



TEREX Equipment Limited Operations Manual

Operations Manual TA300

15504764
OHE11001



Original Operating Instructions

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TEREX Equipment Limited Operations Manual Re-order

Issued by;
Customer Support Department
Terex Equipment Limited
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Motherwell, ML1 5RY
Scotland

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<http://construction.support.terex.com>
www.terex.com

OHE11001
Re-order Part Number
15504764

This controlled document is the original instruction
and should remain with the vehicle at all times.

Revision: October 2012

Operations Manual
TA300

15504764
OHE11001

Dealer:

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TEREX®

TEREX Equipment Limited Operations Manual - Introduction

For further information on the subject matter detailed within this operations manual, please refer to Terex Equipment Limited Service Manuals and Product Parts Books.

Alternatively, please contact;

Customer Support Department
Terex Equipment Limited
Newhouse Industrial Estate
Motherwell, ML1 5RY

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<http://constructionsupport.terex.com>

www.terex.com

The illustrations, technical information, data and descriptive text in this manual, to the best of our knowledge, were correct at the time of print. The right to change specifications, equipment and maintenance instructions at any time without notice, is reserved as part of the Terex Equipment Limited policy of continuous development and improvement of the product.

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Please refer to TEREX Specification Sheets or consult Factory Representatives to ensure that information is current.

Operations Manual
TA300

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**ONLY TRAINED COMPETENT PERSONNEL
SHOULD BE ALLOWED TO OPERATE THIS
VEHICLE**

The operator is responsible and must be familiar with the contents of the Operations Manual and any Local / National regulations prior to operating this vehicle.

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CALIFORNIA Proposition 65 Warnings

WARNING: Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

WARNING: Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. **Wash hands after handling.**

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EC DECLARATION OF CONFORMITY

MANUFACTURER'S NAME AND FULL ADDRESS:		
Terex Equipment Limited, Newhouse Industrial Estate, Motherwell, Scotland. ML1 5RY		
PERSON AUTHORISED TO COMPILE TECHNICAL FILE		DIRECTIVES COMPLIED WITH:
Name: David Maslin, Address: Newhouse Industrial Estate, Motherwell, Scotland. ML1 5RY		2000/14/EC Noise Directive 2004/108/EC Electromagnetic Compatibility 2006/42/EC Machinery Directive 97/68/EC Emissions Directive
DESCRIPTION OF MACHINERY:		
MAKE:		TEREX
MODEL/DESIGNATION:		TA300 Articulated Dump Truck
INSPECTOR:		
UNIT SERIAL NUMBER:		
WE DECLARE THAT THE ABOVE MACHINERY FULFILLS ALL THE RELEVANT PROVISIONS OF THE ABOVE DIRECTIVES		
FULL QUALITY ASSURANCE (Annex VIII):		CERTIFICATE NUMBER:
L.R.Q.A. Ltd., Hiramford, Middlemarch Office Village, Siskin Drive, Coventry, CV3 4FJ. England		LRQ 0925301/B
		DATE OF MANUFACTURE:
FOR AND ON BEHALF OF THE MANUFACTURER:		SIGNATURE: 
NAME: Paul Douglas		
POSITION: General Manager		
PLACE: Motherwell, Scotland		DATE:

SPARE PARTS STATEMENT

When carrying out repairs, alterations or fitting attachments, it is important that only genuine spare parts are used to ensure the operating safety of the machine is not impaired.

It is only by using genuine parts that the technical requirements stipulated by the manufacturer can be maintained.

If a General Operating Approval is issued for this machine, it may be considered null and void if non-genuine parts are used.



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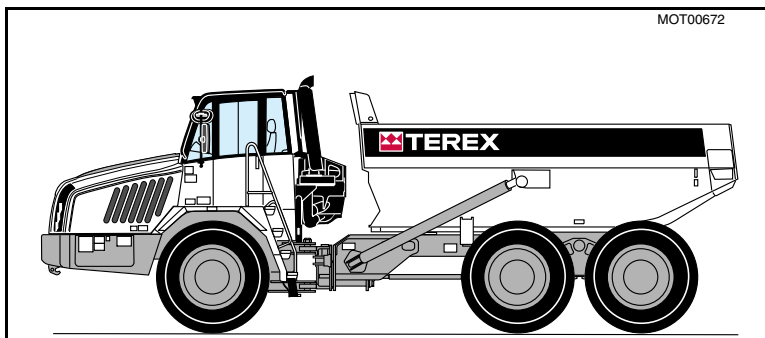
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INTRODUCTION

This manual is provided as a guide to familiarize the operator and service personnel with the controls, recommended inspections, start-up, operating, shutdown and parking procedures for the Terex articulated trucks. It is essential that operators read and understand the manual before operating the machine.

The Terex articulated haulers are 3 axle types with an oscillation and articulation pivot joint between the tractor and trailer units. Articulation is achieved by frame steering. The machine has part time or full time 6 wheel drive controlled by the operator. The machine range has the capability to carry a maximum payload from 27.5 US ton to 41.9 US ton (25 tonnes to 38 tonnes) or a heaped capacity of between 20.3 yd³ to 30.3 yd³ (15.5 m³ to 23.3 m³).



SAFETY PRECAUTIONS

The machine should be properly operated and maintained to keep it in a safe, efficient operating condition. Be sure that all controls are free of mud, grease, or other matter that might cause slips hazardous to the operator, service personnel or equipment. Report all malfunctions to those responsible for maintenance, and, do not operate the equipment until corrected. Normal service or maintenance performed as required can prevent unexpected and unnecessary downtime.

Safety Alert Symbol

The Safety Alert System identifies important safety messages in this manual. When you see this symbol, BE ALERT! Your safety is involved. Carefully read the message that follows and inform other operators.



Hazard Classification

A multi-tiered hazard classification system is used to communicate potential personal injury hazards. The following signal words used with the safety alert symbol indicate a specific level of severity of the potential hazard. Signal words used without the safety alert symbol relate to property damage and protection only. All are used as attention getting devices throughout this manual as well as on decals and labels fixed to the machinery to assist in potential hazard recognition and prevention.

Introduction

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.



INTENDED USE OF MACHINE

This product and its approved attachments are designed to perform the following functions.

- 1.Loading
- 2.Hauling
- 3.Spreading

USE OTHER THAN INTENDED

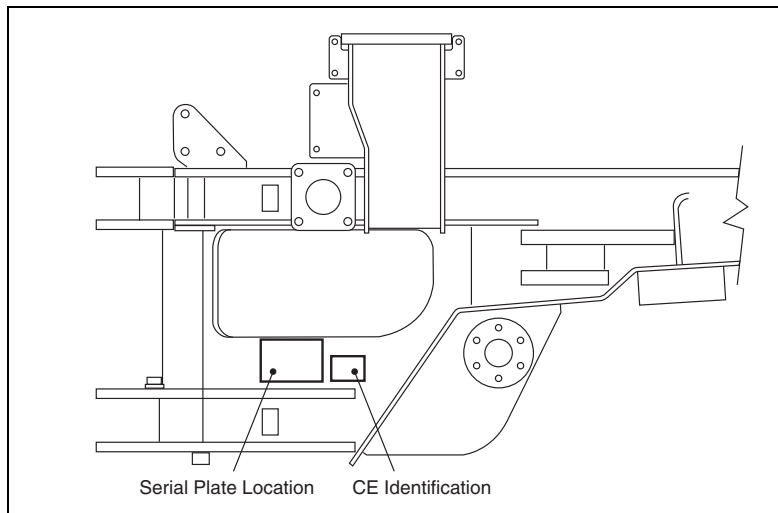


Any use other than that stated in "Intended use" shall be considered impermissible.

The manufacturer shall not be held liable for any resulting damage. The risk is borne by the user alone.

PRODUCT IDENTIFICATION NUMBER - PLATE LOCATION

Information regarding the machine model, code and chassis serial number is found on the unit serial number plate on the rear right of the front frame. The machine model and serial number should always be referenced in any correspondence with your dealer or factory.



While reading this manual you will notice references to controls and equipment which may not be found on all machines. It is important that you know your machine and its equipment and how to operate it properly.

There is a dealer serving every part of the world where these products are sold. Your dealer is ready to provide you with any additional information needed and should be consulted for additional publications for this machine.



WARNING

SPARE PARTS

When carrying out repairs, alterations or fitting attachments, it is important that only genuine spare parts are used to ensure the operating safety of the machine is not impaired.

It is only by using genuine parts that the technical requirements stipulated by the manufacturer can be maintained.

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Introduction

THEFT DETERRENT PRACTICES

General

The owner/operator should take the following precautions to discourage theft, to aid in the recovery in the event that the machine is stolen, or to reduce vandalism.

Actions to Discourage Theft and Vandalism

Remove all keys any time the machine is left unattended.

At night lock all doors and attach, secure or lock all anti-vandalism and anti-theft devices on the machine.

Immobilize the machine by removing a critical electrical or starting system device.

Upon receipt of a machine, record the machine serial number and the serial numbers of all major components and attachments. Keep this list up to date and filed in a safe location for fast retrieval.

Place a decal or notice on the machine that all serial numbers are recorded.

Discourage the thief! Inspect the gates and fences of the machinery storage yard or construction site. Keep machines in well-lit areas and ask the local law enforcement authorities to make frequent checks around the storage yard or work site.

Establish liaison with neighbours and ask them to watch equipment left at job sites and to report any suspicious activities to the local law enforcement authorities.

Make frequent inventories of machines to promptly detect losses or vandalism.

Actions to Aid in Recovery of Stolen Machines

In the event of theft, immediately notify the law enforcement authorities having jurisdiction. Provide the investigating officer with name, type of equipment, chassis and serial numbers of major attachments and components. It is helpful to show the investigating officer an Operations Manual, photographs, and advertising, to familiarize him with the appearance of the machine.

Report the theft to the insurance company. Provide the model and all serial numbers.

Report the model and serial numbers of the stolen machine to a dealer handling the respective line of equipment. Request that the dealer forward this same information to the equipment manufacturer.



2 - Safety

Safety

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SAFETY

The machine should be properly operated and maintained to keep it in a safe, efficient operating condition. Be sure that all controls are free of mud, grease, or other matter that might cause slips hazardous to the operator, serviceman, or other personnel or equipment. Report all malfunctions to those responsible for maintenance, and, do not operate the equipment until corrected. Normal service or maintenance performed as required can prevent unexpected and unnecessary downtime.

This operations manual describes general inspections, servicing and operation with the normal safety precautions required for normal servicing and operating conditions. It is not a guide however, for other than normal conditions or situations, and therefore, servicemen and operators must be safety conscious and alert to recognize potential servicing or operating safety hazards at all times, and take, necessary precautions to assure safe servicing and operation of the machine.



WARNING

These machines are equipped with cylinders containing compressed nitrogen gas. Transportation of these machines by any method may require a special permit from the appropriate authority of the country involved. Consult your dealer for details.



CAUTION

These machines use a solution of high purity urea. Avoid prolonged or repeated contact with skin. After handling, always wash hands thoroughly with soap and water. In case of contact with eyes, rinse immediately with water. If large quantities are ingested or irritation persists seek medical attention immediately.

All information, illustrations and specifications contained in this publication are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.

Continuing improvement and advancement of the design may cause changes to your machine which may not be included in this publication. Each publication is reviewed and revised, as required, to update and include these changes in later editions.

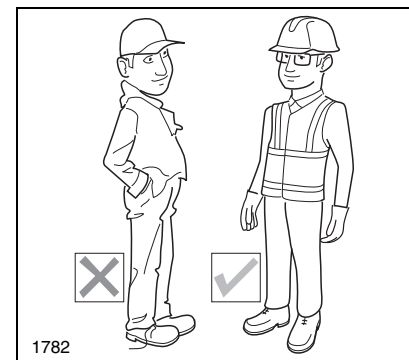
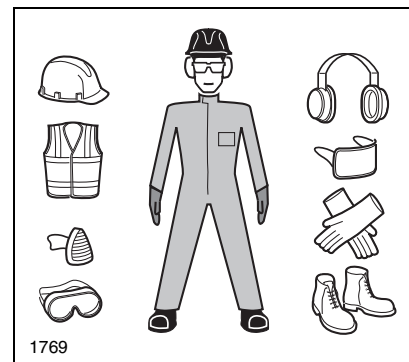
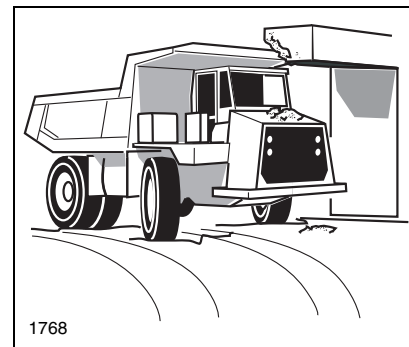
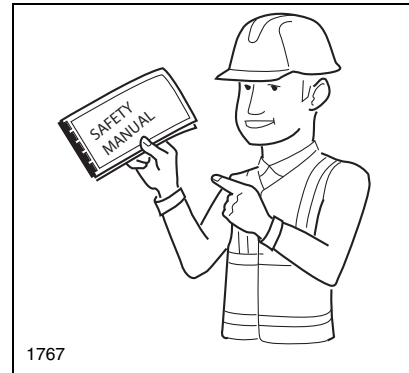
This operations manual contains lubrication and routine servicing instructions, most of which can be performed in the field. Maintenance manuals containing repair/ rebuild procedures can be obtained from your dealer.

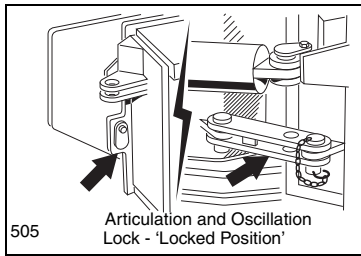
Safety

SAFETY

General

- Read this operations manual and learn the operating characteristics and limitations of the machine. Know what operating clearances the machine requires.
- Read and understand all the safety signs prior to operation.
- If the safety signs are obstructed by dirt or debris, clean them using mild soap and water prior to operation.
- If the safety signs are damaged or illegible, replace them immediately, prior to operation.
- Read the AEM Safety Manual and follow the recommended safety precautions.
- Know clearances of all side and overhead obstructions such as wires, bridges, etc., for operating safely.
- Be especially aware of overhead power lines.
- Always know all traffic rules, signs, flags and hand signals used on the job and know who has the responsibility for signalling.
- Be aware of operating hazards that weather changes can create on the job. Know proper procedures to follow when a severe rain or electrical storm strikes.
- Never attempt to operate or work on a machine when not feeling physically fit.
- Know what safety equipment is required and use it. Such equipment may be: Hard hat, safety glasses, reflector type vests, respirators and ear plugs.
- Never wear loose clothing, rings, watches, heavy gloves etc., that might catch levers and controls and cause loss of control.
- Keep hands and controls free from water, grease and mud to assure nonslip control.
- Handle fuels and lubricants carefully and clean up spills to avoid fire and slipping hazards.
- Clean any mud, grease or oil from controls, handrails, ladders and decks. Lash necessary tools securely and remove all loose items before operating the machine. Never rush. Walk, do not run.
- Never carry more than one passenger and only in the passenger seat.

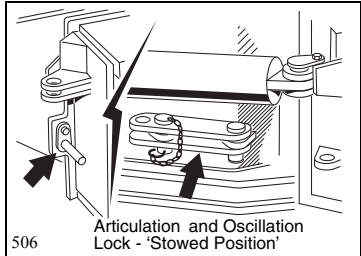




CAUTION

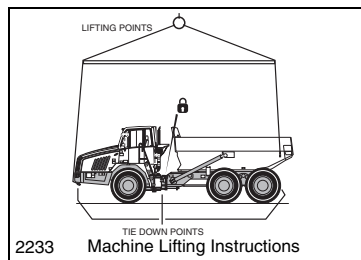
The protection offered by the roll over and falling object protective structure may be impaired if it has been subjected to any modification or damage. Unauthorized modification will void certification.

Articulation and Oscillation Lock



- Always connect the steering and oscillation lock bar before working in the articulation area, before lifting the machine and during transportation of this machine by trailer/vessel.
- Always disconnect the steering and oscillation lock bar and secure in the 'Stowed' position before operating the machine. The machine would not be free to steer otherwise.

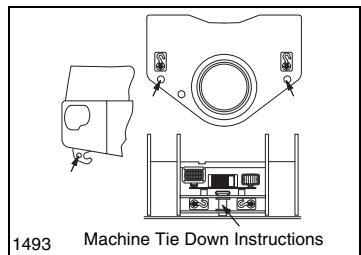
Machine Lifting Precautions



- Prior to lifting, the machine should be parked on a level surface, wheels blocked, steering and oscillation lock bars connected.
- The machine should be lifted using a spreader bar if possible. Lift using FOUR slings from the lifting points provided at the bumper end of the front chassis and at the rear of the body.

NOTICE: Be aware that this machine is free to oscillate if not lifted correctly. If in any doubt contact your dealer for further information.

Machine Tie Down Precautions



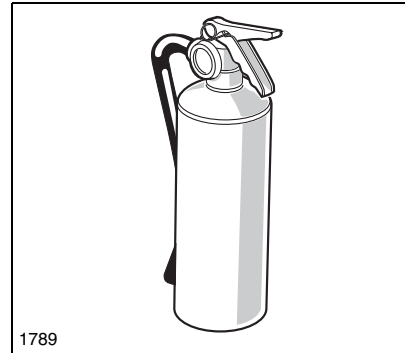
- The machine should be secured at the tie down points located at the bumper end of the front chassis, the front face of the trailer chassis and the tow pin at the rear of the trailer chassis.

Safety

Preventing Fire Hazards

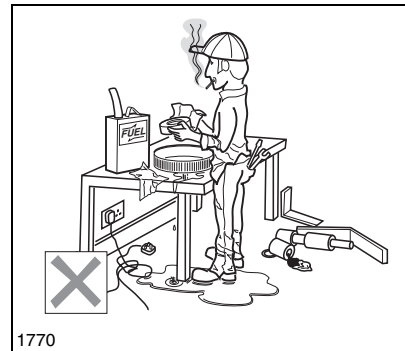
General Fire Precautions

- Make sure the machine has a fire extinguisher and that it is accessible and fully charged. (Not furnished with the machine).
- Never use an open flame as a light anywhere on, or around, the machine.
- Clean all dirt, oil, grease and other fluids from systems and components to minimize fire hazards and aid in spotting loose or leaking lines, fittings etc.
- Check the engine compartment for rubbish, oily rags or other debris that could cause fires before starting the engine.
- Don't let greasy, oily rags or similar hazards accumulate in the cab.
- If the machine has been operated with an under inflated tyre, make sure that the tyre has cooled sufficiently before parking and leaving the machine unattended.



Flammable Fluid Precautions

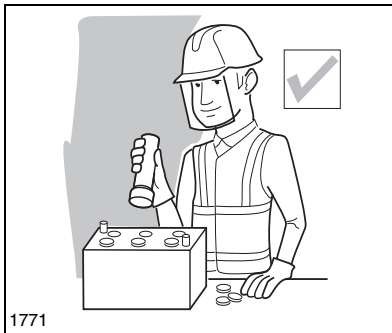
- Don't use diesel fuel or other flammable fluids for cleaning purposes. Use approved, nonflammable solvents.
- Make sure all fluid system caps, drain cocks, valves, fittings, lines, etc., are secure and leak free.
- Never use an open flame (match, lighter etc.) when checking fuel, lubricant, coolant and battery fluid levels, or when checking for fluid leaks. Use a flashlight or other safe lighting only.
- Shut off the engine and use extra caution if the engine is hot when refuelling. Ground the hose spout to prevent sparks when the spout touches the fuel tank filler tube.
- Never smoke while checking or adding fuel or other fluids or handling fluid containers and lines.
- Use care and do not stand downwind when adding fuel or other flammable fluids to tanks and reservoirs to avoid fluids being blown or splashed onto clothing.
- Close fuel tank shut-off valves, if used, before servicing the fuel system.
- When preparing machines or components for storage, seal and tape all openings and close containers tightly to seal in all volatile inhibitor fluids and compounds used.



- Follow manufacturer's recommendations when handling and using engine-starting fluids and disposing of spent containers. Do not puncture or burn empty containers. These fluids are explosive and highly flammable.

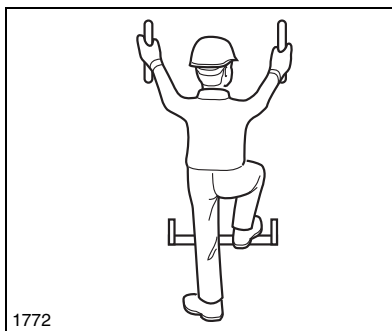
Electrical Hazard Precautions

- Never smoke or allow open flames or sparks near batteries.
- Leave the battery box open when charging batteries in the machine for adequate ventilation. Explosive gas (hydrogen) is produced.
- Always disconnect batteries before repairing the electrical system to avoid danger of fire-causing sparks. Disconnect the battery ground cable first and reconnect last.
- Always disconnect batteries & alternator leads before carrying out any welding on the machine.
- Never check the battery charge by placing metal objects across the battery posts; for the avoidance of sparks at the battery posts.
- Use jumper cables only as recommended. Improper use can result in battery explosion or unexpected machine motion.
- Never operate the engine starter for more than 30 seconds and allow two minutes between long cranking periods for cooling. An overheated starter could cause a fire.
- If electric coolant or lubricant heaters are used, be sure to follow the heater manufacturer's recommendations for use to avoid electrical and/or fire hazards.



Mounting and Dismounting

- Always face the access system and maintain at least three points of support to mount or dismount the machine (two hands and one foot, or two feet and one hand).
- Always face the access system and maintain at least three points of support to mount or dismount the machine.
- Ensure walkways, stairways, platforms, handrails and handholds are free of frost, ice, oil, water or anything else that could cause slip, trip or falls.
- Never mount or dismount a moving machine. Never jump off the machine.



Safety

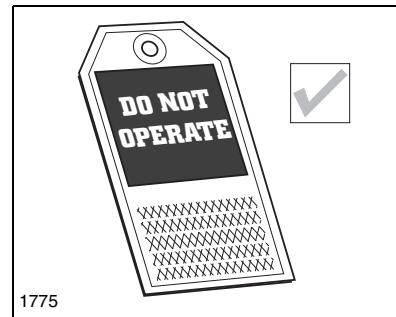
Pre-Starting

- If the engine is to be started and run indoors, ensure proper ventilation to remove deadly exhaust gases.
- Always perform 'Pre-Starting Inspection' instructions described in section 4 to ensure the machine is ready for operation.
- Always walk around the machine to make sure no-one is working on, underneath or close to the machine before starting the engine or operating the machine.
- Adjust, secure and latch the seat and fasten the seat belt before starting the machine.
- Sound the horn before starting the engine or beginning to move the machine; two blasts for forward and three blasts for reverse.



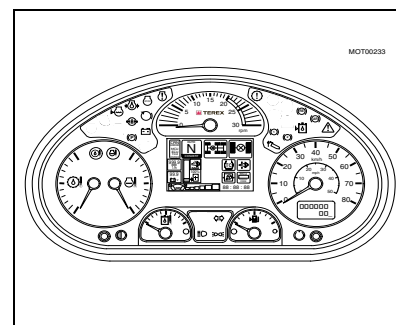
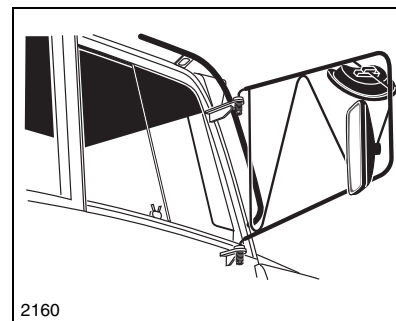
Starting

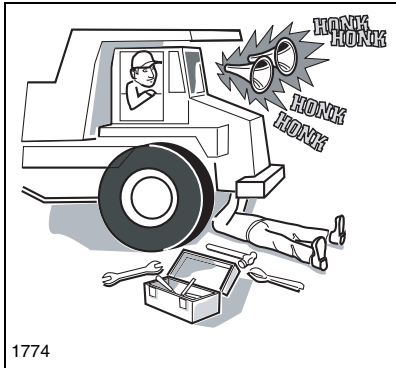
- Do not start the engine or operate any control if there is a 'DO NOT OPERATE' or similar warning sign attached to any control.
- Use jumper cables only as recommended. Improper use can result in battery explosion or unexpected machine motion.
- Always obey 'Starting the Engine' instructions described in section 4.
- Do not bypass the machine's neutral-start system. The neutral start system must be repaired if it malfunctions.
- Start and operate the machine only from the operator's seat.



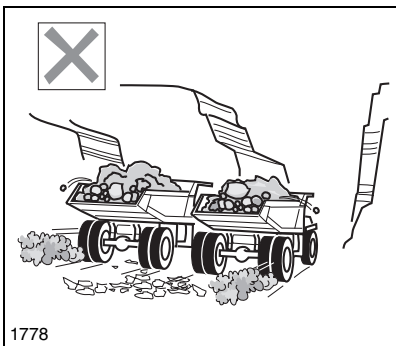
Operating

- Ensure all cab glass, mirrors and light lenses are clean during the machine operation for maximum visibility. Ensure mirrors are properly set / positioned.
- Always keep the cab floor clear of anything that could restrict full operation of the pedals.
- Always make sure all gauges, warning/indicator lights and controls are working properly before operating the machine.
- Always perform 'Pre-Operating Checks' described in section 4 to ensure the machine is ready for operating.
- Always wear seat belts when operating the machine
- Do not operate if any personnel enter the immediate work area.





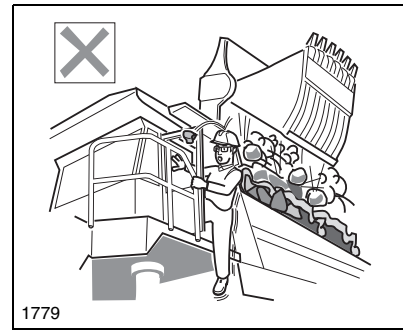
- Sound the horn before starting the engine or beginning to move the machine; two blasts for forward and three blasts for reverse.
- Watch for ground crew and other personnel on foot. Sound the horn as a warning before setting the machine in motion and when approaching ground crew.
- Be sure the body is fully down before moving the machine.
- Always try to face or look in the direction the machine is travelling.
- Use extreme caution and turn on lights at night or when fog, dust or similar hazards limit visibility. Do not overdrive your headlights.
- Observe instruments frequently. Report any defects or unusual noises in the machine during operation.
- Stay in gear when driving downhill. Do not coast with transmission in neutral. Select the proper gear and maintain safe speed with the service brakes or/and retarder. Always maintain safe speeds for haul road operating conditions for maximum control. Reduce speed before turning.



- In the event of a loss of electric power to the gear shift control, the transmission will automatically lock in Neutral. If this occurs, stop the machine using the service brakes, apply the Parking / Emergency brake. Do not operate the machine until the fault is corrected.
- Always operate straight up or down slopes whenever possible, side-hill operation can cause sideslip and possible roll-over.
- Slow down when moving in congested areas. Do not race with other machines. Stop in authorized areas only, except in emergency.
- Brake firmly in one application. Do not FAN the pedal. Never operate the machine if a warning light or parkbrake service alarm is on. It indicates a fault in the braking system.
- Always give loaded machines the right-of-way when your machine is empty.

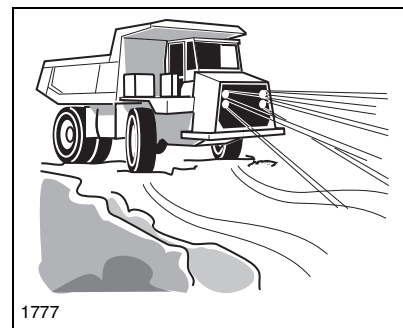
Safety

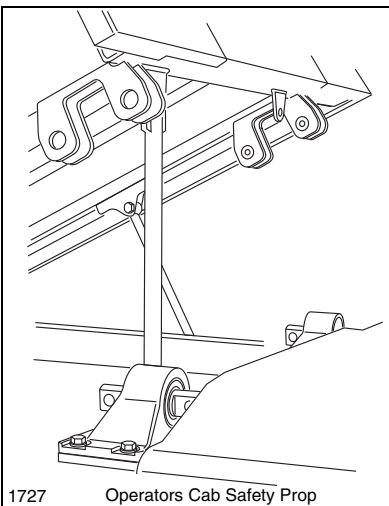
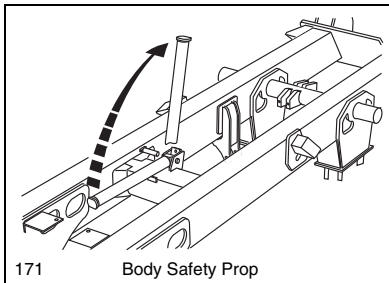
- Always watch for holes, soft edges or other hazards when backing to dump over a spoil bank.
- Always apply the brakes with the Parking-Emergency brake control when the machine is being loaded or when dumping a load.
- This machine is installed with a safety feature which prevents 'uncontrolled movement' when the machine is in neutral gear
- Park / Emergency brake is applied automatically when transmission is shifted to neutral and outspeed is less than 60RPM~1MPH
- The automatic application of the park brake is released when a forward or reverse transmission gear is requested by the operator. However, the park brake switch overrides the release of the automatic park brake control only when the machine is in gear.
- Always stay in the cab when the machine is being loaded.
- Always lower the body and shut down the machine according to the procedure under 'Stopping The Engine' described in section 4 before leaving the machine unattended. If on a grade wheels should be blocked.



Roading

- Match speed to road conditions.
- Yield the right of way when required. Obey the rules of the road.
- Stay as close to the side of the road as possible. Pass other equipment only when the road is clear, there is sufficient space to pass, and reserve power is available.
- Stop at appropriate intervals to inspect the machine and allow the tyres to cool. Tyre air pressure will rise during operation. Do not reduce tyre pressure. Excess speed will cause tyres to heat up. Reduce your travel speed, not tyre pressure.
- Use accessory lights and devices at night or in poor visibility. Carry a flare kit. Do not overdrive your headlights.





Lubrication and Servicing

- Do not allow unauthorized personnel to service or maintain this machine. Study this operations manual and the maintenance manual before starting, operating or servicing this machine. Always follow procedures and safety precautions detailed throughout the maintenance manual.
- Always attach a 'DO NOT OPERATE' or similar warning sign to the ignition switch or a prominent control before cleaning, lubricating or servicing the machine.
- Never allow anyone to work on the machine while it is moving. Make sure there is no one on the machine before working on it.
- Do not work under or near an unblocked or unsupported body. Always use the body safety prop. The body safety prop must only be used when the body is empty.
- Do not work under or near any unblocked or unsupported linkage, part or machine.
- Always install the steering lock bar before making adjustments or servicing the machine with the engine running. Refer to 'General' safety section.
- Always shut down the machine according to the procedure under 'Stopping The Engine', described in section 4 and turn off the master switch before cleaning, lubricating or servicing the machine except as called for in this Operator's Handbook or the maintenance manual.
- Always relieve pressure before servicing any pressurised system. Follow the procedures and safety precautions detailed in the relevant maintenance manual section.
- When changing oil in the engine, transmission and hydraulic systems, or removing hydraulic lines, remember that the oil may be hot and can cause burns to unprotected skin.
- When working on or around exhaust components, remember that the components may be hot and can cause burns to unprotected skin.
- Always deflate the tyre before attempting to remove any embedded objects or removing the tyre and rim assembly from the machine.

Safety

- Always use a self-attaching chuck with a long airline, and, stand to one side while the tyre is inflating. Refer to Section 160-0050, WHEEL RIM AND TYRE in the maintenance manual.
- Do not work under or near an unblocked or unsupported raised operator's cab. Always use the operator's cab safety prop with the locking pin.

Scrapping the Machine

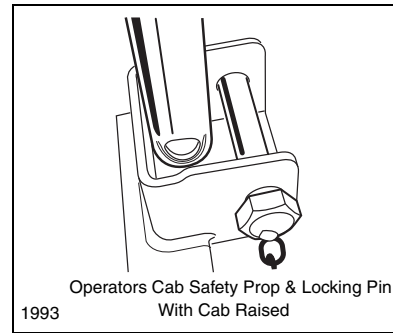
At the end of its life, the machine should be disassembled by a competent person using safe working practices, wearing the appropriate Personal Protective equipment and working in accordance with local regulations.

The appropriate lifting equipment, chocks and stands must be used to maintain a stable machine as components are removed and the machine's centre of mass changes. Fluids must be drained off into suitable containers and if possible recycled otherwise disposed of in an environmentally friendly manner in accordance with local regulations.

Care must be taken when dealing with flammable liquids and the machine parts that contained those liquids. Any process that could ignite flammable materials must not be used on components that have contained flammable liquids in them or have residual flammable liquids on them.

Fire extinguishers must be readily available if cutting/welding equipment is to be used.

When possible recyclable materials should be separated out and processed in accordance with local regulations using an authorised agent.



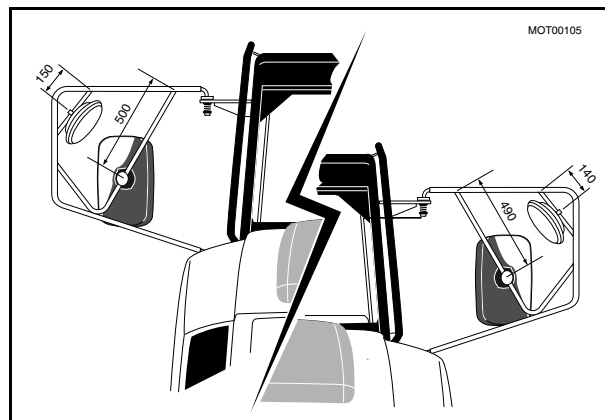
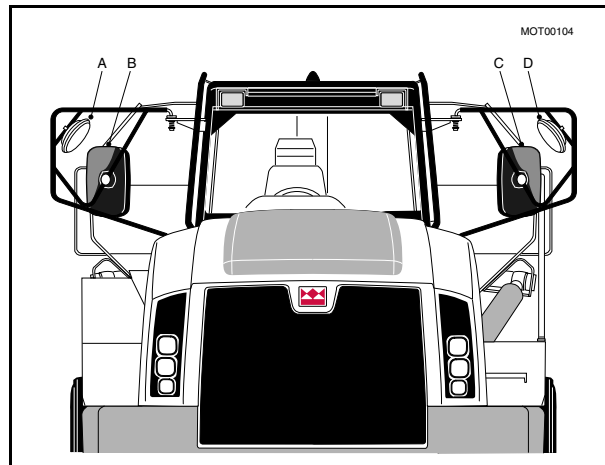
Mirrors and CCTV



CAUTION

The operator must survey their surroundings before entering the machine, and check their field of vision prior to and during operation of the machine. All mirrors must be adjusted when installed, and prior to operating the machine, to achieve optimum visibility and thus minimize the risk of injury to themselves and others. Site management should utilize appropriate jobsite organization to minimize hazards due to restricted visibility. Modifications made to the machine may restrict the visibility and compromise compliance with safety standards (ISO 5006:2006).

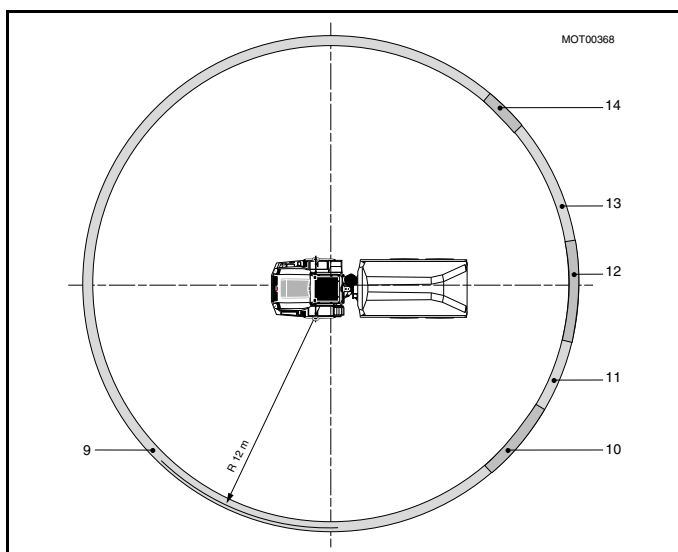
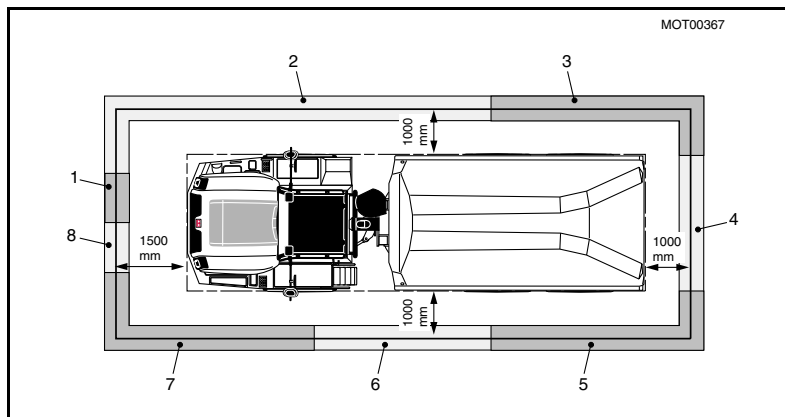
Make sure that all mirrors are installed and adjusted to optimize operator visibility. The mirrors, illustrated below, are all capable of adjustment. Make sure that the brackets which support these mirrors are folded out from the cab to form an angle of 90 degrees. These brackets may be folded parallel to the cab for transportation of the machine. Set the mirrors in the defined position shown in the illustration.



Safety

When all the mirrors have been fitted, the machine has a total of four mirrors, designated A to D respectively, and positioned generally as illustrated. The area surrounding the machine is to be considered as two distinct fields of view, illustrated below as areas 1 to 9 in the immediate vicinity, and areas 10 to 15 at a radius of 12 m from the operator when seated. The operator **MUST** adjust the mirrors, and set the CCTV camera, to achieve visibility as identified below:

- Areas 2, 8 and 10 can be directly viewed from the operator's seating position without the need for mirrors.
- Adjust mirror A to facilitate the view of Areas 1, 2, 3, 14 and 15.
- Adjust mirror B such that Areas 4 and 14 are fully visible.
- Adjust mirror C such that Areas 6 and 12 are fully visible.
- Adjust mirror D to facilitate the view of Areas 7, 8, 9, 11 and 12.
- Set the CCTV to facilitate vision of Areas 5 and 13.



Wheels and Tyres

If tyres on the machine were inflated at the factory with dry nitrogen gas, the tyre walls will be marked 'N' and the following factory installed decal will be found mounted on the fenders.

NOTICE: Tyres on this machine are factory inflated with dry nitrogen. It is recommended that dry nitrogen be used exclusively for all tyre pressure adjustments as well as inflation of replacement tyres.

Nitrogen gas improves tyre pressure retention, increases tyre life by reducing carcass oxidation from within, minimizes rim rust, and has no known detrimental effect on the tyre. It also reduces the potential of a tyre explosion because it is an inert gas and will not support combustion inside the tyre. The same tyre inflation pressure used for air inflation should be used for nitrogen inflation. Refer to Section 160-0050, Wheel, Rim and Tyre of the machine maintenance manual for recommended procedures for inflating and pressure adjusting tyres with dry nitrogen gas. Only proper nitrogen charging equipment operated by personnel trained in its use should be used.



CAUTION

Never mix components of one manufacturer's rims with those of another. Using the rim base of one manufacturer with the lock ring of another or vice versa is dangerous. The lock ring of one may not fully engage with the lock ring groove of the other. Always consult the rim manufacturers for proper matching, assembly and safety instructions. Also, use and servicing of damaged, worn out or improperly assembled rim assemblies is a very dangerous practice. Failure to comply with the above warnings could result in an explosion from tyre pressure causing serious property damage and serious personnel injury or death.

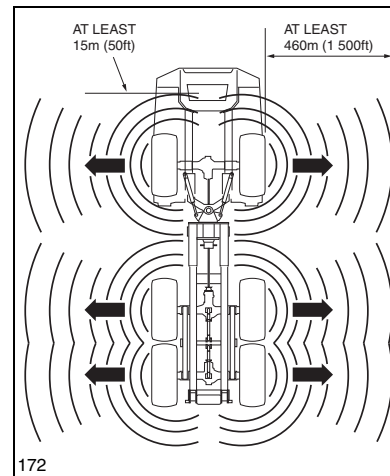
Safety

Avoid Tyre Explosion Hazard

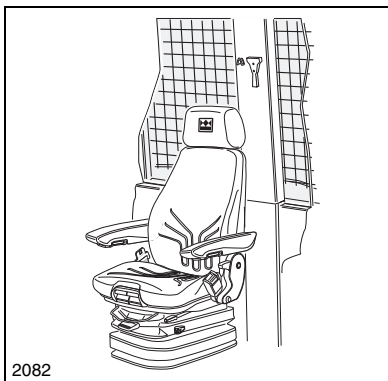


CAUTION

Whenever a machine's tyre(s) is (are) exposed to excessive heat such as a machine fire or extremely hot brakes, the hazard of a subsequent violent tyre explosion must be recognized. All nearby persons must avoid approaching the machine so as not to be physically endangered in the event of an explosion of the tyre and rim parts. The machine should be moved to a remote area, but only when this can be done with complete safety of the operator operating or towing the machine. All other persons should stay clear of the machine. The fire or overheated brakes, wheel etc., should be extinguished or cooled from a safe distance. Do not attempt to extinguish the fire or cool the machine by use of hand-held fire extinguishers. If it is absolutely necessary to approach a machine with a suspect tyre, approach only from the front or the back. Stay at least 15 m (50 ft) from the tread area. Keep observers out of the area and at least 460 m (1500 ft) from the tyre sidewall. Refer to the accompanying sketch. The tyre(s) should be allowed at least eight (8) hours cooling time after the machine is shut down or the fire extinguished before approaching closer.



Emergency Exit from Cab



Normal access to, and egress from, the cab is facilitated via the door on the left-hand side. However, in an emergency, an alternative exit can be gained via the side windows. A hammer is provided to break the left-hand or right-hand side window glass to facilitate safe egress.

The hammer is mounted on a bracket on the rear wall of the cab, and can be easily lifted off in an emergency.



CAUTION

Do not attempt to break the windscreen with the Emergency hammer. It is ONLY provided to allow access through the left-hand and right-hand windows.

Exercise extreme care when breaking the window glass to protect your face and body from airborne glass particles.

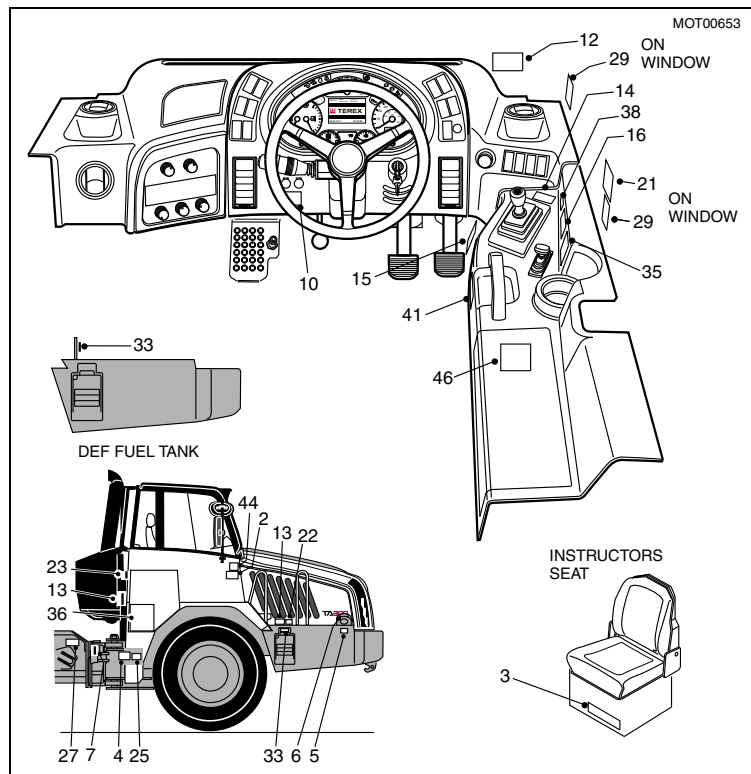
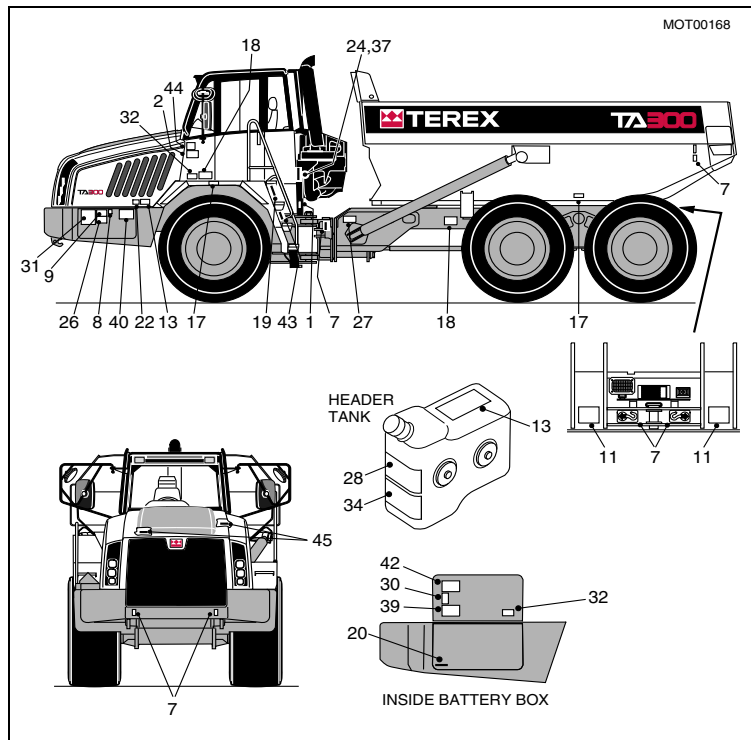
Be careful when passing through the window aperture to avoid contact with shards of glass that may remain attached to the frame, or loose within or outside of the cab.

Safety

Decals and Instruction Plates

Decals and instruction plates fitted to machines may vary from country to country to suit local needs. These pages contain a brief description and the location of the decals and instruction plates that may appear on your machine.

- 1 . Decal - Grease
- 2 . Fall Hazard Decal
- 3 . Plate - ROPS / FOPS - ANSI
- 4 . Plate - Serial English
- 5 . Decal - Fuel ULS ISO
- 6 . Decal - Fuel ULS
- 7 . Decal - Hook Point
- 8 . Decal - Battery Earth
- 9 . Decal - Caution Jump Start
- 10 . Decal - Steering Column
- 11 . Decal - Warning Reverse
- 12 . Decal - Warning Decline TA250/300
- 13 . Decal - Warning Hot
- 14 . Decal - Park Brake Operation
- 15 . Decal - Warning Park Brake
- 16 . Decal - Hydraulic Control
- 17 . Decal - Nitrogen Filled Tyres
- 18 . Decal - Warning Crush Hazard
- 19 . Decal - Diagnostic Points
- 20 . Decal - Notice Cab Jack
- 21 . Decal - Sound Power 109 db
- 22 . Decal - Warning Hood Raise
- 23 . Decal - Hydraulic Oil
- 24 . Decal - Transmission Filters
- 25 . Decal - CE, Machine Safety
- 26 . Decal - Caution Welding
- 27 . Decal - Warning Articulation
- 28 . Decal - Caution Radiator
- 29 . Decal - Emergency Exit
- 30 . Decal - Notice Accumulator
- 31 . Decal - Lift instruction
- 32 . Decal - Caution Cab Tilt
- 33 . Decal - Notice Diesel Exhaust Fluid
- 34 . Decal - Caution Anti-Freeze
- 35 . Decal - Caution Power Down
- 36 . Decal - Service Panel ANSI
- 37 . Decal - Skin Injection Hazard
- 38 . Decal - Warning Handbook
- 39 . Decal - Warning Accumulator
- 40 . Decal - Danger Battery
- 41 . Decal - Danger Power Lines

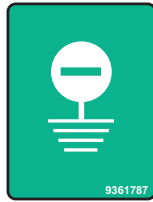


- 42 . Decal - Warning Accumulator
- 43 . Decal - Warning Fall Hazard
- 44 . Restraint Harness Anchor Location
- 45 . Lanyard Anchor Position
- 46 . Decal - Welding Flasher Unit Disconnect

Decals and Instruction Plates
Pictorial Decal Set



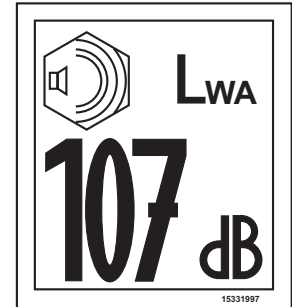
Hook Point (1797)



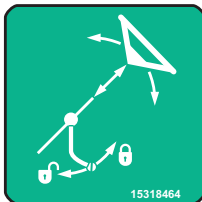
Battery Earth (1798)



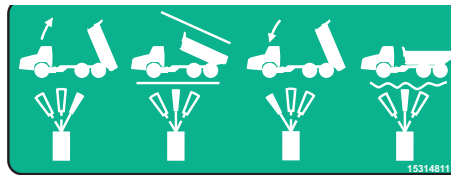
CE Marking (1799)



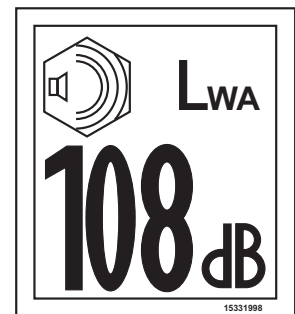
Sound Power (1776)



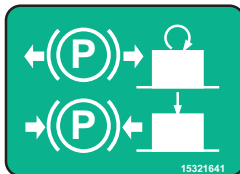
Steering Column Adjustment (1801)



Body Control (1800)



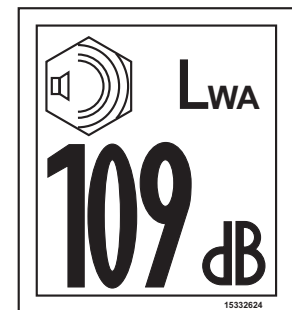
Sound Power (1777)



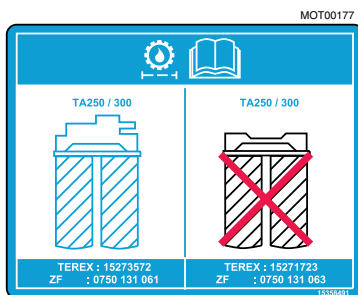
Park Brake (1805)



Emergency Exit (1804)



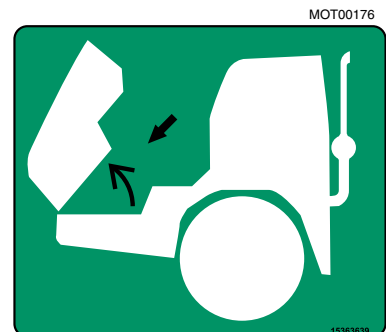
Sound Power (1809)



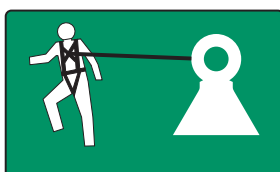
Transmission Filter



Hood Raise Lower (1806)



Lanyard Anchor Location



Safety Harness (2222)

Safety

Pictorial Decal Set

Serial Plate


TEREX

TEREX EQUIPMENT LIMITED
NEWHOUSE INDUSTRIAL ESTATE
MOTHERWELL, SCOTLAND. ML1 5RY.

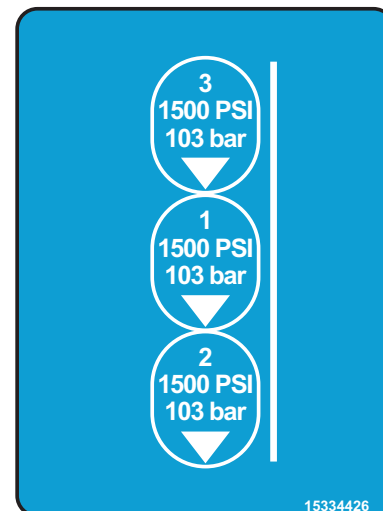
MODEL NO.
PRODUCT IDENTIFICATION NO.
MAX. RATED PAYLOAD / lb /kg
MASS UNLADEN / lb /kg
STRUCK CAPACITY / yd³ /m³
ENGINE POWER / hp /kW
YEAR OF MANUFACTURE
MODEL YEAR

15316595

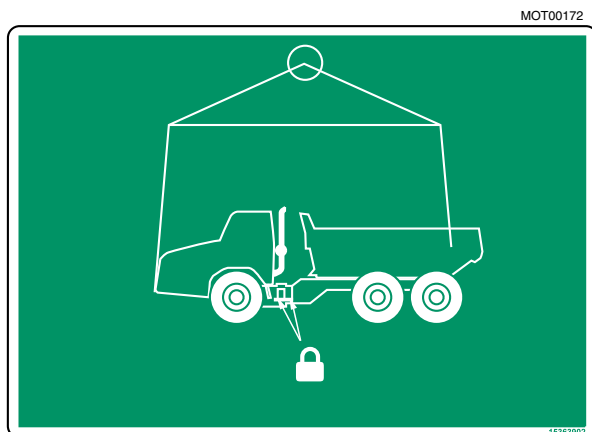
Serial Plate (1808)

		 		
MIN.	MAX.	S.A.E.	A.P.I.	MIL
-54°C (-65°F)	→ 54°C (130°F)	---	---	MIL-H-5606A
-29°C (-20°F)	→ 74°C (165°F)	DEXRON®	⊕ AUTO	
-18°C (-0°F)	→ 82°C (180°F)	10W	CC/CD	MIL-L-210B / C
0°C (32°F)	→ 99°C (210°F)	20W-20	CC/CD	MIL-L-210B / C
7°C (45°F)	→ 99°C (210°F)	30W	CC/CD	MIL-L-210B / C

Hydraulic Oil (1980)



TA250/300 Accumulator Nitrogen Precharge (1979)



Lift Instruction

Safety Decals Set ISO Standard

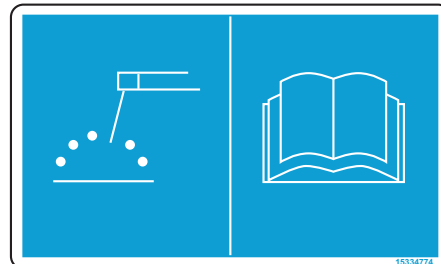
								
	%		KPH	MPH	%		KPH	MPH
	0	6	50	31	0	6	50	31
	5	5	27	17	5	6	48	30
	10	4	15	9	10	5	28	17
	15	3	9	6	15	5	22	14
	20	2	8	5	20	4	16	10
	25	2	6	4	25	3	12	7
	30	1	5	3	30	3	11	7
	15134648							

Safety

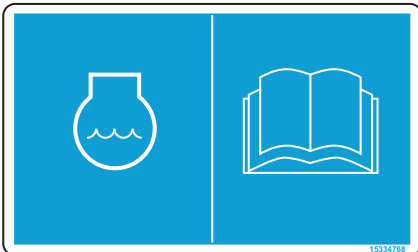
Safety Decals Set ISO Standard



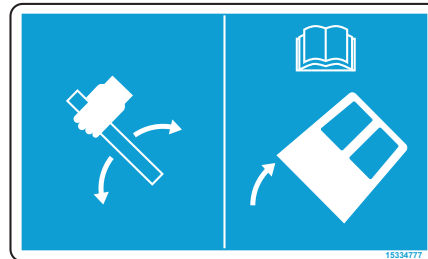
Burn Hazard, allow to cool before opening (1881)



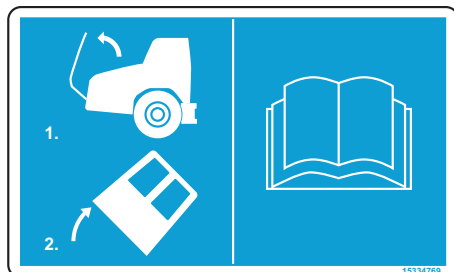
Welding Notice. See handbook for welding procedures (1888)



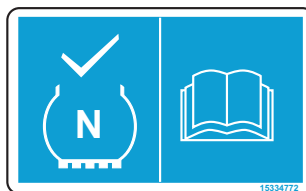
Anti-freeze Notice. See handbook for correct concentration (1882)



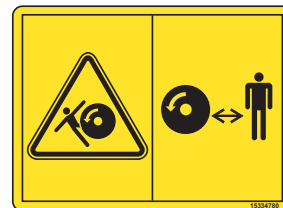
Cab Jack Notice (1889)



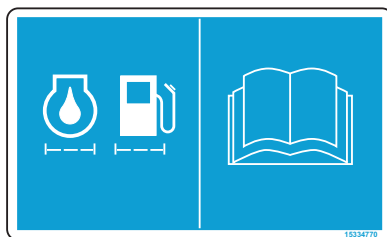
Cab Tilt Notice. Raise hood before tilting cab (1883)



Nitrogen Filled Tyres. Use nitrogen only to fill (1886)



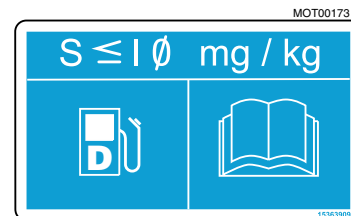
Reverse Warning. Keep clear of truck when it is reversing (1890)



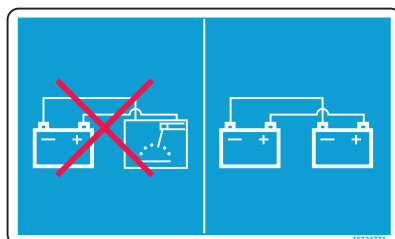
Filters Notice. See handbook for replacement intervals (1884)



Fall Hazard Warning. Use access system provided (1894)



Fuel Type Notice



Jump Start Notice. Jump start using identical battery pack (1885)



Fall Hazard Warning. Use Safety Harness provided (2219)

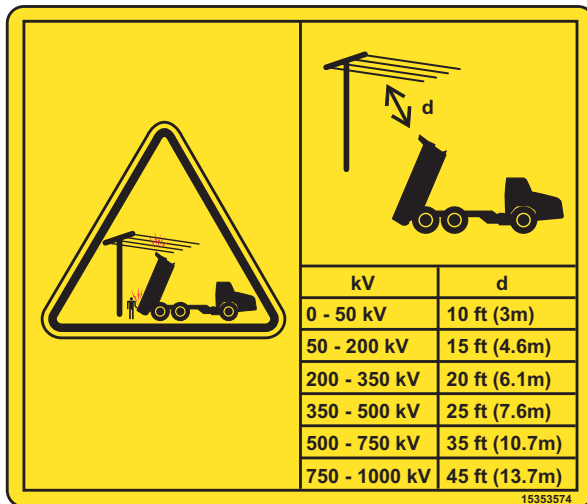
Safety Decals Set ISO Standard



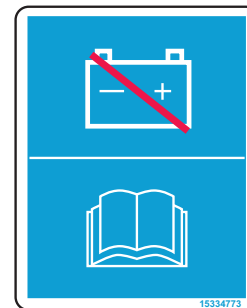
Pressurised Accumulator Warning. Do not weld, keep away from flames. Relieve all pressure before servicing (1893)



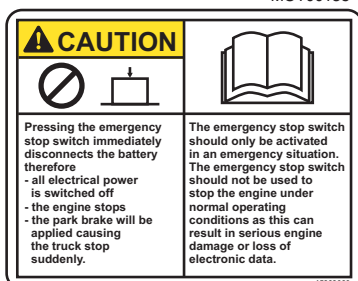
Batteries Warning. Explosive, keep all flames and sparks away (1891)



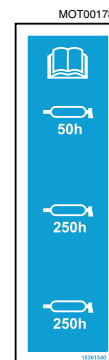
Power Lines Warning. Maintain required clearance (2171)



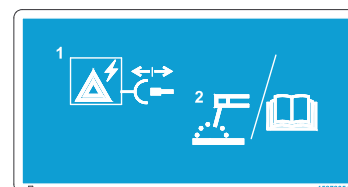
Power Down Notice. Power down truck when not in use (1887)



Emergency Stop Switch Warning, should use only in emergency situation



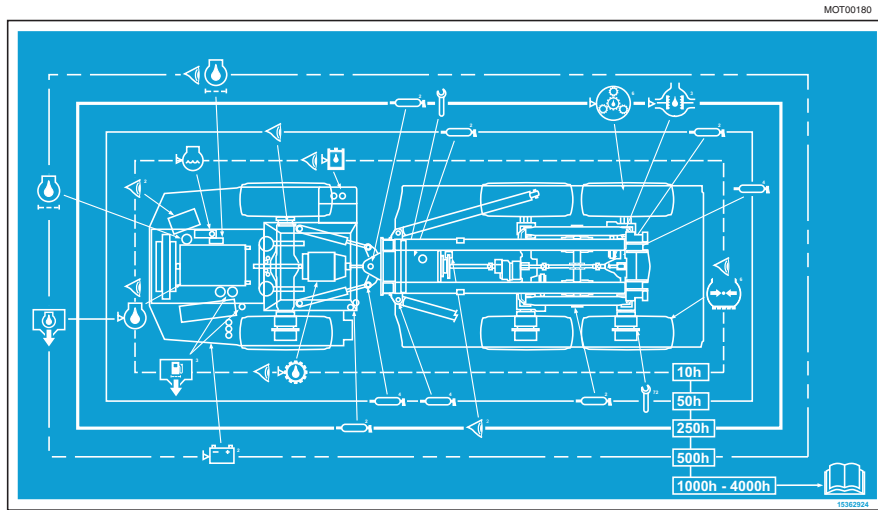
Grease Points



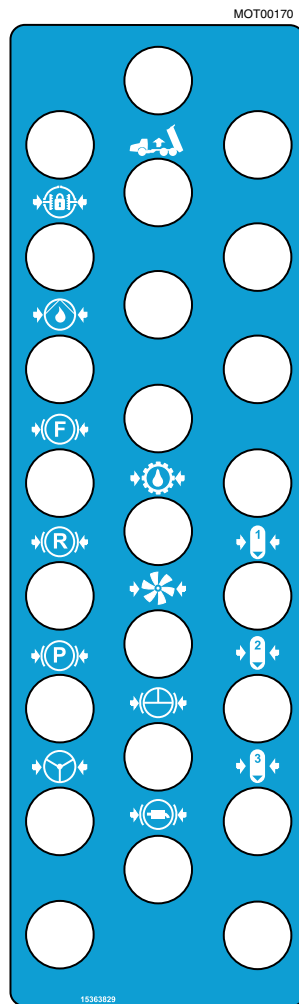
Welding - Flasher Unit Disconnect (MOT00648)

Safety

Safety Decals Set ISO Standard



TA250/300 Service Lubrication Chart. See Operator Handbook section 8 for details



TA250/300 Diagnostic Point

Safety Decals Set ANSI Standard

NOTICE OF ROPS & FOPS CERTIFICATION					
This structure meets the following requirements for the machine and weights listed:					
ROPS		FOPS		MAX. WEIGHT	
SAE	ISO	SAE	ISO	lb	kg
J1040	3471/1	J1043	3449	33069	15000
MANUFACTURED FOR/BY				TEREX EQUIPMENT LTD. - SCOTLAND	
MODEL				STRUCTURE PART No.	
TA25/27				15502380	
TA30					
TA35/40					
TA350/400					
				B C	

CAUTION

Damage to ROPS may weaken structure and may cause injury.

CAUTION

If damaged, ROPS must be replaced. Do not repair. Unauthorised modification will void certification. Tighten fasteners periodically.

15332782

ROPS and FOPS Certification (1812)

WARNING

Crush Hazard
Death or serious injury may result.

Install support before servicing.

15333265

Crush Hazard (1812)

MOT00179

TA250/300		TA250/300		TA250/300		TA250/300	
%	KPH	MPH	%	KPH	MPH	%	KPH
0	6	50	31	0	6	50	31
5	5	27	17	5	6	48	30
10	4	15	9	10	5	28	17
15	3	9	6	15	5	22	14
20	2	8	5	20	4	16	10
25	2	6	4	25	3	12	7
30	1	5	3	30	3	11	7

15332782

TA250/300 Gradeability Chart

WARNING

Burn Hazard.
Contact with hot surfaces can result in burns.

Do not touch.
Allow surfaces to cool before servicing.

15333277

Hot Surface Warning (1822)

WARNING

Burn Hazard.
Hot fluid under pressure can scald.

Allow to cool before opening.

15333278

Hot Radiator Steam Warning (1823)

WARNING

Fall Hazard
Falling can result in death or serious injury.

Do not work on this machine without safety harness and lanyard.

15356708

Fall Hazard Warning (2220)

WARNING

Injection Hazard.
Escaping fluid under pressure can penetrate skin, resulting in serious injury.

Relieve pressure before disconnecting hydraulic lines. Keep away from leaks and pin holes. Use a piece of cardboard or paper to search for leaks. Do not use hand.

Fluid injected into skin must be surgically removed within a few hours by a doctor familiar with this type of injury or gangrene will result.

15333273

Skin Injection Warning (1818)

WARNING

Crush Hazard.
Sudden and unwanted machine movement can result in serious injury or death.

1. → (P) ←
2. (N)

Always ensure when starting / stopping engine to:
1. Apply park brake.
2. Shift transmission into neutral.

15333274

Park Brake Warning (1817)

NOTICE

EQUIPMENT DAMAGE HAZARD
WELDING ON THIS TRUCK CAN CAUSE DAMAGE TO THE SOLID STATE FLASHER UNIT.

DISCONNECT FLASHER UNIT BEFORE WELDING.

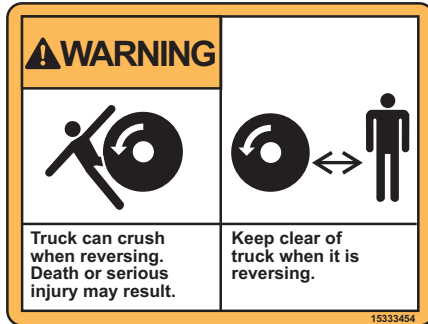
READ MANUALS.

153373053

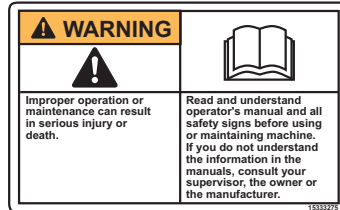
Welding - Flasher Unit Disconnect (MOT00649)

Safety

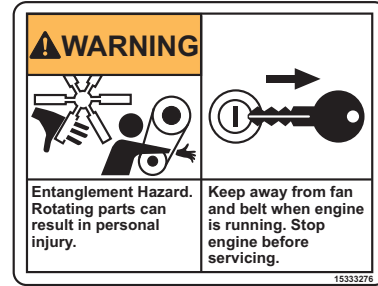
Safety Decals Set ANSI Standard



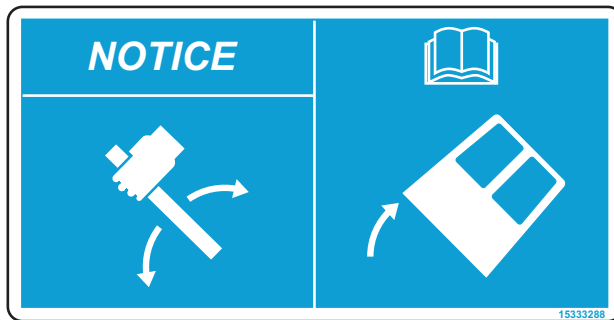
Reverse Warning (1835)



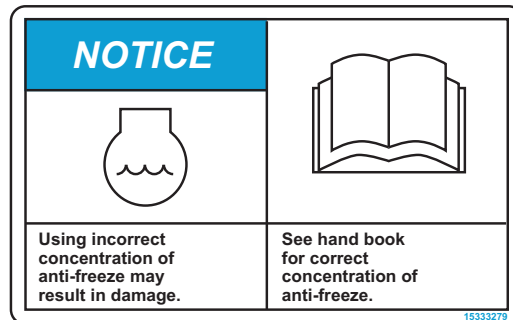
Read Operations Manual Warning (1820)



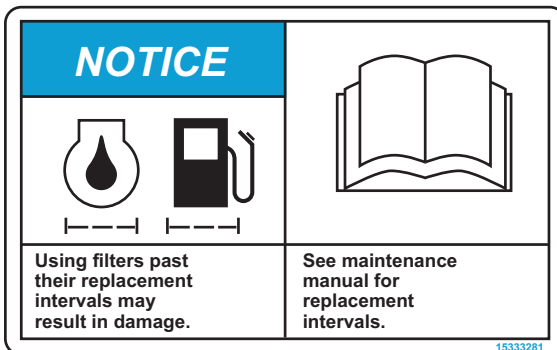
Moving Parts Warning (1821)



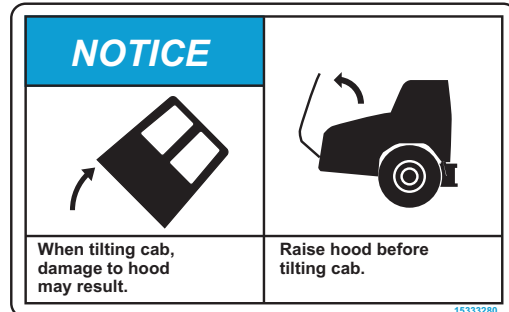
Cab Jack Notice (1833)



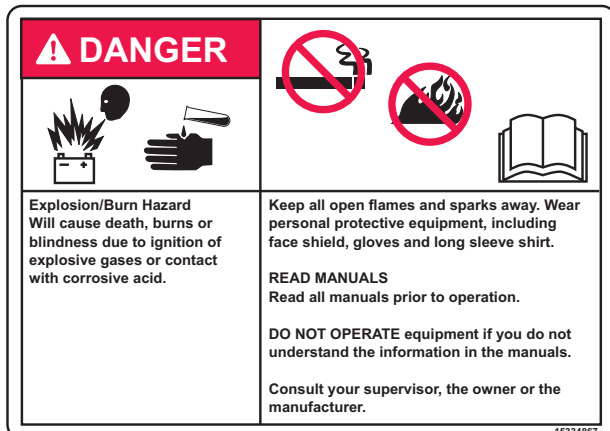
Antifreeze Notice (1824)



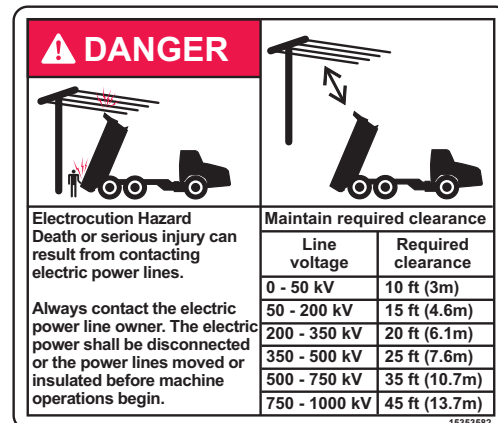
Filters Notice (1826)



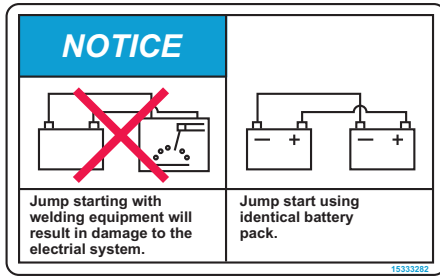
Cab Tilt Notice (1825)



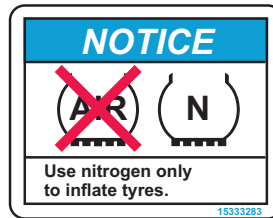
Danger Batteries (1983)



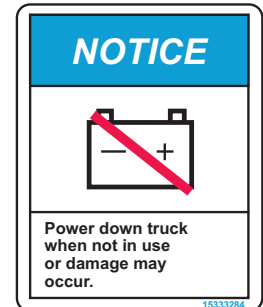
Danger Power Lines (2172)

Safety Decals Set ANSI Standard

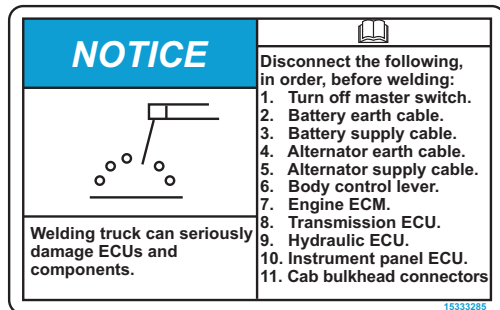
Jump Start Notice (1827)



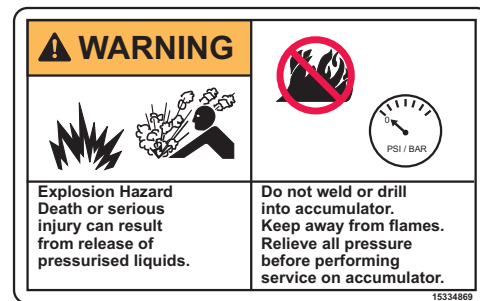
Nitrogen Filled Tyres Notice (1828)



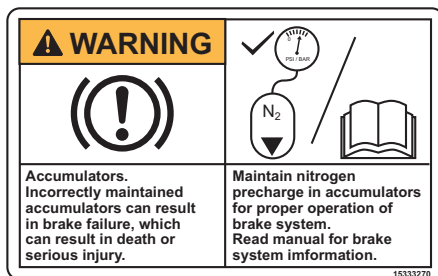
Power Down Notice (1829)



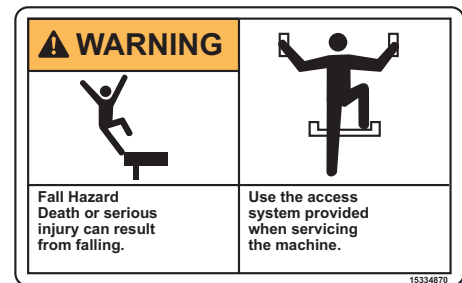
Welding Notice (1830)



Accumulator Warning (1885)



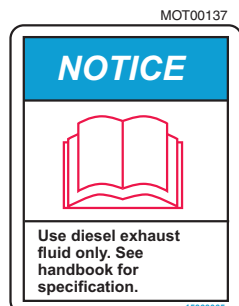
Accumulator Warning (1922)



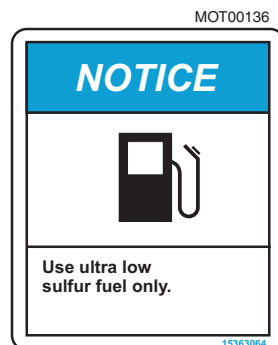
Fall Hazard Warning (1986)



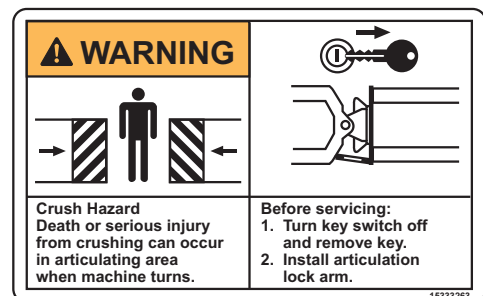
Use Ultra Low Sulfur Fuel Only



Use Diesel Exhaust Fluid Only



Use Ultra Low Sulfur Fuel Only

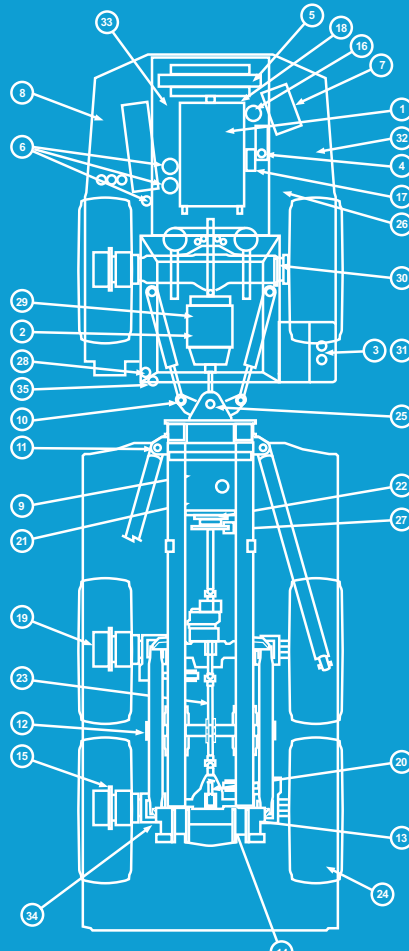


Crush From Articulation Warning (1795)

Safety

MOT00135

LUBRICATION AND SERVICE CHART						
INTERVAL HOURS	REF PTS	IDENTIFICATION	SERVICE INSTRUCTIONS	NO PTS	LUBRICANT OR COOLER	SERVICE QUANTITIES
10 DAILY	1	ENGINE	CHECK OIL LEVEL. ADD OIL IF LOW	1	EO	AS REQUIRED
	1	ENGINE	CHECK FOR LEAKS	1	-	-
	2	TRANSMISSION	CHECK OIL LEVEL. ADD OIL IF LOW	1	EO	AS REQUIRED
	3	HYDRAULIC TANK	CHECK OIL LEVEL. ADD IF LOW	1	HO	AS REQUIRED
	3	HYD. FILTER RESTRICTION GAUGE	CHECK. RENEW ELEMENT IF REQ'D	1	-	-
50 WEEKLY	4	RADIATOR EXPANSION TANK	CHECK COOLANT LEVEL. ADD IF LOW	1	ETHYLENE GLYCOL	SEC 160-0050
	7	ENGINE AIR CLEANER	CHECK. RENEW ELEMENT IF REQ'D	1	-	-
	24	TYRES	CHECK CONDITION & PRESSURE	6	-	-
250 MONTHLY	9	OSCILLATION BUSHES	LUBE	2	EP, NLGI	SEE NOTE 3
	12	SUSPENSION BEAM BUSHINGS	LUBE	2	EP, NLGI	SEE NOTE 3
	10	STEERING CYLINDER PINS	LUBE	4	EP, NLGI	SEE NOTE 3
	11	BODY CYLINDER PINS	LUBE	4	EP, NLGI	SEE NOTE 3
	13	BODY HINGE / TAILGATE PINS	LUBE	2	EP, NLGI	SEE NOTE 3
	15	WHEEL RIM NUTS	CHECK TORQUE	72	-	600 Nm / 442 lbf ft
	30	CAB FRESH AIR FILTER	INSPECT & CLEAN IF REQUIRED	1	-	-
	14	PANHARD ROD BEARINGS	LUBE	4	EP, NLGI	SEE NOTE 3
	19	WHEEL PLANETARIES	CHECK OIL LEVEL. ADD IF LOW	6	EPL	AS REQUIRED
	20	DIFFERENTIALS	CHECK OIL LEVEL. ADD IF LOW	3	EPL	AS REQUIRED
500 3 MONTH	21	OSCILLATION PIVOT	CHECK END FLOAT. ADJUST IF REQ'D	1	-	-
	25	ARTICULATION BEARINGS	LUBE	2	EP, NLGI	SEE NOTE 3
	27	PARKING BRAKE PADS	CHECK WEAR. RENEW IF REQ'D	2	-	-
	35	FRONT AXLE (IFS)	LUBE	2	EP, NLGI	SEE NOTE 3
	1	ENGINE	DRAIN OIL & REFILL WITH NEW OIL	1	EO	-
1000 6 MONTH	16	ENGINE OIL FILTER	RENEW	1	-	-
	17	CENTRIFUGAL OIL FILTER	CLEAN	1	-	-
	8	BATTERY ELECTROLYTE	CHECK LEVEL. ADD ELECTRO IF LOW	2	-	AS REQUIRED
	2	TRANSMISSION	DRAIN OIL & REFILL WITH NEW OIL	1	EO	-
	2	TRANSMISSION	RUN AEB STARTER	1	-	-
	3	HYDRAULIC TANK BREATHERS	RENEW	3	-	REF. SERVICE MANUAL
	6	FUEL FILTER / WATER SEPARATOR	RENEW	1	-	-
	2	TRANSMISSION BREATHERS	CLEAN IF REQUIRED	1	-	-
	28	TRANSMISSION OIL FILTERS	RENEW	2	-	-
	29	TRANSMISSION INTERNAL STRAINER	CLEAN	1	-	-
2000 ANNUALLY	22	DRIVESHAFT BEARINGS	CHECK OIL LEVEL. ADD IF LOW	1	EPL	SEE NOTE 4
	30	CAB FRESH AIR FILTER	RENEW	1	-	-
	32	FUEL TANK	RENEW CAP FILTER / CARTRIDGE	4	-	-
	6	BATTERIES	CLEAN. CHECK STATE OF CHARGE	2	-	-
	18	DRIVE BELT	CHECK FOR DAMAGE	1	-	-
	26	ADBLUE TANK	RENEW REDUCTANT FILTER	1	-	-
	3	HYDRAULIC TANK	DRAIN OIL & REFILL WITH NEW OIL	1	HO	-
	19	BRAKE PACKS	CHECK BRAKE WEAR	6	-	REF. SERVICE MANUAL
	10	WHEEL PLANETARIES	DRAIN OIL & REFILL WITH NEW OIL	6	EPL	-
	20	DIFFERENTIALS	DRAIN OIL & REFILL WITH NEW OIL	6	EPL	SEE NOTE 2
4000	25	ARTICULATION PIVOT NUT	CHECK TORQUE	1	-	1425 Nm / 1050 lbf ft
	31	HYDRAULIC OIL FILTER	RENEW	1	-	-
	4	RADIATOR EXPANSION TANK	CHECK COOLANT ANTIFREEZE	1	-	-
	23	DRIVELINES	CHECK FOR DAMAGE	5	-	-
	1	ENGINE MOUNTING BOLTS	CHECK TORQUE	4	-	200 Nm / 148 lbf ft
	2	TRANSMISSION MOUNTING BOLTS	CHECK TORQUE	3	-	920 Nm / 679 lbf ft
	7	ENGINE AIR CLEANER	CLEAN/RENEW FILTER ELEMENT	1	-	-
	1	ENGINE	CHECK AND ADJUST VALVE CLEARANCE	20	-	-
	34	AXLE MOUNTING BOLTS	CHECK TORQUE	24	-	671 Nm / 495 lbf ft
	33	AIR CON. COMPRESSOR	DRAIN, FLUSH & REFILL WITH NEW REFRIGERANT OIL	1	PAG OIL	-
6000	5	COOLING SYSTEM	DRAIN, FLUSH & REFILL WITH NEW COOLANT	-	-	-



NOTES ON LUBRICATION AND SERVICE CHART

- NOTE 1 - CAPACITIES GIVEN ARE APPROXIMATE - WORK TO DIPSTICK, SIGHT GAUGES OR LEVEL PLUGS.
 NOTE 2 - CAPACITY OF FRONT AND REAR DIFFERENTIALS 21 LTR (5.5 US GAL)
 CAPACITY OF CENTRE DIFFERENTIAL IS 23 LTR (6 US GAL)
 NOTE 3 - LUBRICATE SLOWLY UNTIL EXCESS LUBE IS SEEN.
 NOTE 4 - REMOVE PLUG FROM PORT ON UNDERSIDE OF OSCILLATION HUB. PLUG IS REMOVED TO DRAIN THE CAVITY OF ANY OIL THAT ENTERS THE CAVITY WHEN FILLING. REMOVE THE COVER PLATE AND LEVEL PLUG ON SIDE OF OSCILLATION HUB. ADD OIL IF REQUIRED. REFILL ALL PLUGS.

- EO - ENGINE OIL. REFER TO "RECOMMENDED LUBRICANTS".
 HO - HYDRAULIC OIL. REFER TO "RECOMMENDED LUBRICANTS".
 EPL - EXTREME PRESSURE LITHIUM No. 2 GREASE (WITHOUT "MOLY").
 EPNLGI - EXTREME PRESSURE LITHIUM No. 2 GREASE (WITHOUT "MOLY").
 PAG OIL - POLYALKYLENE GLYCOL (PAG) COMPRESSOR LUBRICATING OIL - LOW VISCOSITY (ISO46)



15362898

TA300 Service Lubrication Chart

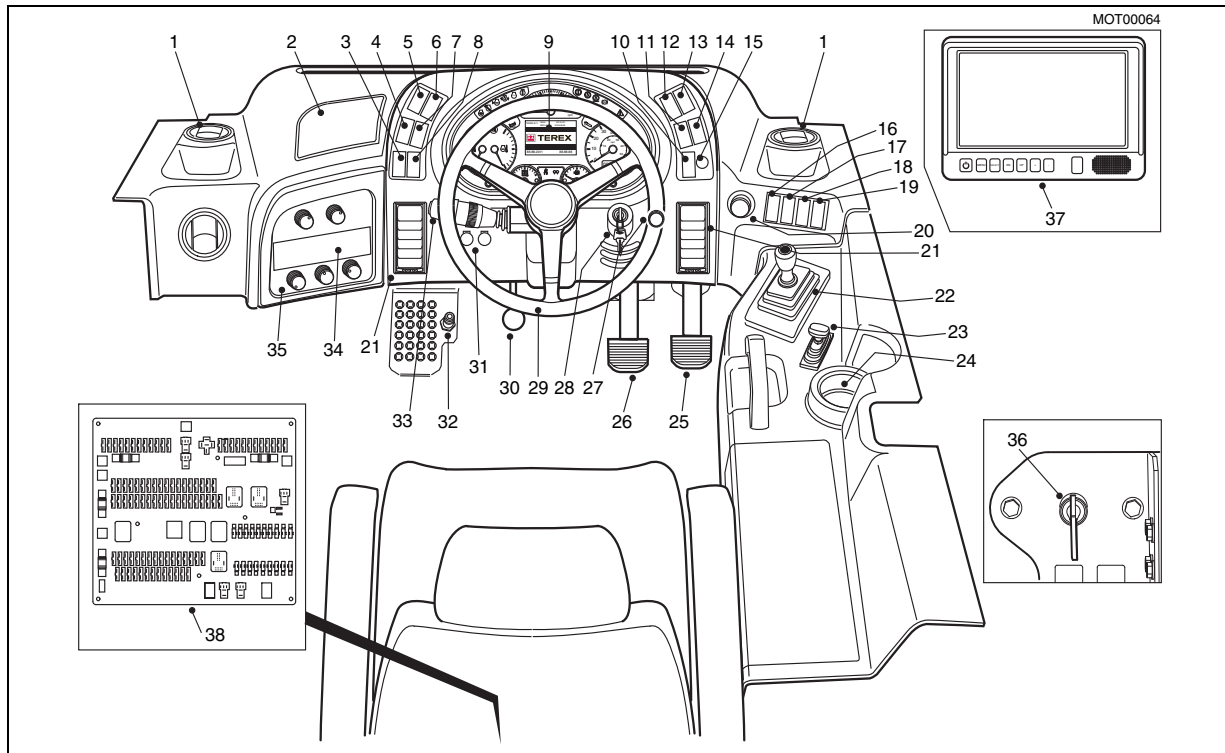


3 - Controls and Operating

Controls and Operating

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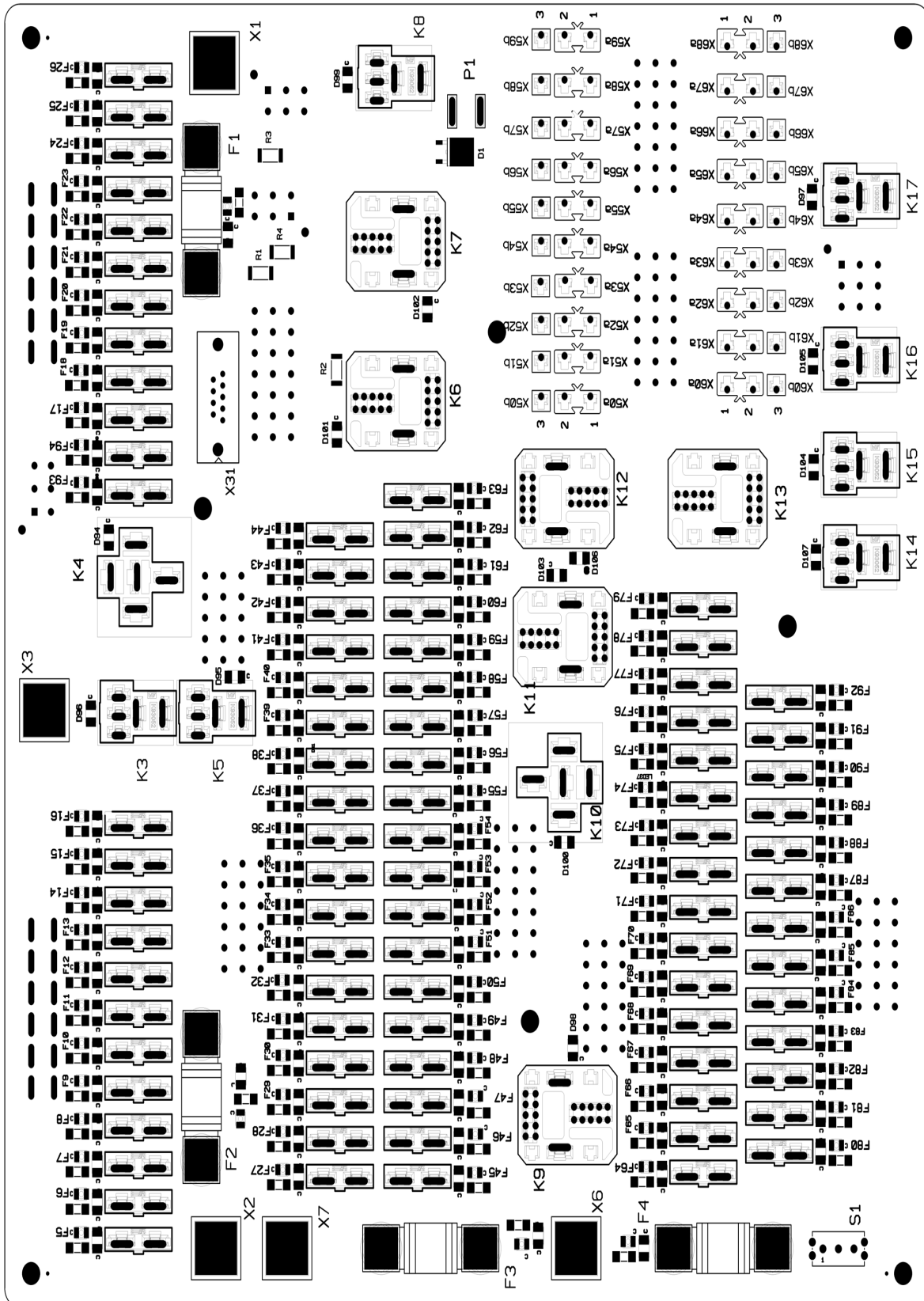
CONTROLS AND INSTRUMENTS



- | | |
|--|---|
| 1 - Side Window Demister | 22 - Transmission Gear Shift Control |
| 2 - N/A | 23 - Body Control Lever |
| 3 - Hazard Warning Lights | 24 - Cup Holder |
| 4 - N/A | 25 - Accelerator Control |
| 5 - Display Menu O.K. Switch | 26 - Service Brake Control |
| 6 - Display Menu Navigation Switch | 27 - Engine Start / Stop Switch |
| 7 - N/A | 28 - Power Key Switch |
| 8 - Rear Wash / Wipe | 29 - Steering Wheel |
| 9 - Display Screen | 30 - Steering Wheel Adjustment Lock |
| 10 - N/A | 31 - 12V / 24V Jack Points |
| 11 - Transmission Retarder Request Switch | 32 - Cross Axle Differential Lock Request Switch |
| 12 - Engine Exhaust Brake Request Switch | 33 - Lights, Windscreen Wiper / Wash, Horn Switch, Direction Indicators |
| 13 - N/A | 34 - Radio Facia |
| 14 - Transmission Differential Lock Request switch | 35 - Heater/Air Conditioner Controls |
| 15 - N/A | 36 - Battery Master Switch |
| 16 - Heated Mirrors (Optional) | 37 - Rear View Camera |
| 17 - Rear Working Lights (Optional) | 38 - Fuse / Relay Printed Circuit Board |
| 18 - Flashing / Rotating Beacon (Optional) | |
| 19 - Rear Fog Lamp (Optional) | |
| 20 - Park / Emergency Brake Control | |
| 21 - Heater Vent | |

Controls and Operating

FUSE / RELAY BOX



Controls and Operating

Fuse Name	Size	Function
F1	80A	Master Fuse Terminal 30
F2	80A	Master Fuse Terminal 30
F3	80A	Master Fuse Terminal 15
F4	80A	Master Fuse Terminal 15
F5	3A	Not Connected
F6	7.5A	Transmission Controller
F7	2A	Emergency Operation
F8	15A	Spare
F9	5A	Interior Light
F10	7.5A	Hazard Warning
F11	15A	DC-DC Convertor
F12	7.5A	Telematics Interface
F13	15A	Work Socket 24V
F14	10A	Air Seat Compressor
F15	5A	Hydraulic Oil Sensors
F16	20A	Fuel Heater
F17	20A	Engine Management System
F18	2A	Main Controller
F19	15A	Main Controller
F20	25A	Spare
F21	20A	Engine Management System
F22	2A	Main Controller / Ignition Lock
F23	15A	Main Controller
F24	7.5A	Spare
F25	2A	Programming Interface
F26	15A	Hood Lift
F27	3A	Sensor Front Frame
F28	15A	Main Controller
F29	5A	Spare
F30	3A	Rocker Switches
F31	15A	X39.3 (Reserve Cabin)
F32	10A	Not Connected

Controls and Operating

Fuse Name	Size	Function
F33	15A	Not Connected
F34	5A	Difflock
F35	1A	Spare
F36	15A	Spare
F37	5A	Camera System
F38	2A	Body Position Proximity
F39	15A	Spare
F40	15A	Main Controller
F41	2A	Start / Stop Button
F42	5A	Not Connected
F43	15A	Front Work Light
F44	15A	Rear Work Light
F45	20A	Spare
F46	10A	Not Connected
F47	10A	Spare
F48	2A	TCU Diagnostic Interface
F49	5A	Steering Column Switch
F50	7.5A	Dashboard
F51	1A	Transmission Temperature Sensor
F52	1A	Relay
F53	5A	Wiper Motors
F54	7.5A	Transmission Shift Lever
F55	5A	Foot Switch
F56	1A	Temperature Sensor
F57	2A	Transmission Speed Sensor
F58	3A	Sensors Front Frame
F59	10A	Front Wiper Motor Speed
F60	7.5A	Transmission Controller
F61	15A	Emergency Operation
F62	15A	Spare
F63	7.5A	Horns
F64	10A	Spare
F65	10A	Spare

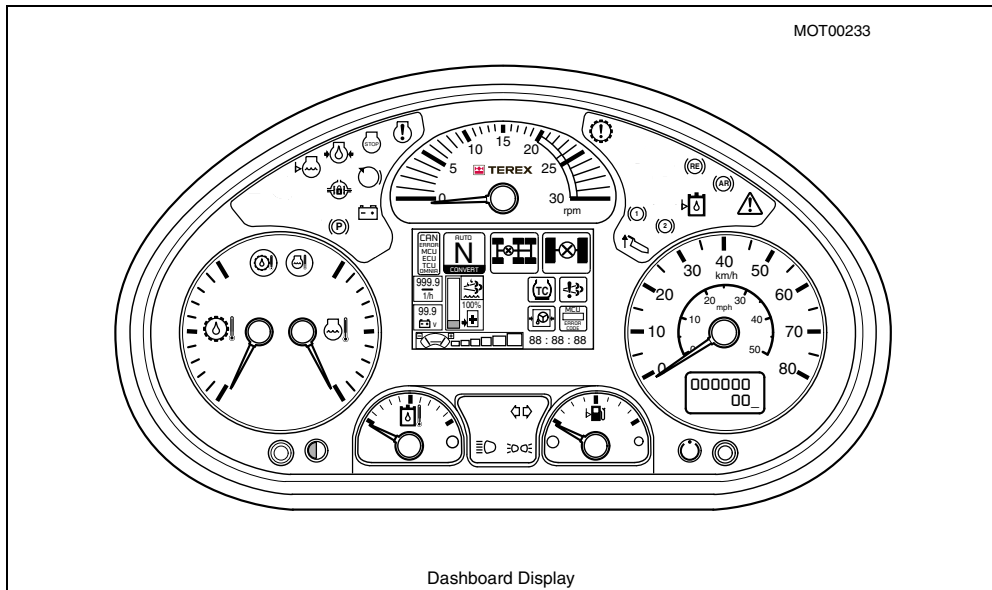
Controls and Operating

Fuse Name	Size	Function
F66	15A	Main Controller
F67	3A	Hydraulic Block
F68	30A	Not Connected
F69	15A	Heated Mirror
F70	15A	Not Connected
F71	10A	Not Connected
F72	10A	Spare
F73	15A	Not Connected
F74	15A	Air Conditioning
F75	10A	Spare
F76	10A	Engine Management System
F77	10A	Ignition / Telematics
F78	10A	Engine Management System
F79	15A	Main Controller
F80	15A	Not Connected
F81	15A	Not Connected
F82	15A	Not Connected
F83	15A	Not Connected
F84	2A	Not Connected
F85	2A	Not Connected
F86	20A	Spare
F87	20A	Not Connected
F88	1A	Not Connected
F89	15A	Not Connected
F90	2A	Not Connected
F91	15A	Not Connected
F92	2A	Not Connected
F93	5A	Emergency Switch
F94	5A	Not Connected
S1	500A	Battery Disconnect

Controls and Operating

Relay Name	Type	Function
K3	Micro Relay	12V Terminal 15
K4	N/A	N/A
K5	Micro Relay	Differential Lock
K6	Power relay	Front Work Lights
K7	Power relay	Rear Work Lights
K8	Micro Relay	Horns
K9	Power relay	
K10	Mini Relay	
K11	Power relay	Emergency Operation
K12	Power relay	
K13	Power relay	
K14	Micro Relay	
K15	Micro Relay	Wiper Motors
K16	Micro Relay	Wiper Motors
K17	Micro Relay	Cabin Up/Down

BASIC DATA



Operating the machine is supported by a combined dashboard display. The dashboard display provides machine information to the operator through various gauges and indicators. Beside this indication and display capabilities the dashboard display also provides up to 36 digital inputs, which are mostly used as inputs for the Rocker Switches located on the dashboard.

The illustration above shows the dashboard display layout. The meaning of all LED Indicators are given in the following pages.

The dashboard display consists of the following:

1. Warning lights and symbols
2. Instruments
3. 3.5" colour display and buttons.

CAUTION

When removing the Giga Panel (above) do not use sharp objects to lever the panel out as this will result in damage. Kneel on the cab floor, place your hands behind the panel and apply gentle pressure with your fingers until it releases.

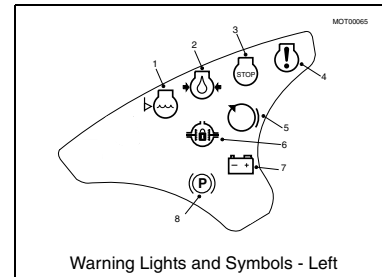
Controls and Operating

Warning Lights and Symbols - Left of Dashboard Display

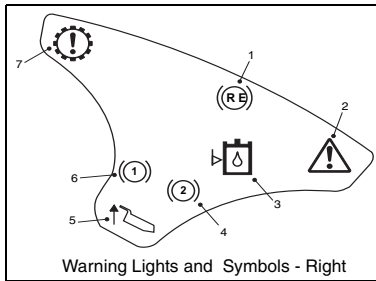
1. **Engine Coolant Level Low** - Illuminates when the coolant level drops below the safe operating level.
2. **Engine Oil Pressure Low** - Illuminates when the engine oil pressure drops below the safe operating pressure.
3. **Engine Stop Light** - When the 'Stop Engine' light comes on, the ECU has detected a major malfunction in the engine that requires immediate attention. It is the operator's responsibility to shut down the engine to avoid serious damage.

NOTICE: The fault code is displayed in the Diagnostic Screen.

4. **Engine Check Light** - When the 'Check Engine' light comes on, the ECU has detected a fault in the engine. The fault should be diagnosed and corrected at the earliest opportunity.
5. **Engine Exhaust Brake** - Indicates that the engine exhaust brake is active. It remains illuminated until the brake is deactivated.
6. **Differential Locks** - Illuminates when the differential lock is active.
7. **Alternator charging** - Indicates that the system batteries are in a state of undercharging or battery voltage low.
8. **Parking Brake** - Illuminates when the parking brake is applied.



Controls and Operating



Warning Lights and Symbols - Right of Dashboard Display

1. **Transmission Retarder Active** - Illuminates when the transmission retarder is active.
2. **Engine Over Speed** - Illuminates when the engine speed rises above the safe operating speed (Engine Speed > 2300 Rpm). The operator should take action to slow the vehicle.
3. **Hydraulic Oil Level Low** - Illuminates when the hydraulic oil drops below a safe operating level. Stop the truck and fill the oil.
4. **Rear Brakes Accumulator Pressure Low** - Illuminates to warn of low pressure in the rear brake system accumulator. A buzzer also sounds. If the light illuminates, stop the machine and investigate the cause.
5. **Body UP Indicator Lamp** - Indicates that the body has been raised and it is off the chassis bed. Transmission upshift is restricted while the light is illuminated.
6. **Front Brakes Accumulator Pressure low** - Illuminates to warn of low pressure in the front brake system accumulator. A buzzer also sounds. If the light illuminates, stop the machine and investigate the cause.
7. **Transmission Check Light** - Illuminates when a fault has been detected by the TCU. The fault should be diagnosed and corrected at the earliest opportunity.

NOTICE: Fault Codes are displayed in Diagnostic Display Screen.

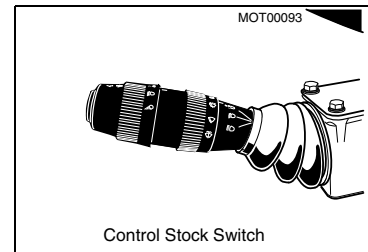
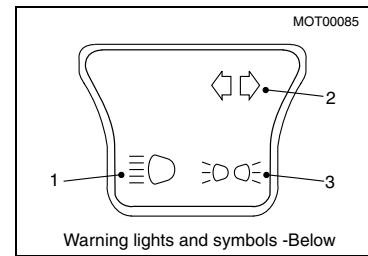
Controls and Operating

Warning Lights and Symbols - Below Dashboard Display

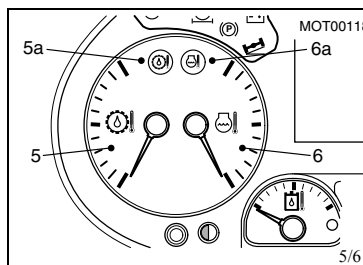
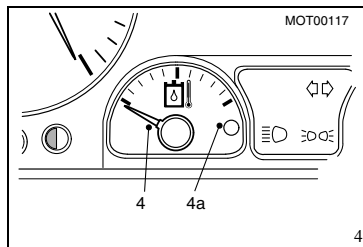
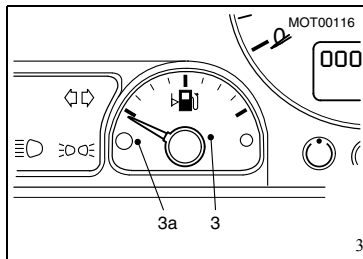
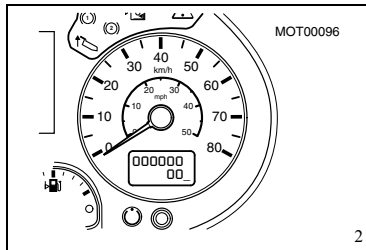
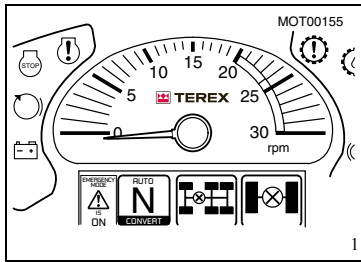
1. **High Beam** - Illuminates when high beam is switched on.
2. **Direction Indicators** - Flashes when the indicator lights (left or right) are operating.

NOTICE: The indicator flash is accompanied with buzzing signal.

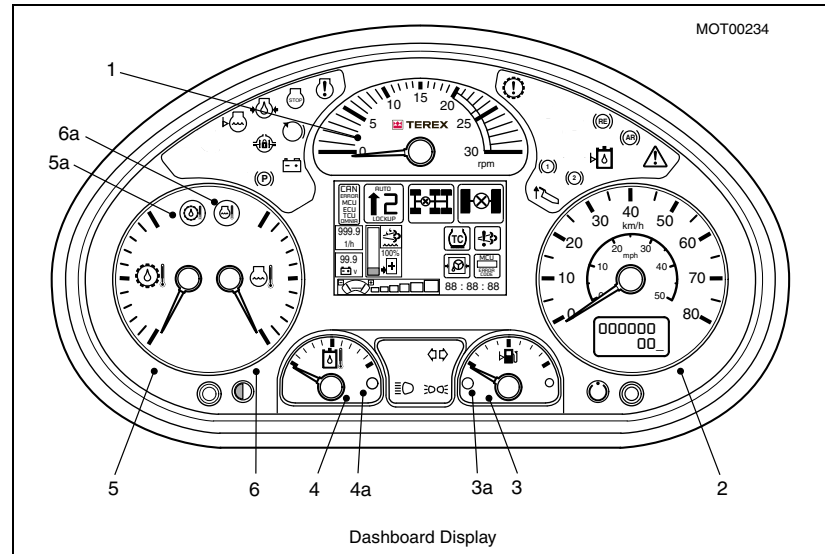
3. **Lights ON** - Is ON if the control Stock Switch is set to headlights ON or working lights ON



Controls and Operating



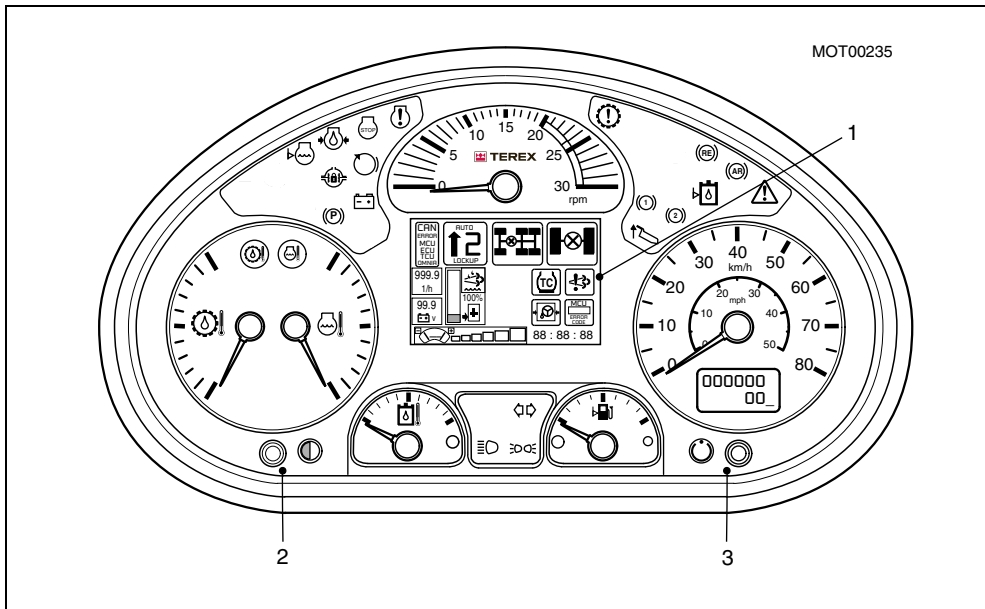
Instruments



- 1. Tachometer** - Driven from the engine ECU, the tachometer indicates the number of engine crankshaft revolutions per minute. The needle shows the variations in engine operating speed. Never accelerate the engine to speeds indicated by the red zone on the dial face.
- 2. Speedometer** - The speedometer indicates travel speed in kilometres per hour (displayed white) and miles per hour, (displayed yellow). A digital display is centered at the base of the speedometer, consisting of a two line LCD. The upper line displays total engine hours or total distance travelled in kilometres or miles. The lower line indicates trip distance run since last reset in kilometres or miles. Refer to Section 3 for details
- 3. Fuel Level Gauge** - Indicates fuel level within the tank. Should the fuel level drop below 25% a warning light (3a) on the instrument display will illuminate. Fill the tank overnight to minimize condensation in the tank. Avoid a dry tank condition as this will result in a requirement to bleed the fuel system.
- 4. Hydraulic Oil Temperature Gauge** - Indicates hydraulic oil operating temperature. The gauge should read in the white zone during normal operation. Should the temperature increase (above 80 Deg), a warning light (4a) on the instrument display will illuminate. If the gauge reads in the red zone, stop the machine and investigate the cause.
- 5. Transmission Oil Temperature Gauge** - Indicates transmission oil operating temperature. The gauge should read in the white zone during normal operation. If the gauge reads in the red zone and the warning light (5a) on the instrument display illuminates, stop vehicle and investigate the cause.
- 6. Engine Coolant Temp Gauge** - This gauge should read in the white zone after the engine has warmed. If the gauge reads in the red zone the warning light (6a) on the instrument display will illuminate. Stop the engine and investigate the cause.

Controls and Operating

Menu Screen and Buttons

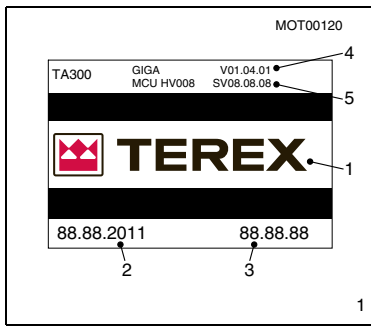


1. **Menu Screen** - The following illustrations show the sequential display in its five possible screens. On initial starting of the vehicle, the display shows the Power Up Screen (1) and then automatically scrolls to the Main Screen.
2. **Left Menu Control Button** - The "Display-Menu O.K. Switch", also called the "Left Menu Control Button" is used to change values (brightness setup, setting date/time, etc.) or to be used as 'ENTER / OK' button in particular situations.

The Dashboard display screen provides a 320 x 240 pixel colour display, used as a flexible operator information device. There are several different screens displayed during power up, normal operation, body Lift, brightness and date/time setup and engine and transmission diagnostics.

3. **Right Menu Control Button** - Switching between the different screens is performed automatically, depending on the current active function. Alternatively a screen can be chosen manually by using the "Display-Menu (+)(-) Switch" (refer to 'Switches' - 4) on the Dashboard or by using the Dashboard display's "Right Menu Control Button".

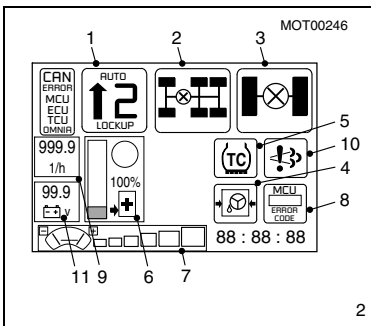
Controls and Operating



Screen - 1:

PowerUp Screen - Displays the Terex logo(1).

The Date (2) and Time (3) are displayed at the bottom of the screen. Dashboard display software version (4) and MCU software version (5) are displayed at the top of the screen.



Screen - 2:

Main Screen - Displays several indicators, as shown.

- 1. Gear Indicator** - The GEAR INDICATOR displays information relating to the transmission status. The indicator displays the gear selected and drive direction. Drive direction is indicated by a colored arrow: Green = Forward, Red = Reverse. The Transmission drive mode: Automatic / Manual and Torque convertor status: Lock - up / Converter is also shown.
- 2. Transmission Differential Lock Engaged** - Displays if the transmission differential Lock is engaged.

NOTICE: On trucks using Ergotraction software, this lamp will illuminate briefly when accelerating quickly from rest and when the engine brake is activated. In both cases this identifies that the differential lock is engaging due to the level of torque/brake torque, and is normal. Ergotraction software, where fitted, monitors the torque/speed output to front and rear drives, and if the difference exceeds design parameters the TCU sends a signal to apply the differential lock automatically, locking the front and rear outputs and resulting in 1:1 drive.

- 3. Cross Axle Differential Lock Engaged** - Displays if the cross axle differential lock is engaged.

NOTICE: Cross Axle Differential Lock activates only when transmission differential lock is switched on and the vehicle speed is less than 15km/h.

- 4. Steering Oil Pressure Low** - Illuminates to warn of a fault in the steering system supply pressure. Illuminates when the ignition is turned on and pressure is low. If the light illuminates, stop the machine and investigate the cause.
- 5. Traction Control Active** - Displays if the traction control is active.
- 6. Diesel Exhaust Fluid Tank Indicator** - The ADD BLUE TANK INDICATOR shows the current fluid level in the add blue tank in graphical form (bargraph) as well as a numerical value 0...100%. The red warning indicator illuminates if the fluid level is at 20% or below.

NOTICE: The engine power derates gradually as the DEF level reduces.

- 7. Front Windscreen Wiper Intermediate Status Bar** - Displays the speed stage at which the wiper is operating. The front windscreen

Controls and Operating

wiper intermediate Status Bar is shown just as the control stock wiper switch is set to "Intermediate" position. The intermediate status can be set from step 1 (slow - 15 sec pause time) to step 6 (fast - 0 sec pause time) by using the "Display-Menu (+)(-) Switch".

8. **MCU Error Code** - Refer to Section 3 for MCU error codes. The error codes will be displayed in sequence in intervals of 1sec.
9. **Fuel Consumption Indicator** - Displays 3 possible indications on fuel consumption:
 - Total fuel consumption since last reset in litres (Refer 8a).
 - Average fuel consumption since last reset in litres / hour (Refer 8b).
 - Instantaneous fuel consumption in litres / hour (Refer 8c).

A normal short click on left menu control button toggles the display between the 3 possible indications. The indicator can be set to zero by pressing Left Menu Control Button for 2 seconds.

10. **Exhaust System Fault Indicator** Illuminates to warn of a fault in the Exhaust system. Stop the machine and investigate the cause when the indicator illuminates.

11. **Battery Voltage Indicator** Indicates the power supply voltage of the machine. In the normal condition the indicator glows green. When the voltage drops below 24V the indicator glows yellow. When the voltage drops below 20V the indicator turns red. Recharge the battery or replace with a new one.

Screen - 3: Body Up Screen

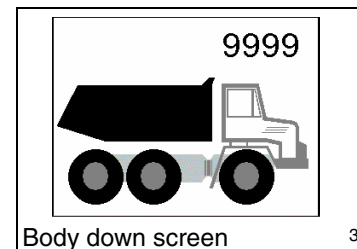
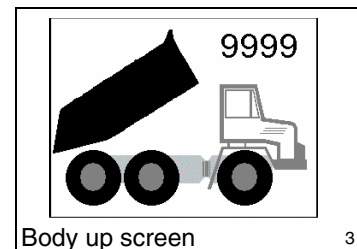
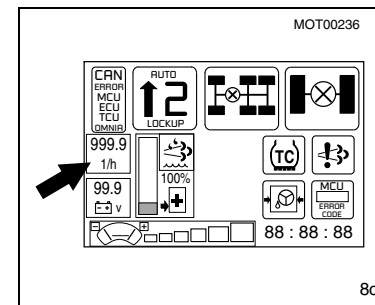
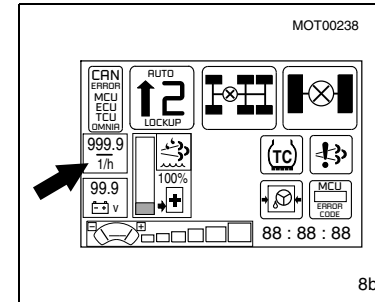
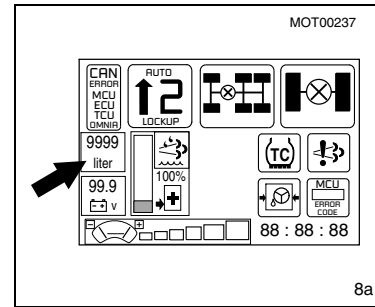
The "Body Up Screen" appears automatically once the body control lever has been activated for more than 2 seconds. It shows the body's current state depending on the signal coming from the body proximity switch.

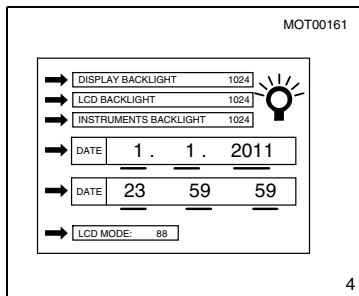
'Body Up' Indicates that the body has been raised and it is off the chassis bed. Transmission upshift / vehicle movement is restricted while the light is illuminated.

The "Body Up Counter" is incremented after each "regular" body up/down cycle.

A few seconds after the body proximity switch signal has changed from "Body is UP" to "Body is DOWN" position the display returns to the main screen.

Whenever the body up screen is displayed, the counter can be set to zero by pressing the "Left Menu Control Button" on the dashboard display for 2 seconds.



**Screen - 4:****Brightness and RTC Setup Screen**

This screen allows separate setting of the dashboard display's LCD and instruments backlight values. There are two different value settings, adjustable for day (Control Stock Lights Switch OFF) and night (Control Stock Lights Switch ON-1).

When this screen is chosen - by using the "Display-Menu (+)(-) Switch" or the dashboard display's "Right Menu Control Button" - pressing the dashboard display's "Left Menu Control Button" leads into a deeper menu level. A green arrow appears on the left and points to the first item "DISPLAY BACKLIGHT".

Now, the value can be changed circular from 1024, 1000, 900, ..., 100, 80, ..., 20, ..., 1024, ... by tapping the dashboard display's "Left Menu Control Button".

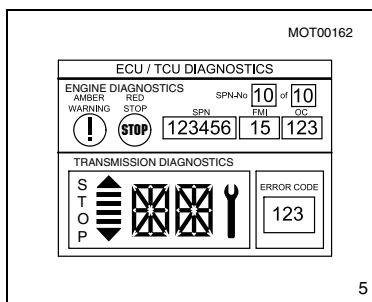
The symbol on the right indicates if the "Control Stock Lights Switch" is set to ON. You can adjust different values for day - Control Stock Lights Switch OFF - and night - Control Stock Lights Switch ON.

The green arrow can be moved to the next item by pushing the "Right Menu Control Button". When the green arrow points to the Date or Time item, the "Right Menu Control Button" moves a green underline which tags the day, month, year, hour, second, minute value that can be changed with the "Left Menu Control Button".

The following values in the Odometer LCD corresponds to the codes in the LCD mode:

- 0 - Total engine hours
Trip distance since last reset (in kilometres)
- 1 - Total driven distance (in kilometers)
Trip distance since last reset (in kilometres)
- 2 - Total engine hours
Trip distance since last reset (in miles)
- 3 - Total driven distance (in miles)
Trip distance since last reset (in miles)

NOTICE: The Trip Distance can be set to zero by pressing Right Menu Control Button for 2 seconds

Screen - 5:**ECU / TCU Diagnostic Screen**

The Diagnostic Screen shows the current Fault Status of the engine and the transmission.

ENGINE DIAGNOSTICS is based on the DM1 Message sent by the ECU via CAN. The ECU sends no more than 10 Fault Codes and the status of the Amber Warning Lamp (the light comes on when the computer has detected a fault in the engine) and the Red Stop Lamp (the light comes on when the computer has detected a major malfunction in the engine that requires immediate attention). If there is more than 1 fault active the Suspect Parameter Number (SPN), the Failure Mode Identifier (FMI) and the Occurrence Count (OC) is displayed cyclically in 1 second intervals.

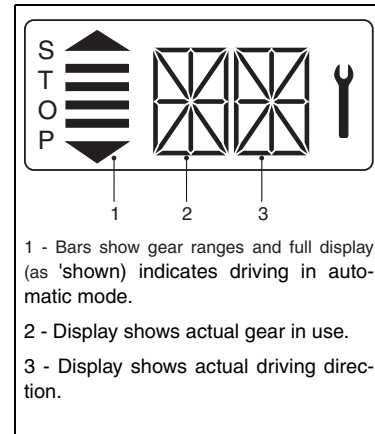
Controls and Operating

TRANSMISSION DIAGNOSTICS is based on the ZF TCU_1 CAN Message. In the 'ERROR CODE' the ZF TCU ERROR CODE is displayed cyclically in 1 second intervals.

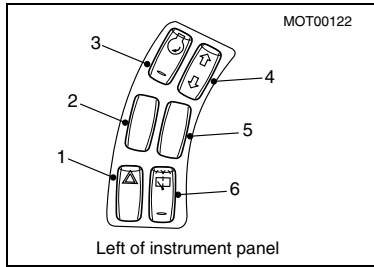
The display indicates gear selected and driving direction as follows:

Manual Mode - When driving with the shift selector in manual range, the bars only are shown in position 1, and, driving direction and gear selected are indicated in positions 2 and 3.

Automatic Mode - When driving with the shift selector in automatic range, a full display of bars and arrows are shown in position 1, and, driving direction and gear selected are indicated in positions 2 and 3. For more details please refer to Section 3.

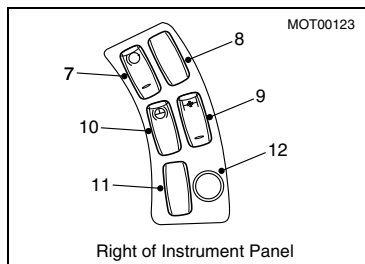


Controls and Operating



Switches

1. **Hazard Warning Lights** - Press the bottom of the switch to make the indicators flash simultaneously as hazard warning lights. The direction indicator warning lamp on the instrument panel will flash (ensure that the ignition / power is ON). To switch the hazard lights off; press the top of the switch.
2. N/A
3. **Display Menu OK Switch** - The "Display-Menu O.K. Switch", also called as the "Left Menu Control Button" is to be used to change values (brightness setup, setting date/time, etc.) of the menu screen or to be used as 'ENTER / OK' Button in particular situations.
4. **Display Menu Navigation Switch** - Switching between the different screens is performed using this switch.
5. N/A
6. **Rear Wash/Wipe** - Press the bottom of the switch to operate the rear screen wiper. Press the switch and hold for wash. To switch off, press the top of the switch.
7. **Engine Exhaust Brake Request Switch** - There are 2 positions for the switch. Press the top of the switch to request the engine exhaust brake. This position applies the engine exhaust brake when the service brake is applied. Press the bottom of the switch and the engine exhaust brake will be active when the throttle pedal is released. The engine exhaust brake symbol illuminates on the display screen when the engine exhaust brake is engaged.



8. N/A

9. **Transmission Differential Lock Request Switch** - Press the bottom of the switch to engage the transmission differential lock in manual mode. The differential lock warning lamp on the instrument panel will illuminate when the function is activated. Pressing the switch to the Off position will disengage the differential lock.

NOTICE: By default automatic mode is ON.

10. **Transmission Retarder (manual) Switch** - This switch is used to slow the machine or maintain a steady speed on declines. The retarder prevents the machine 'running away' by accelerating down the decline.

There are 3 positions for the switch. Refer figure MOT00247.

Position A

Transmission retarder request OFF.

In this position there is no transmission retarder.

Position B

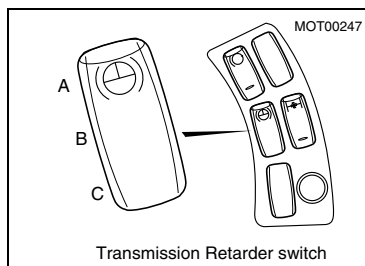
Transmission retarder request ON.

This position applies the transmission retarder when service brake is applied.

Position C

Transmission retarder request ON.

This position applies the transmission retarder when throttle pedal is not active.



Controls and Operating

11.N/A

12.N/A.

13. **Heated Mirrors** - Press the bottom of the switch to activate the heated mirrors. To switch off, press the top of the switch.

14. **Rear Working Lights** - Press the bottom of the switch to operate the rear working lights. To switch off, press the top of the switch.

15. **Flashing/Rotating Beacon** - Press the bottom of the switch to operate the flashing/rotating beacon. To switch off, press the top of the switch.

16. **Rear Fog Lamp** - Press the bottom of the switch to operate the rear fog lamp. To switch off, press the top of the switch.

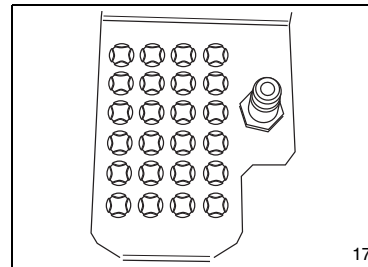
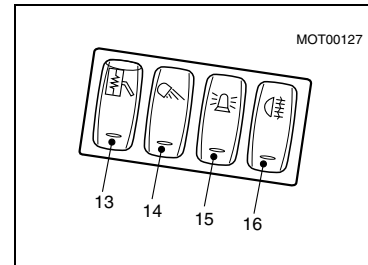
17. **Cross Axle Differential Lock Request Switch** - Pressing and holding the foot switch will activate the cross axle differential lock.

NOTICE: The switch gets activated only if:

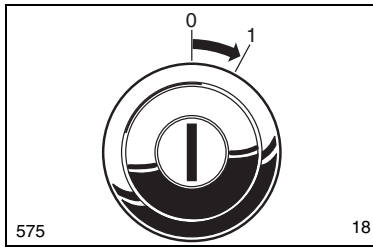
- a) 'Transmission Differential Lock Request Switch' is in manual mode
- b) The vehicle speed is less than 15km/h.

NOTICE: The cross axle differential lock switch is only active when the transmission differential lock switch is ON.

Power Key Switch - The switch is used for switching power ON and OFF. There are two positions for the switch.



Controls and Operating



'0' - Power switched off. All electrical systems are inoperative.

NOTICE: Hazard warning light illumination is possible when the switch is in 0.

'1' - Power switched on, instruments, gauges and warning lights register as appropriate. All electrical systems are operative. The key must remain in this position whilst operating the machine.

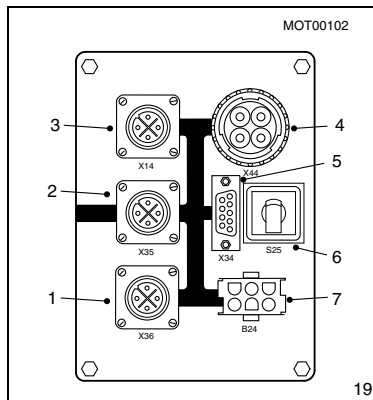
NOTICE: At this point the 'Display Screen' starts up. Sequentially all the indicators are ON and the instruments will touch the maximum indicative value before returning to the minimum.

Press the Start / Stop switch to start the engine. On pressing the switch again the engine will stop.

After a few seconds, the buzzer alarm sounds to indicate that the power is still ON.

On switching the key from 1 to 0 the power goes off. The engine will go to low idle and after 3 seconds the engine will stop.

18. Diagnostic Test Point - Test points are located at the right hand side of the cabin. This comprises a 4 plug-in connector for:



1) X36 CAN-4 : Diagnostic Bus - For special Diagnostic Equipment

2) X35 CAN-3 : HMI Bus - Dash Board, Steering Lever switch

3) X14 CAN-2 : Power Train Bus - ECU, TCU

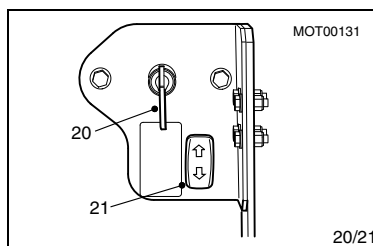
4) X44 : For Engine Diagnostics

5) X34 : Serial Interface - MCU programming connector (RS232)

6) S25 : For manually activating specific circuits in case of emergency

7) B24 : Connector for AEB kit

19. Battery Master Switch - (Located at the left hand side of the truck in the battery box). Turn the key clockwise to connect the batteries to the electrical circuits. Switch the key off and remove it when leaving the machine unattended.



20. Hood Lift Switch - Controls lifting or lowering of the hood.

Controls and Operating

Controls

High Beam Dipper, Direction Indicator, Windscreen Wiper/Washer Headlight / Parking / Front Working Light and Horn

1. High Beam Dipper and Flasher:

Neutral Position = Dipped Beam

Control Upwards = High Beam Flash

Control Downward with Lights On = High Beam Continuous

High Beam continuous is possible only if the steering lever switch is set to position 1, 2 or 3 (Lights ON). High Beam Flash is possible in any position.

2. Direction Indicator:

Control Rearwards = Left Indicators

Control Forwards = Right Indicators

3. Windscreen Wiper/Washer:

Position 0 = Neutral Position

Position 1 = Intermittent Sweep

Position 2 = Wiper Fast Speed

Position 3 = Windscreen Wash

4. Headlight, Parking and Front Working Lights:

Position 0 = Light OFF

Position 1 = Parking Light and Headlight ON

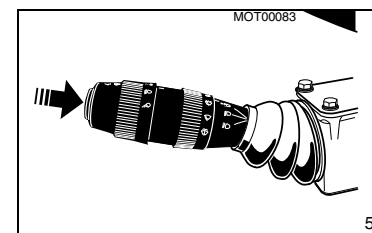
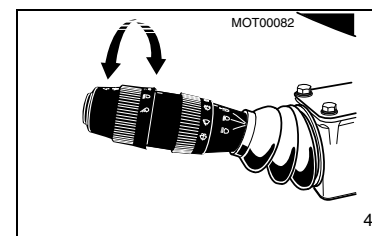
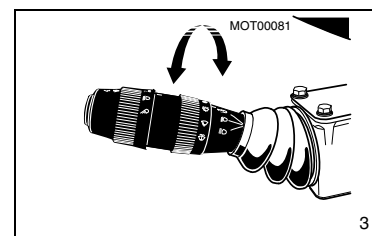
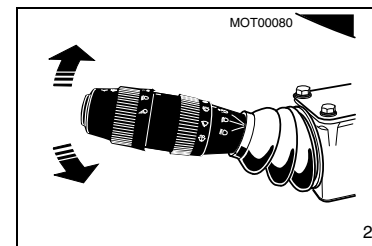
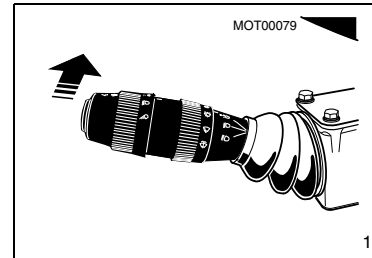
Position 2 = Headlight ON

Position 3 = Front Working Light ON

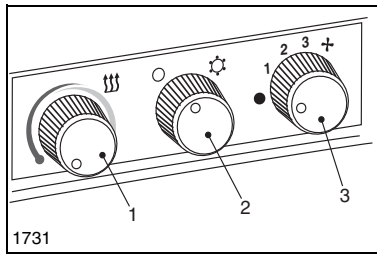
Parking Light stays ON at position 2 and 3

5. Horn:

Button pushed in = Horn Sounds



Controls and Operating

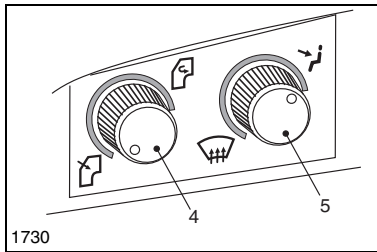


Heater

The blower control (3) is rotated to select one of three blower speeds. Air direction can be adjusted by turning the direction controls (4 and 5).

The temperature control (1) is rotated to vary the heater output temperature. Heater output air is unheated with the control turned fully anticlockwise and heated by turning clockwise.

Heater/air conditioner outlets (6) may be adjusted to control the air flow output by opening and closing the control flaps. Air direction can be adjusted by rotating the complete outlet.

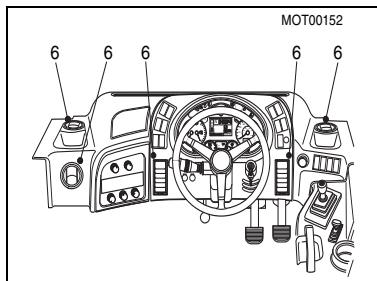


Air Conditioner

Keep all windows and vents closed.

Blower control (3) is rotated to select one of three blower speeds. The air conditioning will not operate if the blower control is not switched on. Air direction can be adjusted by turning the direction controls (4 and 5).

Turning control (2) to the right switches on the air conditioning. The air conditioner output temperature can be controlled using the temperature control (1).



The heater/air conditioner outlets (6) may be adjusted to control the air flow output by opening and closing the control flaps. Air direction can be adjusted by rotating the complete outlet.

NOTICE: When the air conditioning is switched on, the engine cooling fan automatically engages.

Air Condition Commissioning Procedure

If the machine has been idle overnight or for an extended period of time, the refrigerant in the air conditioning unit converts from a gas to a liquid. This puts the compressor unit under a great deal of strain trying to compress a liquid instead of a gas, and could cause a failure of the air conditioning unit. The following commissioning procedure allows the air conditioning unit to achieve normal operating parameters.

1. Start the machine and allow it to run until the engine is at a normal operating temperature of 80°C (176°F).
2. Turn the blower control to setting 1.
3. Turn on the air conditioning unit on for 5 seconds then off for 5 seconds.
4. Repeatedly switch the air conditioning on and off for at least 1 minute. This should be at least 12 repetitions.
5. Commissioning the air conditioning unit is complete and ready for use.

NOTICE: Follow the instructions given above, otherwise the machine may be damaged.

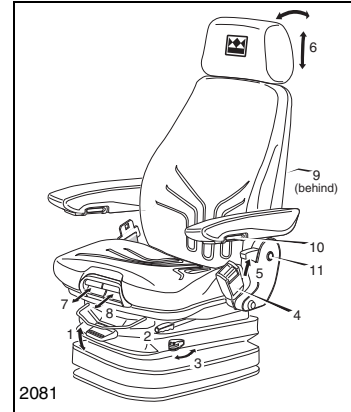
Controls and Operating

Operator's Seat - Air Suspension

The air seat only reacts when the driver sits on the seat. When unoccupied, the seat sinks to the lowest position to allow easier access.

The following is the list of controls to adjust the seat:

1. Height and weight adjustment.
2. Horizontal adjustment (slide rails).
3. Adjustable damper.
4. Seat belt.
5. Backrest angle adjustment.
6. Headrest height adjustment.
7. Fore/Aft isolator (forward position - unlocked, rearmost position - locked).
8. Seat cushion fore/aft adjustment.
9. Seat cushion angle adjustment.
10. Lumber support adjustment.
11. Arm rest adjustment (x2).



CAUTION

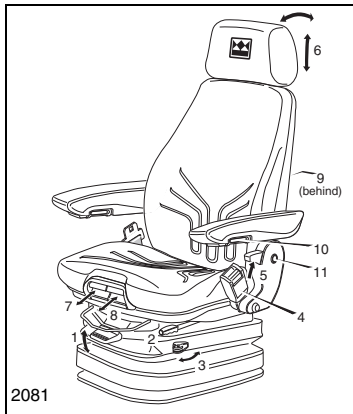
Do not attempt to adjust the seat or seat belt while the machine is moving. Loss of control may result. Stop the machine; apply brakes; then adjust as required.

Operator's Seat - Operation

To achieve the most comfortable driving position, adjust the seat as follows:

1. Sit in the seat.
2. Pull up and immediately release the height and weight adjustment (1) handle - this will set the seat to cater for the operator's weight. Sit completely still while carrying out the adjustment. The seat position is now adjusted correctly to cater for the operator's weight. Further lifting or pressing down on this lever will raise or respectively lower the seat, if the height requires adjustment.

NOTICE: Do not operate the height and weight adjustment lever for a period longer than one minute, otherwise the inbuilt compressor may be damaged.



3. Angular adjustment of the base cushion (seat pan) about the horizontal axis is achieved by lifting lever (8) and exerting pressure on the front or rear of the seat pan to tilt it to the desired horizontal attitude. Release the handle when the required position is achieved.

4. Pull up the depth adjustment handle (7) to facilitate movement of the seat forwards or backwards. Release the handle when the required position is achieved.

5. If adjustment of the armrest angles is desired, this can be achieved by turning the rotary adjusters (10). If the armrests are not required, they can be folded up out of the way. This is achieved by removing the caps (11) on each side of the frame, loosening the hexagon nuts and hinging the armrest upwards. Tighten the nuts and refit the caps (11) on completion.

6. Pull up (or push down) the headrest (6) to the required height. This can be achieved, by increments, up to its end stop. The angle of the headrest (6) can also be adjusted, by pushing or pulling it in the desired direction, and completely removed by lifting it off over the end stop.



CAUTION

The cab is for protection of the operator and adheres to the mandatory standard for Roll Over Protection Structure (ROPS).

A prerequisite for protection is that the operator remain in the cab, with the seat belt securely fastened.

Should the vehicle begin to roll, hold on to the steering wheel.

Controls and Operating

7. The height and curvature of the backrest cushion can be adjusted by rotation of the lumbar support (9) at the rear of the cushion.

8. Pull up the handle (5) and adjust the backrest to the required angle, release the handle when the required position is achieved.

9. Set the fore/aft isolator (3) position to suit the driving conditions. When active, shock impacts in the driving direction can be more readily absorbed by the driver's seat. (Forward position - off, rearmost position - on.)

10. If necessary carry out fore/aft seat adjustments by first lifting the lever (2), moving to the required position, then lowering the lever again until it locks. It should not be possible to move the driver's seat in the forward/rearward plane with the lever in its locked position.

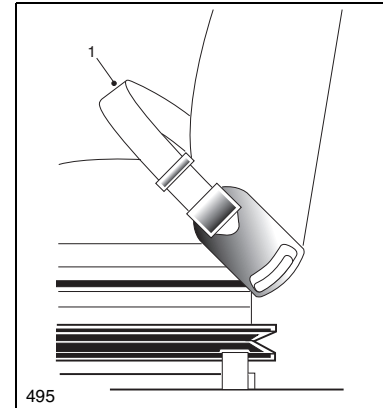
11. Engage the seat belt (4).

Controls and Operating

Seat Belt

Retractable seat belts (1) are installed on both the operator's seat and the jump seat. The seat belts require no external adjustment and allow freedom of movement for proper manipulation of all controls.

NOTICE: To extract the jump seat belt, the button on the housing must be pressed.



CAUTION

Always wear seat belt when operating the machine.

Always check condition of seat belts and mounting hardware before operating the machine.

Any signs of looseness or wear should be reported to your Service Department or Dealer for repair or replacement immediately.

Replace the seat belt at least once every three years, regardless of appearance.

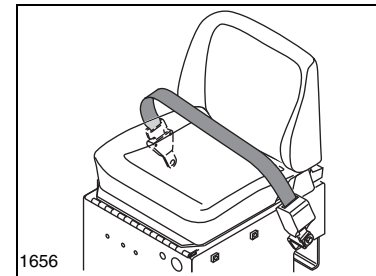
Stop the machine; apply park brakes; then carry out adjustments.

Trainer / Instructor Seat

The trainer/instructor seat has only to be used when operator training or instruction is being performed, or for service personnel performing service diagnostics.

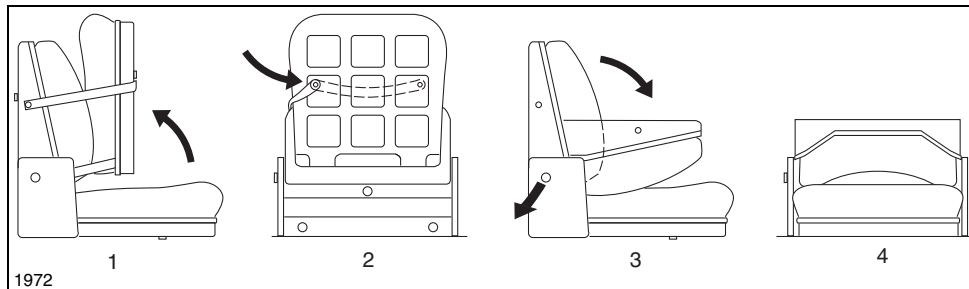
NOTICE: The Trainer/instructor seat is NOT for continuous passenger use.

To access the compartment below the instructor seat, lift the seat (1) and use the strap to hold the seat in position (2). The seat backrest can be folded down when not in use. Pull the seat release catch, located on the side of the seat, to unlock the backrest (3). The backrest can now be folded down (4).



NOTICE

The backrest must be unlocked using the release catch before attempting to fold it down. Failure to do this will damage the seat



Controls and Operating

MACHINE CONTROLS

Braking

The dual circuit brake system is applied during normal operation by using the service brake pedal or, in an emergency, by using the park emergency brake control.

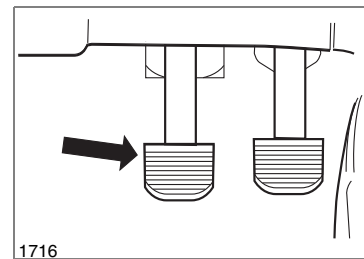
The 'Front Brake System' warning light and the 'Rear Brake System' warning light are located on the instrument panel. A buzzer will also sound if the brake pressure is low. If any of these lights illuminate and/or the buzzer sounds, stop the machine and do not operate until the fault is corrected.

NOTICE: The park brake is applied automatically when the truck is stopped. For normal braking, the service brake pedal should be employed.

Service Brake

This is a cab wall mounted pedal operated by the right foot. Depress the pedal as required by speed, load and road conditions, to slow or stop the machine. Release the pedal as the machine slows until, when stopped, the pedal is depressed just enough to hold it stationary. Do not 'FAN' the pedal.

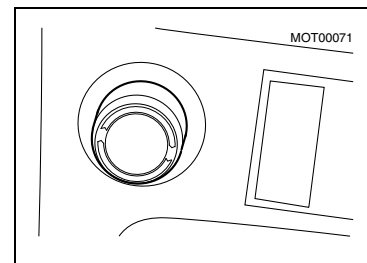
NOTICE: Pedal movement will be experienced when applying or releasing the park/emergency brake control when the engine is running.



Park Brake

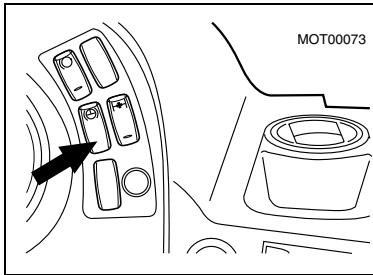
Pushing the control in will apply the spring operated driveline mounted parking brake and the service brakes at all wheels. The parking brake warning light on the instrument panel will illuminate when the control is pushed in. Turn the control clockwise and put the gear in transmission to drive.

NOTICE: This Machine is installed with a safety feature which prevents 'uncontrolled movement'. Initial powering of the vehicle by means of the master switch will not activate the park brake hydraulic controls in the cab until the operator applies the service brake pedal. The park brake system will then operate relative to the position of the park brake switch.



Automatic Park Brake Override Switch

The Park brake is applied automatically when the machine is stationary regardless of the procedure used to stop the machine. The machine must be able to be pushed along with the gear lever in neutral position. To enable this functionality lift the safety cover on the switch (1) and push the switch forward to release the park brake.



Transmission Retarder

This switch is used to request the transmission retarder. The retarder will engage when the switch is pressed (refer to Section 3) and provided that the transmission 'Stop' warning light is 'OUT', the transmission is in 'lockup', accelerator pedal is released (off gas) and the transmission oil temperature is within operating range. Refer to Section 3 for details to disengage the retarder.

The retarder is used to apply a continuous braking force to hold the truck to a safe steady speed when descending gradients, to reduce the need for service brake applications, thus reducing service brake wear and preventing overheating. The retarder may be used any time to slow down. If additional braking is required, apply the service brakes. The retarder is not intended for bringing the machine to a halt, or for sudden deceleration - the service brakes should be employed for this purpose.

Retarder Operation

Before the machine starts down the gradient, request the retarder and release the accelerator (off gas). For maximum retardation, oil circulation cooling and the machine downgrade speed (retarder applied), it is recommended that the gear should be preselected manually. The manually preselected gear should be high enough to keep the engine operating at governed speed. Generally the gear used to ascend a grade, fully laden, is also correct for its descent. Please refer to the gradeability decal for recommended gear selection per grade specification. If the rate of descent is too slow, the transmission should be upshifted to the next highest gear. If the rate of descent is too fast, the service brakes should be applied and the transmission shifted into a lower gear which will allow a safe descent and efficient retarder operation.

Frequent use of the retarder will result in higher transmission oil temperatures. Therefore, the converter oil temperature gauge should be checked frequently. During normal operation the gauge should read between 80°C and 110°C. However, during converter mode temperatures may reach 120°C, and during retarder operation the oil temperature can reach 140°C.

NOTICE: The transmission 'CHECK' warning light and transmission temperature warning symbol on the display screen will illuminate when the transmission oil temperature reaches 140 °C. The retarder will automatically disengage when the oil temperature reaches 150 °C. The speed must be reduced by using the service brakes so that the oil is cooled down. Reduce downgrade travel speed to avoid the oil overheating and possible damage to the transmission.

If the machine is approaching an overspeed condition, the transmission upshifts automatically through the gears (to 6th) to decrease the engine speed, whether in manual or automatic mode.

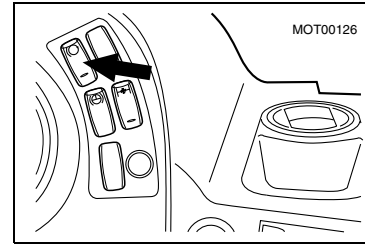
With the accelerator released (off gas) the retarder will then automatically apply when the machine speed reaches 2150 rev/min and will disengage at 1650rev/min. The service brakes can be applied to reduce travel speed further.

When the retarder temperature reaches 150°C the retarder is disengaged and a fault code will be displayed and recorded by the ECU.

Controls and Operating

Engine Exhaust Brake

There are 2 positions for the switch. Press the top of the switch to request the engine exhaust brake. This position applies the engine exhaust brake when service brake is applied. Press the bottom of the switch. This position applies the engine exhaust brake when throttle pedal is not active. The engine exhaust brake symbol illuminates on the display screen when the engine exhaust brake is engaged.



NOTICE: For the Engine Exhaust Brake to activate -

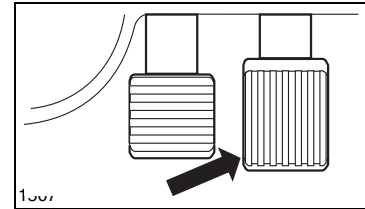
- a) the ECU must be live. Engine speed must be greater than 1000 rpm
- b) the throttle pedal should be deactivated
- c) the throttle pedal position must be less than 5%

The engine exhaust brake is applied automatically when throttle pedal is released and engine speed is greater than 1000 rpm.

The engine exhaust brake also operates when ever the service brake is applied.

Operation

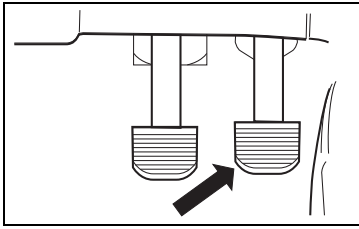
Before the machine starts down the gradient fully laden, it is recommended that the descent gear be preselected manually (Refer to Section 3). The manually pre-selected gear should be high enough to keep the engine operating at governed speed. Generally the gear used to ascend a grade, fully laden, is also correct for its descent. Please refer to the gradeability decal for recommended gear selection per grade specification. The engine exhaust brake can now be selected and the accelerator released (off gas). If the rate of descent is too slow, the transmission should be upshifted to the next highest gear. If the rate of descent is too fast, the service brakes should be applied and the transmission shifted into a lower gear which will allow a safe descent and efficient engine braking. If further braking is required, apply the service brakes.



WARNING

If descending a steep gradient in a laden truck in automatic gear shift mode, the transmission E.C.U. may automatically upshift to prevent a machine (engine) overspeed condition. Also, if the accelerator is re-applied when engine brake is actuated and the truck is in automatic gear shift mode, a rapid acceleration (increase in ground speed) and gear upshift could occur.

 WARNING											
 Operating the truck outside the stated limits on the chart could result in death or serious injury.	 Do not operate truck outside the limits stated on the chart. Select the correct gear for the gradient you are on.	%		KPH	MPH	%		KPH	MPH		
		0	6	50	31	0	6	50	31		
		5	5	27	17	5	6	48	30		
		10	4	15	9	10	5	28	17		
		15	3	9	6	15	5	22	14		
		20	2	8	5	20	4	16	10		
		25	2	6	4	25	3	12	7		
30	1	5	3	30	3	11	7				



Engine

Electronic Foot Pedal

The electronic foot pedal provides an electrical signal to the engine's fuel control system in proportion to the degree of pedal actuation.

NOTICE: The engine MUST be started with the foot 'OFF' the electronic foot pedal.

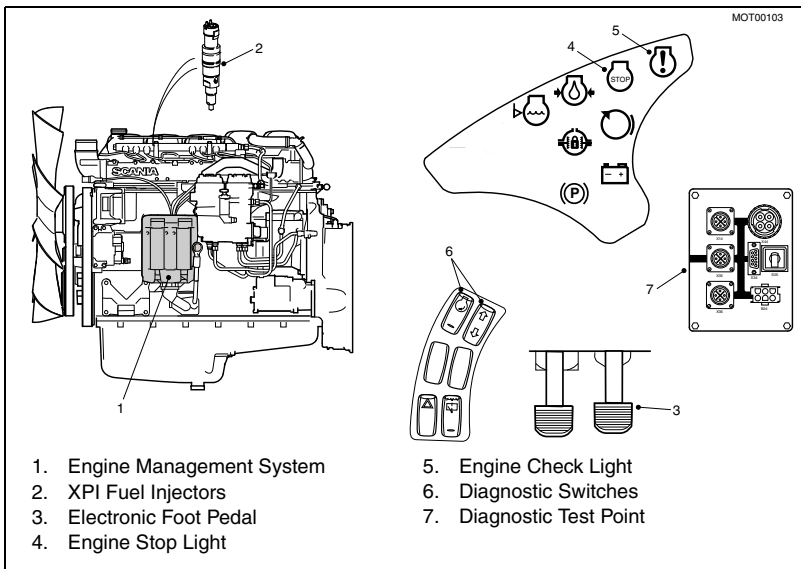
Do not place the engine under full load at full speed immediately after starting. Always allow the engine to fully circulate lubricant and warm up gradually before operating at full speed and full load. Operate the engine at top rated speed when maximum power is needed for the load.

XPI Fuel Injection System

This machine is equipped with the XPI Fuel Injection System (extra high pressure injection), an S8 Engine Management System (EMS), which continually monitors the engine and warns the operator when a problem develops. The system also takes action to prevent damage to the engine and, provides the serviceman with diagnostic capabilities so that problems can be corrected quickly and easily.

NOTICE: Before any welding is done on a machine equipped with the XPI System, disconnect the following in this order: Battery earth cable, battery supply cable, alternator earth cables, alternator supply cables and electrical connections at the ECU, TCU, body control lever, MCU and cab bulkhead to avoid damage to electrical components. Turn off the battery master switch to isolate the batteries before disconnecting any components. After welding, connect all of the above in the reverse order.

Controls and Operating



XPI Fuel Injection System - Description

1. Engine Management System (EMS) - Receives electronic inputs from the driver as well as from sensors that provide information electronically, such as speed, oil pressure and temperature, boost pressure and temperature and coolant temperature. This information is used to control both the quantity of fuel injected and the injection timing. The EMS is programmed to control the horsepower rating, torque curve, maximum engine speed and engine protection devices. The EMS processes this information and sends electronic signals to the XPI Fuel System Injectors where the precise amount of fuel is injected into the engine.

2. XPI Fuel Injectors - The engine is equipped with extra high pressure (XPI) injector that injects diesel fuel directly into the combustion chamber. The amount of fuel injected and the beginning of injection timing is determined by the engine control unit. Injection duration and the fuel pressure in accumulator determine the amount of fuel which is injected into the cylinder. The EMS sends a command pulse which activates the injector solenoid.

NOTICE: Never apply 12 or 24 volts directly to terminals on the injector or engine sensors as they will burn out. Before removing injectors, the fuel passages must be blown out to prevent fuel flow from entering the cylinder head.



WARNING

The operator of the machine must not attempt to use or read an SDP3 of any kind while the machine is operating. Doing so can result in loss of control, which may cause machine damage and may result in personal injury.



WARNING

Engine or electronics system diagnosis must be done by a person other than the operator. The operator must maintain control of the moving machine while the assistant performs the diagnosis.



WARNING

Due to the high fuel pressure, leakage can cause jets of fuel that penetrates through the skin!

Always consider the high pressure part of the system (accumulator and high pressure lines) as pressurized. The pressure could be as high as 3000 bar. This applies also to an engine that is not running!

Before working on any of the fuel system components: Depressurize the system by use of SDP3 and then untightening the cylinder high pressure line nut at the accumulator of the cylinder you are going to work on. Cover the nut with a cloth during the operation. Use safety glasses and gloves.

Avoid standing closer than 1 m to a running engine. Fuel jets will diverge within this distance from the source and become less harmful.

The pressure can be as high as 2400 bar also in an engine that is not running.

Use SDP3 to de-pressurize the system before working on the components.

Always wear safety glasses when working on the system.

NOTICE: Never apply 12 or 24 volts directly to terminals on the injector or engine sensors as they will burn out. Before removing injectors, the fuel passages must be blown out to prevent fuel flow from entering the cylinder head.

The machine is equipped with an engine protection derate system, which records fault codes and illuminates appropriate warning lights when an out-of-range condition associated with any of the following sensors is found:

- Coolant temperature
- Oil pressure
- Oil temperature
- Boost pressure
- Boost temperature

The engine power and speed will be gradually reduced depending on the level of severity of the out-of-range condition. The operator **MUST** shut down the engine to avoid serious damage.

The engine should not be restarted after it has been shut down after activation of the engine protection derate system unless the problem has been diagnosed and corrected.

Controls and Operating

MCU ERROR CODES

Error Code	Description of Error	Check
01	DASHBOARD DISPLAY- DASH NOT LIVE	
02	ECU NOT LIVE	
03	TCU NOT LIVE	
04	Control Stock- LEVER NOT LIVE	
05	-----	
06	-----	
07	-----	
08	-----	
09	-----	
10	-----	
11	MCU OUT_00 X1:18 SHORT	K2_MainRelayTerminal15_ON
12	MCU OUT_00 X1:18 BREAK	K2_MainRelayTerminal15_ON
13	MCU OUT_01 X1:17 SHORT	E5_ParkingLights_ON
14	MCU OUT_01 X1:17 BREAK	E5_ParkingLights_ON
15	MCU OUT_02 X1:16 SHORT	E5_LowBeam_Left_ON
16	MCU OUT_02 X1:16 BREAK	E5_LowBeam_Left_ON
17	MCU OUT_03 X1:15 SHORT	E5_Indicators_LEFT_ON
18	MCU OUT_03 X1:15 BREAK	E5_Indicators_LEFT_ON
19	MCU OUT_04 X1:14 SHORT	E7_BrakeLights_ON
20	MCU OUT_04 X1:14 BREAK	E7_BrakeLights_ON
21	MCU OUT_05 X1:13 SHORT	K15_FrontWiper_Speed_1_ON
22	MCU OUT_05 X1:13 BREAK	K15_FrontWiper_Speed_1_ON
23	MCU OUT_06 X1:12 SHORT	K15a_FrontWiper_Speed_2_ON
24	MCU OUT_06 X1:12 BREAK	K15a_FrontWiper_Speed_2_ON
25	MCU OUT_07 X1:11 SHORT	E8_Indicators_RIGHT_ON
26	MCU OUT_07 X1:11 BREAK	E8_Indicators_RIGHT_ON

Controls and Operating

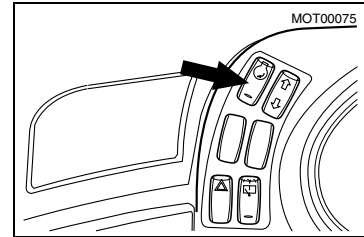
Error Code	Description of Error	Check
27	MCU OUT_08 X1:2 SHORT	E5_HighBeam_Left_ON
28	MCU OUT_08 X1:2 BREAK	E5_HighBeam_Left_ON
29	MCU OUT_09 X1:3 SHORT	P8_FlashingReverseLamp_ON
30	MCU OUT_09 X1:3 BREAK	P8_FlashingReverseLamp_ON
31	MCU OUT_10 X1:4 SHORT	E6_LowBeam_Right_ON
32	MCU OUT_10 X1:4 BREAK	E6_LowBeam_Right_ON
33	MCU OUT_11 X1:5 SHORT	E20_ReverseLamp_ON
34	MCU OUT_11 X1:5 BREAK	E20_ReverseLamp_ON
35	MCU OUT_12 X1:6 SHORT	K8_Horn_ON
36	MCU OUT_12 X1:6 BREAK	K8_Horn_ON
37	MCU OUT_13 X1:7 SHORT	E11_WorkLights_Front_ON
38	MCU OUT_13 X1:7 BREAK	E11_WorkLights_Front_ON
39	MCU OUT_14 X1:8 SHORT	Q7_TransFan_OFF
40	MCU OUT_14 X1:8 BREAK	Q7_TransFan_OFF
41	MCU OUT_15 X1:9 SHORT	Reserve
42	MCU OUT_15 X1:9 BREAK	Reserve
43	MCU OUT_00E X2:18 SHORT	M2_WashPump_Front_ON
44	MCU OUT_00E X2:18 BREAK	M2_WashPump_Front_ON
45	MCU OUT_01E X2:17 SHORT	Reserve
46	MCU OUT_01E X2:17 BREAK	Reserve
47	MCU OUT_02E X2:16 SHORT	E6_HighBeam_RIGHT_ON
48	MCU OUT_02E X2:16 BREAK	E6_HighBeam_RIGHT_ON
49	MCU OUT_03E X2:15 SHORT	K16_RearWiper_ON
50	MCU OUT_03E X2:15 BREAK	K16_RearWiper_ON
51	MCU OUT_04E X2:14 SHORT	Reserve_PWM
52	MCU OUT_04E X2:14 BREAK	Reserve_PWM
53	MCU OUT_05E X2:13 SHORT	Reserve
54	MCU OUT_05E X2:13 BREAK	Reserve

Controls and Operating

Whenever the 'Stop' or 'Check' light comes on, the EMS will determine where the problem is and will store this information in its memory. If the malfunction is intermittent, the lights will come on and go off as the computer senses the changing engine condition.

The fault codes are displayed in the diagnostic screen.

NOTICE: Refer to 'Electronic Fuel System Diagnostic Codes' table for fault code descriptions.



Controls and Operating

ENGINE FAULT CODES

Fault codes generated in the CAN network are sent via CAN message. This document describes how to interpret these fault codes.

Abbreviations

Abbreviation	Explanation
SPN	Suspect Parameter Number
FMI	Failure Mode Identifiers

Failure Mode Identifiers

Explanation of FMI codes.

Code	Explanation
0	Data valid but above normal operational range (that is, engine overheating)
1	Data valid but below normal operational range (that is, engine oil pressure too low)
2	Data erratic, intermittent, or incorrect
3	Voltage above normal or shorted high
4	Voltage below normal or shorted low
5	Current below normal or open circuit
6	Current above normal or grounded circuit
7	Mechanical system not responding properly
8	Abnormal frequency, pulse width, or pending
9	Abnormal update rate
10	Abnormal rate of change
11	Failure mode not identifiable
12	Bad intelligent device or component
13	Out of calibration
14	Special instructions
15	Reserved for future assignment by the SAE subcommittee

Controls and Operating

List of fault codes

SPN	SPN Name	SPN Description	FMIa
51	Engine Throttle Position	The position of the valve used to regulate the supply of a fluid, usually air or fuel/air mixture, to an engine.	0,1,2,3,4,5
94	Engine Fuel Delivery Pressure	Gauge pressure of fuel in the system as delivered from the supply pump to the injection pump.	0
98	Engine Oil Level	Ratio of current volume of engine sump oil to the maximum required volume.	2,3,4
100	Engine Oil Pressure	Gauge pressure of oil in the engine lubrication system as provided by the oil pump.	0,1,2,3,4
102	Engine Intake Manifold #1 Pressure	The gauge pressure measurement of the air intake manifold.	0,1,2,3,5
105	Engine Intake Manifold 1 Temperature	Temperature of pre-combustion air found in the intake manifold number 1 of the engine air supply system.	0,2,3,4
107	Engine Air Filter 1 Differential Pressure	Change in the engine air system pressure, measured across the filter, due to the filter and any accumulation of solid foreign matter on or in the filter.	1
108	Barometric Pressure	Absolute air pressure of the atmosphere.	2,3,4
110	Engine Coolant Temperature	Temperature of liquid found in the engine cooling system.	0,1,2,3,4
111	Engine Coolant Level	Ratio of volume of liquid found in the engine cooling system to total cooling system volume.	1,3,4
156	Engine Injector Timing Rail 1 Pressure	The gauge pressure of fuel in the timing rail delivered from the supply pump to the injector timing inlet.	0,1,2,3,4
167	Charging System Potential (Voltage)	Electrical potential measured at the charging system output. The charging system may be any device charging the batteries. This includes alternators, generators, solid state charger and other charging devices.	2,5,6
168	Battery Potential / Power Input 1	This parameter measures the first source of battery potential as measured at the input of the ECM/actuator etc. coming from one or more batteries, irrespective of the distance between the component and the battery.	0, 1
171	Ambient Air Temperature	Temperature of air surrounding vehicle.	0,1,2
190	Engine Speed	Actual engine speed which is calculated over a minimum crankshaft angle of 720 degrees divided by the number of cylinders.	0,2
559	Accelerator Pedal Kickdown Switch	Switch signal which indicates whether the accelerator pedal kickdown switch is opened or closed.	2

Controls and Operating

SPN	SPN Name	SPN Description	FMI ^a
1761	Aftertreatment 1 SCR Catalyst Tank Level	A special catalyst uses a chemical reagent to reach legal requirement for NOX emissions. This parameter indicates the reagent level within that catalyst tank.	0,1,3,6,8
2797	Engine Injector Group 1	A first collection of fuel injector circuits that are grouped together.	2,3,4
2798	Engine Injector Group 2	A second collection of fuel injector circuits that are grouped together.	2,3,4
3031	Aftertreatment 1 SCR Catalyst Tank Temperature	Temperature of the reagent in the storage tank.	0,1,3,6
3226	Aftertreatment 1 Outlet NOx	The amount of combined NOx and NO2 in the exhaust entering the aftertreatment system measured by a NOx sensor at the aftertreatment outlet, represented in NOx molecule parts per million non-NOx molecules in exhaust bank 1.	2,3,5,6
3241	Aftertreatment 1 Exhaust Gas Temperature 1	The reading from the exhaust gas temperature sensor located farthest upstream in the aftertreatment system in exhaust bank 1.	2,3,5,6
3360	Aftertreatment 1 SCR Catalyst Tank Controller	The catalyst tank controller has the ability to read attributes of the catalyst reagent such as the catalyst reagent level, catalyst reagent temperature and catalyst reagent quality.	2
3361	Aftertreatment 1 SCR Catalyst Dosing Unit	The catalyst dosing unit is a device that mixes the catalyst reagent and air, and delivers a metered quantity of this mixture to the exhaust stream.	2,3,4,6
3363	Aftertreatment 1 SCR Catalyst Tank Heater	Percentage of heating applied to the catalyst tank heater.	2,3,5,6
4090	NOx limits exceeded, root cause unknown	Indicates that On-Board Diagnostics has determined that the limits for NOx in the exhaust stream have been exceeded, but the root cause cannot be determined by the OBD system.	0,2
4095	NOx limits exceeded due to Interrupted Reagent Dosing	Indicates that On-Board Diagnostics has determined that the limits for NOx in the exhaust stream have been exceeded due to an interruption in reagent dosing activity.	2
4096	NOx limits exceeded due to Empty Reagent Tank	Indicates that On-Board Diagnostics has determined that the limits for NOx in the exhaust stream have been exceeded due to the reagent tank being empty.	2
4334	Aftertreatment 1 SCR Dosing Reagent Absolute Pressure	The SCR dosing reagent absolute pressure (measured closest to dosing valve) for aftertreatment system 1 (exhaust bank 1).	0,1,2,3,6
4337	Aftertreatment 1 SCR Dosing Reagent Temperature	The SCR dosing reagent temperature (measured closest to dosing valve) for aftertreatment system 1 (exhaust bank 1).	2,3,6

Controls and Operating

SPN	SPN Name	SPN Description	FMI ^a
4341	Aftertreatment 1 SCR Catalyst Reagent Line Heater 1 Preliminary FMI	Used to identify the applicable J1939-73 FMI detected in the SCR catalyst reagent line heater 1, by the manufacturer's control software in exhaust bank 1.	2,3,5,6
4374	Aftertreatment 1 SCR Catalyst Reagent Pump Motor Speed	Rotational speed of the motor driving a pump for reagent used in an aftertreatment system.	0,1,2,3,5,6

NOTICE: Possible FMIs, for an explanation of the code see the table under the heading Failure Mode Identifiers.

Controls and Operating

Error Code	Description of Error	Check
55	MCU OUT_06E X2:12 SHORT	Q14_TransmissionFan_Speed_PWM
56	MCU OUT_06E X2:12 BREAK	Q14_TransmissionFan_Speed_PWM
57	MCU OUT_07E X2:11 SHORT	SystemHydraulic_unloader_valve
58	MCU OUT_07E X2:11 BREAK	SystemHydraulic_unloader_valve
59	MCU OUT 08E X2:2 SHORT	
60	MCU OUT 08E X2:2 BREAK	
61	MCU OUT 09E X2:3 SHORT	
62	MCU OUT 09E X2:3 BREAK	
63	MCU OUT 10E X2:4 SHORT	
64	MCU OUT 10E X2:4 BREAK	
65	MCU OUT 11E X2:5 SHORT	
66	MCU OUT 11E X2:5 BREAK	
67	MCU OUT 12E X2:6 SHORT	
68	MCU OUT 12E X2:6 BREAK	
69	MCU OUT 13E X2:7 SHORT	
70	MCU OUT 13E X2:7 BREAK	
71	MCU OUT 14E X2:8 SHORT	Q8_BodyRaiseValve
72	MCU OUT 14E X2:8 BREAK	Q8_BodyRaiseValve
73	MCU OUT 15E X2:9 SHORT	Q8_BodyLowerValve
74	MCU OUT 15E X2:9 BREAK	Q8_BodyLowerValve
75	MCU OUT 16E X2:25 SHORT	--- Not Available ---
76	MCU OUT 16E X2:25 BREAK	--- Not Available ---
77	MCU OUT 17E X2:26 SHORT	--- Not Available ---
78	MCU OUT 17E X2:26 BREAK	--- Not Available ---
79	MCU OUT 18E X2:27 SHORT	--- Not Available ---
80	MCU OUT 18E X2:27 BREAK	--- Not Available ---
81	MCU OUT 19E X2:28 SHORT	--- Not Available ---
82	MCU OUT 19E X2:28 BREAK	--- Not Available ---
83	MCU OUT 20E X2:29 SHORT	--- Not Available ---

Controls and Operating

Error Code	Description of Error	Check
84	MCU OUT 20E X2:29 BREAK	--- Not Available ---
85	MCU OUT 21E X2:30 SHORT	--- Not Available ---
86	MCU OUT 21E X2:30 BREAK	--- Not Available ---
87	MCU OUT 22E X2:31 SHORT	--- Not Available ---
88	MCU OUT 22E X2:31 BREAK	--- Not Available ---
89	MCU OUT 23E X2:50 SHORT	--- Not Available ---
90	MCU OUT 23E X2:50 BREAK	--- Not Available ---
91	MCU OUT 24E X2:42 SHORT	--- Not Available ---
92	MCU OUT 24E X2:42 BREAK	--- Not Available ---
93	MCU OUT 25E X2:43 SHORT	--- Not Available ---
94	MCU OUT 25E X2:43 BREAK	--- Not Available ---
95	MCU OUT 26E X2:44 SHORT	--- Not Available ---
96	MCU OUT 26E X2:44 BREAK	--- Not Available ---
97	MCU OUT 27E X2:45 SHORT	--- Not Available ---
98	MCU OUT 27E X2:45 BREAK	--- Not Available ---
99	MCU OUT 28E X2:46 SHORT	--- Not Available ---
100	MCU OUT 28E X2:46 BREAK	--- Not Available ---
101	MCU OUT 29E X2:47 SHORT	--- Not Available ---
102	MCU OUT 29E X2:47 BREAK	--- Not Available ---
103	MCU OUT 30E X2:48 SHORT	--- Not Available ---
104	MCU OUT 30E X2:49 BREAK	--- Not Available ---
105	MCU OUT 31E X2:49 SHORT	--- Not Available ---
106	MCU OUT 31E X2:49 BREAK	--- Not Available ---
107	MCU IN_X1:22	B02 ThrottlePedal High Volt
108	MCU IN_X1:22	B02 ThrottlePedal Low Volt
109	MCU IN_X1:39	B02 ThrottlePedal Activated
110	MCU IN_X1:36	K05 DifferentialLockRelay Activated

Controls and Operating

Error Code	Description of Error	Check
111	DASHBOARD DISPLAY IN_XJ:26XK:10	S27 BrakePedal Activated
112	MCU IN_X2:22 S24	BodyRaise/Lower High Volt
113	MCU IN_X2:22 S24	BodyRaise/Lower Low Volt
114	-----	
115	-----	
116	-----	
117	-----	
118	-----	
119	-----	
120	-----	
121	-----	
122	-----	
123	-----	
124	-----	
125	-----	
126	-----	
127	-----	
128	-----	
129	-----	
130	-----	
131	-----	
132	-----	

Controls and Operating

NOTICE: Before any welding is done on a machine equipped with an EST-37 shift system, disconnect the following in this order: battery earth cable, battery supply cable, alternator earth cables, alternator supply cables and electrical connections at the engine EMS, transmission ECU, hydraulic ECU, DISPLAY ECU and cab bulkhead to avoid damage to electrical components. Turn off the battery master switch to isolate the batteries before disconnecting any components.

After welding connect all of the above in reverse order.

EST-37 Automatic Shift Transmission

The EST-37 transmission is equipped with an electronic control unit (ECU) which continually monitors the transmission and shift system electrical components and warns the operator when a problem develops. It also takes action to prevent damage to the transmission, and provides the serviceman with diagnostic capabilities so that problems can be corrected quickly and easily.

When a fault occurs, a two digit error code will be displayed on the LCD display on the dash panel. The error code is also recorded in the transmission ECU, and can be accessible by the serviceman by plugging in a data reader to extract information relating to the fault. The error code recorded in the ECU memory will remain until it is erased by a technician.

If a major fault is detected, it is the operator's responsibility to shut down the machine as soon as it is safe to do so. The machine should not be restarted until the fault has been diagnosed and corrected.

Refer to 'Description of Fault Codes Ergocontrol' table for a list of fault codes and checks in Section 3.

The EST-37 transmission control has been designed to provide the driver with maximum operational flexibility, by allowing the choice of automatic or manual gear selection to optimize vehicle performance under all operating conditions.

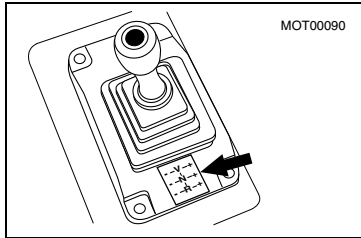
The transmission provides six forward gears, three reverse gears and a neutral position. The gear positions are indicated on the DISPLAY screen. When the lever is in the automatic range, shifts will occur automatically between 1st and 6th gear, depending on operating requirements. The reverse gears 1st through 3rd are manual mode only.

NOTICE: When in manual mode, if the engine speed drops below the lock up disengaging speed, the transmission will automatically downshift to the next lowest gear. A manual upshift will only be accepted if the transmission is in lock up.

NOTICE: To perform a stall test, manual upshifts can be selected without lock up being engaged by special activation of the auto/manual button on the gearshift controller. Described in Section 3.

Controls and Operating

NOTICE: Do not allow the machine to coast in neutral. This practice can result in severe transmission damage.



VTS-3 Shift Controller

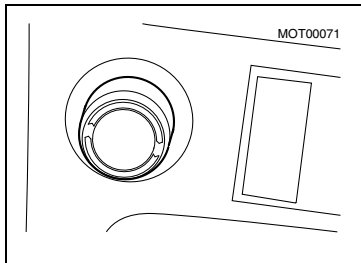
The shift controller has 3 positions the lever can rest in, Forward, Neutral (N) and Reverse.

The shift controller has a 'Function' button on the top of the lever which is used to switch between automatic and manual modes. Press the function button in 'NEUTRAL', then move the lever forward to select automatic mode, when driving normal upshifting and downshifting will occur. If required, a gear can be held in manual mode by pressing the function button once, to resume full automatic mode the function button should be pressed again. Manual gears can also be selected by pushing the lever to the left for lower gears or to the right for higher gears, again by pressing the function button once automatic mode will be resumed.

NOTICE: A manual upshift will only be accepted if the speed is high enough to maintain lock up. In manual mode, if transmission enters converter mode it will downshift automatically to prevent overheating from operating in converter mode.

NOTICE: The transmission will only allow gearshifts when the predetermined values have been reached.

NOTICE: There is no shift inhibitor in the gear shift control, therefore, no resistance would be felt while moving through the gear ranges.



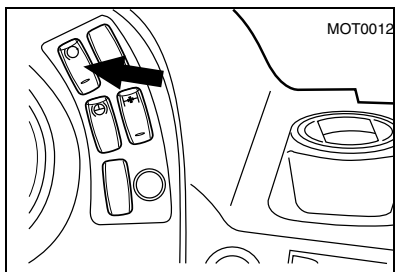
When performing a stall test a certain procedure has to be carried out to allow selection of 6th gear with the machine at standstill. The procedure is as follows:

1. Ensure the Parking Brake is applied.
2. Ensure both the engine and transmission have reached an adequate operating temperature.
3. Press the bottom of the Engine Exhaust Brake switch to select the 'ON' position.
4. Press the function button in neutral and move the gear lever forward to select automatic mode.
5. Press the function button 5 times within 4 seconds.
6. Manually select 6th gear by pushing the lever to the right.

NOTICE: If the Service Brake is applied during the Stall Test, the Engine Exhaust Brake will activate and prevent the test completion.

The gear lever housing sends a signal to the electronic control unit, which in turn will only allow the engine to be started when the gear lever is in the 'NEUTRAL' position. The gear shift lever must always be placed in 'NEUTRAL' and the parking brake applied when starting the engine, or whenever the machine is left unattended.

When shifting from 'NEUTRAL' to start from a standstill, or to reverse direction, decelerate the engine to idle speed before selecting the proper gear. When 'REVERSE' is selected, the 'Reverse Alarm' sounds and the

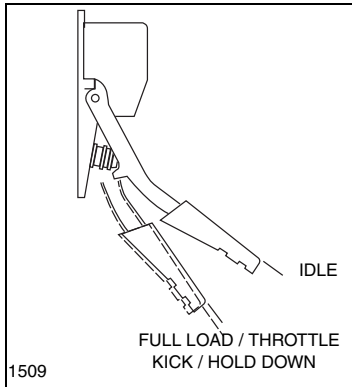


Controls and Operating

'Reverse Light' illuminates to warn personnel to the rear of the machine that reverse gear has been selected.

During reversing operations it is recommended to reduce the engine speed. Use only 1st or 2nd gear and never exceed 10 km/h (6.2 mile/h).

The electronic control system distinguishes between the throttle position (or load ranges) depending on the governor position (injection pump). On a light throttle opening, the transmission will give earlier upshifts and later downshifts than when operating at full throttle.

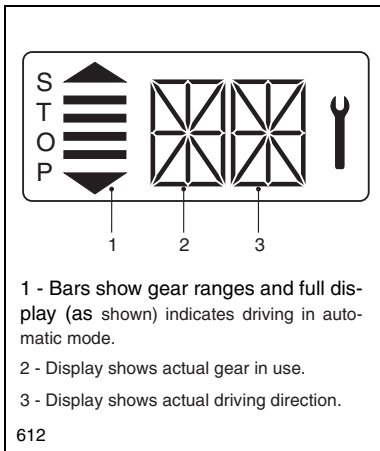


A kickdown facility, which can be used when automatic mode is selected, allows for the possibility of selecting a lower gear by pressing down fully on the throttle pedal and holding. This can be used to provide a downshift on demand provided that the vehicle speed is within the range allowable. That is, the vehicle is not travelling at a speed that would result in the engine overspeeding in the lower gear. When driving with kickdown, the transmission will give earlier downshifts and later upshifts. To disengage the transmission kickdown, release the throttle pedal and allow it to return to a light throttle position.

When operating in automatic range with the display indicating that the transmission has downshifted to 2nd gear, there are two options for providing a further downshift as conditions indicate.

1. 1st gear can be manually selected by pushing the shift lever to the left.
2. Kickdown can be selected from 2nd automatic, when the transmission will downshift to 1st gear, depending upon the vehicle speed.

When the kickdown is released, the transmission will upshift to 2nd automatic, provided that the forward speed has increased sufficiently to allow this to happen, and that the shift lever is in the automatic mode.



A DISPLAY screen is provided which indicates gear selected and driving direction as follows:

Manual Mode - When driving with shift selector in manual range, the bars only are shown in position 1, and, driving direction and gear selected are indicated in positions 2 and 3.

Automatic Mode - When driving with shift selector in automatic range, a full display of bars and arrows are shown in position 1, and, driving direction and gear selected are indicated in positions 2 and 3.

Under certain conditions, the transmission may start to 'hunt' between gears when in automatic mode. The transmission changes up and down between two gears at short intervals because there is not sufficient power to sustain driving in the higher gear, but is sufficient for upshifting from the lower gear. By using the shift display, it can be established which gears are involved and in these circumstances the lower gear should be selected using the shift control lever. Automatic mode should be reselected at the earliest opportunity.

During machine operation, watch for wide deviations from normal readings on the transmission oil temperature gauge. If the gauge shows the oil temperature rising above 120 °C during normal operation, or above 145

Controls and Operating

°C during retarder operation, the machine must be stopped and inspected for external oil leakage. If no leaks are found, shift to 'NEUTRAL' and operate the engine at 1200 - 1500 rev/min. If the transmission oil temperature does not decrease into the normal range within 2 or 3 minutes, the cause of the overheating should be corrected before the machine is operated further.

NOTICE: In cold weather, the transmission oil should be warmed up by running the engine at idle speed with the gear selector in neutral, since the system will not operate satisfactorily if the oil is too cold.

When the machine is stopped, such as for yielding the right of way to a loaded machine, the transmission can be left in the selected range and the machine held stationary with the service brakes.

When the machine is stopped for extended period with the engine left running, shift the transmission to Neutral so that the parking brake is automatically applied, and to avoid unnecessary heat buildup.



CAUTION

Do not attempt to adjust the steering wheel while the machine is moving. Loss of control may result. Stop the machine; apply park brake; then carry out adjustments.

Always select the correct drive direction and gear before releasing the parking brake.

Never allow the machine to coast with the transmission in 'NEUTRAL'.

When running down a gradient the engine speed should not be allowed to drop below 1200 rev/min, at which point lockup would disengage preventing retarder operation.

In the event of a loss of electric power to the gear shift control, the transmission will automatically shift to 'NEUTRAL'. If this occurs, stop the machine using service brakes. The park brakes will be applied automatically when the speed reduces to below 1m/h. Do not operate the machine until the fault is corrected. Apply park brake switch before leaving the vehicle.

Always select 'NEUTRAL' before leaving the operator seat

The retarder will automatically disengage when the oil temperature reaches 150 °C (302 °F), irrespective of engine speed.

Controls and Operating

DESCRIPTION OF FAULT CODES FOR ERGO-CONTROL

Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODE possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
10 / 16	5001	12	LOGICAL ERROR AT DIRECTION SELECT SIGNAL 3RD SHIFT LEVER TCU detected a wrong signal combination for the direction • cable from shift lever 3 to TCU is broken • cable is defective and is contacted to battery voltage or vehicle ground • shift lever is defective	TCU shifts transmission to neutral if selector active OP-Mode: transmission shutdown if selector active	• check the cables from TCU to shift lever 3 • check signal combinations of shift lever positions F-N-R • if shift lever is a CAN shift lever check CAN cable/shifter/device	fault is cleared if TCU detects a valid neutral signal for the direction at the shift lever
11 / 17	5000	12	LOGICAL ERROR AT GEAR RANGE SIGNAL TCU detected a wrong signal combination for the gear range • cable from shift lever to TCU is broken • cable is defective and is contacted to battery voltage or vehicle ground • shift lever is defective	TCU shifts transmission to neutral OP-Mode: transmission shutdown	• check the cables from TCU to shift lever • check signal combinations of shift lever positions for gear range	fault is taken back if TCU detects a valid signal for the position
12 / 18	5010	12	LOGICAL ERROR AT DIRECTION SELECT SIGNAL TCU detected a wrong signal combination for the direction • cable from shift lever to TCU is broken • cable is defective and is contacted to battery voltage or vehicle ground • shift lever is defective	TCU shifts transmission to neutral OP-Mode: transmission shutdown	• check the cables from TCU to shift lever • check signal combinations of shift lever positions F-N-R	fault is taken back if TCU detects a valid signal for the direction at the shift lever
13 / 19	5020	12	LOGICAL ERROR AT ENGINE DERATING DEVICE TCU detected no reaction of engine while derating device active	after selecting neutral, TCU changes to OP-Mode limp home	• check engine derating device	This fault is reset after power up of TCU
15 / 21	5040	12	LOGICAL ERROR AT DIRECTION SELECT SIGNAL 2. SHIFT LEVER TCU detected a wrong signal combination for the direction • cable from shift lever 2 to TCU is broken • cable is defective and is contacted to battery voltage or vehicle ground • shift lever is defective	TCU shifts transmission to neutral if selector active OP-Mode: transmission shutdown if selector active	• check the cables from TCU to shift lever 2 • check signal combinations of shift lever positions F-N-R	fault is taken back if TCU detects a valid neutral signal for the direction at the shift lever
16 / 22	5050	12	LOGICAL ERROR AT AXLE CONNECTION feedback axle connection measured by TCU and output signal axle connection don't fit • axle can't be connected or disconnected due to mechanical problem • one of the cables from feedback axle connection -switch to TCU is broken	OP-Mode: normal	• check the cables from TCU to feedback axle connection switch • check signals of the feedback axle connection switch	
25 / 37	5110	3	S.C. TO BATTERY VOLTAGE OR O.C. AT TRANSMISSION SUMP TEMPERATURE SENSOR INPUT the measured voltage is too high: • cable is defective and is contacted to battery voltage • cable has no connection to TCU • temperature sensor has an internal defect • connector pin is contacted to battery voltage or is broken	no reaction, TCU uses default temperature OP-Mode: normal	• check the cable from TCU to the sensor • check the connectors • check the temperature sensor	
26 / 38	5110	4	S.C. TO GROUND AT TRANSMISSION SUMP TEMPERATURE SENSOR INPUT the measured voltage is too low: • cable is defective and is contacted to vehicle ground	no reaction, TCU uses default temperature OP-Mode: normal	• check the cable from TCU to the sensor • check the connectors • check the temperature sensor	

Controls and Operating

Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
			- temperature sensor has an internal defect - connector pin is contacted to vehicle ground			
27 / 39	5120	3	S.C. TO BATTERY VOLTAGE OR O.C. AT RETARDER / TORQUE CONVERTER TEMPERATURE SENSOR INPUT the measured voltage is too high: - cable is defective and is contacted to battery voltage - cable has no connection to TCU - temperature sensor has an internal defect - connector pin is contacted to battery voltage or is broken	no reaction, TCU uses default temperature OP-Mode: normal	- check the cable from TCU to the sensor - check the connectors - check the temperature sensor	
28 / 40	5120	4	S.C. TO GROUND AT RETARDER / TORQUE CONVERTER TEMPERATURE SENSOR INPUT the measured voltage is too low: - cable is defective and is contacted to vehicle ground - temperature sensor has an internal defect - connector pin is contacted to vehicle ground	no reaction, TCU uses default temperature OP-Mode: normal	- check the cable from TCU to the sensor - check the connectors - check the temperature sensor	
29 / 41	5130	3	S.C. TO BATTERY VOLTAGE OR O.C. AT PARKING BRAKE SENSOR INPUT the measured voltage is too high: - cable is defective and is contacted to battery voltage - cable has no connection to TCU - sensor has an internal defect - connector pin is contacted to battery voltage or is broken	TCU uses default value OP-Mode: normal	- check the cable from TCU to the sensor - check the connectors - check the parking brake sensor	
2A / 42	5130	4	S.C. TO GROUND PARKING BRAKE SENSOR INPUT the measured voltage is too low: - cable is defective and is contacted to vehicle ground - sensor has an internal defect - connector pin is contacted to vehicle ground	TCU uses default value OP-Mode: normal	- check the cable from TCU to the sensor - check the connectors - check the parking brake sensor	
2B / 43	5313	12	INCHSENSOR-SIGNAL MISMATCH the measured voltage from CCO and CCO2 signal don't match or out of range - cable is defective - sensor has an internal defect	During inching mode: TCU shifts to neutral While not inching: no change OP-Mode: normal	- check the cable from TCU to the sensor - check the connectors - check sensor	
31/ 49	5140	3	S.C. TO BATTERY VOLTAGE OR O.C. AT ENGINE SPEED INPUT TCU measures a voltage higher than 7.00 V at speed input pin - cable is defective and is contacted to battery voltage - cable has no connection to TCU - speed sensor has an internal defect - connector pin is contacted to battery voltage or has no contact	OP-Mode: substitute clutch control	- check the cable from TCU to the sensor - check the connectors - check the speed sensor	
32 / 50	5140	4	S.C. TO GROUND AT ENGINE SPEED INPUT TCU measures a voltage less than 0.45V at speed input pin - cable / connector is defective and is contacted to vehicle ground - speed sensor has an internal defect	OP-Mode: substitute clutch control	- check the cable from TCU to the sensor - check the connectors - check the speed sensor	

Controls and Operating

Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
33 / 51	5140	12	LOGICAL ERROR AT ENGINE SPEED INPUT TCU measures a engine speed over a threshold and the next moment the measured speed is zero • cable / connector is defective and has bad contact • speed sensor has an internal defect • sensor gap has the wrong size	OP-Mode: substitute clutch control	• check the cable from TCU to the sensor • check the connectors • check the speed sensor • check the sensor gap	This fault is reset after power up of TCU
34 / 52	5150	3	S.C. TO BATTERY VOLTAGE OR O.C. AT TURBINE SPEED INPUT TCU measures a voltage higher than 7.00 V at speed input pin • cable is defective and is contacted to battery voltage • cable has no connection to TCU • speed sensor has an internal defect • connector pin is contacted to battery voltage or has no contact	OP-Mode: substitute clutch control if a failure is existing at output speed, TCU shifts to neutral OP-Mode: limp home	• check the cable from TCU to the sensor • check the connectors • check the speed sensor	
35 / 53	5150	4	S.C. TO GROUND AT TURBINE SPEED INPUT TCU measures a voltage less than 0.45V at speed input pin • cable / connector is defective and is contacted to vehicle ground • speed sensor has an internal defect	OP-Mode: substitute clutch control if a failure is existing at output speed, TCU shifts to neutral OP-Mode: limp home	• check the cable from TCU to the sensor • check the connectors • check the speed sensor	
36 / 54	5150	12	LOGICAL ERROR AT TURBINE SPEED INPUT TCU measures a turbine speed over a threshold and at the next moment the measured speed is zero • cable / connector is defective and has bad contact • speed sensor has an internal defect • sensor gap has the wrong size	OP-Mode: substitute clutch control if a failure is existing at output speed, TCU shifts to neutral OP-Mode: limp home	• check the cable from TCU to the sensor • check the connectors • check the speed sensor • check the sensor gap	This fault is reset after power up of TCU
37/ 55	5160	3	S.C. TO BATTERY VOLTAGE OR O.C. AT INTERNAL SPEED INPUT TCU measures a voltage higher than 7.00 V at speed input pin • cable is defective and is contacted to battery voltage • cable has no connection to TCU • speed sensor has an internal defect • connector pin is contacted to battery voltage or has no contact	OP-Mode: substitute clutch control	• check the cable from TCU to the sensor • check the connectors • check the speed sensor	
38 / 56	5160	4	S.C. TO GROUND AT INTERNAL SPEED INPUT TCU measures a voltage less than 0.45V at speed input pin • cable / connector is defective and is contacted to vehicle ground • speed sensor has an internal defect	OP-Mode: substitute clutch control	• check the cable from TCU to the sensor • check the connectors • check the speed sensor	
39 / 57	5160	12	LOGICAL ERROR AT INTERNAL SPEED INPUT TCU measures a internal speed over a threshold and at the next moment the measured speed is zero • cable / connector is defective and has bad contact • speed sensor has an internal defect • sensor gap has the wrong size	OP-Mode: substitute clutch control	• check the cable from TCU to the sensor • check the connectors • check the speed sensor • check the sensor gap	This fault is reset after power up of TCU
3A / 58	5170	3	S.C. TO BATTERY VOLTAGE OR O.C. AT OUTPUT SPEED INPUT TCU measures a voltage higher than 12.5 V at speed input pin • cable is defective and is contacted to battery voltage	special mode for gear selection OP-Mode: substitute clutch control if a failure is existing at turbine speed, TCU shifts to neutral OP-Mode: limp home	• check the cable from TCU to the sensor • check the connectors • check the speed sensor	

Controls and Operating

Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
			• cable has no connection to TCU • speed sensor has an internal defect • connector pin is contacted to battery voltage or has no contact			
3B / 59	5170	4	S.C. TO GROUND AT OUTPUT SPEED INPUT TCU measures a voltage less than 1.00V at speed input pin • cable / connector is defective and is contacted to vehicle ground • speed sensor has an internal defect	special mode for gear selection OP-Mode: substitute clutch control if a failure is existing at turbine speed, TCU shifts to neutral OP-Mode: limp home	• check the cable from TCU to the sensor • check the connectors • check the speed sensor	
3C / 60	5170	12	LOGICAL ERROR AT OUTPUT SPEED INPUT TCU measures a output speed over a threshold and at the next moment the measured speed is zero • cable / connector is defective and has bad contact • speed sensor has an internal defect • sensor gap has the wrong size	special mode for gear selection OP-Mode: substitute clutch control if a failure is existing at turbine speed, TCU shifts to neutral OP-Mode: limp home	• check the cable from TCU to the sensor • check the connectors • check the speed sensor • check the sensor gap	This fault is reset after power up of TCU
3E / 62	5180	2	OUTPUT SPEED ZERO DOESN'T FIT TO OTHER SPEED SIGNALS if transmission is not neutral and the shifting has finished, TCU measures outputspeed zero and turbine speed or internal speed not equal to zero. • speed sensor has an internal defect • sensor gap has the wrong size	special mode for gear selection OP-Mode: substitute clutch control if a failure is existing at turbine speed, TCU shifts to neutral OP-Mode: limp home	• check the sensor signal of output speed sensor • check the sensor gap of output speed sensor • check the cable from TCU to the sensor	This fault is reset after power up of TCU
56 / 86	5280	9	ENGINE CONF TIMEOUT Timeout of CAN-message ENGINE CONF from engine controller • interference on CAN-Bus • CAN wire/connector is broken • CAN wire/connector is defective and has contact to vehicle ground or battery voltage	OP-Mode: substitute clutch control	• check engine controller • check wire of CAN-Bus • check cable to engine controller	
57 / 87	5290	9	EEC1 TIMEOUT Timeout of CAN-message EEC1 from EEC controller • interference on CAN-Bus • CAN wire/connector is broken • CAN wire/connector is defective and has contact to vehicle ground or battery voltage	OP-Mode: substitute clutch control	• check EEC controller • check wire of CAN-Bus • check cable to EEC controller	
58 / 88	5300	9	EEC3 TIMEOUT Timeout of CAN-message EEC3 from EEC controller • interference on CAN-Bus • CAN wire/connector is broken • CAN wire/connector is defective and has contact to vehicle ground or battery voltage	OP-Mode: substitute clutch control	• check EEC controller • check wire of CAN-Bus • check cable to EEC controller	
65 / 101	5430	2	ENGINE TORQUE SIGNAL CAN signal for engine torque is defective • engine controller is defective • interference on CAN-Bus	OP-Mode:substitute clutch control	• check engine controller • check wire of CAN-Bus • check cable to engine controller	
69 / 105	5440	2	REFERENCE ENGINE TORQUE SIGNAL CAN signal for reference of engine torque is defective • engine controller is defective • interference on CAN-Bus	OP-Mode:substitute clutch control	• check engine controller • check wire of CAN-Bus • check cable to engine controller	
6A / 106	5450	2	ACTUAL ENGINE TORQUE SIGNAL CAN signal for actual engine torque is defective • engine controller is defective • interference on CAN-Bus	OP-Mode:substitute clutch control	• check engine controller • check wire of CAN-Bus • check cable to engine controller	

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Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
6B / 107	5460	2	NOM FRICTION TORQUE SIGNAL CAN signal for nominal friction torque is defective • engine controller is defective • interference on CAN-Bus	OP-Mode:substitute clutch control	• check engine controller • check wire of CAN-Bus • check cable to engine controller	
6E / 110	5470	2	EEC2 TIMEOUT Timeout of CAN-message EEC2 from EEC controller • interference on CAN-Bus • CAN wire/connector is broken • CAN wire/connector is defective and has contact to vehicle ground or battery voltage	no reaction, TCU uses default signal accelerator pedal in idle position OP-Mode: normal	• check EEC controller • check wire of CAN-Bus • check cable to EEC controller	
71 / 113	5480	3	S.C. TO BATTERY VOLTAGE AT CLUTCH K1 the measured resistance value of the valve is out of limit, the voltage at K1 valve is too high. • cable / connector is defective and has contact to battery voltage • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from TCU to the gearbox • check the regulator resistance • check internal wire harness of the gearbox	
72 / 114	5480	4	S.C. TO GROUND AT CLUTCH K1 the measured resistance value of the valve is out of limit, the voltage at K1 valve is too low. • cable / connector is defective and has contact to vehicle ground • cable / connector is defective and has contact to another regulator output of the TCU • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
73 / 115	5480	5	O.C. AT CLUTCH K1 the measured resistance value of the valve is out of limit. • cable / connector is defective and has no contact to TCU • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
74 / 116	5490	3	S.C. TO BATTERY VOLTAGE AT CLUTCH K2 the measured resistance value of the valve is out of limit, the voltage at K2 valve is too high. • cable / connector is defective and has contact to battery voltage • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
75 / 117	5490	4	S.C. TO GROUND AT CLUTCH K2 the measured resistance value of the valve is out of limit, the voltage at K2 valve is too low. • cable / connector is defective and has contact to vehicle ground • cable / connector is defective and has contact to another regulator output of the TCU • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
76 / 118	5490	5	O.C. AT CLUTCH K2 the measured resistance value of the valve is out of limit. • cable / connector is defective and has no contact to TCU • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	

Controls and Operating

Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
77 / 119	5500	3	S.C. TO BATTERY VOLTAGE AT CLUTCH K3 the measured resistance value of the valve is out of limit, the voltage at K3 valve is too high. • cable / connector is defective and has contact to battery voltage • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
78 / 120	5500	4	S.C. TO GROUND AT CLUTCH K3 the measured resistance value of the valve is out of limit, the voltage at K3 valve is too low. • cable / connector is defective and has contact to vehicle ground • cable / connector is defective and has contact to another regulator output of the TCU • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
79 / 121	5500	5	O.C. AT CLUTCH K3 the measured resistance value of the valve is out of limit. • cable / connector is defective and has no contact to TCU • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
7A / 122	5540	3	S.C. TO BATTERY VOLTAGE AT CONVERTER CLUTCH	no reaction OP-Mode: normal	• check the cable from TCU to the valve • check the regulator resistance	
7B / 123	5540	4	S.C. TO GROUND AT CONVERTER CLUTCH	CONVERTER LOCK UP CLUTCH SOLENOID CONNECTED AT ADMX: TCU switch off VPS2 OP-mode: normal CONVERTER LOCK UP CLUTCH SOLENOID CONNECTED AT AIP7: TCU switch off VPS2 OP-mode: normal	• check the cable from TCU to the valve • check the regulator resistance	
7C / 124	5540	5	O.C. AT CONVERTER CLUTCH	no reaction OP-Mode: normal	• check the cable from TCU to the valve • check the regulator resistance	
81 / 129	5510	3	S.C. TO BATTERY VOLTAGE AT CLUTCH K4 the measured resistance value of the valve is out of limit, the voltage at K4 valve is too high. • cable / connector is defective and has contact to battery voltage • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
82 / 130	5510	4	S.C. TO GROUND AT CLUTCH K4 the measured resistance value of the valve is out of limit, the voltage at K4 valve is too low. • cable / connector is defective and has contact to vehicle ground • cable / connector is defective and has contact to another regulator output of the TCU • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
83 / 131	5510	5	O.C. AT CLUTCH K4 the measured resistance value of the valve is out of limit. • cable / connector is defective and has no contact to TCU • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance	

Controls and Operating

Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
					• check internal wire harness of the gearbox	
84 / 132	5520	3	S.C. TO BATTERY VOLTAGE AT CLUTCH KV the measured resistance value of the valve is out of limit, the voltage at KV valve is too high. • cable / connector is defective and has contact to battery voltage • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
85 / 133	5520	4	S.C. TO GROUND AT CLUTCH KV the measured resistance value of the valve is out of limit, the voltage at KV valve is too low. • cable / connector is defective and has contact to vehicle ground • cable / connector is defective and has contact to another regulator output of the TCU • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
86 / 134	5520	5	O.C. AT CLUTCH KV the measured resistance value of the valve is out of limit. • cable / connector is defective and has no contact to TCU • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
87 / 135	5530	3	S.C. TO BATTERY VOLTAGE AT CLUTCH KR the measured resistance value of the valve is out of limit, the voltage at KR valve is too high. • cable / connector is defective and has contact to battery voltage • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
88 / 136	5530	4	S.C. TO GROUND AT CLUTCH KR the measured resistance value of the valve is out of limit, the voltage at KR valve is too low. • cable / connector is defective and has contact to vehicle ground • cable / connector is defective and has contact to another regulator output of the TCU • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
89 / 137	5530	5	O.C. AT CLUTCH KR the measured resistance value of the valve is out of limit. • cable / connector is defective and has no contact to TCU • regulator has an internal defect	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance • check internal wire harness of the gearbox	
8A / 138	5535	4	S.C. TO GROUND AT DLM TRANSVERSAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground • cable is defective and is contacted to vehicle ground • device has an internal defect • connector pin is contacted to vehicle ground	output will be on until TCU power down even if fault vanishes (loose connection) OP-Mode: normal	• check the cable from TCU to the valve • check the connectors • check the resistance of valve	
8B / 139	5535	3	S.C. TO BATTERY VOLTAGE AT DLM TRANSVERSAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage • cable is defective and is contacted to battery voltage	no reaction OP-Mode: normal	• check the cable from TCU to the valve • check the connectors • check the resistance of valve	

Controls and Operating

Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
			• device has an internal defect • connector pin is contacted to battery voltage			
8C / 140	5535	5	O.C. AT DLM TRANSVERSAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin • cable is defective and has no connection to TCU • device has an internal defect • connector has no connection to TCU	no reaction OP-Mode: normal	• check the cable from TCU to the valve • check the connectors • check the resistance of valve	
8D / 141	5536	4	S.C. TO GROUND AT DLM INDICATOR LAMP OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground • cable is defective and is contacted to vehicle ground • device has an internal defect • connector pin is contacted to vehicle ground	output will be on until TCU power down even if fault vanishes (loose connection) OP-Mode: normal	• check the cable from TCU to the device • check the connectors • check the resistance of device	
8E / 142	5536	3	S.C. TO BATTERY VOLTAGE AT DLM INDICATOR LAMP OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage • cable is defective and is contacted to battery voltage • device has an internal defect • connector pin is contacted to battery voltage	no reaction OP-Mode: normal	• check the cable from TCU to the device • check the connectors • check the resistance of device	
8F / 143	5536	5	O.C. DLM INDICATOR LAMP OUTPUT TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin • cable is defective and has no connection to TCU • device has an internal defect • connector has no connection to TCU	no reaction OP-Mode: normal	• check the cable from TCU to the device • check the connectors • check the resistance of device	
91 / 145	5560	4	S.C. TO GROUND AT RELAY REVERSE WARNING ALARM TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground • cable is defective and is contacted to vehicle ground • backup alarm device has an internal defect • connector pin is contacted to vehicle ground	backup alarm will be on until TCU power down even if fault vanishes (loose connection) OP-Mode: normal	• check the cable from TCU to the backup alarm device • check the connectors from backup alarm device to TCU • check the resistance of backup alarm device	
92 / 146	5560	3	S.C. TO BATTERY VOLTAGE AT RELAY REVERSE WARNING ALARM TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage • cable is defective and is contacted to battery voltage • backup alarm device has an internal defect • connector pin is contacted to battery voltage	no reaction OP-Mode: normal	• check the cable from TCU to the backup alarm device • check the connectors from backup alarm device to TCU • check the resistance of backup alarm device	
93 / 147	5560	5	O.C. AT RELAY REVERSE WARNING ALARM TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin • cable is defective and has no connection to TCU • backup alarm device has an internal defect • connector has no connection to TCU	no reaction OP-Mode: normal	• check the cable from TCU to the backup alarm device • check the connectors from backup alarm device to TCU • check the resistance of backup alarm device	

Controls and Operating

Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
94 / 148	5570	4	S.C. TO GROUND AT RELAY STARTER INTERLOCK, TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground • cable is defective and is contacted to vehicle ground • starter interlock relay has an internal defect • connector pin is contacted to vehicle ground	no reaction OP-Mode: normal	• check the cable from TCU to the starter interlock relay • check the connectors from starter interlock relay to TCU • check the resistance of starter interlock relay	
95 / 149	5570	3	S.C. TO BATTERY VOLTAGE AT RELAY STARTER INTERLOCK, TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage • cable is defective and is contacted to battery voltage • starter interlock relay has an internal defect • connector pin is contacted to battery voltage	no reaction OP-Mode: normal	• check the cable from TCU to the starter interlock relay • check the connectors from starter interlock relay to TCU • check the resistance of starter interlock relay	
96 / 150	5570	5	O.C. AT RELAY STARTER INTERLOCK TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin • cable is defective and has no connection to TCU • starter interlock relay has an internal defect • connector has no connection to TCU	no reaction OP-Mode: normal	• check the cable from TCU to the starter interlock relay • check the connectors from starter interlock relay to TCU • check the resistance of starter interlock relay	
9A / 154	5590	4	S.C. TO GROUND AT CONVERTER LOCK UP CLUTCH SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground • cable is defective and is contacted to vehicle ground • converter clutch solenoid has an internal defect • connector pin is contacted to vehicle ground	CONVERTER LOCK UP CLUTCH SOLENOID CONNECTED AT ADMX: TCU switch off VPS2 OP-mode: normal CONVERTER LOCK UP CLUTCH SOLENOID CONNECTED AT AIP7: TCU switch off VPS2 OP-mode: normal	• check the cable from TCU to the converter clutch solenoid • check the connectors from converter clutch solenoid to TCU • check the resistance of converter clutch solenoid	
9B / 155	5590	3	O.C. AT CONVERTER LOCK UP CLUTCH SOLENOID TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin • cable is defective and has no connection to TCU • converter clutch solenoid has an internal defect • connector has no connection to TCU	converter clutch always open, retarder not available OP-mode: normal	• check the cable from TCU to the converter clutch solenoid • check the connectors from converter clutch solenoid to TCU • check the resistance of converter clutch solenoid	
9C / 156	5590	5	S.C. TO BATTERY VOLTAGE AT CONVERTER LOCK UP CLUTCH SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage • cable is defective and is contacted to battery voltage • converter clutch solenoid has an internal defect • connector pin is contacted to battery voltage	no reaction OP-mode: normal	• check the cable from TCU to the converter clutch solenoid • check the connectors from converter clutch solenoid to TCU • check the resistance of converter clutch solenoid	
9D / 157	5600	4	S.C. TO GROUND AT RETARDER SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground • cable is defective and is contacted to vehicle ground • retarder solenoid has an internal defect	no reaction OP-mode: normal	• check the cable from TCU to the retarder solenoid • check the connectors from retarder solenoid to TCU • check the resistance of retarder solenoid	

Controls and Operating

Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
			connector pin is contacted to vehicle ground			
9E / 158	5600	3	O.C. AT RETARDER SOLENOID TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin - cable is defective and has no connection to TCU - retarder solenoid has an internal defect - connector has no connection to TCU	no reaction OP-mode: normal	- check the cable from TCU to the retarder solenoid - check the connectors from retarder solenoid to TCU - check the resistance of retarder solenoid	
9F / 159	5600	5	S.C. TO BATTERY VOLTAGE AT RETARDER SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage - cable is defective and is contacted to battery voltage - retarder solenoid has an internal defect - connector pin is contacted to battery voltage	no reaction OP-mode: normal	- check the cable from TCU to the retarder solenoid - check the connectors from retarder solenoid to TCU - check the resistance of retarder solenoid	
A1 / 161	5610	4	S.C. TO GROUND AT DIFFLOCK OR AXLE CONNECTION SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground - cable is defective and is contacted to vehicle ground - difflock solenoid has an internal defect - connector pin is contacted to vehicle ground	no reaction OP-mode: normal	- check the cable from TCU to the difflock solenoid - check the connectors from difflock solenoid to TCU - check the resistance of difflock solenoid	
A2 / 162	5610	3	S.C. TO BATTERY VOLTAGE AT DIFFLOCK OR AXLE CONNECTION SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage - cable is defective and is contacted to battery voltage - difflock solenoid has an internal defect - connector pin is contacted to battery voltage	no reaction OP-mode: normal	- check the cable from TCU to the difflock solenoid - check the connectors from difflock solenoid to TCU - check the resistance of difflock solenoid	
A3 / 163	5610	5	O.C. AT DIFFLOCK OR AXLE CONNECTION SOLENOID TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin - cable is defective and has no connection to TCU - difflock solenoid has an internal defect - connector has no connection to TCU	no reaction OP-mode: normal	- check the cable from TCU to the difflock solenoid - check the connectors from difflock solenoid to TCU - check the resistance of difflock solenoid	
A4 / 164	5620	4	S.C. TO GROUND AT WARNING SIGNAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground - cable is defective and is contacted to vehicle ground - warning device has an internal defect - connector pin is contacted to vehicle ground	no reaction OP-mode: normal	- check the cable from TCU to the warning device - check the connectors from warning device to TCU - check the resistance of warning device	
A5 / 165	5620	5	O.C. AT WARNING SIGNAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin - cable is defective and has no connection to TCU - warning device has an internal defect - connector has no connection to TCU	no reaction OP-mode: normal	- check the cable from TCU to the warning device - check the connectors from warning device to TCU - check the resistance of warning device	

Controls and Operating

Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
A6 / 166	5620	3	S.C. TO BATTERY VOLTAGE AT WARNING SIGNAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage • cable is defective and is contacted to battery voltage • warning device has an internal defect • connector pin is contacted to battery voltage	no reaction OP-mode: normal	• check the cable from TCU to the warning device • check the connectors from warning device to TCU • check the resistance of warning device	
B1 / 177	5660	2	SLIPPAGE AT CLUTCH K1 TCU calculates a differential speed at closed clutch K1. If this calculated value is out of range, TCU interprets this as slipping clutch. • low pressure at clutch K1 • low main pressure • wrong signal at internal speed sensor • wrong signal at output speed sensor • wrong size of the sensor gap • clutch is defective	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check pressure at clutch K1 • check main pressure in the system • check sensor gap at internal speed sensor • check sensor gap at output speed sensor • check signal at internal speed sensor • check signal at output speed sensor • replace clutch	
B2 / 178	5665	2	SLIPPAGE AT CLUTCH K2 TCU calculates a differential speed at closed clutch K2. If this calculated value is out of range, TCU interprets this as slipping clutch. • low pressure at clutch K2 • low main pressure • wrong signal at internal speed sensor • wrong signal at output speed sensor • wrong size of the sensor gap • clutch is defective	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check pressure at clutch K2 • check main pressure in the system • check sensor gap at internal speed sensor • check sensor gap at output speed sensor • check signal at internal speed sensor • check signal at output speed sensor • replace clutch	
B3 / 179	5670	2	SLIPPAGE AT CLUTCH K3 TCU calculates a differential speed at closed clutch K3. If this calculated value is out of range, TCU interprets this as slipping clutch. • low pressure at clutch K3 • low main pressure • wrong signal at internal speed sensor • wrong signal at output speed sensor • wrong size of the sensor gap • clutch is defective	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check pressure at clutch K3 • check main pressure in the system • check sensor gap at internal speed sensor • check sensor gap at output speed sensor • check signal at internal speed sensor • check signal at output speed sensor • replace clutch	
B4 / 180	5675	2	SLIPPAGE AT CLUTCH K4 TCU calculates a difference speed at TCU calculates a differential speed at closed clutch K4. If this calculated value is out of range, TCU interprets this as slipping clutch. • low pressure at clutch K4 • low main pressure • wrong signal at internal speed sensor • wrong signal at turbine speed sensor • wrong size of the sensor gap • clutch is defective	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check pressure at clutch K4 • check main pressure in the system • check sensor gap at internal speed sensor • check sensor gap at turbine speed sensor • check signal at internal speed sensor • check signal at turbine speed sensor • replace clutch	
B5 / 181	5680	2	SLIPPAGE AT CLUTCH KV TCU calculates a differential speed at closed clutch KV. If this calculated value is out of range, TCU interprets this as slipping clutch. • low pressure at clutch KV • low main pressure • wrong signal at internal speed sensor • wrong signal at turbine speed sensor • wrong size of the sensor gap • clutch is defective	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check pressure at clutch KV • check main pressure in the system • check sensor gap at internal speed sensor • check sensor gap at turbine speed sensor • check signal at internal speed sensor • check signal at turbine speed sensor • replace clutch	

Controls and Operating

Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
B6 / 182	5685	2	SLIPPAGE AT CLUTCH KR TCU calculates a differential speed at closed clutch KR. If this calculated value is out of range, TCU interprets this as slipping clutch. • low pressure at clutch KR • low main pressure • wrong signal at internal speed sensor • wrong signal at turbine speed sensor • wrong size of the sensor gap • clutch is defective	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	• check pressure at clutch KR • check main pressure in the system • check sensor gap at internal speed sensor • check sensor gap at turbine speed sensor • check signal at internal speed sensor • check signal at turbine speed sensor • replace clutch	
B7 / 183	5700	0	OVERTEMP SUMP TCU measured a temperature in the oil sump that is over the allowed threshold.	no reaction OP-Mode: normal	• cool down machine • check oil level • check temperature sensor	
B8 / 184	5710	0	OVERTEMP RETARDER TCU measured a temperature in the retarder oil that is over the allowed threshold.	TCU disables retarder OP-Mode: normal	• cool down machine • check oil level • check temperature sensor	
B9 / 185	5720	0	OVERSPEED ENGINE	retarder applies if configured OP-Mode: normal		
BA / 186	5730	0	DIFFERENTIAL PRESSURE OIL FILTER TCU measured a voltage at differential pressure switch out of the allowed range • oil filter is polluted • cable/connector is broken or cable/connector is contacted to battery voltage or vehicle ground • differential pressure switch is defective	no reaction OP-Mode: normal	• check oil filter • check wiring from TCU to differential pressure switch • check differential pressure switch (measure resistance)	
BB / 187	5740	2	SLIPPAGE AT CONVERTER LOCKUP CLUTCH TCU calculates a differential speed at closed converter lockup clutch. If this calculated value is out of range, TCU interprets this as slipping clutch. • low pressure at converter lockup clutch • low main pressure • wrong signal at engine speed sensor • wrong signal at turbine speed sensor • wrong size of the sensor gap • clutch is defective	Lockup Clutch is disabled immediately. After fault code was displayed while transmission is in Neutral the Lockup Clutch will be enabled again.	• check pressure at converter lockup clutch • check main pressure in the system • check sensor gap at engine speed sensor • check sensor gap at turbine speed sensor • check signal at engine speed sensor • check signal at turbine speed sensor • replace clutch	
BC / 188	5745	15	OVERSPEED OUTPUT TCU measures a transmission output speed above the defined threshold	No reaction OP-Mode: normal		
BD / 189	5750	4	S.C. TO GROUND AT ENGINE BRAKE SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground • cable is defective and is contacted to vehicle ground • engine brake solenoid has an internal defect • connector pin is contacted to vehicle ground	no reaction OP-mode: normal	• check the cable from TCU to the engine brake solenoid • check the connectors from engine brake solenoid to TCU • check the resistance of engine brake solenoid	
BE / 190	5750	3	S.C. TO BATTERY VOLTAGE AT ENGINE BRAKE TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage • cable is defective and is contacted to battery voltage • engine brake solenoid has an internal defect • connector pin is contacted to battery voltage	no reaction OP-mode: normal	• check the cable from TCU to the engine brake solenoid • check the connectors from engine brake solenoid to TCU • check the resistance of engine brake solenoid	

Controls and Operating

Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
BF / 191	5750	5	O.C. AT ENGINE BRAKE TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin • cable is defective and has no connection to TCU • engine brake solenoid has an internal defect • connector has no connection to TCU	no reaction OP-mode: normal	• check the cable from TCU to the engine brake solenoid • check the connectors from engine brake solenoid to TCU • check the resistance of engine brake solenoid	
C0 / 192	5751	0	ENGINE TORQUE OR ENGINE POWER OVERLOAD TCU calculates an engine torque or engine power above the defined thresholds	OP-Mode: normal		
C1 / 193	5752	0	TRANSMISSION OUTPUT TORQUE OVERLOAD TCU calculates an transmission output torque above the defined threshold	OP-Mode: normal		
C2 / 194	5755	15	TRANSMISSION INPUT TORQUE OVERLOAD TCU calculates an transmission input torque above the defined threshold	programmable :No reaction or shift to neutral OP-Mode: normal		
C4 / 196	5770	4	S.C. TO GROUND AT JOYSTICK STATUS INDICATOR TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground • cable is defective and is contacted to vehicle ground • joystick status indicator has an internal defect • connector pin is contacted to vehicle ground	no reaction OP-Mode: normal	• check the cable from TCU to joystick status indicator • check the connectors from joystick status indicator to TCU • check the resistance of joystick status indicator	
C5 / 197	5770	3	S.C. TO BATTERY VOLTAGE AT JOYSTICK STATUS INDICATOR TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage • cable is defective and is contacted to battery voltage • joystick status indicator has an internal defect • connector pin is contacted to battery voltage	no reaction OP-Mode: normal	• check the cable from TCU to joystick status indicator • check the connectors from joystick status indicator to TCU • check the resistance of joystick status indicator	
C6 / 198	5770	5	O.C. AT JOYSTICK STATUS INDICATOR TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin • cable is defective and has no connection to TCU • joystick status indicator has an internal defect • connector has no connection to TCU	no reaction OP-Mode: normal	• check the cable from TCU to joystick status indicator • check the connectors from joystick status indicator to TCU • check the resistance of joystick status indicator	
C7 / 199	5780	4	S.C. TO GROUND AT OVERTEMP NEUTRAL INDICATOR TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground • cable is defective and is contacted to vehicle ground • overtemp status indicator has an internal defect • connector pin is contacted to vehicle ground	no reaction OP-Mode: normal	• check the cable from TCU to OVERTEMP NEUTRAL INDICATOR • check the connectors from OVERTEMP NEUTRAL INDICATOR to TCU • check the resistance of OVERTEMP NEUTRAL INDICATOR	
C8 / 200	5780	3	S.C. TO BATTERY VOLTAGE AT OVERTEMP NEUTRAL INDICATOR TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage • cable is defective and is contacted to battery voltage • overtemp status indicator has an internal defect • connector pin is contacted to battery voltage	no reaction OP-Mode: normal	• check the cable from TCU to OVERTEMP NEUTRAL INDICATOR • check the connectors from OVERTEMP NEUTRAL INDICATOR to TCU • check the resistance of OVERTEMP NEUTRAL INDICATOR	

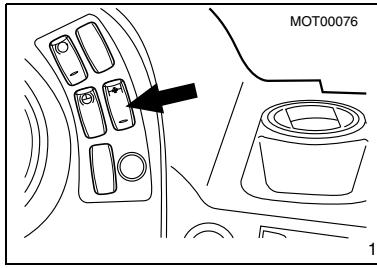
Controls and Operating

Fault-Code (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
C9 / 201	5780	5	O.C. AT OVERTEMP NEUTRAL INDICATOR TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin • cable is defective and has no connection to TCU • OVETEMP status indicator has an internal defect • connector has no connection to TCU	no reaction OP-Mode: normal	• check the cable from TCU to OVERTEMP NEUTRAL INDICATOR • check the connectors from OVERTEMP NEUTRAL INDICATOR to TCU • check the resistance of OVERTEMP NEUTRAL INDICATOR	
CA / 202	5790	9	ENGINE_RETARDER CONFIG_TIMEOUT Timeout of CAN-message ENGINE_RETARDER CONFIG from EEC controller • interference on CAN-Bus • CAN wire/connector is broken • CAN wire/connector is defective and has contact to vehicle ground or battery voltage	OP-Mode: substitute clutch control	• check EEC controller • check wire of CAN-Bus • check cable to EEC controller	
CB / 203	5800	9	ERC1 TIMEOUT Timeout of CAN-message ERC1 from EEC controller • interference on CAN-Bus • CAN wire/connector is broken • CAN wire/connector is defective and has contact to vehicle ground or battery voltage	OP-Mode: substitute clutch control	• check EEC controller • check wire of CAN-Bus • check cable to EEC controller	
D1 / 209	5810	3	S.C. TO BATTERY VOLTAGE AT POWER SUPPLY FOR SENSORS TCU measures more than 6V at the pin AU1 (5V sensor supply)	see fault codes no. 21 to 2C	• check cables and connectors to sensors, which are supplied from AU1 • check the power supply at the pin AU1 (should be appx. 5V)	fault codes no. 21 to no. 2C may be a reaction of this fault
D2 / 210	5810	4	S.C. TO GROUND AT POWER SUPPLY FOR SENSORS TCU measures less than 4V at the pin AU1 (5V sensor supply)	see fault codes no. 21 to 2C	• check cables and connectors to sensors, which are supplied from AU1 • check the power supply at the pin AU1 (should be appx. 5V)	fault codes no. 21 to no. 2C may be a reaction of this fault
D3 / 211	5820	4	LOW VOLTAGE AT BATTERY measured voltage at power supply is lower than 10V (12V device) lower than 18V (24V device)	shift to neutral OP-Mode: TCU shutdown	• check power supply battery • check cables from batteries to TCU • check connectors from batteries to TCU	
D4 / 212	5820	3	HIGH VOLTAGE AT BATTERY measured voltage at power supply is higher than 18V (12V device) higher than 32.5V (24V device)	shift to neutral OP-Mode: TCU shutdown	• check power supply battery • check cables from batteries to TCU • check connectors from batteries to TCU	
D5 / 213	5830	2	ERROR AT VALVE POWER SUPPLY VPS1, TCU switched on VPS1 and measured VPS1 is off or TCU switched off VPS1 and measured VPS1 is still on • cable or connectors are defect and are contacted to battery voltage • cable or connectors are defect and are contacted to vehicle ground • permanent power supply KL30 missing • TCU has an internal defect	shift to neutral OP-Mode: TCU shutdown	• check fuse • check cables from gearbox to TCU • check connectors from gearbox to TCU • replace TCU	
D6 / 214	5840	2	ERROR VALVE POWER SUPPLY VPS2 TCU switched on VPS2 and measured VPS2 is off or TCU switched off VPS2 and measured VPS2 is still on • cable or connectors are defect and are contacted to battery voltage • cable or connectors are defect and are contacted to vehicle ground	shift to neutral OP-Mode: TCU shutdown	• check fuse • check cables from gearbox to TCU • check connectors from gearbox to TCU • replace TCU	

Controls and Operating

FaultCode (hex/dec)	SPN	FMI	MEANING OF THE FAULT CODEpossible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
			- permanent power supply KL30 missing - TCU has an internal defect			
D7 / 215	5545	4	S.C. TO GROUND AT DLM LONGITUDINAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground - cable is defective and is contacted to vehicle ground - device has an internal defect - connector pin is contacted to vehicle ground	output will be on until TCU power down even if fault vanishes (loose connection) OP-Mode: normal	- check the cable from TCU to the valve - check the connectors - check the resistance of valve	
D8 / 216	5545	3	S.C. TO BATTERY VOLTAGE AT DLM LONGITUDINAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage - cable is defective and is contacted to battery voltage - device has an internal defect - connector pin is contacted to battery voltage	no reaction OP-Mode: normal	- check the cable from TCU to the valve - check the connectors - check the resistance of valve	
D9 / 217	5545	5	O.C. AT DLM LONGITUDINAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin - cable is defective and has no connection to TCU - device has an internal defect - connector has no connection to TCU	no reaction OP-Mode: normal	- check the cable from TCU to the valve - check the connectors - check the resistance of valve	
E3 / 227	5860	3	S.C. TO BATTERY VOLTAGE AT DISPLAY OUTPUT TCU sends data to the display and measures always a high voltage level on the connector - cable or connectors are defective and are contacted to battery voltage - display has an internal defect	no reaction OP-Mode: normal	- check the cable from TCU to the display - check the connectors at the display - change display	
E4 / 228	5860	4	S.C. TO GROUND AT DISPLAY OUTPUT TCU sends data to the display and measures always a high voltage level on the connector - cable or connectors are defective and are contacted to vehicle ground - display has an internal defect	no reaction OP-Mode: normal	- check the cable from TCU to the display - check the connectors at the display - change display	
F1 / 241	5890	2	GENERAL EEPROM FAULT TCU can't read non volatile memory TCU is defective	no reaction OP-Mode: normal	replace TCU	often shown together with fault code F2
F3 / 243	5910	13	APPLICATION ERROR something of this application is wrong	transmission stay neutral OP-Mode: TCU shutdown	replace TCU	This fault occurs only if a test engineer did something wrong in the application of the vehicle
F5 / 245	5930	7	CLUTCH FAILURE AEB was not able to adjust clutch filling parameters One of the AEB-Values is out of limit	transmission stay neutral OP-Mode: TCU shutdown	check clutch	TCU shows also the affected clutch on the Display
F6 / 246	5930	13	CLUTCH ADJUSTMENT DATA LOST OR INCHPEDAL CALIBRATION DATA LOST TCU was not able to read correct clutch adjustment parameters - interference during saving data on non volatile memory - TCU is brand new	default values = 0 for AEB offsets used OP-Mode: normal no Inchmode available	execute AEB	
F7 / 247	5940	11	SUBSTITUTE CLUTCH CONTROL - transmission input torque wrong - engine retarder torque wrong - speed signal(s) defective	OP-Mode : substitute clutch control	- check engine retarder torque - check speed sensors	

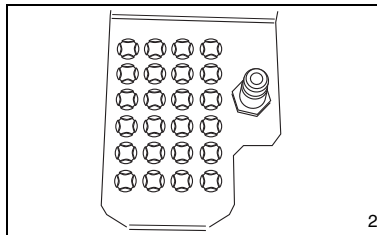
Differential Lock



Transmission Differential Lock Request Switch Press the bottom of the switch to engage the transmission differential lock in manual mode. The differential lock warning lamp on the instrument panel will illuminate when the function is activated. Pressing the switch to the Off position will disengage the differential lock. By default automatic mode is ON.

To apply the differential locks, slow the machine with the service brakes and operate the differential lock switch(s). Stop the machine and disengage the differential locks as soon as conditions allow.

NOTICE: It should only be necessary to engage the differential locks in extreme conditions.



NOTICE: On trucks using Ergotraction software, the differential lock lamp will illuminate briefly when accelerating quickly from rest and when the engine brake is activated. In both cases this identifies that the differential lock is engaging due to the level of torque/brake torque, and is normal. Ergotraction software, where fitted, monitors the torque/speed output to front and rear drives, and if the difference exceeds design parameters the TCU sends a signal to apply the differential lock automatically, locking the front and rear outputs and resulting in 1:1 drive.

NOTICE: Before driving in soft or slippery conditions, stop and engage differential locks. Spinning wheels can result in damage to the dropbox and axle differentials.

NOTICE: Disengage differential locks when driving on firm ground.

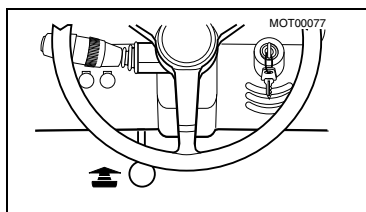
Controls and Operating

Hydraulic Controls

The braking, steering, body control and transmission oil cooler are all controlled by the main hydraulic valve, which is mounted on the chassis. However, the body control and transmission oil cooler are electronically monitored by the ECU which is mounted in the cab on the right of the operator's seat. The TCU warns the operator when a problem develops, and helps to diagnose errors.

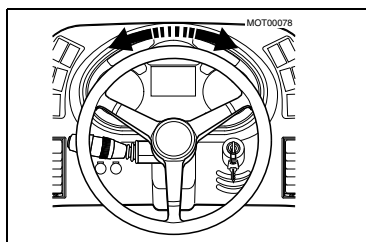
There are two LEDs on the MCU. The top LED illuminates green when indicating power on, and the bottom LED flashes either red or yellow depending on status. If there are no errors, the bottom LED flashes yellow to indicate normal status. If either LED flashes red, this indicates an error has occurred. The rate of flashing gives an immediate diagnosis as to the nature of the error. Further information can be obtained from the MCU by plugging in a diagnostic data reader to the RS232 diagnostic test point.

Controls and Operating



Steering

The steering wheel position can be adjusted as required for the most convenient operating position. To adjust, pull out the adjustment lock and tilt the steering wheel up or down as desired. Release the lever to lock the adjustment.



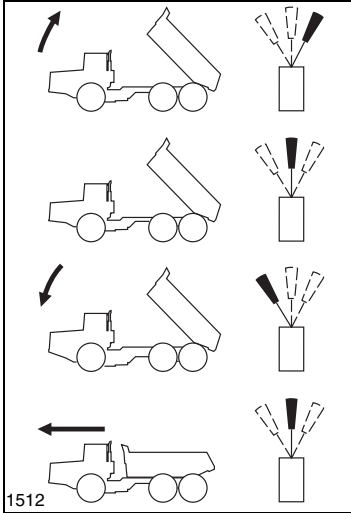
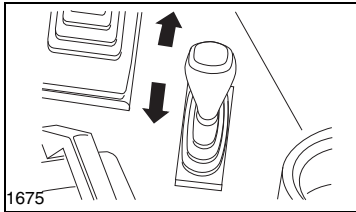
To steer the machine, rotate the steering wheel in the desired direction to the required radius of turn. The machine will turn only as the steering wheel is turned and at a rate of turning directly proportional to steering wheel speed. The machine will stop and hold position when the steering wheel is stopped. To return the machine to the straight ahead position or to the opposite direction, turn the steering wheel in the opposite direction.



CAUTION

Do not attempt to adjust the steering wheel while the machine is moving. Loss of control may result. Stop the machine; apply park brake; then carry out adjustments.

Controls and Operating



Body Control

This body control lever operates the body hoist cylinders. The three operating positions of the lever are -

Raise - Pulling the lever back and holding in this position will raise the body. When released, the lever will spring back to the neutral position.

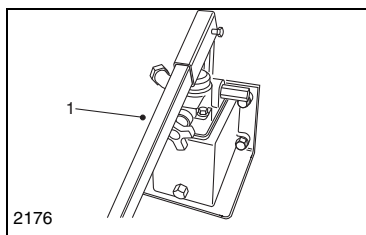
Neutral - If the body is above the body proximity switch, the lever in this position will stop and hold the body at any desired height. If the body is below the proximity switch, the MCU defaults the main hydraulic valve to the float position. The body should be fully lowered and in the neutral position while the machine is in motion. The lever will remain in the neutral position when released.

Power Down - Pushing the lever forward provides hydraulic force to power down the body. Pushing the lever fully forward will engage the electric detent. When the body reaches the proximity switch, the lever springs back to the 'neutral' position and power down is ramped back to allow a smooth transition to the float position.

NOTICE: In the event of an engine, hydraulic or hydraulic MCU failure the body can be lowered using the body lower emergency switch in the cab. If hydraulic AND electrical power is lost, the body can be lowered using an emergency procedure detailed in the maintenance manual, Section 230-0000, Body System Schematic.

NOTICE: The body must remain lowered with lever in the 'neutral' position until it is necessary to operate the body again. Failure to comply to this could result in overheating the hydraulic oil and failure of the hydraulic system components.

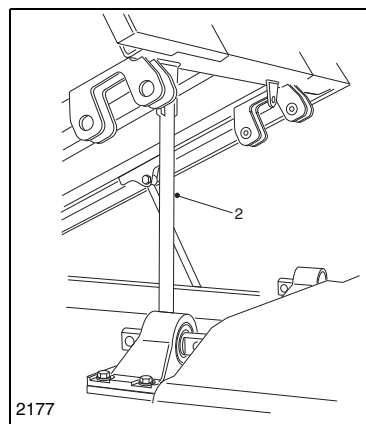
Controls and Operating



Tilting Cab

The operator's cab can be tilted to improve accessibility to components below, by using hydraulic hand pump (1) housed inside the battery box.

To tilt the cab, remove the 4 cab mounting bolts on the left hand side. Using the lever in the hand pump, charge the hydraulic cylinder until the cab is fully tilted and hold in place with cab prop (2) and install the cab prop retaining pin (3).

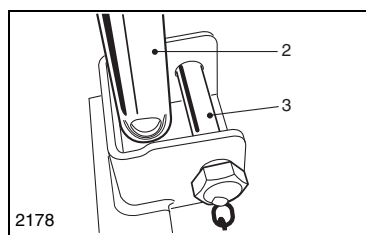


To lower the cab, ensure the weight of cab is off the safety prop, remove the cab prop and slowly open the valve on the hand pump to gently lower the cab until holes in the cab line up with holes in the mounts. Reinstall the 4 cab mounting bolts.



WARNING

Do not work under or near an operator's cab that is unblocked or unsupported. Always use the operator's cab safety prop with the locking pin.



Controls and Operating

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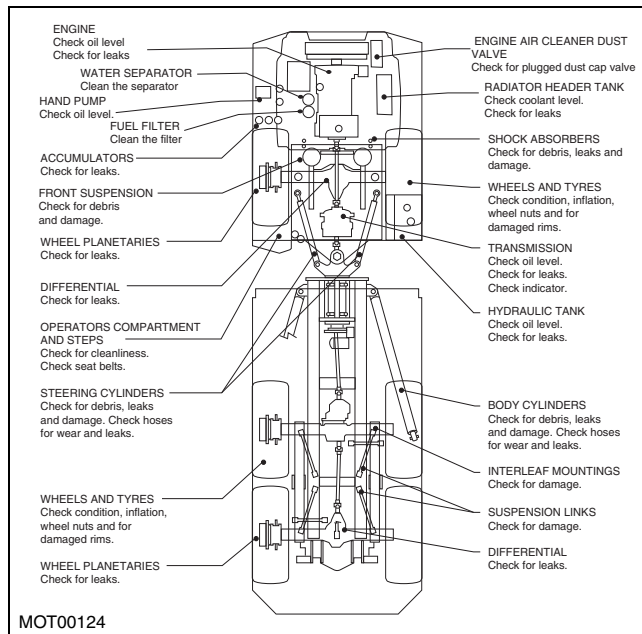


4 - Operating the Machine

Operating the Machine

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Operating the Machine



Operating The Machine

Pre-Starting Inspection

- Make sure all safety signs are free of damage, and are fully readable, replace as necessary.
- Before the engine is started ensure the machine is ready for operation.
- The machine should be in a level position to permit accurate checking of fluid quantities in the engine and other components.
- Make sure parking brake is set and block wheels if necessary to prevent accidental movement of the machine while checking component levels.
- Test all lights and horn for proper operation.
- Walk around the machine and carry out the inspections and component checks described in the drawing opposite and on the following pages.

Component Checks

1. **Engine** - With engine off, check the oil level. Leave the engine off for at least 1 minute before checking the oil level.

NOTICE:

a) Remove the dipstick 1 and check the oil level. The correct level is between the minimum and maximum marks on the oil dipstick.

b) Top up with oil when the oil level is at or below the lower mark.

2. **Fuel Filter/Water Separator** - Engines are equipped with dual fuel filters in the form of a water separating suction filter (1) and a pressure filter (2). Clean the filter and separator.

3. **Radiator Header Tank** - Check the coolant level when cold.

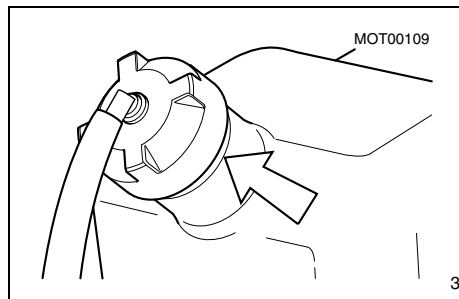
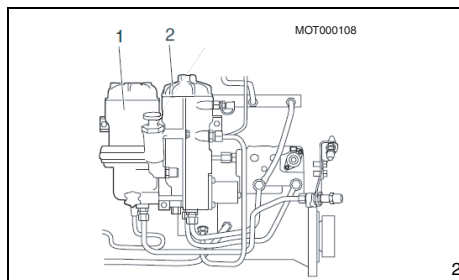
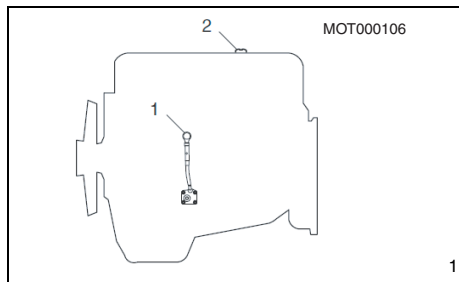


WARNING

Partially unscrew the radiator cap to slowly release pressure before removing the cap completely. Fill to the bottom of the filler neck.

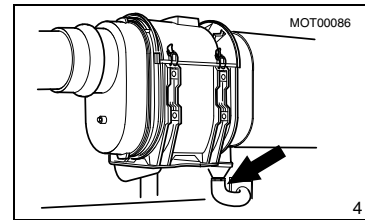
NOTICE: In subfreezing temperatures, be sure that the coolant contains sufficient antifreeze.

NOTICE: Please refer to the maintenance manual for correct procedure.

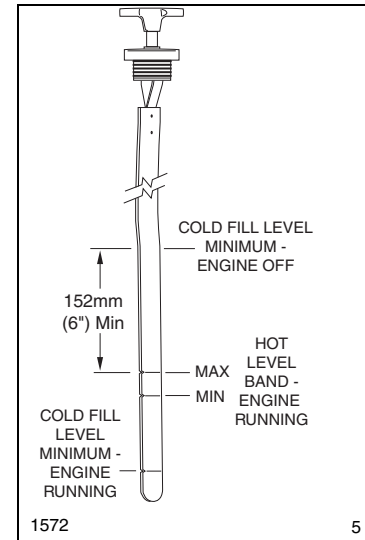


Operating the Machine

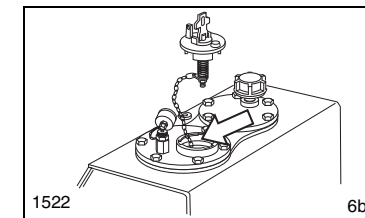
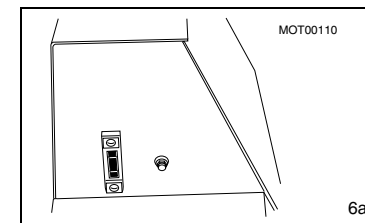
4. **Engine Air Cleaner Dust Valve** - Check for a plugged dust cap valve. Unplug the valve and clean the air cleaner dust cup if required.



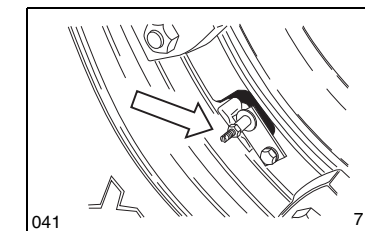
5. **Transmission - Cold Oil Level - Engine Off** - This check is made only to determine if the transmission contains sufficient oil for safe starting. Make sure the oil level is well above the upper mark on the dipstick. Add oil if oil is close to or below the lower mark.



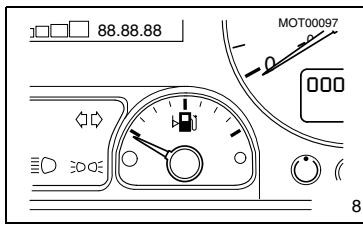
6. **Hydraulic Tank - Oil Level Check** - Operate the body hoist cylinders to their fully-extended positions to charge cylinders and lines then lower the body. With the engine off, oil should show in the sight gauge (6a). Add oil, if low, through tank filler cap (6b). Check the filter restriction indicator/gauge, with the oil at operating temperature. If the needle is in the green section of the gauge, the filter condition is acceptable. If the needle is in the red section, the differential pressure across the filter has exceeded 1.2 bar and the filter element must be renewed. It is not unusual for the gauge needle to be in the red section when the oil is cold, which is acceptable, and therefore only perform this check when the oil is at operating temperature.



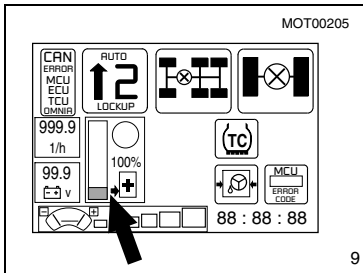
7. **Tyres** - Carefully inspect all tyres for cuts, bruises, or other damage, and, proper inflation for the loads to be carried. Inflate all tyres to the recommended pressure while cold.



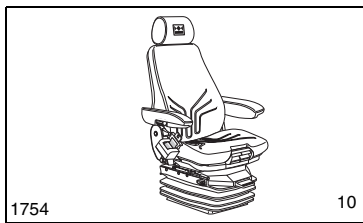
Operating the Machine



8. Check Fuel Level Gauge - The fuel tank should be filled at the end of each shift.



9. Check DEF Level Indicator - The DEF tank should be filled at the end of each shift.



10. Seat and Seat Belts - Adjust the seat position as required, to allow complete machine control at all times with minimum fatigue. Make sure the seat belt does not restrict movement for machine operation.

Operating the Machine

Engine Operation



CAUTION

Never start the engine indoors unless proper exhaust ventilation is provided to remove deadly exhaust gases. Once the engine is running, move the machine outdoors as soon as possible. Exhaust gases are hazardous and can cause unconsciousness and death.

NOTICE: Do not place the engine under FULL LOAD at FULL SPEED IMMEDIATELY after starting. ALWAYS allow the engine to fully circulate lubricant and warm up gradually before operating at full speed and full load.

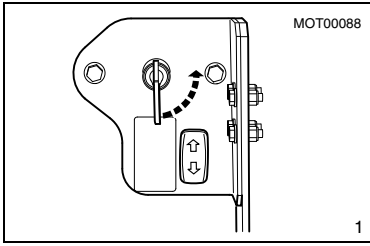
Operate the engine at top rated speed when maximum power is needed for the load.

NEVER idle the engine for more than 5 minutes at a time; shut it off.

If any gauge operates out with its normal operating range, or a warning light illuminates, shut the engine down immediately and report to service or maintenance personnel.

NOTICE: Operating the engine beyond high idle speed can cause severe engine damage. The engine speed must not exceed 2300 rev/min. under any circumstances. When descending a steep grade, use a combination of transmission gears, retarder, engine brake and service brakes to control the machine and engine speed.

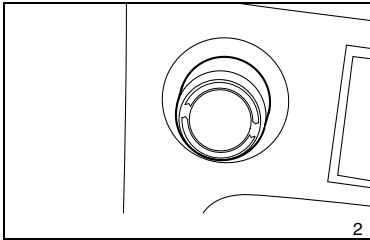
Operating the Machine



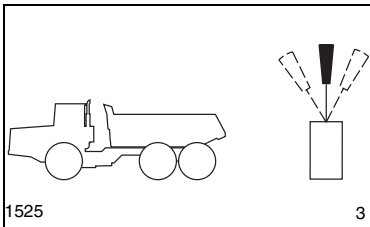
Starting the Engine

Attention to the warning lights and instruments when starting the engine, and operating, will help the operator monitor the machine systems and components.

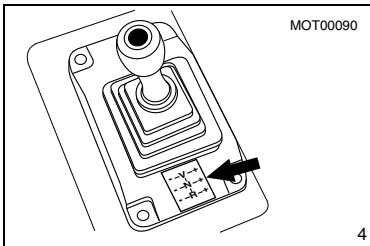
1. Turn the master switch, located on the inside panel of the battery box, to the ON position.



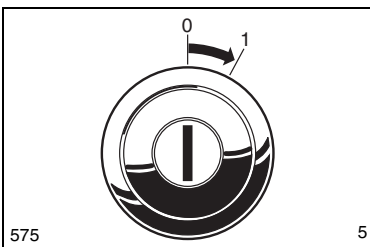
2. Make sure the park-emergency brake lever is in 'PARK' position. (Button pushed 'In')



3. Make sure the body control lever is in the 'NEUTRAL' position.

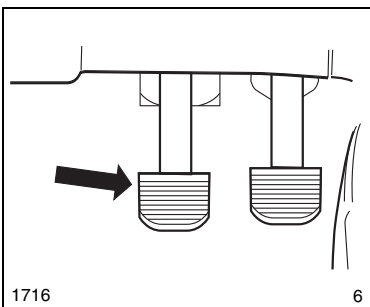


4. Make sure the transmission gear shift control is in the 'NEUTRAL' position.



5. Insert the key into ignition switch. Turn the key fully clockwise until it stops. Wait until all the gauges and warning lights on the dashboard display have completed self check procedure. The audible warning buzzer will also sound.

NOTICE: Ensure engine and transmission check lights extinguish. If not, do not start and investigate.



6. Press the service brake pedal.

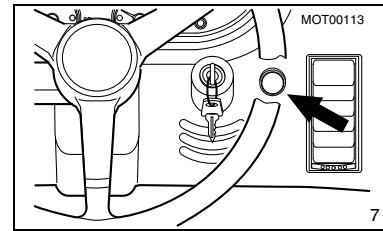
Operating the Machine

7. Press and release the Start / Stop switch to start the engine. First the horn will sound and then the engine starts.



CAUTION

**Never crank the engine more than 30 seconds continuously.
Allow starter at least 2 minutes cooling time between long
cranking periods to avoid overheating.**



Operating the Machine

Starting the Engine with Jumper Cables



CAUTION

Batteries contain sulphuric acid and can emit hydrogen gas. Check for required voltage and polarity connections to discharged batteries.



CAUTION

Excessive booster voltage and/or incorrect jumper cable connections, open flames, lighted cigars, or other ignition sources can cause battery explosion/fire. Do not lean over batteries, and always wear safety glasses, face shield, safety gloves, and any other appropriate safety equipment when working with or near battery.



CAUTION

Do not jump start a machine by using arc welding equipment. Currents and voltages are dangerously high and cannot be sufficiently reduced to make the method safe.



CAUTION

Ensure that machines are not touching each other. Use cables that are equal to cable size on the machine. A booster battery should be the same specification as a discharged battery.

If jumper cables are used to start an engine, be sure to follow this procedure:

Connect one end of a jumper cable, usually coloured red, to the discharged battery 'POSITIVE' (+) post. Connect the other end of the same cable to the 'POSITIVE' (+) post on the booster or charged battery.

Connect one end of the second cable, usually coloured black, to the 'NEGATIVE' (-) post of the booster battery. Connect the other end of the 'NEGATIVE' (-) cable to machine frame for grounding so that if a spark occurs, it is away from battery fumes (explosive hydrogen).

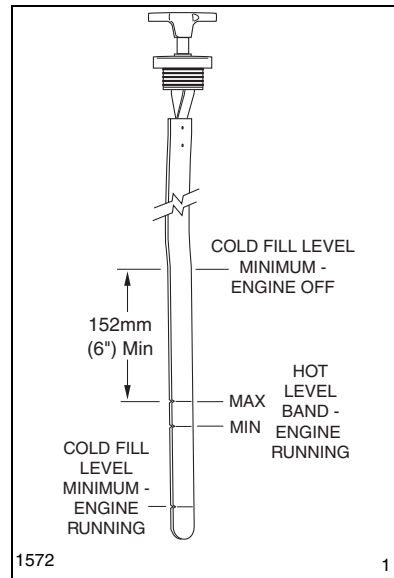
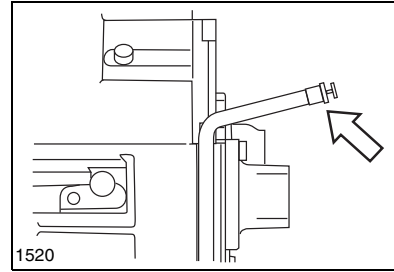
Check for cause of failure on the dead battery.

Operating the Machine

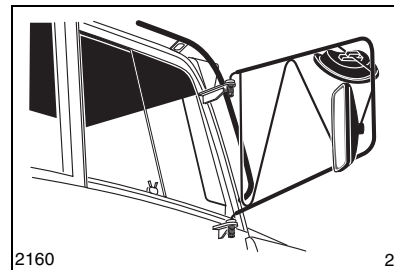
Pre-Operating Checks

Make sure all cab glass, mirrors and lights are clean. Test all controls to ensure they are functioning properly. Move the transmission gear shift control momentarily to 'REVERSE' to make sure the reverse alarm sounds.

1. **Transmission - Hot Oil Level** - The parking brake must be applied and the machine's wheels securely blocked while carrying out this check. With the engine idling, transmission in 'NEUTRAL' and at normal operating temperature 80° C (176° F), the oil level should be up to, but not over, the upper mark on the dipstick. Add oil if oil is close to or below the minimum oil level.



2. **Mirrors** - Ensure mirrors are positioned correctly to maximise visibility.



Operating the Machine

Brake Function Checks

In addition to the above checks, the following brake function checks can be carried out to determine if both the service and emergency brake systems are functional before operating the machine.



CAUTION

Make sure the area around the machine is clear of personnel and obstructions before carrying out these checks.

NOTICE: The following checks are NOT intended to measure maximum brake holding ability. If NEW brake pads are fitted, they MUST be bur-nished as per the manufacturer's recommendations before carrying out the checks.

Service Brake Holding Ability Check

Depress the service brake pedal and move the transmission gear shift to Drive. Pull the parking-emergency brake control out to release the brakes. Depress accelerator control and accelerate the engine to 1 350 rev/min. The machine should not move. Decelerate engine, shift transmission to 'NEUTRAL' so that the parking brake is applied automatically, before releasing the service brake pedal.

Emergency Brake Holding Ability Check

Push the parking-emergency brake control in to apply 'EMERGENCY' brakes and move the transmission gear shift to Drive. Depress accelera-tor control and accelerate the engine to 1 350 rev/min. The machine should not move. Decelerate the engine, move the gear shift control to 'NEUTRAL' and pull out the parking-emergency brake control. The parking brake is applied automatically when the transmission is shifted to 'NEU-TRAL'.

NOTICE: Brake holding effort required to hold a machine static at a spe-cific rev/min., can vary from machine to machine due to differences in engine performance, power train efficiencies, etc., as well as differences in brake holding ability.

NOTICE: As an indication of system deterioration, a comparison can be made between the current amount of movement, with the service/emerg-ency brakes applied and previous checks.



CAUTION

If the machine moves during the above checks, stop the machine, apply the parking brake and do not operate until the fault is corrected.

Operating the Machine

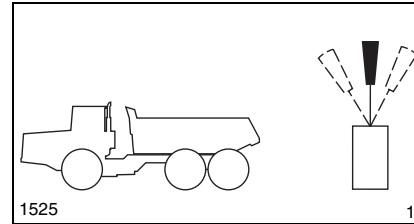
Driving and Stopping

Before driving off observe all instruments and warning lights. All instruments should operate in their normal range and all warning lights should be out except possibly the direction indicator, headlight main beam and differential Lock warning lights.

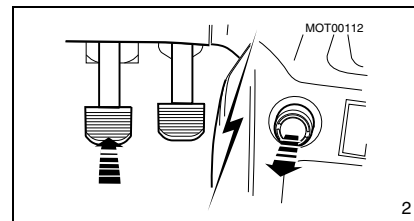
Make sure the area around the machine is clear of personnel and obstructions before driving off.

In the first few minutes of travel check carefully for the required steering, braking, engine and transmission power response for maximum operating safety.

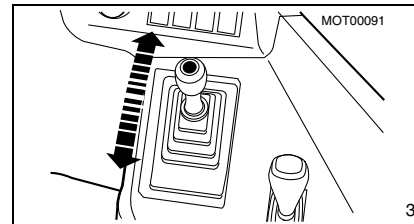
1. Make sure the body is fully down and the body control lever is in the 'NEUTRAL' position.



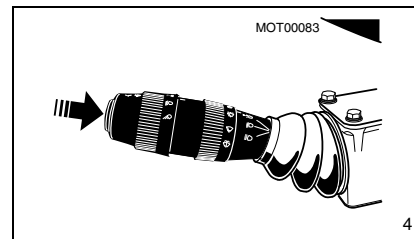
2. Apply the service brake and release the parking brake switch.



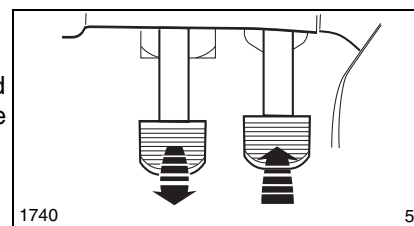
3. Select the driving direction and the required gear.



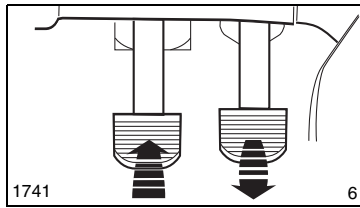
4. Sound the horn; two blasts for forward and three blasts for reverse.



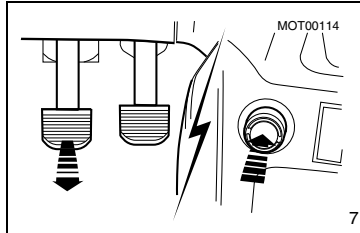
5. Release the service brake, apply the accelerator and move off. The transmission will automatically shift up and down the gears as speed and conditions allow. If necessary the machine should be slowed by use of the service brake and/or the retarder and/or engine brake.



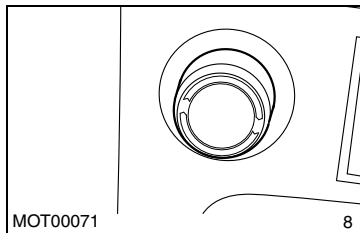
Operating the Machine



6. To stop the machine release the accelerator and depress the service brake pedal. Release the service brake as the machine slows until, when stopped, the pedal is depressed just enough to hold the machine stationary. Do not 'FAN' the pedal.



7. When the machine has stopped, apply the parking brake switch, shift the transmission to 'NEUTRAL' and release the service brake.



8. If the service brake does not stop the machine, apply the parking-emergency brake. This should only be applied to stop the machine in an emergency.

NOTICE: The park brake must be inspected after a severe service/park/emergency braking stop.



WARNING

There is no mechanical connection between the engine and wheels on machines with converter transmissions. The parking brake must always be applied when the engine is switched off.

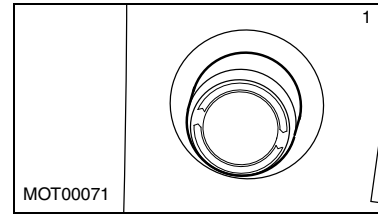
NOTICE: This machine is installed with a safety feature which prevents 'uncontrolled movement'.

Initial powering of the machine by means of the master switch will not activate the park brake hydraulic controls in the cab until the operator applies the service brake pedal. The park brake system will then operate relative to the position of the park brake switch.

Operating the Machine

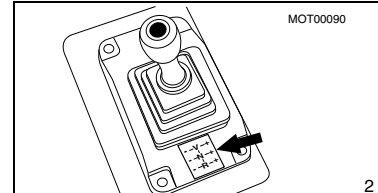
Stopping the Engine

1. Make sure parking-emergency brake control is in 'PARK' position.

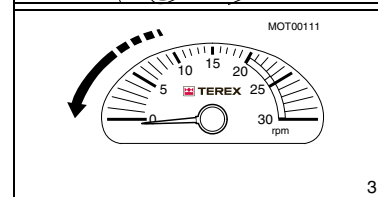


2. Make sure the transmission is in 'NEUTRAL'.

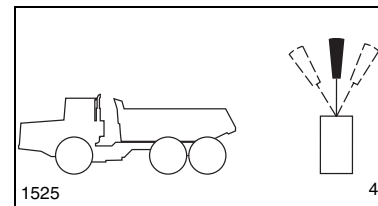
NOTICE: Stopping a turbo charged engine immediately after high speed operation may cause damage to the turbocharger as it will continue to turn without an oil supply to the bearings.



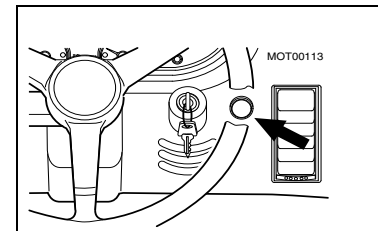
3. Allow the engine to run between idle and 1 000 rev/min. with no load for 2 minutes. This allows the engine to cool and the turbocharger to slow down.



4. Make sure the body control lever is in 'NEUTRAL'.

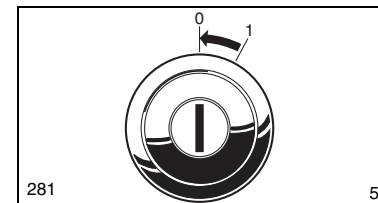


5. To stop the engine press and release the Stop / Start switch.



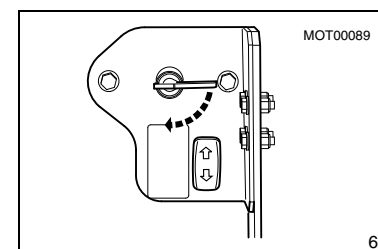
6. Await the dashboard display to re-illuminate (reboot).

7. Turn the ignition key switch to 0 position (Off) and remove.



8. Exit the driver's cab via egress,

9. Turn the master switch located in the battery box to the 'OFF' position. This prevents battery draining.



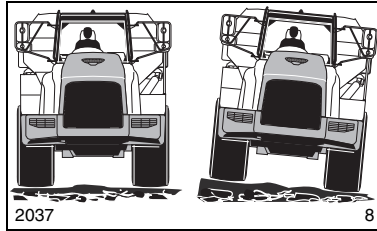
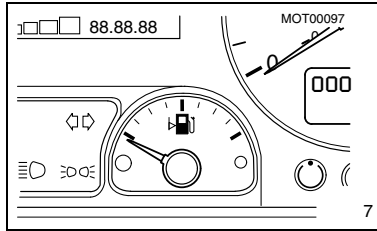
Operating the Machine

Parking

When parking the machine overnight, or for an extended period, the following procedure in addition to that given in 'Stopping the Engine' will help maintain it in good condition for subsequent use:

1. Fill the fuel tank completely before parking the machine overnight or for extended periods, to prevent condensation. If a security kit is supplied, keep it locked.
2. Always park on level ground where possible. If it must be parked on a grade, position the machine at right angles to the grade and block wheels securely. Lock the doors.
3. If below freezing temperatures are expected, make sure the cooling system has sufficient antifreeze to prevent the coolant freezing. If anti-freeze cannot be added to the cooling system, drain the system completely.

Check all tyres, hoses, wiring, tubing and fittings for cuts, ply separation, abrasion, fraying, or other damage or deterioration. Inspect for structural damage to the cab, body and chassis. Attach warning signs to the steering wheel or to a control to alert others if lubricant has been drained, batteries removed etc.



Operating the Machine

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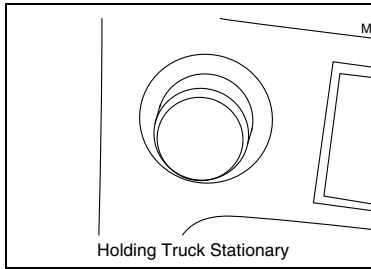


5 - Working the Machine

Working the Machine

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Working The Machine



Off-highway articulated machines are used on a variety of hauling jobs, from sand and gravel pits to road construction and mining. Every machine operation, regardless of the type of job, can be divided into four phases; loading, hauling, dumping and the empty return.

NOTICE: After coming to a stop for loading or unloading the machine, the park/emergency brake control can be pushed in to hold the brakes in the applied position as though the foot brake is depressed.

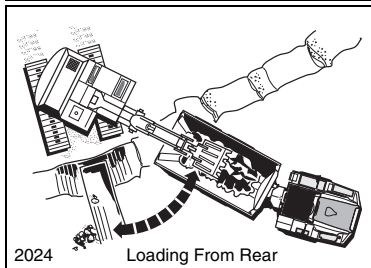
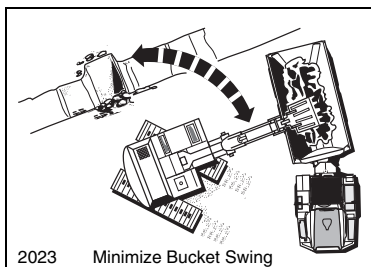
Loading



WARNING

Should the machine be fitted with a tailgate, cohesive material must not be loaded into the body. There is a risk of injury to the operator if a tailgate is used with a cohesive material.

NOTICE: When loading, the operator should be diligent and be aware of the material which is to be loaded onto the machine. At any time, should he feel that a load constitutes an obvious safety hazard, he has the right and duty to refuse to load this onto the machine.

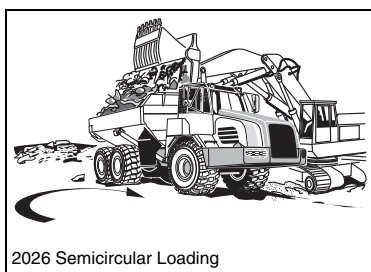


The most common methods of loading articulated machines are with hydraulic excavators, and front end loaders. The machines can be loaded equally well from the rear or the side using hydraulic excavators or rope shovels. Ideally, excavators should require 90° or less swing. With a backhoe excavator a very efficient loading method is with the backhoe on top of the bank loading over the rear of the truck at the base of the bank. Backhoe slew angles can be small, leading to very short cycle times.



For maximum material movement, the truck operator must help the loading machine operator to keep loading time to a minimum. The shorter the distance the loading unit bucket must travel between the cut, or stockpile and the machine body, the more passes it can make in a given period of time and the quicker the machine can be loaded.

The fewer manoeuvres the machine must make to get into the loading position, the sooner loading can start. In restricted areas it may be necessary to turn and reverse the machine into the loading position.



If the required space is available the machine can travel round without the need to reverse. Waiting machines should stay about two machine lengths behind the one being loaded to avoid any spillage from the loading machine bucket or machine body. The operator of the waiting machine is also able to judge the best spot for the machine when it is his/her turn to be loaded.

Working the Machine

On some jobs, the loading machine might work most efficiently when the receiving machines are positioned on both sides of the loader. Thus, while one machine is being loaded, another can move into position on the opposite side of the loader and the loading machine can swing over to load the next machine with a minimum of lost time. Since the machine is usually backed into the loading position with this method, the operator must be alert and careful while backing.

For fastest, most accurate loading, when being loaded by a front end loader, the machine operator should stop on the most level area and at an angle to the face of the bank or stockpile. This minimizes loader travel time, particularly with a raised, full bucket. Where possible, the machine should also locate downwind of the loader when dusty material is being loaded on a windy day. This practice improves both working conditions and visibility for the loader operator.

A cleanup dozer or small loader is often worked in conjunction with the main loading machine to keep the area clear of bucket spillage for maximum efficiency of the loading operation. The machine operator must always be alert to the position of the cleanup machine when entering the loading area to avoid congestion, and, for maximum safety.

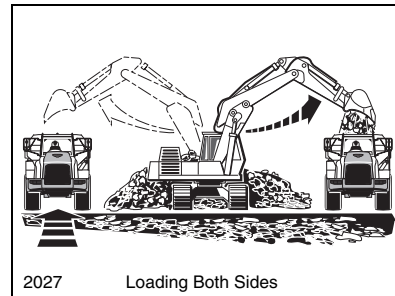


WARNING

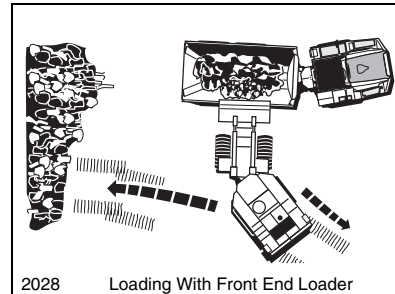
Avoid rocks and other shovel spillage that can needlessly damage tyres or other machine components. Allow the cleanup machine sufficient time to clear up such debris.

Do not move the machine into loading position with the shovel bucket swinging overhead. Large rocks that might fall from the bucket can be dangerous to both the operator and the machine.

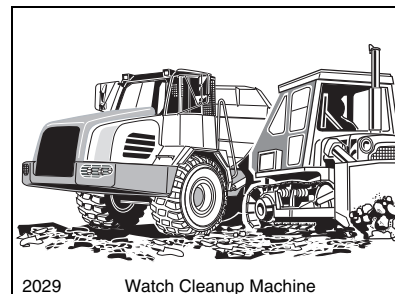
Keep your head and arms inside the cab during loading to avoid the danger of falling rocks or other shovel spillage.



2027 Loading Both Sides



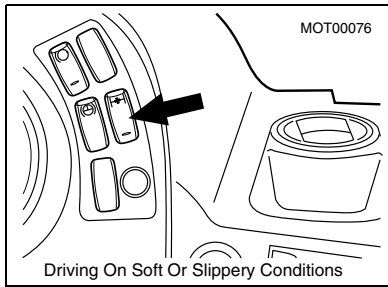
2028 Loading With Front End Loader



2029 Watch Cleanup Machine

When the loader operator signals that the truck is loaded, sound two blasts on the horn for forward movement and three blasts for reverse movement. Select the correct gear and release the brakes. Move out of the loading area and onto the haul road, with the least possible delay, to allow any waiting machine to move into the loading position as soon as possible.

Working the Machine



Hauling

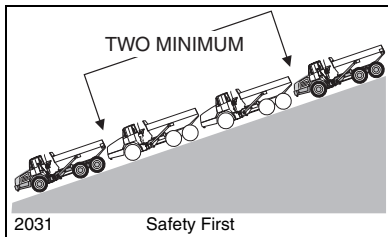
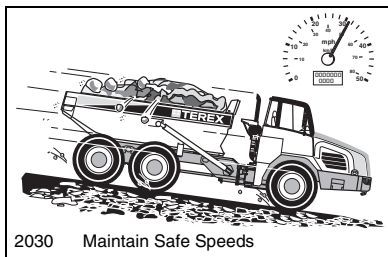
While travelling the haul road, always maintain a safe speed for the haul road conditions and grades. Never allow the machine to move or coast with the transmission in 'NEUTRAL'!

When approaching or encountering extremely soft or slippery conditions, stop the machine and engage the differential locks. Do not engage the differential locks when the machine is moving or wheels are spinning. Disengage the locks as soon as conditions return to normal.

When approaching downgrades, select the proper transmission gear range and use the retarder and service brakes as required to maintain safe descent speed, without over-speeding the engine, or gaining excess travel speed. Generally, the transmission range required for ascending is also correct for descending a grade.

Always remain a safe distance behind the machine ahead, particularly on downgrades. A good rule-of-thumb to follow is to allow two truck-lengths between machines for each 16 km/h (10 mile/h) of travel speed under normal operating conditions. Under adverse conditions, allow more room for safe operation. On jobs on which minimum distance between machines is specified for the haul road, be sure to observe the regulations at all times. Such regulations are established for the safety of everyone on the job.

Pay attention to haul road conditions to avoid rocks, holes, or other obstacles. Such obstacles not only present hazards to safe operation, but can needlessly damage tyres and suspensions if not avoided.



Working the Machine

Dumping

When dumping, the operator should steer the machine ensuring that it is straight and with the loaded body on level ground. The dumping operation usually depends upon the type of material being hauled. For instance, overburden and other waste material is usually dumped over a spoil bank or piled into large mounds. The dumping on a job of this type might be controlled by a dump 'SPOTTER', 'FLAGMAN' or 'BANKSMAN' or second person who directs the machine to its dumping area. While backing to dump, the operator must watch the 'SPOTTER' at all times and follow his/her direction. Under no circumstances should the operator leave the seat to gain better visibility while backing. Always remain seated to maintain maximum machine control.

Mineral ores, blasted rock etc., are usually dumped into a hopper, or crusher, where it is processed. When dumping into a hopper, the operator, in order to avoid excess wear on the tyres, must avoid hitting the protecting rail at the hopper. If a DRIVEOVER HOPPER is used, the operator must avoid rubbing the tyre inner sidewalls.

When hauling dirt or rock from a borrow pit into a fill area such as an earth-fill dam, the load is usually dumped in a string with other loads and the loads smoothed out with a crawler tractor. When dumping on a fill of this type, the operator usually works alone and picks his/her own dumping place. To save bulldozer work and cleaning up, the load should be dumped as close as possible to the preceding load. The operator should pull past the preceding load, turn in line with the string and back the machine until it is within a few feet of the last load. This assures that the load will fall in the right place. No matter what kind of job the operator is working, there are a few things which are common to all jobs and which the operator should observe -

NOTICE: Before raising the body, make sure that the rear wheels are on firm level ground. If one wheel is higher than the other, a twisting strain is imposed upon the body hinge pins, hoists and chassis. Stop the machine, allow the engine to slow to idle, shift the transmission to 'NEUTRAL' so that the parking brake is applied automatically and the machine is held stationary.



CAUTION

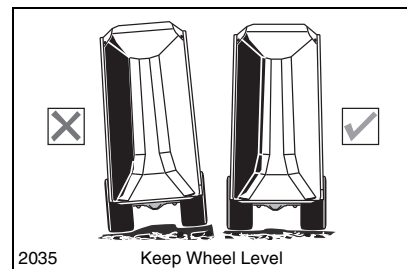
When dumping over a spoil bank without a 'SPOTTER', know how close the machine can safely approach the edge under all weather conditions. If in doubt as to dumping safety, dump the load a safe distance from the edge so that it can be pushed over the edge later.



2033 Manoeuvring To Dump

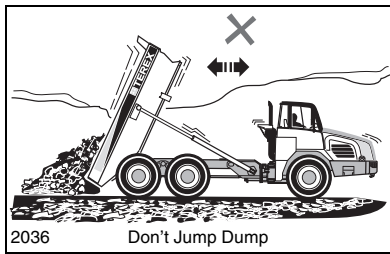


2034 Keep A Safe Distance From The Edge



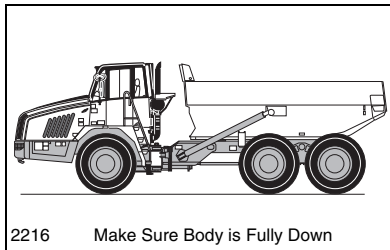
2035 Keep Wheel Level

Working the Machine



Push the body control lever back into the 'RAISE' position and accelerate the engine. Decelerate the engine to slow the raising speed as the hoists approach their maximum extension. When the body has been raised to the desired height, release the control lever into the 'NEUTRAL' (Hold) position until the body is to be lowered. Do not hold the lever in the 'RAISE' position when the hoists are fully extended to prevent unnecessary hydraulic system relief valve operation.

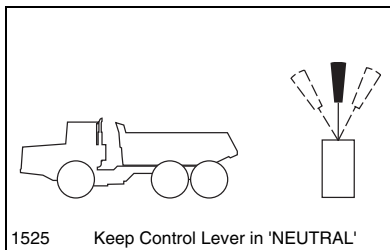
NOTICE: Never 'JUMP DUMP' the machine by bouncing the rear tyre against a stop block, or otherwise jarring the body in its raised position, to dislodge stuck or frozen material. The tremendous stress that this practice develops on the body pin area, chassis and hydraulic system can cause needless, extensive stresses.



Once the load has been dumped, push the control lever fully forward into the detent 'POWER DOWN' position and accelerate the engine. As the hoists approach their fully retracted positions, decelerate the engine. At a predetermined body height a proximity sensor causes the body control lever to spring back to 'NEUTRAL' position, allowing the body to float onto the chassis under its own weight.

Empty Return

Make sure the body is completely lowered, the body control lever is in the 'NEUTRAL' position and transmission is in the correct gear range before releasing the brakes and moving away from the dump site.



CAUTION

Make sure the body is completely lowered, the body control lever is in the 'NEUTRAL' position and transmission is in correct gear range before releasing the brakes and moving away from the dump site.

Except for the above, the procedure for returning empty to the loading area is the same as that given earlier for 'HAULING'.

Working the Machine

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6 - Roading

Roading

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ROADING

NOTICE: Make sure the body is lowered and body control lever is in the 'NEUTRAL' position. Failure to comply to this could result in overheating the hydraulic oil and failure of the hydraulic system components.

Make sure the differential lock switch remains in the 'OFF' position when roading. Failure to comply to this could result in damage to the transmission and axle components.



WARNING

These machines are equipped with cylinders containing compressed nitrogen gas. Transportation of these machines by any method may require a special permit from the appropriate authority of the country involved. Consult your Dealer for details.

General

'ROADING' (operating a machine over public highways) requires special care and attention. Machines of such a large size, are slower and less manoeuvrable than most other machines encountered on the road. Yet, while on the road, they must be operated for extended periods of time at, or near, maximum speeds.

Before 'ROADING' a machine for an extended distance between jobs, or between widely scattered sections of a job, the machine must be properly equipped and in good condition. It is also recommended to carry a 'Warning Triangle'.

The operator must use extra care while on the public highways and remain constantly alert, especially for overhead cables and low bridges.

Necessary permits must be obtained from the proper authorities before the machine is 'ROADED' on public highways.

Preparation Prior to Roading

Lubrication

Thoroughly lubricate and service all components and systems as described under 'LUBRICATION AND SERVICING' in this manual and/or maintenance manuals for this machine.

Inspection

Perform all pre-starting and post-starting checks described in this manual and pay particular attention to the function of all instruments and lights, and make any repairs necessary.

NOTICE: Improper tyre inflation during over-the-road operation can cause rapid tyre deterioration by overheating. Tyre pressures increase with heat. Always check pressures while tyres are cold. Consult your tyre dealer for proper pressures and tyre speed limits for roading.

Check the inflation pressures of all tyres, while cold, with an accurate tyre pressure gauge. Inflate tyres if necessary, while cold, to the recommended pressure for 'ROADING'. Inspect all tyres thoroughly and carefully for stones or other debris embedded in the treads or carcasses. Inspect for cuts, bruises, burned beads abnormal wear and damaged wheels rims. Replace any damaged or excessively worn tyres.

Roading

Check all hoses, drain cocks, fuel level check cocks, and other potential sources of leaks. Make sure that all leaks are repaired and that all drain cocks are sufficiently tightened to avoid subsequent loosening. Make sure that all warning flags, oversize load signs etc. are in place and secure.

Clean all glass and adjust the operator's seat for correct operation of all controls.

Check the lights, horn, windscreen wipers, heater, defroster, headlight dip control, and all controls for correct operation.

Make sure the machine body is empty, fully lowered and the body control lever is in the 'NEUTRAL' position.

Make sure the differential lock switch is in the 'OFF' position.

Drive transmission through all gears while slowly accelerating the engine.

In Case of Trouble

If trouble develops on route, move the machine off the road at the first safe parking place, and shut off the engine. Carefully note as many of the symptoms of the trouble as possible, such as rough engine operation with loss of power and overheating, or loss of speed and transmission clutch pressure with normal engine operation etc.

If the area in which the trouble occurs requires that the machine be left unattended while the trouble is reported by phone, disconnect a battery cable and apply security locks, if so equipped, before leaving the parked machine. Make sure that the body is completely lowered and the parking brake is applied.

Report the following data as soon as possible.

1. Exact location.
2. Destination.
3. The nature of the trouble (with as many details as possible) and the time and conditions under which it happened.
4. The telephone number at which the machine operator can be reached.

NOTICE: Do not attempt to restart or operate the machine unless instructed to do so. An engine, Pump, transmission or other components that develops a minor defect can be completely destroyed in just a few extra minutes of unnecessary operation.



7 - Moving a Disabled Machine

Moving a Disabled Machine

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Moving a Disabled Machine



WARNING

Removing the drive line between the parking brake and the rear axles or removing the axle shafts and planetary covers or pinion gears from the axles will make the parking brake ineffective.



WARNING

Uncontrolled machine movement hazard. There is no mechanical connection between the machine wheels and the engine. Before releasing the parking brake, make sure the machine wheels are secured with chock blocks to prevent or restrict unexpected machine movement.



WARNING

When moving the machine with insufficient hydraulic pressure, for safe braking and steering, use extreme caution to ensure personnel and property safety.



WARNING

Make sure the parking brake actuator is returned to its original position, and the parking brake is operating correctly, before removing the chock

Moving a Disabled Machine

Any unusual power train noises noted while operating the machine should be reported to those responsible for maintenance. Should the power train, hydraulic or electrical systems fail, the machine should be stopped and shut down immediately until suitable repairs can be made. If the failure is in the power train and the machine must be moved to a service area or workshop to make required repairs, it is advisable to carry out the following procedures to prevent any possible additional damage, which may be caused by the wheels turning the power train as the machine is driven or towed.

If the transmission or drop box is at fault, disconnect the drive lines to the axles and dropbox before moving the machine.

If a differential or planetary is at fault, carry out the following procedure for the component concerned: Disconnect drive lines, remove planetary covers and remove the axle shafts. Remove the pinion gears from their covers. Replace the planetary pins in the covers, and refit the planetary covers on the drive wheels to retain lubricant and prevent ingress of dirt.

If possible, start the engine to provide the required hydraulic pressure for steering and braking. If the nature of the trouble prevents engine operation, repairs must be made on the site of the breakdown, or special arrangements made for towing the machine safely to the repair area without braking and steering power.



WARNING

Never allow riders on a machine being towed without sufficient hydraulic pressure for safe braking.

If the parking brake must be released, but the engine cannot be operated to provide the required hydraulic pressure or if there is electrical failure, the brake can be released manually by following this procedure:

Block all wheels securely. Turn the hex-head on the parking brake actuator anticlockwise until the brake pads are free from the disc. When the hydraulic system is repaired, return the actuator to its original position by turning the hex-head fully clockwise.

Connect a suitable towing bar to one of the lugs on the tractor frame of the disabled machine and reverse another machine, in a straight and in-line manoeuvre, towards the disabled machine. Connect the opposite end of the towing bar to the towing pin of the recovery machine and ensure that it is securely locked.

NOTICE: An alternative method of towing a disabled machine is by connecting an A-Frame arrangement to the lugs on the tractor frame of the disabled machine and the towing pin of the recovery machine.

Moving a Disabled Machine

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8 - Lubrication and Servicing

Lubrication and Servicing

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Lubrication And Servicing

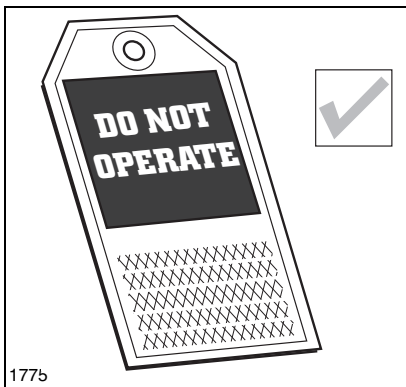


SAFETY

Do not allow unauthorized personnel to service or maintain this machine. Study the operations manual and maintenance manual before starting, operating or servicing this machine. Always follow procedures and safety precautions detailed in the maintenance manual.

Always attach a 'DO NOT OPERATE' or similar warning sign to ignition switch or a control and lockout before cleaning, lubricating or servicing the machine.

Never allow anyone to work on the machine while it is moving. Make sure no one is on the machine before working on it.

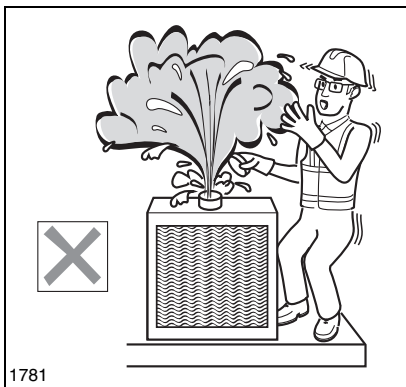


Do not work under or near an unblocked or unsupported body. Always use the body safety prop. The body prop must only be used when the body is empty.

Do not work under or near any unblocked or unsupported linkage, part or machine.

Always shut the machine down in accordance with the procedure described in 'Stopping The Engine', within Section 4. Turn off the master switch before cleaning, lubricating or servicing the machine except as called for in this manual or maintenance manual.

Always install the steering lock bar before adjusting or servicing the machine with the engine running. Refer to 'General' safety section within Chapter 4.



WARNING

Escaping fluids under pressure can penetrate your skin.

When changing oil in the engine, transmission and hydraulic systems, or removing hydraulic lines, remember that the oil may be hot and can cause burns to unprotected skin.

When working on or around exhaust components, remember that the components may be hot and can cause burns to unprotected skin.

Always deflate tyre before attempting to remove any embedded objects or removing the tyre and rim assembly from the machine.

Always use a self-attaching chuck with a long airline and stand to one side while the tyre is inflating. Refer to Section 160-0050, Wheel Rim and Tyre in the maintenance manual.



WARNING

When working around battery area, keep all flames and sparks away from batteries.

Lubrication and Servicing

LUBRICATION AND SERVICING

Lubrication is an essential part of preventive maintenance. It is important that the instructions regarding types of lubricants and the frequency of their application be followed to prolong the useful life of the machine. Periodic lubrication of moving parts reduces to a minimum the possibility of mechanical failures.

Thoroughly clean all fittings, caps, and plugs, to prevent dirt from entering the system while servicing.

Lubricants must be at operating temperature when draining.

Do not operate any system unless its oil level is within the operating range as indicated on oil level dip stick, sight gauge or level plug.

Small circles on the following illustrations represent points at which lubrication or servicing must take place, at the intervals indicated on the left-hand side of the lubrication chart.

The numbered circles on the illustrations contain reference numbers which correspond to the 'Ref. Points' column of the chart.

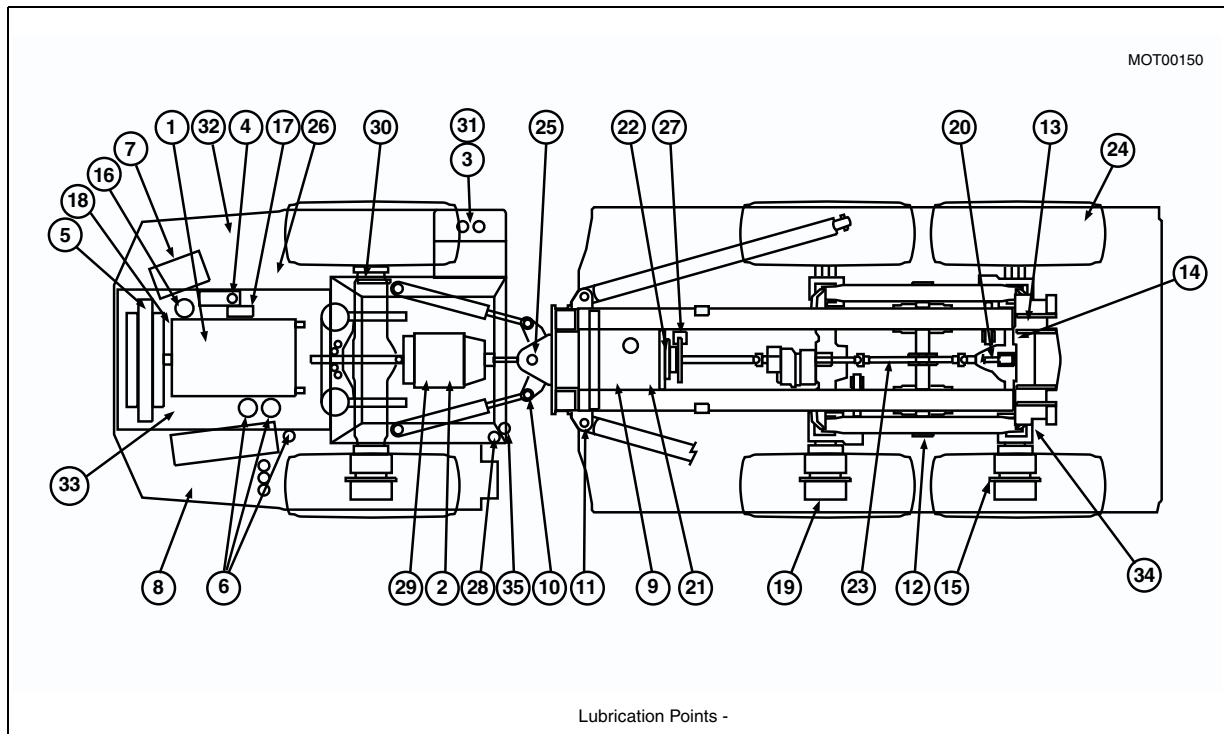
All change and service periods are recommendations based on average operating conditions. Lubricants showing evidence of excessive heat, oxidation or dirt should be changed more frequently to prevent these conditions. Lubricant change and service periods must be established on the basis of individual job conditions.



WARNING

These machines use a solution of high purity urea. Avoid prolonged or repeated contact with skin. After handling, always wash hands thoroughly with soap and water. In case of contact with eyes, rinse immediately with water. If large quantities are ingested or irritation persists seek medical attention immediately.

Lubrication and Servicing



LUBRICATION AND SERVICE CHART

Interval Hours	Ref. Points	Identification	Service Instructions	No. of Points	Lubricant or coolant	Service/Quantities
10 (Daily)	1	Engine	Check oil level. Add if low	1	EO	As required
	1	Engine	Check for leaks	1	-	-
	2	Transmission	Check oil level. Add if low	1	EO	As required
	3	Hydraulic Tank	Check oil level. Add if low	1	HO	As required
	3	Hydraulic Filter Restriction Gauge	Check. Renew Element If Required	1	-	-
	4	Radiator Expansion Tank	Check coolant level. Add if low	1	Ethylene Glycol	-
	7 24	Engine Air cleaner Tyres	Check. Renew element if required. Check condition and pressure.	1 6	- -	Refer Maintenance Manual, Sec 160-0050
50 (Weekly)	9	Oscillation Bushes	Lubricate	2	EP, NLGI	See Note 3
	12	Suspension Beam Bushin	Lubricate	2	EP, NLGI	See Note 3
	10	Steering Cylinder Pins	Lubricate	4	EP, NLGI	See Note 3
	11	Body Cylinder Pins	Lubricate	4	EP, NLGI	See Note 3
	13	Body Hinge / Tailgate Pins	Lubricate	2	EP, NLGI	See Note 3
	15	Wheel Rim Nuts .	Check torque.	72	-	600 Nm (442 lbf ft.)
	30 14	Cab Fresh Air Filter Panhard Rod Bearings	Inspect and clean if required. Lubricate	1 4	- EP, NLGI	- See Note 3
250 (Monthly)	19	Wheel Planetaries	Check oil level. Add if low	6	EPL	As required
	20	Differentials	Check oil level. Add if low	3	EPL	As required
	21	Oscillation Pivot	Check end float. Adjust if required.	1	-	-
	25	Articulation Bearings	Lubricate	2	EP, NLGI	See Note 3
	27	Parking Brake Pads	Check wear. Renew if required.	2	-	-
	35	Front Axle (IFS)	Lubricate	2	EP, NLGI	See Note 3
500 (3 Monthly)	1	Engine	Drain oil and refill with new oil	1	EO	-
	16	Engine Oil Filter	Renew	1	-	-
	17	Centrifugal Oil Filter	Clean	1	-	-
	8	Battery Electrolyte	Check level, Add Electro if low	2	-	As required
	1	Engine	Check valve clearance	1	-	-

Lubrication and Servicing

LUBRICATION AND SERVICE CHART (Continued)						
Interval Hours	Ref. Points	Identification	Service Instructions	No. of Points	Lubricant or Coolant	Service/Quantities
1000 (6 Monthly)	2	Transmission	Drain oil and refill with new oil	1	EO	-
	2	Transmission	Run AEB Starter	1	-	-
	3	Hydraulic Tank Breather	Renew	1	-	Refer Maintenance Manual
	1	Engine	Check valve clearance	1	-	-
	6	Fuel Filter/Water Separator	Renew	1	-	-
	2	Transmission Breather	Clean if required	1	-	-
	28	Transmission Oil Filters	Renew.	2	-	-
	29	Transmission Internal Strainer	Clean.	1	-	-
	22	Drive shaft Bearings	Check oil level. Add if low.	1	EPL	See Note 4
	30	Cab Fresh Air Filter	Renew.	1	-	-
	32	Fuel Tank	Renew cap filter / cartridge.	1	-	-
	8	Batteries	Clean, check state of charge	2	-	-
	18	Belt Drive	Check for damage	1	-	-
	26	Adblue Tank	Renew reductant filter	1	-	-
2000 (Annually)	3	Hydraulic Tank	Drain oil and refill with new oil.	1	HO	-
	19	Brake Packs	Check brake wear	6	-	Refer Maintenance Manual
	19	Wheel Planetaries	Drain oil and refill with new oil	6	EPL	-
	20	Differentials	Drain oil and refill with new oil	3	EPL	See Note 2.
	25	Articulation Pivot Nut	Check torque.	1	-	1425 Nm (1050 lbf ft.)
	31	Hydraulic Oil Filter	Renew.	1	-	-
	4	Radiator Expansion Tank	Check coolant antifreeze	1	-	-
	23	Drive lines	Check for leaks and damage.	5	-	-
	1	Engine Mounting Bolts	Check torque.	4	-	298 Nm (220 lbf ft.)
	2	Transmission Mounting Bolts	Check torque.	3	-	920 Nm (679 lbf ft.)
	7	Engine Air Cleaner	Clean / renew filter element.	1	-	-
	1	Engine	Check and adjust valve clearance.	20	-	-
	34	Axle Mounting Bolts	Check torque	24	-	671 Nm (495 lbf ft.)
4000	33	Air Conditioning Compressor	Drain, flush and refill with new refrigerant oil	1	PAG Oil	-
6000	5	Cooling System	Drain, flush and refill with new coolant	-	-	-

NOTICE: Use 'Lubrication and Service Chart' in conjunction with 'Notes on Lubrication and Service Chart' and 'Miscellaneous Servicing' contained on the following pages.

Notes on Lubrication and Service Chart

Note 1 - Capacities given are approximate - work to dipstick, sight gauges or level plugs.

Note 2 - Capacity of front and rear differentials is 21 Litres (5.5 US gal). Capacity of centre differential is 23 Litres (6 US gal).

Note 3 - Lubricate slowly until excess lube is seen.

Note 4 - Remove the plug from the port on the underside of the oscillation hub. The plug is removed to drain the cavity of any oil that enters the cavity when filling. Remove the cover plate and level plug on the side of the oscillation hub. Add oil if required. Refit all plugs

Note 5 - Clean radiator and cooler fins more often when operating under extremely dusty conditions.

Note 6 - Change safety element after every third primary element service.

Note 7 - Independent Front Suspension (IFS) grease points (2). Remove excess grease from the grease holes in the pivot blocks (8 per side) and at the damper pins (2 per side).

Lubricate the left-hand IFS grease manifold until excess is observed exiting through the grease holes in the pivot blocks (8) and at the damper pins (2).

Lubricate the right-hand IFS grease manifold until excess is observed exiting through the grease holes in the pivot blocks (8) and at the damper pins (2).

Note 8 - This service interval is dependant on fuel quality. If a lesser grade of fuel is used than that specified within the recommended lubricants, the service interval should be reduced accordingly.

Note 9 - Check the air cleaner restriction gauge and operate the vacuator valve. Renew the element if the indicator denotes a blockage.

Lubrication and Servicing

- EO - Engine Oil. Refer to 'Recommended Lubricants' and 'Engine Oil Drain Intervals'.
 HO - Hydraulic Transmission Oil. Refer to 'Recommended Lubricants'.
 EPL - Extreme Pressure Gear Lubricant. Refer to Recommended Lubricants.
 EP, NLGI - Extreme Pressure Lithium No. 2 Grease (without 'Molybdenum').
 PAG Oil - Polyalkylene Glycol (PAG) Compressor Lubricating Oil Low Viscosity (ISO46).

INSPECTION INTERVAL FOR ENGINE

	Daily	First time at		Interval (hours)				At least	
		First Start	500	500	1000	2000	6000	Annually	Every 5 years
Lubrication System	X	X							
Checking oil level									
Changing the oil.									
Cleaning the centrifugal oil cleaner.									
Renewing the oil filter.				X1				X	
Cooling System	X								
Checking coolant level									
Checking coolant anti-freeze or corrosion protection.						X		X	
Cleaning the coolant system and changing coolant.							X1		X
Air Cleaner	X								
Reading the vacuum indicator.									
Cleaning or renewal of the filter element.						X1			X
Renewing the safety cartridge.						X			X
Fuel System	X	X							
Checking fuel level									
Renewing the fuel filter.					X1				X
Electrical Systems		X		X				X	
Checking the electrolyte level in batteries.									
Checking state of charge.									
Cleaning the batteries.									
Checking the coolant level monitor.									
Other	X	X			X			X	
Checking the drive belt.									
Check for leaks.						X			
Checking and adjusting the valve clearance.			X			X			
Renewing the reductant filter.					X				

NOTICE: X1 Indicates additional inspections maybe required.

Lubrication and Servicing

MISCELLANEOUS SERVICING WHEN REQUIRED

Seat Belts - Inspect for damage. Replace if required.



WARNING

Replace seat belts at least once every three years, regardless of appearance.

Windscreen Wipers And Washers - Replace wiper blades and top up reservoirs.

Wheel Rim Nuts - After first 10 hours (1 day) of operation re-torque nuts to 550 Nm (406 lbf ft.). Check torque every 250 hours (monthly) thereafter.

Engine - Steam clean the engine prior to performing any repair or service work on it, and if heavily contaminated due to prevailing site conditions.



WARNING

Electrical and electronic connections, the Engine ECM and harness connections should be protected or not directly steam cleaned when on or removed from the engine.

NOTICE: The engine and its components that are scheduled to be checked, serviced or replaced must be cleaned in accordance with the manufacturer's recommendations.

EVERY 10 HOURS OF OPERATION (DAILY)

Walk Around Inspection - Inspect the machine as described in Section 4 of the operations manual.

Engine - Visually check the engine for damage, loose or frayed belts and listen for any unusual noises.

Engine Air Cleaner - Change air cleaner element only when air restriction gauge locks up in the red. Service vacuator valves daily. Inspect and remove any obstructions from the vacuator valve lips which should be open and pliable with the engine stopped.

NOTICE: Service air cleaners more often when operating under extremely dusty conditions.

Engine Crankcase - Check oil level and add oil if low. With the engine off, the oil should be between the lower and upper marks on the dipstick, up to the upper mark is preferable.

Transmission - Check oil level and add oil if low. Refer to maintenance manual Section 120-0010, Transmission and Mounting, for correct oil level check procedure.

Hydraulic Tank - Check oil level and add oil if low. With the engine off and the body down the oil should be visible in the sight gauge.

Radiator Header Tank - Check coolant level when cold and add if low. Fill the radiator header tank with coolant until coolant reaches the bottom of the filler neck and holds that level.

NOTICE: Anytime a significant amount of coolant is added, the coolant inhibitor MUST be checked. If the concentration is low, engine damage will result. Conversely, over-inhibiting antifreeze solutions can result in silicate dropout.

AFTER FIRST 250 HOURS OF OPERATING NEW OR REBUILT COMPONENTS

Wheel Planetaries - Drain oil and refill.

Differentials - Drain oil and refill.

Axles - Check all visible nuts and bolts for loosening.
Retorque planetary fill/drain plugs to 55 Nm (40.5 lbf ft.)

AFTER FIRST 500 HOURS OF OPERATING NEW OR REBUILT COMPONENTS

Transmission - Drain oil, replace filter, clean internal filter and finger magnet. Refill the transmission.

NOTICE: When refilling the transmission ensure that the transmission cooler is primed to prevent damage.

Engine - Replace DCA4 coolant filter and check DCA4 coolant additive concentration.

Lubrication and Servicing

EVERY 250 HOURS OF OPERATION (MONTHLY)

Oil Can Points - Lubricate working parts with engine oil.

General Inspection - Check the entire machine for leaks, loose bolts and nuts or damaged parts. Examine the machine, particularly the chassis, for cracks or broken welds. Repair where necessary.

Engine Air Intake - Check the air intake system for wear points or damage to piping, loose clamps and leaks.

Parking Brake - Check pads and disc for wear. Adjust or replace if required. Test for correct function. Friction material thickness should never be allowed to wear below 3 mm (0.12 in).

EVERY 500 HOURS OF OPERATION (3 MONTHS)

Differentials - Check oil level and add if low. The correct oil level is up to the rim of the oil filler and level-check hole. Refer to relevant differential section within the maintenance manual for specific details.

Planetaries - Check oil level and add if low. Oil level should be at the lower bottom edge of the thread, with the wheel hub orientated so that the oil drain plugs are positioned horizontally in the middle of the axle. Refer to relevant planetary section within the maintenance manual for specific details.

EVERY 2000 HOURS OF OPERATION (ANNUALLY)

Hydraulic Oil Tank - Drain oil, remove and clean filter screen assemblies. Reinstall filter screens and refill the tank.

Hydraulic Oil Filter - Clean the filter housing and install a new element when the filter restriction gauge reads in the red zone, or after 2 000 hours of operation, whichever comes first.

Drive lines - Visually check low maintenance drive lines for leaking or damaged seals.

NOTICE: Low Maintenance drive lines can be identified by having plugs fitted to the spiders, not grease nipples.

Multi Disc Brakes - Check operation and brake wear is within the prescribed limit. Refer to maintenance manual Section 160-0030 for details

Differentials - Drain oil and refill. Perform oil change when oil is warm. For specific details of oil fill and drain plug locations, refer to the relevant differential section contained within the maintenance manual for details.

Planetaries - Drain oil and refill. Perform oil change when oil is warm and simultaneously with the differential. For specific details of oil fill and drain plug locations and steps, refer to the relevant planetary section contained within the maintenance manual for details. Re-torque fill and drain plugs to 55 Nm (40.5 lbf ft.)

Lubrication and Servicing

RECOMMENDED LUBRICANTS					
COMPONENT	LUBRICANT	*CAPACITY	SPECIFICATIONS	API CODE	SAE GRADE
Engine Crankcase (Including Filters)	Engine Oil with 1.00% sulphated ash limit is recommended. Sulphated ash must not exceed 1.85% limit	45 Litres (11.8 US gal)		CH-4	15W-40 (See Note1)
Transmission (Including cooler)	Engine Oil with 1.85% max. sulphated ash limit	55 Litres (14.5 US gal)	(See Note 2)	CH-4	15W-40 See Trans. Oil Table.
Transmission Cooler	Engine Oil with 1.85% max. sulphated ash limit	8.25 Litres (2.18 US gal)	(See Note 2)	CH-4	15W-40 See Trans. Oil Table.
Hydraulic System (Including Lines)	Hydraulic Transmission Oil	256 Litres (67.2 US gal)	See Hydraulic Oil Table (See Note 3)		
Cooling System	Anti-freeze, Ethylene Glycol	48.8 Litres (12.8 US gal)			
Differential (Front and Rear)	Extreme Pressure Gear Lubricant	21 Litres each (5.5 US gal)	MIL-L-2105	GL-5	80W-90 H
Differential (Centre)	Extreme Pressure Gear Lubricant	23.0 Litres (6.0 US gal)	MIL-L-2105	GL-5	80W-90 H
Planetaries (Front)	Extreme Pressure Gear Lubricant	11.75 Litres each (3.1 US gal)	MIL-L-2105 See Notes 5 and 6)	GL-5	80W-90 H
Planetaries (Centre & Rear) each	Extreme Pressure Gear Lubricant	7.5 Litres each (2.0 US gal)	MIL-L-2105 (See Notes 5 and 6)	GL-5	80W-90 H
Fuel Tank	Diesel Fuel Oil with max. sulphur 0.5%	370 Litres (98 US gal)	DIN EN590		
Grease Nipples	Extreme Pressure Lithium Grease				No.2 Consistency
Drive shaft through Bearings	Extreme Pressure Gear Lubricant	0.125 Litres (0.033 US gal)	MIL-L-2105	GL-5	80W-90
Articulation Bearings	Extreme Pressure Lithium Complex		EMS 19057		
Hand Pump Tank	Hydraulic Transmission Oil	1 Litre (0.26 US gal)	See Hydraulic Oil Table (See Note 3)		
Def Tank Capacity	Urea	52 Litres			

* - Capacities given are approximate, work to dipstick, sight gauges or level plugs.

Note 1 - The use of low viscosity oils, such as 10W-30 or 5W-30, can be used to aid in starting the engine and providing sufficient oil flow at low ambient temperatures. Continuous use of low viscosity oils can decrease engine life due to adverse wear.

Note 2 - Operation below the minimum temperatures listed for the oil used without proper preheat or warm-up results in greatly reduced transmission life. Proper warm-up requires 20 minutes minimum operation in neutral (with engine at part throttle) before operating the transmission in gear.

Note 3 - Hydraulic Transmission Oil meeting Specification EMS19058 is suitable for use in the hydraulic system.

Note 4 - Automatic Transmission Fluids (ATF) may only be used when the ambient temperature is less than -10° C (14° F). Should the temperature increase, it is necessary to switch to engine oil.

Note 5 - Maximum 1.5% of Lubrizol (TEREX Part No. 15250489), may be added to planetary capacity to prevent brake squeal.



WARNING

Any increase in the stated volume of Lubrizol will result in a decrease in brake performance.

Note 6 - Volume of Lubrizol to each planetary is as follows:

Front: Maximum 1.5% = 165 ml (5.57 oz)

Centre and Rear: Maximum 1.5% = 110 ml (3.71 oz)

Lubrication and Servicing

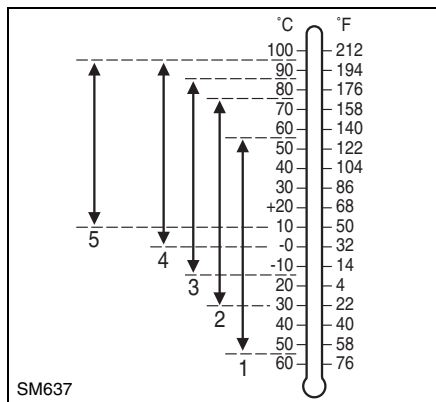
ENGINE OIL DRAIN INTERVALS

Engine oil drain intervals are dependant on the working environment and the type of oil used. Refer to the table below for engine manufacturer's recommended oil drain intervals.

ENGINE OIL DRAIN INTERVALS BY DUTY CYCLE (HOURS)				
	Severe	Heavy	Medium	Light
Fuel Consumption	> 13 gal/hr.	10 to 13 gal/hr.	8.5 to 10 gal/hr.	< 8.5 gal/hr.
API CF-4	150	200	250	300
API CG-4	250	300	400	500
API CH-4 or ACEA E5	300	350	500	600
CES20076 or CES20077	350	400	550	700

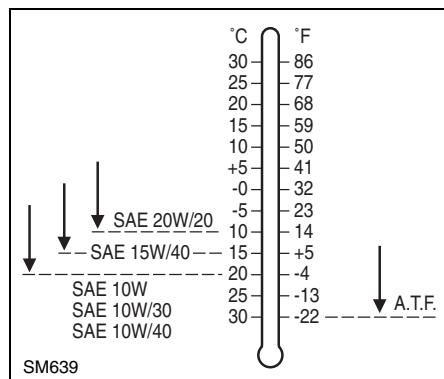
Lubricant Grade Selection Guide at Ambient (Start-up) Temperature

Hydraulic



	SAE	API CODE	MIL-SPEC
1	-	-	MIL-H-5606A
2	DEXRON Auto Trans. Fluid		
3	10W	CC/CD	MIL-L-2104 B/C
4	20W/20	CC/CD	MIL-L-2104 B/C
5	30	CC/CD	MIL-L-2104 B/C

Transmission Oil



NOTICE - Consult your lubricant supplier for correct viscosity of lubricant when ambient temperatures are consistently above or below those listed.

Lubrication and Servicing

Air Conditioning Re-start Procedure

If the machine has been idle for an extended period of time (2 weeks), the refrigerant in the air conditioning unit converts from a gas to a liquid. This puts the compressor unit under a great deal of strain trying to compress a liquid instead of a gas, and could cause a failure in the air conditioning unit. The following commissioning procedure allows the air conditioning unit to achieve normal operating parameters.

1. Start the machine and allow it to run until the engine is at a normal operating temperature of 80 °C (176 °F)
2. Turn the blower control to setting 1.
3. Turn on the air conditioning unit on for 5 seconds then off for 5 seconds.
4. Repeatedly switch the air conditioning on and off for at least 1 minute. This should be at least 12 repetitions.
5. Commissioning the air conditioning unit is complete and ready for use.

SPECIFIC INFORMATION ON LUBRICATION FOR TA300 TIER IV ENGINE

Tier IV engines meet ACEA E7

Other grade oils can be used depending on temperatures:

SAE20W-30 = -15 deg C to +30 deg C

SAE30 = -10 deg C to +30 deg C

SAE40 = -5 deg C to >+45 deg C

SAE50 = 0 deg C to >+45 deg C

SAE5W-30W = <-40 degC to +30 deg C

SAE10W-30 = -25 deg C to +30 deg C

SAE15W-40 = -20 deg C to >+45 deg C

NOTICE:

The engine oil level should be checked at first start and daily.

The engine oil should be changed every 500 hours or annually if the operating hours are less than 500 per annum.

The centrifugal oil cleaner should be cleaned at the same intervals as the engine oil change.

The engine oil filter should be renewed at the same intervals as the engine oil changes.

The coolant should be checked at 2000 hours and renewed every 6000 hours or annually.

An anti corrosion inhibitor is not required.

Fuel filters should be renewed every 1000 hours and 5 years.

The air cleaner should be renewed if warning of a blockage exists or at 2000 hours.

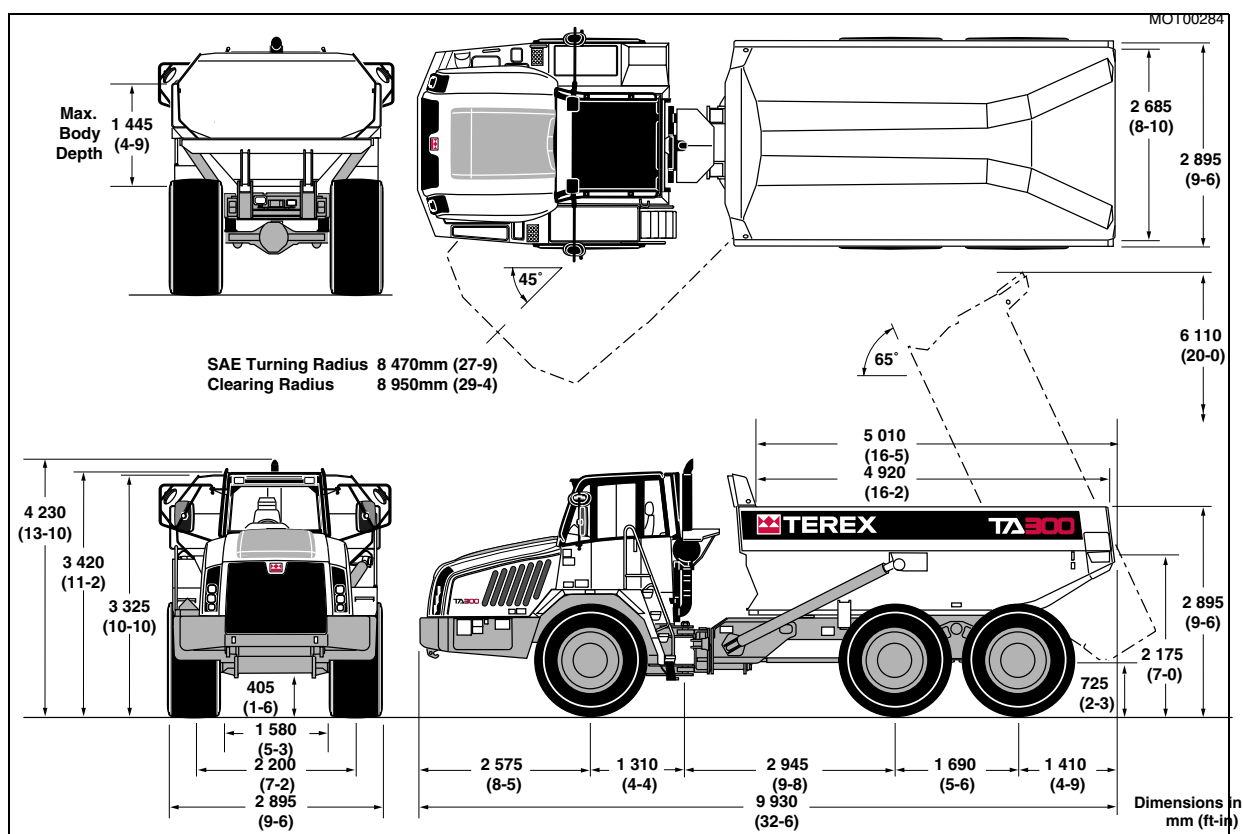


9 - Technical Data

Technical Data

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TECHNICAL DATA TA300



ENGINE

Make / Model	Scania DC09	Cooling	Coolant (50% Water and 50% Glycol - anti-freeze)
Fuel injection	Scania XPI	Valve clearances, cold engine intake valve (mm/in) outlet valve (mm/in)	0.45/0.02 0.70/0.03
Number of cylinders and configuration	5, straight	Number of teeth on the flywheel	158
Working principle	4 stroke engine	Low idle speed (rpm)	600–750
Cylinder diameter (mm/in)	130/5.12	Maximum full-load speed (rpm)	2 100
Cylinder diameter (mm/in)	140/5.51	Maximum torque at speed (rpm)	1300
Displacement (dm ³ /in ³)	9.3/567.5	Fuel	Diesel (10 PPM)
Firing sequence	1-2-4-5-3	Oil pan capacity	32 - 38 Litres
Power Range	276kW	Weight, without coolant and oil (kg/lb)	950/2094
Compression ratio	16:1		
Engine direction of rotation, viewed from rear	Anticlockwise		
Fan direction of rotation, viewed from front	Clockwise		

NOTICE: The Tier IV Engines meet ACEA E7 specifications.

Technical Data

TRANSMISSION

Make/Model.....ZF 6WG 310 RPC Automatic with manual override.

The transmission assembly consists of a torque converter close-coupled to a countershaft-type gearbox with integral output transfer gearing. There is an automatic shifting throughout the range with a kickdown feature. Lockup action in all forward gears. A torque proportioning output differential transmits drive permanently to the front and rear axles. This differential may be locked by the operator for use in difficult traction conditions. There is a standard integral hydraulic retarder which automatically operates should the engine overspeed. A blocked filter indicator and filter bypass system provide valve block with additional protection from unfiltered oil.

Pressures:

Main.....16 + 2 bar (232 + 30 lbf/in²)

Lockup (Wk).....12 ± 2 bar (174 ± 30 lbf/in²)

Converter 'IN'.....10.5 bar (152 lbf/in²) at 2300 rev/min.

Converter 'OUT'.....4.8 bar (70 lbf/in²) at 2300 rev/min.

Converter Relief Valve.....8.5 bar (123 lbf/in²)

Retarder.....4.5 bar (65 lbf/in²)

Temperatures:

Normal.....80° - 110° C (176° - 230° F)

Maximum (Retarder Mode).....145° C (293° F)

Stall Speed.....1805 rev/min.

Ratios:

Torque Converter.....1.84:1

Transmission.....Refer to table below

Forward						
Gear	1	2	3	4	5	6
km/h	5.6	8.6	13.3	20.6	30.2	50.0
mile/h	3.5	5.4	8.3	12.8	18.8	31.1
Reverse						
Gear	1	2	3			
km/h	5.6	13.3	30.2			
mile/h	3.5	8.3	18.8			

AXLES

There are three heavy duty axles with fully floating axle shafts and outboard planetary reduction gearing. The three axles are in permanent all wheel drive (6x6) with a differential coupling between the front and rear axles. All three axles also have hydraulically actuated multiple transverse diff-lock differentials for 100% cross-axle lock up. The inter-axle and cross-axle diff-locks are controlled by the operator, and can be actuated when required in poor traction conditions.

Differential 3.875:1

Planetary 5.71:1

Total Reduction.....22.12:1

SUSPENSION

Front: The axle is mounted to the front chassis frame through the top plate of the front axle housing. The complete unit is pivoted through the front frame. Suspension is provided by four spring and damper assemblies (two per side) which are linked to lower wishbones and which are secured at their upper ends to the front frame via spring mounts. Bumpstops limit the travel of the suspension assemblies when fully loaded.

Rear: Each axle is coupled to the frame by three rubber-bushed links with lateral restraint by a transverse link. Pivoting inter-axle balance beams equalise load on each axle. Suspension movement is cushioned by rubber/metal laminated compression units between each axle and underside of balance beam ends. Pivot points on rear suspension linkages are rubber-bushed and maintenance-free.

WHEELS AND TYRES

Wheels: 3-piece earthmover rims with 12 stud fixing.

TYRE PRESSURES

				Front		Centre		Rear	
Truck	Brand	Size	Pattern	bar	lbs/in ²	bar	lbs/in ²	bar	lbs/in ²
TA300	Bridgestone	23.5 R25	VLT	4.8	69	4.8	69	4.8	69
	Bridgestone	23.5 R25	VMT	4.8	69	4.8	69	4.8	69
	Bridgestone	23.5 R25	VKT	4.8	69	4.8	69	4.8	69
	Michelin	23.5 R25	XADT	4.1	60	4.1	60	4.1	60
	Double Coin	23.5 R25	REM2	4.5	65	4.5	65	4.5	65
	Triangle	23.5 R25	TB516	5.2	76	7.2	76	5.2	76
	Triangle	23.5 R25	TM518	5.2	76	5.2	76	5.2	76
	Triangle	23.5 R25	TL528	5.2	76	5.2	76	5.2	76
	Bridgestone	30/65 R25	VLT	3.2	46	3.2	46	3.2	46
	Michelin	30/65 R25	XADN	3.1	45	3.1	45	3.1	45
	Michelin	750/65 R25	XAD 65	3.1	45	3.1	45	3.1	45
	Magna	23.5 R25	MA02	4.5	65	4.5	65	4.5	65

NOTICE: Tyre pressures should be regarded as nominal only. It is recommended that for tyres both listed and unlisted, the user should consult the tyre manufacturer and evaluate all job conditions in order to make the proper selection.

HYDRAULIC SYSTEM

Braking, steering and body hoist hydraulic systems are controlled by a manifold block mounted on the frame. Systems are supplied with oil from a common tank by the main hydraulic pump, driven from power takeoff on transmission. System components are protected by full flow filtration on the return line.

Pump:

Type.....Piston

Capacity at 2100 rev/min.....4.9 litre/s (77.4 US gal/min.)

Technical Data

Brakes

The machine has a full hydraulic braking system with enclosed, oil-immersed multiple discs on each wheel. Independent circuits serve the front and the rear brake systems. Warning lights and audible alarm indicate low brake system pressure. The brake systems conforms to ISO 3450, SAE J1473.

Actuating Pressure.....60 bar (870 lbf/in²)

Braking surface.....22000 mm² (34.1 in²)

Parking: Spring-applied, hydraulic-released disc on the rear driveline.

Emergency: There is automatic application of the driveline brake should pressure fall in the main brake hydraulic system. Service brakes may also be applied using the parking-emergency brake control.

Retardation: Standard exhaust brake and standard hydraulic retarder integral with transmission.

Steering

Hydrostatic power steering is provided by two single-stage, double-acting, cushioned steering cylinders. Emergency steering pressure is provided by a ground driven pump mounted on the rear of the transmission. An audible alarm and warning light illuminates should the emergency system activate. Conforms to ISO 5010, SAE J53.

System Pressure.....241 bar (3500 lbf/in²)

Steering Angle to either side.....45°

Lock to Lock Turns, steering wheel.....4

Body Hoist

Two single-stage, double-acting hoist rams, cushioned at both ends of stroke.

Electro servo assisted hoist control.

System Pressure.....220 bar (3200lbf/in²)

Control Valve.....Pilot Operated, Closed
Centre

Body Raise Time (loaded).....12 sec

Body Lower Time (power down).....7.5 sec

ELECTRICAL SYSTEM

Type.....24 volt, Negative Ground

Battery.....Two, 12 Volt, 143 Ah each

Accessories.....24 Volt

Alternator.....70 Amp

BODY

The body is an all welded construction, fabricated from high hardness (min. 360 BHN) 1000 MPa (145 000 lbf/in²) yield strength steel. A 25° tail chute angle provides good load retention without the tailgate.

Plate Thicknesses:

Floor and Tailchute.....14 mm (0.55 in)

Sides.....12 mm (0.47 in)

Front.....8 mm (0.31 in)

Volume:

Struck (SAE).....13.8 m³ (18.0 yd.³)

Heaped 2:1 (SAE).....17.5 m³ (22.9 yd.³)

Exhaust System**Diesel Exhaust Fluid (DEF) - Reductant for SCR****Reductant**

Diesel Exhaust Fluid is a urea solution which acts as a reductant. On the Selective Catalytic Reduction (SCR), the reductant is added to the exhaust gases before the catalytic converter. As a result the emissions of nitrogen oxides are reduced.

Diesel Exhaust Fluid specified should be in accordance with DIN 70070

Diesel Exhaust Fluid is a solution of urea and water, with 32.5% by weight of urea. This solution freezes at approximately -11°C. Then both ice and water always have the same concentration.

Recommended Urea Content**Limit Value Urea Content**

32.5%

30-34%

**WARNING**

These machines use a solution of high purity urea. Avoid prolonged or repeated contact with skin. After handling, always wash hands thoroughly with soap and water. In case of contact with eyes, rinse immediately with water. If large quantities are ingested or irritation persists seek medical attention immediately.

Technical Data

VIBRATION

Hands and Arm Vibration

The weighted root mean square acceleration to which hand and arms of the operator are exposed is less than 2.5 m/s² under normal operating conditions.

Whole Body Vibration	TA300
Vibration Emission Value a	0.52m/s ²
Uncertainty K	0.26 m/s ²
Operating Mode: Value obtained under simulated field duty cycle.	

NOTICE: The whole body vibrations on construction machines are influenced by many factors independent of machine design, for example ground conditions, working methods, correct seat adjustment, operator input to vehicle speed.

The single whole-body emission value listed above is determined under particular operating and terrain conditions. In accordance with EN474, it is not intended to be used to determine the whole-body vibration exposure to the operator using the machine.

NOTICE: It is recognized that the appropriate design of the operator's seat is the most effective construction measure to minimize the whole - body vibration emission of a particular machine family.

This machine is equipped with an operator's seat which meets the criteria of EN ISO 7096 representing vertical vibration under severe operating conditions. The seat in this machine has been tested with input spectral class EMI and has a seat transmissibility factor SEAT > 1.1.

Vehicle Weights 23.5 R25 Tyres		
Standard Vehicle	kg	lb.
Net Distribution		
Front Axle	12720	28043
Centre Axle	5480	12081
Rear Axle	5340	11773
Vehicle, Net	23540	51897
Payload	28000	61730
Gross Distribution		
Front Axle	17788	39216
Centre Axle	16988	37452
Rear Axle	16764	36958
Vehicle, Gross	51540	113626
Bare Chassis	17555	38703
Body	4400	9700
Body Hoists (Pair)	530	1170

Ground Pressures		
At 15% sinkage of unloaded radius and specified weights		
23.5 R25	Net	Loaded
Front	128 kPa (17.2 psi)	180 kPa (24.6 psi)
Rear	54 kPa (7.8 psi)	172 kPa (24.6 psi)
750/65 R25	Net	Loaded
Front	90 kPa (13.1 psi)	128 kPa (18.6 psi)
Rear	41 kPa (5.9 psi)	128 kPa (18.6 psi)



WARNING

Maximum permissible gross vehicle weight including options, attachments, full fuel tank and payload must not be exceeded.

NOISE EMISSIONS

Sound Power Level ISO6395	TA300
A - Weighted sound power level Lwa in decibels Uncertainty Kwa, in decibels	109 0.4
Sound Pressure Level at Operators Station ISO6396	TA300
A - Weighted emission sound pressure level Lpa in decibels Uncertainty Kwa, in decibels	75 2.47
The sound level values are in compliance with Directive 2000/14/EC and BS EN 474.	

NOTICE: The above result is for the mode giving the highest exterior sound level when measured and operated as per the prescribed procedures of the standard. Results shown are for the machine in base configuration.

NOTICE: Noise exposure level to the operator and bystander personnel may be higher depending upon proximity to buildings, rock piles, machinery, etc. The actual job site noise exposure level must be measured and applicable regulations complied with respect to employee hearing protection.

Technical Data

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10 - Symbol Identification

Symbol Identification

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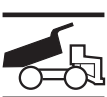
Symbol Identification

SYMBOL IDENTIFICATION

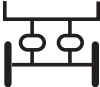
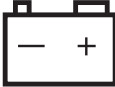
These pages explain the meaning of symbols that may appear on your machine.

Basic Warning Symbol		Fast		Engine Oil		Air Pressure	
Pressurised Compartment		Slow		Engine Oil Pressure		Air Filter or Restriction	
Master Switch		Lock		Engine Oil Filter		Starter Air Pressure	
Switch "ON"		Unlock		Basic Transmission		Oil Level	
Switch "OFF"		Basic Engine		Transmission Oil		Minimum or Low	
Negative Ground		Engine Starter		Transmission Oil Pressure		Maximum or High	
Ammeter		Engine Rev/Min		Transmission Oil Temperature		Basic Hydraulic Oil Symbol	
Circuit Breaker		Engine "OFF"		Transmission Oil Filter		Hydraulic Oil Filter	
Hourmeter		Emergency Engine Shut Off		Transmission Converter Lock up		Hydraulic Oil Filter Pressure	

Symbol Identification

Hot Hydraulic		Light Flood		Heater		Low Steering Pressure	
Coolant Temperature		Light Low Beam		Air Conditioner		High Speed Or Level	
Coolant Cold		Light High Beam		Inside Air Circulation		Low Speed Or Level	
Coolant Hot		Instrument Panel Light		Outside Air		Body Up	
Cooling		Lamp Test		Parking Brake		Body Raise	
Heating		Horn		Parking Brake		Body Hold	
Fuel Gauge Or Fill Tube		Windsheild Wiper		Brake Oil Temperature		Body Lower	
Fuel Filter		Windsheild Defroster		Turn Left		Body Float	
Fuel Shut - Off		Windsheild Washer		Turn Right		Dumpertruck Retarder	
Basic Lights Symbol		Blower Fan		Tilt Steering		Neutral	

Symbol Identification

Lift Point		Water in Fuel		Engine Stop		Trans. Oil Temp	
Do Not Lift		Wait to Start		Trans Over Speed		Drop Oil Temp	
Forward		Bowl Suspension		Battery Power		Drop Oil Pressure	
Reverse		Maintenance		Engine Air Filter		Trans. Retarder	
Clutch Engaged		Transmission Converter		Brake Cooling Oil Pressure		Engine Brake	
Clutch Disengaged		Break Air Pressure		Brake Cooling Oil Temperature		Dropbox High Ratio	
Brake Applied Clutch Engaged		Engine Check		Body Up		Dropbox Low Ratio	
Brake Applied Clutch Disengaged							

Symbol Identification

Steering Pressure 	Pump Pressure Rear 	Pump Pressure Front 	Brake Pressure Rear 
Brake Pressure Front 	Accumulator Pressure 	Load Sense Pressure Rear 	Load Sense Pressure Front 
Parking Brake Pressure 	Body Hoist Lower 	Body Hoist Raise 	
Raise Pilot 	Lower Pilot 	DropBox High Pressure 	DropBox Low Pressure 
Rear Axle Disconnect 	Cross Axle Difflock 	Sound Power 	Park Brake 
Reverse Alarm 	Air Conditioner 	Direction Indicator 	Engine Exhaust Brake 
Differential Locks 	Transmission Check Light 	Body UP Indicator Lamp 	Front Brakes Accumulator Pressure Low 
Rear Brakes Accumulator Pressure Low 			

Symbol Identification

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Symbol Identification

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