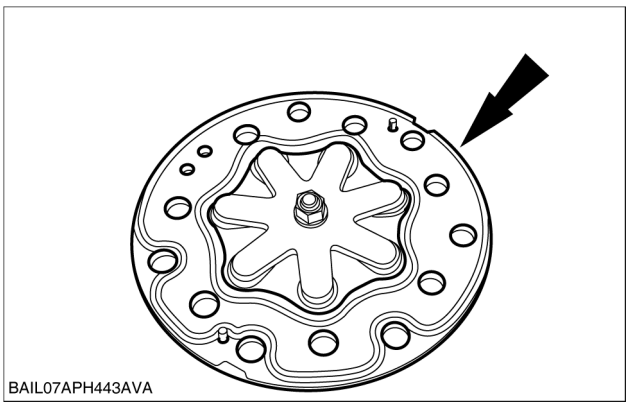
BAIL07APH441AVA 1

3. Remove the plate valve from the cylinder block and check for damage.



BAIL07APH442AVA 2

4. Remove the seals from the plate valve.



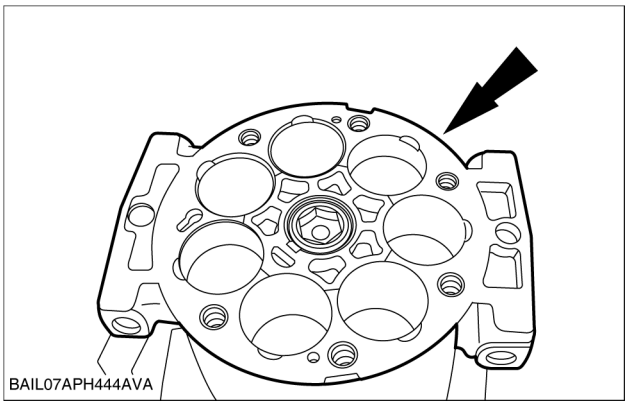
BAIL07APH443AVA 3

Next operation:
Compressor Cylinder head - Assemble (E.40.D)

Compressor Cylinder head - Assemble

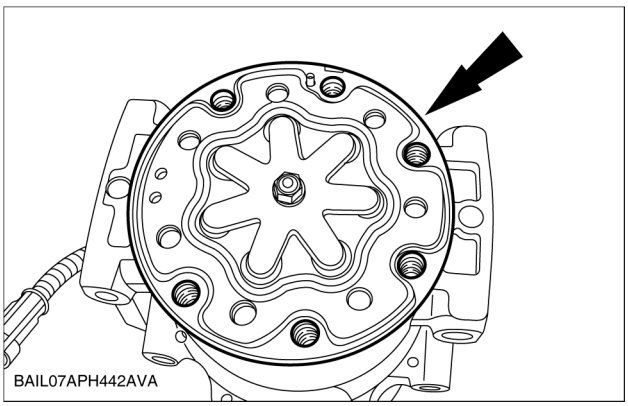
Prior operation:
Compressor Cylinder head - Disassemble (E.40.D)

1. Clean the cylinder block using a lint-free cloth.



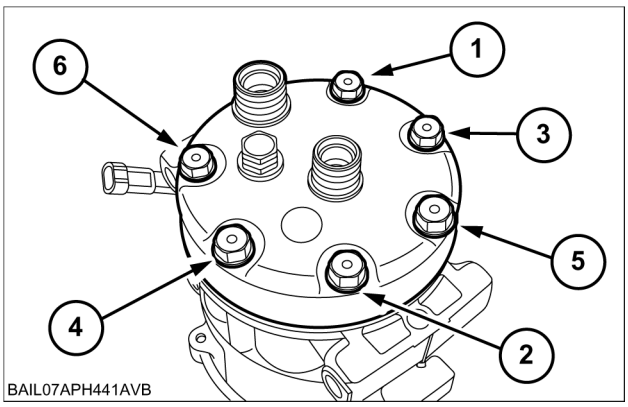
BAIL07APH444AVA 1

2. Spray new seals with fresh refrigerator oil and fit to plate valve.
3. When fitting the plate valve ensure that the dowel pins are seated correctly in the cylinder block.



BAIL07APH442AVA 2

4. Insert the cylinder head screws and tighten in the sequence pictured. First tighten the screws to **20 Nm** (**14 lbf.ft**) and then to the final torque of **32 Nm** (**24 lbf.ft**).
   .



BAIL07APH441AVB 3

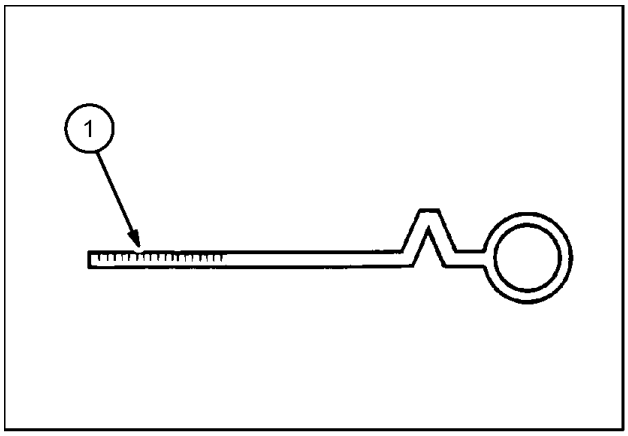
Next operation:
Compressor - Install (E.40.D)

Compressor - Filling

The oil level of the air conditioning compressor must be checked after removing a component of the air conditioner or if a leaky spot is suspected.
Use the following process to check that the correct level of oil has been filled.

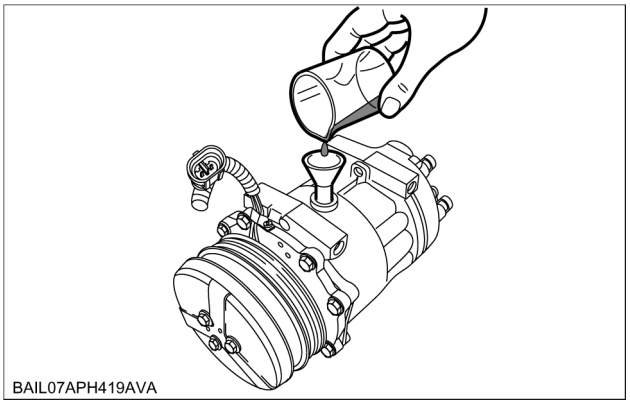
1. Start the engine and leave to idle. Switch on the air conditioner and let air conditioning compressor run for 10 minutes.
   Siphon the refrigerant out of the equipment - see **ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Discharging (E.40.D)**.

2. Remove the oil filler plug. Turn the cap nut of the fitting to allow the oil dip stick **(1)** that is provided in the parts set **380000333** to be completely inserted.
   Pull out the dip stick and count the notches that have been touched by oil. The oil level is sufficient if 5 - 7 notches are wet.
   Top up oil at the filling closure or. siphon off oil until the specified level has been reached.
   Ensure that the filling opening and the filling closure sealing ring are totally clean and undamaged. Then screw in the screw plug again and tighten to **15 - 25 Nm** (**11 - 18 lbf.ft**).



1b0o2004061087 1

3. Oil is contained in the components of the air conditioner.
   After replacing system components, oil must be added to the system to compensate for the amount of oil that was removed with the components.
   Some typical oil levels for the individual parts are provided in the table below. It is however recommended as a rule to measure the oil level as described above to have an exact level for installing new components.



BAIL07APH419AVA 2

Item	Typical oil level	
Evaporator	2.0 fl.oz.	**60 cm³**
Condenser	1.0 fl.oz.	**30 cm³**
Filter drier	0.5 fl.oz.	**15 cm³**
Hoses	0.3 fl.oz.	**10 cm³**

Next operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Evacuate (E.40.D)
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Charging (E.40.D)

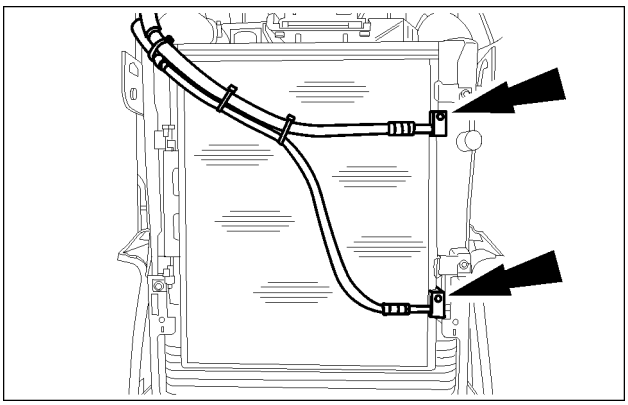
Condenser - Replace

Prior operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Discharging (E.40.D)

Removal

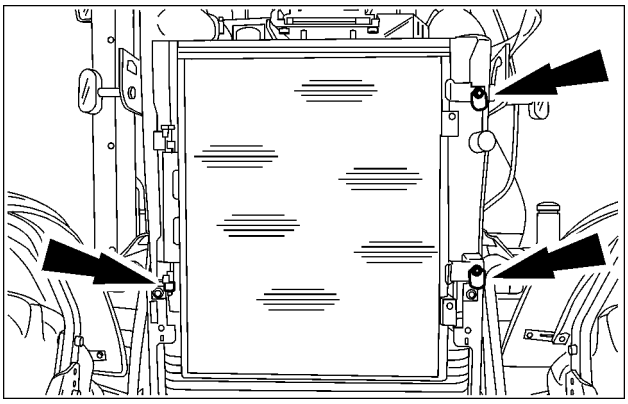
1. Unscrew the screws for the feed and return lines and remove the lines.

NOTE: *Use plugs or screws to close all openings to avoid impurities in the unit.*



SS08F001 1

2. Unscrew the nut of the condenser hinge pin and pull out the hinge pin. Unscrew the tension locks and lift out the condenser.



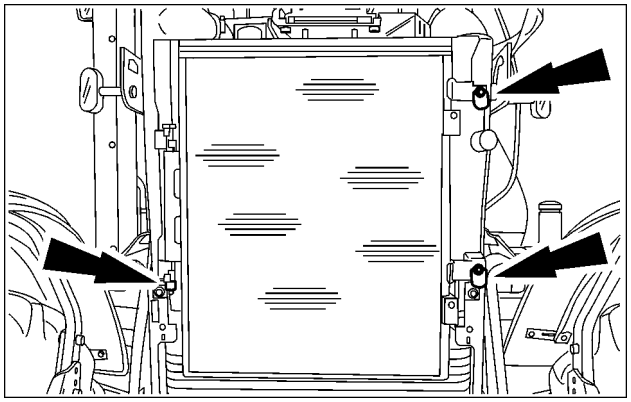
SS08F002 2

3. Check the condenser cooling fins for damage and blockages.
   Check the condenser for signs of leakage. The condenser must be replaced if damaged or leaking.

Assembly

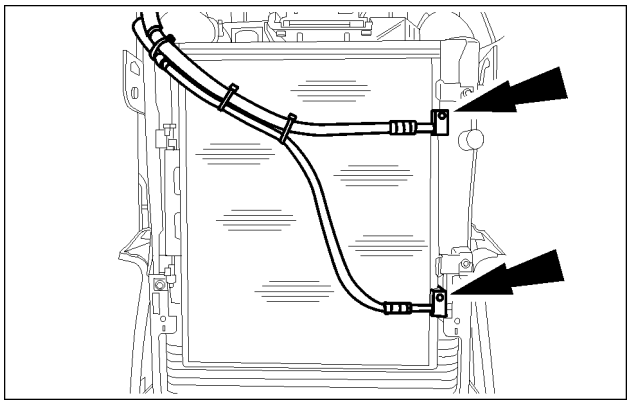
4. If the condenser needs to be replaced, drain the refrigerator oil into a clean measuring container. Measure the quantity of oil and fill the new condenser with the same amount of fresh refrigerator oil - see **Compressor - Filling (E.40.D)**.

5. Move the condenser to its installation position. Insert the hinge bolt and secure with the nut. Close the tension locks.



SS08F002 3

6. Position the feed and return lines and screw in the screws.



SS08F001 4

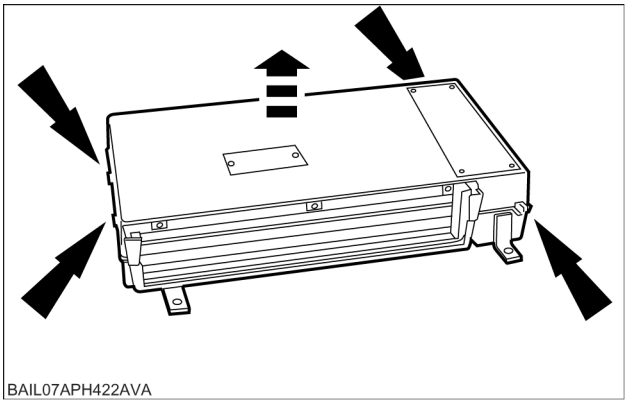
Next operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Evacuate (E.40.D)
Compressor - Filling (E.40.D)
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Charging (E.40.D)

Evaporator - Replace

Prior operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Remove (Heating and air conditioning device) (E.40.D)

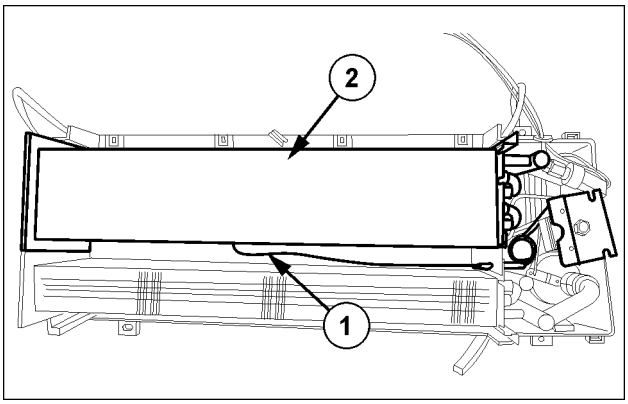
Removal

1. Remove the retaining screws of the rear air duct; remove the air duct. Remove the four retaining clips on the housing and remove the upper part of the housing.



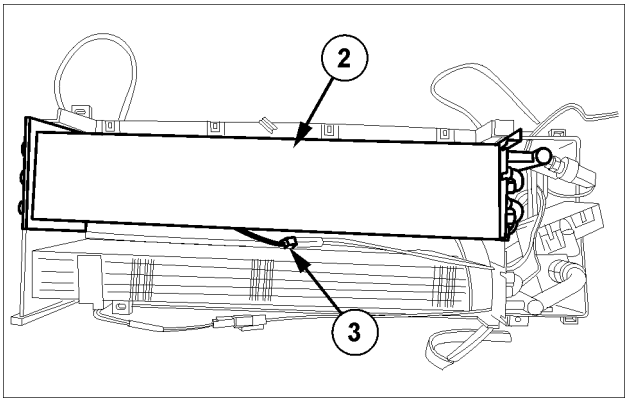
BAIL07APH422AVA 1

2. Standard air conditioner design:
Remove the evaporator temperature sensor **(1)**. Remove the evaporator **(2)**.



SS08D026 2

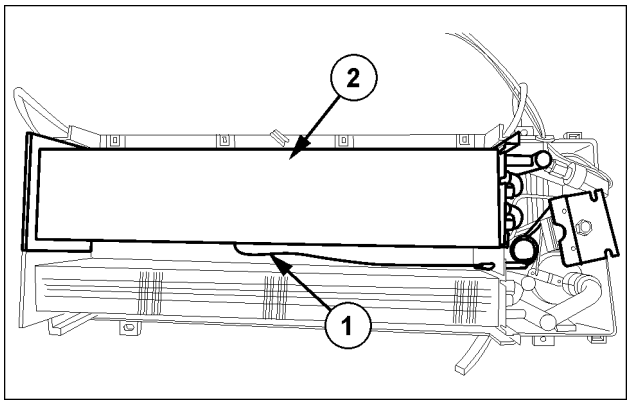
Automatic air conditioner (ATC) design:
Remove the evaporator temperature sensor **(3)**. Remove the evaporator **(2)**.



SS08D027 3

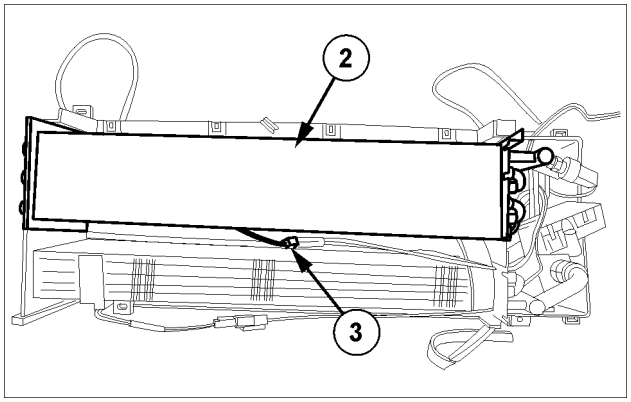
Assembly

3. Standard air conditioner design:
   Insert the evaporator **(2)**. Asemble the evaporator temperature sensor **(1)**.



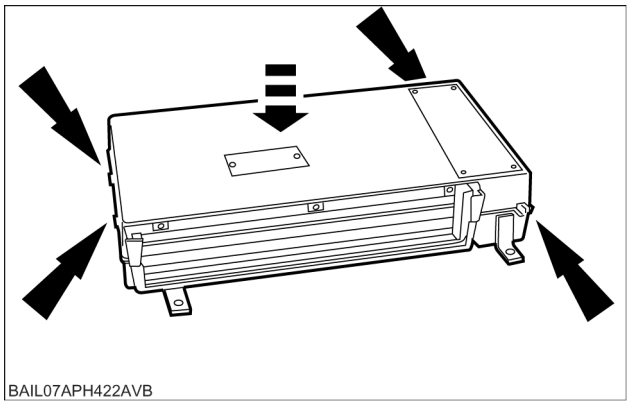
SS08D026 4

Automatic air conditioner (ATC) design:
Insert the evaporator **(2)**. Asemble the evaporator temperature sensor **(3)**.



SS08D027 5

4. Fit the upper part of the housing.
   Attach the four retaining clips to the housing. Attach the rear air duct and screw in the retaining screws.



BAIL07APH422AVB 6

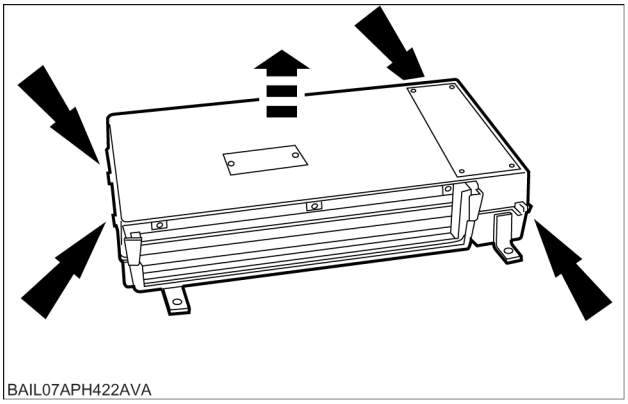
Next operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Install (Heating and air conditioning device) (E.40.D)

Expansion valve - Replace

Prior operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Remove (Heating and air conditioning device) (E.40.D)

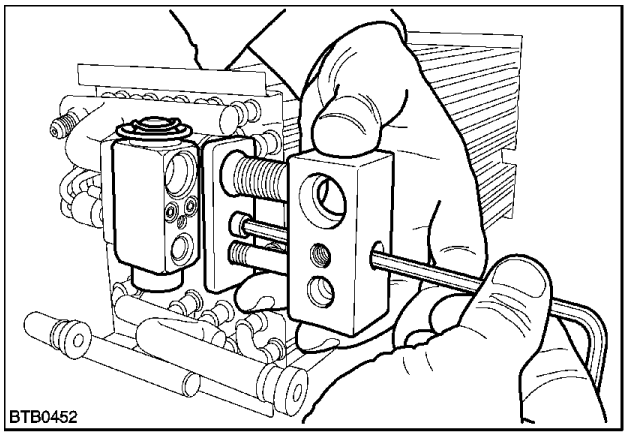
Removal

1. Remove the four retaining clips on the housing and take out the evaporator to obtain access to the expansion valve.



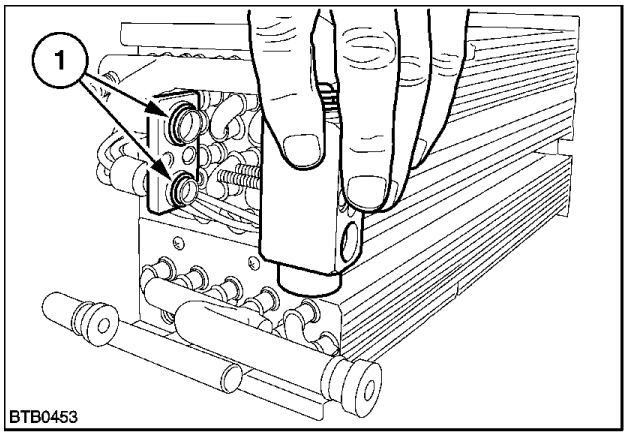
BAIL07APH422AVA 1

2. Unscrew the retaining socket screw of the inlet/outlet support on the expansion valve and remove the support.



BTB0452 2

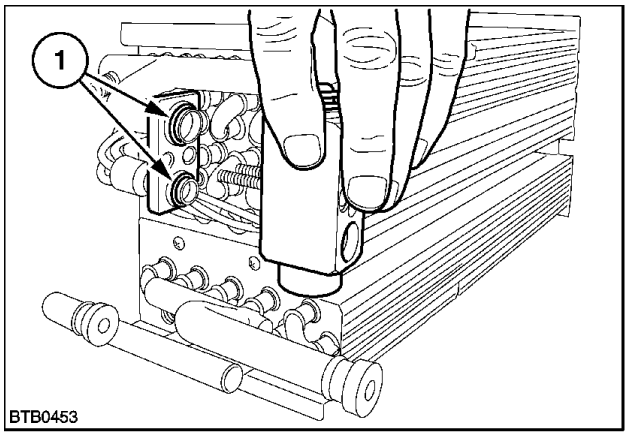
3. Remove the expansion valve and remove the 'O'-rings **(1)**.



BTB0453 3

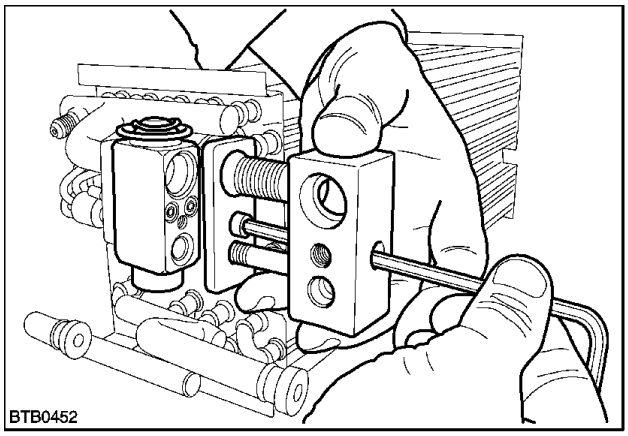
Assembly

4. Fit new 'O'-rings **(1)**, grease with refrigerator oil and install the expansion valve.



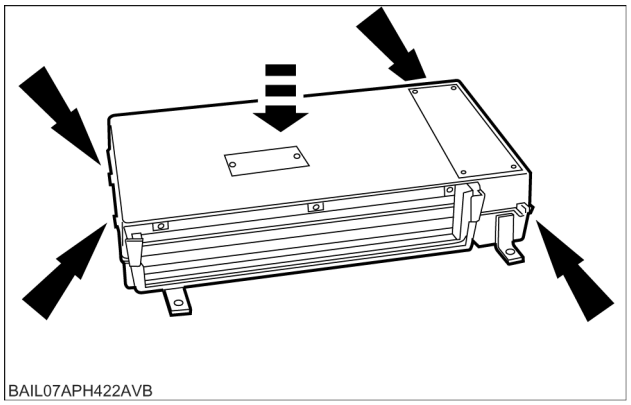
BTB0453 4

5. Screw in the socket screw and use it to secure the inlet/outlet support on the expansion valve.



BTB0452 5

6. Install the evaporator inside its housing and attach the four retaining clips.



BAIL07APH422AVB 6

Next operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Install (Heating and air conditioning device) (E.40.D)

Heater Water valve actuator - Replace

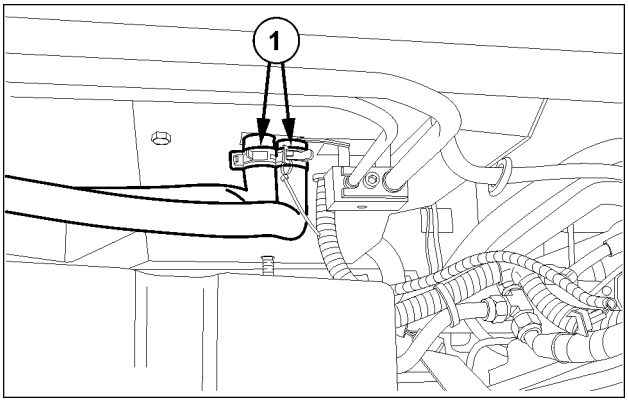
PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)

Prior operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Remove (Heating and air conditioning device) (E.40.D) Step 1 to step 4 and step 14 to step 19

NOTE: *The refrigerant does not have to be siphoned out of the unit in order to replace the heating valve.*

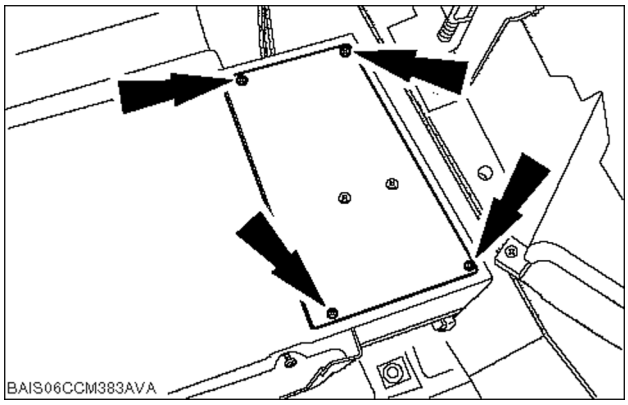
Removal

1. Pull off the hoses for the cab heating **(1)**.



SS08D110 1

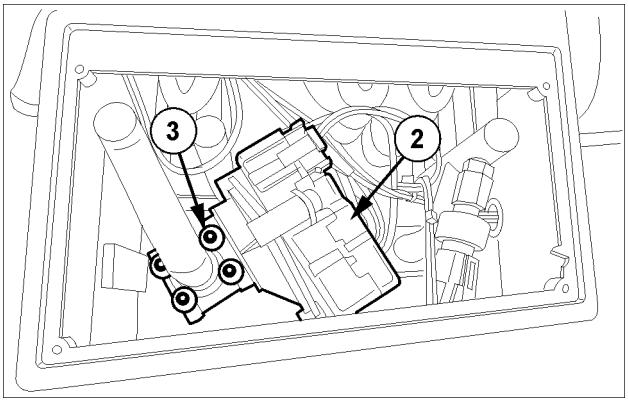
2. Remove the cover plate from the heating and air conditioning unit.



BAIS06CCM383AVA 2

3. Disassemble the socket from the electrical heating valve **(2)**. Remove the hose clips **(3)** and remove the heating valve.

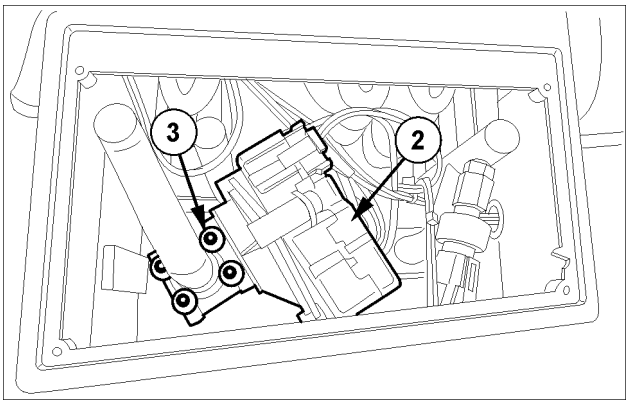
NOTE: *The servo motor can be disassembled alone or together with the heating valve as required.*



SS08D020 3

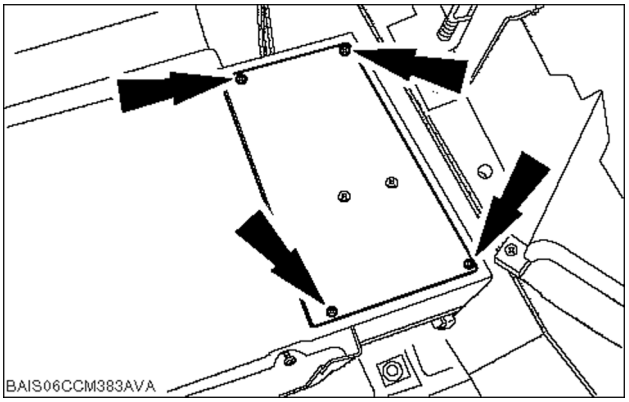
Assembly

4. Fit the heating valve using the retaining screws **(3)**. Disassemble the socket from the electrical heating valve **(2)**.



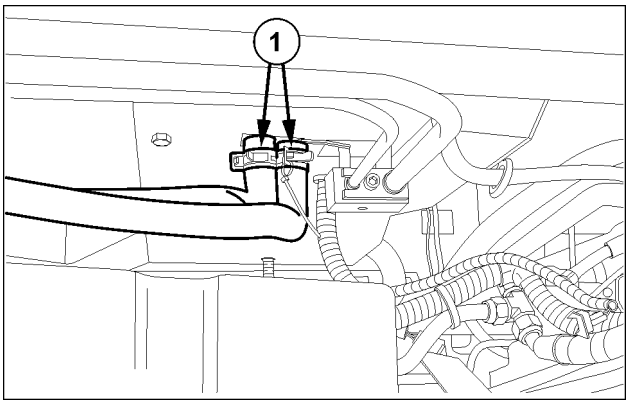
SS08D020 4

5. Fit the cover plate to the heating and air conditioning unit.



BAIS06CCM383AVA 5

6. Fit the hoses for the cab heating **(1)**.



SS08D110 6

Next operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Install (Heating and air conditioning device) (E.40.D) Step 4 to step 8 and step 20 to step 23

Receiver/drier - Replace

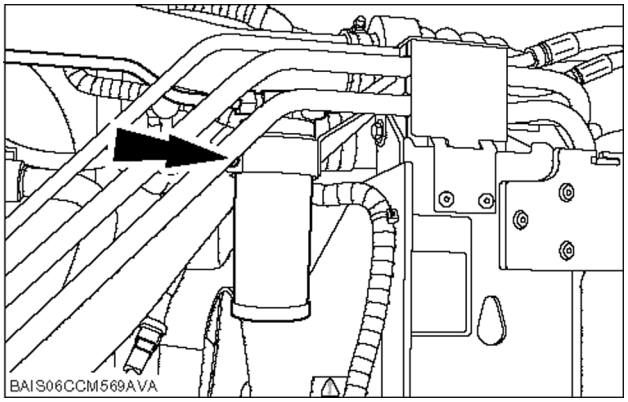
The fluid reservoir with drying element should always be changed if there are signs of moisture in the unit.
It must also be changed after the refrigerant has been siphoned out of the unit and the hose fittings have been disconnected.

Prior operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Discharging (E.40.D)

Removal

1. Open the connections at the drier. Remove the bracket screws and take out the drier.

NOTE: *Use protective caps to close the open connections to avoid impurities in the unit.*

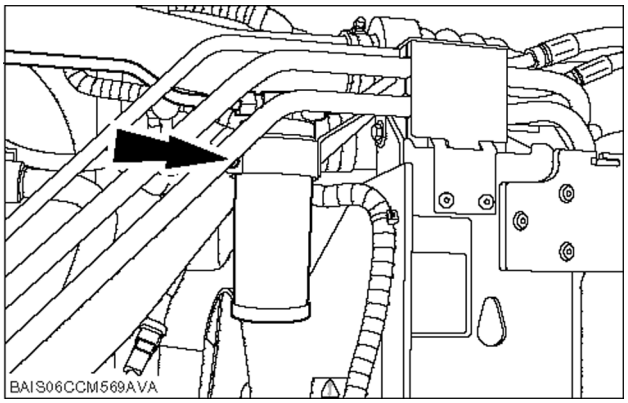


BAIS06CCM569AVA 1

Assembly

2. When the drier is changed, drain the refrigerator oil into a clean measuring container. Measure the quantity of oil and fill the new drier with the same amount of fresh refrigerator oil - see **Compressor - Filling (E.40.D)**.

3. Remove the protective caps from the connections. Attach the drier to the bracket and do not tighten the clamping screw. Connect the feed and return lines to the drier and tighten.
   Tighten the clamping screw.



BAIS06CCM569AVA 2

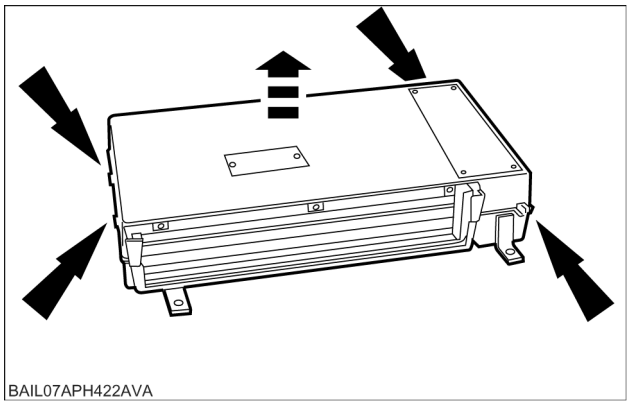
Next operation:
Compressor - Filling (E.40.D)
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Evacuate (E.40.D)
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Charging (E.40.D)

Cooler - Replace

Prior operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Remove (Heating and air conditioning device) (E.40.D)

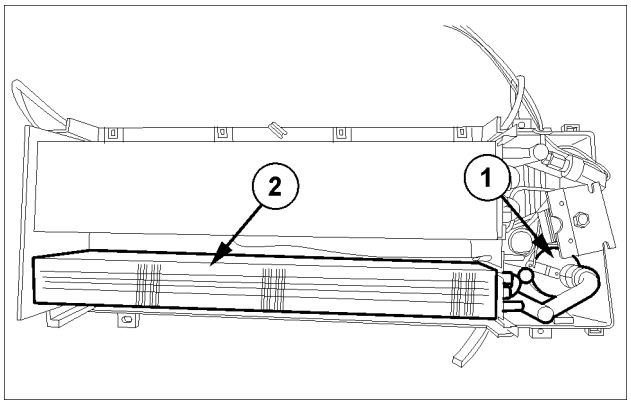
Removal

1. Remove the retaining screws of the rear air duct; remove the air duct.
   Remove the four retaining clips on the housing and remove the upper part of the housing.



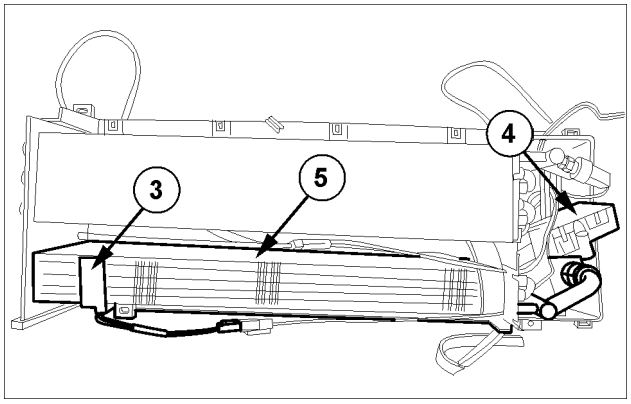
BAIL07APH422AVA 1

2. Standard air conditioner design:
   Disassemble the heating valve **(1)**. Remove the heating cooler **(2)**.



SS08D017 2

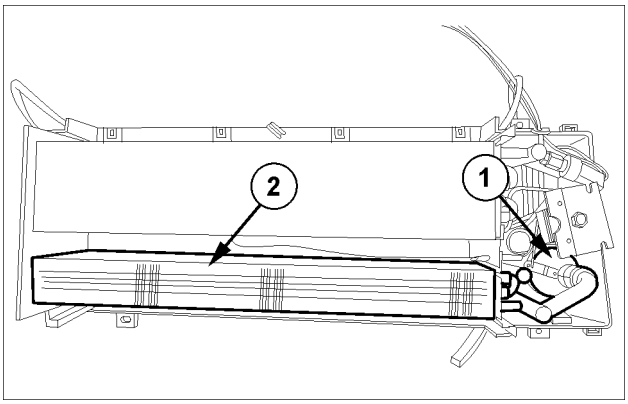
Automatic air conditioner (ATC) design:
Disassemble the air outlet temperature sensor **(3)** and the electrical heating valve **(4)**. Remove the heating cooler **(5)**.



SS08D016 3

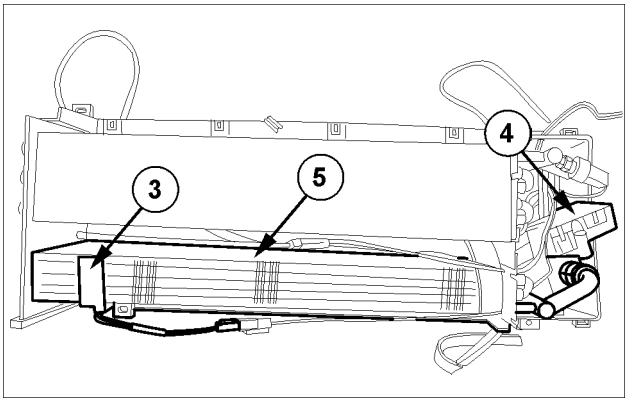
Assembly

3. Standard air conditioner design:
   Install the heating cooler **(2)**. Fit the heating valve **(1)**.



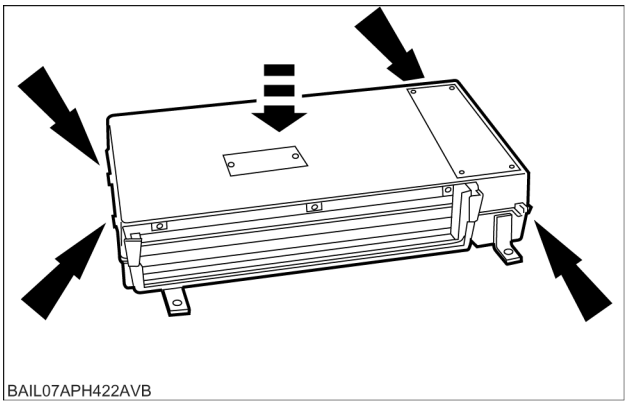
SS08D017 4

Automatic air conditioner (ATC) design:
Install the heating cooler **(5)**. Fit the air outlet temperature sensor **(3)** and the electrical heating valve **(4)**.



SS08D016 5

4. Fit the upper part of the housing again. Attach the four retaining clips to the housing. Attach the rear air duct and screw in the retaining screws.



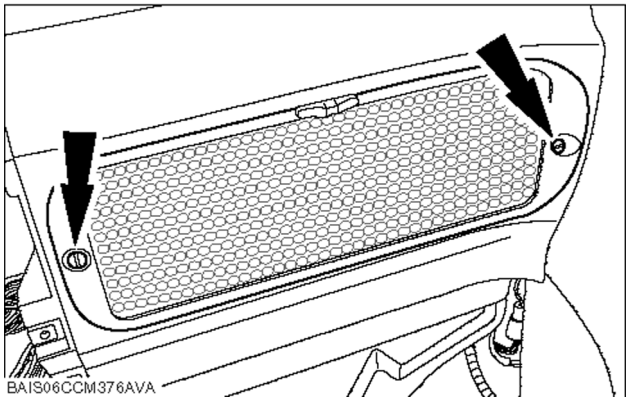
BAIL07APH422AVB 6

Next operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Install (Heating and air conditioning device) (E.40.D)

Ventilation system Motor - Replace

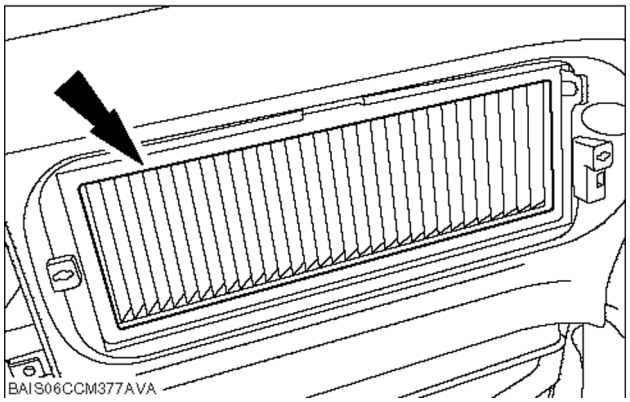
Removal

1. Turn the starter switch to the “OFF” position.
   Remove the air circulation grating.



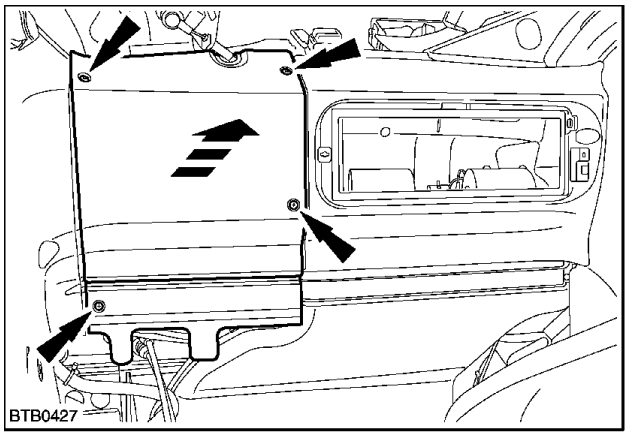
BAIS06CCM376AVA 1

2. Remove the air circulation filter element.



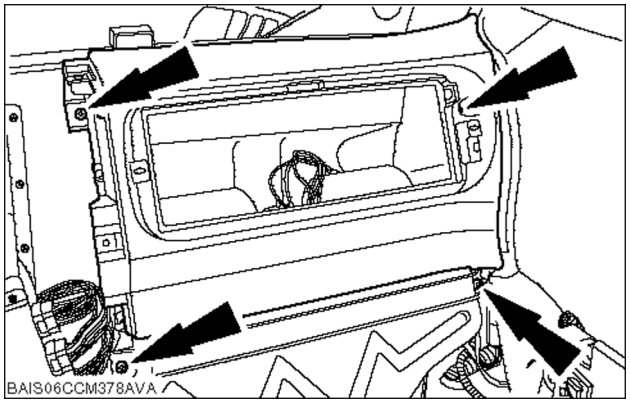
BAIS06CCM377AVA 2

3. Remove the cover next to the fan housing.



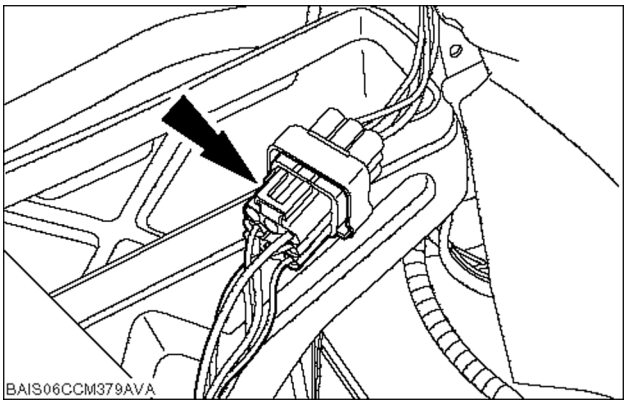
BTB0427 3

4. Unscrew the retaining screws of the fan housing.



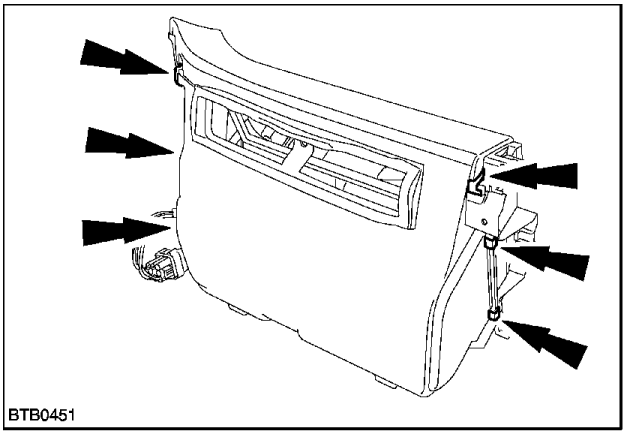
BAIS06CCM378AVA 4

5. Remove the electrical connector of the fan motor. Remove the fan motor housing.



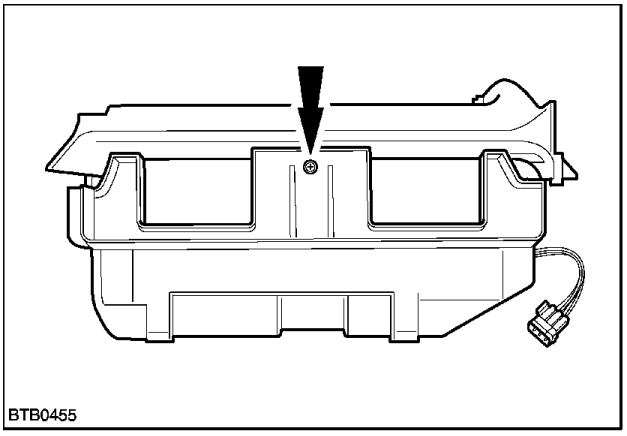
BAIS06CCM379AVA 5

6. To obtain access to the fan motor, remove the 6 retaining clips which are used to join the two halves of the fan housing.



BTB0451 6

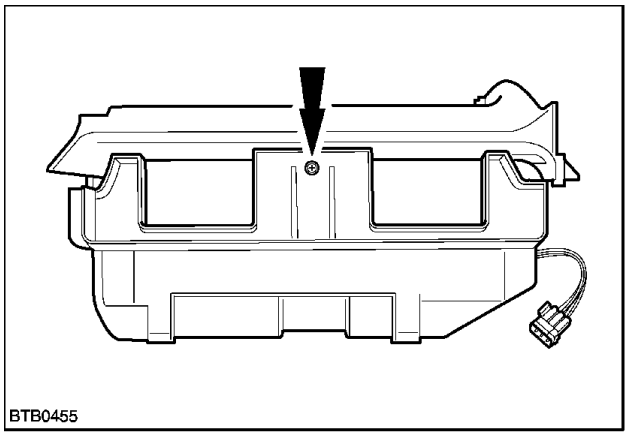
7. Unscrew the retaining screw of the fan and pull the fan out of the housing.



BTB0455 7

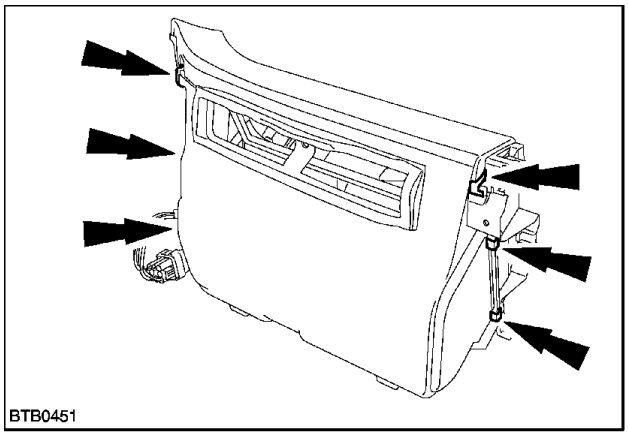
Assembly

8. Place the fan in the back half of the housing and secure using the retaining screw.



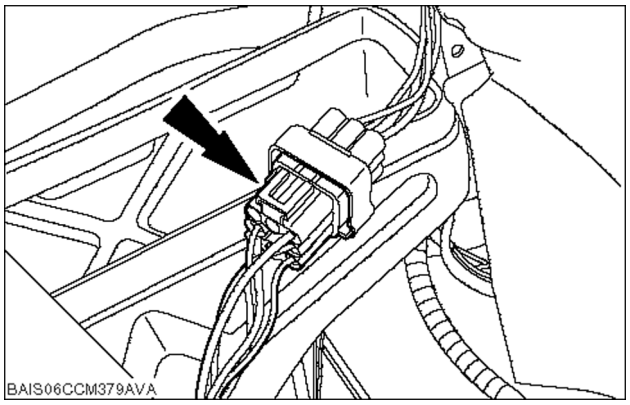
BTB0455 8

9. Assembly the two halves of the fan motor housing and secure it using the 6 retaining clips.



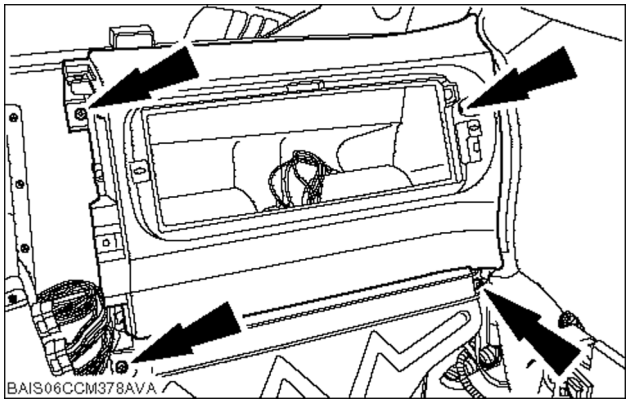
BTB0451 9

10. Attach the electrical connector of the fan motor and install the fan motor housing.



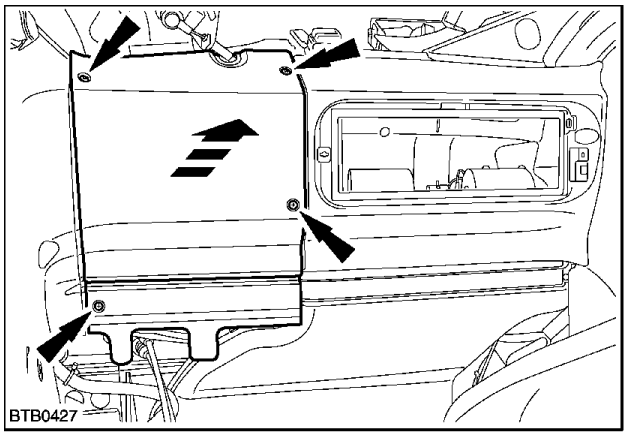
BAIS06CCM379AVA 10

11. Screw in the retaining screws of the fan housing.



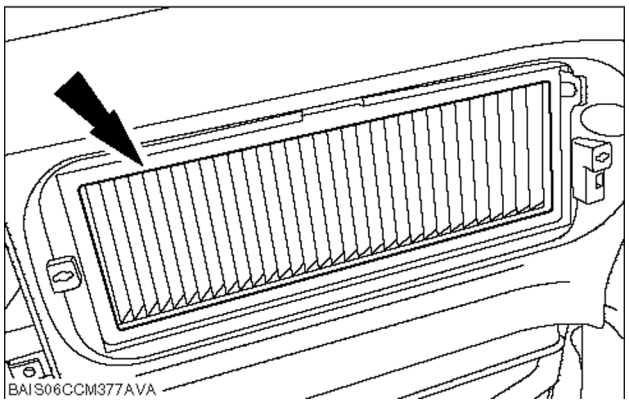
BAIS06CCM378AVA 11

12. Attach the cover next to the fan housing.



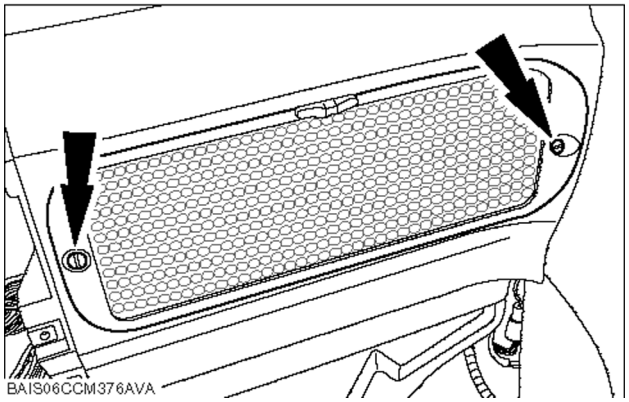
BTB0427 12

13. Fit the air circulation filter element.



BAIS06CCM377AVA 13

14. Attach the air circulation grating and secure using the two retaining screws.



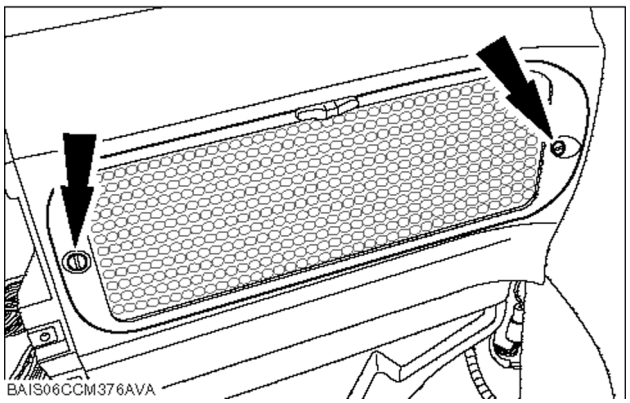
BAIS06CCM376AVA 14

Ventilation system Blower speed drive - Replace (Voltage divider)

PUMA 165 Standard Climate Control, PUMA 180 Standard Climate Control, PUMA 195 Standard Climate Control, PUMA 210 Standard Climate Control, PUMA 165 Multicontroller Standard Climate Control, PUMA 180 Multicontroller Standard Climate Control, PUMA 195 Multicontroller Standard Climate Control, PUMA 210 Multicontroller Standard Climate Control

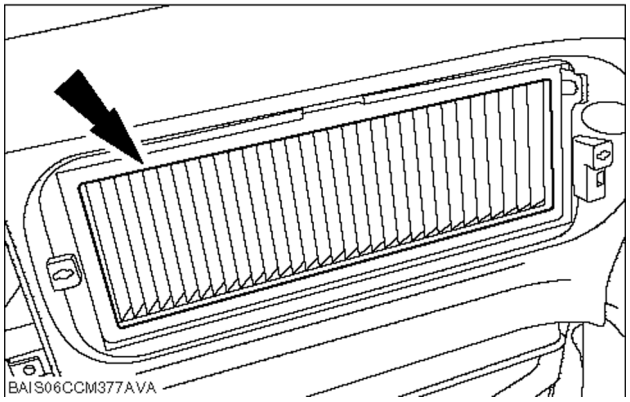
Removal

1. Turn the starter switch to the “OFF” position. Remove the air circulation grating.



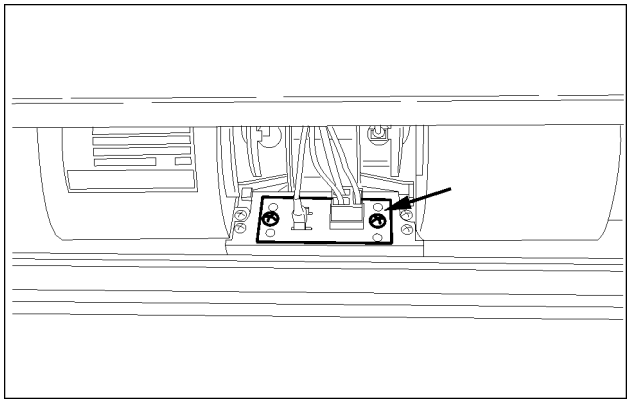
BAIS06CCM376AVA 1

2. Remove the air circulation filter element.



BAIS06CCM377AVA 2

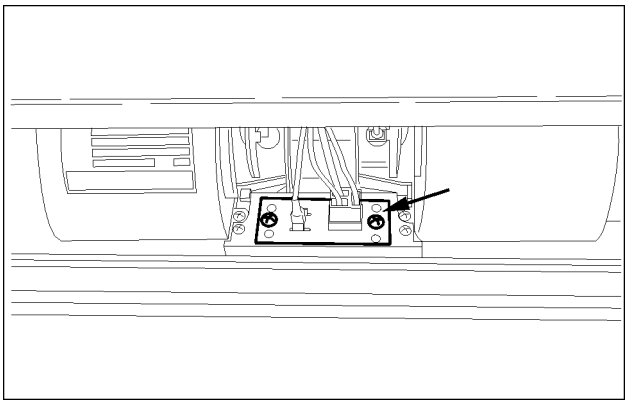
3. Unscrew the retaining screws, disconnect the connector and remove the voltage divider.



SS08D014 3

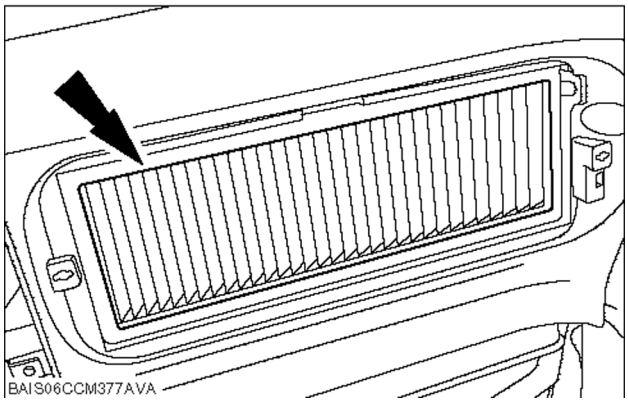
Assembly

4. Fit the voltage divider.
   Tighten the retaining screws and connect the connector.



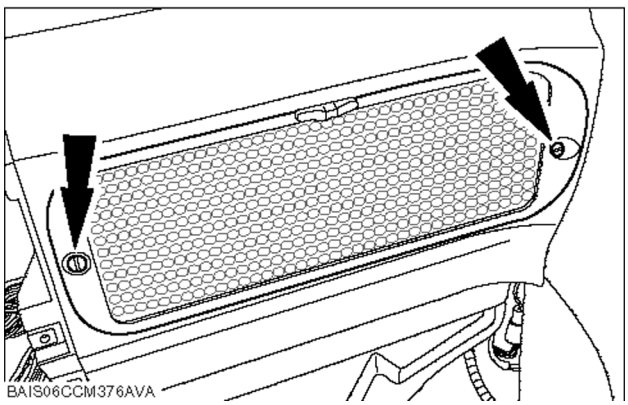
SS08D014 4

5. Insert the air circulation filter element again.



BAIS06CCM377AVA 5

6. Re-fit the air circulation grating.



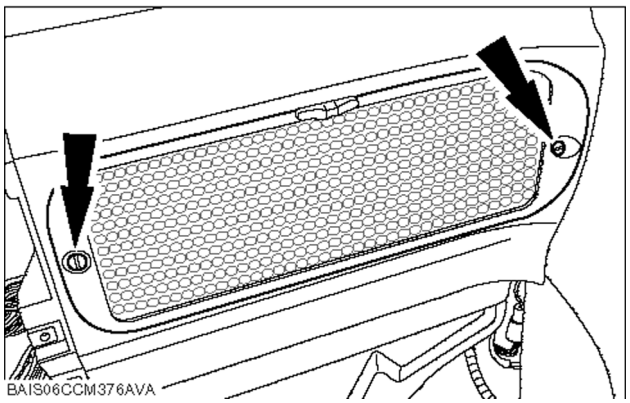
BAIS06CCM376AVA 6

Ventilation system Blower speed drive - Replace (Voltage regulator)

PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)

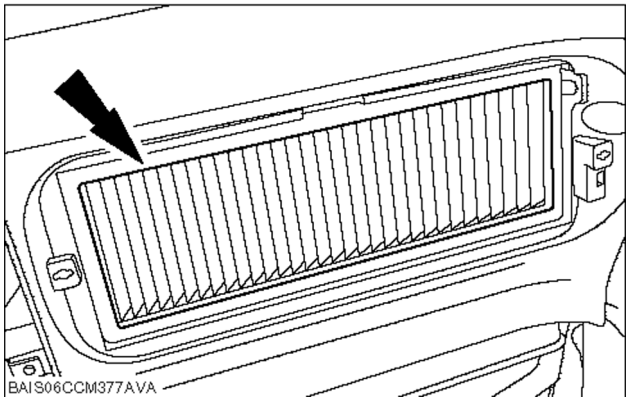
Removal

1. Turn the starter switch to the “OFF” position. Remove the air circulation grating.



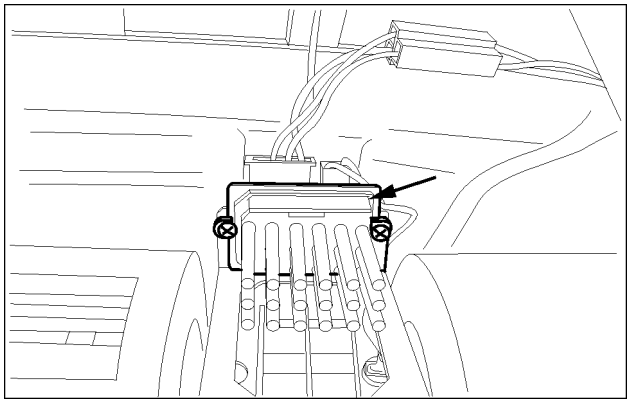
BAIS06CCM376AVA 1

2. Remove the air circulation filter element.



BAIS06CCM377AVA 2

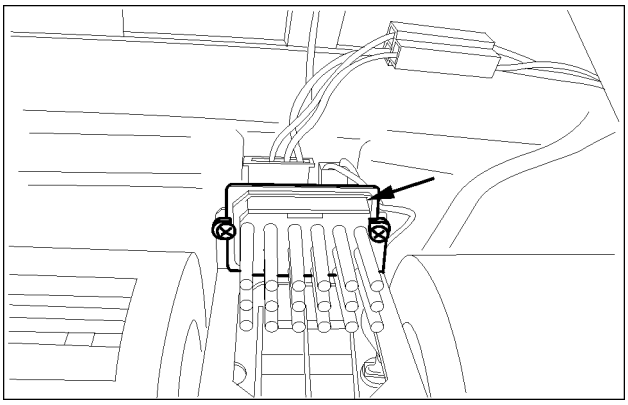
3. Unscrew the retaining screws, disconnect the connector and remove the voltage regulator.



SS08D015 3

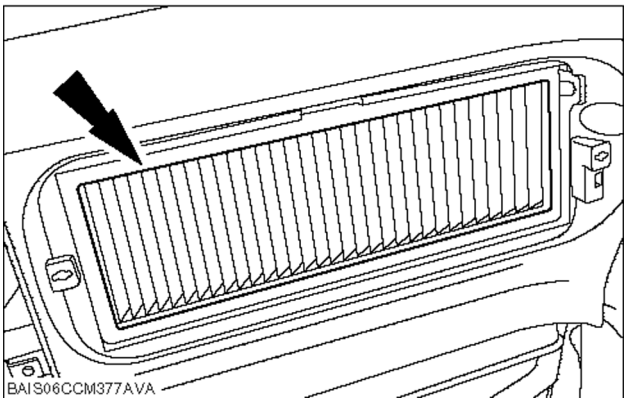
Assembly

4. Fit the voltage regulator.
   Tighten the retaining screws and connect the connector.



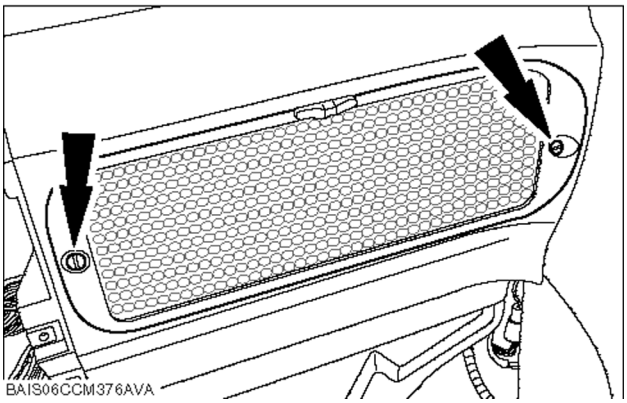
SS08D015 4

5. Insert the air circulation filter element again.



BAIS06CCM377AVA 5

6. Re-fit the air circulation grating.

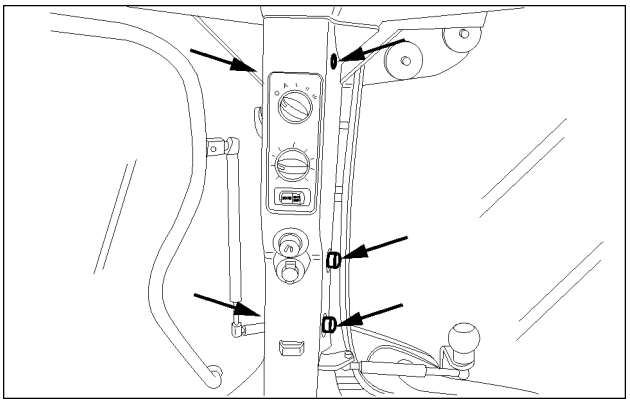


BAIS06CCM376AVA 6

Electrical control Temperature control potentiometer - Replace

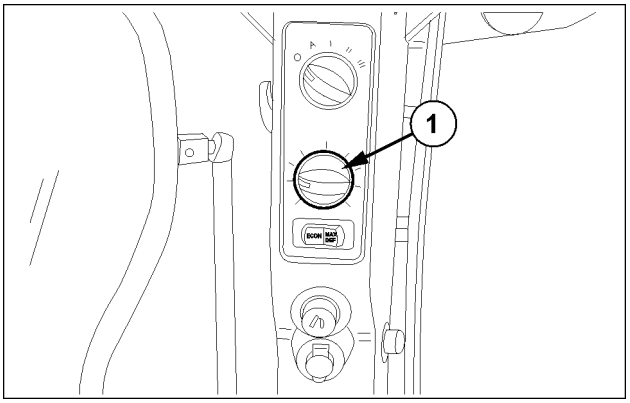
PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)

1. Turn the starter switch to the “OFF” position.
   Remove the facing.



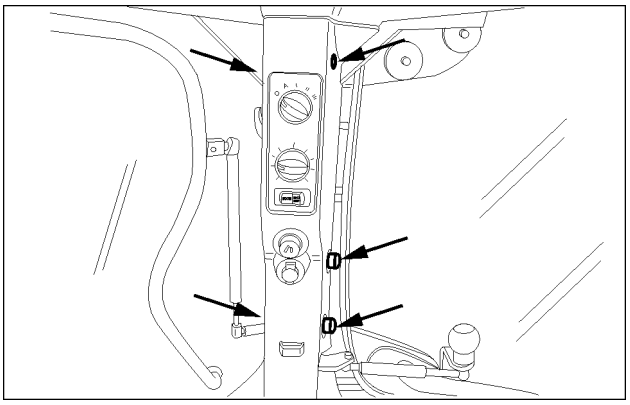
SS08D010 1

2. Remove the turning knob **(1)** and unscrew the cap nut located behind it.
   Disconnect the plug connection.
   Replace the potentiometer.



SS08D102 2

3. Tighten the cap nut and fit the turning knob **(1)**.
   Connect the connector.
4. Re-install the facing.



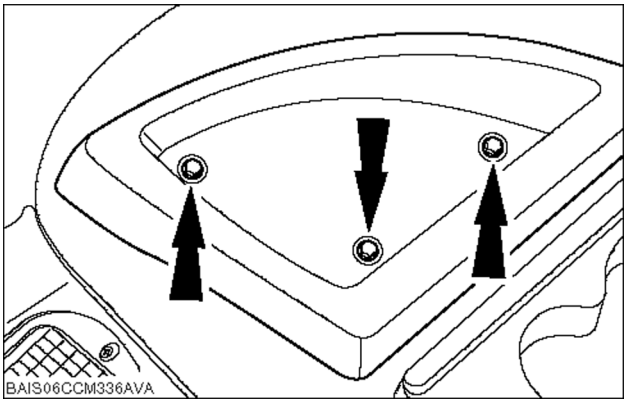
SS08D010 3

Electronic HVAC control - Replace

PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)

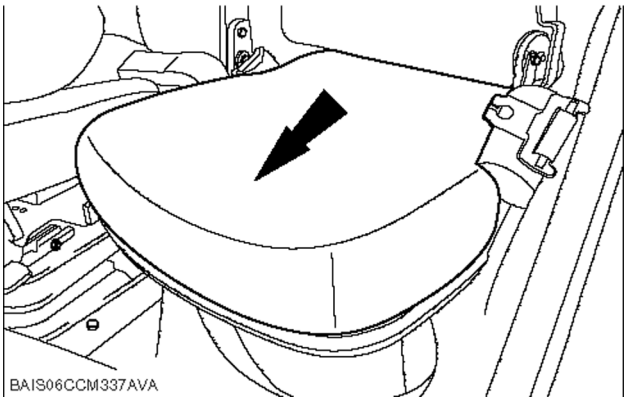
Removal

1. Turn the starter switch to the “OFF” position.
   Disassemble the repository on the left side.



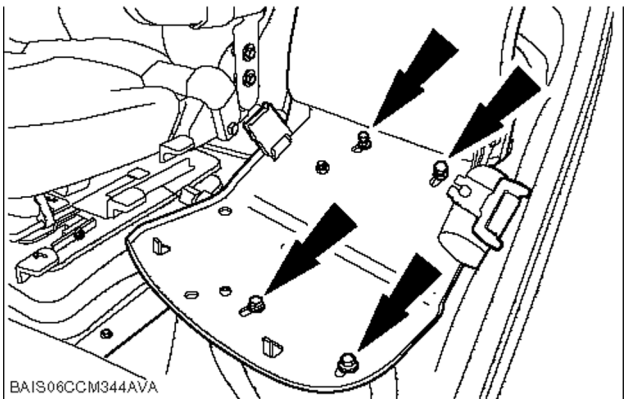
BAIS06CCM336AVA 1

2. Remove the seat cushion from the passenger seat.



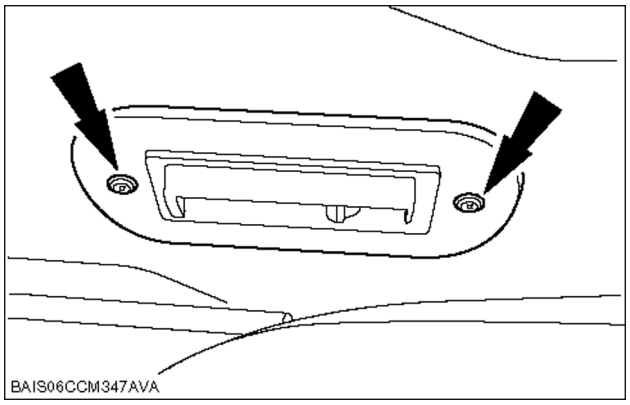
BAIS06CCM337AVA 2

3. Remove the passenger seat.
   Remove the retaining plate.



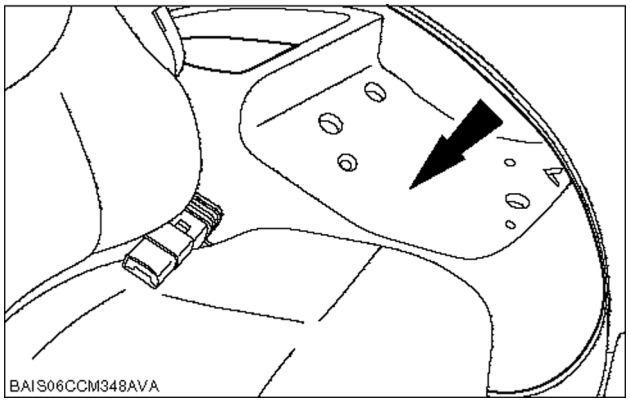
BAIS06CCM344AVA 3

4. Disassemble the air outlet on the left side.



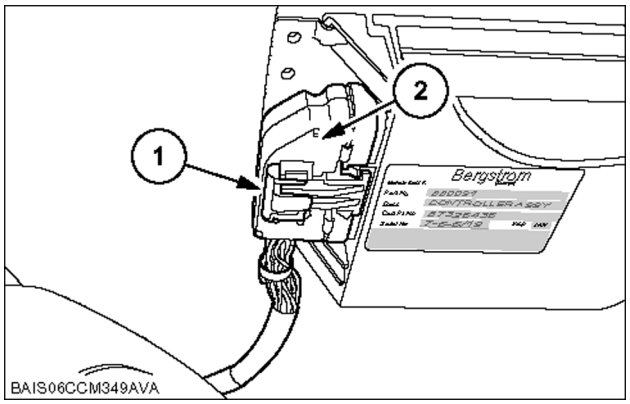
BAIS06CCM347AVA 4

5. Remove the side covering on the left.



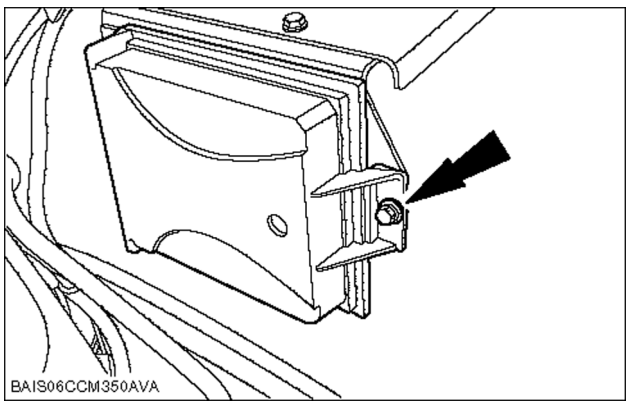
BAIS06CCM348AVA 5

6. Remove the connector tab **(1)** and pull out the connector **(2)**.



BAIS06CCM349AVA 6

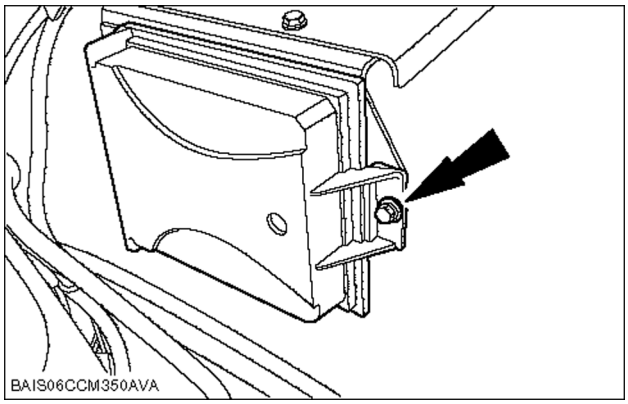
7. Remove the climate controller.



BAIS06CCM350AVA 7

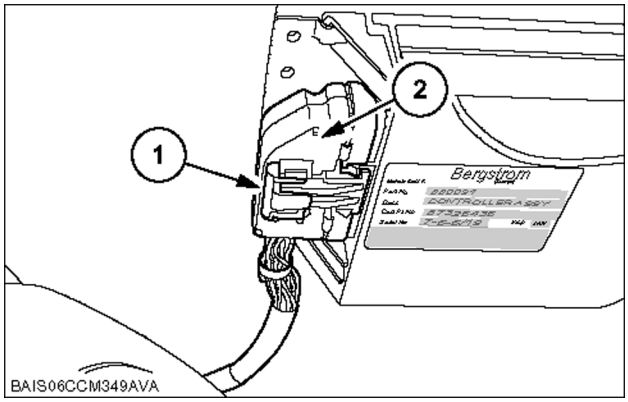
Assembly

8. Install the climate controller.



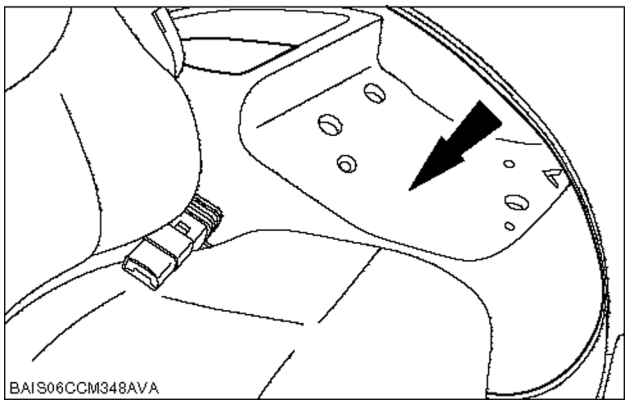
BAIS06CCM350AVA 8

9. Connect the electrical connector **(2)** and attach the tab **(1)**.



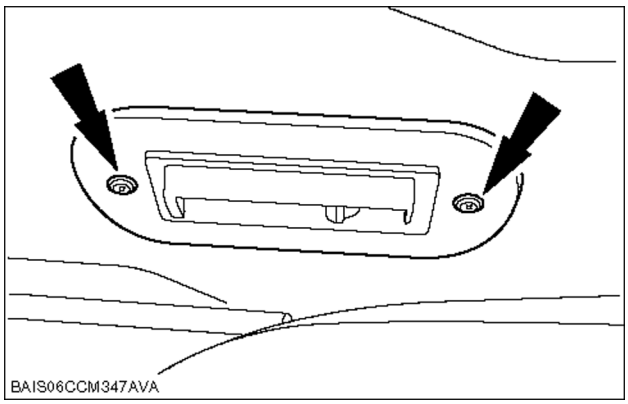
BAIS06CCM349AVA 9

10. Attach the side covering on the left.



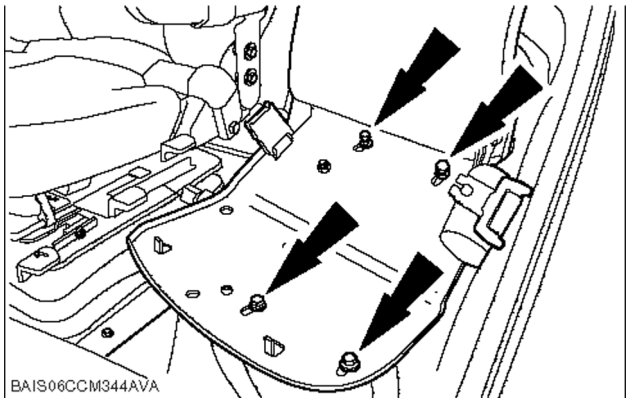
BAIS06CCM348AVA 10

11. Fit the air outlet on the left side.



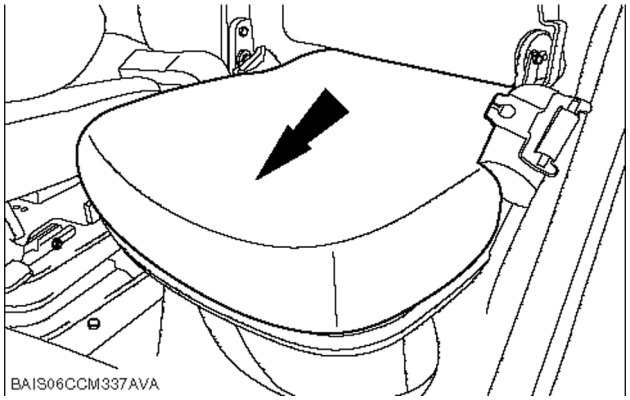
BAIS06CCM347AVA 11

12. Fit the retaining plate.
Install the passenger seat.



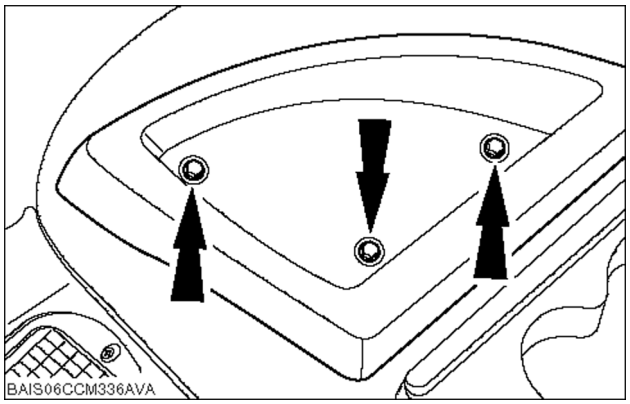
BAIS06CCM344AVA 12

13. Place the seat cushion on the passenger seat.



BAIS06CCM337AVA 13

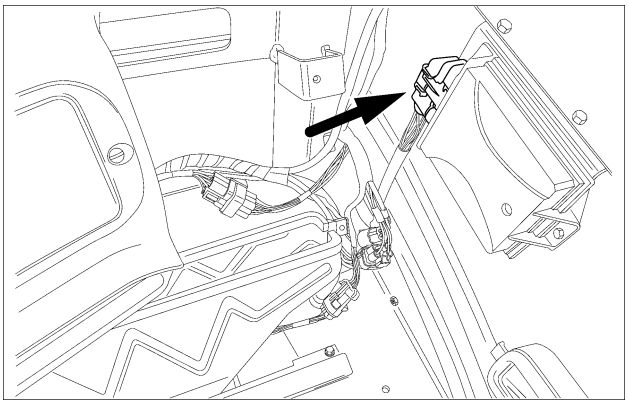
14. Fit the repository on the left side.



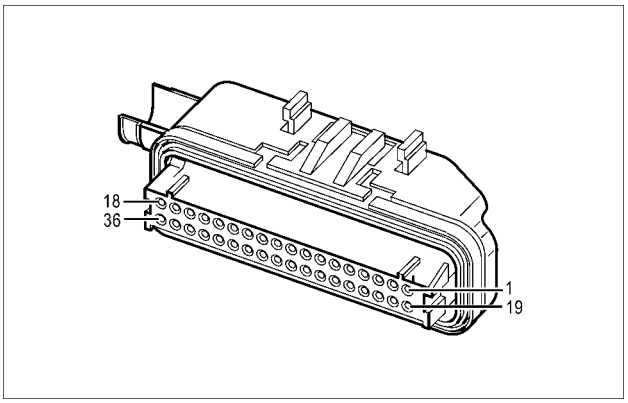
BAIS06CCM336AVA 14

Electronic HVAC control - Electrical test

PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)



SS08F003 1



SS08F004 2

BEHIND THE CAB SIDE COVERING ON THE LEFT

Pin	Description	Function		Normal Signal	Notes
1	CAN Low	Provides CAN communication to the vehicle		**2,3 V**	
2	CAN High			**2,6 V**	
3	Water Valve Signal	Provides control signal to water valve	Full Cold (LO)	**11,2 V**	Blower switch in position "0, A, I, II, III"
			Middle (**74 °F**)	**4,6 V**	Blower switch in position "A, I, II, III"
			Full Hot (HI)	**2,1 V**	
4	Actuator Power Water Valve	Provides feed back from actuator power supply		V bat	
5	Blower Signal	Output to the Blower Control Module	Speed switch "0"	**11 V**	constant
			Speed switch "A"	**6 - 1,1 V**	variable
			Speed switch "I"	**5,8 V**	constant
			Speed switch "II"	**3,7 V**	
			Speed switch "III"	**1,1 V**	
6	Power supply from relay	Provides feed back from actuator current power	V bat	V bat	
15	Clutch Relay	Output to drive AC Clutch relay	"ON"	V bat	
			"OFF"	**0 V**	
17	Battery (+)	Input Power from vehicle	V bat	V bat	
18	Ground	Input Ground from vehicle	Ground		
21	Cabin Temperature	Input from Cabin Temperature Sensor	**0 °C** (**32.0 °F**)	**~ 3,87 V**	**9399 Ω ± 2,5 %**
			15 °C (**59.00 °F**)	**~ 3,09 V**	**4441 Ω ± 2,5 %**
			20 °C (**68.00 °F**)	**~ 2,81 V**	**3511 Ω ± 2,5 %**
			30 °C (**86.00 °F**)	**~ 2,25 V**	**2240 Ω ± 2,5 %**
22	Outlet Temperature	Input from Outlet Temperature Sensor	**0 °C** (**32.0 °F**)	**~ 3,56 V**	**13,06 k Ω ± 2,5 %**
			15 °C (**59.00 °F**)	**~ 2,64 V**	**6,28 k Ω ± 2,5 %**
			20 °C (**68.00 °F**)	**~ 2,32 V**	**4,99 k Ω ± 2,5 %**
			30 °C (**86.00 °F**)	**~ 1,76 V**	**3,22 k Ω ± 2,5 %**
23	Evaporator Temperature	Input from Evaporator Temperature Sensor	**0 °C** (**32.0 °F**)	**~ 3,43 V**	**66 k Ω ± 2,5 %**
			15 °C (**59.00 °F**)	**~ 2,51 V**	**30,7 k Ω ± 2,5 %**
			20 °C (**68.00 °F**)	**~ 2,20 V**	**23,7 k Ω ± 2,5 %**
			30 °C (**86.00 °F**)	**~ 1,72 V**	**15,7 k Ω ± 2,5 %**

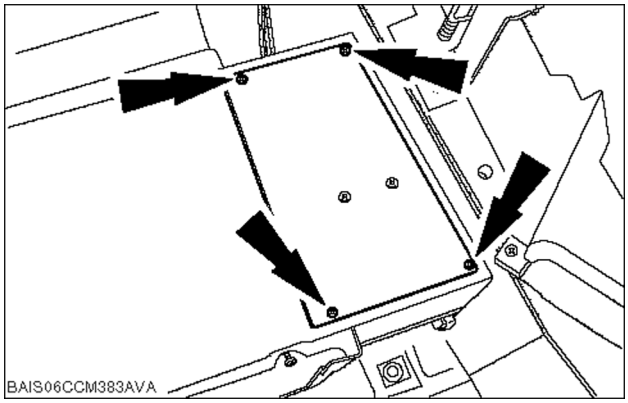
Pin	Description	Function		Normal Signal	Notes
24	Outside Temperature	Input from Outside Temperature Sensor	**0 °C** (**32.0 °F**)	**~ 3,56 V**	**13,06 k Ω ± 2,5 %**
			15 °C (**59.00 °F**)	**~ 2,64 V**	**6,28 k Ω ± 2,5 %**
			20 °C (**68.00 °F**)	**~ 2,32 V**	**4,99 k Ω ± 2,5 %**
			30 °C (**86.00 °F**)	**~ 1,76 V**	**3,22 k Ω ± 2,5 %**
25	Manual/Defrost	Input from Max Defrost Switch	Selected	V bat	
			Otherwise	**0,4 V**	
26	Econ	Input from Econ Switch	Selected	V bat	
			Otherwise	**0,4 V**	
27	Blower Auto	Auto Position of Blower Switch	Selected	**0,2 V**	
			Otherwise	**5 V**	
28	Blower Low "I"	Low Position of Blower Switch "I"	Selected	**0,2 V**	
			Otherwise	**5 V**	
29	Temperature Set potentiometer	Input from Temperature Set point Pot	Low **15 °C** (**59.00 °F**)	**0,25 V**	**10 k Ω ± 10 %**
			Med **25 °C** (**74 °F**)	**2,27 V**	
			High **32 °C** (**89.60 °F**)	**3,17 V**	
30	Blower Medium "II"	Medium Position of Blower Switch "II"	Selected	**0,2 V**	
			Otherwise	**5 V**	
31	Blower High "III"	High Position of Blower Switch "III"	Selected	**0,2 V**	
			Otherwise	**5 V**	
33	High Pressure (+)	(+) Input from High Pressure Switch	Closed	**2,8 V**	
			Open	**3,1 V**	
34	High Pressure (-)	(-) Input from High Pressure Switch	Closed	**2,8 V**	
			Open	**2,5 V**	
35	Low Pressure (+)	(+) Input from Low Pressure Switch	Closed	**2,8 V**	
			Open	**3,1 V**	
36	Low Pressure (-)	(-) Input from Low Pressure Switch	Closed	**2,8 V**	
			Open	**2,5 V**	

Sensing system Low pressure switch - Replace

Prior operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Remove (Heating and air conditioning device) (E.40.D) Step 1 to step 4

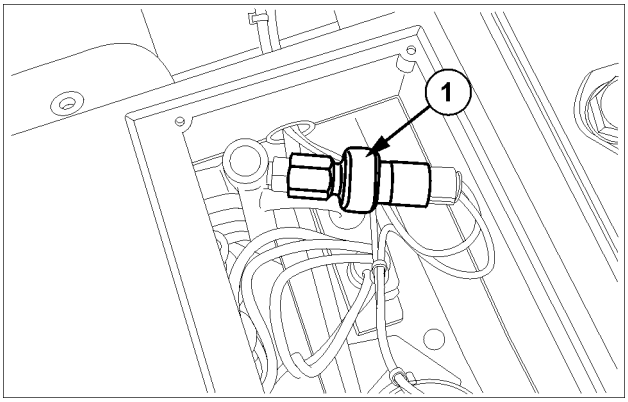
NOTE: *The system does not have to be emptied in order to replace the low pressure switch.*

1. Remove the cover plate from the heating and air conditioning unit.



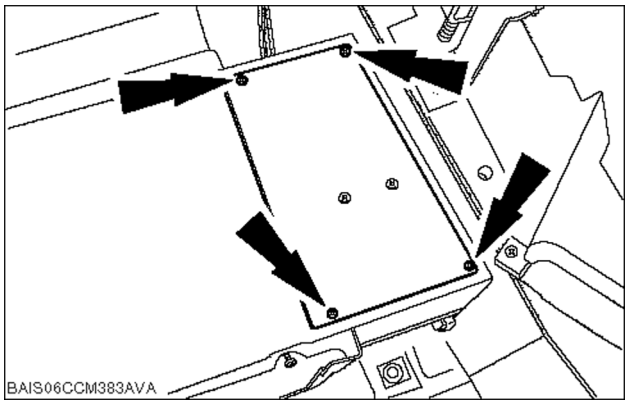
BAIS06CCM383AVA 1

2. Disconnect the electrical connector and replace the low pressure switch **(1)**.
   Plug the electrical connector into the low pressure switch.



SS08E003 2

3. Re-fit the cover plate to the heating and air conditioning unit.



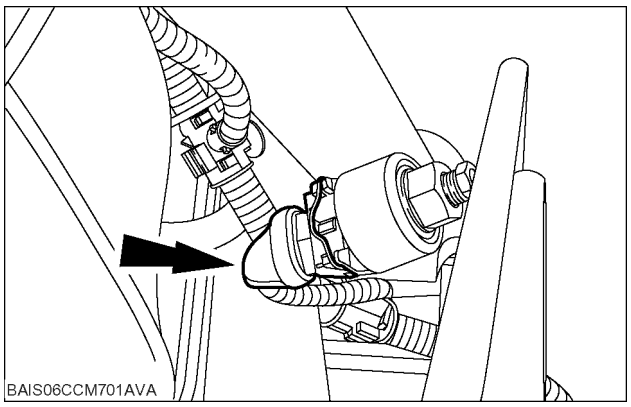
BAIS06CCM383AVA 3

Next operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Install (Heating and air conditioning device) (E.40.D) Step 20 to step 23

Sensing system - Replace (High pressure- low pressure switch)

NOTE: *The refrigerant does not have to be siphoned out of the unit in order to replace the pressure switch.*

1. Turn the starter switch to the “OFF” position.
   Disconnect the connector.
   Unscrew the switch from the self-closing valve.



BAIS06CCM701AVA 1

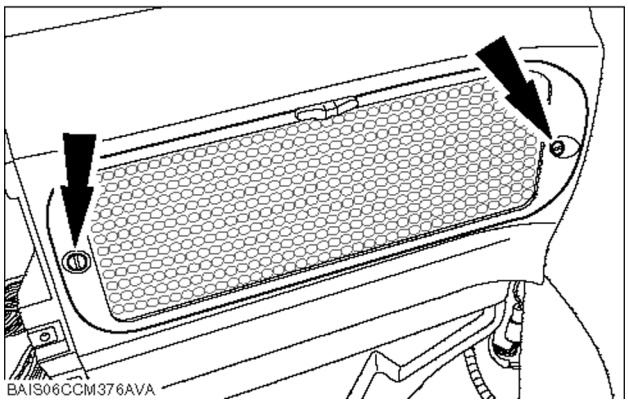
2. Screw in the pressure switch.
   Connect the connector to the pressure switch.

Sensing system Temperature sensor - Replace (Cab temperature)

PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)

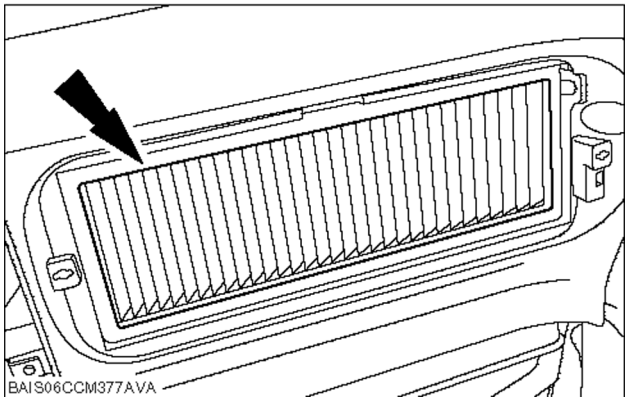
Removal

1. Turn the starter switch to the “OFF” position. Remove the air circulation grating.



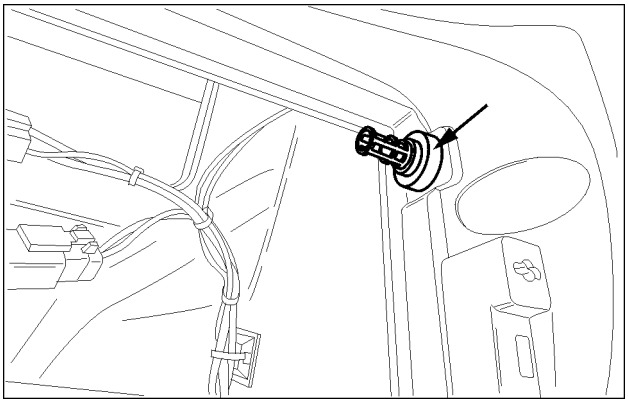
BAIS06CCM376AVA 1

2. Remove the air circulation filter element.



BAIS06CCM377AVA 2

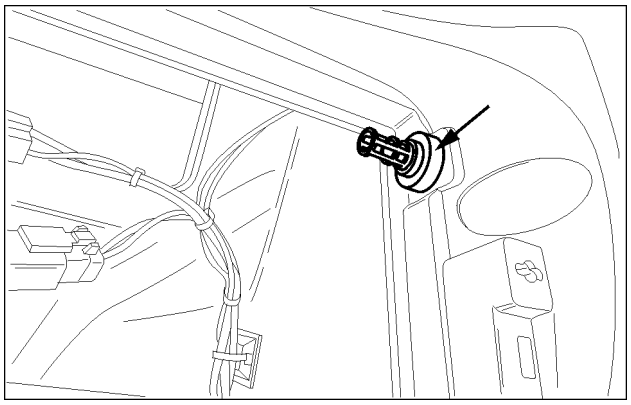
3. Open the catch and take out the sensor. Disconnect the plug connection.



SS08D019 3

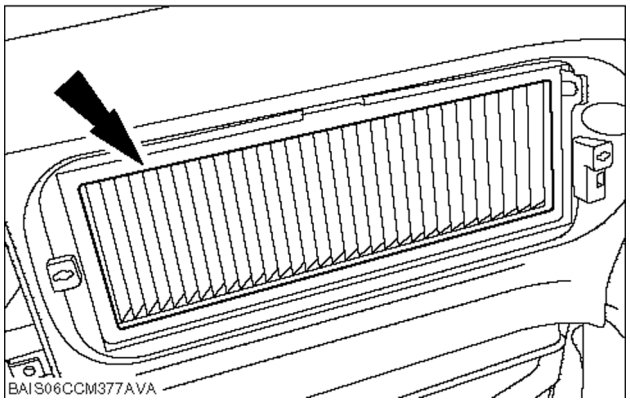
Assembly

4. Connect the connector. Push the sensor inside and close the catch.



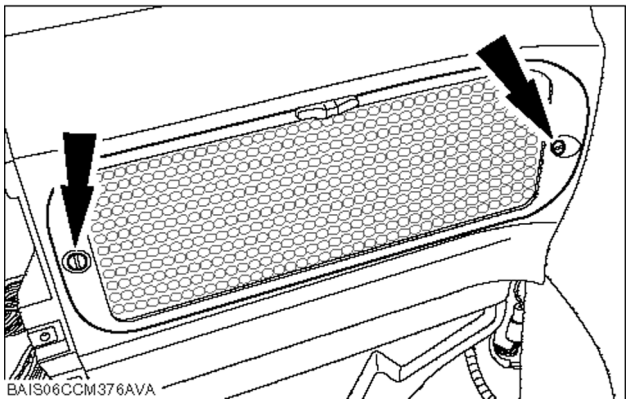
SS08D019 4

5. Insert the air circulation filter element.



BAIS06CCM377AVA 5

6. Fit the air circulation grating.



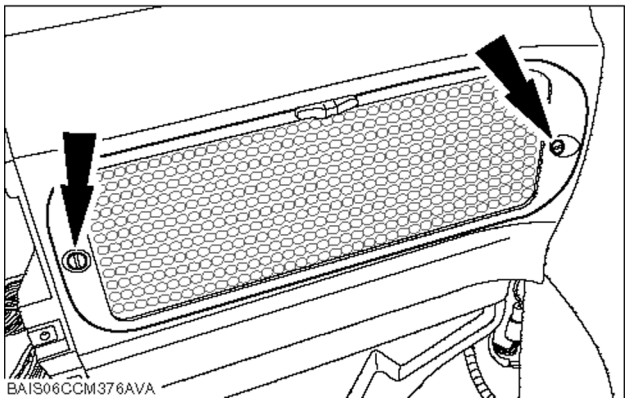
BAIS06CCM376AVA 6

Sensing system Temperature sensor - Replace (Outside temperature)

PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)

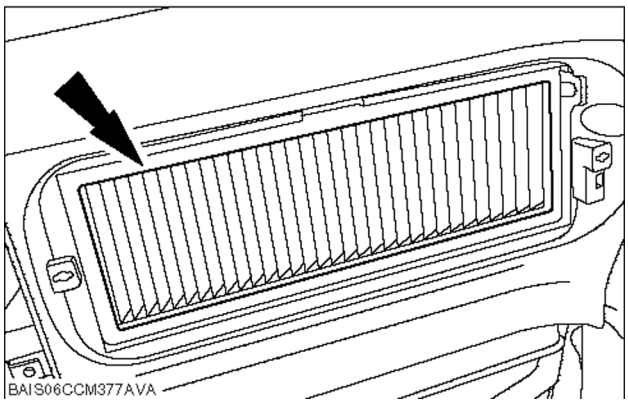
Removal

1. Turn the starter switch to the “OFF” position.
   Remove the air circulation grating.



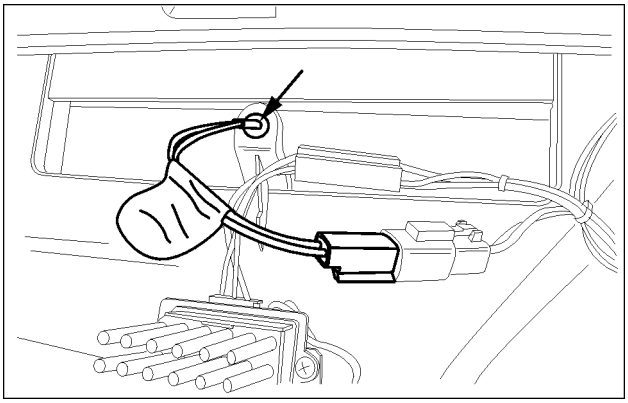
BAIS06CCM376AVA 1

2. Remove the air circulation filter element.



BAIS06CCM377AVA 2

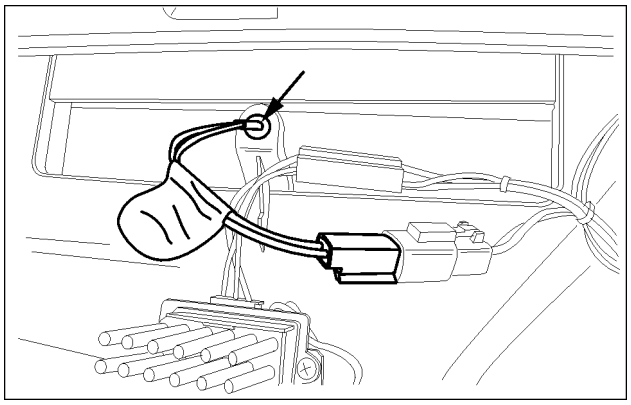
3. Disconnect the plug connection.
   Remove the sensor.



SS08D024 3

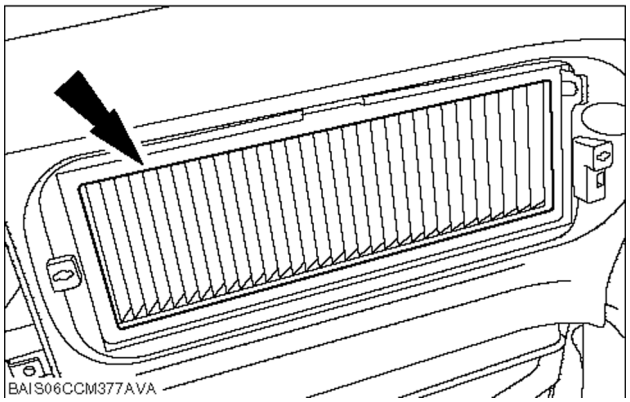
Assembly

4. Fit the sensor.
   Connect the connector.



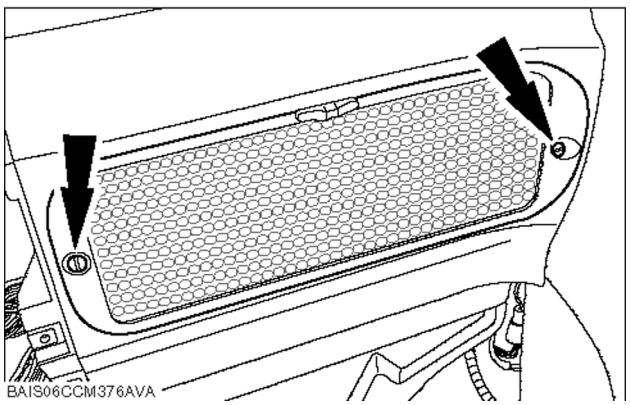
SS08D024 4

5. Insert the air circulation filter element again.



BAIS06CCM377AVA 5

6. Fit the air circulation grating.



BAIS06CCM376AVA 6

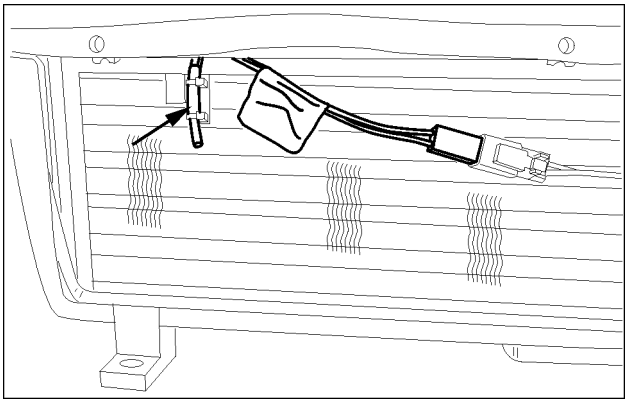
Sensing system Temperature sensor - Replace (Outlet temperature)

PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)

Prior operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Remove (Heating and air conditioning device) (E.40.D) Step 1 to step 8

NOTE: *The refrigerant does not have to be siphoned out of the unit in order to replace the air outlet temperature sensor.*

1. Disconnect the connector and replace the air outlet temperature sensor.



SS08D025 1

Next operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Install (Heating and air conditioning device) (E.40.D) Step 9 to step 12 and step 20 to step 23

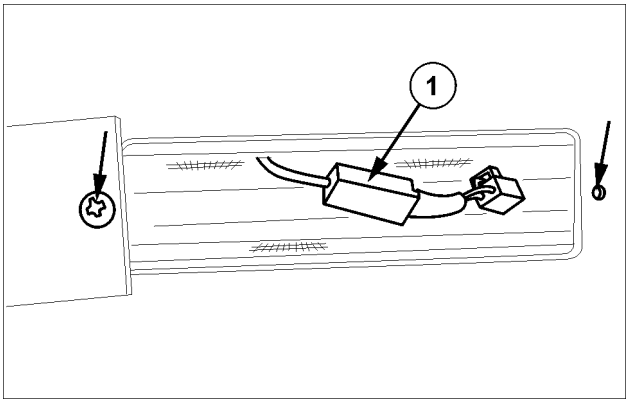
Sensing system Evaporator temperature sensor - Replace

PUMA 165 Auto Temperature Control (ATC), PUMA 180 Auto Temperature Control (ATC), PUMA 195 Auto Temperature Control (ATC), PUMA 210 Auto Temperature Control (ATC), PUMA 165 Multicontroller Auto Temperature Control (ATC), PUMA 180 Multicontroller Auto Temperature Control (ATC), PUMA 195 Multicontroller Auto Temperature Control (ATC), PUMA 210 Multicontroller Auto Temperature Control (ATC)

Prior operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Remove (Heating and air conditioning device) (E.40.D) Step 1 to step 4

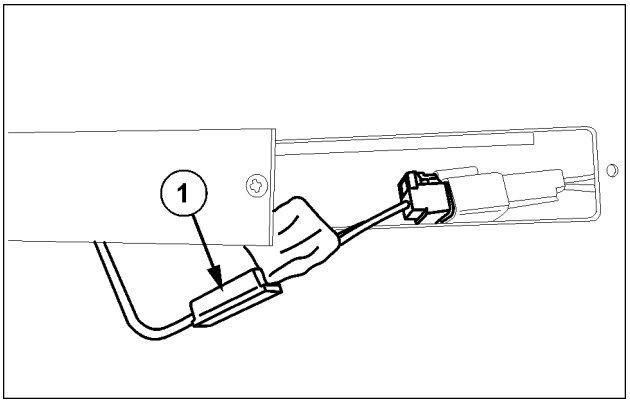
NOTE: *The refrigerant does not have to be siphoned out of the unit in order to replace the evaporator temperature sensor.*

1. Unscrew the retaining screws. Remove the cover plate for the evaporator temperature sensor **(1)** on the heating and air conditioning unit. Take the evaporator temperature sensor out of the evaporator.



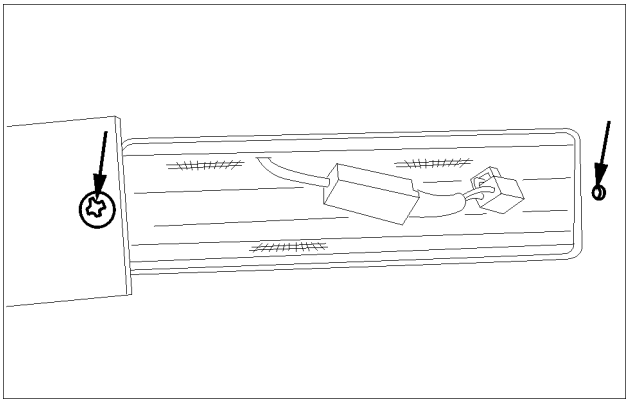
SS08D030 1

2. Pull out the plug connection and disconnect it. Replace the evaporator temperature sensor **(1)**.



SS08D101 2

3. Connect the connector.
   Push the evaporator temperature sensor into the evaporator.
   Fit the cover plate for the evaporator temperature sensor on the heating and air conditioning unit.



SS08D109 3

Next operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Install (Heating and air conditioning device) (E.40.D) Step 20 to step 23

Sensing system Evaporator temperature sensor - Replace

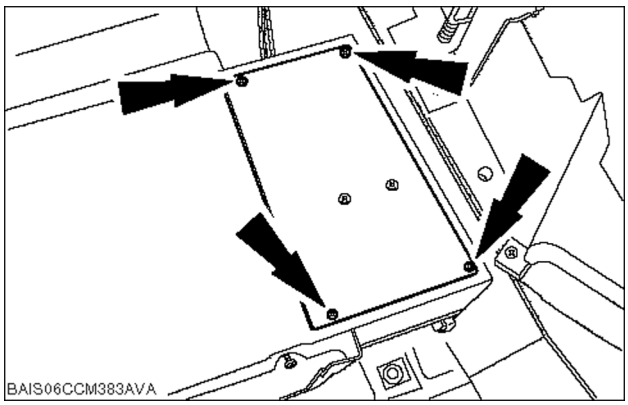
PUMA 165 Standard Climate Control, PUMA 180 Standard Climate Control, PUMA 195 Standard Climate Control, PUMA 210 Standard Climate Control, PUMA 165 Multicontroller Standard Climate Control, PUMA 180 Multicontroller Standard Climate Control, PUMA 195 Multicontroller Standard Climate Control, PUMA 210 Multicontroller Standard Climate Control

Prior operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Remove (Heating and air conditioning device) (E.40.D) Step 1 to step 4

NOTE: *The refrigerant does not have to be siphoned out of the unit in order to replace the evaporator temperature sensor.*

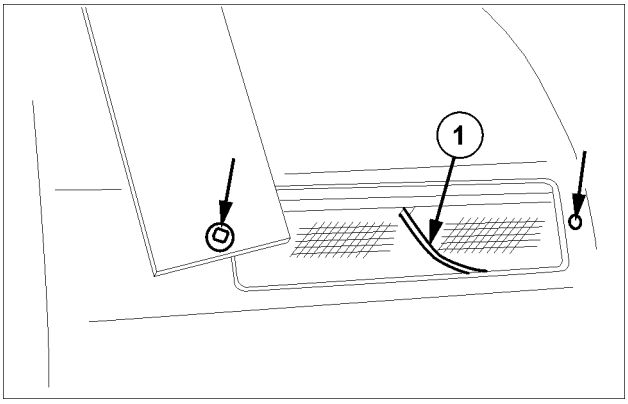
Removal

1. Remove the cover plate from the heating and air conditioning unit.



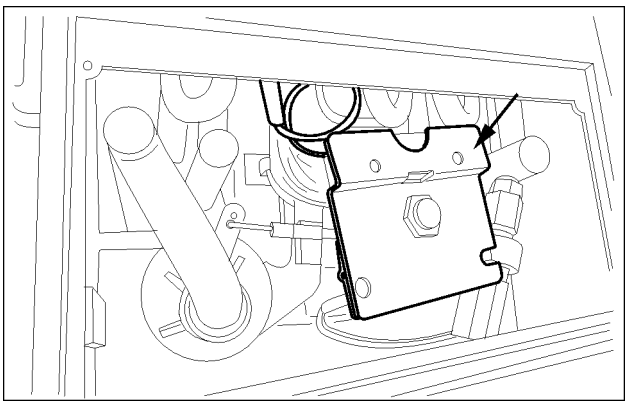
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2. Unscrew the retaining screws. Remove the cover plate for the evaporator temperature sensor **(1)** on the heating and air conditioning unit.



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3. Take the evaporator temperature sensor out of the evaporator. Disconnect the connector.

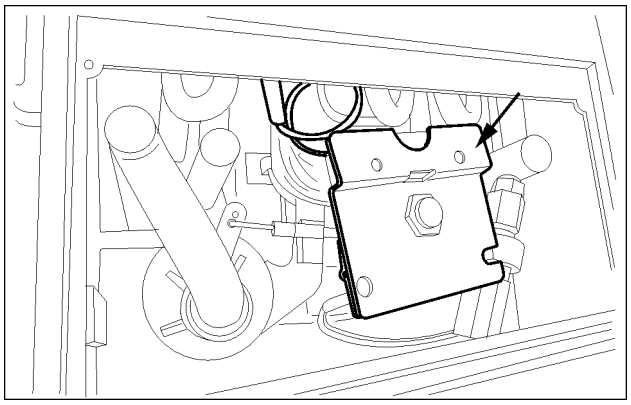


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Assembly

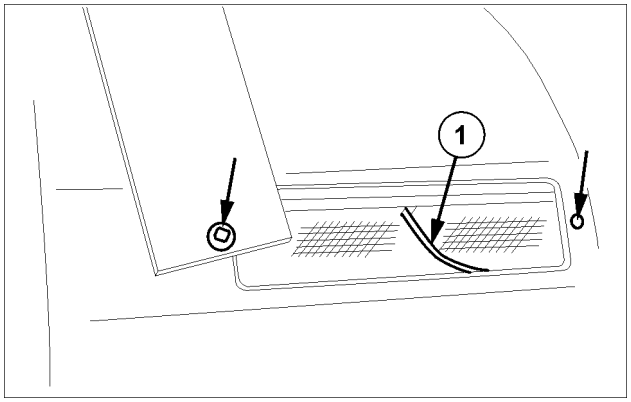
4. Push the evaporator temperature sensor into the evaporator. Connect the connector.

ATTENTION: *Carefully push the sensor pipe into the evaporator and ensure that it is not bent.*



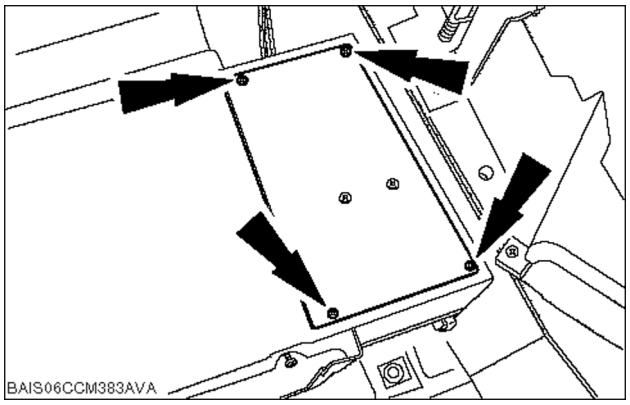
SS08D028 4

5. Fit the cover plate for the evaporator temperature sensor **(1)** on the heating and air conditioning unit and tighten the screws.



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6. Fit the cover plate to the heating and air conditioning unit.



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Next operation:
ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Install (Heating and air conditioning device) (E.40.D) Step 20 to step 23

ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Troubleshooting

Problem	Possible Cause	Correction
Evaporator air not cold Gauge reading :- Low Pressure - Low High Pressure - Low (Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D)).	Low refrigerant charge.	Perform leak tests and repair Evacuate system Charge system, re-test system
Evaporator air not cold Gauge reading :- Low Pressure - High High Pressure - High (Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D)).	Expansion valve allowing too much refrigerant to flow through the evaporator	Check expansion valve as follows: Set for Maximum cooling. Low pressure gauge should drop slowly If expansion valve is defective: Discharge System Replace Expansion Valve Evacuate System Charge System Re-test
Evaporator air not cold Gauge reading :- Low Pressure - High High Pressure - Low (Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D)).	Internal leak in compressor. (reed valves, gasket, worn or scored piston rings or cylinder)	Discharge the system Replace the compressor Evacuate the system Charge the system Re-test
Evaporator air warm Gauge reading :- Low Pressure - Low High Pressure - Low (Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D)).	Extremely low refrigerant charge.	Perform leak tests and repair Evacuate system Charge system, re-test system
Evaporator air warm Gauge reading :- Low Pressure - High High Pressure - High (Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D)).	Improper operation of condenser	Inspect for dirty condenser restricting air flow and cooling. Check operation of condenser cooling fans. Repair or replace as needed. Check for overcharge as follows: Stop the engine. Recover and recycle the charge using correct recovery equipment. Recharge the system with the correct quantity of refrigerant, replacing any lost lubricant. Recheck performance of air conditioning system.

Problem	Possible Cause	Correction
Evaporator air cool but not sufficiently cold. Gauge reading :- Low Pressure - Low High Pressure - Low (Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D)).	Expansion valve not permitting sufficient flow.	(1). Check expansion valve as follows: Set at max. cooling. Low pressure gauge should drop slowly. (2). If expansion valve is defective:- Discharge system. Replace expansion valve. Evacuate system. Charge system. Re-test.
Insufficient cooling Gauge reading :- Low Pressure - Low High Pressure - High (Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D))	Restriction in liquid line	Discharge the system Replace the receiver/drier Inspect all lines and tubing from compressor outlet to expansion valve. Replace if needed. Evacuate the system Charge the system Re-test
Insufficient cooling Low pressure reading does not fluctuate with changes in temperature control switch (pressure should drop until compressor cycles) Evaporator air not cold. Gauge reading :- Low Pressure - Normal High Pressure - Normal (Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D))	System low on charge Air or moisture present in system	Perform leak test Discharge system Repair leaks Replace receiver/drier Check oil level Evacuate system Charge the system Re-test
Low pressure switch cutting out Gauge reading :- Low Pressure - Low High Pressure - Low (Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D))	Stuck valve	(1). Check expansion valve as follows: Set at max. cooling. Low pressure gauge should drop slowly. (2). If expansion valve is defective:- Discharge system. Replace expansion valve. Evacuate system. Charge system. Re-test.

Problem	Possible Cause	Correction
Expansion valve to evaporator tube shows considerable condensation or frost. Gauge reading :- Low Pressure - Low High Pressure - Low (Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D))		(1). Check expansion valve as follows: Set at max. cooling. Low pressure gauge should drop slowly. (2). If expansion valve is defective:- Discharge system. Replace expansion valve. Evacuate system. Charge system. Re-test.
Too cold to touch Gauge reading :- Low Pressure - Low High Pressure - Low (Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D))		(1). Check expansion valve as follows: Set at max. cooling. Low pressure gauge should drop slowly. (2). If expansion valve is defective:- Discharge system. Replace expansion valve. Evacuate system. Charge system. Re-test.
Liquid line hot (condenser outlet to expansion valve tube) Gauge reading :- Low Pressure - High High Pressure - High (Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D))	Overcharged with refrigerant	Inspect for dirty condenser restricting air flow and cooling. Check operation of condenser cooling fans. Repair or replace as needed. Check for overcharge as follows: Stop the engine. Recover and recycle the charge using correct recovery equipment. Recharge the system with the correct quantity of refrigerant, replacing any lost lubricant. Recheck performance of air conditioning system.

Problem	Possible Cause	Correction
High pressure switch cutting out **Gauge reading :-** **Low Pressure - High** **High Pressure - High** **(Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D))**	Air in system	Inspect for dirty condenser restricting air flow and cooling. Check operation of condenser cooling fans. Repair or replace as needed. Check for overcharge as follows: Stop the engine. Recover and recycle the charge using correct recovery equipment. Recharge the system with the correct quantity of refrigerant, replacing any lost lubricant. Recheck performance of air conditioning system.
Compressor cycles “on" and “off" too frequently **Gauge reading :-** **Low Pressure - High** **High Pressure - Normal** **(Refer to example ENVIRONMENT CONTROL Heating, ventilation and air-conditioning - Dynamic description (E.40.D))**	Defective temperature control (thermostatic) switch	Stop engine and shut off A/C Replace temperature control switch Re-test system and check compressor cycling

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SERVICE - Technical Publications & Tools



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SERVICE MANUAL

WORKING ARM



PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

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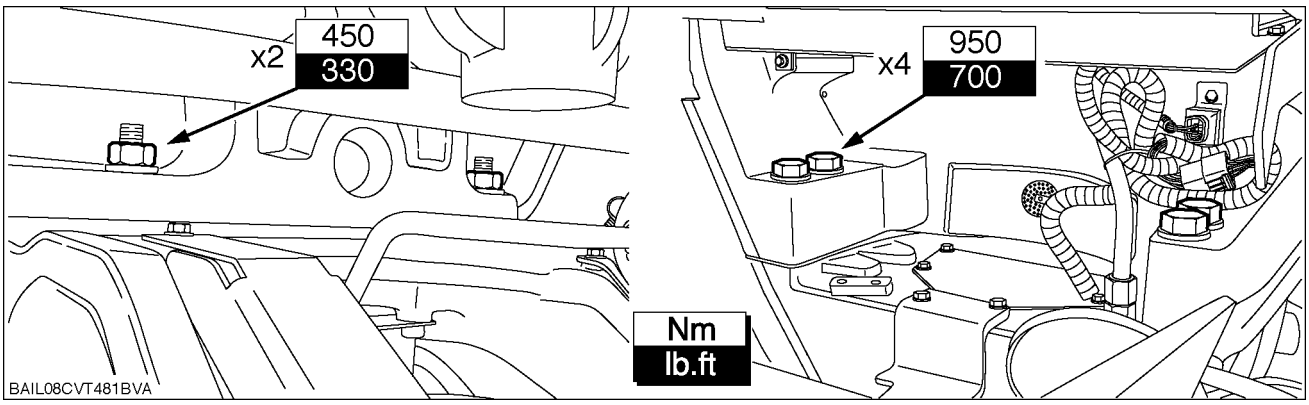
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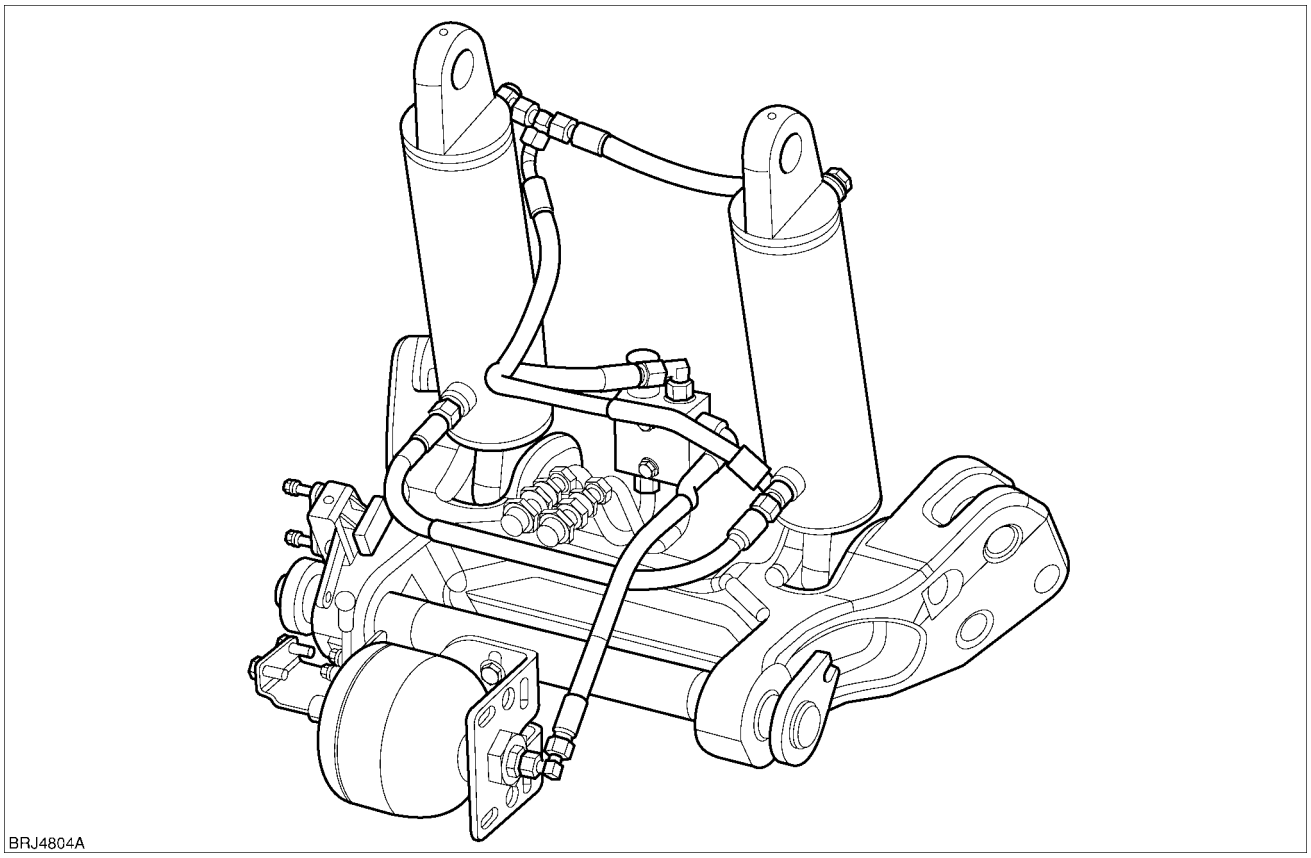
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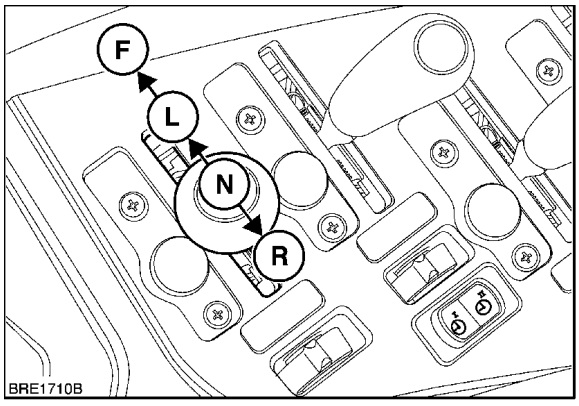
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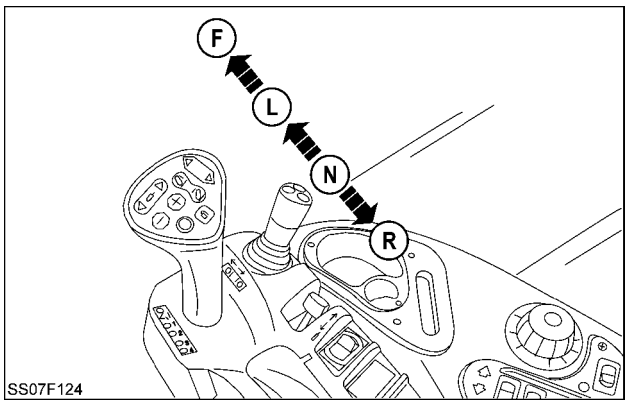
BAIL07CCM309FSA 1

The front powerlift linkage is integrated in the front axle bearing block casting. Two large double-action cylinders provide maximum lifting power in the entire lifting range.
The front powerlift is actuated via a control unit oil circuit (an electrohydraulic control unit is shown in the picture) or via a mid-mounted control unit.



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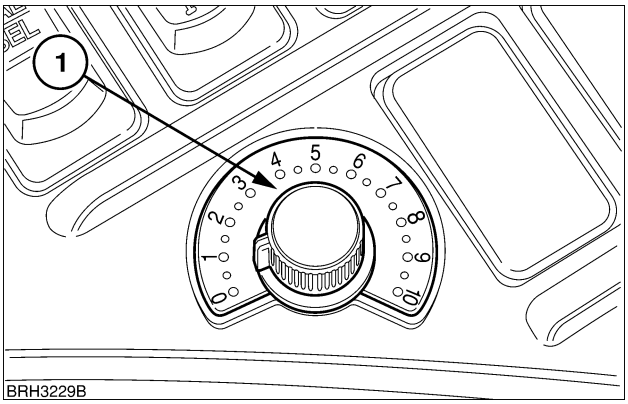
PUMA Standard



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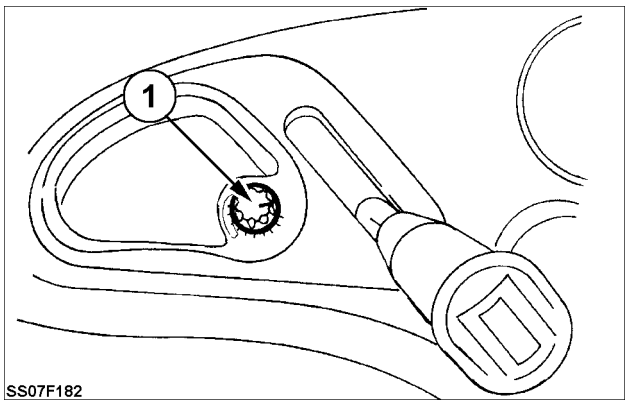
PUMA Multicontroller

A control knob on the right-hand side console is used to set the maximum lift height to which the linkage can be lifted in tractors with mechanically actuated remote valves. In tractors with electrohydraulic control units, a position sensor is used.



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PUMA Standard

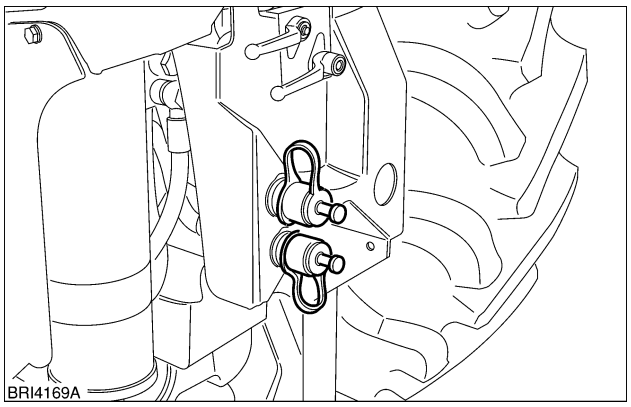


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PUMA Multicontroller

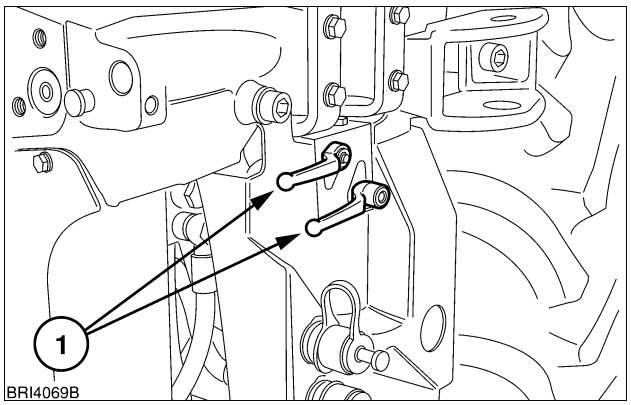
NOTE: *The lift height limit may possibly be affected by the oil flow in the hydraulic system. If the lift height limit was set with a low engine and hydraulic pump speed, it may be that it shifts itself to a higher setting when the engine speed rises.*

Two additional front oil connections with **1/2 in** connection sockets are available on the front of the power lift. These provide a double-action hydraulic actuation for front-mounted equipment.



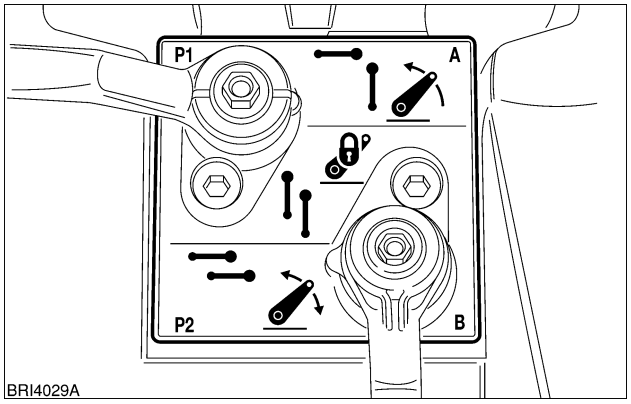
BAIL07CCM294ASA 6

Two selector levers **(1)** are mounted on the front of the powerlift. They make it possible to change the front powerlift between single-action actuation, double-action actuation or a fixed working height.



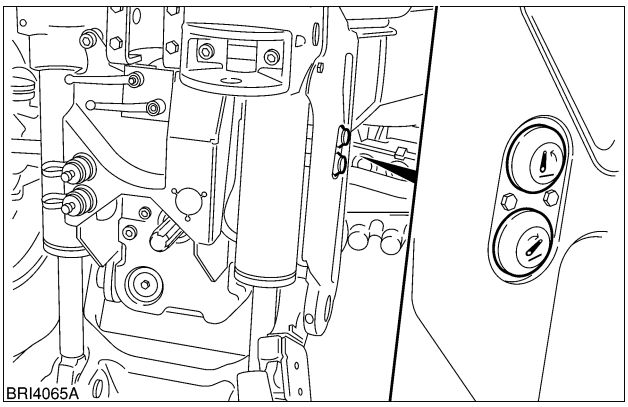
BAIL07CCM295ASA 7

Lever positions:
Upper lever horizontal, lower lever vertical:
The front powerlift works in single-action mode: It is raised by the hydraulics, but lowered by the mounted equipment's dead weight.
Both levers horizontal (see picture **7**):
The powerlift works in double-action mode: It is raised and lowered by the hydraulics.
Both levers vertical:
When both levers are in this position, both hydraulic cylinders are hydraulically locked and the lower links cannot move.



BAIL07CCM296ASA 8

External controls are also available for the three-point front powerlift as an optional extra. These are located on the left-hand side of the front powerlift.



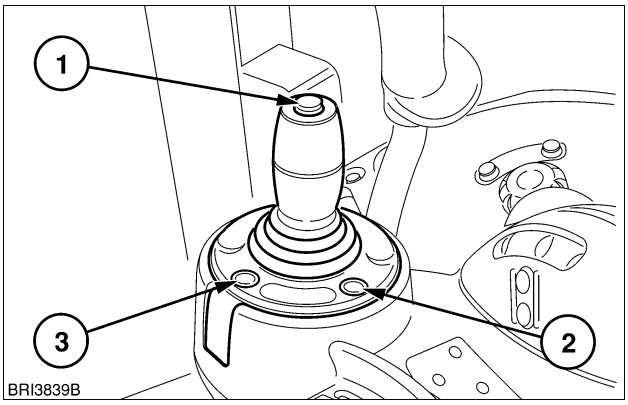
BAIL07CCM297ASA 9

⚠ WARNING ⚠

Extreme care must be exercised when adjusting and checking hitch and control linkage when the engine is running and when linkage is under hydraulic or mechanical load. Study the linkage and hitch travel-keep the hands, arms, legs and feet out of the travel arc of the hitch and linkage.

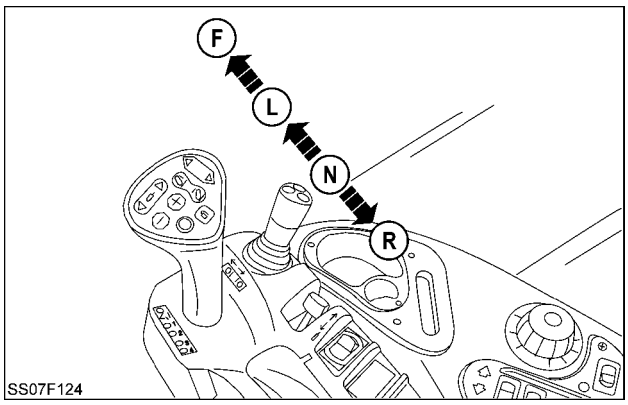
M148B

Depending on the how the tractor is equipped, there are three options to connect the front powerlift to the hydraulics.
Mechanically actuated rear control units: (not possible with the PUMA Multicontroller)
The hoses connected to the mechanically actuated rear control units are laid through the bracket of the mid-mounted valve block on the right-hand cab step. From there two steel pipes lead down on the right-hand side to the front axle bearing block. The pipes run under the radiator to the threaded connections of the front powerlift.
Electrohydraulic control units:
In this version, the oil connection from control unit 1 is removed and the hoses are connected directly to the oil connections of the control units. The hoses are laid to the bracket of the mid-mounted valve block, from there two steel pipes run to the front powerlift as in the first option. In this variant, the control unit controls on the left links next to the linkage can be used to raise and lower the lifting arms. See fig. **9**.
Mid-mounted control units:
A control unit is connected to the front powerlift via a set of additional front oil connections on the right next to the linkage. The powerlift is actuated with the crossgate lever (Figure **10**) (Figure **11**) on the right-hand armrest and with the control unit controls on the left next to the linkage. In this variant, the mid-mounted valve block is equipped with a 3rd and 4th valve plate, which can be used to drive other external consumers.



BAIL06CCM052ASA 10

Actuation with the PUMA standard

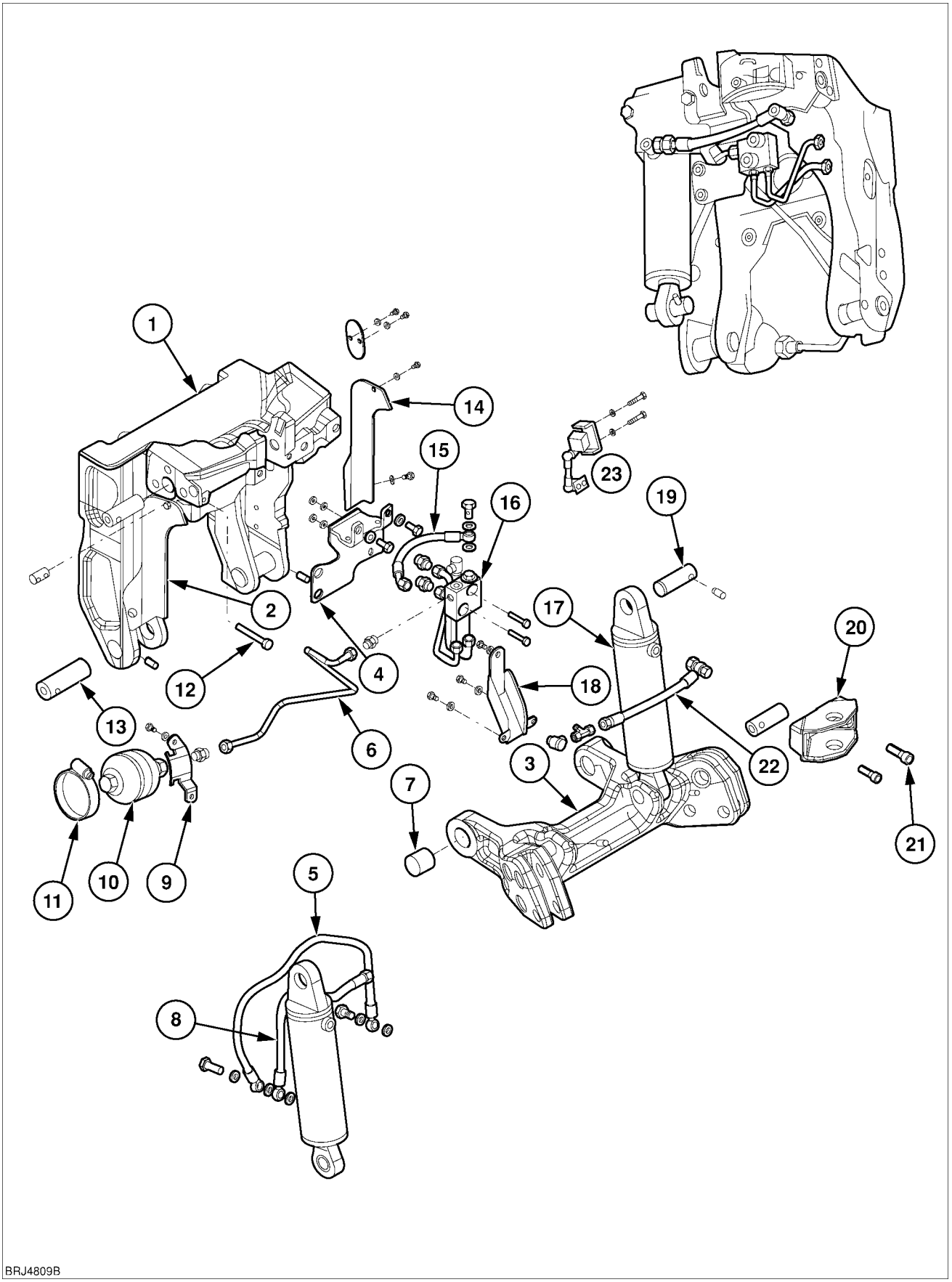


SS07F124 11

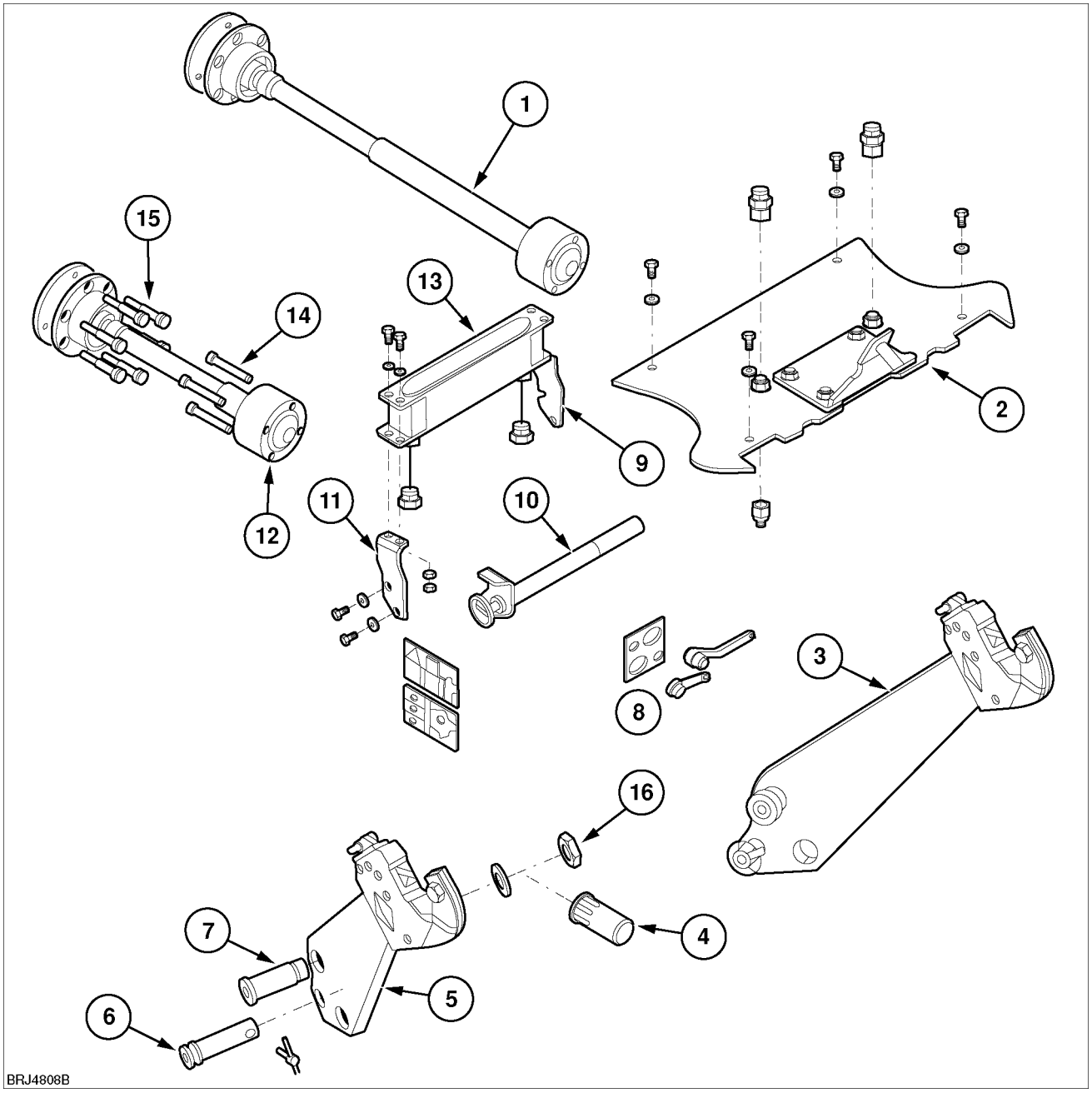
Actuation with the PUMA Multicontroller

HITCH Front hitch - Exploded view

1.Mounting Support
2.Side Cover Right Hand
3.Lift Frame
4.Mounting Bracket
5.Hose
6.Accumulator Pipe
7.Bushing
8.Pipe
9.Accumulator Bracket
10.Accumulator
11Clamp
12.Locking Socket Screw - Torque **87 Nm** (**64.17 lb ft**)
13.Pivot Pin
14.Side Cover Left Hand
15.Hose
16.Multi Valve Lever Assembly
17.Lift Cylinder
18.Sensor Cover
19.Pin
20.Tow Hook
21.Socket Screws - Torque **210 Nm** (**154.89 lb ft**)
22.Hose
23.Sensor



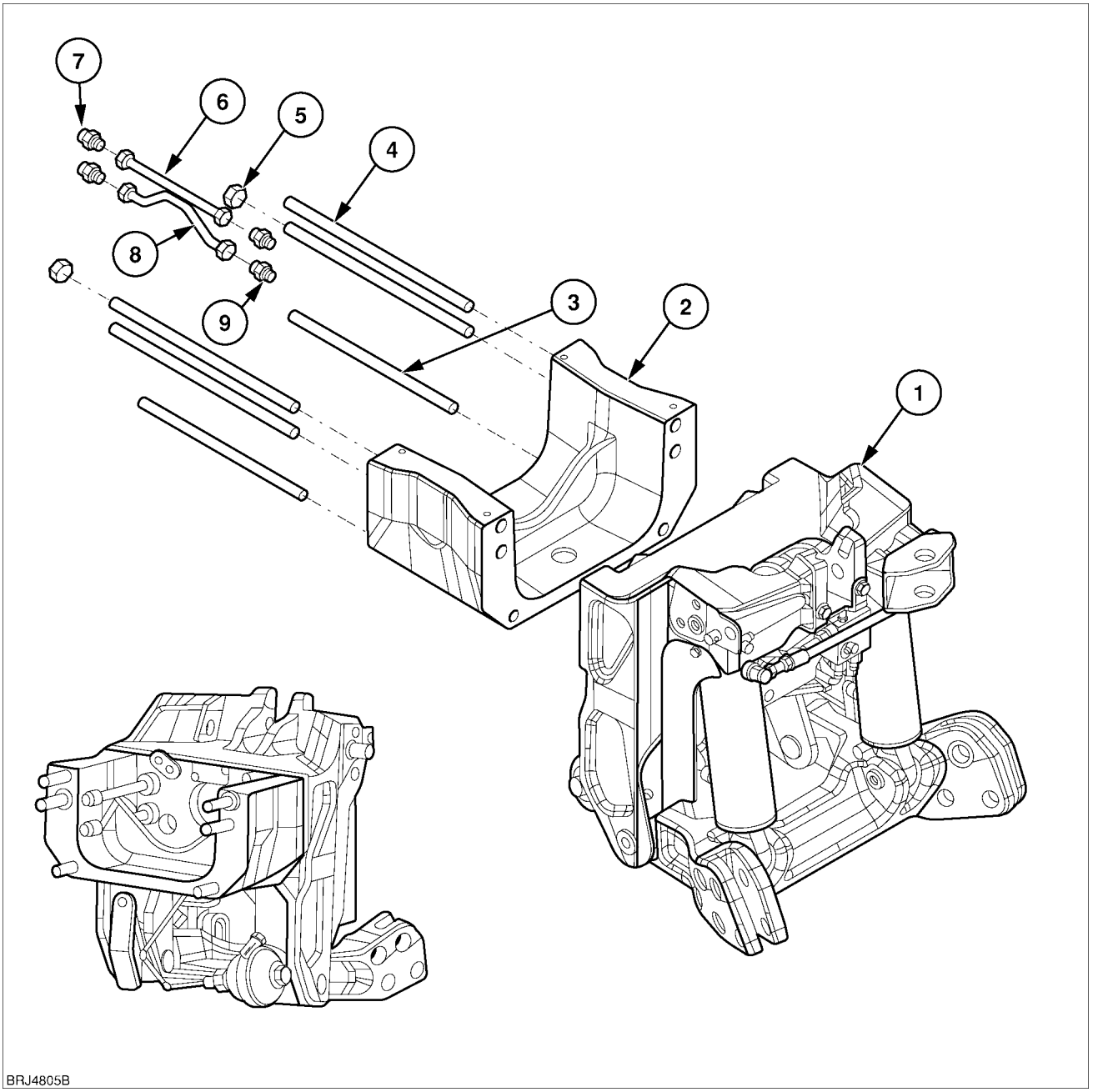
BAIL07CCM314HSA 1



BAIL07CCM315GSA 2

Standard Axle Front Linkage

1.Intermediate Shaft (Where fitted)
2.Plate With Hood Catch
3.Lift Arm Left Hand
4.PTO Cover
5.Lift Arm Right Hand
6.Locking Pin
7.Pivot Pin
8.Levers
9Cooler Support Left Hand
10.Top Link Pin
11.Cooler Support Right Hand
12.Intermediate Shaft
13.Cooler Assembly
14.Bolts - Torque **85 Nm** (**62.69 lb ft**)
15.Bolts - Torque **147 Nm** (**108.42 lb ft**)
16.Nut - Torque **400 Nm** (**295.02 lb ft**)



BAIL07CCM310GSA 3

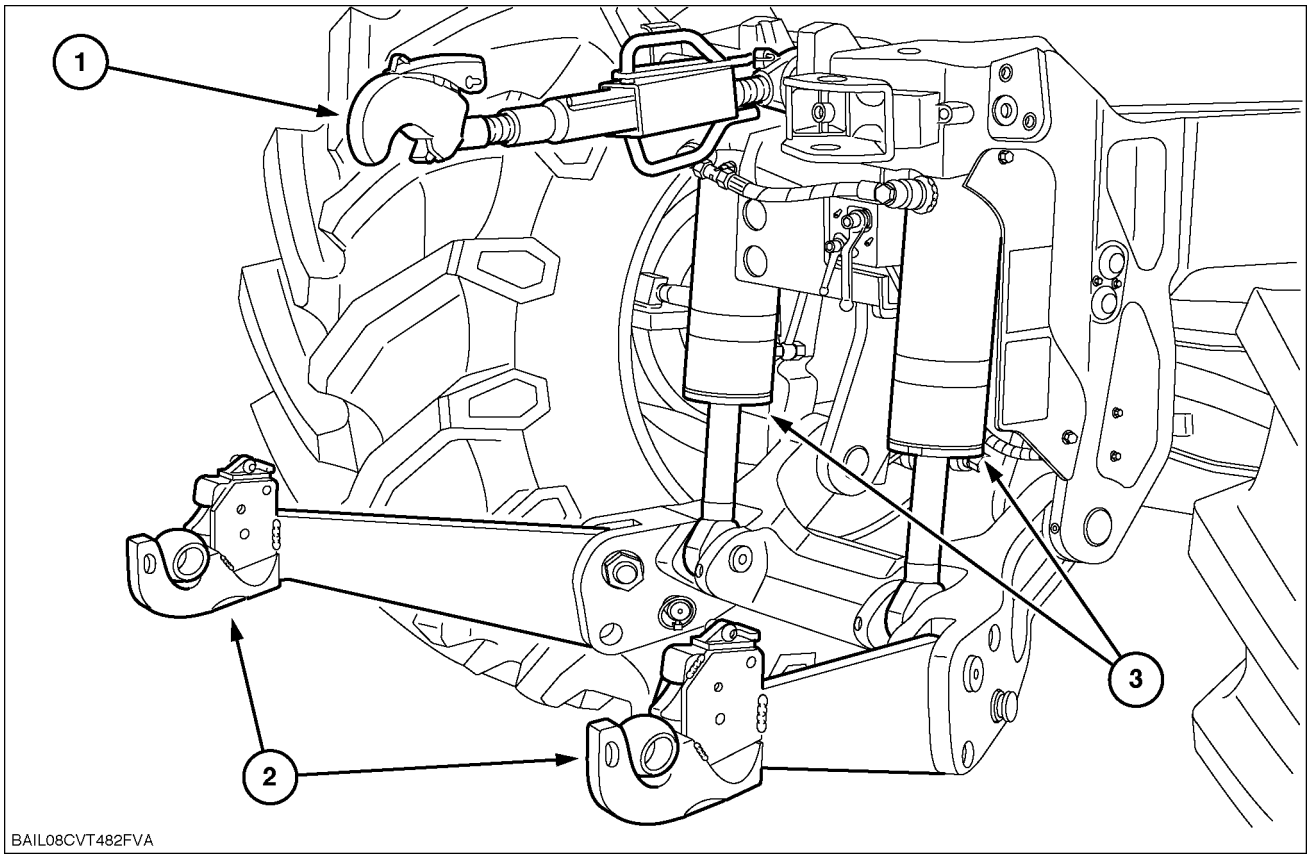
Standard Axle Front Lift Assembly Mounting

1.Front Lift Assembly
2.Spacer Casting (Where Fitted)
3.Threaded Rod
4.Threaded Rod
5.Nut
6.Pipe
7.Connector
8.Pipe
9.Connector

HITCH Front hitch - Static description

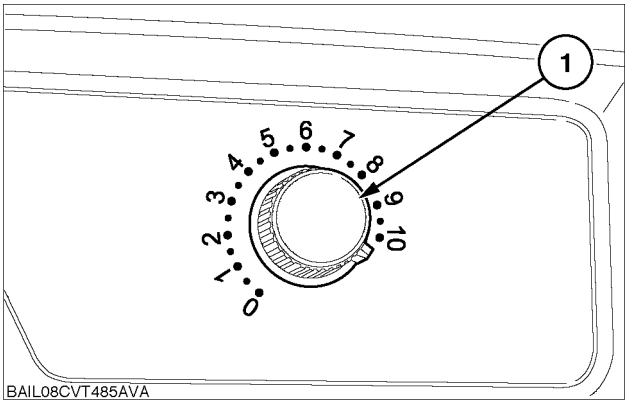
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

NOTE: *The three point front hitch is an option which may be fitted during manufacture, or as a dealer installed accessory. Whichever option is fitted the principles of operation described here apply to both.*



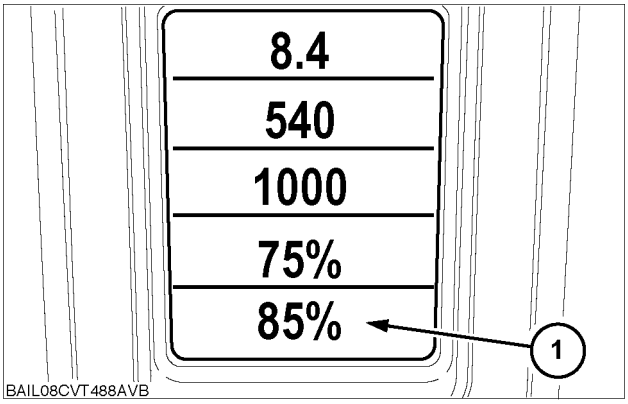
BAIL08CVT482FVA 1

The front hitch consists of an adjustable top link **(1)** a pair of folding lower links **(2)** and two large double action cylinders **(3)**. The top link and lower links have open claw ends that permit rapid coupling and uncoupling of implements. The claws are equipped with self locking latches to ensure the positive retention of the 3 point hitch to the implement. The two large double-action cylinders provide maximum lifting power throughout the entire lifting range. The front hitch may be operated by using the electronic rear remote or mid mount valves (if fitted).



BAIL08CVT485AVA 2

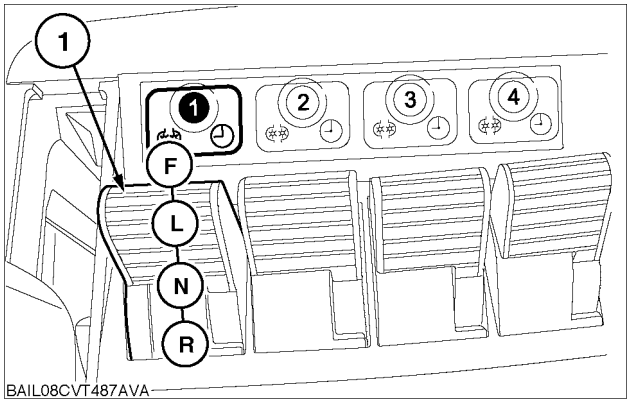
A height limiter allows the operator to set a maximum lift height of the hitch. Control of the height limiter is by a rotary control **(1)** on the armrest console. Turn fully clockwise for maximum height or anti-clockwise to reduce the height.



BAIL08CVT488AVB 3

Having set the required maximum hitch height on the rotary control, the height of the hitch can be shown in the display **(1)** as a percentage **(%)** ranging from 0 (fully lowered) to 100 (fully raised).

NOTE: *The lift height limit can be affected by the oil flow in the hydraulic system. If the lift height limit was set with a low engine and hydraulic pump speed, it may reach a higher setting when the engine speed rises.*



BAIL08CVT487AVA 4

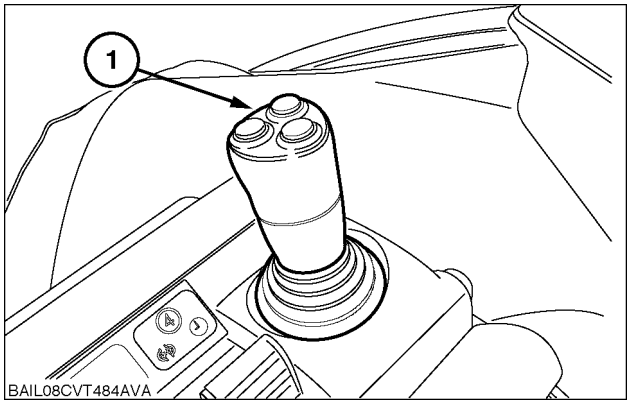
The rear remote valves may be used to operate the front hitch using the control lever **(1)** or the joystick (if fitted). As a factory fitted option the hitch will always be valve number 1 if either rear remote or mid mount valves are used.
With the hitch connected to valve number 1:

Move the lever backwards **(R)** to raise the hitch.

Move the lever forward to **(N)** to stop movement, the hitch will remain at this height.

Move the lever to **(L)** to lower the hitch.

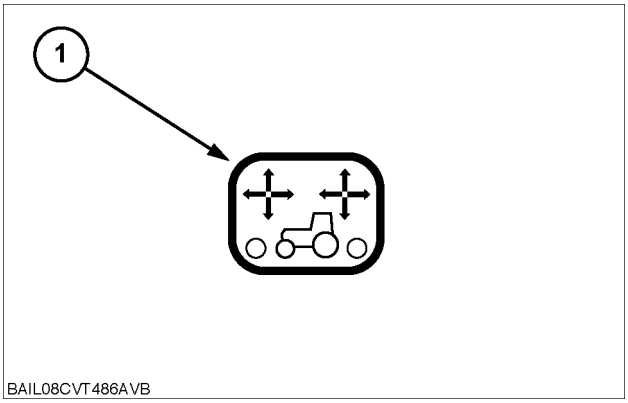
With the lever in **(F)**, the float position is selected allowing the attached implement to follow the ground contours.
Valve number 1 is programmed to operate with the hitch height limiter.



BAIL08CVT484AVA 5

Where a front hitch is supplied as a factory option, the vehicle will be fitted with a joystick and mid mount valves. The joystick **(1)** can be used to control the front hitch using the rear remote or mid mount valves.
Valve number 1 will be used to operate the hitch with the front height limiter as previously described.

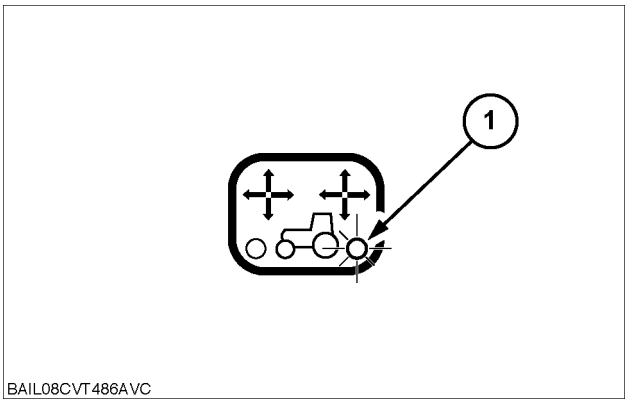
NOTE: *Operation of the joystick is disabled if the operator leaves the seat and at key off.*



BAIL08CVT486AVB 6

Vehicles equipped with both rear remote and mid mount valves, the joystick can be used to operate either valve assembly. A selector switch **(1)** on the armrest console allows the operator to switch joystick control between mid mount and rear remote valves. Repeated pressing of the switch will cycle between the mid mount and rear remote valves. A light in the switch indicates the current valve selection.

NOTE: *Before switching joystick operation between rear remote and mid mount valves or vice versa, make sure all remote valve levers are in the neutral position.*

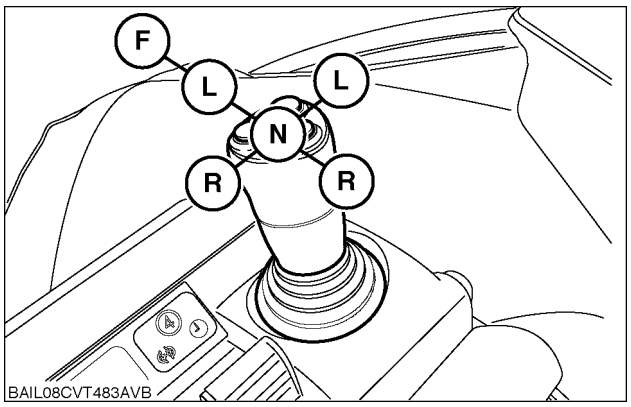


BAIL08CVT486AVC 7

To operate the front hitch using the rear remote valves and joystick, depress the switch, the rear remote valve indicator lamp **(1)** will start to flash.
After five seconds the rear indicator lamp will stop flashing and remain on, confirming control of the rear remote valves has been reactivated. Operation of the front hitch is now controlled by the joystick through the rear remote valves. Repeating the process will change control to the mid mount valves.

NOTE: *Switching the joystick from mid mount to rear remote valve operation will automatically disable the rear remote levers.*

IMPORTANT: *At key off, joystick operation is deactivated. When the joystick is deactivated the warning lights in the front and rear selector switch will flash. The joystick will be reactivated when the operator is in the seat with the engine running for more than three seconds*

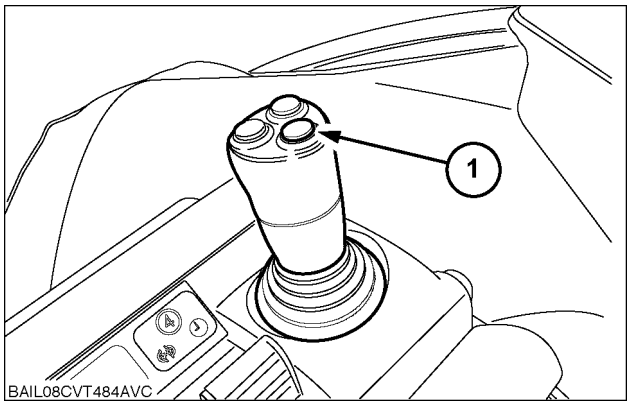


BAIL08CVT483AVB 8

Both the rear remote and mid mount valves offer the following functions when operated by the joystick:

Remote Valve 1: Move the joystick backwards or forward to select Raise **(R)**, Neutral **(N)**, Lower **(L)** and Float **(F)** on the front hitch.

Remote Valve 2: Move the joystick Left or Right to provide oil flow through the front couplers (if fitted).



BAIL08CVT484AVC 9

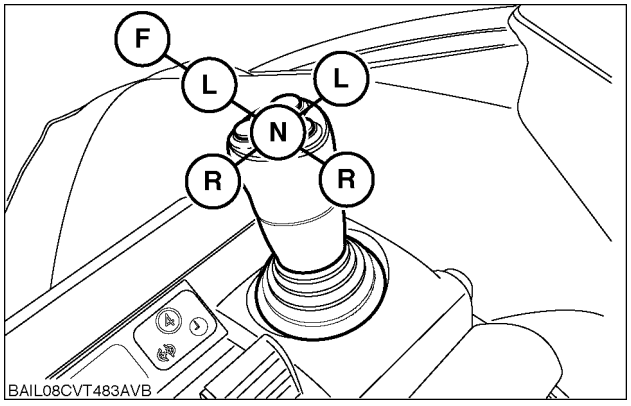
Where valves 3 and 4 are fitted the joystick functions are as follows. This applies to both mid mount and rear mount valves.

Remote Valve 3: Depress and hold the button **(1)** and move the joystick backwards or forwards to operate Raise, Neutral, Lower and Float.

Remote Valve 4: Depress and hold the button **(1)** and move the joystick left or right to operate Raise, Neutral and Lower.

NOTE: *Button **(1)** is the only button to have any functionality when the joystick is used to operate the front hitch.*

NOTE: *The joystick should not be used for hydraulic motor operation.*

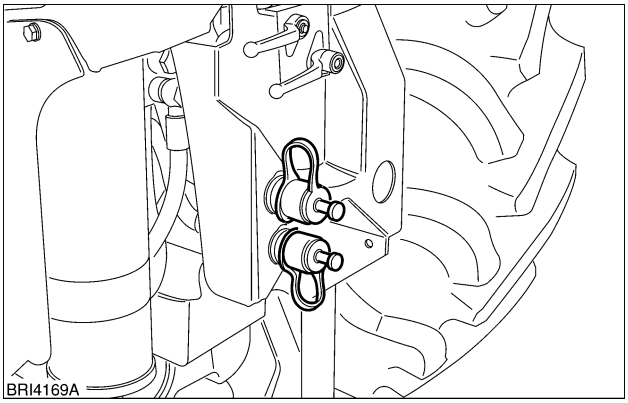


BAIL08CVT483AVB 10

Move the joystick backwards to position **(R)** to raise the hitch, when the maximum height set by the height limiter is reached the hitch will stop.
Move the joystick forward to position **(L)** to fully lower the hitch at a controlled rate.
Move the joystick fully forward to position **(F)** float, will allow the hitch to lower under its own weight. Float can also be used to allow the lift cylinder to extend or retract freely allowing an implement to follow the contours of the ground.
The joystick can also be moved laterally **(R)** and **(L)** to provide oil for equipment connected to the optional connectors.
By moving the joystick diagonally two cylinders may be operated simultaneously.

NOTE: *Always use the float position to lower a single acting cylinder. The lower position is for double acting cylinders only.*

NOTE: *With the joystick operating the rear remote valves, the float position for valves 2 and 4 (lateral movement of the joystick) is not available.*

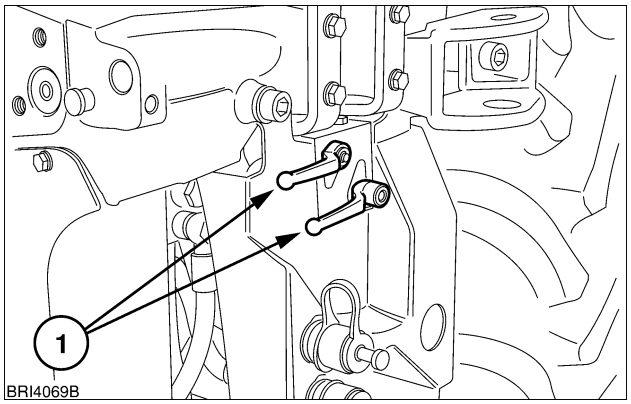


BAIL07CCM294ASA 11

Two auxiliary connectors with **1/2 in** female couplings may be fitted to the front hitch frame. These will provide a double acting hydraulic service for equipment mounted on the front 3 point hitch. When operated by the joystick lateral movement of the joystick (left or right) will provide pressurized oil at the couplings.

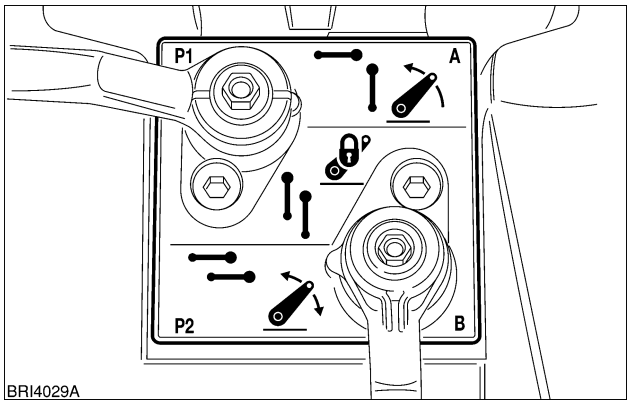
NOTE: *When the front couplers are not in use the protective plugs should always be inserted into the coupler to prevent dust or debris entering the hydraulic system.*

NOTE: *Before disconnecting hoses from the front couplers, any residual pressure in the hydraulic lines must be released.*



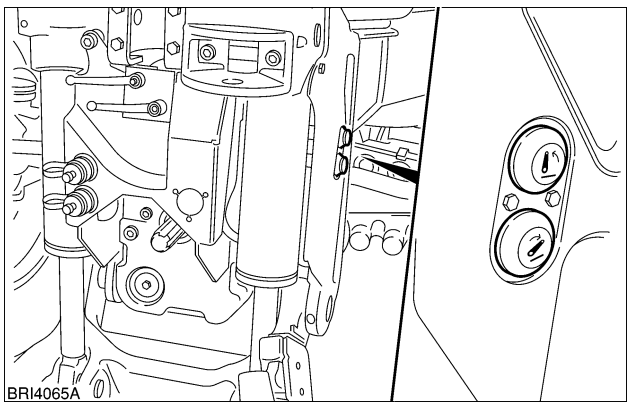
BAIL07CCM295ASA 12

Two selector levers **(1)** are mounted on the front of the hitch assembly, making it possible to change the front hitch between single-action mode, double-action mode or a fixed working height.



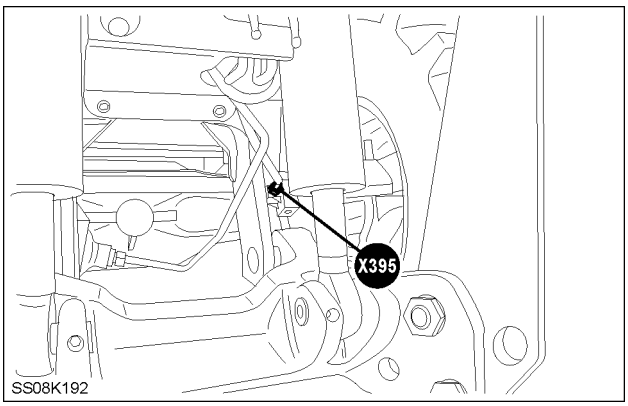
BAIL07CCM296ASA 13

Lever positions:
Upper lever horizontal, lower lever vertical, the hitch operates in single-action mode, raised by the hydraulics, but lowered by the mounted equipment's dead weight.
With both levers horizontal, the hitch operates in double-action mode, raised and lowered by the hydraulics.
With both levers vertical, both hydraulic cylinders are hydraulically locked and the lower links cannot move.



BAIL07CCM297ASA 14

External controls are available as an optional extra, mounted on the left-hand side of the hitch.



SS08K192 15

Vehicles fitted with a front hitch have an auxiliary control unit fitted in addition to, and mounted alongside the central control unit behind the driver's seat. This auxiliary controller processes information from the front hitch height potentiometer, via connector **X395** to regulate height limit settings and provide **(%)** height references to the cluster.

⚠ WARNING ⚠

Extreme care must be exercised when adjusting and checking hitch and control linkage when the engine is running and when linkage is under hydraulic or mechanical load. Study the linkage and hitch travel-keep the hands, arms, legs and feet out of the travel arc of the hitch and linkage.

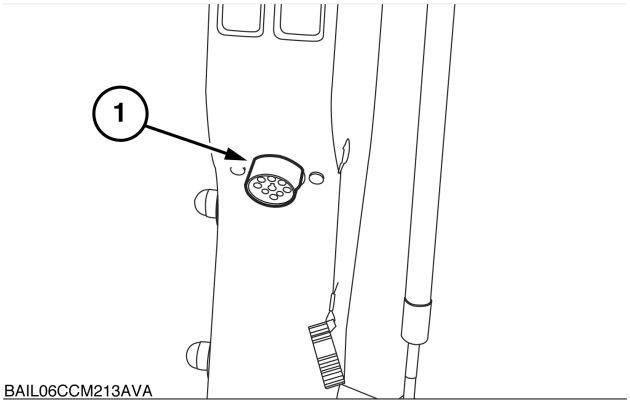
M148B

HITCH Front hitch - Calibrate

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

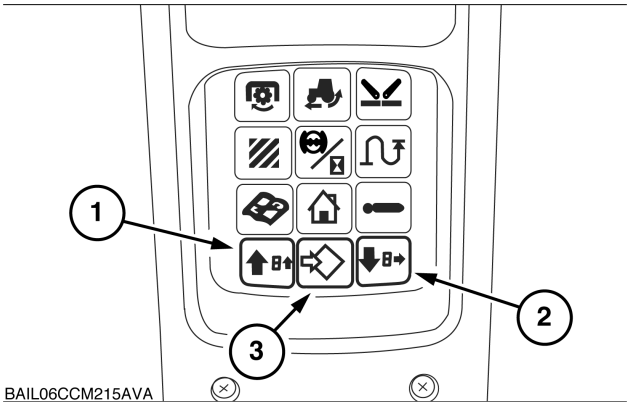
NOTE: *The calibration procedure is controlled by the electronic management system. To prevent inadvertent movement of the tractor, park the tractor away from any obstacles, firmly apply the parking brake and block the wheels, front and rear. Check that the Ground speed display is Zero before commencing.*

1. Switch the hydraulic master in position "ON".
2. Switch the select switch into Mid-mount remote control valve.
3. Install the diagnostic connector **380000843** into the diagnostic socket **(1)**.

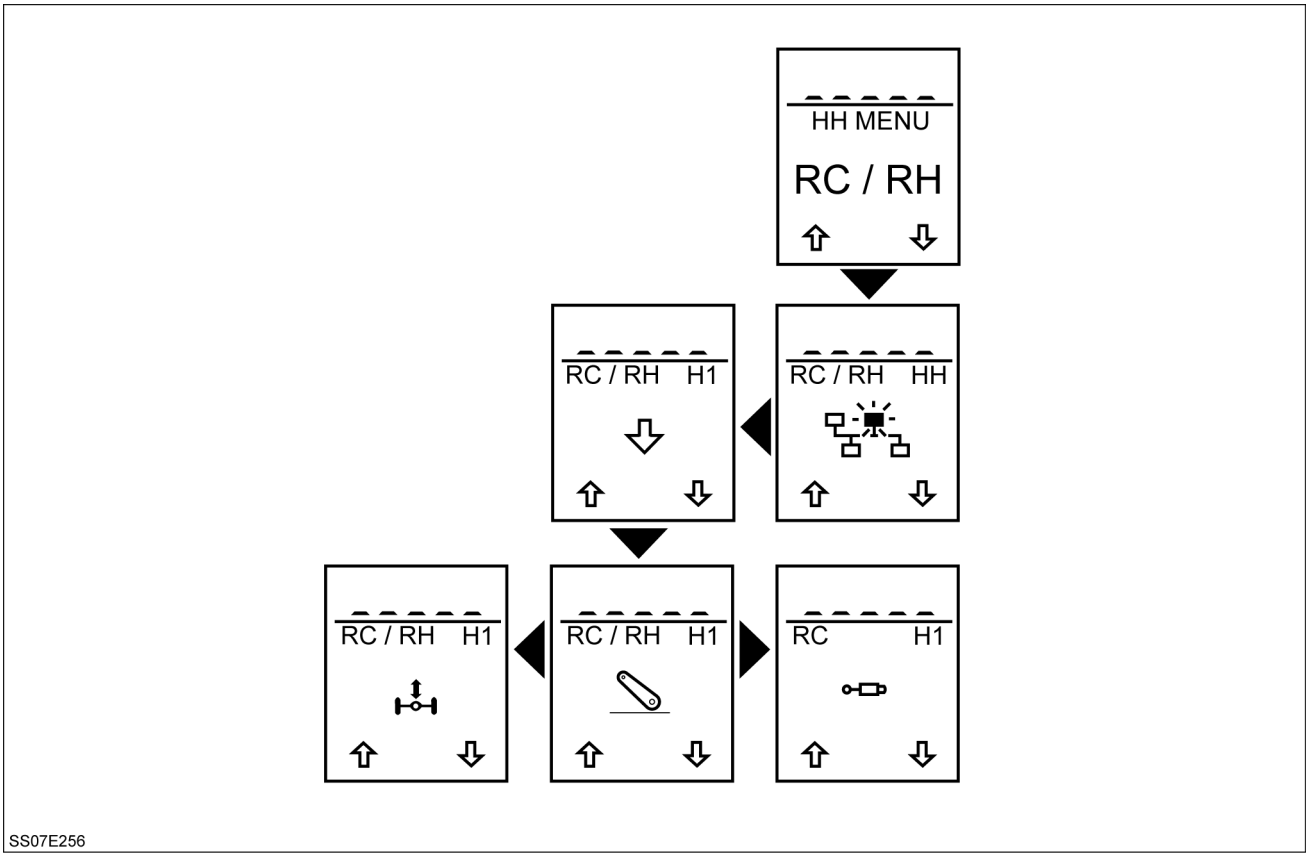


BAIL06CCM213AVA 1

4. Turn the height set control to the OFF position.
5. Use the "Up" **(1)**button, "Down" **(2)** button and the "Menu" button **(3)** on the ICU2 to navigate the HH menu's to H1 and the front hitch symbol on the RC/RH controller.



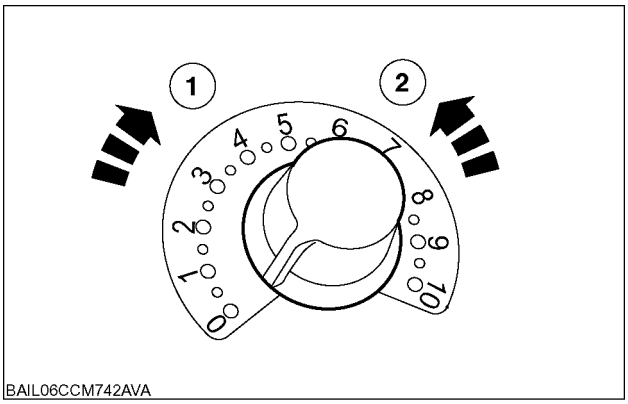
BAIL06CCM215AVA 2



SS07E256 3

6. Turn the height set control to the ON position and then back to the OFF position.
   The current potentiometer position will show on the top section of the display.

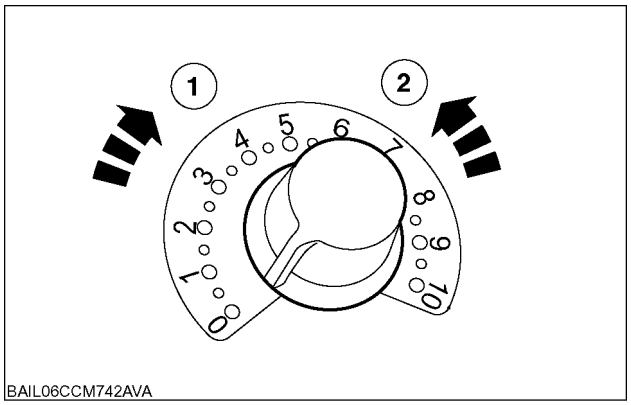
7. Lower the front hitch to it's lowest position.
   When the end stop is reached, turn the height set control to the ON position and then back to the OFF position.



BAIL06CCM742AVA 4

8. The bottom value position is recorded and displayed in the top section of the display for 2 seconds.

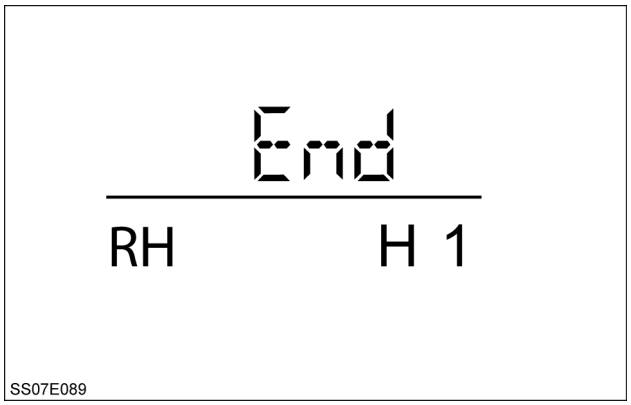
9. Raise the front hitch to it's highest position.
When the end stop is reached, turn the height set control to the ON position and then back to the OFF position.



BAIL06CCM742AVA 5

10. The top value position is recorded and displayed in the top section of the display for 2 seconds.

11. The display will then show "End" to indicate that the calibration process has been completed successfully.



SS07E089 6

12. Key OFF to store the calibration values.

NOTE: *If an error occurs during calibration a "U" code will be displayed and the procedure will need to be repeated. Refer to the "U" code listing in* ***Control module - Fault code index (A.50.A)****.*

HITCH Front hitch - Remove

⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

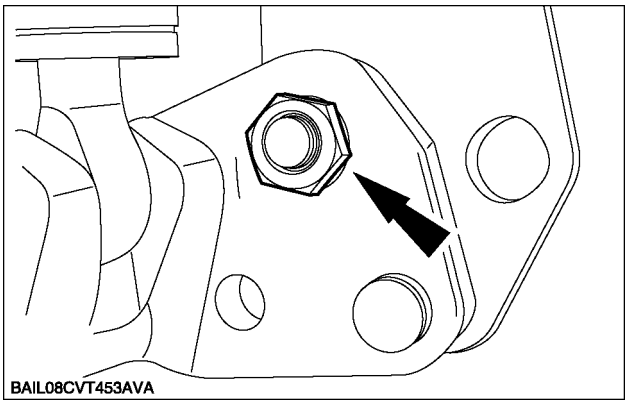
B012

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

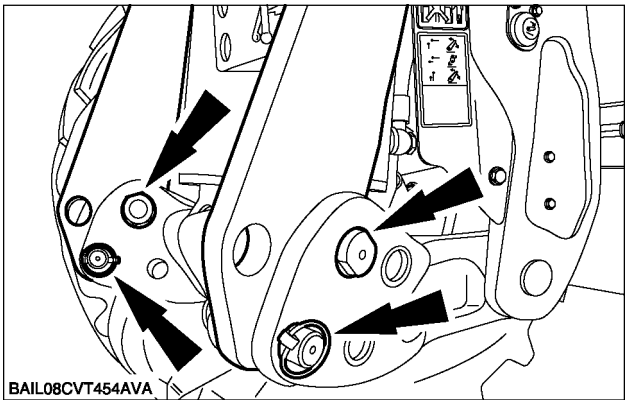
B026

1. Fully lower the front hitch.
2. Disconnect the battery ground cable, for further information refer to **Battery - Disconnect (A.30.A)**.
3. Remove the lower lift link pin retaining nuts.



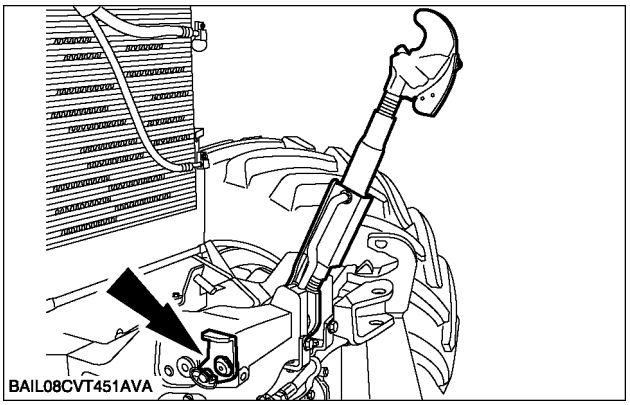
BAIL08CVT453AVA 1

4. Remove the lower lift link retaining pins and remove lower lift links.



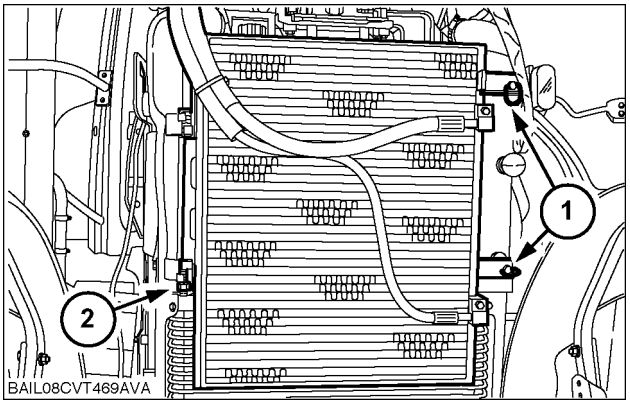
BAIL08CVT454AVA 2

5. Remove the retaining pin and remove the top link.



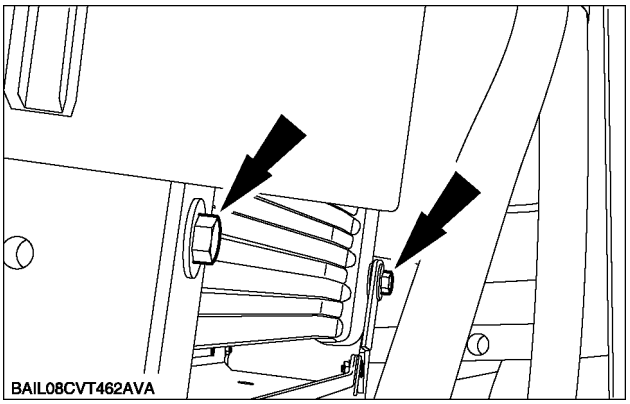
BAIL08CVT451AVA 3

6. Release the condensor retaining clips **(1)** and remove the condensor hinge bolt **(2)**.
Detach the condensor and carefully position it on top of the engine.



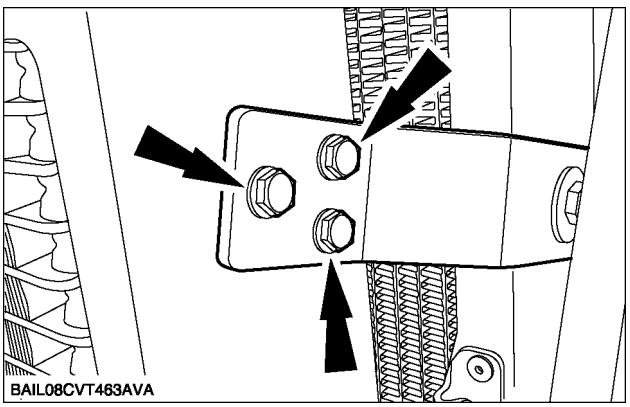
BAIL08CVT469AVA 4

7. Remove the oil cooler rear retaining bolts.



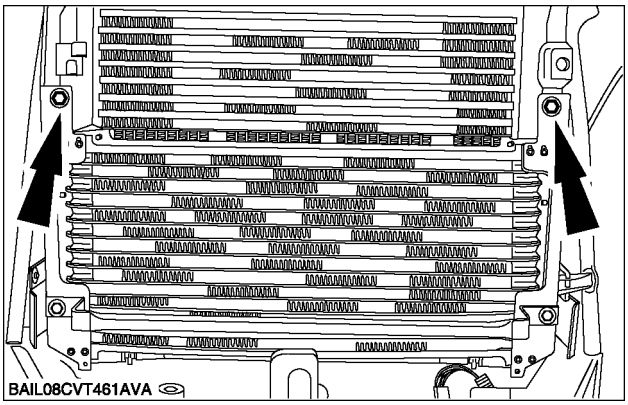
BAIL08CVT462AVA 5

8. Detach the cooling assembly brackets from the oil cooler.



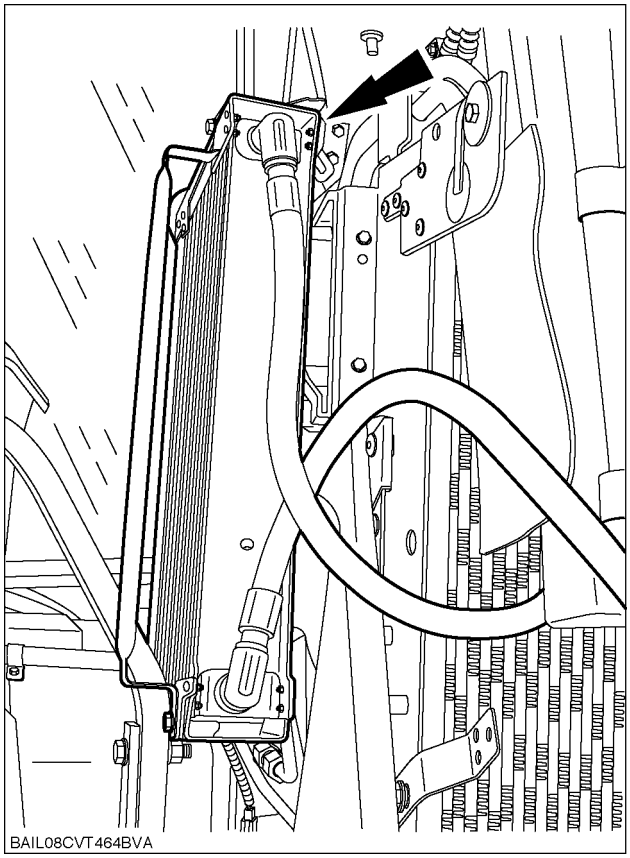
BAIL08CVT463AVA 6

9. Detach the oil cooler.



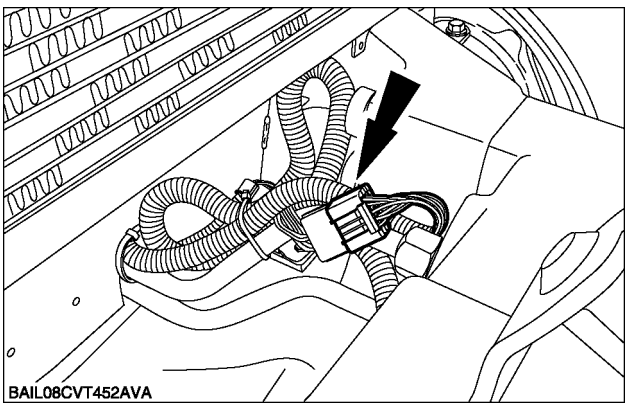
BAIL08CVT461AVA 7

10. Carefully secure the oil cooler to one side.



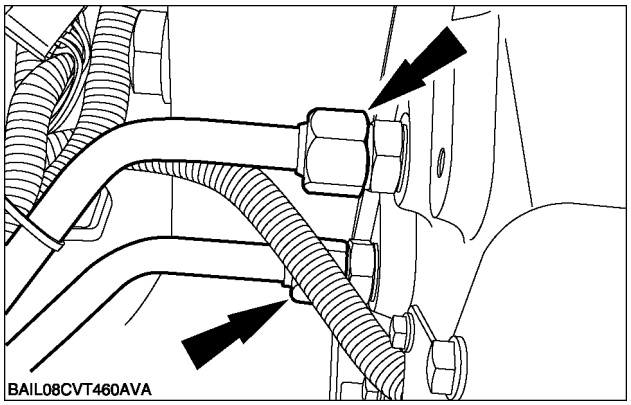
BAIL08CVT464BVA 8

11. Disconnect the front hitch electrical connectors.



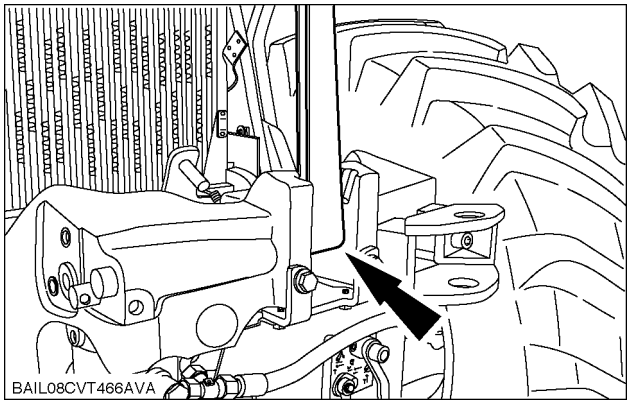
BAIL08CVT452AVA 9

12. Disconnect the hydraulic oil supply and return pipe.



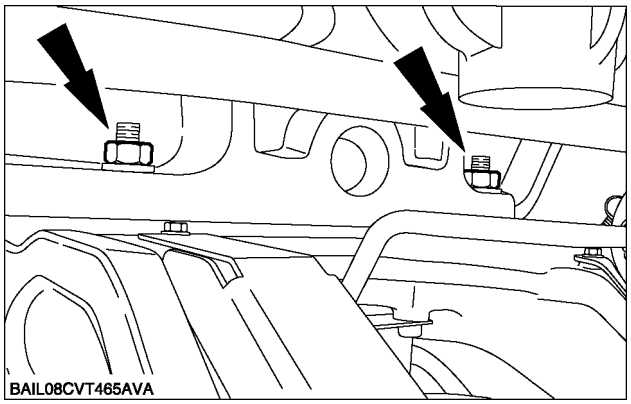
BAIL08CVT460AVA 10

13. Using suitable lifting equipment, support the front hitch.



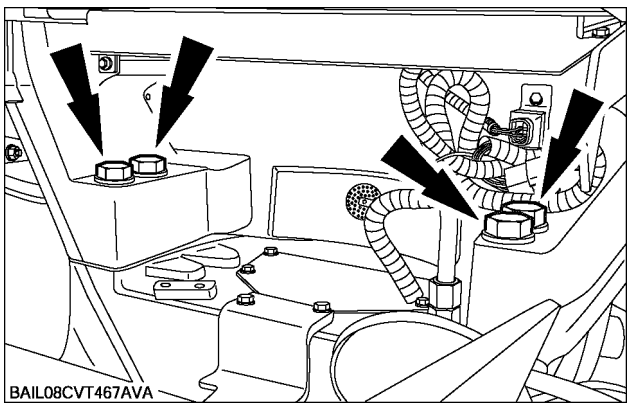
BAIL08CVT466AVA 11

14. Remove the front hitch lower retaining nuts.



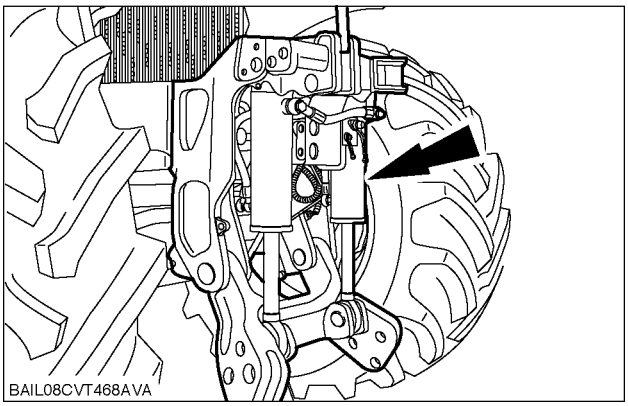
BAIL08CVT465AVA 12

15. Remove the front hitch upper retaining bolts.



BAIL08CVT467AVA 13

16. Remove the front hitch.



BAIL08CVT468AVA 14

HITCH Front hitch - Install

⚠ DANGER ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

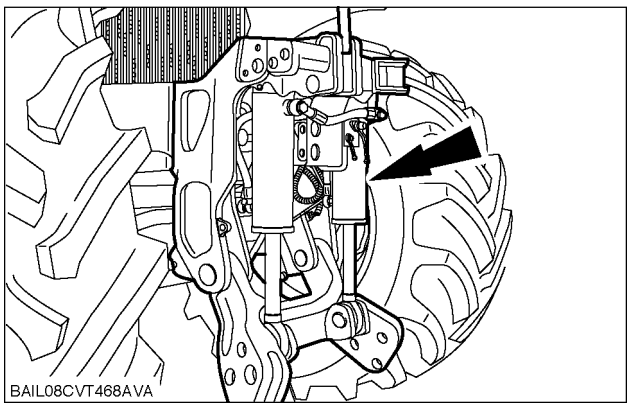
B012

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

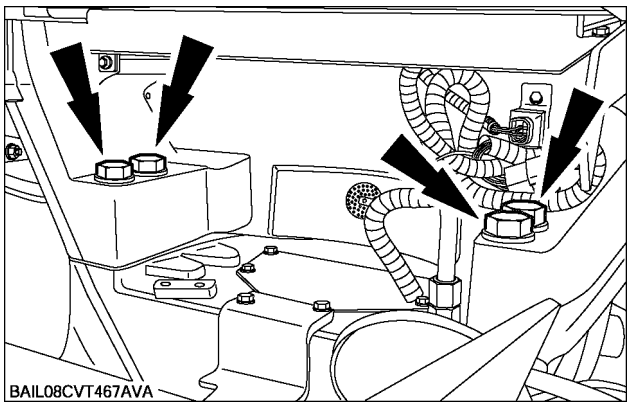
B026

1. Using a suitable hoist, install the front hitch.



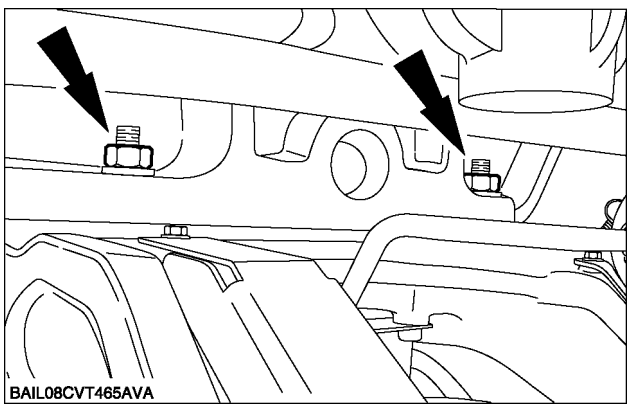
BAIL08CVT468AVA 1

2. Install the front hitch upper retaining bolts. Tighten to **650 Nm** (**480 lb ft**)



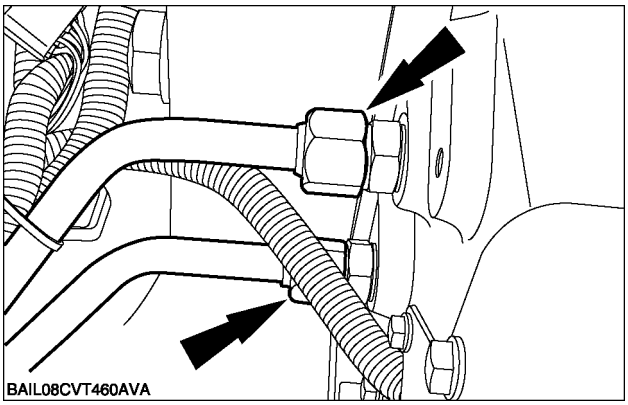
BAIL08CVT467AVA 2

3. Install the front hitch lower retaining nuts. Tighten to **650 Nm** (**480 lb ft**)



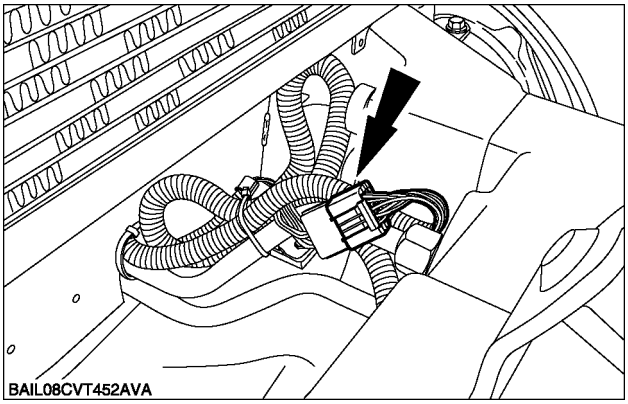
BAIL08CVT465AVA 3

4. Connect the hydraulic oil supply and return pipes.



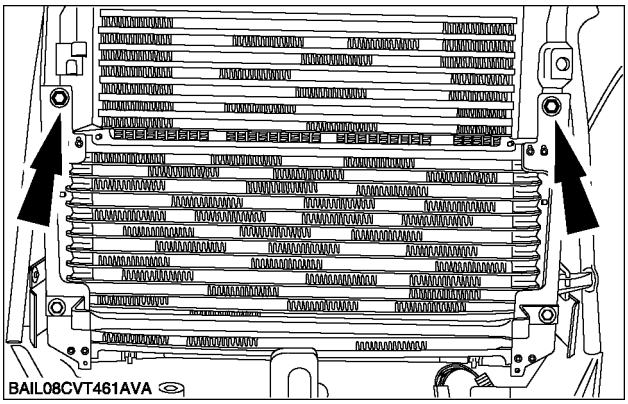
BAIL08CVT460AVA 4

5. Connect the front hitch electrical connector.



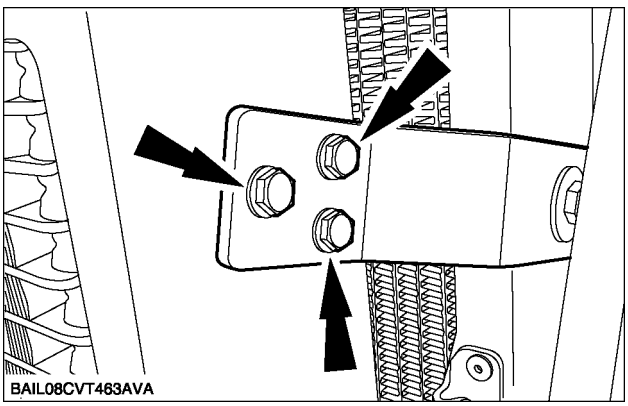
BAIL08CVT452AVA 5

6. Attach the oil cooler.



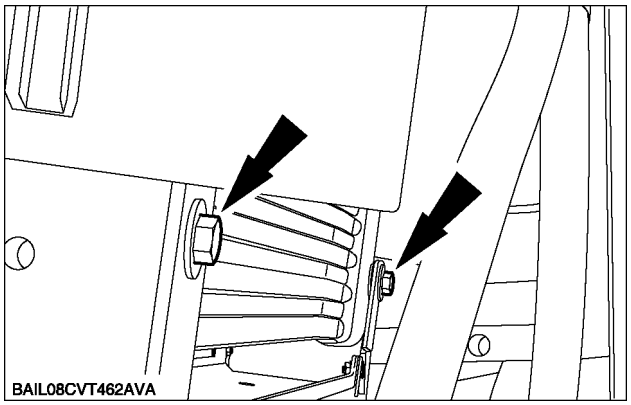
BAIL08CVT461AVA 6

7. Attach the cooling assembly brackets to the oil cooler.



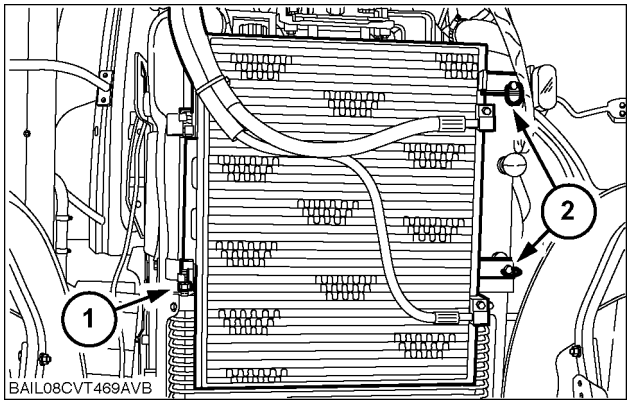
BAIL08CVT463AVA 7

8. Install the oil cooler rear retaining bolts.



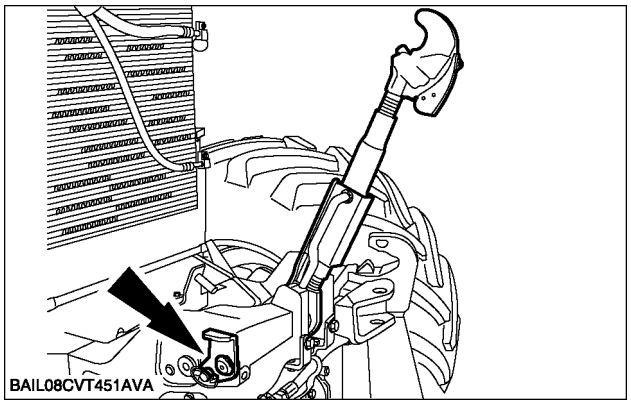
BAIL08CVT462AVA 8

9. Install the condensor into position.
Install the condensor hinge bolt and retaining nut **(1)** and secure the condensor retaining clips **(2)**.



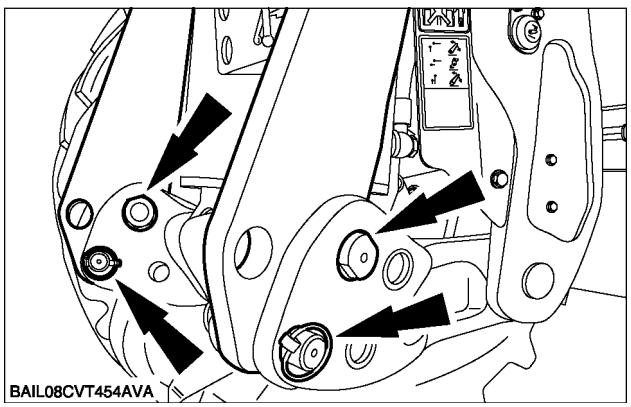
BAIL08CVT469AVB 9

10. Install the front top link and install the retaining pin .



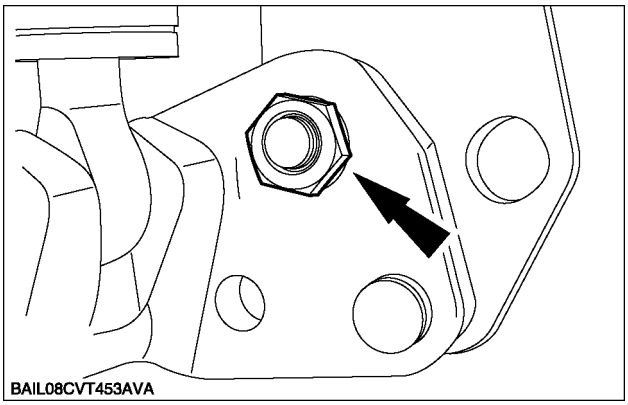
BAIL08CVT451AVA 10

11. Install the lower lift links, and retaining pins.



BAIL08CVT454AVA 11

12. Install the lower lift link pin retaining nuts.



BAIL08CVT453AVA 12

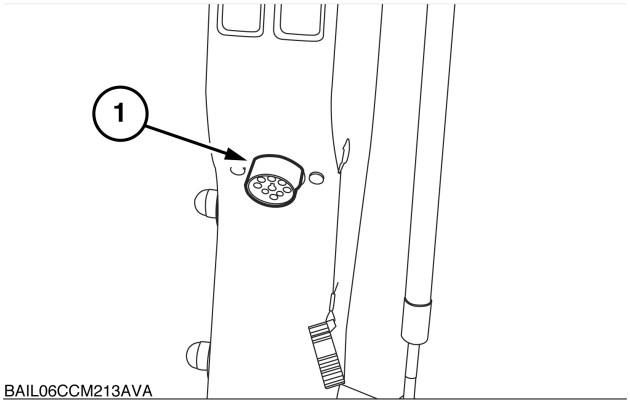
Next operation:
Connect the battery ground cable, for further information refer to **Battery - Connect (A.30.A)**

HITCH Front hitch - Calibrate

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

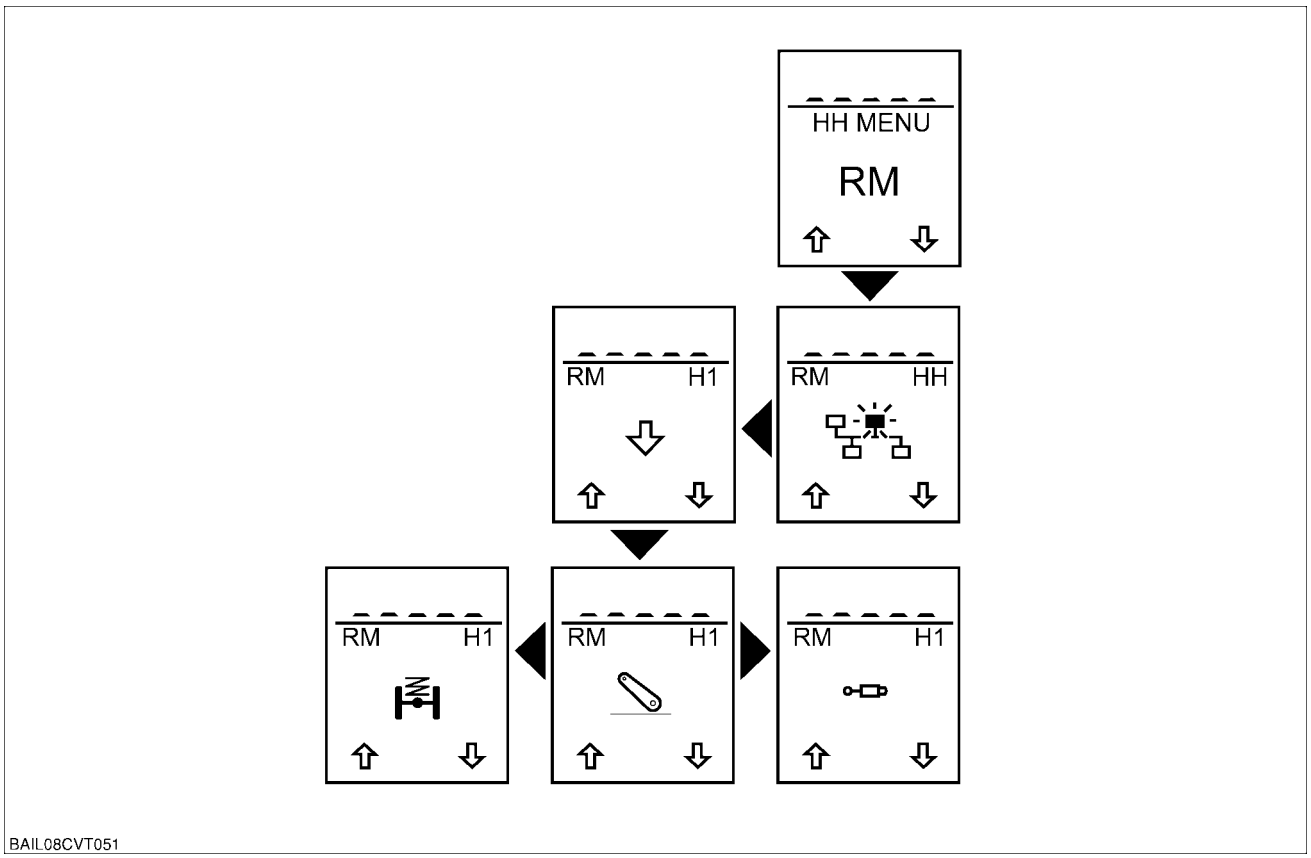
NOTE: *The calibration procedure is controlled by the electronic management system. To prevent inadvertent movement of the tractor, park the tractor away from any obstacles, firmly apply the parking brake and block the wheels, front and rear. Check that the Ground speed display is Zero before commencing. Calibration cannot proceed unless the tractor is stationary.*

1. Install the diagnostic connector **380000843** into the diagnostic socket **(1)**.



BAIL06CCM213AVA 1

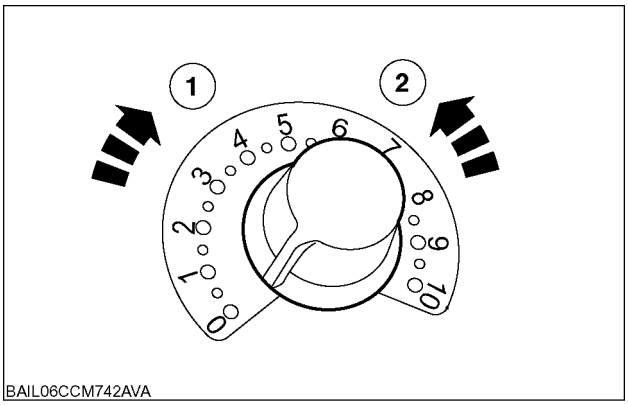
2. Turn the height set control to the OFF position.
3. Use the "up", "down" and "menu" keys on the ICU3 to navigate the HH menu's to H1 and the front hitch symbol on the RM controller.



BAIL08CVT051 2

4. Turn the height set control to the ON position and then back to the OFF position.
   The current potentiometer position will show on the top section of the display.

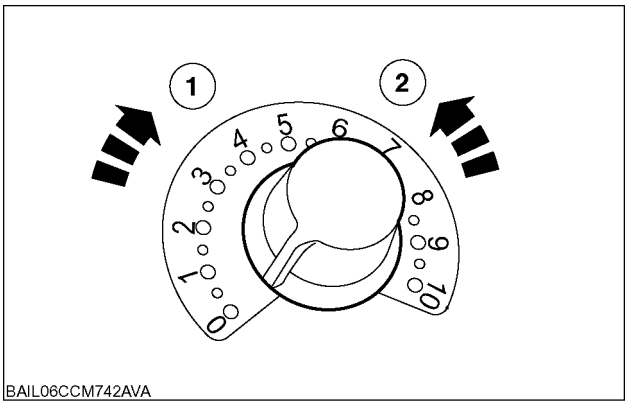
5. Lower the front hitch to it's lowest position.
When the end stop is reached, turn the height set control to the ON position and then back to the OFF position.



BAIL06CCM742AVA 3

6. The bottom value position is recorded and displayed in the top section of the display for 2 seconds.

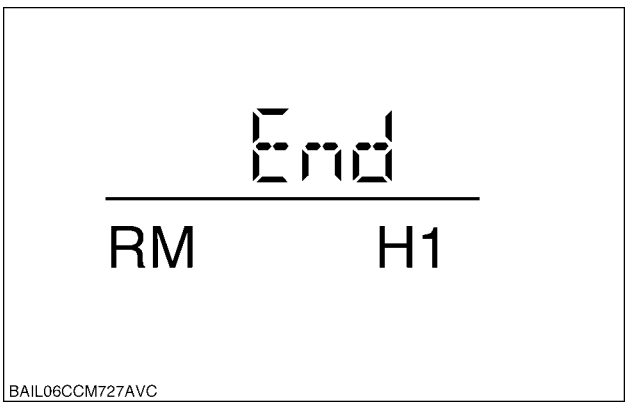
7. Raise the front hitch to it's highest position.
When the end stop is reached, turn the height set control to the ON position and then back to the OFF position.



BAIL06CCM742AVA 4

8. The top value position is recorded and displayed in the top section of the display for 2 seconds.

9. The display will then show "End" to indicate that the calibration process has been completed successfully.



BAIL06CCM727AVC 5

10. Key OFF to store the calibration values.

NOTE: *If an error occurs during calibration a "U" code will be displayed and the procedure will need to be repeated. Refer to the "U" code listing in* ***Control module - Fault code index (A.50.A)****.*

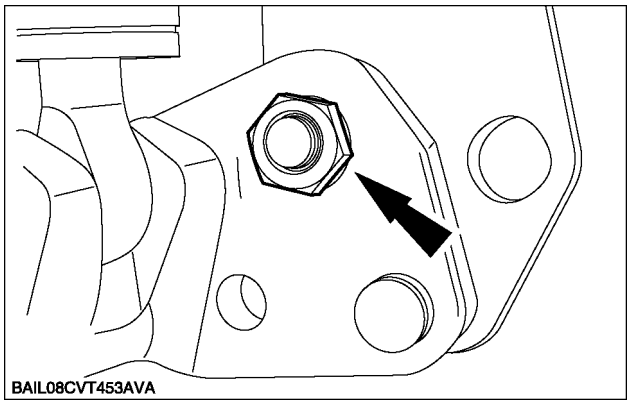
Cylinder - Remove

⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

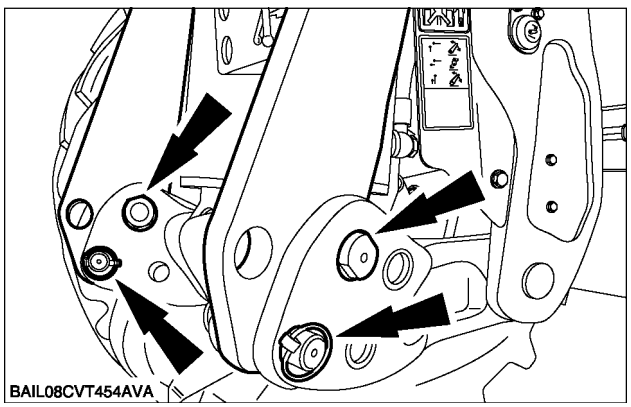
B026

1. Fully lower the front hydraulic lift arms.
2. Disconnect the battery ground cable, for further information refer to **Battery - Disconnect (A.30.A)**.
3. Remove the lift arm pin retaining nuts.



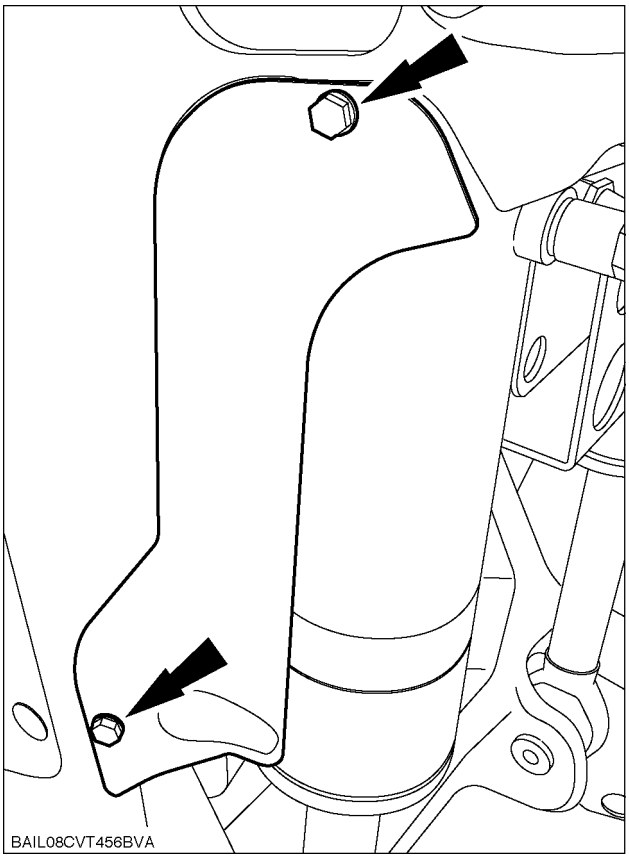
BAIL08CVT453AVA 1

4. Remove the lower lift arm retaining pins and remove lower lift arms.



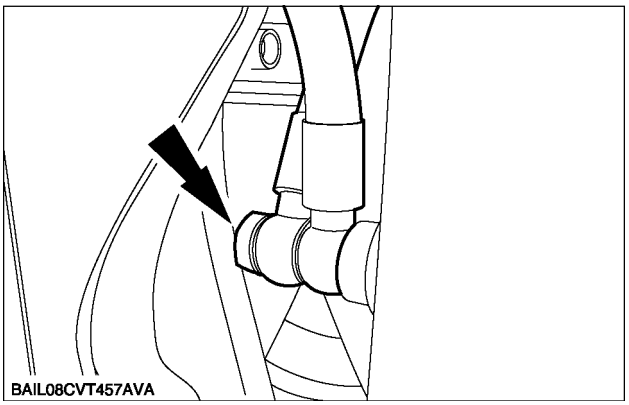
BAIL08CVT454AVA 2

5. Remove the lift ram shield.



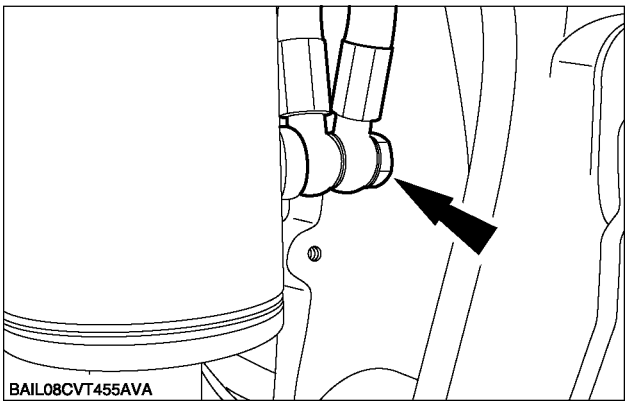
BAIL08CVT456BVA 3

6. Disconnect the lift ram upper hydraulic hoses.



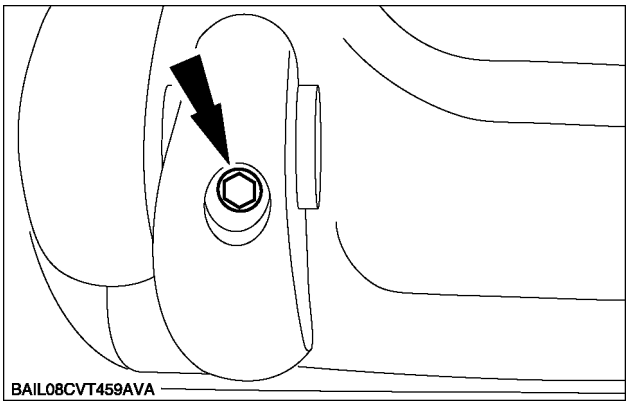
BAIL08CVT457AVA 4

7. Disconnect the lift ram lower hydraulic hoses.



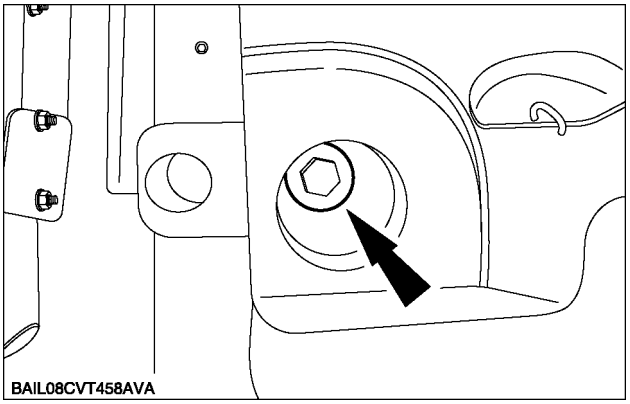
BAIL08CVT455AVA 5

8. Remove the lift ram lower retaining pin.



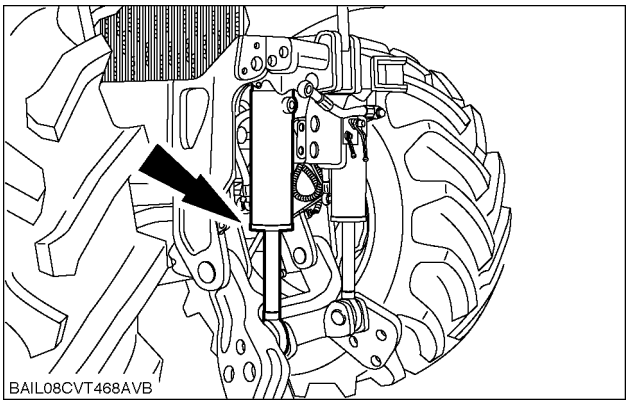
BAIL08CVT459AVA 6

9. Support the lift ram and remove the lift ram upper retaining pin.



BAIL08CVT458AVA 7

10. Remove the lift ram.



BAIL08CVT468AVB 8

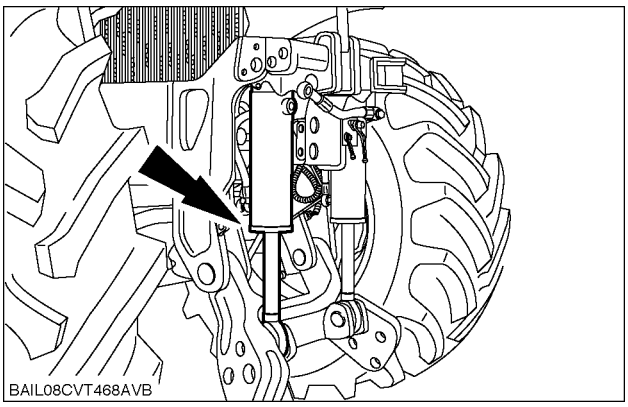
Cylinder - Install

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

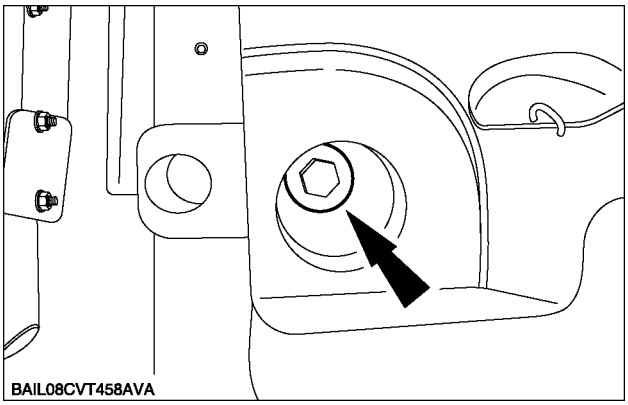
B026

1. Install the lift ram into position.



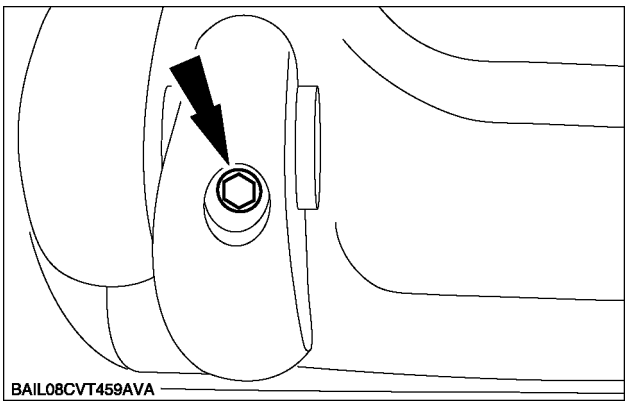
BAIL08CVT468AVB 1

2. Install the lift ram upper retaining pin.



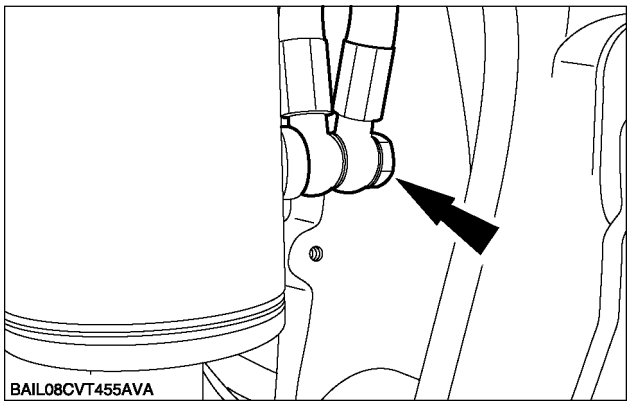
BAIL08CVT458AVA 2

3. Install the lift ram lower retaining pin.



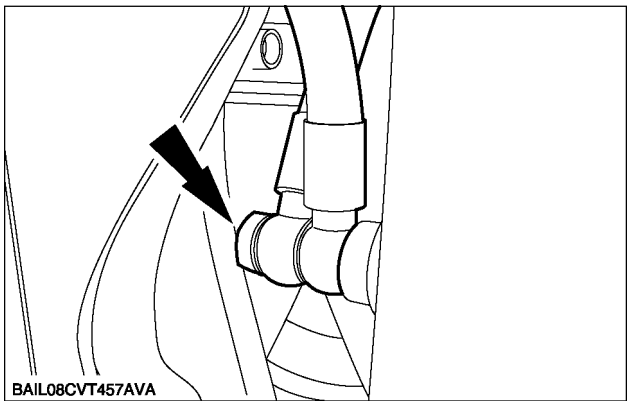
BAIL08CVT459AVA 3

4. Connect the lift ram lower hydraulic hoses.



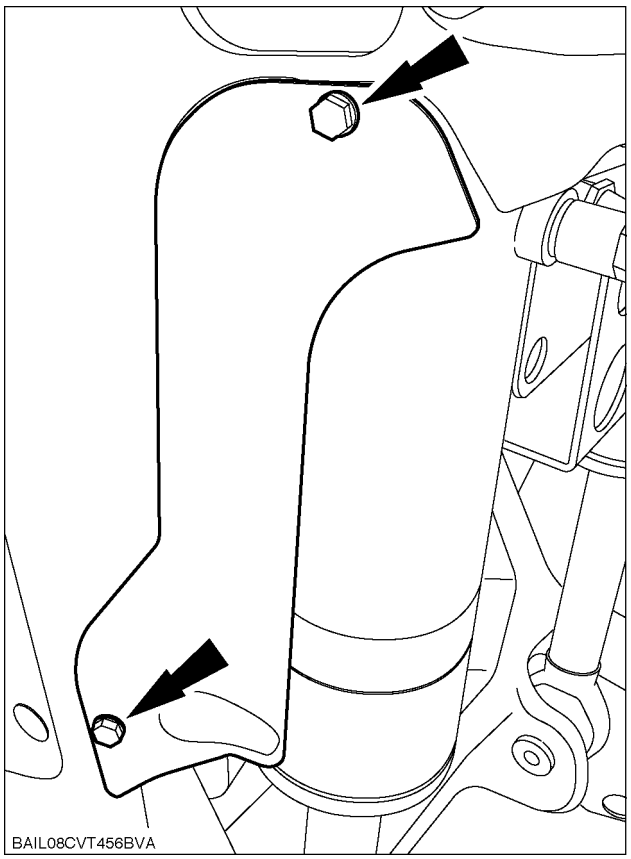
BAIL08CVT455AVA 4

5. Connect the lift ram upper hydraulic hoses.



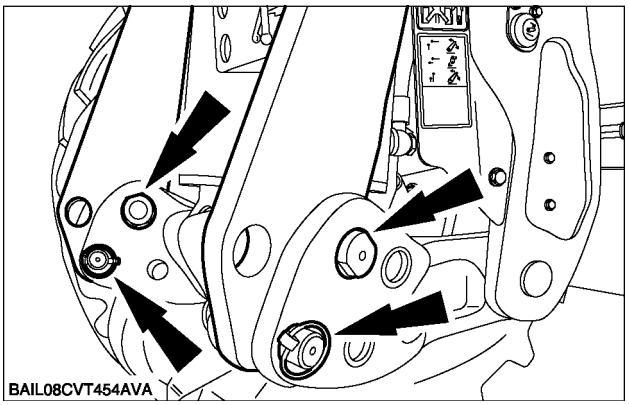
BAIL08CVT457AVA 5

6. Install the lift ram shield.



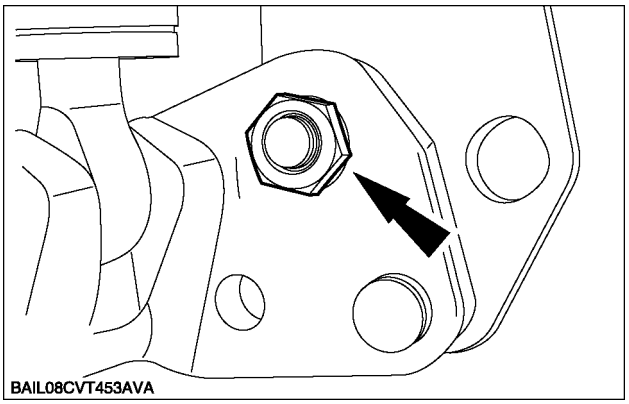
BAIL08CVT456BVA 6

7. Install the lower lift arm retaining pins



BAIL08CVT454AVA 7

8. Install the lift arm pin retaining nuts.



BAIL08CVT453AVA 8

Next operation:
Connect the battery ground cable, for further information refer to **Battery - Connect (A.30.A)**

Index

WORKING ARM - H

HITCH Front hitch - 10.B

Cylinder - Install 41

Cylinder - Remove 38

HITCH Front hitch - Calibrate 24
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

HITCH Front hitch - Calibrate 36
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

HITCH Front hitch - Exploded view 10

HITCH Front hitch - Install 32

HITCH Front hitch - Remove 27

HITCH Front hitch - Static description 4
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

HITCH Front hitch - Static description 16
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

HITCH Front hitch - Torque 3

WORKING ARM - H

HITCH Rear hitch - 10.C

PUMA 165 Multicontroller , PUMA 165 , PUMA 180 Multicontroller , PUMA 180 , PUMA 195 Multicontroller , PUMA 195 , PUMA 210 Multicontroller , PUMA 210

Contents

WORKING ARM - H

HITCH Rear hitch - 10.C

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  - General specification . . . 3
- Top link
  - General specification . . . 4

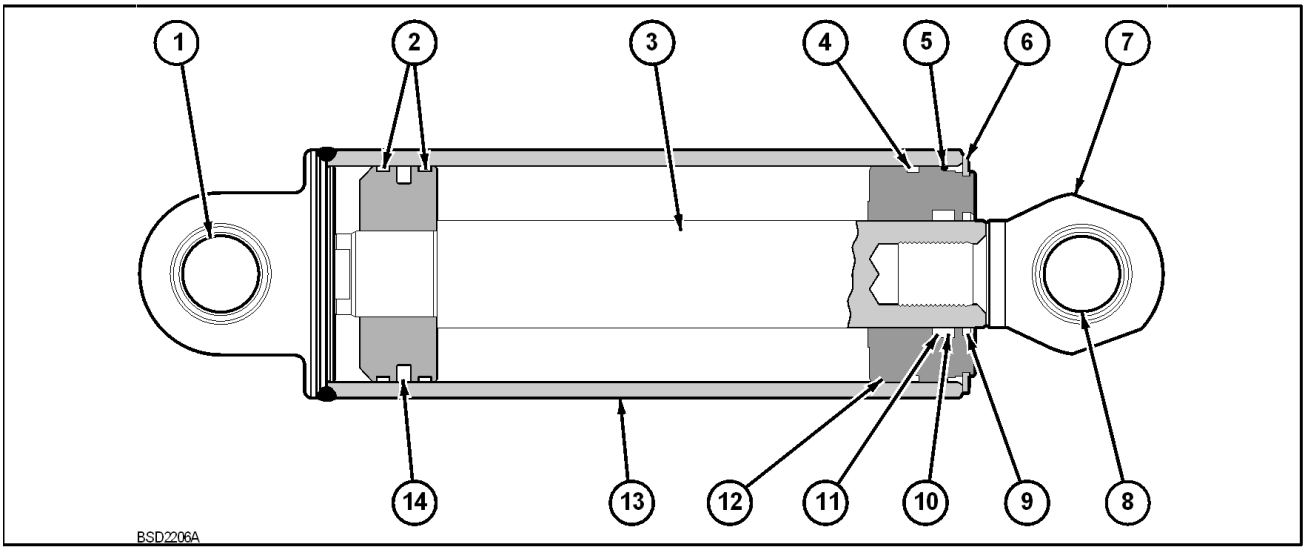
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  - Remove . . . 14
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  - Configure . . . 17
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  - Draft pin sensor - Remove . . . 18
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Cylinder - General specification

100 mm Cylinder Specifications

Type		Single-acting
Quantity		2
Pin diameter	mm	34.7
Stroke	mm	200



BSD2206A 1

Lift Cylinder Sectional View

1 Bushing
2 Guide Rings
3 Rod Assembly
4 Ring
5 Retaining Ring
6 Seeger Ring
7 Rod Connection
8 Bushing
9 Rod Wiper
10 Back Up Washer
11 Rod Seal
12 Head
13 Cylinder Body
14 Piston Seal

Top link - General specification

TOP LINK SPECIFICATIONS

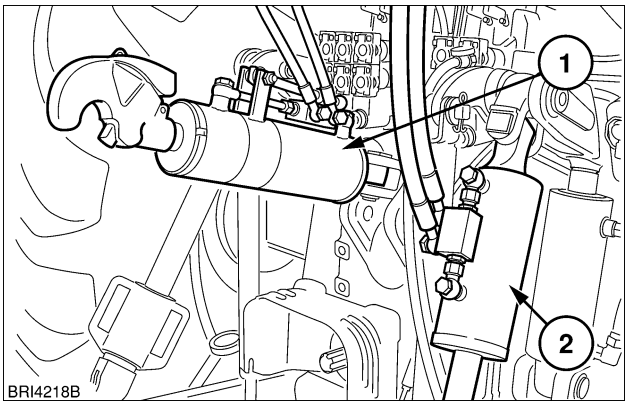
Type	Double-acting
Quantity	1
Pin diameter	**28 mm**
Stroke	**228 mm**
End Cap Locking Torque	**400 N·m**

RIGHT HAND LIFT LINK SPECIFICATIONS

Type	Double-acting
Quantity	1
Pin diameter	**28 mm**
Stroke	**120 mm**
Extension Range	**870 - 990 mm**
End Cap Locking Torque	**400 N·m**

Top link - Static description

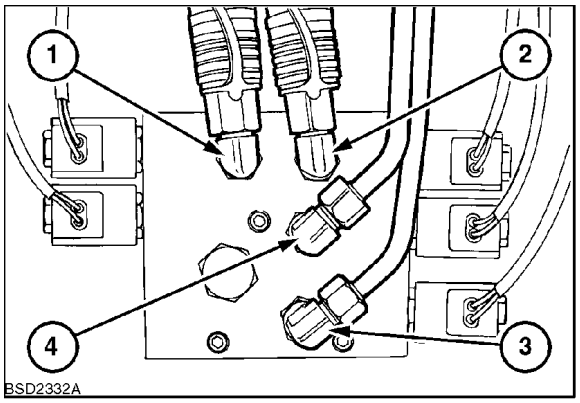
All models can be fitted with a hydraulically adjustable top link **(1)** and right hand lift link **(2)**.



BAIL07CCM298ASA 1

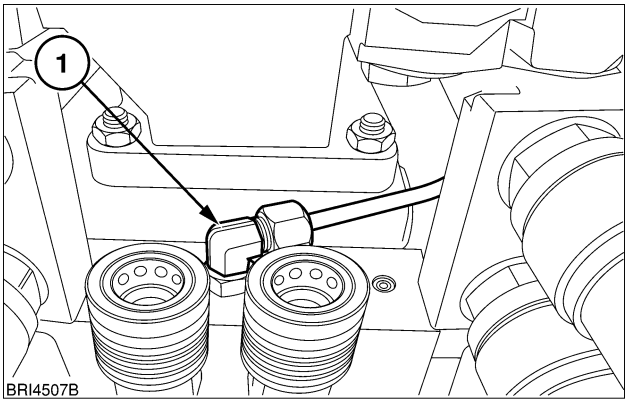
The cylinders are connected to a solenoid valve block by hydraulic hoses and tubes. The solenoid valve block is situated to rear of the centre housing and is fed high pressure oil via a hose connected by a tee piece which also feeds the suspension valve

1. Connector to Hydraulically Adjustable Top Link
2. Connector to Hydraulically Adjustable Top Link
3. Connector to Hydraulically adjustable Lift Link
4. Connector to Hydraulically adjustable Lift Link



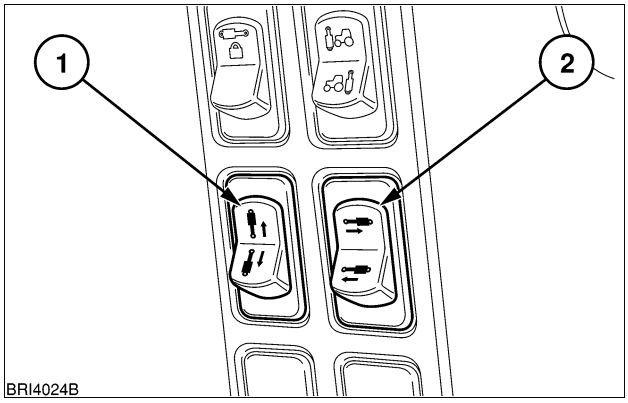
BSD2332A 2

A load sensing line is connected to the manifold



BAIL06CCM257ASA 3

Control of these cylinders is handled by two switches located on the 'C' pillar on the right hand side of the cab. Switch **(1)** controls the extend and retract of the top link. Switch **(2)** controls the extend and retract of the right hand lift link.

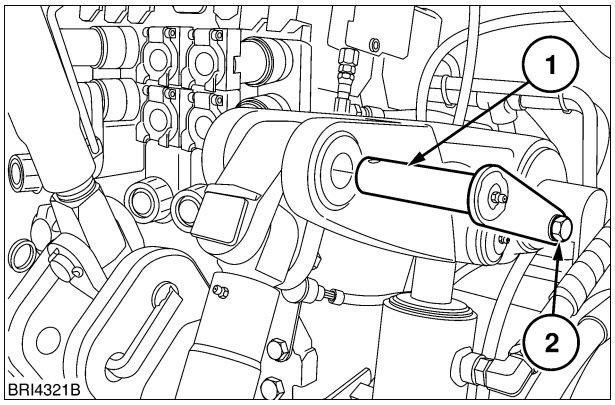


BAIL06CCM126ASA 4

HITCH Rear hitch - Install Hydraulic Pushback Hitch

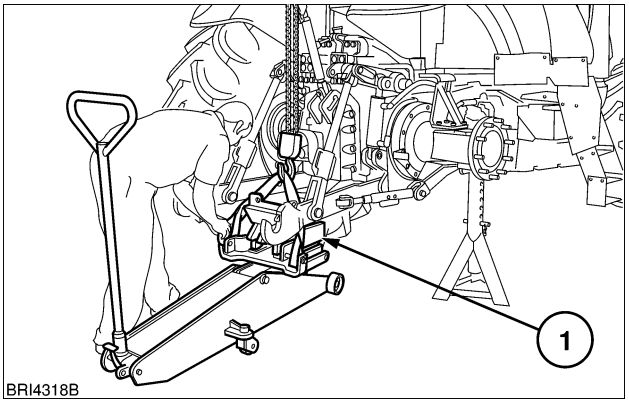
1. Position the tractor on a clean hard level surface. Chock the left hand front and rear wheels. Jack up the right hand rear axle casing and place a suitable axle stand under the axle casing so that the right hand rear wheel is just clear of the ground. Support the wheel with a removal tool, remove the wheel nuts and withdraw the wheel.

2. Install right hand lift arm pin **(1)** and secure with bolt **(2)**. Repeat for left hand side. Tighten pin retaining bolts **(2)**to **50 - 65 Nm** (**36.88 - 47.94 lbft**).



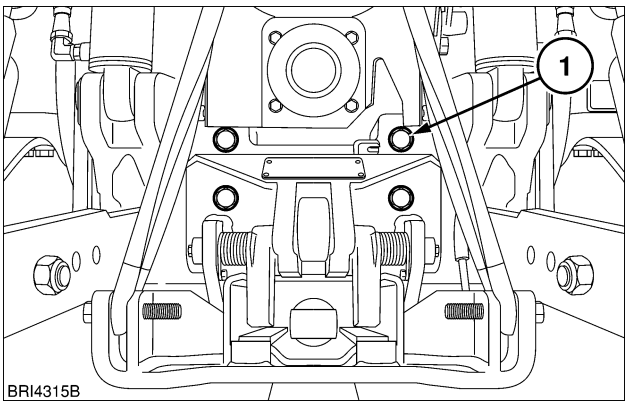
BAIL06CCM226ASA 1

3. Using a trolley jack and suitable lifting equipment position the pick up hitch assembly **(1)** under the rear axle and align the hitch and axle mounting bolt holes



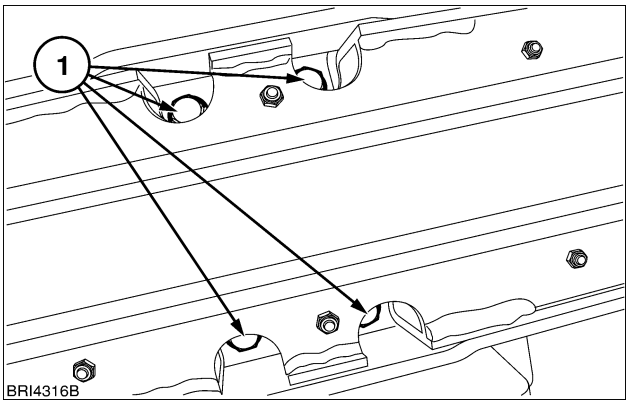
BAIL06CCM227ASA 2

4. Install the four rear bolts and washers **(1)**. Tighten the bolts to **310 - 400 Nm** (**228.64 - 295.02 lbft**).



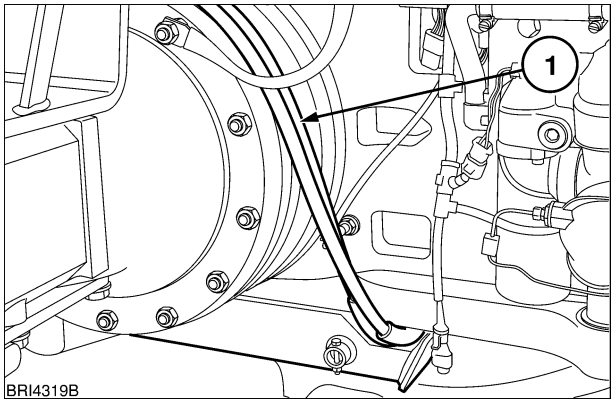
BAIL06CCM228ASA 3

5. From underneath the tractor install the four bolts **(1)**. Tighten the bolts to **340 - 460 Nm** (**250.77 - 339.28 lbft**).



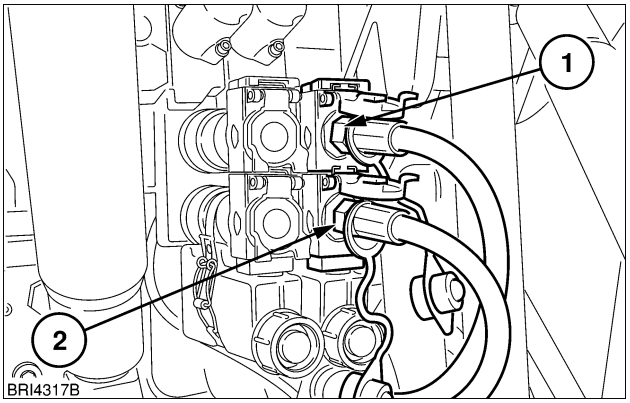
BAIL06CCM229ASA 4

6. Route the pick up hitch hoses **(1)** over the top of the right hand axle housing and connect into a remote valve.



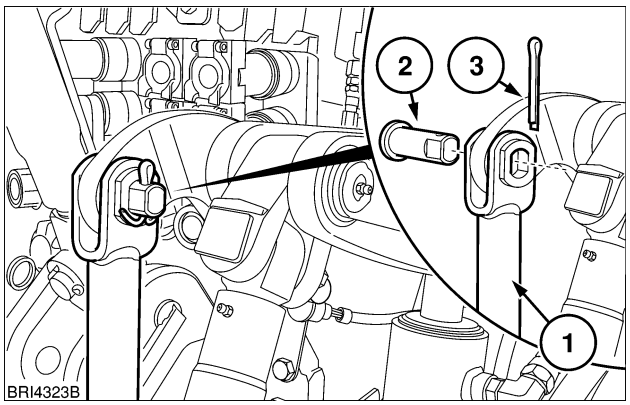
BAIL06CCM230ASA 5

7. Ensure the green hose **(1)** is fitted to the top port and the red hose **(2)** to the lower port.



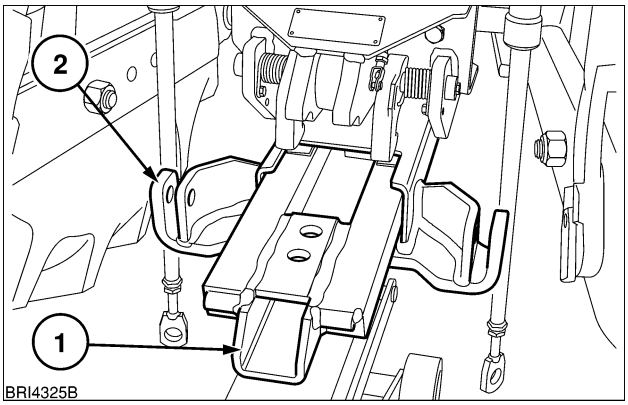
BAIL06CCM231ASA 6

8. Connect upper end of the pick up hitch lift rods **(1)** to the idler arms using clevis pin **(2)** and split pin **(3)**.



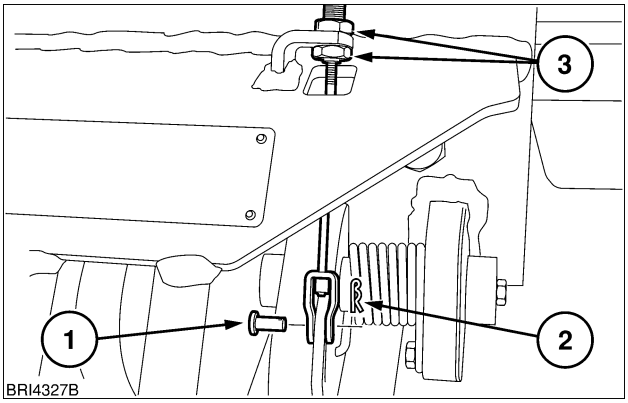
BAIL06CCM232ASA 7

9. Slide the carrier assembly **(1)** into the hitch assembly **(2)** .



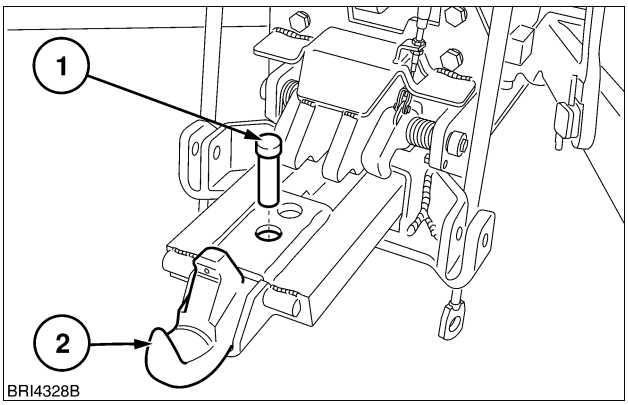
BAIL06CCM233ASA 8

10. Secure rear hitch release cable to the carrier assembly by attaching the latch with clevis pin **(1)**and 'R' clip **(2)**. Adjust cable with locknuts **(3)** as required.



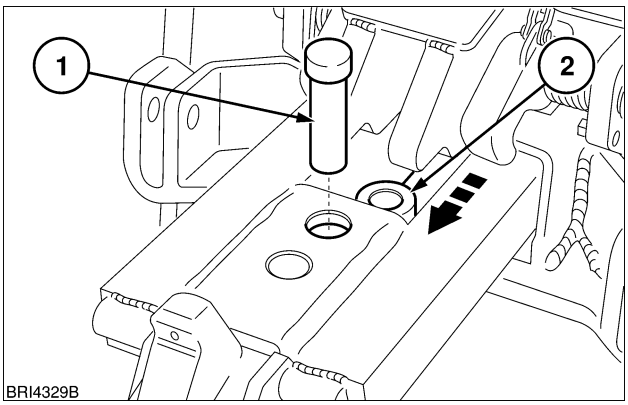
BAIL06CCM234ASA 9

11. Locate the hook assembly **(2)** into the carrier and lock in position with pin **(1)**.



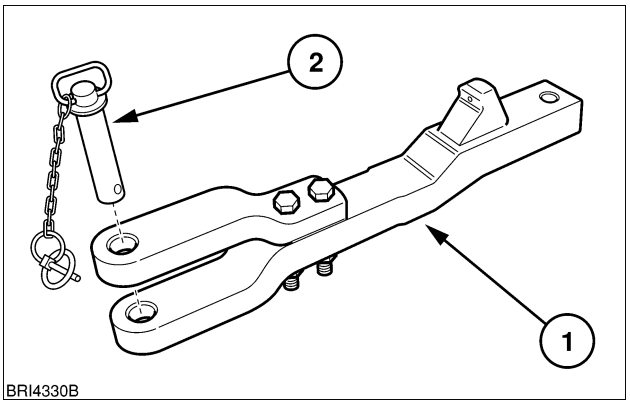
BAIL06CCM235ASA 10

12. Start the engine and fully extend the hitch cylinder. Check that the piston rod eye is vertical. Push the carrier assembly forwards until the locking pin **(1)** can be inserted through the cylinder rod eye **(2)** .



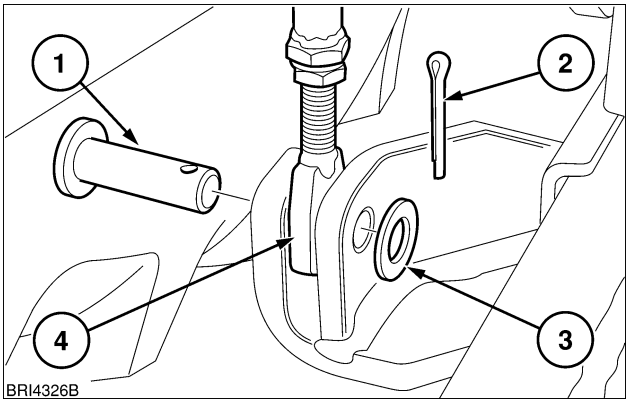
BAIL06CCM236ASA 11

13. Alternatively the drawbar **(1)** and tow pin **(2)**assembly can be installed into the carrier.



BAIL06CCM237ASA 12

14. Attach the lower end of the pick up hitch lift rods **(4)**to the hitch assembly with clevis pins **(1)**, washer **(3)**, and split pins **(2)**.



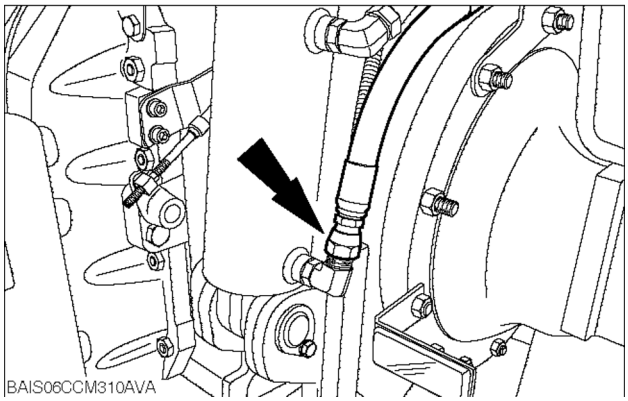
BAIL06CCM238ASA 13

15. Check operation of pick up hitch and hook
    1. Fully raise three point hitch and check that the latch can be released with the lever in the cab.
    2. Lower the lift arms until the hook is just above the ground and check operation of the 'push-back' using the remote valve.
    3. Fully raise the lift arms and check the latch engages to lock the pick up hitch in the raised position.
    4. Lower the lift arms **15 cm** (**5.91 in**) and check that the pick up lift rods are not under load. adjust lift rods **(1)** Figure **13** to equal length if required.
16. Using suitable equipment replace the right hand rear wheel. Tighten wheel nuts to the specified torque. Refer to **Rear wheel - Torque (D.50.C)**

Cylinder - Pressure test

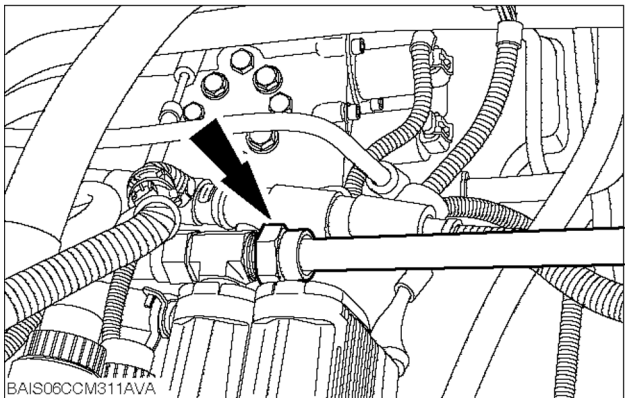
IMPORTANT: *Before performing any pressure or flow testing operate the tractor until the oil in the rear axle is at normal operating temperature.* ***65 °C*** *(* ***145 °F****).*

1. The following tests checks the operation of the EDC valve / lift cover control valve and lift rams.
2. Fully lower the lift arms.
3. Disconnect the flexible hose from the lift cylinder elbow.



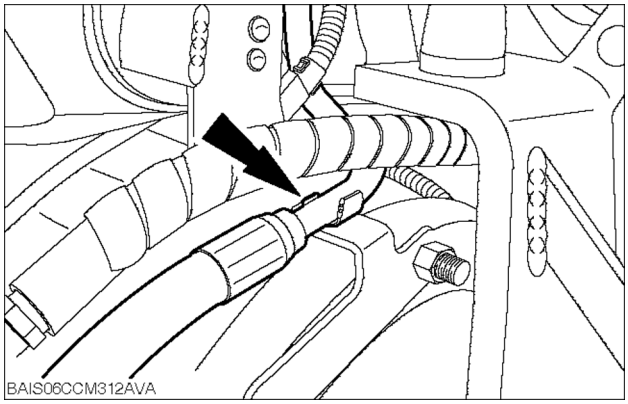
BAIS06CCM310AVA 1

4. Disconnect the lift cylinder pipe from the Tee-piece on the EDC valve.



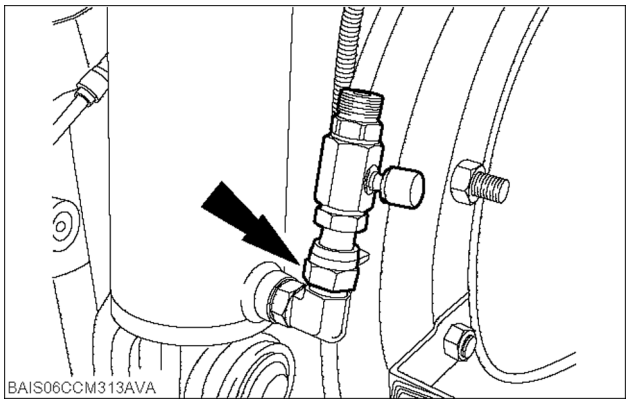
BAIS06CCM311AVA 2

5. Disconnect the bracket and remove the lift cylinder pipe/hose assembly.



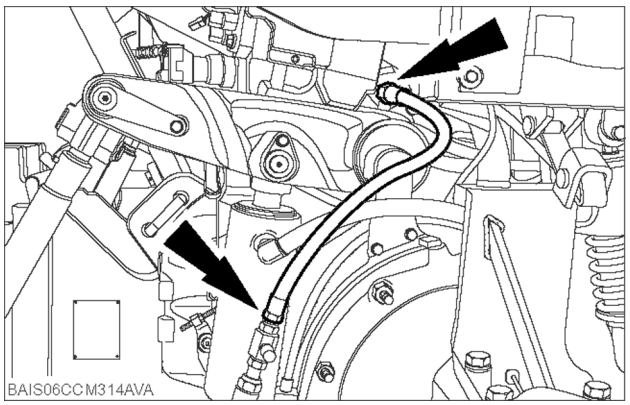
BAIS06CCM312AVA 3

6. Install Tee-piece 380000517.



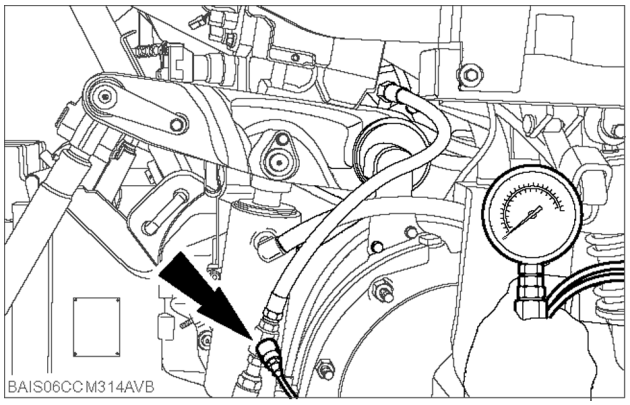
BAIS06CCM313AVA 4

7. Install special tool 380200003, (or fabricate a 1 metre length of suitable hose with 1 inch female connectors at either end) between the lift arm elbow and the tee-piece on the EDC valve.



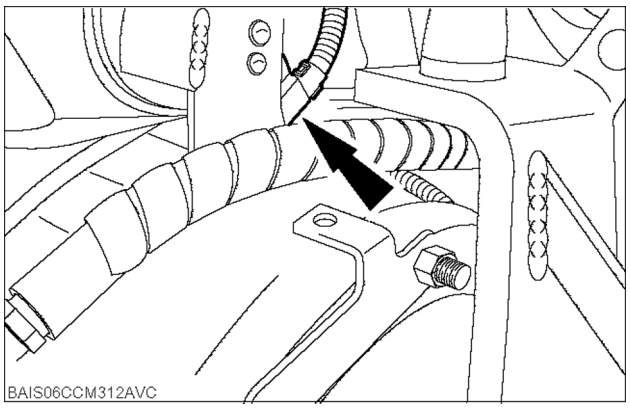
BAIS06CCM314AVA 5

8. Install quick release fitting **380000492** to the tee-piece and install **0 - 250 bar** gauge 380000553 with quick release coupler, **380000543** and hose **380000545** .



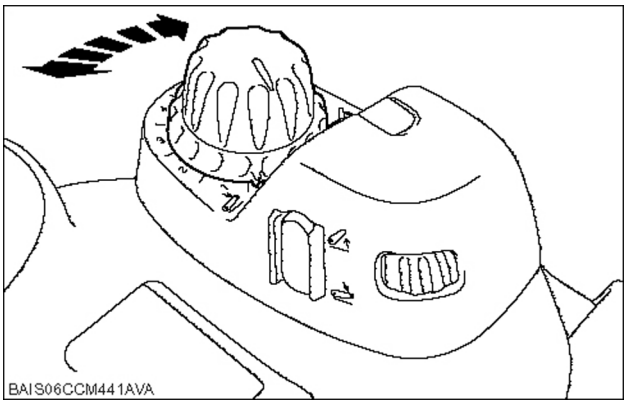
BAIS06CCM314AVB 6

9. With the key ON, disconnect the lift arm potentiometer. Error code 1027 will be displayed or stored in the memory.
Key OFF and reconnect the potentiometer.
Start the engine, Error code 1024 (EDC requires calibration) will be displayed or stored in the memory.
Set the engine speed to **1500 rev/min**.



BAIS06CCM312AVC 7

10. Move the position control fully down and then fully up. Maximum pump pressure will be applied for approximately **2 seconds** as the pressure relief valve operates.
    The gauge should reach **210±5 bar** (**3046±73 lbf/in2**).
    If the pressure is low this may indicate either a faulty EDC valve / lift cover control valve or a fault in one of the lift rams.



BAIS06CCM441AVA 8

Cylinder - Remove

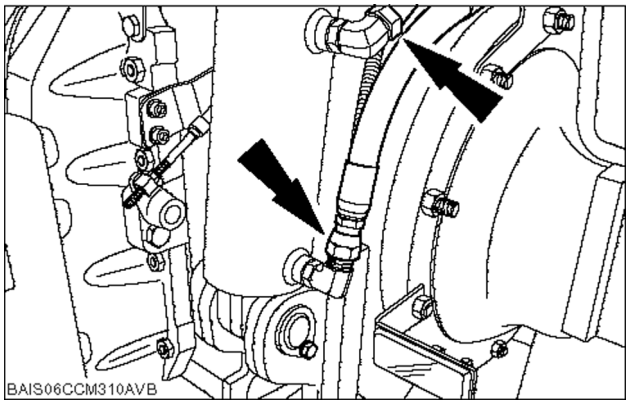
Prior operation:
Battery - Disconnect (A.30.A)

⚠ **WARNING** ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

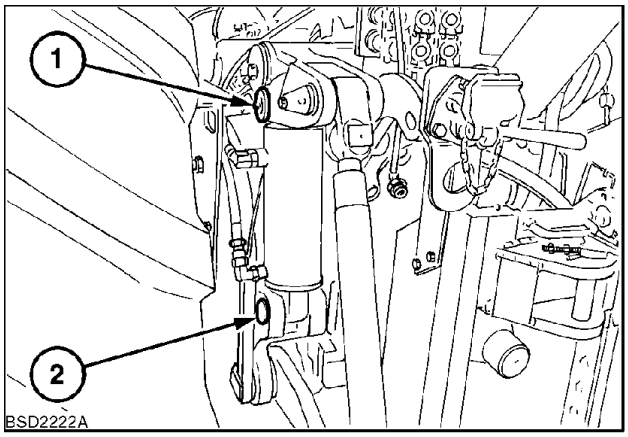
B026

1. Fully lower lift arms and support with blocks. Disconnect the oil supply lines taking care to drain the oil into a suitable container.



BAIS06CCM310AVB 1

2. Undo bolts which secure pins **(1)** and **(2)** .



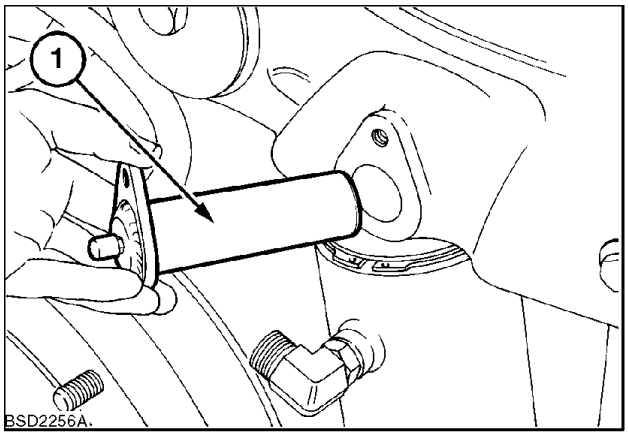
BSD2222A 2

3. Remove pins **(1)** and remove lift cylinder.

⚠ **WARNING** ⚠

Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012



BSD2256A_203 3

Cylinder - Install

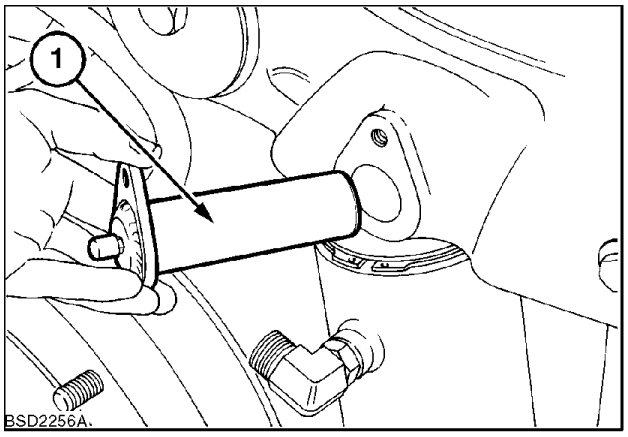
Prior operation:
Cylinder - Remove (H.10.C)

1. Support the lift cylinder and locate the pin into the lift arm

⚠ WARNING ⚠

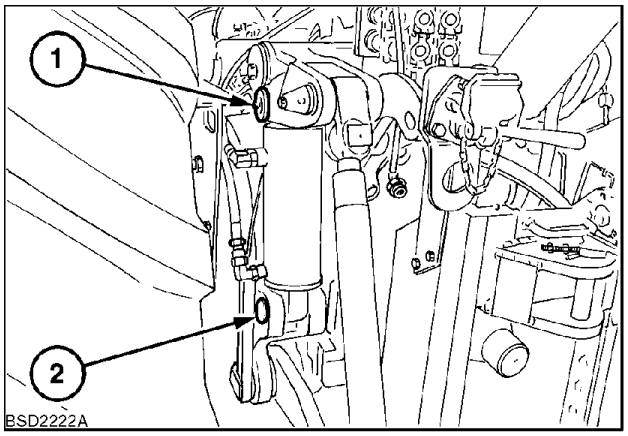
Lift and handle all heavy components using lifting equipment of appropriate lifting capacity. Make sure that units or parts are supported by suitable slings or hooks. Make sure that no-one is in the vicinity of the load to be lifted. Failure to comply could result in serious injury or death.

B012



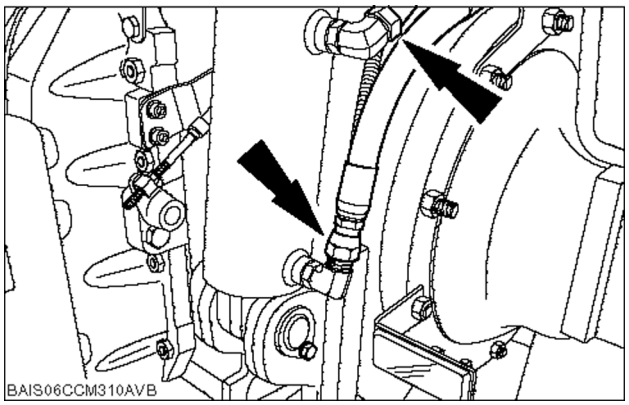
BSD2256A_203 1

2. Secure the pins with the bolts and tighten to specified torque.



BSD2222A 2

3. Connect oil supply pipes



BAIS06CCM310AVB 3

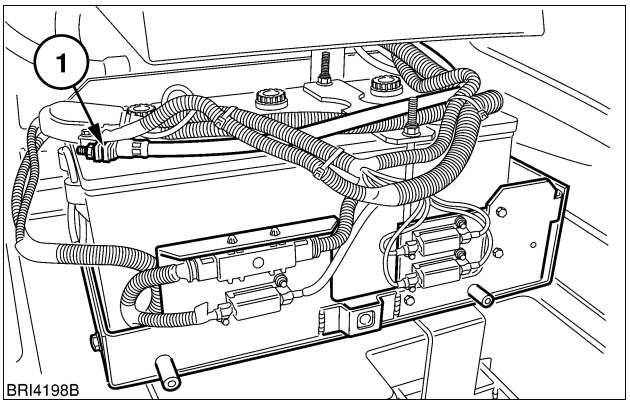
Top link - Remove

⚠ WARNING ⚠

Handle all parts carefully. Do not put your hands or fingers between parts. Wear suitable safety clothing - safety goggles, gloves and shoes.

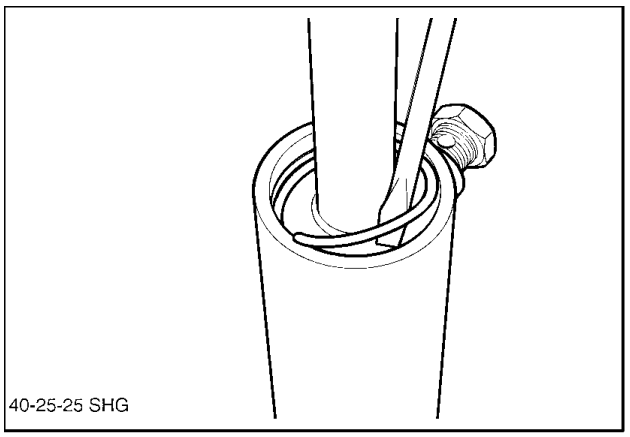
B026

1. Remove the top link ram as follows:
   Open and raise engine hood.
   Detach negative cable **(1)** from battery and insulate.
   Disconnect the oil lines taking care to drain the oil into a suitable container, remove split pin. Remove the cotter pin and carefully lift out the cylinder.



BAIL06CCM151ASA 1

2. Remove the Right Hand Adjustable cylinder in a similar fashion.
   Overhaul
   Unscrew the cylinder end cap using the appropriate tool.
   Withdraw piston and rod from tube assembly.
   Inspect bore of cylinder and replace if scored,
   Check and replace seals if required **Top link - Static description (H.10.C)**

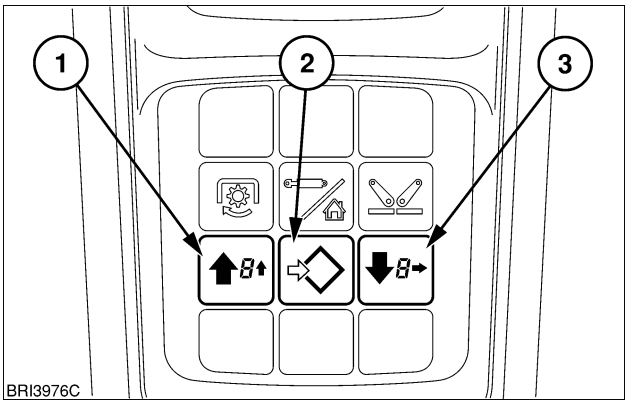


40-25-25 SHG 2

3. Re-assemble cylinder and torque end cap to **105 Nm** (**77.44 lbft**) (Right Hand Lift Link) and **400 Nm** (**295.02 lbft**) (Top Link).

Top link - Configure

1. Enter the mode by navigating the H menus using the menu/enter keys **(1)** and **(3)** on the instrument cluster. Navigate to the RC module, menu H3 and select the REAR EHRs, pressing the Enter key **(2)** to accept the menu selection.

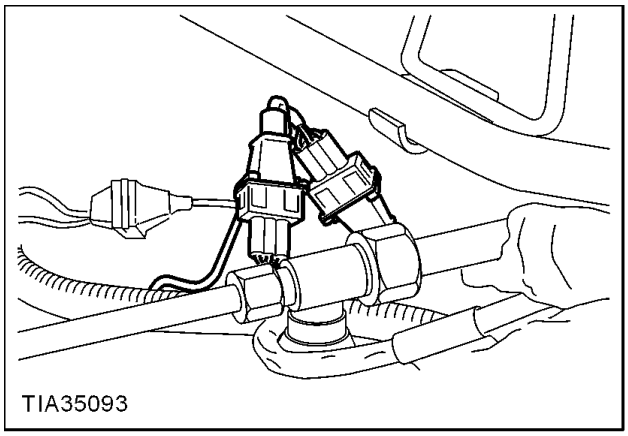


BAIL06CCM119ASA 1

2. The lower LCD section of the display will show “ch _ _” .:
3. Use the menu/enter keys to select the channel 5
4. The menu/enter keys are used to toggle between “Yes” and “No”, indicating whether top/side link control is enabled (“Yes”) or disabled (“No”)
5. When the desired option is displayed, press and hold down either the up or down key for 1 second until the instrument cluster bleeps indicating that the selection has been stored.

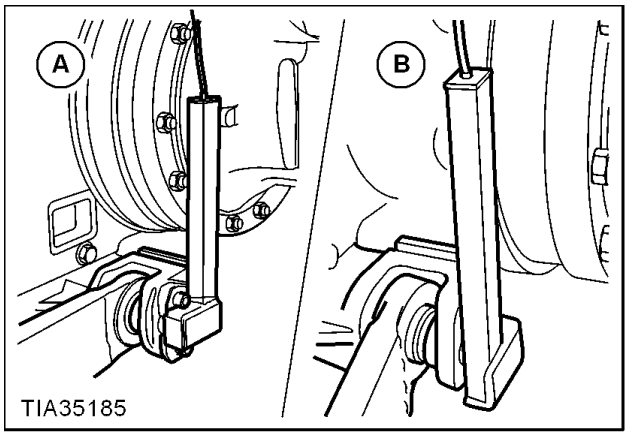
Sensing system Draft pin sensor - Remove

1. Lower hydraulic lift arms.
   Disconnect load sensing pin connectors. The connectors are located on top of the hydraulic lift cover and can be accessed from the rear of the tractor.



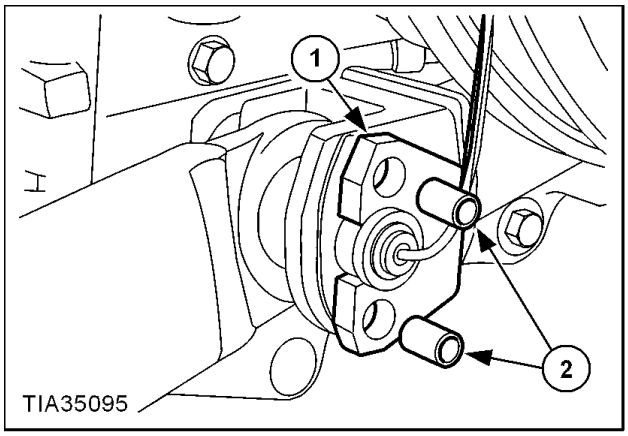
TIA35093 1

2. Remove wiring protection guard at pin.



TIA35185 2

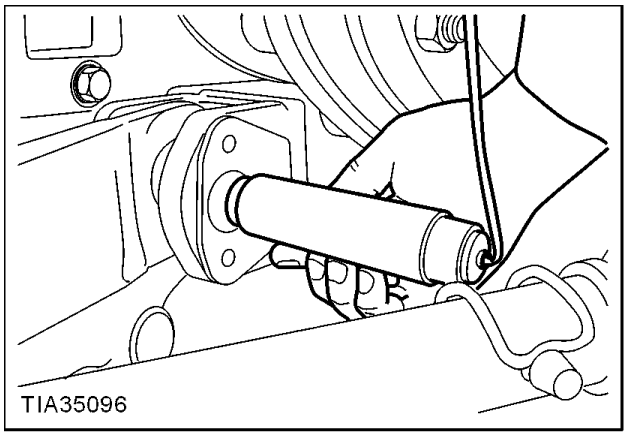
3. Remove spacers **(2)** and clamp **(1)**and withdraw pin.



TIA35095 3

Installation

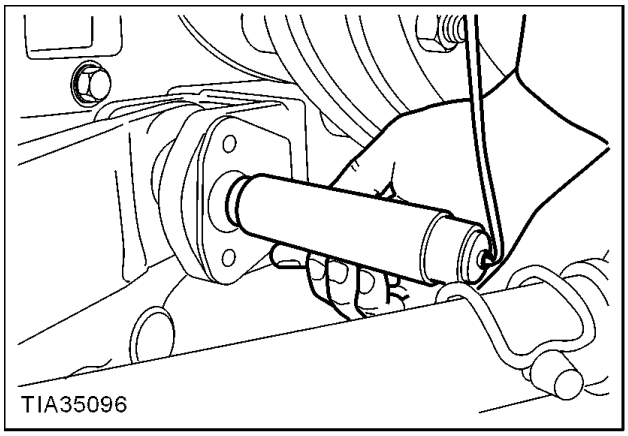
4. Install pin using removal procedure in reverse and torque clamp bolts to **48 Nm** (**34 lb in**)



TIA35096 4

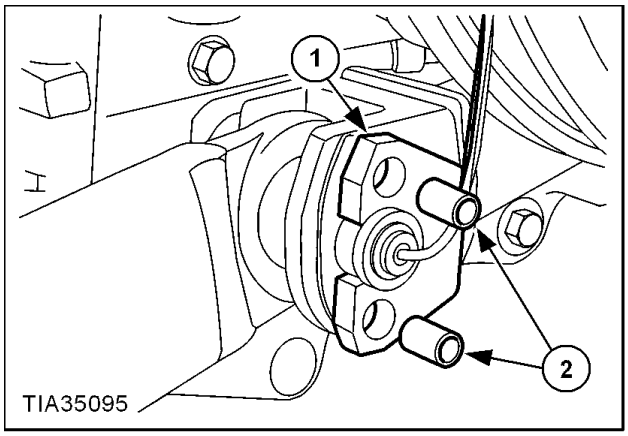
Sensing system Draft pin sensor - Install

1. Install pin



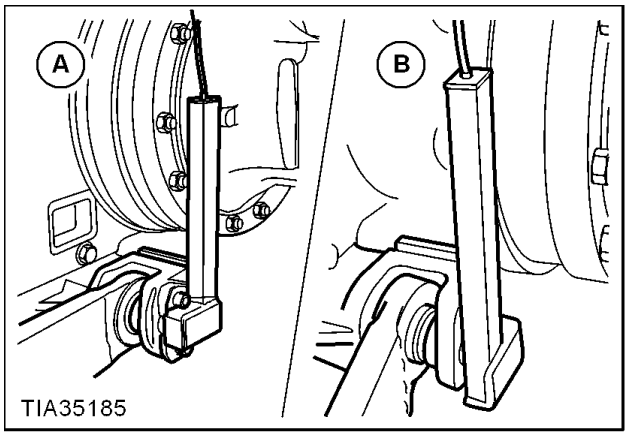
TIA35096 1

2. Install spacers **(2)** and clamp **(1)**.



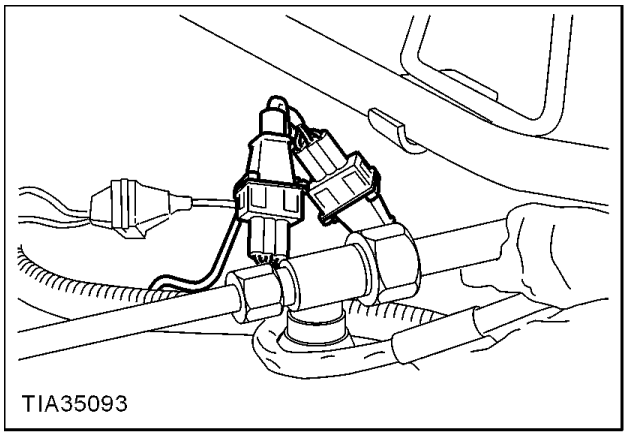
TIA35095 2

3. Install wiring protection guard at pin.
   Torque clamp bolts to the specified torque.



TIA35185 3

4. Reconnect load sensing pin connectors.



TIA35093 4

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HITCH Electronic draft control - 10.D

PUMA 165 Multicontroller , PUMA 165 [Z7BH01001 - Z9BH40000] , PUMA 165 [Z7BH50001 - Z9BH60000] , PUMA 180 Multicontroller , PUMA 180 [Z7BH01001 - Z9BH40000] , PUMA 180 [Z7BH50001 - Z9BH60000] , PUMA 195 Multicontroller , PUMA 195 [Z7BH01001 - Z9BH40000] , PUMA 195 [Z7BH50001 - Z9BH60000] , PUMA 210 Multicontroller , PUMA 210 [Z7BH01001 - Z9BH40000] , PUMA 210 [Z7BH50001 - Z9BH60000]

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HITCH Electronic draft control - 10.D

FUNCTIONAL DATA

HITCH Electronic draft control

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Control valve

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Electronic control

Exploded view 18
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

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HITCH Electronic draft control

Calibrate 25
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

Control valve

Remove 30
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

Disassemble 31
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Assemble 36
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RH draft pin sensor - Remove 37
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

HITCH Electronic draft control - Static description

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

NOTE: *Observe the following precautions when arc welding on tractors installed with electronic draft control*

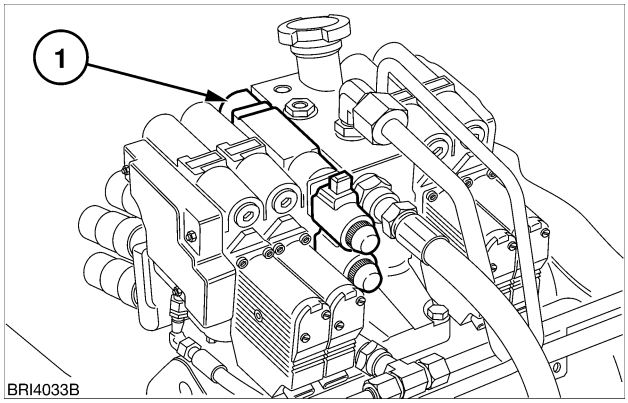
- Where possible, disconnect the part or implement to be arc welded from the tractor.
- Disconnect both battery cables from the battery. Isolate the cable ends to avoid contact with each other and the tractor.
- Position the welder earth (ground) clamp as close to the welding area as possible.
- If welding is to be carried out in close proximity of the tractor microprocessors then they should be removed from the tractor.
- Never allow welding cables to lay on, near or across any electrical wiring or electronic component while welding is in progress.

One method of providing a more constant depth control is to take advantage of the fact that draft loading increases with implement depth. If a fixed implement draft is maintained a fixed implement depth will result, providing the tractor speed and type of soil being worked remain constant.
The hydraulic lift electronic draft control system provides a means of accurately controlling implement draft and soil penetration depth on fully or semi mounted implements.
The principle of electronic draft control, is to sense draft variations through two load sensing pins in the lower links and using a microprocessor translate these variations into electrical signals for controlling the draft loading and working depth of an implement.
The smoothness and accuracy provided during operation gives this system a clear advantage over conventional mechanical systems.
In addition to providing draft control, it is also necessary to provide a system where the hydraulic links can be maintained at a position relative to the tractor regardless of draft forces on the implement. This method of maintaining the implement position is called position control.

COMPONENTS
(Refer to **HITCH Electronic draft control - Functional diagram (H.10.D)**)

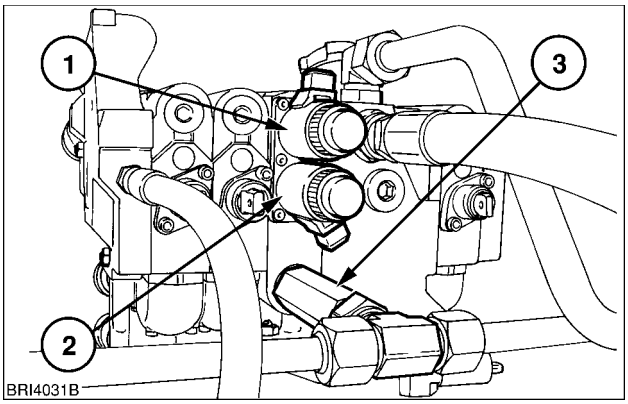
Hydraulic Lift Assembly and Control Valve

The hydraulic lift Electronic Draft Control valve (EDC valve) is a stack type proportional solenoid operated valve mounted with the remote control valves at the rear of the tractor.



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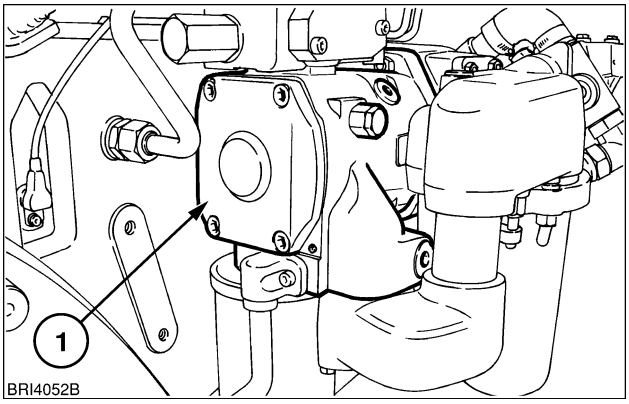
The valve responds to pulse width modulated signals from the microprocessor to either the Raise solenoid **(1)** or the Lower solenoid **(2)**. The valve then directs pump pressure oil to and from the hydraulic lift cylinders via connection **(3)** in direct proportion to the degree of lift required.



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Hydraulic Pump

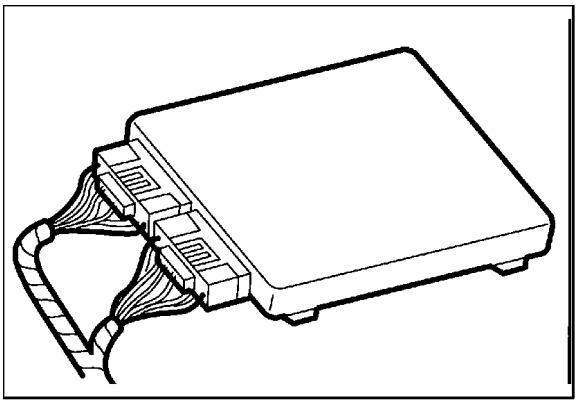
Oil flow to the electronic draft control system is provided by the Load Sensing Variable Displacement piston pump **(1)** which adjusts output according to hydraulic circuit demand.
Figure **3**, Variable Displacement Piston Pump.



BAIL06CCM104ASA 3

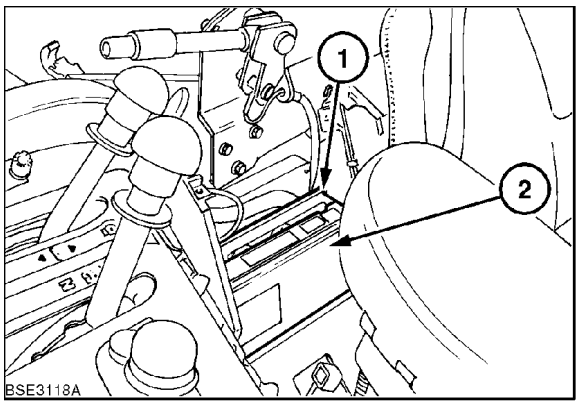
Electronic Draft Control (EDC) Processor

The processor is the management system for the electronic draft control hydraulic lift assembly.
The processor is housed in a protective casing and connected to the electrical harness via multi-pin connectors. The processor contains no serviceable parts and requires direct replacement when faulty.



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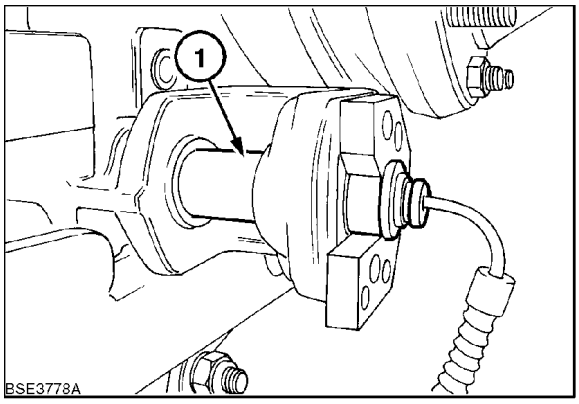
The processor **(1)** is located behind the panel to the rear of the operators seat
The processor converts electronic signals from the operator controls, lift arm position sensing potentiometer and lower link load sensing pins to operate the pulse width modulating valve and raise/lower the hydraulic lift.
The processor also has a self diagnostic capability which detects when the system is not functioning correctly. When this occurs an error code is generated and held in the processor memory so they may be retrieved when diagnosing faults on the tractor.



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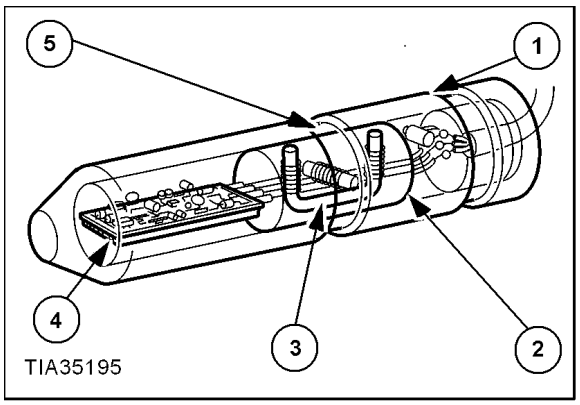
Load Sensing Pins

The load sensing pins **(1)** sense draft variations applied by an implement on the lower links.
The pins react to draft shear forces in the horizontal plane but not forces due to the weight of the implement.



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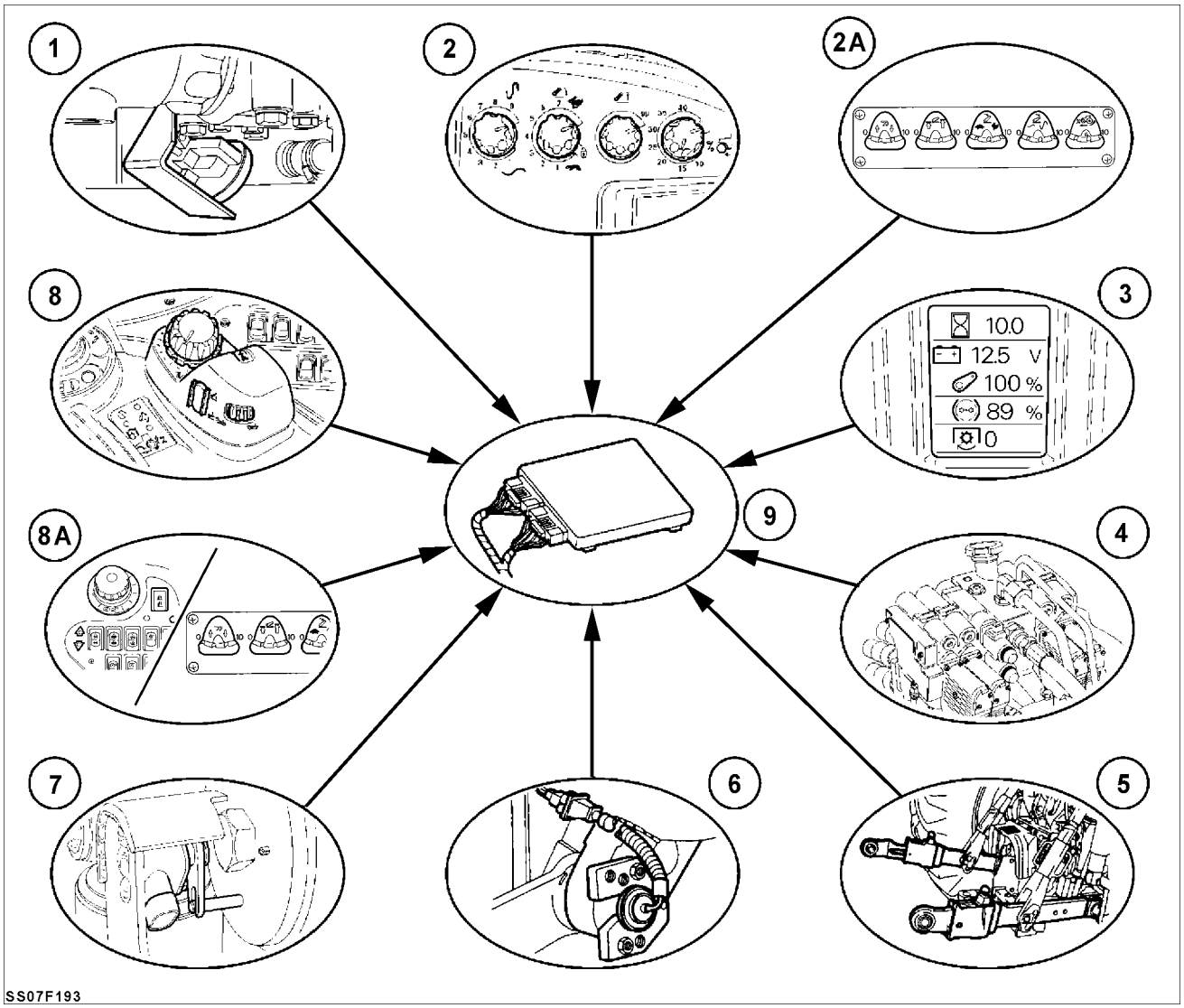
Each load sensing pin consists of a hollow metal tube **(1)** containing a circuit board **(4)** and load sensing core **(2)**. Within the core material are three wire coils **(3)** supported by metal rods. The coils are energised by the **8.5 volt** supply and create a stable pattern of magnetic flux within the core.
The outer casing of the pin is made from a metal with unique electromagnetic properties. When the metal is subjected to a shear force, which is centred on the wasted section **(5)** of the pin, the natural magnetism of the pin casing changes, which distorts the magnetic flux pattern of the core and is transformed into an electrical output signal. This signal which is proportional to the draft load acting on the implement is then received by the processor.



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HITCH Electronic draft control - Functional diagram

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller



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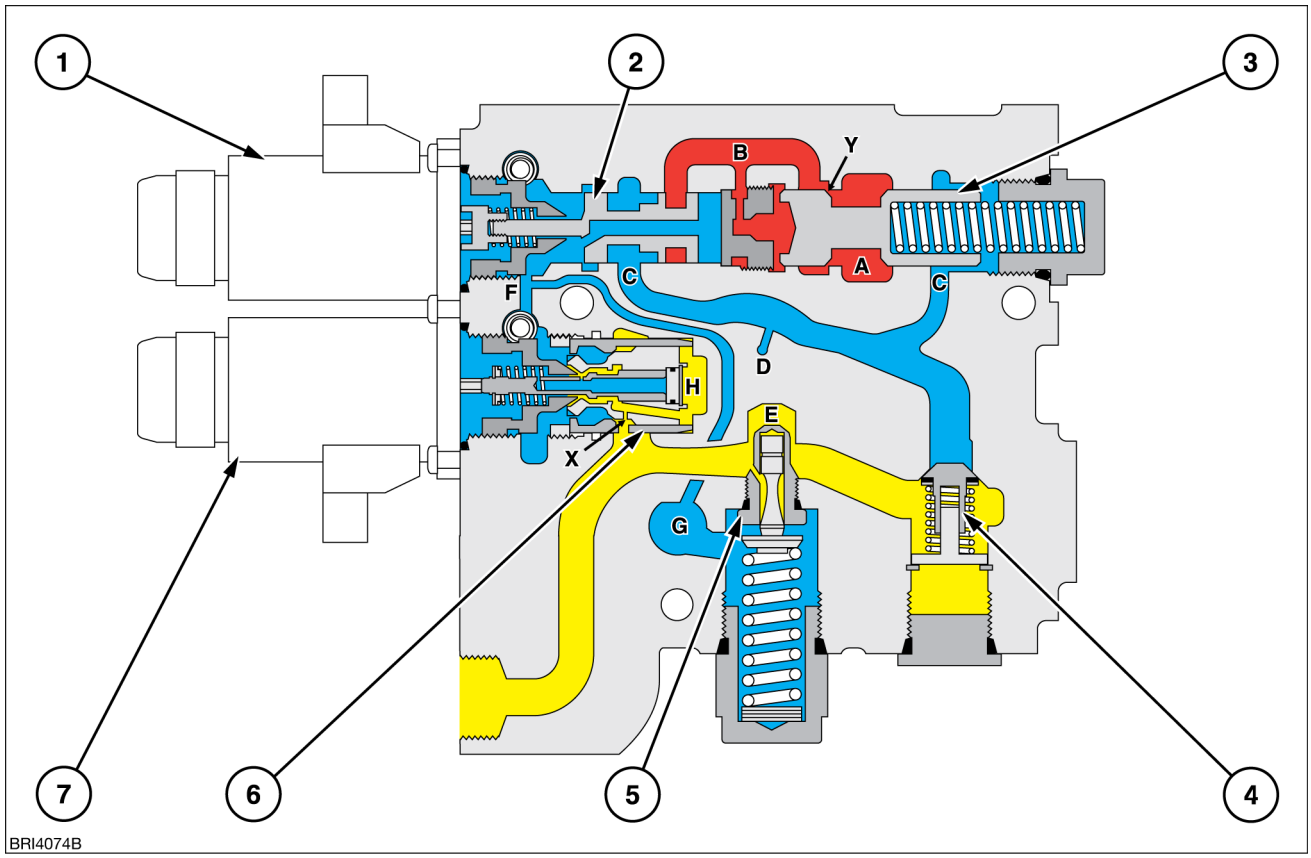
1. Radar sensor performance monitor
2. Control panel (PUMA Standard)
2A. Control panel (PUMA Multicontroller)
3. Instrument panel
4. EPC control valve
5. Hydraulic powerlift
6. Force measuring pin
7. Position sensor potentiometer for the lift arms
8. Controls for Position/Traction position
8A. Controls for Position/Traction position
9. Electronics box

See **HITCH Electronic draft control - Static description (H.10.D)**

Control valve - Dynamic description

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

When the hydraulic lift is in 'Neutral' the control valve solenoids are not energised.
Oil flow from the parallel gallery 'A' flows past the flow compensator spool into gallery 'B' where it is blocked by the lands of the raising spool.
Oil under pressure in the hydraulic lift circuit is prevented from entering gallery 'E' by the load check valve **(4)**.
The trapped pressurised oil in the lift circuit is applied to the right hand end of the metering valve through the small drilling 'X'. The applied pressure holds the metering valve in the closed position preventing oil flow from gallery 'E' to the return to reservoir gallery **(F)**.
When the valve is in neutral, gallery 'C' and load sensing galleries 'D' are open to reservoir, through the centre of the raising spool and gallery 'F'.
Gallery 'G' is a common return to reservoir gallery running through the centre of the valve stack.



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Electronic Draft Control - Neutral

Pump Pressure

Return To Reservoir

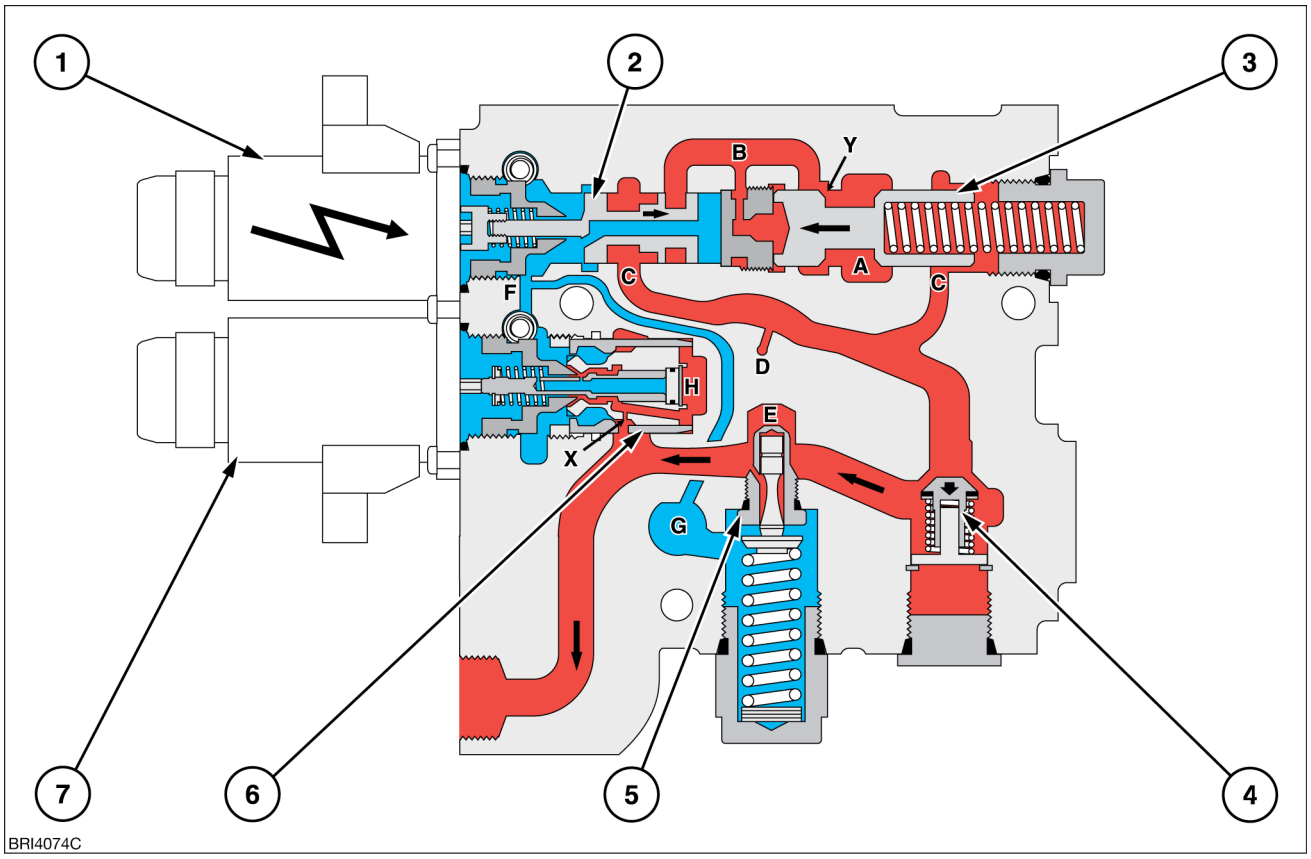
Trapped Oil

1 Raising Solenoid
2 Raising Spool
3 Flow Compensator Spool
4 Load Check Valve
5 Lift Cylinder Safety Valve (**230 Bar**)
6 Lowering Metering Valve
7 Lowering Solenoid

Raising

When the hydraulic lift is raised using the operator controls or the electronic draft control system makes adjustments to reduce implement depth the pulse width modulated raise solenoid is energised by the microprocessor.

Controlled energising of the solenoid by the microprocessor enables the solenoid to move the spool to the right in proportion to the rate of lift required by the system.
When system pressure is sufficient to lift the check valve **(4)** off it's seat, oil from gallery 'C' flows into gallery 'E' and operates the lift cylinder
Pressure oil in the lift circuit is applied through the small drilling 'X' to the right hand end of the metering valve 'H' and holds the valve in a closed position preventing oil in gallery 'E' returning to reservoir through gallery **(F)**.
The operating pressure of the hydraulic lift cylinder is sensed in gallery 'C' and load sensing gallery 'D' which controls hydraulic pump output. Refer to Closed Centre Remote Valves for further details on operation of the load sensing circuit.
The pressure in gallery 'C' is applied to the right hand spring loaded end of the flow control spool while at the same time system pressure in gallery 'B' is applied to the left hand end of the flow control spool
.
The differential pressures applied to each end of the flow control spool causes the spool to move to a state of equilibrium and automatically adjusts the flow from the parallel gallery 'A' across the metering lands 'Y' and through galleries 'C' and 'E' to the lift cylinder.
The flow control spool is essential to ensure that flow from the parallel gallery 'A' to the hydraulic lift is accurately controlled irrespective of the operating pressure of any remote control valve circuits which are operating simultaneously with the hydraulic lift.
When the lift arms reach the required height the microprocessor switches off the signal to the solenoid and the raise spool is moved to the left by the spring to re-establish the neutral condition.
If the lift arms are subjected to shock loading and pressure in the hydraulic lift circuit exceeds **230 bar** the pressure is vented to reservoir through the lift cylinder safety valve.
Figure **2** illustrates flow through the flow control spool when the hydraulic lift is the highest pressure operating circuit in the system.
Figure **3** illustrates operation of the flow control spool when the hydraulic lift is operating at a lower pressure but simultaneously with a remote control valve which is operating at a higher pressure. In this situation the system pressure in parallel gallery 'A' is higher than the operating pressure of the hydraulic lift.



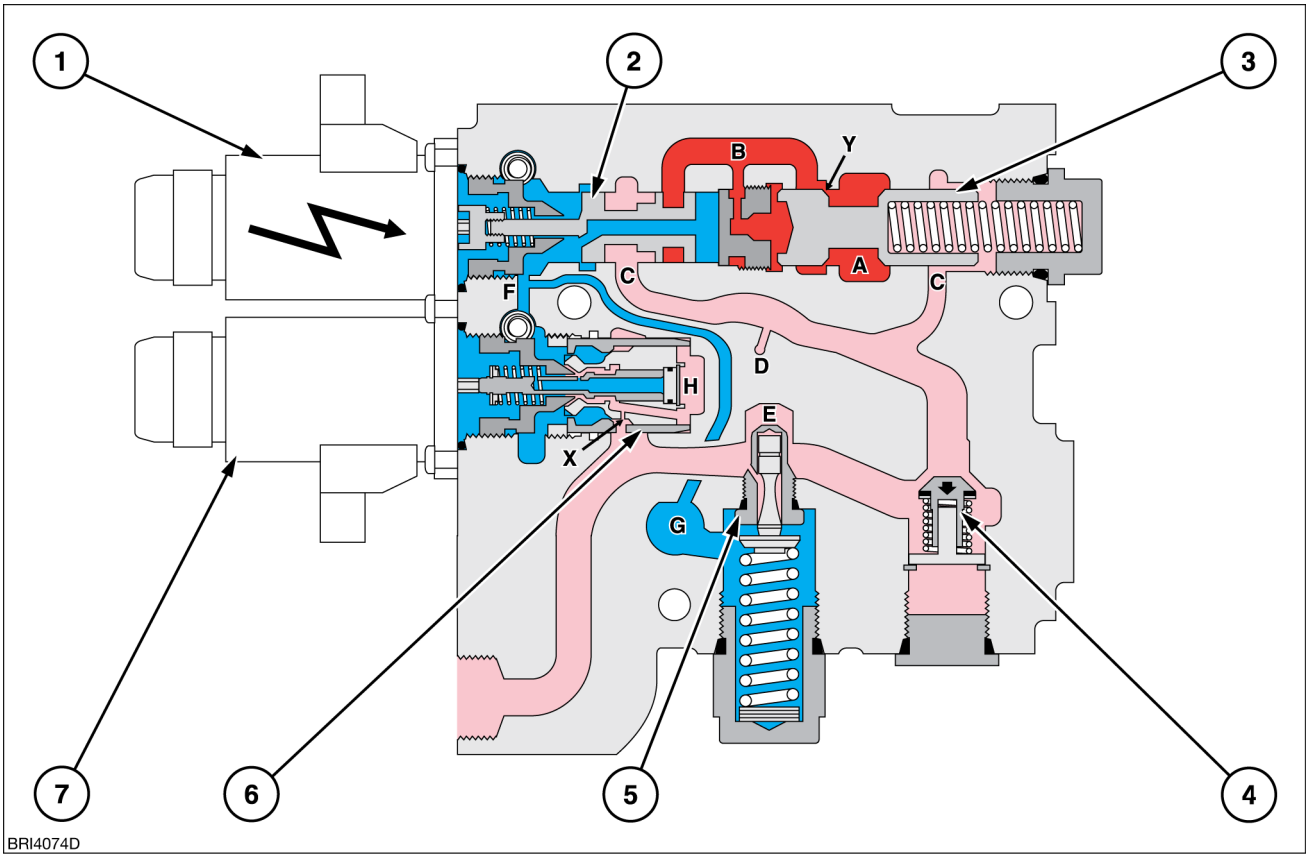
BAIL06CCM099FSA 2

Electronic Draft Control - Raising (High Pressure Lift)

Pump Pressure Oil

Return To Reservoir

1 Raising Solenoid
2 Raising Spool
3 Flow Compensator Spool
4 Load Check Valve
5 Lift Cylinder Safety Valve (**230 Bar**)
6 Lowering Metering Valve
7 Lowering Solenoid



BAIL06CCM100FSA 3

Electronic Draft Control - Raising
Low Pressure Lift while Remote Valves Operating at High Pressure

Pump Pressure Oil

Return To Reservoir

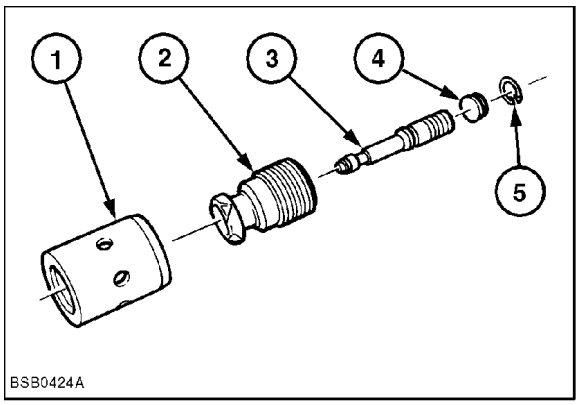
Hydraulic Lift Pressure
(lower than pump pressure)

1 Raising Solenoid
2 Raising Spool
3 Flow Compensator Spool
4 Load Check Valve
5 Lift Cylinder Safety Valve (**230 Bar**)
6 Metering Valve
7 Lowering Solenoid

Lowering

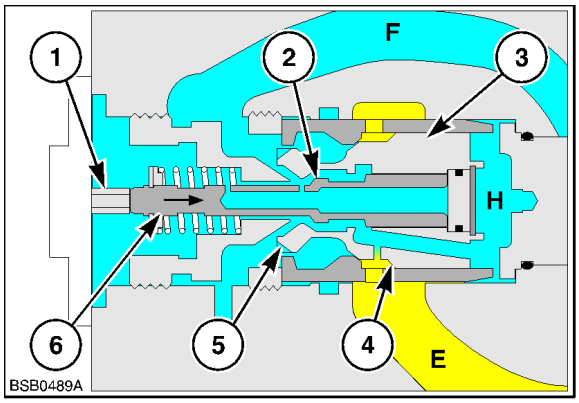
Lowering of the hydraulic lift arms is achieved by venting the oil trapped in the hydraulic lift cylinder back to reservoir through the lowering metering valve in a controlled manner.
Lowering Metering Valve

1. Sleeve
2. Metering Spool
3. Pilot Spool
4. Plug
5. Circlip



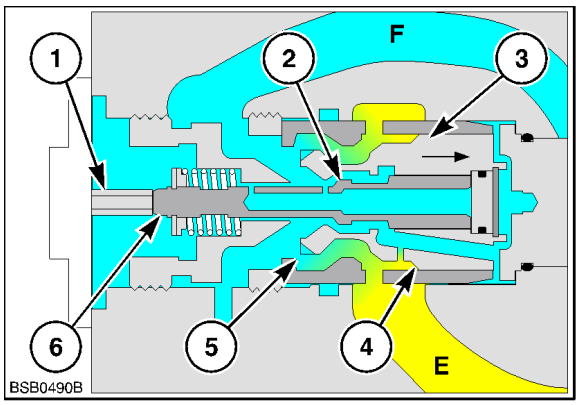
BSB0424A_467 4

The lowering cycle should be considered as a 2 stage operation.
Stage 1: The pulse width modulating solenoid is energised and the plunger **(1)** moves the pilot spool **(6)** to the right. The oil trapped on the right hand end of the lowering valve 'H' is now control vented over the lands of the pilot spool **(2)** to reservoir through gallery 'F'.
The pressure of oil trapped oil in the lift cylinder Gallery 'E' is applied to the chamfer face **(4)** of the metering spool **(3)**, causing the spool to move to the right.

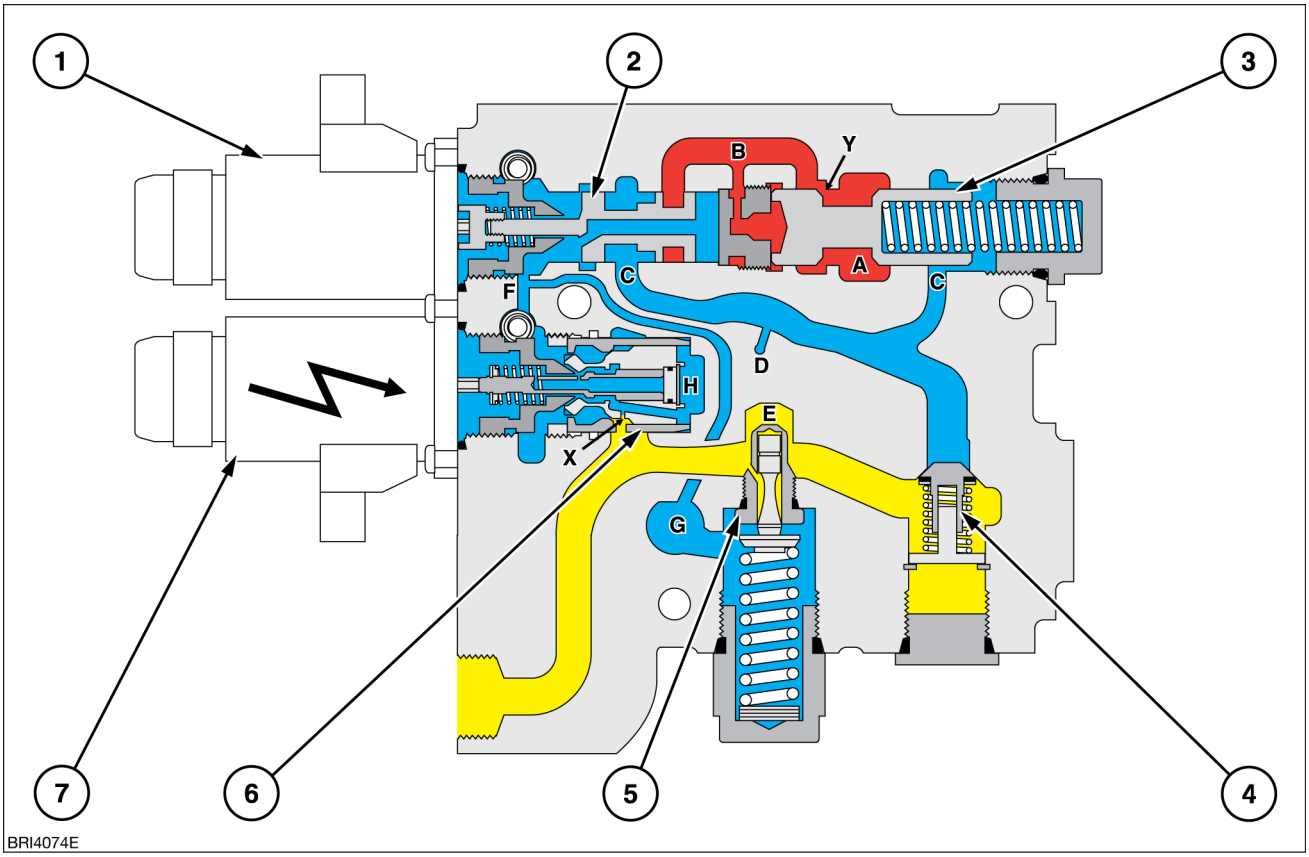


BSB0489A 5

Oil from the lift cylinder flows across the valve metering lands **(5)** and returns to reservoir allowing the lift arms to lower under the weight of the implement.
The rate of lowering is electronically controlled by the processor and pulse width modulated lowering solenoid which adjusts the clearance over the metering lands **(5)**.



BSB0490B 6



BAIL06CCM101FSA 7

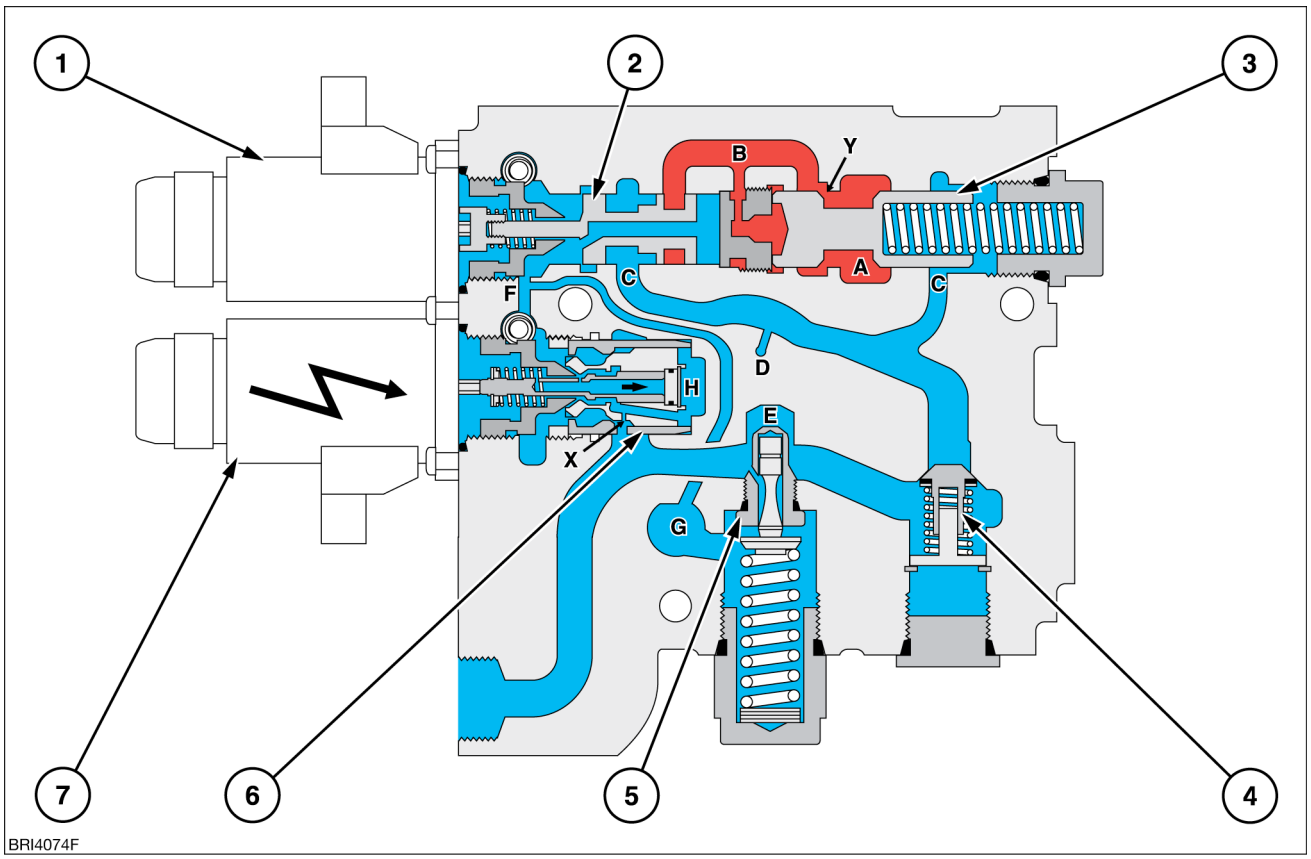
Electronic Draft Control - Lowering (1)

Pump Pressure Oil

Return To Reservoir

Trapped Oil

1 Raising Solenoid
2 Raising Spool
3 Flow Compensator Spool
4 Load Check Valve
5 Lift Cylinder Safety Valve
6 Lowering Metering Valve
7 Lowering Solenoid



BRI06CCM102FSA 8

Electronic Draft Control - lowering (2)

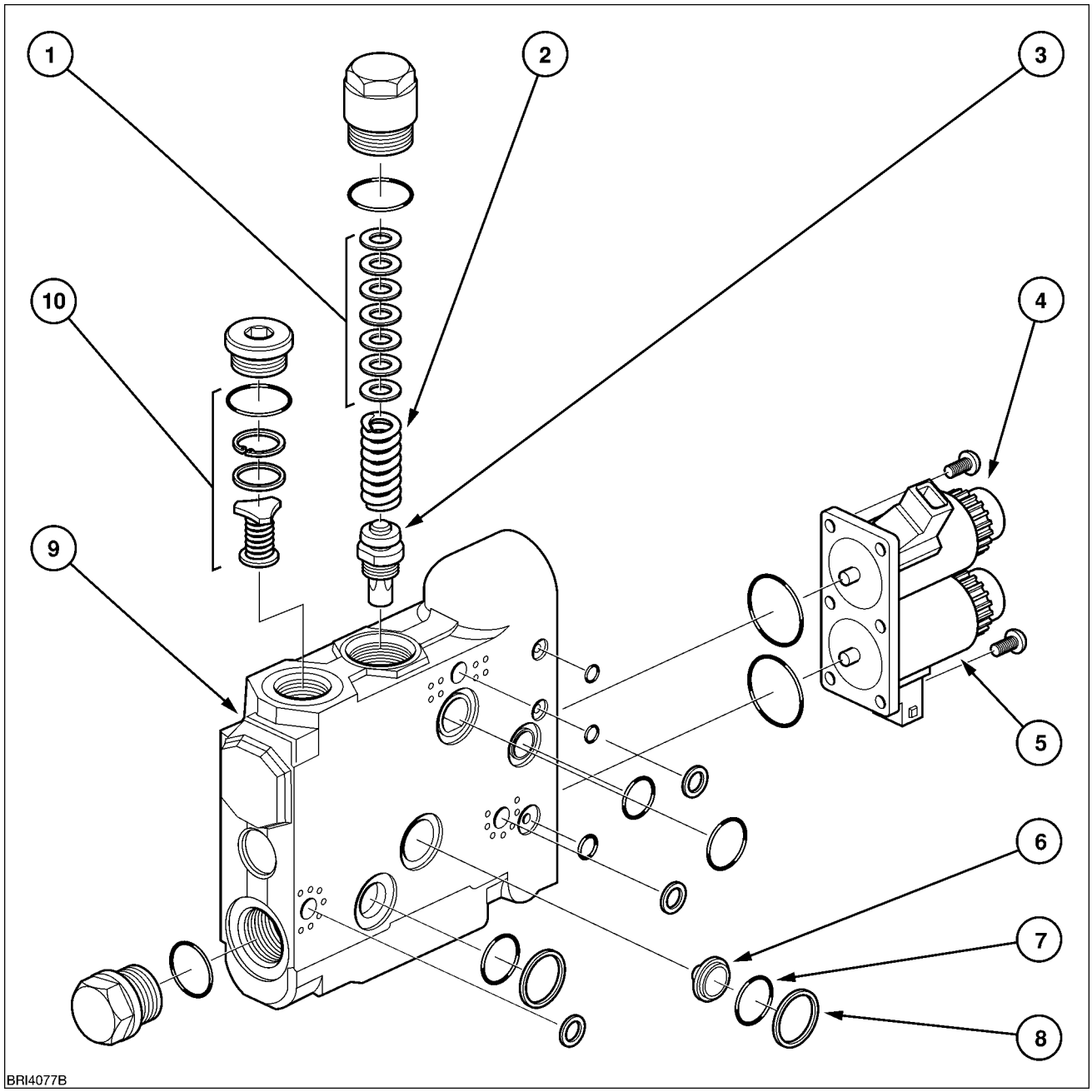
Pump Pressure Oil

Return To Reservoir

1 Raising Solenoid
2 Raising Spool
3 Flow Compensator Spool
4 Load Check Valve
5 Lift Cylinder Safety Valve
6 Lowering Metering Valve
7 Lowering Solenoid

Control valve - Static description

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller



BAIL06CCM107GSA 1

EDC Control Valve Components - (Exploded View)

1. Washers
2. Spring
3. Lift Cylinder Safety Valve
4. Lower Solenoid
5. Raise Solenoid
6. Load Sense Valve
7. O-Ring
8. Support Ring
9. Valve Housing
10. Load Check Valve

The components within the Electronic draft control are as shown and function as follows:-

Flow Control Spool

The flow control spool regulates flow from the parallel gallery, running through the centre of the remote valve and electronic draft control valve sections to the hydraulic lift. The valve compares the pressure in the parallel gallery with the operating pressure of the hydraulic lift and regulates flow to the hydraulic lift circuit according to lift circuit demand.

Raise Spool

The raise spool directs flow to the lift circuit and is directly controlled by the pulse width modulating raise solenoid.

Raise Solenoid

The raise solenoid is a pulse width modulated solenoid controlled by the electronic draft control processor. Activation of the solenoid is controlled by the electronic draft control processor and is proportional to the speed of lift required.

Load Check Valve

The load check valve prevents oil trapped in the lift cylinder escaping to reservoir. The valve will only open when the pressure flowing across the raise spool is greater than the pressure of the trapped oil in the lift cylinder.

Lift Cylinder Relief Valve

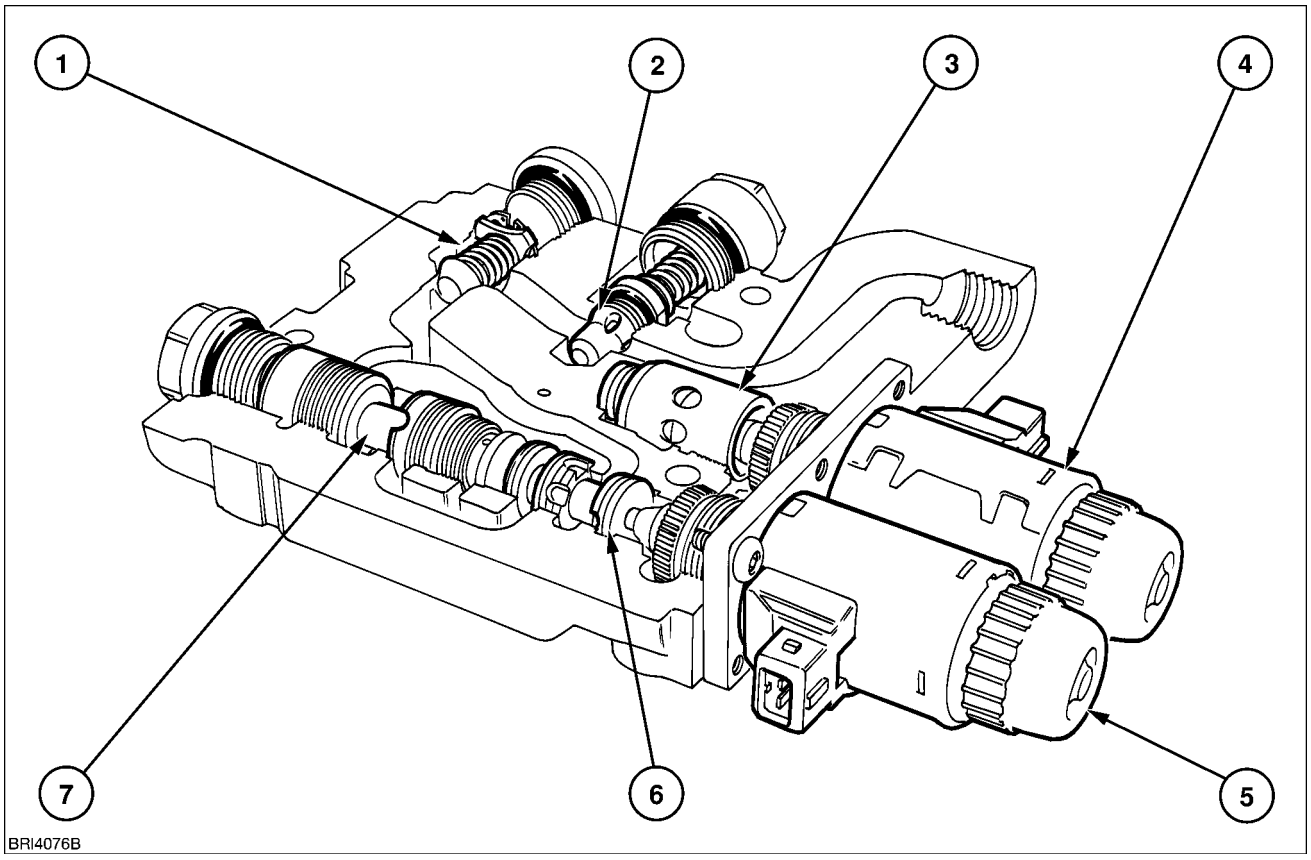
The lift cylinder relief valve protects the lift cylinder from excessive shock loads and operates at **230 bar**.

Lower Solenoid

The lower solenoid is identical in design to the pulse width modulated raise solenoid. The solenoid is activated by the processor and controls operation of the lowering metering valve in order to maintain the desired rate of implement drop.

Lowering Metering Valve

The lowering metering valve controls the rate of flow from the lift cylinder to reservoir when lowering the hydraulic lift. The valve is operated by the pulse width modulated lowering solenoid.



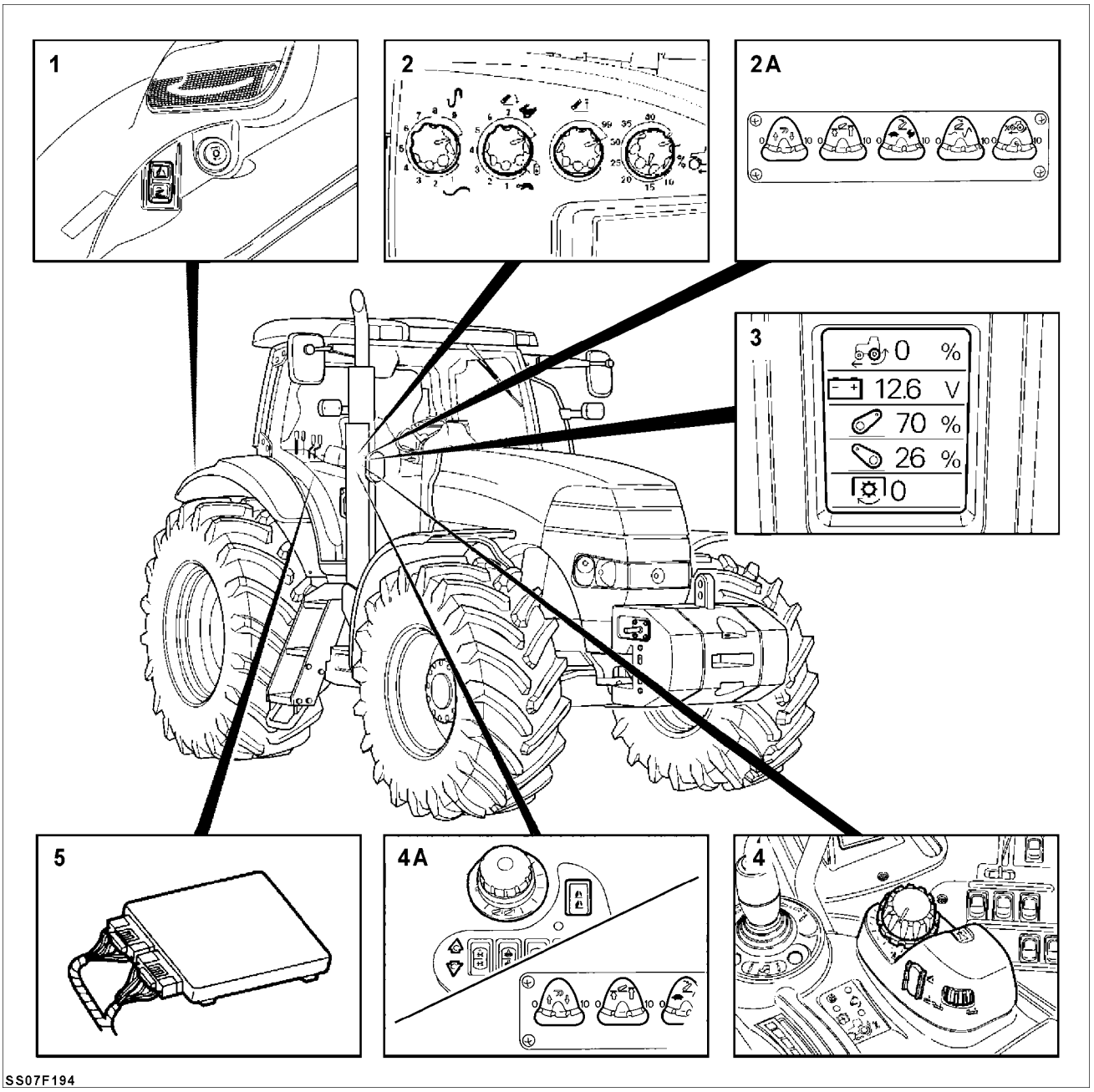
BAIL06CCM103FSA 2

Electronic Draft Control Valve Components - Section View

1 Load Check Valve
2 Lift Cylinder Relief Valve (230 Bar)
3 Lowering Metering Valve
4 Lowering Solenoid
5 Raise Solenoid
6 Raise Spool
7 Flow Compensating Valve

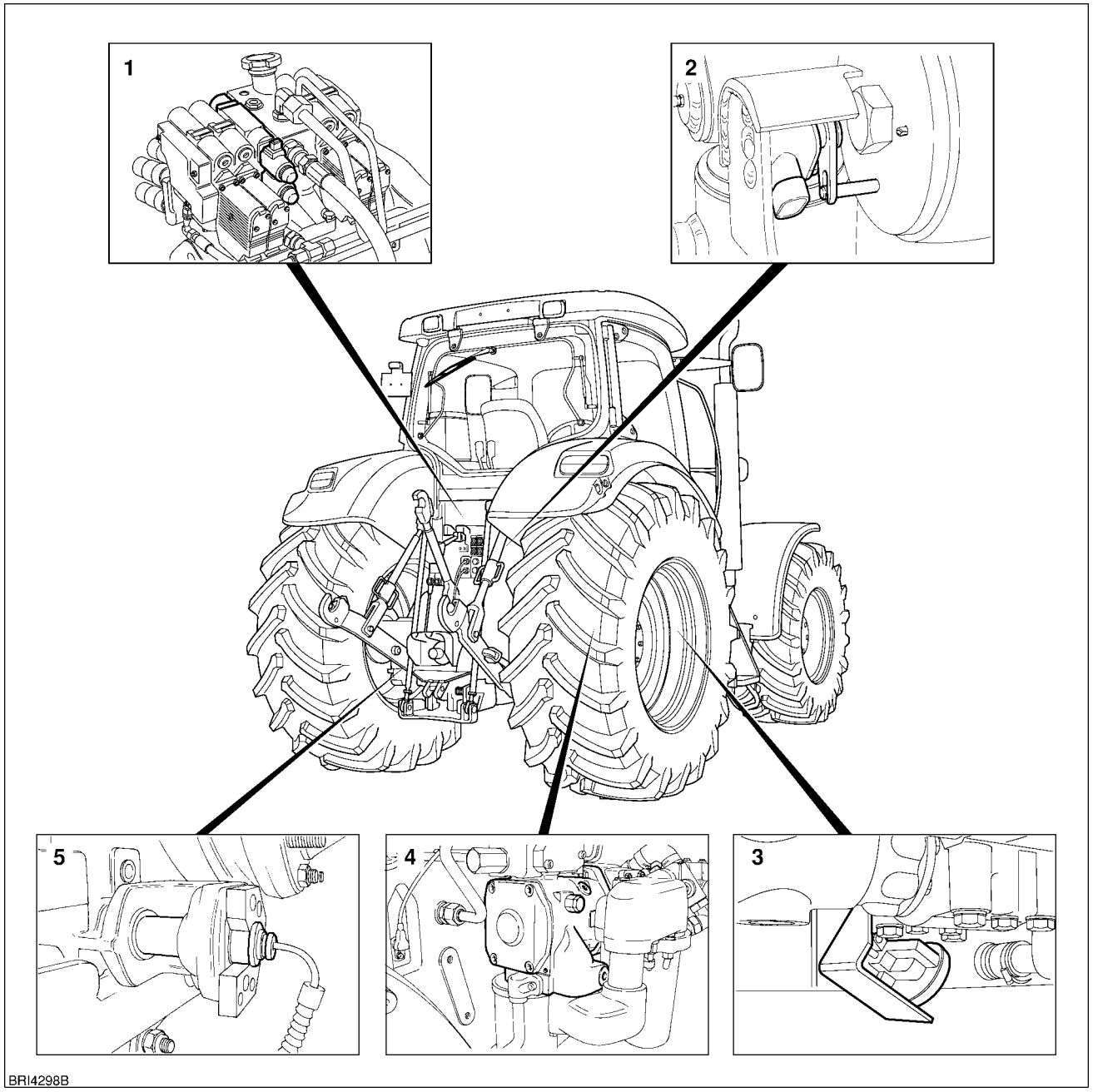
Electronic control - Exploded view

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller



SS07F194 1

1. External Raise/Lower switch on the fender
2. Control for draft control response sensitivity and lowering speed (PUMA Standard)
2A. Control for draft control response sensitivity and lowering speed (PUMA Multicontroller)
3. Instrument panel
4. Controls for Position/Traction position (PUMA Standard)
4A. Controls for Position/Traction position (PUMA Multicontroller)
5. EPC electronic box



BAILCCM225GSA 2

Layout of the components for electronic-hydraulic powerlift control

1. EPC control valve
2. Position sensor potentiometer for the lift arms
3. Radar sensor performance monitor
4. Variable displacement pump
5. Force measuring pin

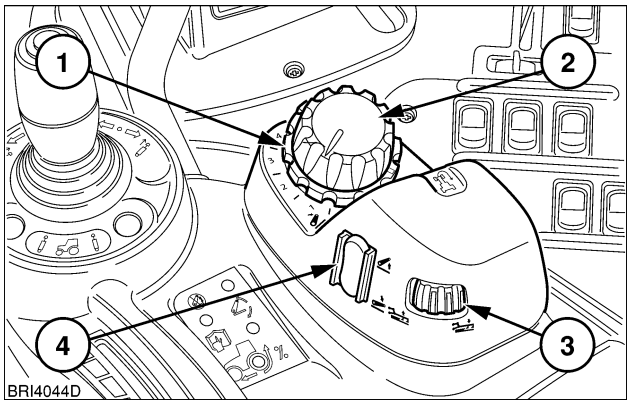
A detailed description of the individual components can be found in **Electronic control - Dynamic description (H.10.D)**.

Electronic control - Dynamic description

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

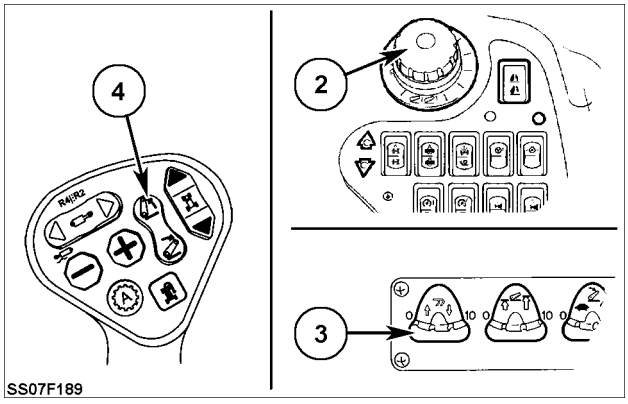
Control panel (Figure 1 or Figure 2)

The control knob of the Position control **(2)** is used to raise or lower the lift arms of the hydraulic powerlift. The knob is also used to set the implement's working depth.
The control for Traction control **(3)** has a scale graded from 0 to 10 and is used to preset the draft acting on the implement, after this has been lowered using the Position control lever.
Traction control is activated in the scale range 0 to 9. Zero is the minimum setting for Traction control and 9 the maximum setting.
In position 10 the hydraulic powerlift is set on Position control and the draft acting on the implement has no effect on the working depth. In this state, the implement's working depth and the position of the lift arms are only controlled with the Position control knob.
The rapid control switch **(4)** is a three-setting switch (a push button in the PUMA Multicontroller), with which the implement can be raised or lowered without operating the powerlift control lever.
Briefly pressing the lower part of the switch or push button lowers the implement to the preset working depth. When released, the switch automatically goes back to the central position.
A long press of the lower part of the switch or push button completely lowers the implement and overrides the working depth set with the control lever for Position control. The lift arms return to the preset depth after the button is released.



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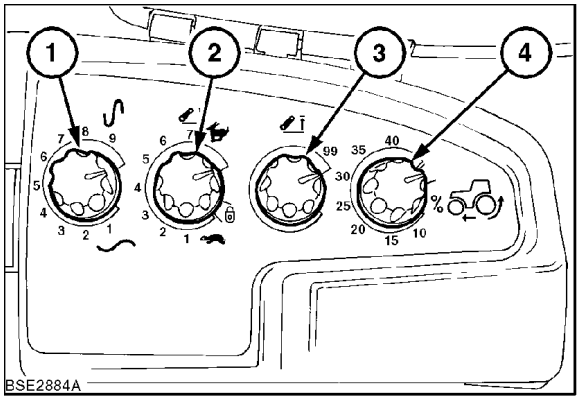
PUMA Standard



SS07F189 2

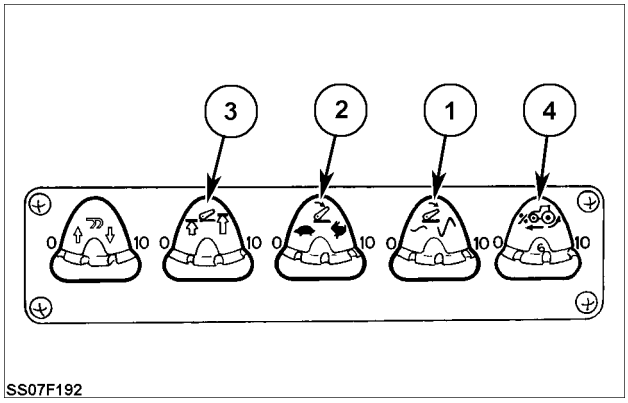
PUMA Multicontroller

EPC control panel (Figure **3** or Figure **4**)
The lowering speed regulator **(2)** is used to set the speed, with which the lift arms lower the mounted equipment in the lowering process.
The height limit rotary control **(3)** restricts the maximum height to which the lift arms can be raised and is used to prevent large implements from striking the rear of the cab or cab platform. This height limit control applies for operation with the powerlift control lever or the remote operation powerlift switches.
By turning the lowering speed regulator all the way anticlockwise to the Transport lock (in the PUMA Standard - padlock symbol) when transporting mounted equipment, you stop the equipment falling unnoticed and hitting the roadway.



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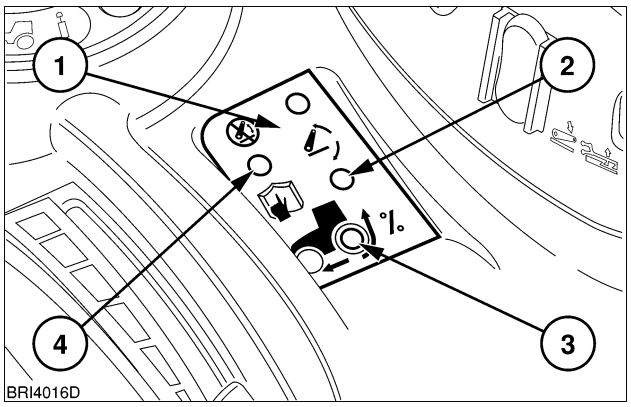
PUMA Standard



SS07F192 4

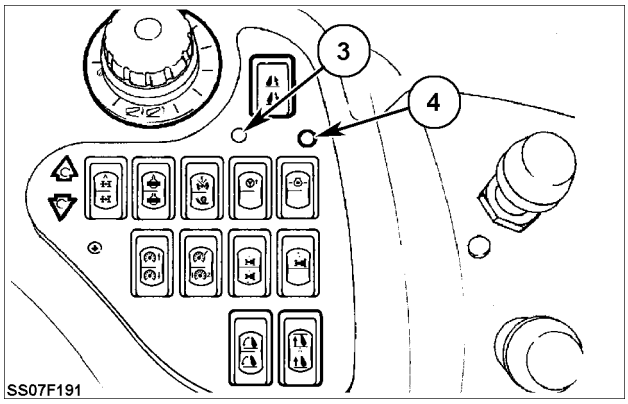
PUMA Multicontroller

On journeys transporting equipment, wagging vibrations of the mounted equipment may affect the tractor's manoeuvrability. If you turn the lowering speed regulator all the way anticlockwise and raise the implement using the rapid control switch, then the active vibration damper, which engages when the tractor's ground speeds are over **8 km/h** (**5 MPH**), is activated,
The active vibration damper is an automatic function to limit the wagging vibrations of the mounted implement.
If the front wheels hit a bump and the tractor front lifts up, the hydraulics react with an immediate counter movement, which minimises the wagging vibrations of the mounted equipment and results in quieter vehicle handling.
With the slip control **(4)**, which is only available together with the optional radar sensor, the driver can preselect a wheel slip threshold. As soon as the wheel slip exceeds the set threshold value, the working depth of the implement is automatically reduced until the wheel slip is again in the desired range.
The telltale "Wheel slip limitation On" **(3)** (Fig. **5** or **6**), lights up when the slip control is switched on and the implement is raised to reset the preselected slip rate.
The telltale **(4)** (Fig. **5** or **6**) fulfils two functions:



BAIL06CCM185ASA 5

PUMA Standard



SS07F191 6

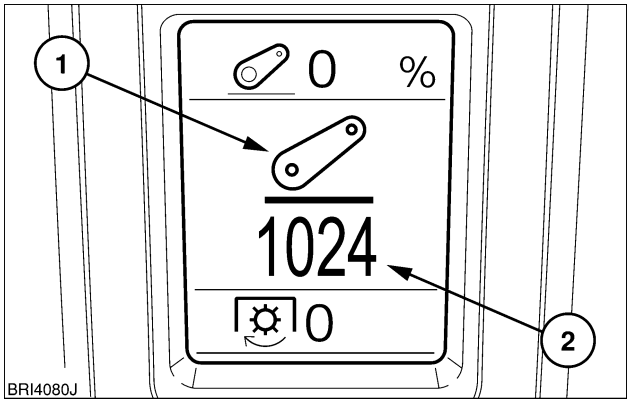
PUMA Multicontroller

By flashing, it indicates that there is a fault in the electronic-hydraulic powerlift control. Information about this system fault is also displayed on the instrument cluster with the powerlift error symbol **(2)**. (See Figure **7**).
By being permanently lit, it indicates that the hydraulic powerlift is deactivated and cannot be operated with the cab controls. This status is also indicated on the instrument cluster by the symbol "Powerlift deactivated" **(1)** (Fig. **7**). The warning "Powerlift deactivated" is displayed in the following cases:

- The Position control lever was operated when the engine was switched off.
- An external operation switch for raising or lowering the lift arms was operated.

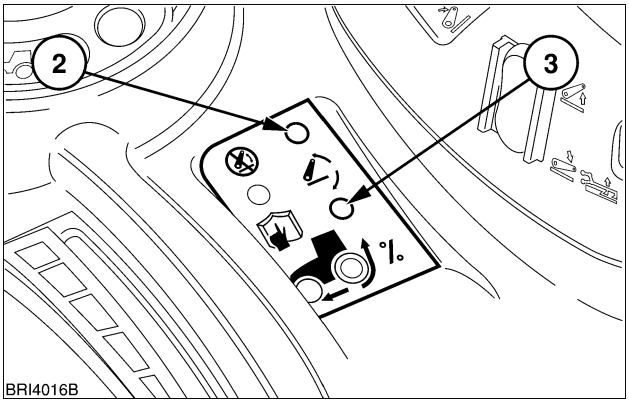
In the PUMA Standard:
To bring the Position control lever back into phase with the lower links, you press the rapid control switch to the central position and turn the control lever to the left or right with the engine running, until the warning light goes out.

In the PUMA Multicontroller:
To bring the Position control lever back into phase with the lower links, you press the "Raise" or "Lower" button on the rapid control switch once. The warning light goes out and the powerlift "slowly" moves to the working height set on the control lever.



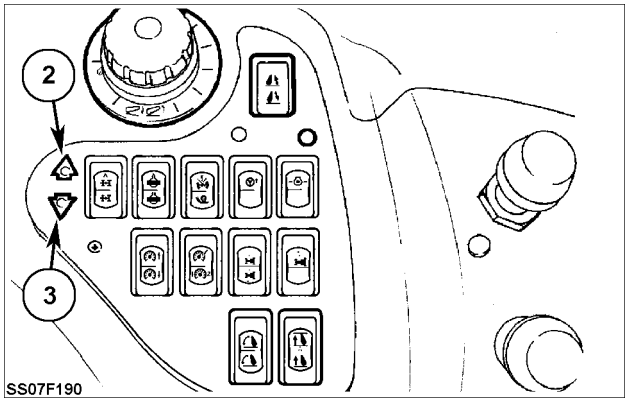
BAIL06CCM191ASA 7

As the ground conditions in the field may vary, the response sensitivity (working range of the traction control) with which the system reacts to the changes of the draft, must be set.
The rotary control for response sensitivity **(1)**, (Fig. **3** or **4**) with a scale graded from 0 to 10 is used for this.
Position 10 on the control is the most sensitive to minor variations in soil density and will cause the hydraulic system to respond with repeated movements of the linkage in order to maintain the draft within the working range set.
Turning the control towards 1 (all the way clockwise) gradually reduces the response sensitivity. This allows the draft on the force measuring pins to vary within a larger working range before the system responds and corrects the implement's working depth.
The telltales for the Control hydraulics **(2)** and **(3)** light up every time that the system engages and corrects the draft.



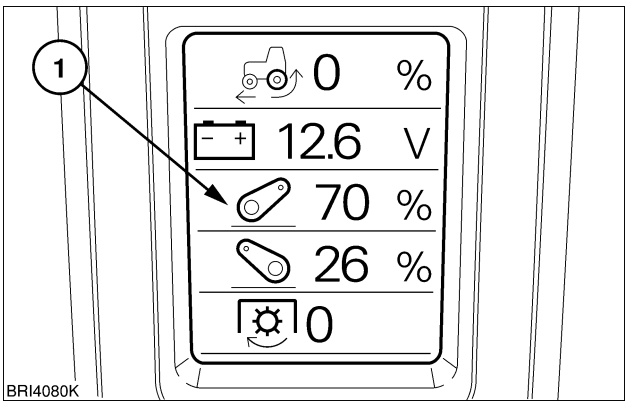
BAIL06CCM187ASA 8

PUMA Standard



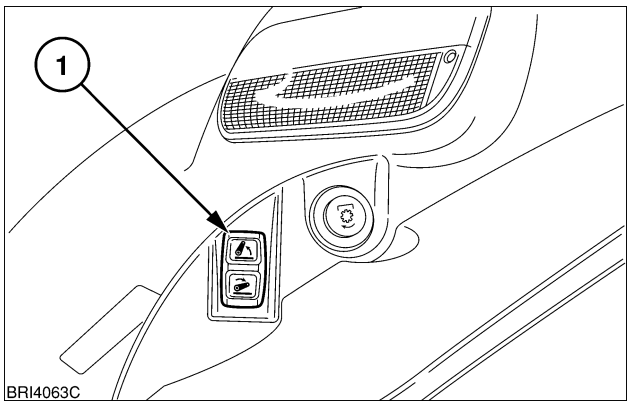
SS07F190 9

PUMA Multicontroller
When operating in Position control, the digital display on the instrument cluster indicates the position of the lift arms as a numeric value between '0' and '99' **(1)**. The number '0' means that the lift arms are fully lowered and the number '99' that they are fully raised.



BAIL06CCM190ASA 10

Powerlift external control switches
Using the external control switches **(1)**, (Fig. **11**) the driver can raise and lower the three-point linkage, when he is standing next to the tractor, which makes hitching and unhitching the mounted equipment easier.

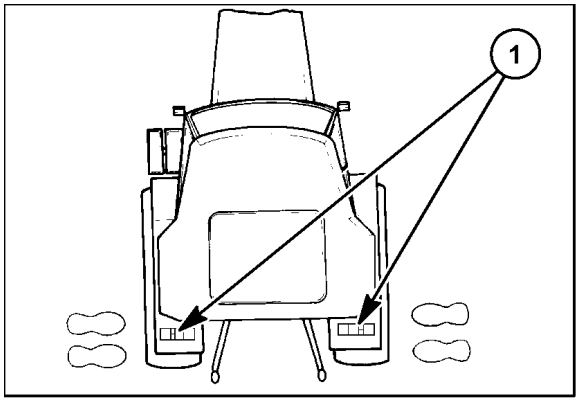


BAIL06CCM181ASA 11

NOTE: *Before the driver gets down from the tractor to operate the external control switches, he must:*
• Move the transmission controls into Neutral.
• Disengage the PTO.
• Apply the handbrake.
With the engine running, move the hand throttle to the reduced idling speed (all the way back).

When operating the external switches **(1)**, the driver must stand to the side of the tractor (outside the rear tyres). To avoid damage to implement or tractor, the powerlift controls in the cab and the rear operation switches must not be operated at the same time.

NOTE: *Before using the external powerlift switches, ensure that no person or object is in the area of the mounted implement or three-point hitch.*
Never operate the external operation switches while standing:
• Directly behind the tractor or the tyres.
• Between the lower links.
• On or near the implement.
• When operating the external switch, never extend the arms or legs, the body or tools and objects between the three-point linkage and/or implement.
• Ensure that a second person is not operating the switches on the other fender.
• Move around the tractor or the mounted implement to operate the switches on the other fender.
• Do not cross between the mounted implement and tractor.



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HITCH Electronic draft control - Calibrate

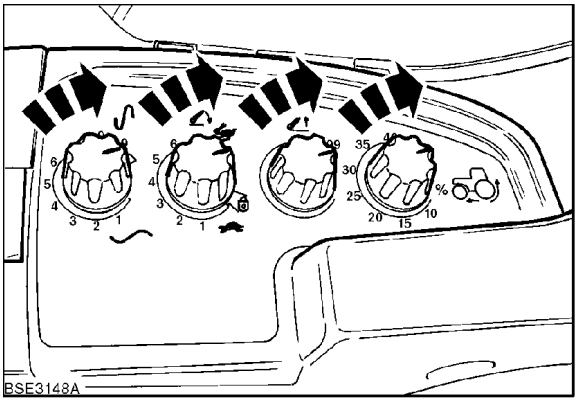
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

NOTE: *The calibration is controlled by the electronic control unit. To prevent the tractor from rolling away inadvertently, do not park the tractor in the vicinity of obstacles, apply the parking brake and chock the front and rear wheels. Before undertaking any work, ensure that the ground speed display is on zero.*

1. Switch hydraulics master to "ON" position.
2. Unhitch all mounted implements from the rear PTO.
3. Lower the linkage using the Position control lever and attach the two test weights.

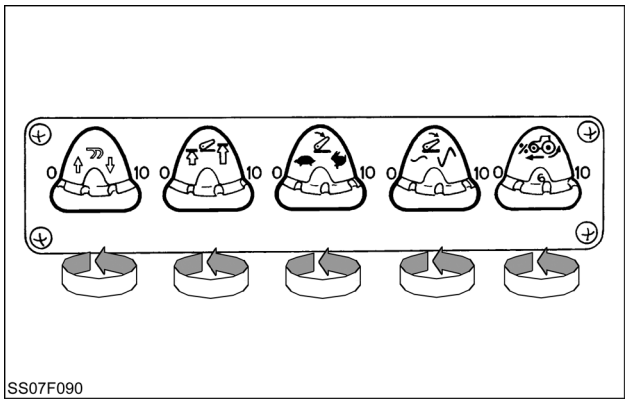
NOTE: *The test weights must be heavy enough that they overcome all frictional forces in the hydraulic powerlift and make it possible for the lift arms to lower without jerking. It is recommended that you use the* ***1111 - 1542 kg*** *(* ***2450 - 3400 lbs****) heavy standard test weights.*

4. Starter switch OFF.
5. In the PUMA Standard:
   Turn all rotary controls in the EDC control panel fully clockwise.



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With the PUMA Multicontroller:
Turn all rotary controls in the EDC control panel fully anticlockwise (position 10).



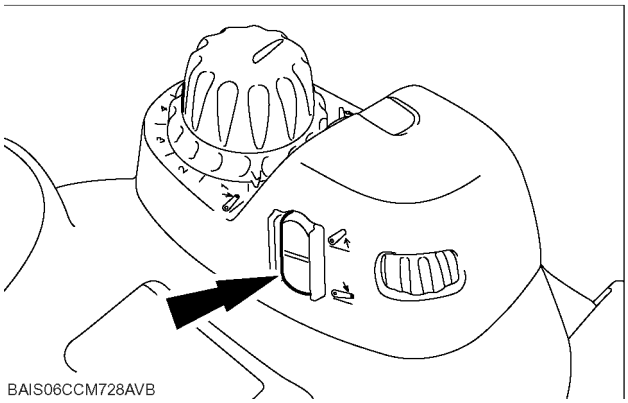
SS07F090 2

6. There are two methods to call up the calibration mode:
   - Quick call-up
   - Call-up via the HH menu

Quick call-up

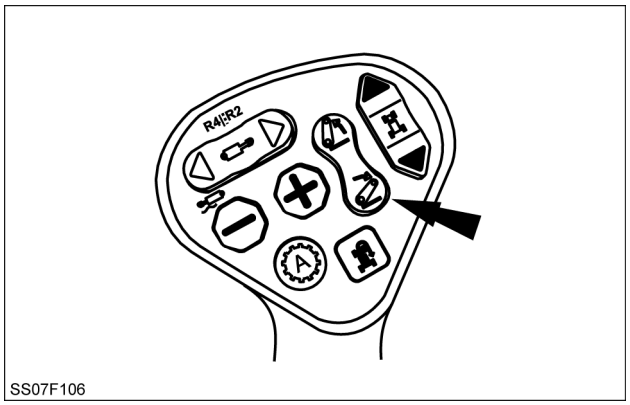
7.

In the PUMA Standard:
Press and hold the EDC rapid lower switch while starting the engine.



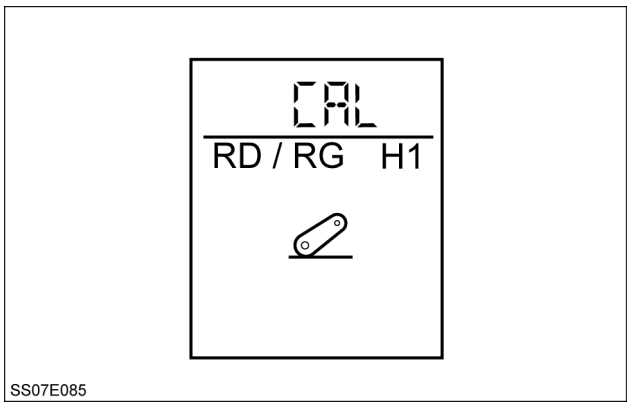
BAIL06CCM728AVB 3

With the PUMA Multicontroller:
Press and hold the EDC rapid lower switch on the Multicontroller while starting the engine.



SS07F106 4

8. The system to be calibrated is displayed on the ICU2 instrument cluster and the transmission oil temperature is displayed in the upper section of the display.

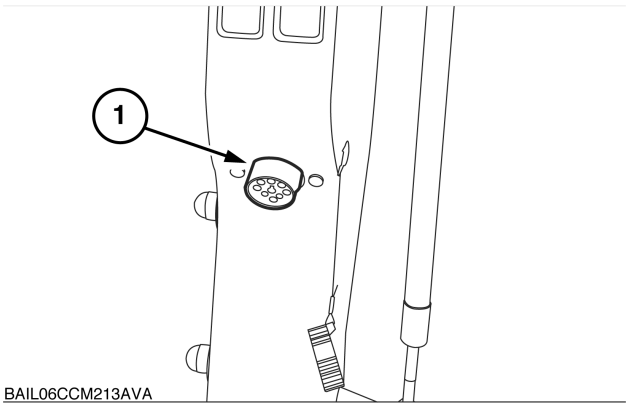


SS07E085 5

9. Go to step 12.

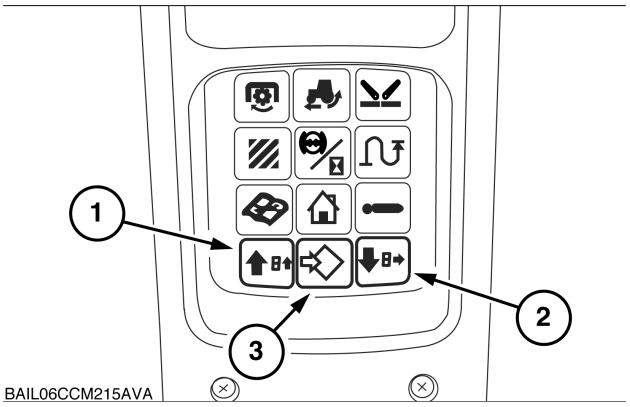
Call-up via the HH menu

10. Connect the diagnostics plug **380000843** to the diagnostics socket **(1)**.

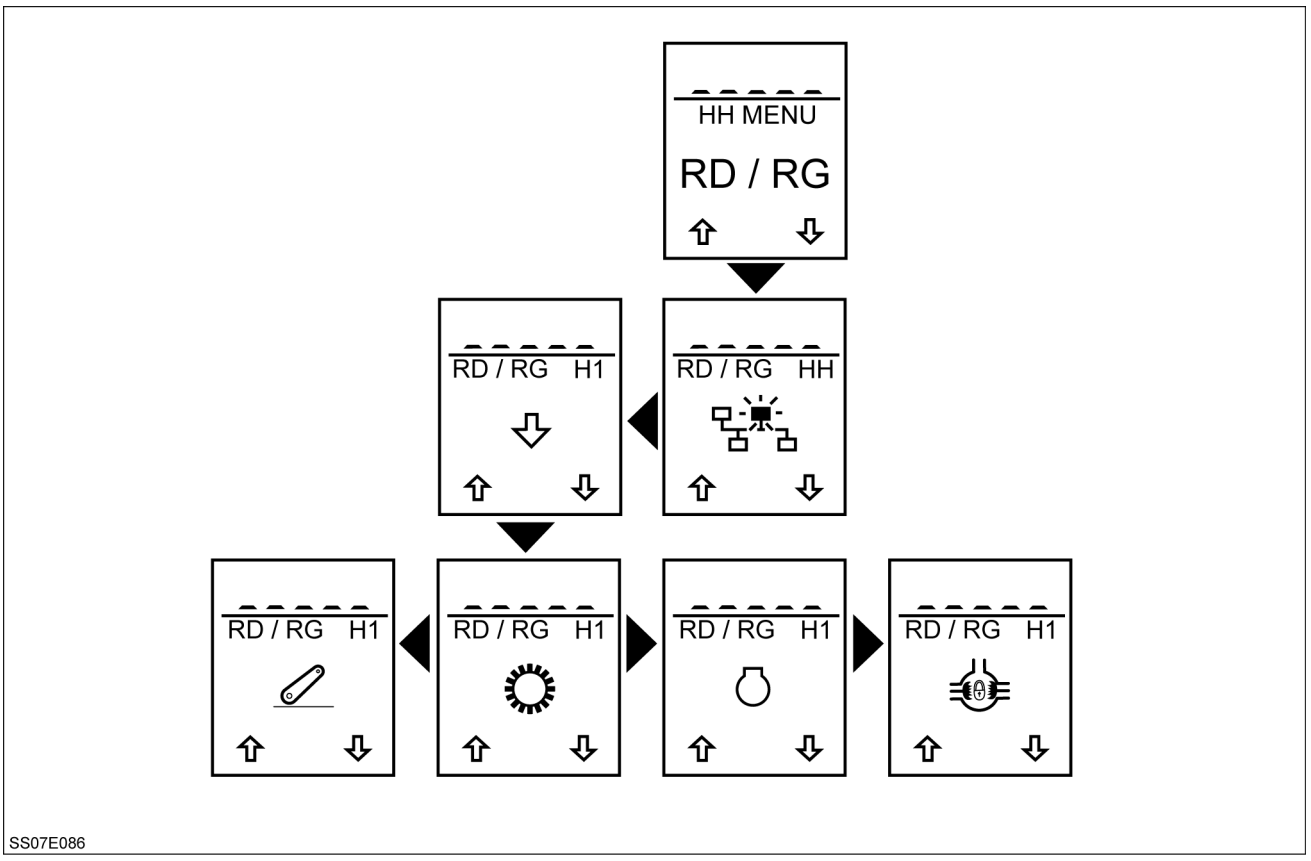


BAIL06CCM213AVA 6

11. Use the "Up" **(1)**button, "Down" **(2)** button and the Menu button **(3)** on the ICU2 instrument cluster to scroll through the HH menu until the option H1 and the electrohydraulic control unit symbol appear on the RD/RG control unit.
"CAL" is displayed on the upper section of the display.



BAIL06CCM215AVA 7



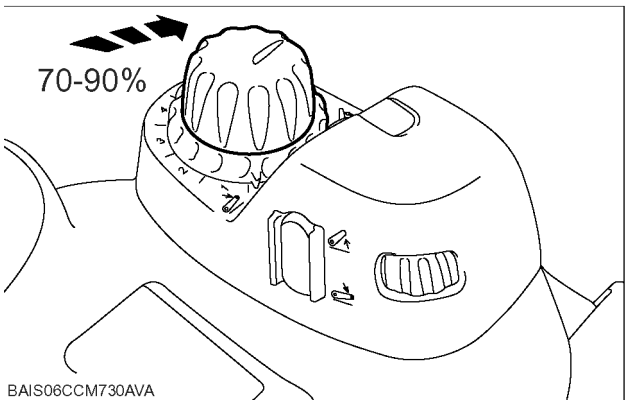
SS07E086 8

12. Set the engine speed until the engine runs true without any signs of hunting or surging.

13. Move the control up to the **70 %** to **90 %** range to start the calibration sequence.

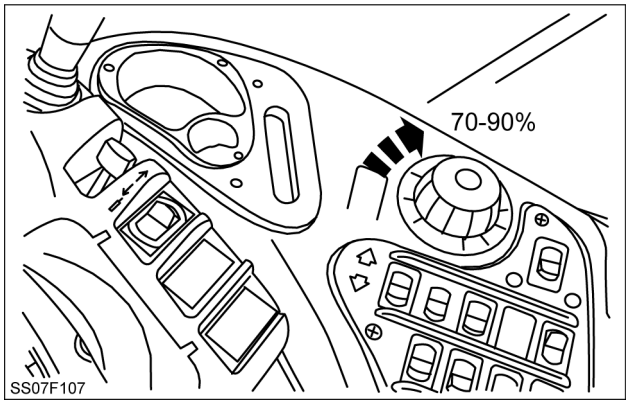
NOTE: *The display in the upper section of the display changes from "CAL" to "0" to indicate the start of the calibration. During the calibration, the lift linkage is raised and lowered slightly 3 times within 2 - 3 minutes.*
Each time it is raised, this is accompanied by a count from '0' to '2' on the display.

PUMA Standard



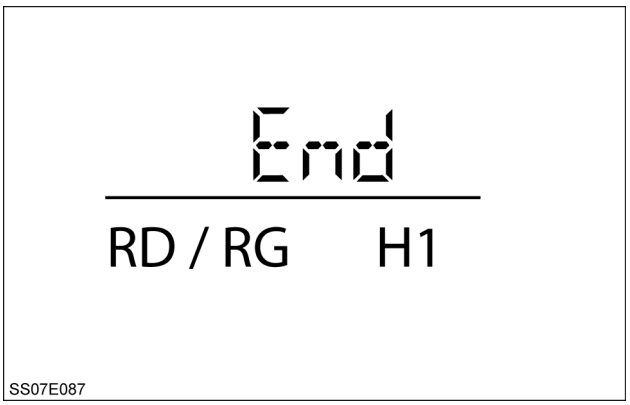
BAIL06CCM730AVA 9

PUMA Multicontroller



SS07F107 10

14. As soon as "End" is displayed on the upper section of the display, the calibration is completed.



SS07E087 11

15. Lower the linkage using the Position control lever.

16. Switch the starter switch to OFF to store the calibration values.

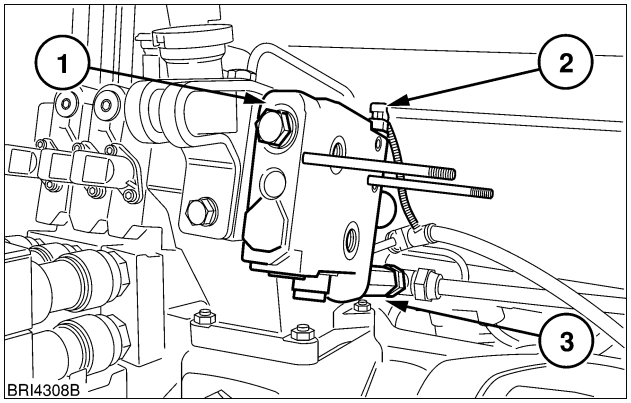
NOTE: *If a fault occurs during calibration, a U code is displayed and the process must be repeated. See the list of the U codes in* ***Control module - Fault code index (A.50.A)****.*

Control valve - Remove

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

Prior operation:
Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Remove (A.10.C)** for EDC valve removal

1. Disconnect the wiring harness connectors **(2)** from the solenoids. Disconnect the lift cylinder supply pipe **(3)** and remove valve **(1)** from tie rods.



BAIL06CCM215ASA 1

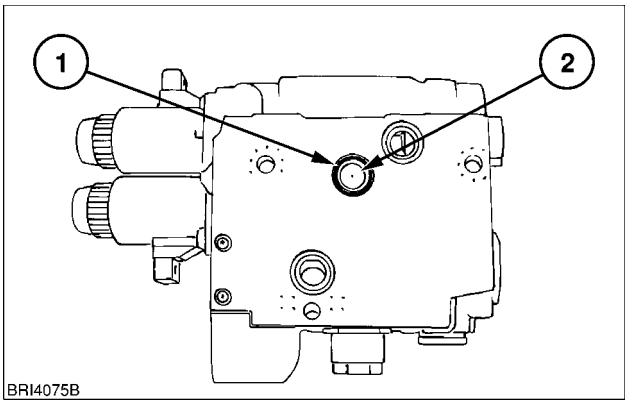
Next operation:
Control valve - Disassemble (H.10.D)

Control valve - Disassemble

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

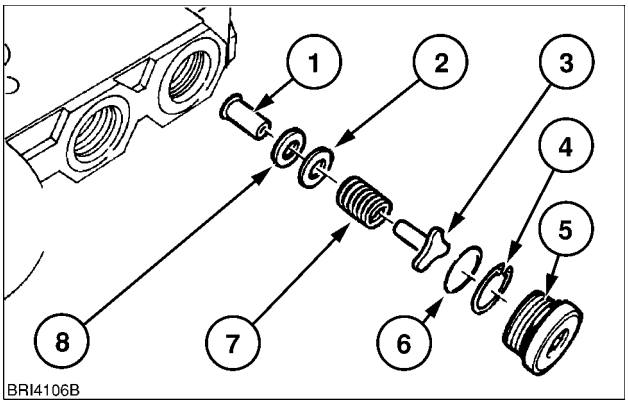
Prior operation:
Control valve - Remove (H.10.D)

1. Remove 'O' ring **(1)** load sense check valve **(2)** and support ring.



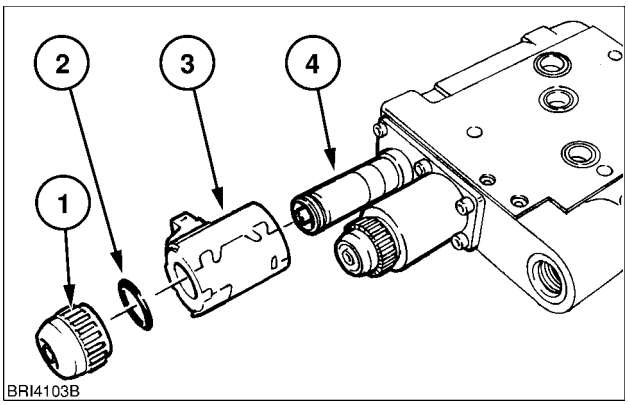
BAIL06CCM105ASA 1

2. Remove load hold valve
   1. Valve
   2. Washer
   3. Guide
   4. Circlip
   5. Plug
   6. Washer
   7. Spring
   8. Rubber Seal



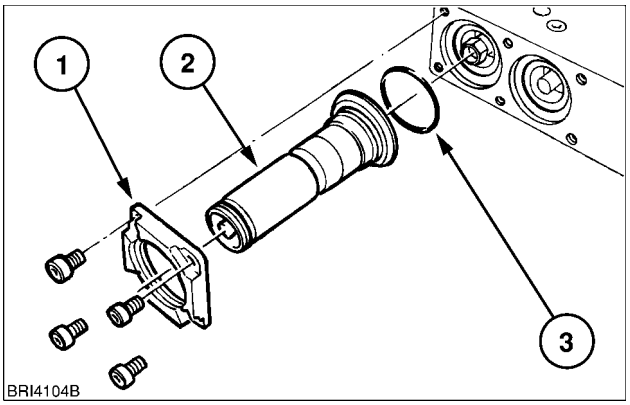
BAIL06CCM108ASA 2

3. Unscrew knob **(1)** and remove 'O' ring **(2)** and coil **(3)** from each solenoid **(4)**.



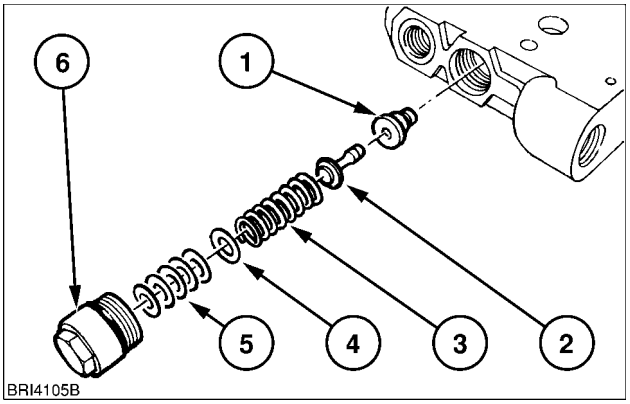
BAIL06CCM109ASA 3

4. Remove retainer **(1)**, solenoid core **(2)** and 'O' ring **(3)**.
   Repeat procedure for opposite solenoid.



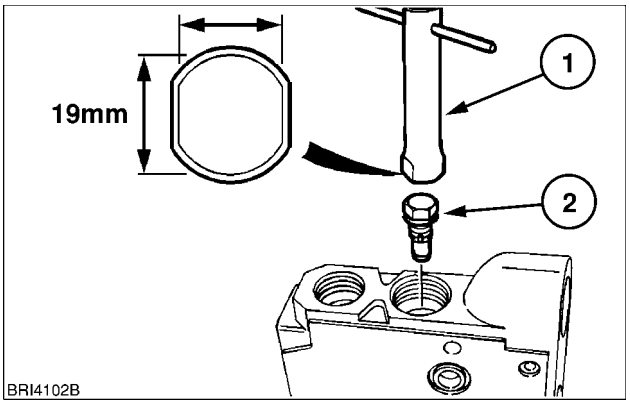
BAIL06CCM110ASA 4

5. Remove Lift Cylinder Safety Valve.
   1. Seat
   2. Valve
   3. Spring
   4. Copper Washer
   5. Shims
   6. End Cap



BAIL06CCM111ASA 5

6. Manufacture box spanner **(1)** from **18 mm** internal diameter steel tube and remove lift cylinder safety valve seat **(2)**.



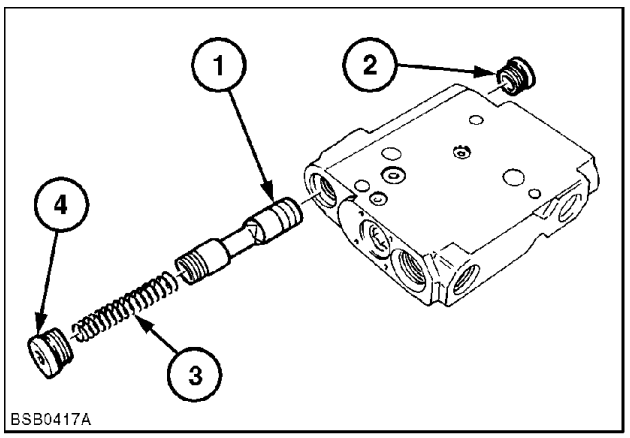
BAIL06CCM112ASA 6

7. Remove flow compensating spool **(1)**.

⚠ **WARNING** ⚠

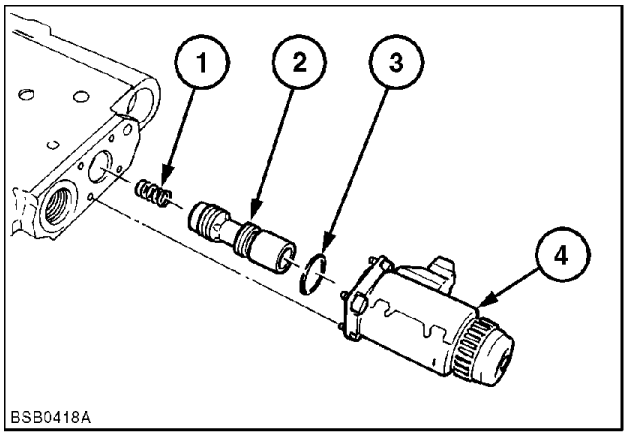
A large spring is positioned beneath the plug, take extreme care when removing plugs.

B041



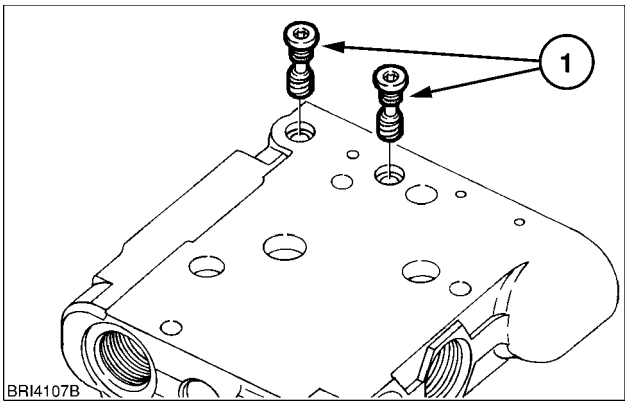
BSB0417A 7

8. Remove solenoid assembly **(4)**, 'O' ring **(3)**, raise spool **(2)** and spring **(1)**.



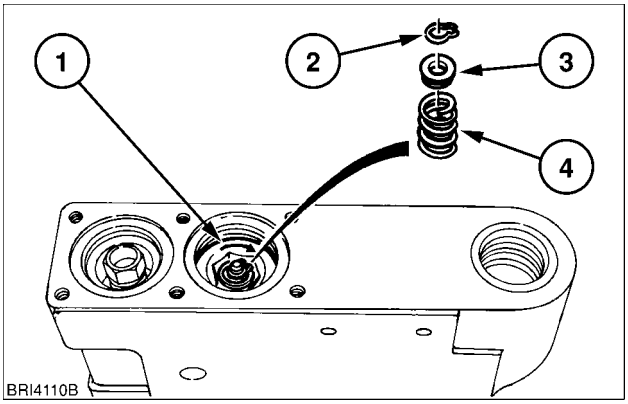
BSB0418A 8

9. To remove the lowering metering valve it is necessary to disassemble the valve in stages as follows:- Remove retaining screws.



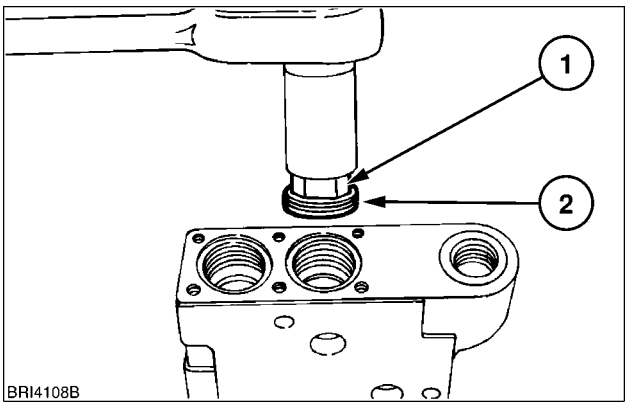
BAIL06CCM113ASA 9

10. Use piece of **14 mm** hexagonal bar with an **11 mm** hole drilled through centre to screw the nozzle **(1)** further into valve housing. This will reduce the pressure of the metering valve spring on circlip **(2)**.
Remove circlip **(2)**, seat **(3)** and spring **(4)**.
Remove Nozzle.



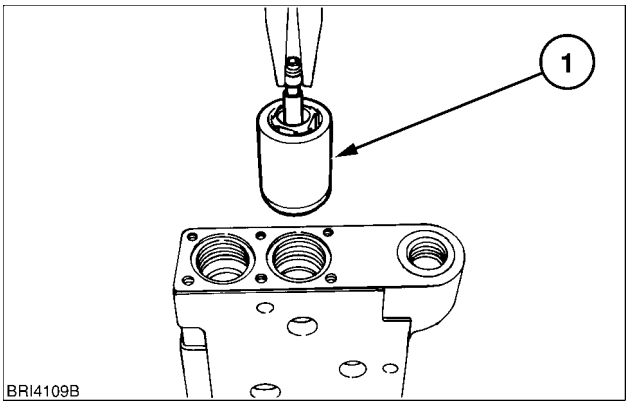
BAIL06CCM114ASA 10

11. Remove locking ring **(1)** use a **17 mm** piece of hexagonal bar **(1)** with **11 mm** hole drilled down centre.



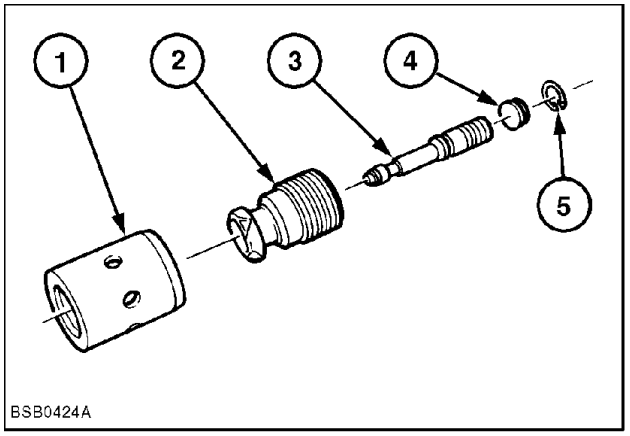
BAIL06CCM115ASA 11

12. Pull metering element **(1)** from housing.

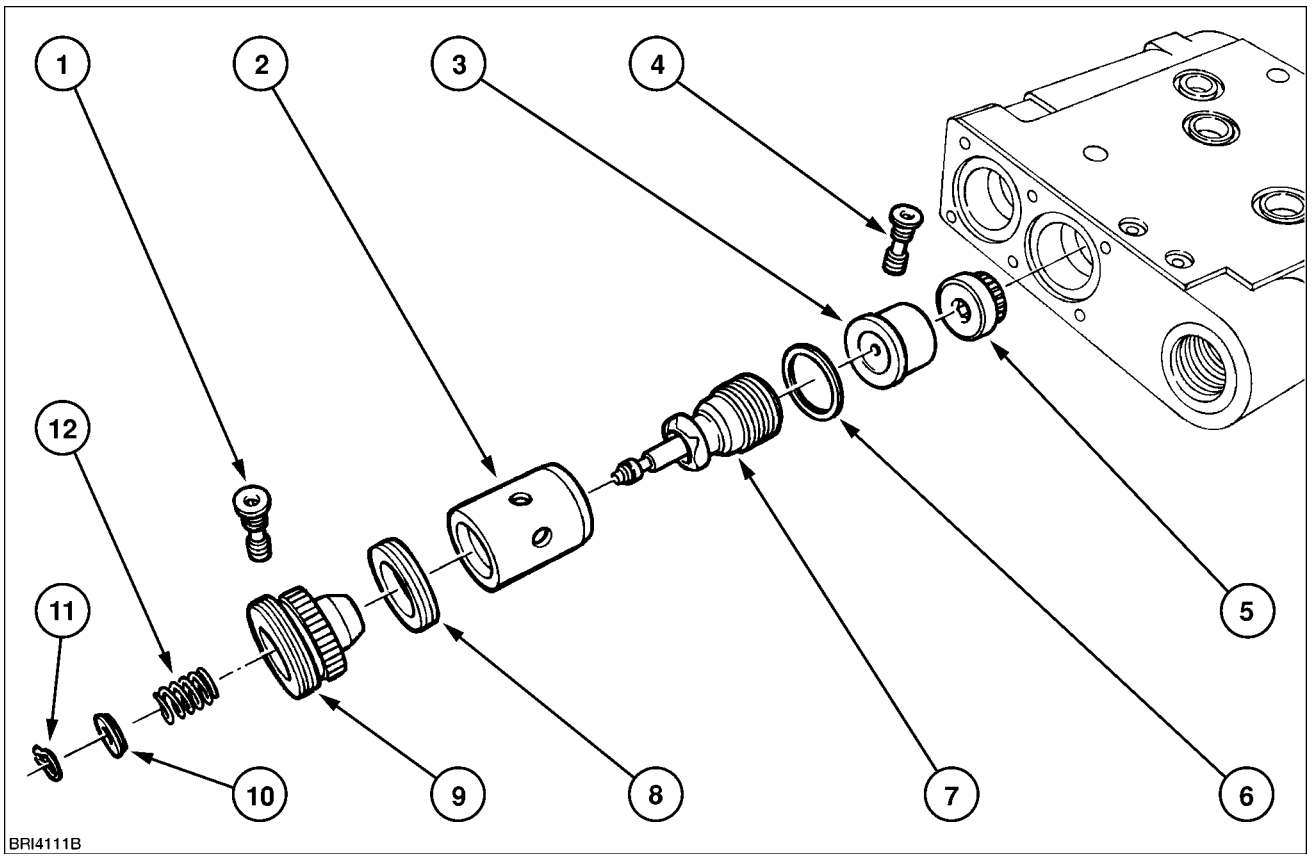


BAIL06CCM116ASA 12

13. Disassemble metering element components.
    1. Seat
    2. Valve
    3. Spring
    4. Copper Washer
    5. Shims
    6. End Cap



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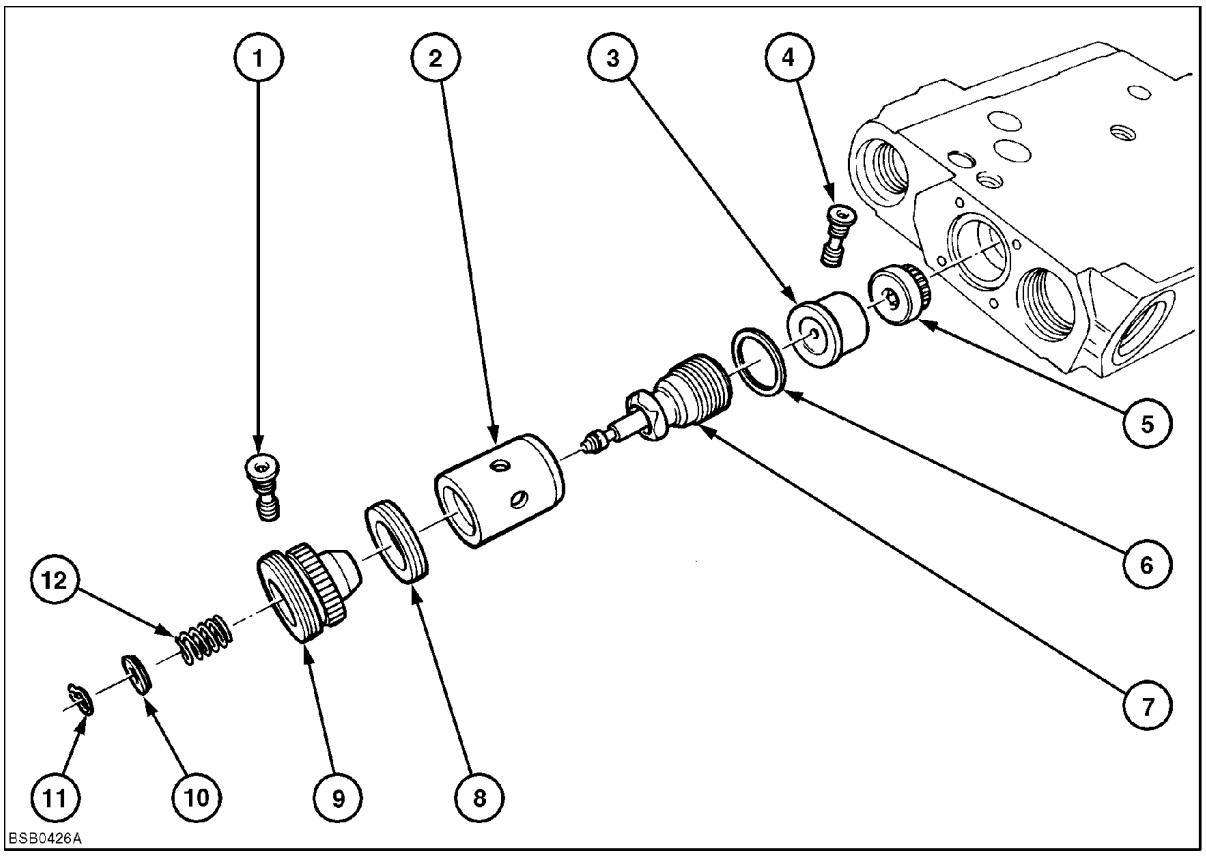
BAIL06CCM117FSA 14

1 Locking Screw
2 Sleeve
3 Plug
4 Locking Screw

5 Orifice
6 Shim
7 Metering Valve
8 Locking Ring
9 Nozzle
10 Seat
11 Circlip

Control valve - Assemble

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]



BSB0426A 1

1 Locking Screw
2 Sleeve
3 Plug
4 Locking Screw
5 Orifice
6 Shim
7 Metering Valve
8 Locking Ring
9 Nozzle
10 Seat
11 Circlip

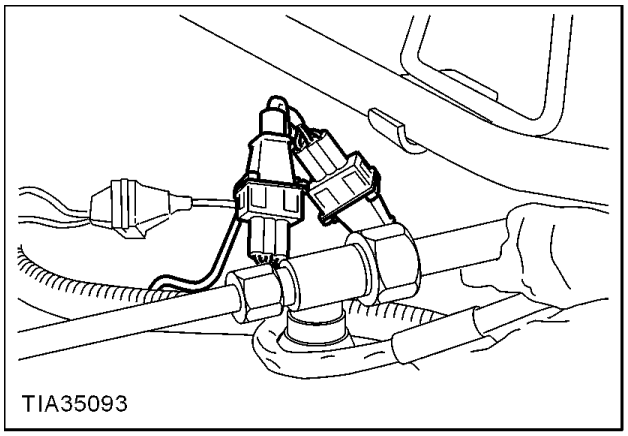
1. Re-assembly follows disassembly **Control valve - Disassemble (H.10.D)**procedure in reverse.
2. When installing nozzle **(9)** and locking ring **(5)** ensure serrated edge of orifice and nozzle align with locking screws **(1)** and **(4)**.

Sensing system RH draft pin sensor - Remove

PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

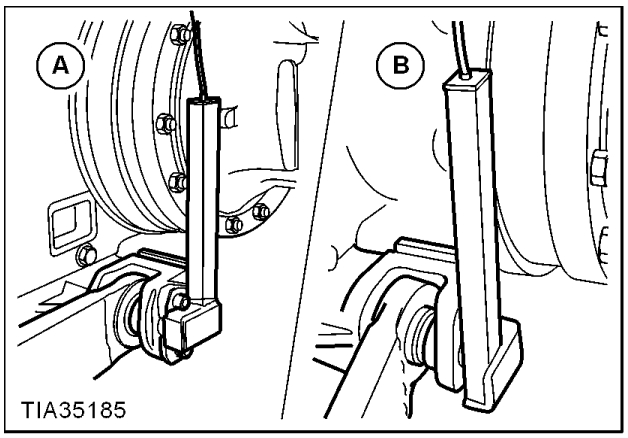
Removal

1. Lower hydraulic lift arms.
   Disconnect load sensing pin connectors. The connectors are located on top of the hydraulic lift cover and can be accessed from the rear of the tractor.



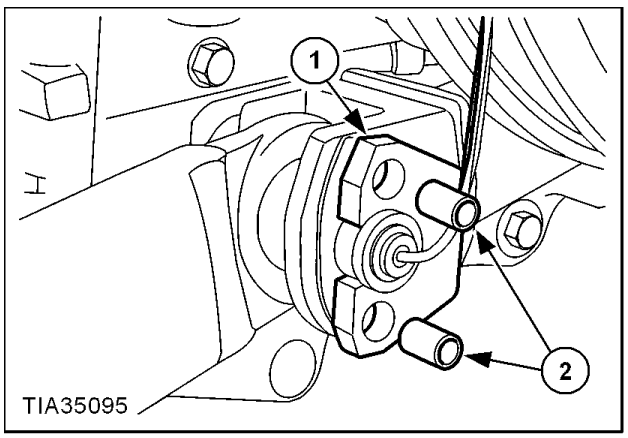
TIA35093 1

2. Remove wiring protection guard at pin.



TIA35185 2

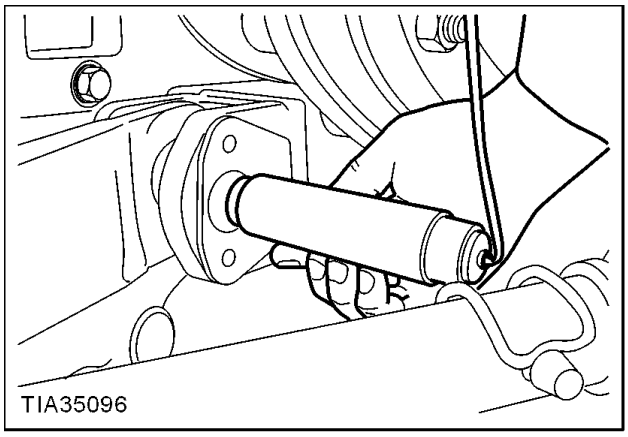
3. Remove spacers **(2)** and clamp **(1)**and withdraw pin.



TIA35095 3

Installation

4. Install pin using removal procedure in reverse and torque clamp bolts to the specified torque.



TIA35096 4

Index

WORKING ARM - H

HITCH Electronic draft control - 10.D

Control valve - Assemble 36
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

Control valve - Disassemble 31
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

Control valve - Dynamic description 9
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Control valve - Remove 30
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

Control valve - Static description 15
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Electronic control - Dynamic description 20
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Electronic control - Exploded view 18
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

HITCH Electronic draft control - Calibrate 25
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

HITCH Electronic draft control - Functional diagram 8
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

HITCH Electronic draft control - Static description 4
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller, PUMA 180 Multicontroller, PUMA 195 Multicontroller, PUMA 210 Multicontroller

Sensing system RH draft pin sensor - Remove 37
PUMA 165 [Z7BH01001 - Z9BH40000], PUMA 165 [Z7BH50001 - Z9BH60000], PUMA 180 [Z7BH01001 - Z9BH40000], PUMA 180 [Z7BH50001 - Z9BH60000], PUMA 195 [Z7BH01001 - Z9BH40000], PUMA 195 [Z7BH50001 - Z9BH60000], PUMA 210 [Z7BH01001 - Z9BH40000], PUMA 210 [Z7BH50001 - Z9BH60000], PUMA 165 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 180 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 195 Multicontroller [Z7BH50001 - Z9BH60000], PUMA 210 Multicontroller [Z7BH50001 - Z9BH60000]

WORKING ARM - H

HITCH Electronic draft control - 10.D

PUMA 165 [Z9BH40001 -] , PUMA 165 [Z9BH60001 -] , PUMA 180 [Z9BH40001 -] , PUMA 180 [Z9BH60001 -] , PUMA 195 [Z9BH40001 -] , PUMA 195 [Z9BH60001 -] , PUMA 210 [Z9BH40001 -] , PUMA 210 [Z9BH60001 -]

Contents

WORKING ARM - H

HITCH Electronic draft control - 10.D

TECHNICAL DATA
Control valve
Torque 3
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

FUNCTIONAL DATA
HITCH Electronic draft control
Static description 4
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Control valve
Sectional view 8
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Hydraulic schema 9
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Exploded view 10
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

SERVICE
Control valve
Remove 11
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Install 12
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Assemble 13
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

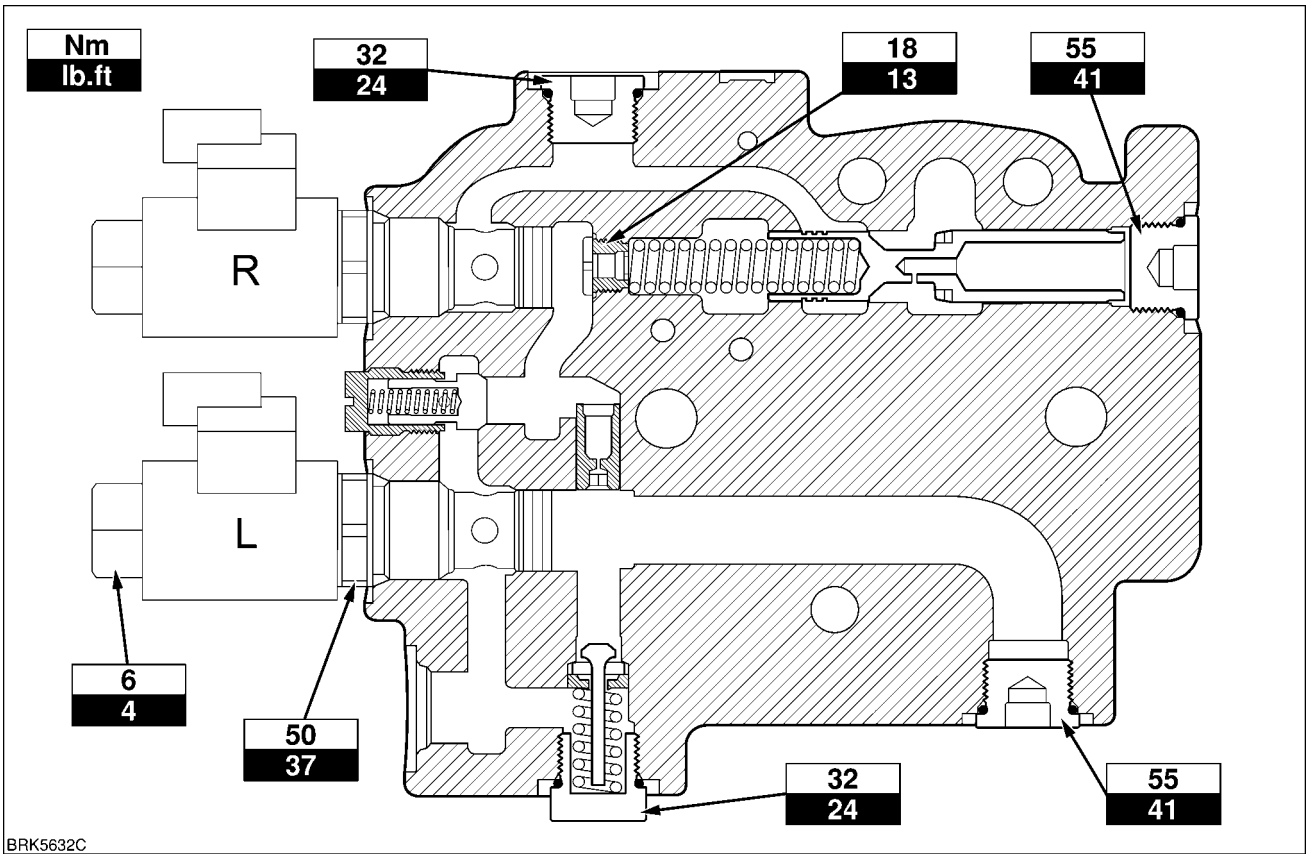
Disassemble 14
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Calibrate EDC valve 15
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Calibrate EDC Position Sensor 19
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Control valve - Torque

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]



BAIL08CVT016FSA 1

HITCH Electronic draft control - Static description

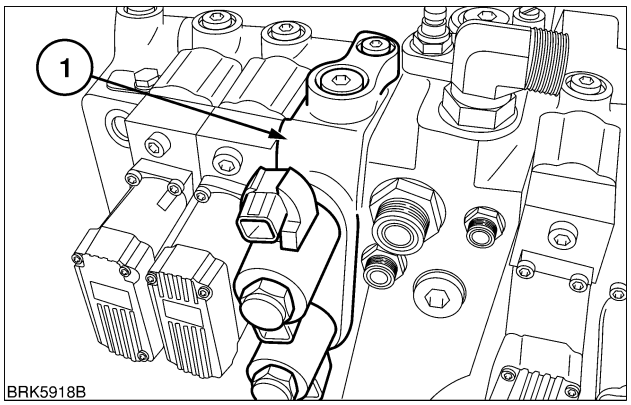
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

One method of providing a more constant depth control is to take advantage of the fact that draft loading increases with implement depth. If a fixed implement draft is maintained a fixed implement depth will result, providing the tractor speed and type of soil being worked remain constant.
The hydraulic lift electronic draft control system provides a means of accurately controlling implement draft and soil penetration depth on fully or semi mounted implements.
The principle of electronic draft control, is to sense draft variations through two load sensing pins in the lower links and using a microprocessor translate these variations into electrical signals for controlling the draft loading and working depth of an implement.
The smoothness and accuracy provided during operation gives this system a clear advantage over conventional mechanical systems.
In addition to providing draft control, it is also necessary to provide a system where the hydraulic links can be maintained at a position relative to the tractor regardless of draft forces on the implement. This method of maintaining the implement position is called position control.

COMPONENTS

Hydraulic Lift Assembly and Control Valve (Figure **1**)

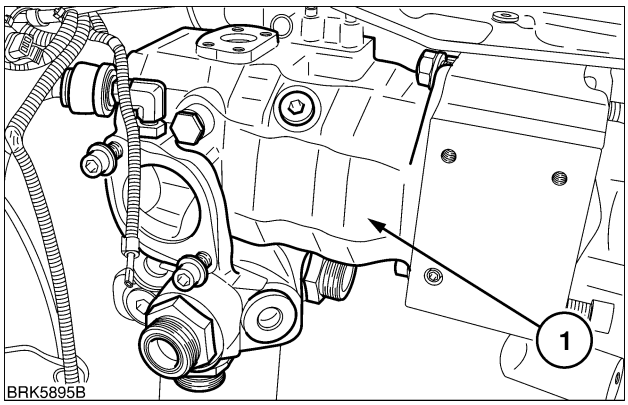
The hydraulic lift Electronic Draft Control valve (EDC valve) is a stack type proportional solenoid operated valve **(1)** mounted with the remote control valves at the rear of the tractor.
The valve responds to pulse width modulated signals from the microprocessor to direct pump pressure oil to and from the hydraulic lift cylinders in direct proportion to the degree of lift required.



BAIL08CVT084ASA 1

Hydraulic Pump (Figure **2**)

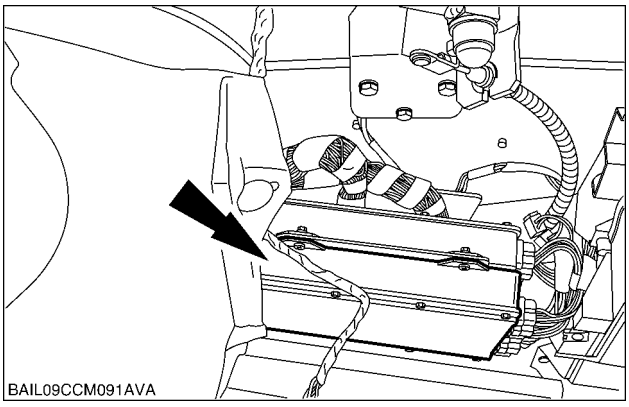
Oil flow to the electronic draft control system is provided by the Load Sensing Variable Displacement piston pump **(1)** which adjusts output according to hydraulic circuit demand.



BAIL08CVT085ASA 2

Electronic Draft Control (EDC) Processor (Figure **3**)

The processor is the management system for the electronic draft control hydraulic lift assembly.
The processor is housed in a protective casing and connected to the electrical harness via multi-pin connectors. The processor contains no serviceable parts and requires direct replacement when faulty.

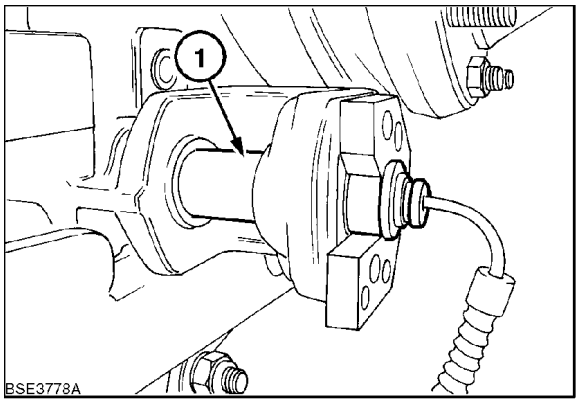


BAIL09CCM091AVA 3

The processor is located behind the panel to the rear of the operators seat (Figure **3**)
The processor converts electronic signals from the operator controls, lift arm position sensing potentiometer and lower link load sensing pins to operate the pulse width modulating valve and raise/lower the hydraulic lift.
The processor also has a self diagnostic capability which detects when the system is not functioning correctly. When this occurs an error code is generated and held in the processor memory so they may be retrieved when diagnosing faults on the tractor.

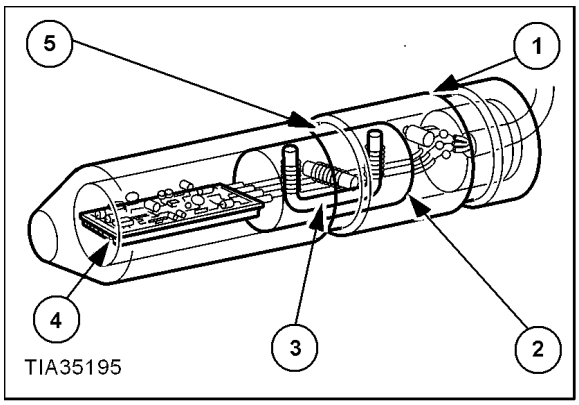
Load Sensing Pins

The load sensing pins **(1)** (Figure **4**) sense draft variations applied by an implement on the lower links.
The pins react to draft shear forces in the horizontal plane but not forces due to the weight of the implement.



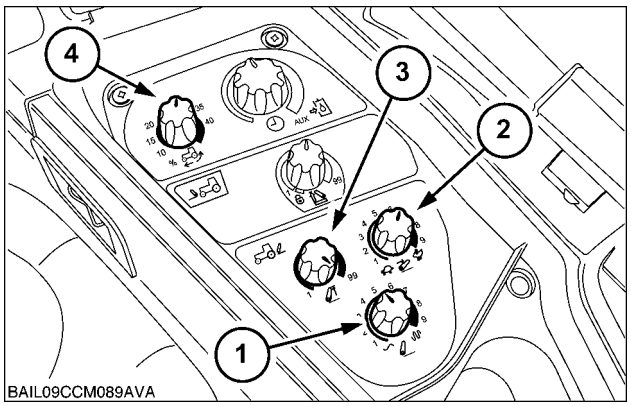
BSE3778A 4

Each load sensing pin (Figure **5**) consists of a hollow metal tube **(1)** containing a circuit board **(4)** and load sensing core **(2)**. Within the core material are three wire coils **(3)** supported by metal rods. The coils are energised by the **8.5 volt** supply and create a stable pattern of magnetic flux within the core.
The outer casing of the pin is made from a metal with unique electromagnetic properties. When the metal is subjected to a shear force, which is centred on the wasted section **(5)** of the pin, the natural magnetism of the pin casing changes, which distorts the magnetic flux pattern of the core and is transformed into an electrical output signal. This signal which is proportional to the draft load acting on the implement is then received by the processor.



TIA35195 5

Controls



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DRAFT SENSITIVITY CONTROL **(1)** (Figure **6**)

Located on the armrest console, this control knob is used to make the system more or less sensitive to changes in draft loading. Turning fully clockwise indicates maximum draft sensitivity.

DROP RATE CONTROL **(2)** (Figure **6**)

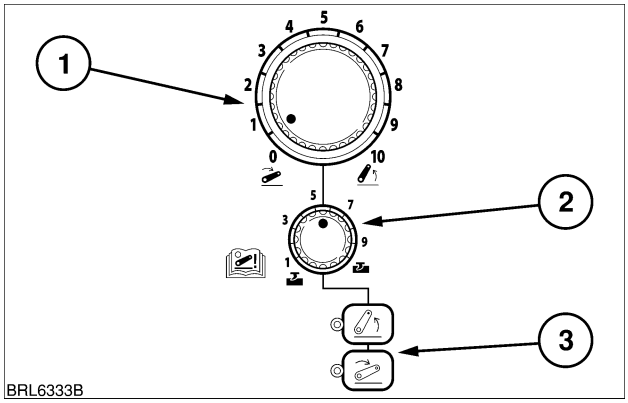
Located on the armrest, the drop rate control knob controls the speed at which the implement drops during a lowering cycle. Turning fully clockwise maximises hitch drop rate, turning fully anticlockwise will lock the hitch to set the drop rate to zero.

HEIGHT LIMIT CONTROL **(3)** (Figure **6**)

Located on the armrest console, the height limit control knob limits the height to which the linkage may be raised. Maximum height is achieved through turning the knob fully clockwise.

SLIP LIMIT CONTROL **(4)** (Figure **6**)

Located on the armrest console, this control knob enables the operator to set a wheel slip threshold, above which the implement will raise until wheel slip returns to the set level. This feature is only available with the optional radar unit. Turning fully clockwise allows maximum slip.



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POSITION CONTROL **(1)** (Figure **7**)

Is used to set the implement height when operating in position control and the maximum depth when operating in draft control. Selecting position 99 sets maximum height.

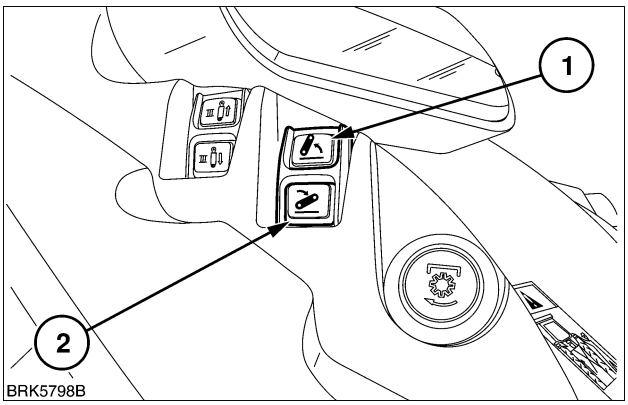
DRAFT CONTROL **(2)** (Figure **7**))

Located on the armrest instrument panel, the draft control knob determines the allowable draft load on the draft sensing pins and hence the implement working depth when operating in draft control. Selecting position 10 will allow maximum draft load and hence maximum depth.

INCHING SWITCHES **(3)** (Figure **7**)

When the EDC is operating (raising or lowering) and whilst the operation is in progress, a lamp on the instrument panel will be on to indicate the EDC is moving.

FENDER RAISE/WORK SWITCH (Figure **8**)

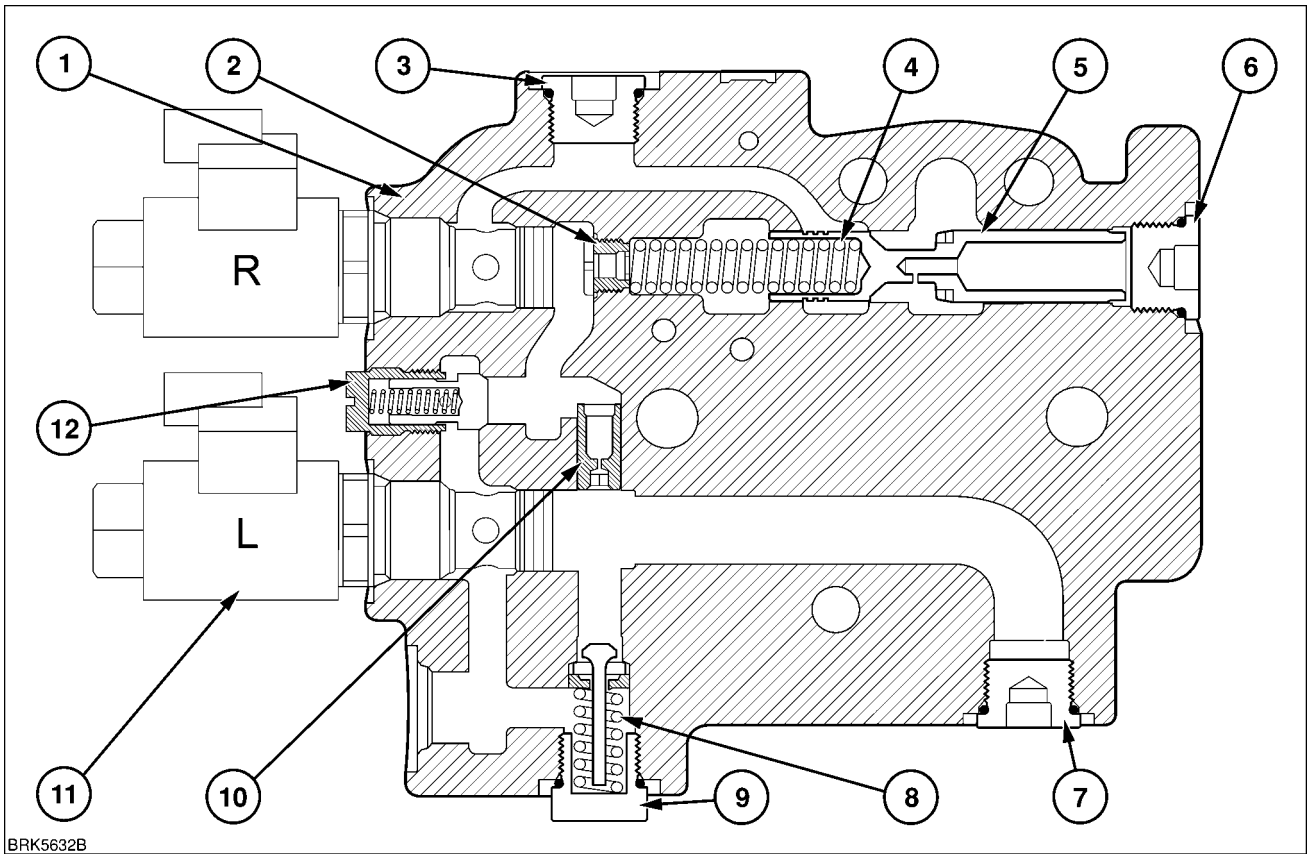


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A pair of push buttons (one to raise **(1)**, one to lower **(2)**) are located on each rear fender allowing external control of the rear linkage. Hitch movement is restricted by height limit, but not by position or draft setting.

Control valve - Sectional view

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

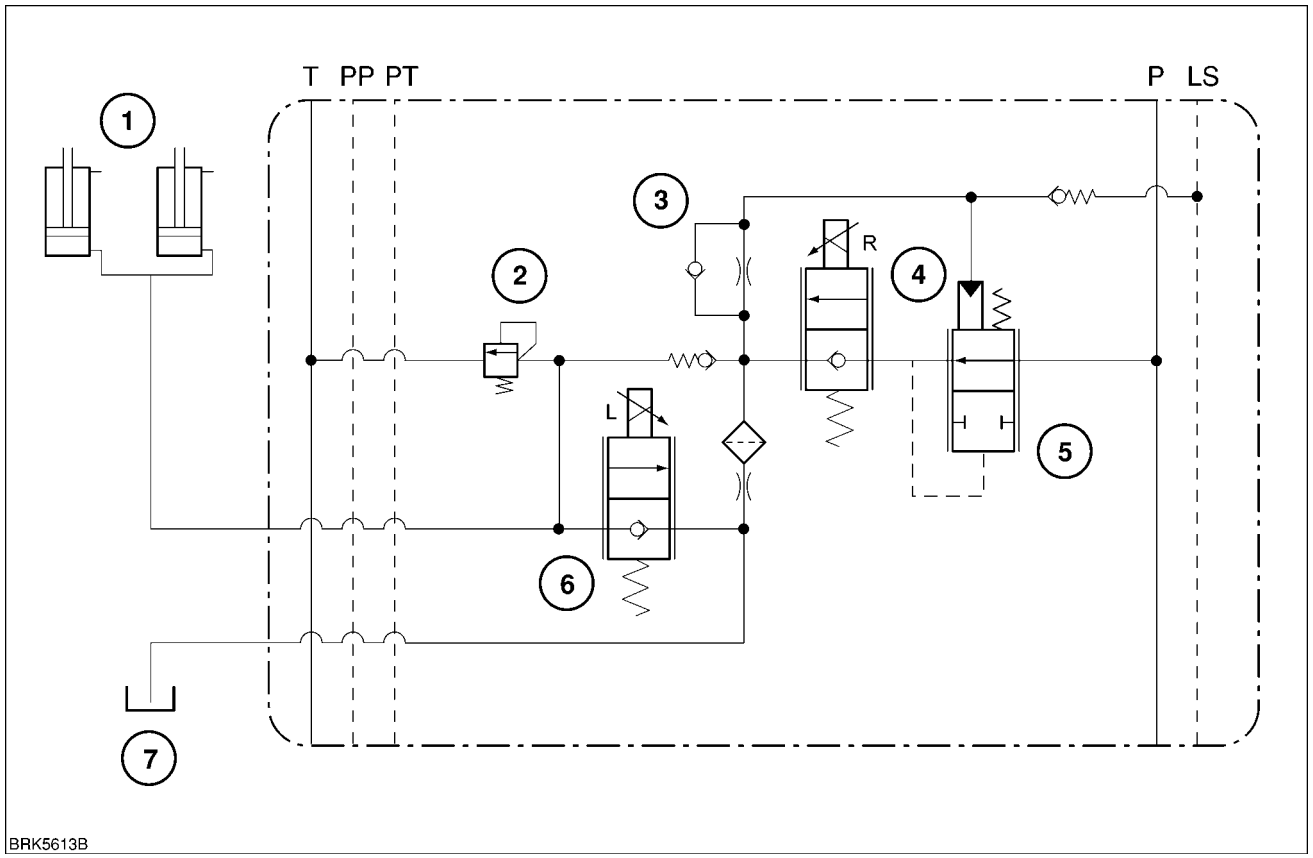


BAIL08CVT011FSA 1

1.Housing
2.Check valve assembly
3.Plug
4.Spring
5.Pressure compensating Spool
6.Plug
7.Plug
8.Relief valve assembly **221 bar** (**3204.5 psi**)
9.Check valve plug
10.Orifice
11.Solenoid
12.Logic check valve assembly

Control valve - Hydraulic schema

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

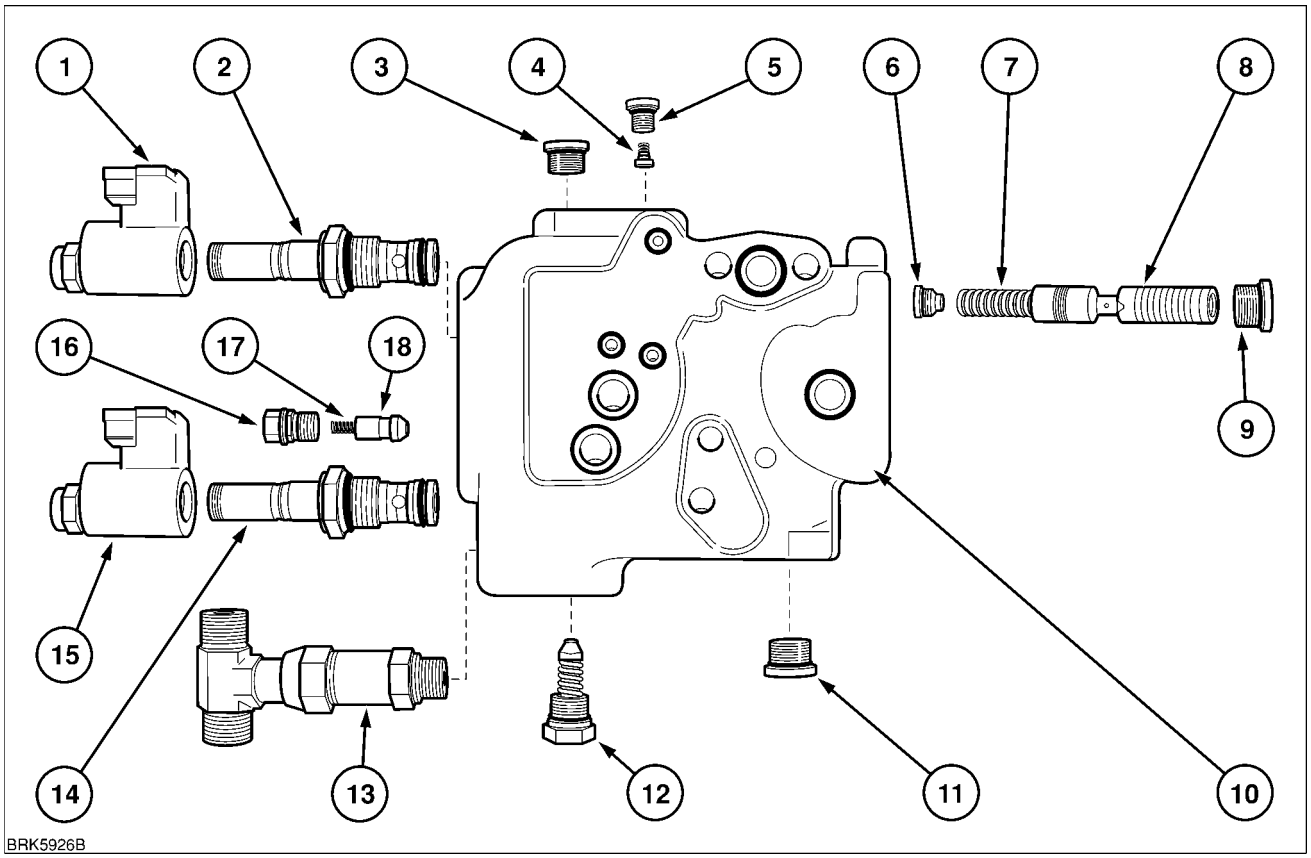


BAIL08CVT140FSA 1

1. Lift cylinders
2. Relief valve **221 bar** (**3204.5 psi**)
3. Check valve
4. Raise valve
5. Pressure compensating valve
6. Lower valve
7. Return to tank

Control valve - Exploded view

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]



BAIL08CVT083ASA 1

Electronic draft control valve components

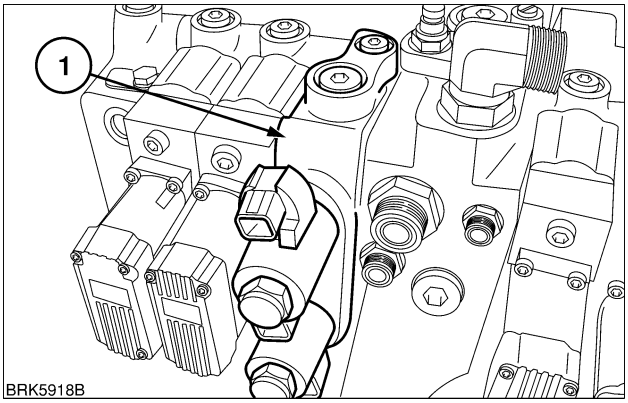
1.Solenoid body
2.Solenoid valve
3.Plug
4.Load sense check valve
5.Plug
6.Check valve
7.Spring
8.Pressure compensating spool
9.Plug
10.Manifold
11.Plug
12.Relief valve assembly **221 bar** (**3204.5 psi**)
13.Lift cylinder connection
14.Solenoid Valve
15.Solenoid Body
16.Plug
17.Spring
18.Logic check valve spool

Control valve - Remove

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Prior operation:
Battery - Disconnect (A.30.A)

1. Remove power beyond slice (where fitted) and remote valves 1 and 2. (Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Remove (A.10.C)**).
2. Remove the electronic draft control valve **(1)** from the tie rods.



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⚠ WARNING ⚠

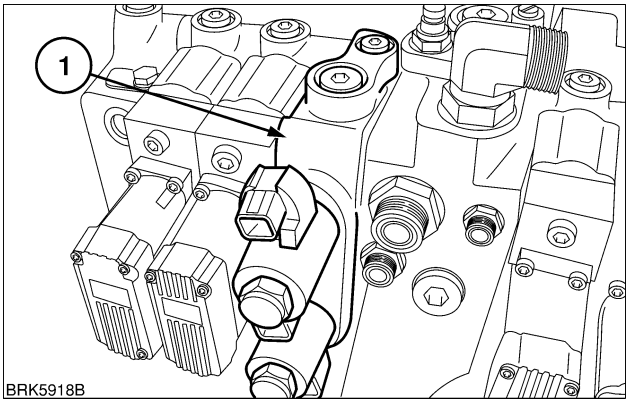
The component is heavy. ALWAYS use a hoist or get assistance to lift the component. Failure to comply could result in serious injury or death.

M944

Control valve - Install

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

1. Install the electronic draft control valve **(1)** on to the tie rods and ensure that all O-rings are correctly seated. Install remote valves 1 and 2. (Refer to **PRIMARY HYDRAULIC POWER SYSTEM Electro-hydraulic remote valve - Install (A.10.C)**. Install power beyond (where fitted).



BAIL08CVT084ASA 1

Control valve - Assemble

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

1. Check components for wear or damage before re-assembly. Replace O-rings.
2. Lubricate all parts with clean hydraulic fluid and install into valve manifold (refer to **Control valve - Exploded view (H.10.D)** and **Control valve - Torque (H.10.D)**

Next operation:
Control valve - Install (H.10.D)

Control valve - Disassemble

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

Prior operation:
Control valve - Remove (H.10.D)

1. Place the valve on a clean work surface.
2. Remove components from valve manifold. (refer to **Control valve - Exploded view (H.10.D)**)

⚠ WARNING ⚠

A large spring is positioned beneath the plug, take extreme care when removing plugs.

B041

3. Check the solenoid valves for wear or damage and replace if necessary.
4. Check the pressure compensating spool for wear or damage. Replace complete valve assembly if spool is damaged.
5. Replace O-rings.

Control valve - Calibrate EDC valve

PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

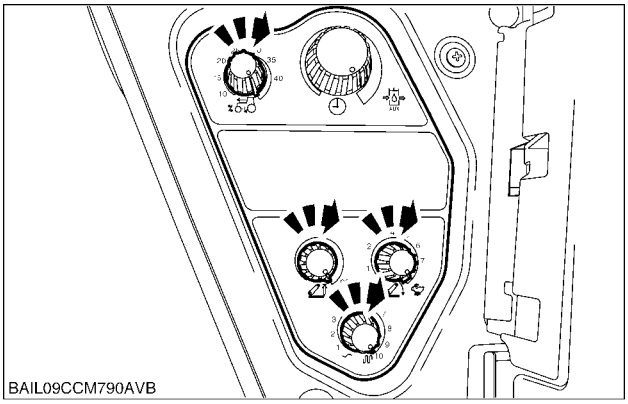
This procedure is required when either new EDC valves or EDC control module are fitted or if the previous calibration has been erased using the 'H8' procedure.

NOTE: *The calibration procedure is controlled by the electronic management system. To prevent inadvertent movement of the tractor, park the tractor away from any obstacles, firmly apply the parking brake and block the wheels, front and rear. Check that the Ground speed display is Zero before commencing.*

1. Disconnect all implements from the rear hitch.
2. Lower the linkage using the position control lever and connect the two test weights.

NOTE: *The test weights must be sufficient to overcome any friction in the hydraulic lift assembly and enable the lift arms to lower without binding.*
The standard test weights of ***1111 - 1542 kg*** *(* ***2450 - 3400 lbs****) are recommended.*

3. Key OFF.
4. Set all EDC panel potentiometers fully clockwise.

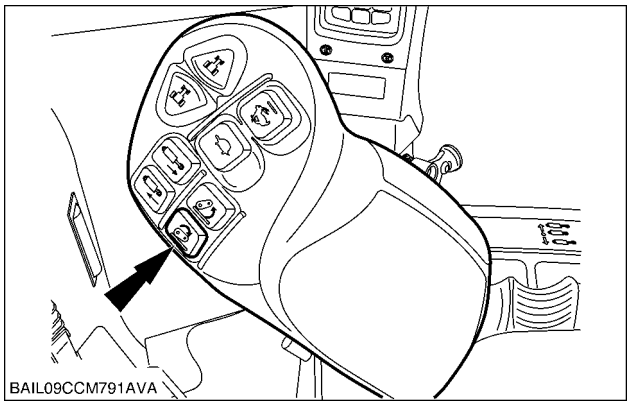


BAIL09CCM790AVB 1

5. There are two methods to enter the calibration mode:
   1. Quick entry - Depress and hold the EDC fast lower switch on the hand controller whilst starting the engine.
   2. HH menu entry - Using the diagnostic connector **380000843** and H1 calibrations in the HH menu

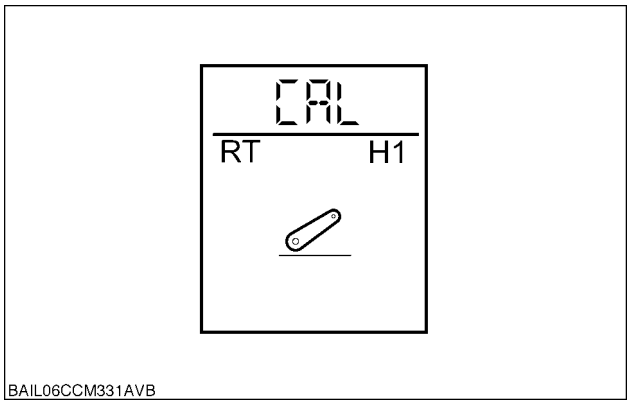
Quick Entry

6. Depress and hold the EDC fast lower switch on the hand controller whilst starting the engine.



BAIL09CCM791AVA 2

7. The system being calibrated will be shown on the ICU3 and "CAL" will be shown on the top section of the display.

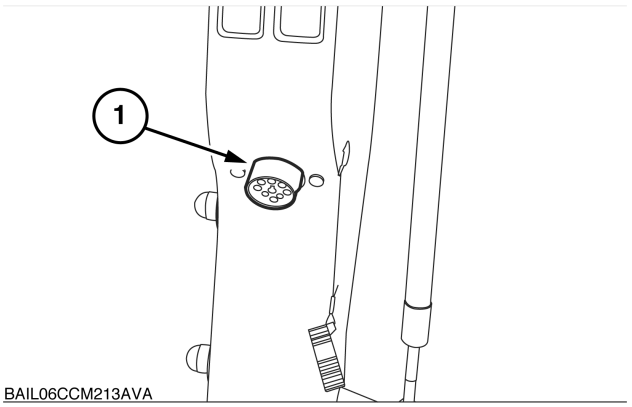


BAIL06CCM331AVB 3

8. Continue from step 11.

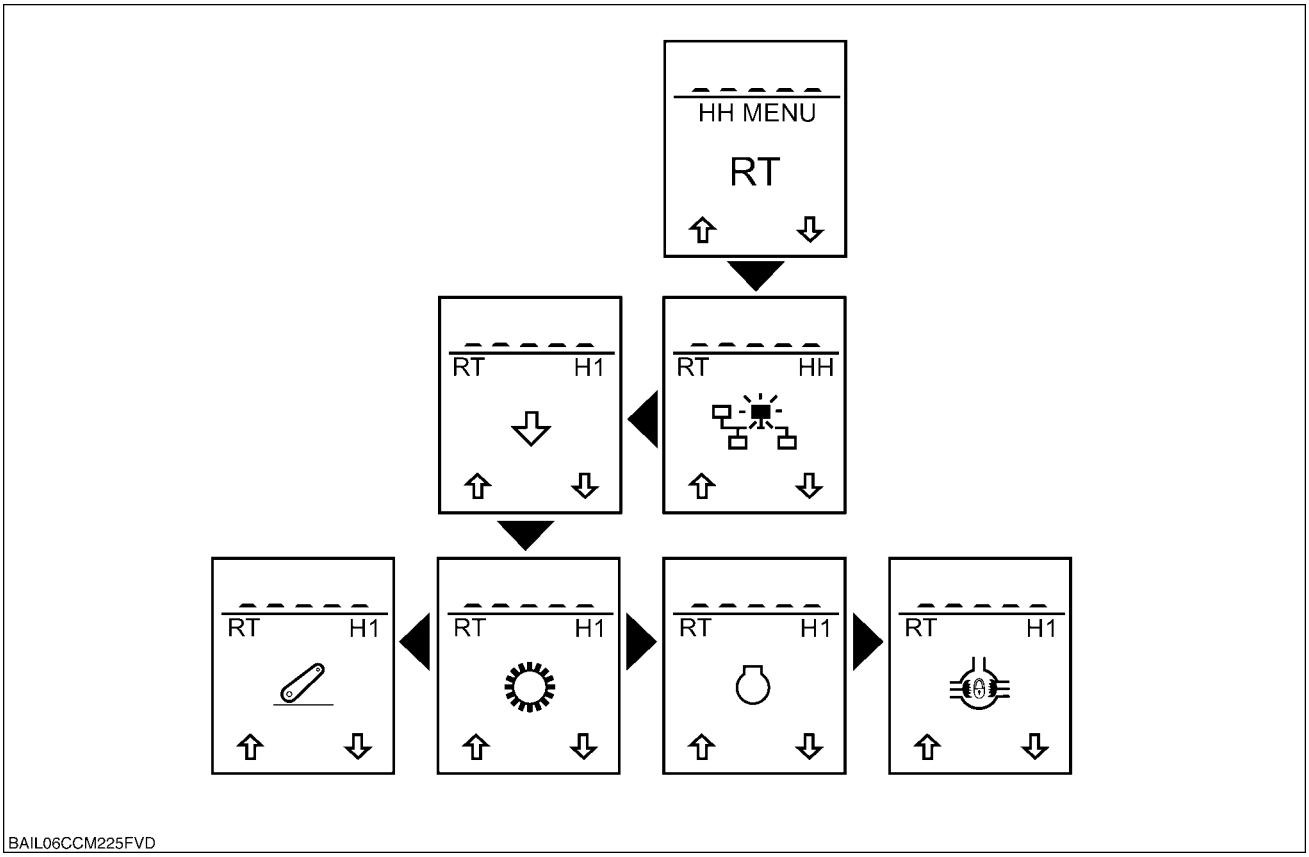
HH Menu Entry

9. Install the diagnostic connector **380000843** into the diagnostic socket **(1)**.



BAIL06CCM213AVA 4

10. Use the "up", "down" and "menu" keys on the ICU3 to navigate the HH menu's to H1 and the EDC symbol, the top section of the display will show "CAL".

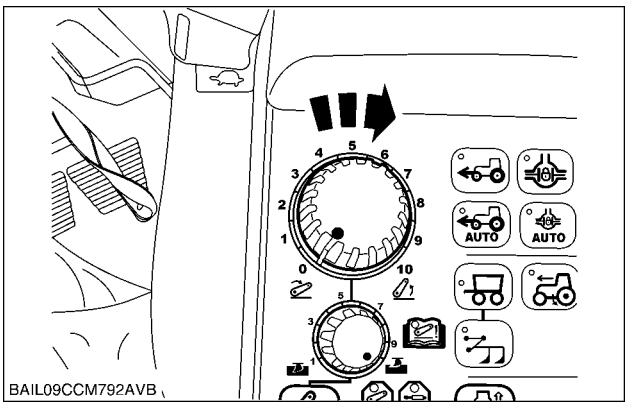


BAIL06CCM225FVD 5

11. Set the engine speed to **1100 - 1300 RPM**, with no noticeable hunting or surging.

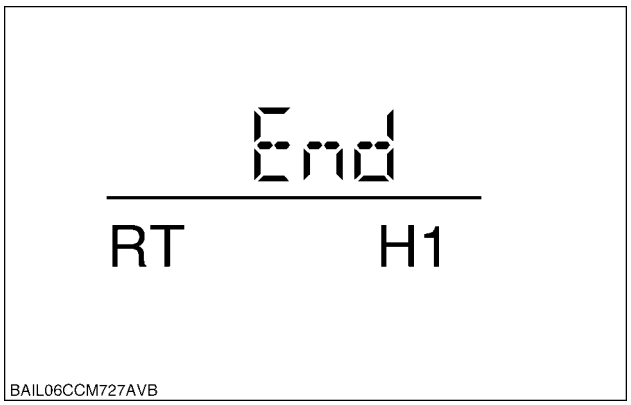
12. Raise the control lever to between **70 %** and **90 %** to start the calibration sequence.

NOTE: *The top section of the display will change from "CAL" to "0" to indicate the start of calibration. During calibration the linkage is automatically raised and lowered a small amount 3 times, within 2-3 minutes.*
Each raise and lower is accompanied by a count on the display from '0' to '2'.



BAIL09CCM792AVB 6

13. When the top section of the display shows "End" the calibration is complete.



BAIL06CCM727AVB 7

14. Lower the linkage using the position control lever.
15. Key OFF to store the calibration values.

NOTE: *If an error occurs during calibration a "U" code will be displayed and the procedure will need to be repeated. Refer to the "U" code listing in* ***ELECTRONIC SYSTEM - Fault code index (A.50.A)****.*

Control valve - Calibrate EDC Position Sensor

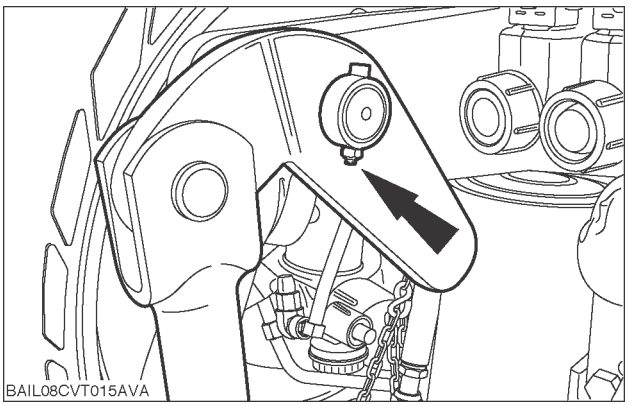
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

This procedure is required, prior to calibration of the EDC valve. If fault code 1024 is displayed the position sensor calibration has not been carried out.

NOTE: *This calibration is not carried out using the "H menu" system.*

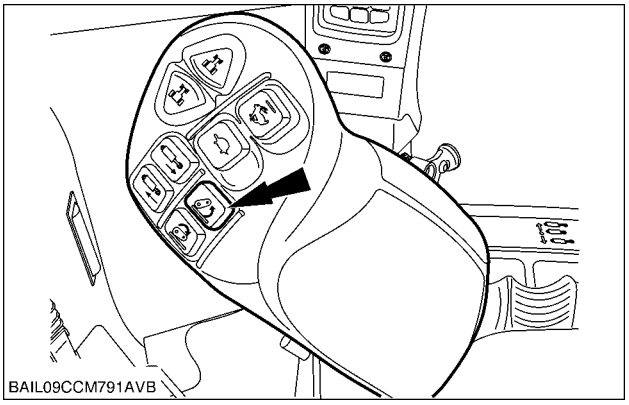
NOTE: *The calibration procedure is controlled by the electronic management system. To prevent inadvertent movement of the tractor, park the tractor away from any obstacles, firmly apply the parking brake and block the wheels, front and rear. Check that the Ground speed display is Zero before commencing.*

1. Remove any load from the hitch and ensure that the 'Automatic Pick Up Hitch' (APUH) lift rods, if fitted are disconnected.



BAIL08CVT015AVA 1

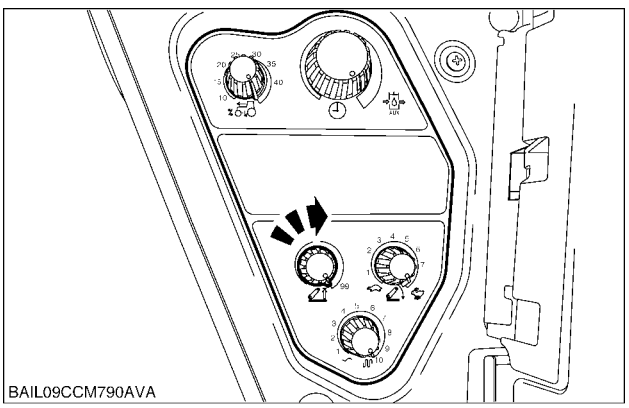
2. Erase the previously stored calibration value by pressing and holding the fast raise switch on the hand controller and turning the ignition switch to the 'ON' position. Release the fast raise switch and turn off the ignition.



BAIL09CCM791AVB 2

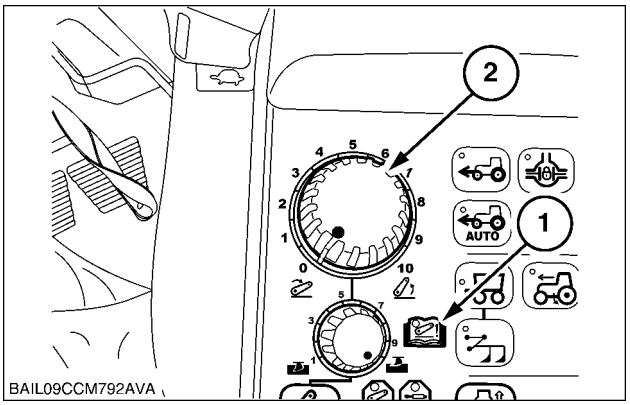
3. Ensure the correct lift ram size has been set, refer to the H3 'options and configurations' menu, **Control module - Configure (A.50.A)**, if no ram size is configured fault code 1070 will be displayed.

4. Ensure the height limit control is in the fully clockwise position. Fault code 1068 will be displayed if the control is not fully clockwise.



BAIL09CCM790AVA 3

5. Start the engine, the 'EDC' status lamp on the armrest control panel **(1)** should flash to indicate there is a fault present. Fully raise and then lower the hitch using the position control lever **(2)** on the armrest.



BAIL09CCM792AVA 4

6. Turn the ignition off to store the calibration value. Refit the 'APUH' rods if applicable.

Index

WORKING ARM - H

HITCH Electronic draft control - 10.D

Control valve - Assemble 13
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Control valve - Calibrate EDC Position Sensor 19
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Control valve - Calibrate EDC valve 15
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Control valve - Disassemble 14
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Control valve - Exploded view 10
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Control valve - Hydraulic schema 9
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Control valve - Install 12
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Control valve - Remove 11
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Control valve - Sectional view 8
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
Control valve - Torque 3
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]
HITCH Electronic draft control - Static description 4
PUMA 165 [Z9BH40001 -], PUMA 165 [Z9BH60001 -], PUMA 180 [Z9BH40001 -], PUMA 180 [Z9BH60001 -], PUMA 195 [Z9BH40001 -], PUMA 195 [Z9BH60001 -], PUMA 210 [Z9BH40001 -], PUMA 210 [Z9BH60001 -]

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