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TEREX®

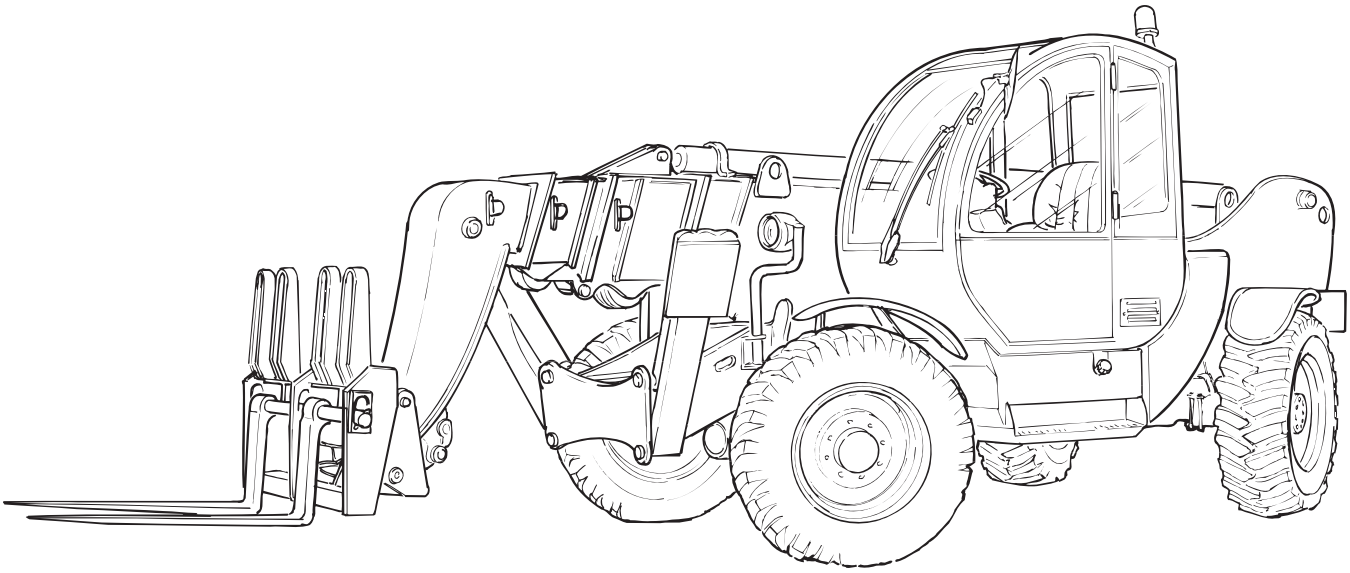
SERVICE MANUAL

Code 57.4402.9200 - 1st Edition 10/2006

Handler with telescopic boom

Telelift 3713 SX

(From serial n. 09944 to serial n. 16244)



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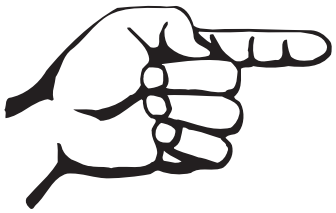

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Code 57.4402.9200 - 1st Edition 10/2006

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Copies consigned: n° ..... on paper

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The undersigned is obliged to use the manual in their workshop, without disclosing the information in the same in any way, to unauthorised workshops and third parties in general, and not to photocopy or reproduce this manual or parts of the same in any way without the prior written authorisation of TEREXLIFT to do so.

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Yours sincerely

Date .....

For acceptance

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.....	.....

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SERIAL NUMBER IDENTIFICATION

Machine denomination	Literature valid up to serial number
Telelift 3713 SX	11321

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INTRODUCTION

Important

Read, understand and obey the safety rules and operating instructions in the **Telelift 3713 SX Operator's Handbook** before attempting any maintenance or repair procedure.
This manual provides the machine owner and user with detailed information on the scheduled maintenance. It also provided qualified service technicians with infromation on troubleshooting and repair procedures.
Basic mechanical, hydraulic and electrical skills are required to perform most procedures. However, several procedures require specialized skills, as well as specific tools and equipment.
In these instances, we strongly recommend letting service and repair the machine at an authorized TEREXLIFT service center.

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DESCRIPTION OF THE MACHINE OPERATION

The source of mechanical energy of this machine is a naturally aspirated diesel engine (**1**) model Perkins 1104C-44 with direct injection, water cooling, 4 cylinders, 63.5 kW power (86 HP) at 2400 rev/min., max torque of 302 Nm at 1400 rev./min. or, in alternative, a turbo.-compressed diesel engine model Perkins 1104C/44T, with direct injection, water cooling, 4 cylinders, 74.4 kW power (101 HP) at 2400 rev./min., max. torque of 412 Nm at 1400 rev./min.
On the flywheel side of the engine, and connected to this engine by a Technodrive coupler complete with elastic joint and with a 1-to-1 ratio, there is Bosch-Rexroth closed-loop pump for hydrostatic drives, model A4VG71 (**2**) with adjustment valve of DA type. The max displacement of this swashplate pump is 71 cm^3/rev. and the max calibration pressure is 420 bar. This pump is used to supply hydraulic power under form of pressure and flow rate which is then used for moving the machine. On the through-shaft of such drive pump there is a Casappa open-loop gear pump (with fixed displacement) (**4**) with priority valve integrated in the housing (**13**). The displacement of this pump is 43 cm^3/rev. Its function is to provide hydraulic power, under form of pressure and flow rate, to the steering circuit of the machine (priority side) and to the circuit for the telescopic boom movements (secondary side). The assembly of the two pumps involves they have a rotation velocity equal to the speed of the diesel engine. A third Casappa open-loop gear pump (with fixed displacement) (**5**) with a displacement of 20 cm^3/rev., is installed on the PTO of the engine located to the distribution side. This pump feeds the servo-assisted braking system (**18**) and the unused oil flow is delivered to the hydraulic geared motor Casappa (**8**) with a displacement of 20 cm^3 for the operation of the cooling fan mounted on the heat exchanger (**9**). Inside the motor housing, an anti-cavitation valve and a pressure limiting valve with bypass function set at 140 bar, are installed.
The suction lines of the open-loop pumps (**5**) and (**4**) are protected by an immersed filter (**7**), placed inside the hydraulic fluid tank (**11**) whose capacity is 120 litres. Just upstream of the connection with the two suction lines mentioned above, there is a gate valve with ball valve which lets you cut out the hydraulic oil tank in order to perform maintenance interventions on the machine's hydraulic system. On the contrary, the drive pump (**2**) is protected by a cartridge filter (**6**), installed on the suction line of the booster pump. This pump is an integral part of the drive pump. The one-way valve (**12**) set at 2.5 bar protects the pump housing against high pressures and guarantees a certain circulation of the drain oil to the hydrostatic motor reducing, in this way, the temperature. From port “G” of the drive pump (**2**) low-pressure oil is taken (25-30 bar) and used for the anti-

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cavitation circuit of the automatic fork levelling system. The hydraulic energy produced by the drive pump (**2**) is converted into mechanical power by a closed-loop hydrostatic motor, model Bosch-Rexroth A6VM107 (**3**) equipped with adjustment valve of DA1 type and with flush valve for reducing the max temperatures inside the drive circuit. The max displacement of this bent-axis motor is 107 cm^3/rev. The motor is directly flanged to the Dana single-speed reduction gear, which, at its turn, is directly fixed with brackets to the rear axle (**20**). The mechanical torque at the gearbox output is transmitted to the front axle (**43**) and the rear axle (**20**), both model 212 manufactured by Dana, through Cardan shafts. The hydraulic drive (**14**) of "load sensing" type with a displacement of 315 cm^3/rev., receives oil from the priority line of the pump (**4**) in relation to the "load sensing" signal sent by the hydraulic drive and connected to such pump with function of pilot signal. In this way, the input flow to the hydraulic drive is exactly the one needed for the instantaneous steering functions; any excess flow of the pump is available for the functions of the telescopic boom. The steering circuit is protected against input overpressures by a pressure reducing valve set at 140 bar. On the two delivery lines to the steering cylinders there are other two pressure reducing valves with anti-shock function set at 200 bar. These two valves are intended to limit possible shocks on the steering wheel due to overstress on the steering cylinders. The three pressure reducing valves are installed in the hydraulic drive (**14**) and cannot be regulated from the outside. The steering circuit is completed by the front steering cylinder (**15**), the rear steering cylinder (**16**) (these cylinders being integral part of the front axle (**43**) and the rear axle (**20**) respectively) and by a 4-way/3-position solenoid valve (**17**) for the selection of the three different steer modes (rear wheels straight, co-ordinate front/rear steering and independent front/rear steering). When the solenoid valve (**17**) is not energised, the front steering cylinder is fed by the hydraulic drive and the rear cylinder is blocked. When one magnet or the other of the solenoid valve (**17**) is energised, the chambers of the cylinders are connected in a different manner thus causing the desired effect on the steering mode. The Walvoil 6-section valve block of mechanical type (**21**) receives oil from the secondary line of the pump (**4**) and feeds all the movements of the telescopic boom, as well as the outriggers and the chassis sway function. This monoblock valve is the 6-way type, with oil which flows through the main valve when the controls are not activated, and then to the tank. When the mechanical lever controls are activated, the movement of the main valve sliders chokes the oil flow, thus producing the necessary pressure for the control of the activated function. Each of the 6 sections of the main valve control a specific function of the machine (lifting/lowering, attachment holding plate rotation, boom extension/

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retraction, attachment locking/unlocking, outriggers and chassis sway function). In the head there is a pressure relief valve set at 280 bar also serving as a safety valve of the circuit which directly acts on the main line of the hydraulic oil. Again in the input head of the main valve there is a solenoid valve discharging the main flow ("deadman" function) which activates the movements of the main valve only when its solenoid is energised. When such solenoid is not energised all the flow from the pump is discharged. In this specific version of the machine, this solenoid valve is mainly used to stop some movements of the machine when the stability limits are reached, and also to completely deactivate such functions when the relevant selector in the driving place is turned to the "road" position. The solenoid valve is activated by the "deadman" pushbuttons located on the mechanical levers of the main valve.
By moving the main lever in the driving place to one side, section 1 of the main valve directly delivers oil to the oil-dynamic block (**22**) consisting of a 6-way/2-position electrical switch block and 2 pressure relief valves (**23**). These valves, calibrated at 295 bar, are mounted on the lines controlling the rotation of the attachment holding frame. When the coil of the electrical switch block is energised by the activation of the pushbutton placed at the top of the main lever in the cab, the oil coming from section 1 of the main valve is sent to the extension cylinders (**36**) and (**38**) of the telescopic boom, connected in series with each other. Cylinder (**36**), which activates the second telescope of the boom, is equipped with a double-acting compensation valve (**35**) serving also as a safety valve, while cylinder (**38**), which activates the third telescope of the boom, is equipped with a single-acting compensation valve (**37**) again serving also as a safety valve.

When the coil of the electrical switch block is not energised, oil is sent to the attachment holding frame cylinder (**34**) of the telescopic boom. This cylinder is equipped with a double-acting compensation valve (**33**) serving also as a safety valve. Parallel to this cylinder, there is the fork levelling compensation cylinder (**32**) (also called balancing cylinder) which is equipped with a special double-acting compensation valve (**31**).Inside this valve, the one-way valves are mounted in reversed manner with respect to the normal position to avoid the pressurisation of the cylinder when the rotation control of the attachment holding frame is activated. Again inside this valve, there are other two one-way valves (**30**), set at 5 bar, serving as anti-cavitation check valves. These valves deliver oil, taken from the low-pressure line of the transmission pump (**2**), to the fork levelling compensation circuit when needed. The two pressure relief valves (**23**) set at 295 bar and mounted in the oil-dynamic block (**22**), protect the automatic fork levelling

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circuit during the boom lifting/lowering phases and in all cases of overload on the attachment holding frame (for instance, in the case of use of the bucket).
Section 2 of the main valve (**21**) controls the telescopic boom lifting cylinder (**29**) through the longitudinal displacement of the main lever placed in the driving cab. This cylinder has one single-acting compensation valve (**28**) with safety function.
Section 3 of the main valve controls the chassis sway cylinders (**41**) mounted on the left and right sides of the machine, anchored to the front axle and equipped with a double-acting compensation valve (**42**) serving also as a safety valve, through the lateral displacement of the special lever installed in the driving place.
Section 4 of the control valve controls the attachment locking cylinder (**40**) through the lateral displacement of the special lever placed in the driving place. This cylinder has a double one-way valve (**39**) with hydraulic release and safety function. On the feeding lines of this cylinder, there are two quick-fit connectors for the connection of the hydraulic lines to the optional attachments which need hydraulic power for their operation (ex. hydraulic winch and maintenance jib, mixing bucket, etc.). In the model dealt with in this manual, this function is optional.
Section 5 of the main valve controls the left outrigger cylinder (**24**) equipped with double-acting compensation valve (**25**) serving also as a safety valve, through the lateral displacement of the special lever placed in the driving place.
Section 6 of the main valve controls the right outrigger cylinder (**26**) equipped with double-acting compensation valve (**27**) serving also as a safety valve, through the lateral displacement of the special lever placed in the driving place.
All the sections of the main valve (**21**) are equipped with a micro-switch which senses and transmits a special ON/OFF signal when the relevant slider is activated. Such signals are used by the operating logic of the system protecting the machine in case of loss of stability (LMI).
The SAFIM S6 servo-assisted braking system with pedal (**18**) receives oil from pump (**5**) and uses this oil to pressurise a hydraulic accumulator (**19**) connected to the same system. The oil at pressure contained in this accumulator is then used to operate the service brake placed inside the front axle (**43**). The fill valve inside the braking system takes the flow from the feeding line so the pressure on the accumulator line reaches the calibration value of the cutout valve set at 150 bar. When this pressure is reached, the valve gradually releases all the flow through port B to the radiator fan motor.
The brake pedal installed in the driving place, which is an integral part of the S6 servo-assisted braking system, is connected to a slider of proportional type which controls the service brake line. In relation to the stroke of this slider, a gradual communication between

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the feeding line, connected to an accumulator (**19**) with 0.5 lt. capacity and a fill pressure of 50 bar, connected to port R1, and the service brake line, is established so the flow is distributed to such line and the discharge line increasing, in this way, the pressure (and as a result the braking force) on the line of the service brake. When the slider is in the rest position, the line of the service brake is connected to the discharge. The pressure switch set at 2-10 bar, placed on the line of the service brake, sends an electrical signal when this brake is engaged. The other pressure switch set at 70 bar and connected to port F, sends an electrical warning signal when the pressure inside the feeding circuit of the brake line is too low to guarantee the minimum braking efficiency.
The oil coming from the drain line of the main valve (**21**) is cooled down by heat exchanger (**9**) which is divided in two sectors, i.e. one absorbing heat from the cooling circuit of the diesel engine and the other absorbing heat from the hydraulic circuit of the machine. The oil cooled down by the heat exchanger flows to tank (**11**) directly. A one-way valve calibrated at 8 bar (**10**), is installed parallel to the input line of the heat exchanger and used as safety valve. Its function is to avoid overpressure conditions of the heat exchanger (as is the case of a machine starting at low temperatures) by directly draining any excess oil into the tank.

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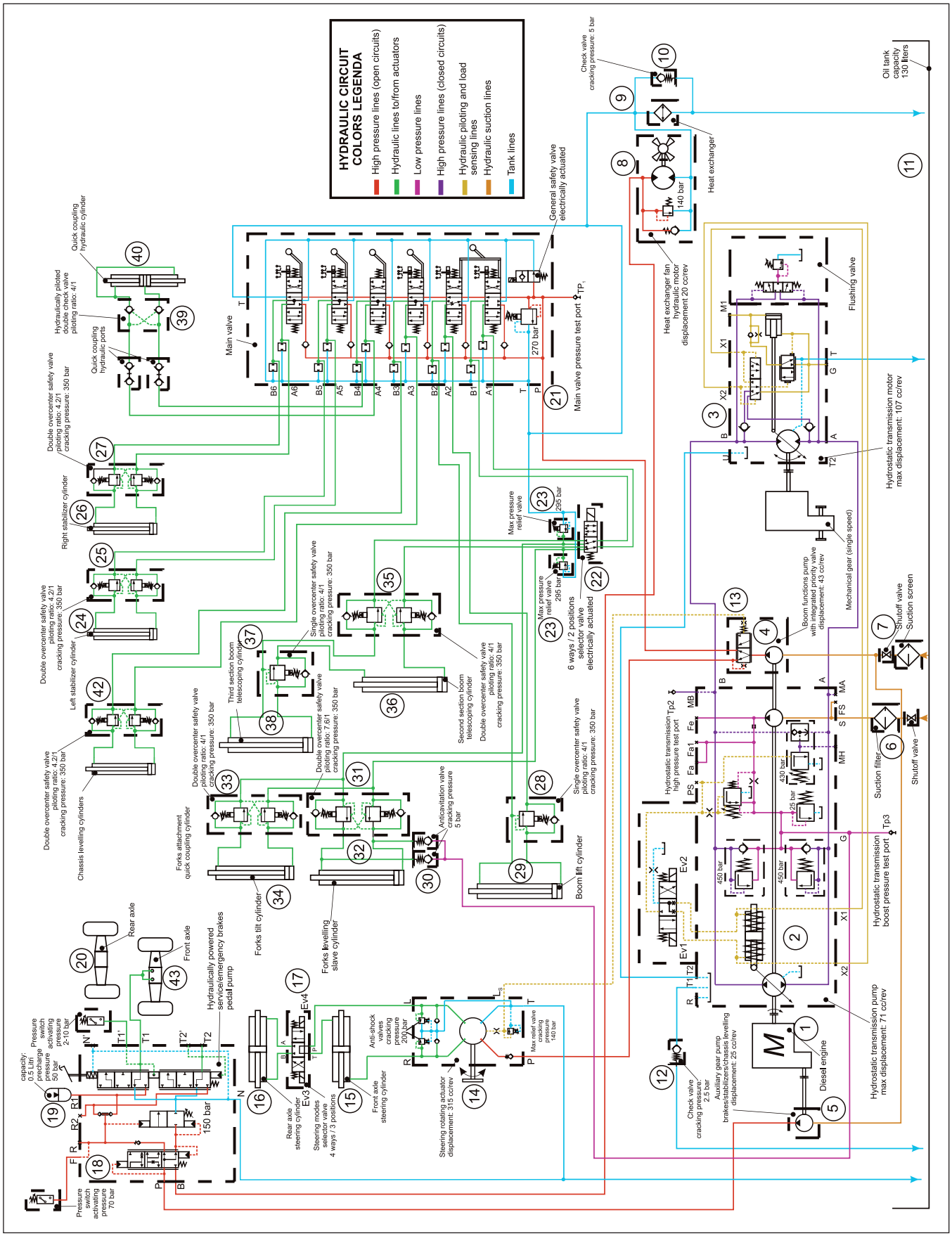
Telelift 3713 SX hydraulic schematic



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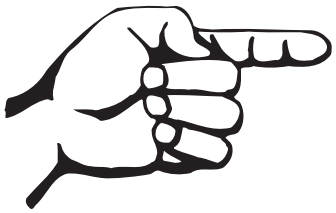

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SAFETY INFORMATION

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1.1 SAFETY RULES

1.1-1 Personal Safety

In this manual, any important information is preceded by a **SPECIAL SYMBOL**.
All operators who work or service the machine must know the exact meaning of these safety symbols.

There are six special (or safety) symbols in this manual, always combined with keywords that class the situations according to their danger degree.
The symbols are always followed by a text explaining the situation taken into account, the attention to be paid to such situation, the method and the behaviour to be adopted. When necessary, it stresses prohibitions or supplies instructions to prevent dangers.
Sometimes, it can be followed by illustrations.

We list below the special (or safety) symbols according to the relative seriousness of the hazard situation:

Draws the attention to situations that involve your own as well as the others' safety and that can result in serious or lethal injury.

⚠DANGER

Draws the attention to situations that involve your own as well as the others' safety and that can result in serious or lethal injury.

⚠WARNING

Draws the attention either to situations that involve your own as well as the others' safety and that can result in minor or moderate injury or to situations that involve the machine efficiency.

⚠CAUTION

Draws the attention either to situations that involve your own as well as the others' safety and that can result in minor or moderate injury or to situations that involve the machine efficiency.

CAUTION

Draws the attention to important technical information or practical advice that allows for a safer and more efficient use of the machine.

NOTICE

Draws the attention to important environment-related information.

Be sure to wear protective eye wear and other protective clothing if the situation warrants it.

Be aware of potential crushing hazards such as moving parts, free swinging or unsecured components when lifting or placing loads. Always wear approved steel-toed shoes.

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1.1-2 Workplace Safety

Be sure to keep sparks, flames and lighted tobacco away from flammable and combustible materials like battery gases and engine fuels. Always have an approved fire extinguisher within easy reach.

Be sure that all tools and working areas are properly maintained and ready for use. Keep work surfaces clean and free of debris that could get into machine components and cause damage.

Be sure that your workshop or work area is properly ventilated and well lit.

Be sure any forklift, overhead crane or other lifting or supporting device is fully capable of supporting and stabilizing the weight to be lifted. Use only chains or straps that are in good condition and of ample capacity.

Be sure that fasteners intended for one time use (i.e., cotter pins and self-locking nuts) are not reused. These components may fail if they are used a second time.

Be sure to properly dispose of old oil or other fluids. Use an approved container. Please be environmentally safe.

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1.2 GENERAL REMARKS

Most accidents occurring while working, servicing or maintaining operation machines, are caused by not complying with the basic safety precautions.
Therefore, it is necessary to pay steady attention to the potential hazards and the effects that may come of operations carried out on the machine.

CAUTION

If you recognise hazardous situations, you can prevent accidents!

For instance, this handbook makes use of special **safety symbols** to highlight potentially hazardous situations.

⚠CAUTION

The instructions given in this handbook are the ones established by TEREXLIFT. They do not exclude other safe and most convenient ways for the machine commissioning, operation and maintenance that take into account the available spaces and means.

If you decide to follow instructions other than those given in this manual, you must:

- be sure that the operations you are going to carry out are not explicitly forbidden;
- be sure that the methods are safe and in compliance with the indications given in this section;
- be sure that the methods cannot damage the machine directly or indirectly or make it unsafe;
- contact TEREXLIFT Assistance Service for any suggestion and the necessary written permission.

CAUTION

Do not hesitate to pose questions if you are in doubt! Contact TEREXLIFT: the assistance service is at your disposal. Addresses, phone and fax numbers are given in the cover and in the title-page of this manual.

1.3 SERVICEMEN'S REQUISITES

The operators who use the machine regularly or occasionally (e.g. for maintenance or transport) shall have the following requisites:

health:
before and during any operation, operators shall never take alcoholic beverages, medicines or other substances that may alter their psycho-physical conditions and, consequently, their working abilities.

physical:
good eyesight, acute hearing, good co-ordination and ability to carry out all required operations in a safe way, according to the instructions of this manual.

mental:
ability to understand and apply the rules, regulations and safety precautions. They shall be careful and sensible for their own as well as for the others' safety and shall desire to carry out the work correctly and in a responsible way.

emotional:
they shall keep calm and always be able to evaluate their own physical and mental conditions.

training:
they shall read and familiarise with this handbook, its enclosed graphs and diagrams, the identification and hazard warning plates. They shall be skilled and trained about the machine use.

CAUTION

It is recommended to take part in at least one technical training course organised by TEREXLIFT Assistance Office.

CAUTION

Ordinary and extraordinary maintenance of the machineare quite complex from a technical point of view and should be performed by an authoirsed service centre.

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1.3-1 PERSONAL PROTECTIVE EQUIPMENT

During work, but especially when maintaining or repairing the machine, operators must wear suitable protective clothing and equipment:

- Overalls or any other comfortable garments. Operators should wear neither clothes with large sleeves nor objects that can get stuck in moving parts of the machine
- Protective helmet when working under or in the vicinity of suspended load
- Protective gloves
- Working shoes
- Breathing set (or dust mask)
- Ear-protectors or equivalent equipment
- Goggles or facial screen.

CAUTION

Use only type-approved protective equipment in good condition.

1.4 SAFETY PRECAUTIONS

⚠DANGER

Read and understand the following safety instructions before servicing the machine.
The following list contains safety rules which must absolutely be obeyed to prevent accidents and injuries.

1.4-1 WORKING AREA

- Make sure the area all around the machine is safe. Always be aware of potential risks.
- During work, keep the working area in order. Never leave objects scattered: they could hinder the machine movements and represent a danger for personnel.

1.4-2 PRECAUTIONS DURING WORK

- Do not walk or stop under raised loads or machine parts supported by hydraulic cylinders or ropes only.
- Keep the machine handholds and access steps always clean from oil, grease or dirt to prevent falls or slips.
- When entering/leaving the cab or other raised parts, always face the machine; never turn the back.
- When carrying out operations at hazardous heights (***over 3 meters from the ground***), always use type-approved safety belts or fall preventing devices.
- Do not enter/leave the machine when it is running.
- Before servicing the engine, let its parts cool down.
- Do not leave the driving place when the machine is running.
- Neither stop nor carry out interventions under or between the machine wheels when engine is running. When maintenance in this area is needed, stop the engine, engage the parking brake and chock the wheels to prevent accidental movements.
- Do not carry out maintenance or repair works without a sufficient lighting.
- When using the machine lights, the beam should be oriented in order not to blind the personnel at work.
- Before applying voltage to electric cables or components, ensure they are properly connected and efficient.
- Do not carry out interventions on electric components with voltage over 48V.

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- Do not connect wet plugs or sockets.
- Signs and stickers shall never be removed, hidden or become unreadable.
- Except for maintenance purposes, do not remove safety devices, covers, guards,. Should their removal be necessary, stop the engine, remove them with the greatest care and always remember to refit them before starting the engine and using the machine again.
- Aleays stop the engine and disconnect the batteries before maintenance or service.
- Do not lubricate, clean or adjust moving parts.
- Do not carry out operations manually when specific tools are provided for this purpose.
- Absolutely avoid to use tools in bad conditions or in an improper way.
- Before carrying out operations on hydraulic lines under pressure (hydraulic oil, compressed air) and/or before disconnecting hydraulic components, ensure the relevant line has been previously depressurised and does not contain any hot fluid.

⚠ DANGER

Any intervention on the hydraulic or pneumatic circuit must be carried out by authorised personnel. Before any operation on lines under pressure, release any residual pressure from the circuit.
Do not use your fingers to check for pressure leaks. Fine jets of air, oil or fuel can injure you.

- Neither smoke nor use open flames if there is a risk of fire or close to fuel, oil or batteries.
- Do not leave fuel cans or bottles in unsuitable places.
- Do not empty catalytic mufflers or other vessels containing burning materials without taking the necessary precautions.
- Carefully handle all flammable or dangerous substances.
- After any maintenance or repair work, make sure that no tool, cloth or other object has been left within compartments with moving parts or in which suction and cooling air circulates.
- Never give orders to several people at a ime. Instructions and signs must be given by one person only.
- Always pay the due attention to the instructions given by the foreman.
- Never distract the operator during working phases or crucial manoeuvres.
- Do not call an operator suddenly, if unnecessary.
- Do not frighten an operator or throw objects by no means.
- After work, never leave the machine under potentially dangerous conditions.

NOTICE

Treatment and disposal of used oils is subject to federal, national and local laws and regulations. Collect and deliver these wastes to authorised centres.

- Use the assistance of a second person to handle loads weighing 30 to 50 kg.
- For loads over 50 kg, the use of special hoisting equipment in good condition and equipped as per enforced regulations is mandatory.

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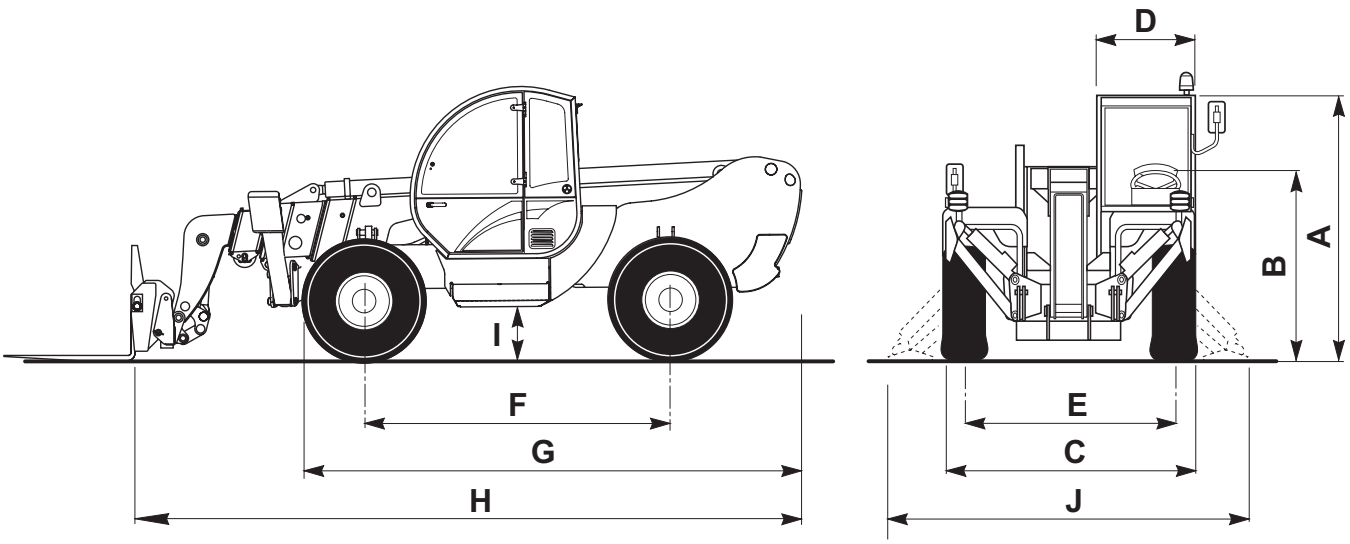
2.1 MAIN DIMENSIONS



			Telelift 3713 SX
A	Overall height	mm	2560
B	Height to the steering wheel	mm	1920
C	Overall width	mm	2330
D	Cab width	mm	910
E	Track	mm	1920
F	Wheel-base	mm	2850
G	Length to the front tyres	mm	3910
H	Length to the attachment holding plate	mm	5610
I	Ground clearance	mm	460
J	Max width with extended outriggers	mm	2930
•	Internal steering radius	mm	1300
•	External steering radius	mm	3990

2.2 TYRES

		Telelift 3713 SX	
		Standard	**Optional**
- Dimensions		405/70 R20	405/70 R24
- P. R. (or load index)		14 pr	14 pr
- Rim		13x20	13x24
- Wheel disc		8 holes DIN 70361	8 holes DIN 70361
- Pressure	bar/Psi	5.5/80	4.5/65

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2.3 LIMIT OF USE

			Telelift 3713 SX
•	Angle of approach	°	90
•	Departure angle	°	45
•	Ambient temperature	°C	-20÷+40

2.4 WEIGHT

			Telelift 3713 SX
•	Weight in working order	kg	9900

2.5 SPEED

			Telelift 3713 SX
•	Working speed (*)	km/h	0÷8
•	Travel speed	km/h	0÷30
•	Max. slope with full load	%	54

(*) either forward or reverse motion.

2.6 PAYLOAD AND REACH

			Telelift 3713 SX
•	Max lifting height:		
	with outriggers	mm	12640
	without outriggers	mm	12470
•	Reach at max height without outriggers	mm	1290
•	Max reach forward with outriggers	mm	8740
•	Attachment holding plate rotation	°	145
•	Maximum payload with outriggers	kg	3700
•	Payload at max height with outriggers	kg	2500
•	Payload at max reach with outriggers	kg	1000

Courtesy of Crane.Market

2.7 FORKS

			Telelift 3713 SX	
			Floating type	Fixed type
•	Dimensions	mm	1200x130x50	1200x130x50
•	Weight	kg	70	70
•	Fork holding frame - class		FEM III	FEM III

2.8 DIESEL ENGINE

			Telelift 3713 SX	
			Aspirated version	Turbo version
•	Make		PERKINS	PERKINS
•	Model/Type		1104C-44	1104C-44T
•	Features		Diesel 4 cylinders in line 4 strokes direct injection	Diesel 4 cylinders in line 4 strokes direct injection
•	Bore x Stroke	mm	103x127	105x127
•	Total displacement	cc	4232	4400
•	Power at 2300 rpm	kW	63,5	74,4

2.9 ELECTRICAL SYSTEM

			Telelift 3713 SX
•	Voltage	V	12
•	Starter (power)	kW	3
•	Battery	Ah	120

2.10 MACHINE SOUND LEVELS

			Telelift 3713 SX	
			Aspirated version	Turbo version
•	Guaranteed sound power level (in accordance with the Directive 2000/14/CE)	dB	Lwa = 104	Lwa = 106
•	Measured sound pressure level (in accordance with the Directive 98/37/CE)	dB	Lpa = 93	Lpa = 84

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2.11 VIBRATION LEVELS

			Telelift 3713 SX
•	Mean assessed vibration level transmitted to arms	m/s^2	< 2.5
•	Mean assessed vibration level transmitted to body	m/s^2	< 0.5

Values calculated in accordance with standard prEN13059

CAUTION

This is a Class A device. In a residential environment, such device can cause radio disturbance. In such cases, the operator is required to take suitable measures.

2.12 REFUELLING

			Telelift 3713 SX
•	Diesel engine	l	11,5
•	Engine cooling system	l	15
•	Fuel tank	l	135
•	Hydraulic oil tank	l	150
•	Differential gears	l	8,7
•	Wheel reduction gears	l	0,75
•	Gearbox	l	1,5

Products:
Engine oil: **SHELL RIMULA SAE 15W-40 (API CH-4 / CG-4 / CF-4 / CF, ACEA E3, MB 228.3)**
Power divider-Differential gears-Reduction gears: **FUCHS TITAN GEAR LS 85 W-90 (API GL-5 LS / GL-5)**
Hydraulic system and brakes: **SHELL TELLUS T 46 (DENISON HF-1 DIN 51524 part 2 & 3)**

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2.13 TIGHTENING TORQUES

Thread diameter	Pitch	Wrench measure mm				Tightening torques Material class					
		S	S			8.8		10.9		12.9	
			UNI	UNI	UNI	Normal	Galvanized	Normal	Galvanized	Normal	Galvanized
mm	mm		5931/32	5933÷36	5923÷30	Nm	Nm	Nm	Nm	Nm	Nm
4	0,7	7	3	2,5	2	3,2	2,8	4,4	3,9	5,3	4,8
5	0,8	8	4	3	2,5	6,1	5,5	8,7	7,8	10,3	9,3
6	1	10	5	4	3	10,6	9,5	14,8	13,3	17,8	16,0
8	1,25	13	6	5	4	25,1	22,5	35,4	31,8	42,5	30,2
	1	13	6	5	4	26,5	23,8	37,3	33,5	44,7	40,3
10	1,5	17	8	6	5	51,1	46,0	71,9	64,7	86,3	77,6
	1,25	17	8	6	5	53,4	48,1	75,1	67,5	90,2	81,1
12	1,75	19	10	8	6	86,5	77,8	121,4	109,2	145,9	131,3
	1,25	19	10	8	6	92,4	83,2	129,5	116,6	156,1	140,5
14	2	22	12	10	6	137,7	123,9	193,8	174,4	232,6	209,3
	1,5	22	12	10	6	145,9	131,3	206,1	185,5	246,9	222,0
16	2	24	14	10	8	209,1	188,2	293,8	264,4	353,0	317,7
	1,5	24	14	10	8	218,3	196,5	308,1	277,3	369,3	332,4
18	2,5	27	14	12	8	288,7	259,8	406,1	365,5	487,7	436,9
	1,5	27	14	12	8	314,2	282,8	442,8	398,5	530,6	477,5
20	2,5	30	17	12	10	408,1	367,3	573,4	516,1	687,7	618,9
	1,5	30	17	12	10	439,7	395,8	619,3	557,4	742,8	662,5
22	2,5	32	17	-	12	542,3	488,5	763,2	686,9	915,3	823,7
	1,5	32	17	-	12	582,6	524,3	819,3	737,4	983,6	885,3
24	3	36	19	-	12	705,1	634,5	990,8	891,7	1193,3	1074,4
	2	36	19	-	12	745,3	671,3	1051,0	945,9	1255,1	1129,5
27	3	41	19	-	-	1036,0	927,5	1448,9	1304,0	1734,6	1561,2
	2	41	19	-	-	1091,8	982,6	1530,6	1377,5	1836,7	1653,0
30	3,5	46	22	-	-	1307,9	1258,1	1989,3	1772,4	2357,1	2121,4
	2	46	22	-	-	1510,2	1359,1	2122,4	1910,2	2540,8	2286,7
33	3,5	50	24	-	-	2000,0	1800,0	2800,0	2520,0	3400,0	3060,0
	2	50	24	-	-	1610,0	1450,0	2300,0	2070,0	2690,0	2420,0
36	4	55	27	-	-	2600,0	2340,0	3700,0	3330,0	4300,0	3870,0
	3	55	27	-	-	2800,0	2520,0	3900,0	3510,0	4600,0	4140,0
39	4	60	27	-	-	3400,0	3060,0	4800,0	4320,0	5600,0	5040,0
	3	60	27	-	-	3600,0	3240,0	5100,0	4590,0	5900,0	5310,0

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Thread diameter	Pitch	Standard nuts		Low nuts	
		5S	8G	5S	8G
		Nm	Nm	Nm	Nm
4	0,7	5,5		3,5	
5	0,8	5,5		3,5	
6	1	9,5	13,0	6,0	8,0
8	1,25	23,0	32,0	14,0	20,0
	1	25,0	35,0	16,0	22,0
10	1,5	46,0	64,0	29,0	40,0
	1,25	49,0	68,0	31,0	42,0
12	1,75	80,0	110,0	50,0	69,0
	1,25	88,0	125,0	55,0	78,0
14	2	125,0	180,0	78,0	110,0
	1,5	140,0	195,0	88,0	120,0
16	2	195,0	275,0	120,0	170,0
	1,5	210,0	295,0	130,0	185,0
18	2,5	270,0	390,0	170,0	245,0
	1,5	305,0	425,0	190,0	265,0
20	2,5	305,0	540,0	190,0	340,0
	1,5	425,0	600,0	260,0	375,0
22	2,5	510,0	720,0	320,0	450,0
	1,5	570,0	800,0	360,0	500,0
24	3	660,0	930,0	410,0	580,0
	2	720,0	1000,0	450,0	630,0
27	3	980,0	1400,0	610,0	880,0
	2	1050,0	1500,0	660,0	940,0
30	3,5	1350,0	1850,0	850,0	1160,0
	2	1450,0	2050,0	910,0	1280,0
33	3,5	1650,0	2310,0	1050,0	1470,0
	2	1980,0	2770,0	1270,0	1780,0
36	4	2120,0	2970,0	1360,0	1900,0
	3	2550,0	3570,0	1630,0	2280,0
39	4	2730,0	3820,0	1750,0	2450,0
	3	3250,0	4550,0	2080,0	2910,0

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2.14 DRILL DIAMETERS FOR THREADS

Thread x pitch	DRILL DIAMETER LIMITS		DRILL BIT DIAMETER
	max	min	
M 4 x 0,7	3,42	3,24	3,30
x 0,5	3,60	3,46	3,50
M 5 x 0,8	4,33	4,13	4,20
x 0,5	4,60	4,46	4,50
M 6 x 1	5,15	4,92	5,00
x 0,75	5,38	5,19	5,20
M 8 x 1,25	6,91	6,65	6,80
x 1	7,15	6,92	7,00
M 10 x 1,5	8,87	8,38	8,50
x 1,25	9,38	9,19	9,20
M 12 x 1,75	10,44	10,10	10,20
x 1,5	10,68	10,38	10,50
M 14 x 2	12,21	11,83	12,00
x 1,5	12,68	12,38	12,50
M 16 x 2	14,21	13,84	14,00
x 1,5	14,68	14,38	14,50
M 18 x 2,5	15,74	15,29	15,50
x 1,5	16,68	16,38	16,50
M 20 x 2,5	17,74	17,29	17,50
x 1,5	18,68	18,38	18,50
M 22 x 2,5	19,74	19,29	19,50
x 1,5	20,68	20,38	20,50
M 24 x 3	21,25	20,75	21,00
x 2	22,21	21,83	22,00
M 27 x 3	24,25	23,75	24,00
x 2	25,21	24,83	25,00
M 30 x 3,5	26,77	26,21	26,50
x 3	27,25	26,75	27,00
M 33 x 3,5	27,77	29,21	29,50
x 2	31,21	30,83	31,00
M 36 x 4	32,27	31,65	32,00
x 3	33,25	32,75	33,00
M 39 x 4	35,27	34,67	35,00
x 3	36,25	35,75	36,00

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2.15 STANDARD TIGHTENING TORQUES FOR FITTING SEALS

■ 60° CONICAL SEALS

Thread diameter		TIGHTENING TORQUES (0+10%)
inc.	mm	60° CONICAL SEALS Nm
G 1/8"		15
G 1/4"	M 10 x 1	20
9/16"-18		25
11/16"-16		40
13/16"-16		55
3/4"-16		62
1"-14		80
7/8"-14		80
1.1/16"-12		110
1.3/16"-12		115
1.5/16"-12		160
1.7/16"-12		130
1.11/16"-12		190
1.5/8"-12		225
1.7/8"-12		270
2"-12		245
2.1/4"-12		360

■ FRONT O-LOK (Parker) SEALS

Thread diameter		TIGHTENING TORQUES (0+10%)
inc.	mm	FRONT O-LOK (Parker) SEALS Nm
9/16"-18		25
11/16"-16		40
13/16"-16		55
1"-14		80
1.3/16"-12		115
1.7/16"-12		130
1.11/16"-12		190
2"-12		245

■ 37° COUNTER-SUNK CONICAL SEALS (JIC)

Thread diameter		TIGHTENING TORQUES (0+10%)
inc.	mm	37° CONICAL SEALS (JIC) Nm
7/16"-20	M10x1	15
1/2"-20	M12x1.5	20
9/16"-18	M14x1.5	28
	M16x1.5	62
3/4"-16	M18x1.5	62
7/8"-14	M22x1.5	80
1.1/16"-12	M27x2	110
1.3/16"-12		141
1.5/16"-12	M33x2	160
1.5/8"-12	M42x2	225
1.7/8"-12	M48x2	270
2.1/4"-12	M10x1	360

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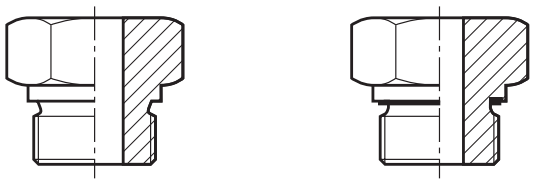
■ SEALS WITH GRIP-RING

Thread diameter				TIGHTENING TORQUE (0+10%) SEALS WITH GRIP-RING
inc.	mm	Fitting Series	Pipe ø mm	Nm
G 1/8"	M10x1	LL	4	10
G 1/8"	M10x1	LL	6	10
G 1/8"	M10x1	L	6	25
G 1/4"	M12x1.5	L	8	50
G 1/4"	M14x1.5	L	10	50
G 1/8"	M20x1.5	L	12	130
G 1/8"	M20x1.5	L	15	190
G 1/8"	M20x1.5	L	18	245
G 1/8"	M20x1.5	L	22	130
G 1/8"	M20x1.5	L	28	190
G 1/8"	M20x1.5	L	35	245
G 1/8"	M20x1.5	L	42	245
G 1/4"	M12x1.5	S	6	50
G 1/4"	M14x1.5	S	8	50
G 3/8"	M16x1.5	S	10	80
G 3/8"	M18x1.5	S	12	80
G 1/2"	M22x1.5	S	16	105
G 3/4"	M27x2	S	20	220
G 1"	M33x2	S	25	370
G 1.1/4"	M42x2	S	30	500
G 1.1/2"	M48x2	S	38	600

■ FITTING ASSEMBLY

Thread diameter		TIGHTENING TORQUES (0+10%) JOINTS	
		A	B
inc.	mm	Nm	Nm
G 1/8"	M10x1	25	12
	M12x1.5	30	18
G 1/4"		40	18
	M14x1.5	50	20
	M16x1.5	60	35
	M18x1.5	80	50
G 3/8"		95	40
	M20x1.5	140	60
G 1/2"	M22x1.5	140	75
	M26x1.5	220	85
G 3/4"		250	110
	M27x2	250	100
G 1"		400	190
	M33x2	400	150
G 1.1/4"		600	240
	M42x2	600	260
G 1.1/2"		800	300
	M48x2	800	350



A B

A Male face
Mechanical seal or copper washer

B Male face
Soft seal with O-ring

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2.16 LOCKING MATERIAL

THREAD LOCKERS

Product	*APPLICATION*	*Characteristics Temp. °C*	*Thread*	*Locking speed*	*Resistance*
Loctite 290	Thread locking	to 150°	M 12	Rapid	Medium
Loctite 222	Thread locking	to 150°	M 20	Moderate	Low
Loctite 243	Thread locking	to 150°	M 20	Rapid	Medium
Loctite 262	Thread locking	to 150°	M 20	Moderate	High
Loctite 270	Thread locking	to 150°	M 20	Moderate	Very high
Loctite 277	Thread locking	to 150°	M 36	Slow	High
Loctite 272	Thread locking	to 200°	M 36	Slow	High

THREAD SEALANT *For hermetic sealing. Not suitable for thermoplastic materials*

Product	*APPLICATION*	*Characteristics max °C*	*Thread max*	*type*	*Locking speed*	*Disassembly difficulty*
Loctite 511	Fitting sealant	150°	M80	Con./Cyl.	Rapid	Low
Loctite 542	Fitting sealant	150°	M36	Con./Cyl.	Rapid	Moderate
Loctite 545	Fitting sealant	150°	M36	Con./Con.	Moderate	Low
Loctite 565	Fitting sealant	150°	M80	Con./Cyl.	Instantaneous	Low
Loctite 572	Fitting sealant	150°	M80	Con./Cyl.	Moderate	Low
Loctite 577	Fitting sealant	150°	M80	Con./Cyl.	Rapid	Moderate

GASKETS *Total sealing in 24-72 hours*

Product	*APPLICATION*	*Characteristics max °C*	*Play max mm*	*Formation time*	*Resistance to fluids*
Loctite 518	Formed-in-place gasket	150°	0,5	Moderate	Excellent
Loctite 509	Formed-in-place gasket	150°	0,2	Moderate	Excellent
Loctite 573	Formed-in-place gasket	150°	0,2	Slow	Excellent
Loctite 574	Formed-in-place gasket	150°	0,5	Rapid	Excellent
Loctite 510	Formed-in-place gasket	200°	0,2	Moderate	Excellent
Loctite 5699	Formed-in-place gasket	200°	6,0	Rapid	Excellent
Loctite 5999	Formed-in-place gasket	200°	6,0	Instantaneous	Excellent
Loctite 5910	Formed-in-place gasket	200°	6,0	Rapid	Excellent
Loctite 5900	Formed-in-place gasket	200°	6,0	Instantaneous	Excellent
Loctite 5920	Formed-in-place gasket	250°	M 36	Slow	Good

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2.17 HOISTING INSTRUCTIONS

⚠ DANGER

All parts weighing more than 25 kg MUST COMPULSORILY be handled with suitable hoisting means.
In the Disassembly and Assembly section there is a clear indication of the weight of the part to handle, while chapter A.12 contains a summary table with the weight of the single components.

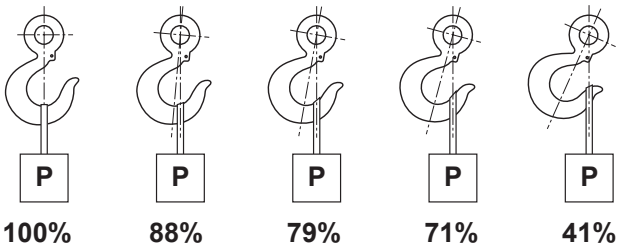
Before removing parts of the machine, make sure that:
- all fixing bolts have been removed
- all hydraulic and electrical parts have been disconnected
- the part to be removed is not blocked.

STRANDED ROPES
- Use ropes or other hoisting accessories suitable to the weight of the part to be handled. For ropes, refer to the following table:

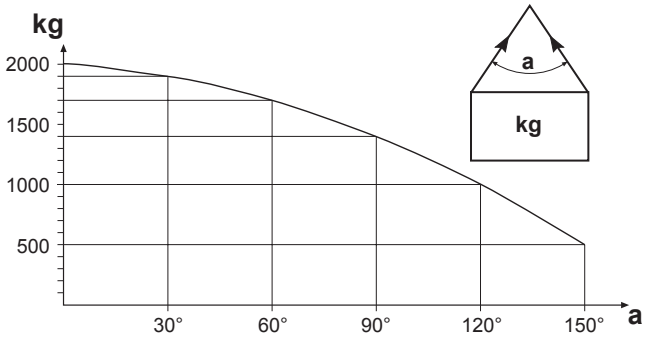
STRANDED ROPES	
Rope diameter mm	Max admissible load kg
10	1000
11.2	1400
12.5	1600
14	2200
16	2800
18	3600
20	4400
22.4	5600
30	10000
40	18000
50	28000
60	40000

The value of the admissible load has been considered as equal to 1/6 the rope breaking load.

- Attach the load to the natural seat of the hook. Attaching a load to an end can cause the load to fall down during raising and result in serious injury.



- Do not attach a heavy load to ropes forming a wide suspension angle. The total capacity of the ropes reduces proportionally to the angle as shown in the following chart.



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2.18 ADVICE TO RENEW FLEXIBLE HOSES

NOTICE

Before disconnecting a hydraulic pipe, place containers of suitable size underneath to prevent oil spillage.

CAUTION

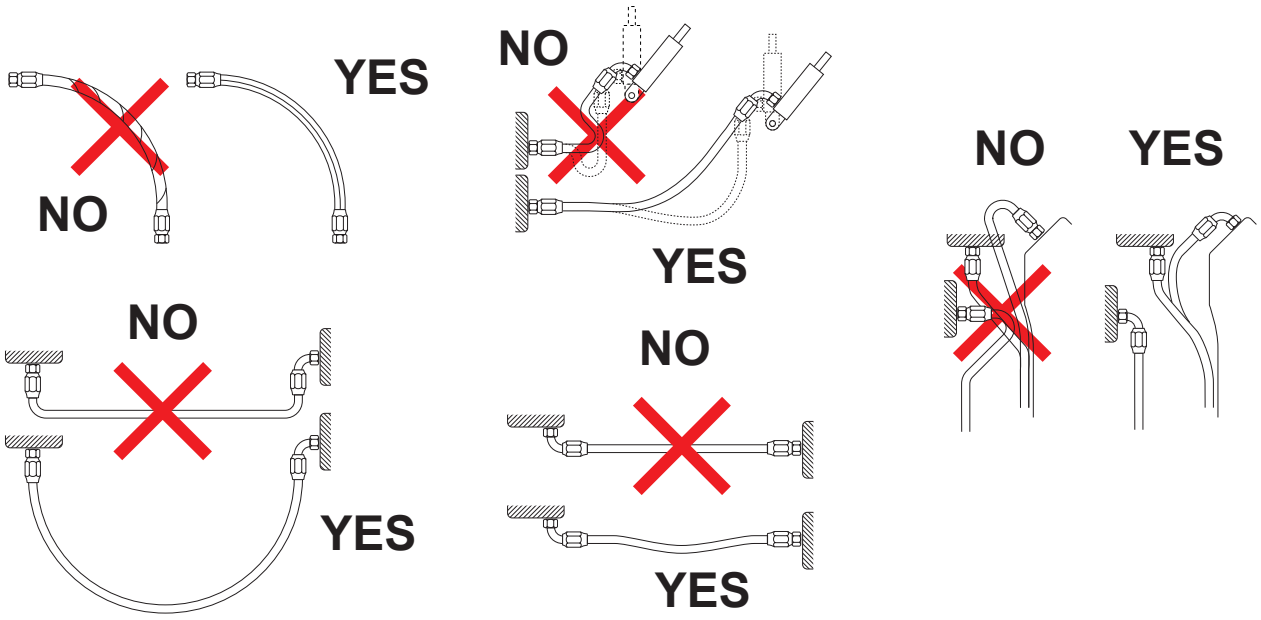
Plug all disconnected parts to prevent dust or impurities from entering the circuit. They can cause serious damage.

⚠DANGER

Before disconnecting the hydraulic pipe, check that there is no residual pressure. In case, eliminate the pressure operating the control levers with the engine stopped.
In any case, disconnect the hydraulic pipe with extreme caution and always wear suitable personal protection equipment -e.g. goggles, gloves, facial screen, etc.
Wrap up the end of the pipe to be disconnected with some rags and slowly loosen the pipe connector so that air comes out as slow as possible.

1 Before disconnecting or refitting a flexible hose, carefully clean the area all around.
2 Blow some compressed air to remove any impurity.
3 For an easier renewal of the hoses, whose run is not clearly visible, proceed as follows:
- disconnect the hose to be replaced from both sides
- tie a cord to one end of the hose
- remove the hose pulling the cord until it comes out completely
- untie the cord and tie it to the new hose
- pull the cord from the other side to refit the hose until reaching the connecting point to the line.

Useful advice for mounting flexible hoses:



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2.19 LISTS OF RECOMMENDED SPARE PARTS

Telelift 3713 SX

ELECTRICAL COMPONENTS

Code	Description	Q.ty
638700	Solenoid	1
07.0701.0007	Solenoid	1
07.0703.0063	Relay	1
07.0703.0060	Fuse	2
56.0009.0002	Horn	1
56.0006.0002	Relay	1
634973	Fuse	2
56.0012.0000	Sensor	1
09.0802.0000	Load cell	1
07.4501.0028	Indicator	1
07.0703.0419	Switch	1
07.0703.0436	Lever	1
07.0703.0420	Moment limiter cut-out key	1
07.0703.0441	Emergency button	1
07.0703.0425	Indicator light	1
07.0703.0424	Indicator light	1
07.0703.0426	Indicator light	1
07.0703.0427	Fuel indicator light	1
07.0703.0029	Start switch	1
638226	Selector switch	1
07.0703.0430	Switch	1
07.0703.0433	Switch	1
07.0703.0435	Switch	1
637650	Fuse	2
07.0703.0080	Fuse	1
634972	Fuse	5
07.0703.0148	Fuse	10
634973	Fuse	5
07.0703.0485	Relay	2

MISCELLANEOUS

Code	Description	Q.ty
04.0603.0111	Hose (optional)	1
04.0603.0110	Hose	1
640536	Seals kit	1
07.4529.0071	O-ring	2
07.4529.0073	Back-up ring	2
640591	Bushing	1
905371	O-ring	1
636455	Seals kit	1
640101	Seals kit	1
640102	Seals kit	1
640594	Phasing valve	1
04.0603.0109	Hose	1
09.4670.0003	Vibration-proof support	2
09.0805.0005	Sleeve	1
09.4645.0000	Gas cable	1
09.4645.0003	Cable	1

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Code	Description	Q.ty
09.4655.0000	Gas lever	1
640100	Seals kit	1
09.4605.0005	Tank	1
09.4605.0006	Cap	1
07.0712.0010	Fan	1
632696	Bobbin	1
07.0700.0001	Indicator	1
56.0013.0000	Thermistor	1
07.0738.0000	Star wheel	1
638004	Seals kit	1
05.4329.0001	Pressure meter	1
05.4329.0002	Pressure meter	1
05.4329.0000	Accumulator	1
09.4645.0022	Parking brake cable	2
09.4670.0001	Vibration-proof support	2
637452	Seals kit	1
09.4661.0014	Plug	1
09.4661.0002	Oil level gauge	1
56.0013.0001	Fuel gauge	1
09.4610.0002	Rear view mirror	1
09.0803.0023	Lock	1
09.0803.0024	Hook latch	1
53.3000.8200	Manifold	1
04.4210.0001	Female coupling (optional)	1
04.4210.0000	Male coupling (optional)	1
639395	Seals kit (optional)	1

SPARE PARTS FOR THE CAB

Code	Description	Q.ty
07.0740.0066	Paper filter	1
07.0740.0076	Handle	1
07.0740.0088	Wiper arm	1
07.0740.0089	Wiper blade	1
07.0740.0029	Handle	1
07.0740.0050	Handle	1
07.0740.0051	Lever-fitted lock	1

FILTER

Code	Description	Q.ty
Aspirated engine		
640885	Cartridge	2
07.4501.0041	Cartridge	1
638243	Oil filter	2
07.4501.0057	Fuel filter	2
07.0700.0000	Cartridge	2
Turbocharger engine		
638243	Oil filter	2
639399	Air filter	1
639400	Cartridge	2
07.4501.0057	Fuel filter	2
07.0700.0000	Cartridge	2

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2.20 MACHINE PAINT COLOUR

STANDARD machines

GREY RAL 7012

WHITE RAL 1013

MAT BLACK RAL 9005 (from June 2004 for cylinders)

AUSA machines

ORANGE RAL 2004

GENIE machines

BLUE GENIE

GREY GENIE

BLACK RAL 9500

MZ IMER machines

ORANGE RAL 2010

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2.21 CHECKING THE CYLINDER MOVEMENT TIMES

CAUTION

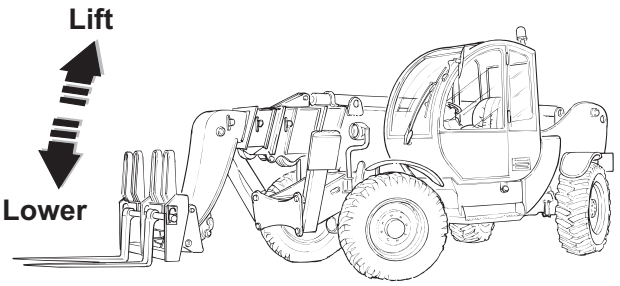
The check of the movement times of the cylinders shall be done with the hydraulic oil at a temperature of 60°.

CAUTION

To check the engine speed, the area easy to reach is the external pulley of the output shaft.

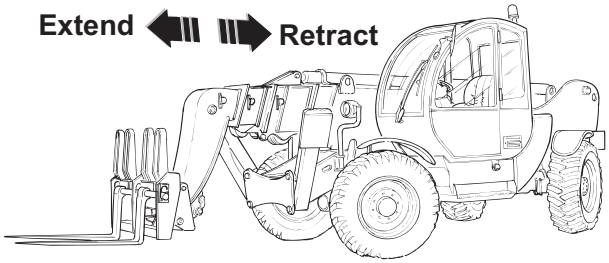
BOOM LIFTING/LOWERING

Telelift 3713 SX	Time (s)	
	up	down
Max engine speed	13”	7”
Min. engine speed	34”	19”



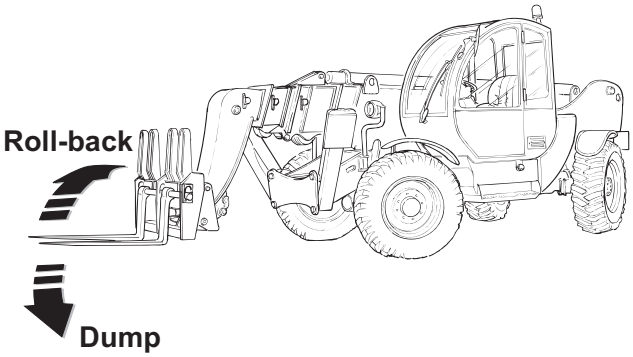
BOOM EXTENSION/RETRACTION

Telelift 3713 SX	Time (s)	
	out	in
Max engine speed	16”	14”
Min. engine speed	45”	20”



ATTACHMENT DUMPING

Telelift 3713 SX	Time (s)	
	dumping	roll-back
Max engine speed	3”	3”
Min. engine speed	9”	7”



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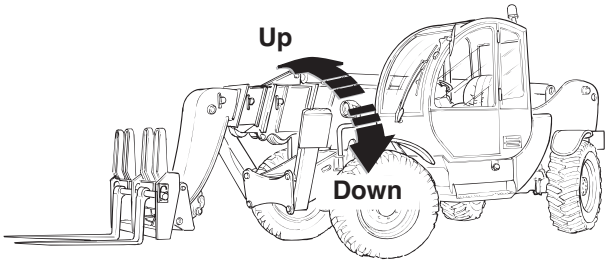
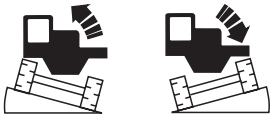
OUTRIGGERS MOVEMENT

Telelift 3713 SX	Time (s)	
	up	down
Max engine speed	6”	7”
Min. engine speed	14”	19”



MACHINE SWAY

Telelift 3713 SX	Time (s)	
	right to left	left to right
Max engine speed	13”	12”
Min. engine speed	17”	17”



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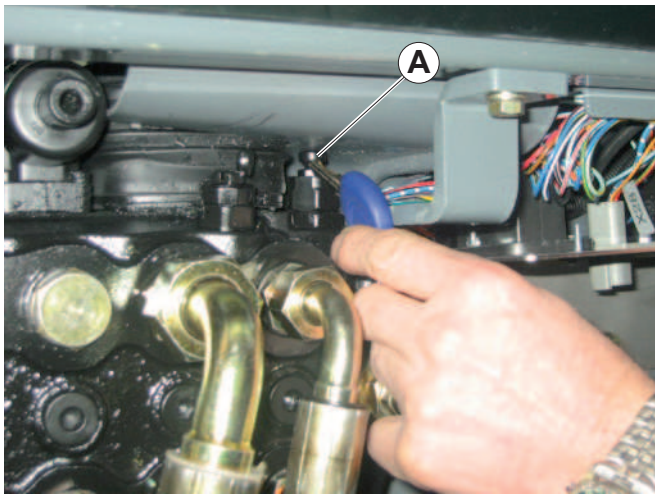
2.22 HYDRAULIC CALIBRATIONS

1. PRELIMINARY OPERATIONS

Warm up the hydraulic oil to 80°C by keeping one of the elements of the boommain valve to full stroke under pressure.
To faster reach this temperature, cover the oil core of the radiator with a piece of cardboard if the radiator is a combined water-oil type; or cover the oil radiator if the machine is equipped with a separate oil radiator.

2. CALIBRATING THE BOOM MAIN VALVE

Locate port **ref. 2** on the **Walvoil** main valve (encl. 1) to connect the pressure gauge.

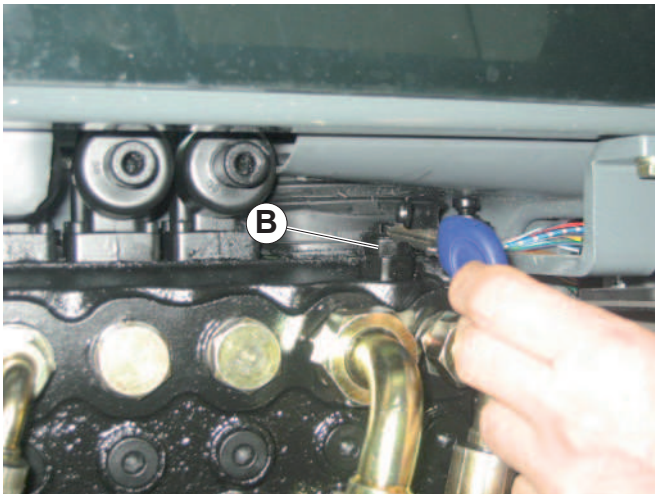


2.1 CALIBRATING THE CONTROL VALVE OF THE MAIN VALVE

Connect a 0-400 bar pressure gauge to port **ref. 2**. Lift the boom to end of stroke.
Adjust valve **A** (encl. 1) of the Walvoil main valve at a value of 280 bar keeping the cylinder to end of stroke with the thermal engine running at max speed.

Also calibrate the fork inclination safety valves (position B) of the **Walvoil** main valve (encl. 1):

- Move one of the cylinders to end of stroke and act on valve **A** to set the pressure of the main valve at a value of 300 bar.
- With the engine running at maximum speed, tilt the forks using the joystick and act on one of the two valves **B** until reaching a pressure value of 295 bar.
- Calibrate the second valve **B** tilting the forks to the opposite direction.
- When both fork inclination safety valves have been calibrated, reset the pressure control valve **A** at a value of 280 bar operating the relevant adjustment device.

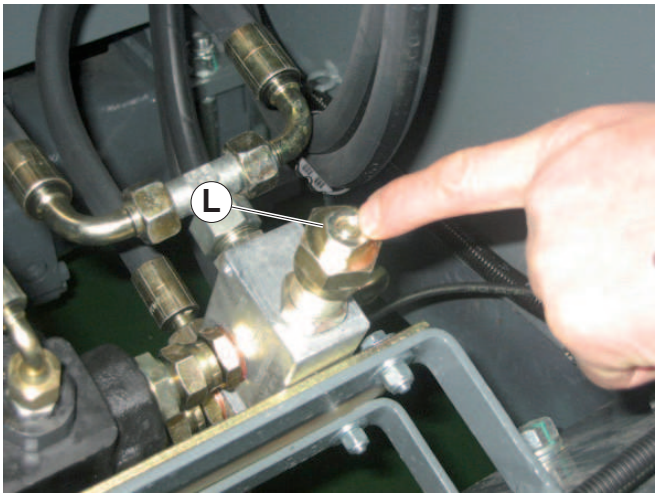


3. CALIBRATING THE BLOCK VALVES OF THE FORK BALANCE CYLINDER (encl. 2)

- Loosen the lock nuts of the valve and tighten the two registers of cartridges **3**.
- Re-loosen of one turn and a half both valves and re-tighten the lock nuts.

4. SETTING THE SAFETY VALVES (encl. 2)

- With a 5mm Allen wrench and a 17mm hexagon wrench, tighten valves L (encl. 2) till they are flush with the upper face of the locknut.



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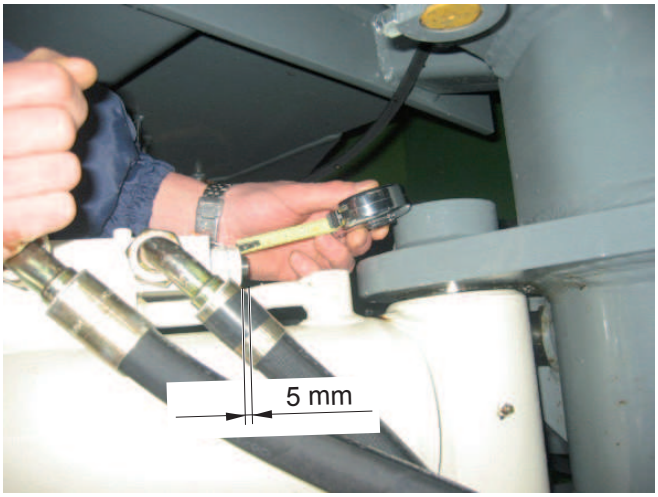
5. SETTING THE VALVE OPERATING BOOM LIFTING CYLINDER (encl. 1)

For a correct adjustment of the valve operating the boom lifting cylinder, proceed as follows.

- With a 24mm hexagon wrench, remove the locknut from the valve (machine chassis side).
- With a 8mm Allen wrench, move screw ref. **5** 5mm far from the face of the valve (see photo below).
- Test the correct operation as follows: load the maximum admissible load (3700 kg) onto the forks and lower the boom. As soon as the alarm of the overload warning system triggers, check that the down-movement of the boom stops. Should this not be the case, tighten screw ref. **5** 1/4 turn and test again.



6. CALIBRATING THE HYDROMATIK HYDROSTATIC TRANSMISSION PUMP

Do the calibration of the hydrostatic transmission with the hydraulic oil at a temperature of 80°C and with the 2nd mechanical speed engaged.

- Connect a 0-60 bar manometer to port ref. **C** (encl. 3) to measure the low pressure.
- Connect a 0-600 bar manometer to port ref. **D** to measure the high pressure.
- Hold the selector to neutral position and make sure the max engine speed does not exceed 2500 rev/min. At idle, the engine must run at 900 rev/min. Should this not be the case, adjust the idle position.
- Measure the boost pressure and ensure it is about 26/28 bar with the engine running at idle speed.
  The boost pressure has not a fixed value but varies from pump to pump.
  Note: In older pump models, it was possible to adjust this value by means of a register. In these machines, the low pressure is also used for the re-sequencing cylinder and for the distributor.
- Fully depress the brake pedal with the left foot to bring the machine to a stop. Do not use the parking brake.

PRIOR TO CALIBRATION

- Turn the speed selector to the forward speed position.
- Using the gas lever, run the engine at 1100 rev./min checking the value on the tachometer.
- Adjust the choke valve **E** acting on the adjustment screw until the high pressure manometer **D** (encl. 3) shows a value of 60 bar.

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6.1 CALIBRATING THE "DA" CURVE

Do this operation by strictly following the instructions provided as the proper functioning of pump and transmission depends on this calibration.

- Turn the speed selector to the forward speed position.
- Let the engine run at maximum speed and check the high pressure value. If this value is below 430 bar, increase the pressure 425-430 bar acting on the pressure cut-off valve **F**.
- Gradually increase the engine speed while checking the high pressure manometer. When the pressure gauge shows 400 bar, hold the gas pedal down and attempt to keep this pressure value.
- If the 400bar pressure is not reached with the engine running at 2000 revs, adjust the spark advance valve **G** (encl. 3).

⚠WARNING

The spark advance screw must never be rotated beyond the vertical axis of the pump (observe the reference mark on the screw).

6.2 CHECKING THE SAFETY VALVE

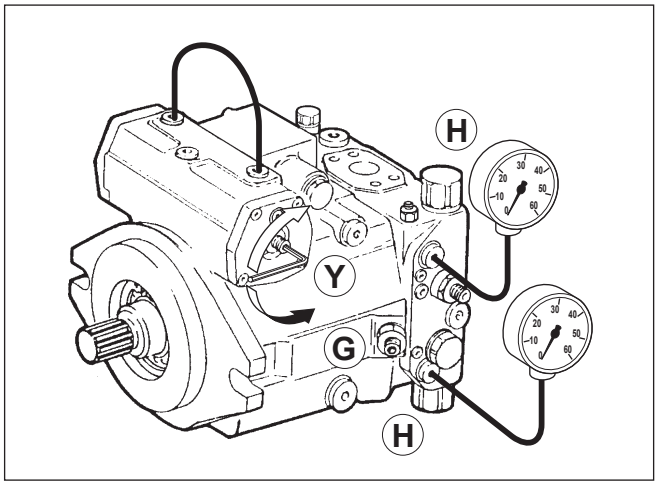
- With the engine running at maximum speed and the forward speed engaged, set the pressure cut-off valve **F** at 430 bar.

  The two pressure control valves **H** (encl. 3) are the cartridge type and already set at 450 bar by Rexroth; therefore they do not require any calibration.

6.3 CALIBRATING THE MECHANICAL ZERO

The calibration of the mechanical zero **I** is required if the machine moves when the forward/reverse speed lever is in the neutral position.

- Turn the speed selector to neutral.
- With the engine running at idle, adjust the mechanical zero screw **Y** by rotating it until the high-pressure manometer reads the same value measured by the boost pressure manometer.



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7. CALIBRATING THE BRAKING SYSTEM PRESSURE

- Connect a 0-250bar pressure gauge to position **T** (encl. 4).
- Depress the foot brake some times until the value shown on the pressure gauge starts increasing. When the pressure gauge stops, the value shown corresponding to the calibration value of valve **R** (encl. 4) should be 140 bar. If the value is below 140 bar, loosen valve **R**; if the value is above 140 bar, tighten the valve.

  Note: To check the pressure, it is necessary to depress the foot brake some times until the pressure gauge restarts increasing; when it stops in stable position, it shows the calibration value.
  Pay special attention while disconnecting the hose from the accumulator. Oil can splash all around. First of all, release any residual pressure from the accumulators.

8. CALIBRATING THE POWER STEERING

- Connect a 0-250bar pressure gauge to position **Z** (encl. 5).
- Select the front-wheel steering mode.
- Move the steering cylinder to end of stroke and make sure the value of the power steering **A** is 140 bar. If the value is below 140 bar, tighten valve **X**; if the value is above 140 bar, loosen the valve.

  Note: To reach valve **X**, remove the protection cap (encl. 5).

9. SETTING THE OVERLOAD WARNING SYSTEM

9.1 SETTING THE DLE OVERLOAD WARNING SYSTEM (valid from serial n. 10488)

To adjust the DLE overload warning system, use a weight of 1000 kg to be applied on the forks.

With the machine resting on the wheels:

- Set the boom angle to 0 degrees and extend the boom up to 5.10 metres measured from the front of the wheels to the centre of the weight loaded on the forks.
- Switch on the overload warning system.

With the machine resting on the outriggers:

- Set the boom angle to 0 degrees and extend the boom up to 7.30 metres measured from the front of the wheels to the centre of the weight loaded on the forks.
- Switch on the overload warning system.

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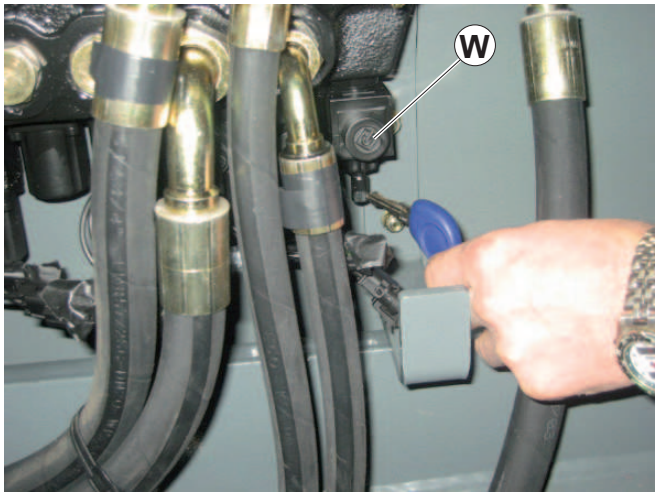
10. CHECKING THE SAFETY VALVE OF THE DISTRIBUTOR (deadman function)

- Valve **W** (encl. 1) is an electric valve which activates at any pressure of the deadman button on the joystick. If the deadman button is defective and it is not possible to activate the joystick functions, press the valve cap upwards to continue your work.

⚠WARNING

Rectify any problems of the electrical system as soon as possible since working in this condition is extremely dangerous.



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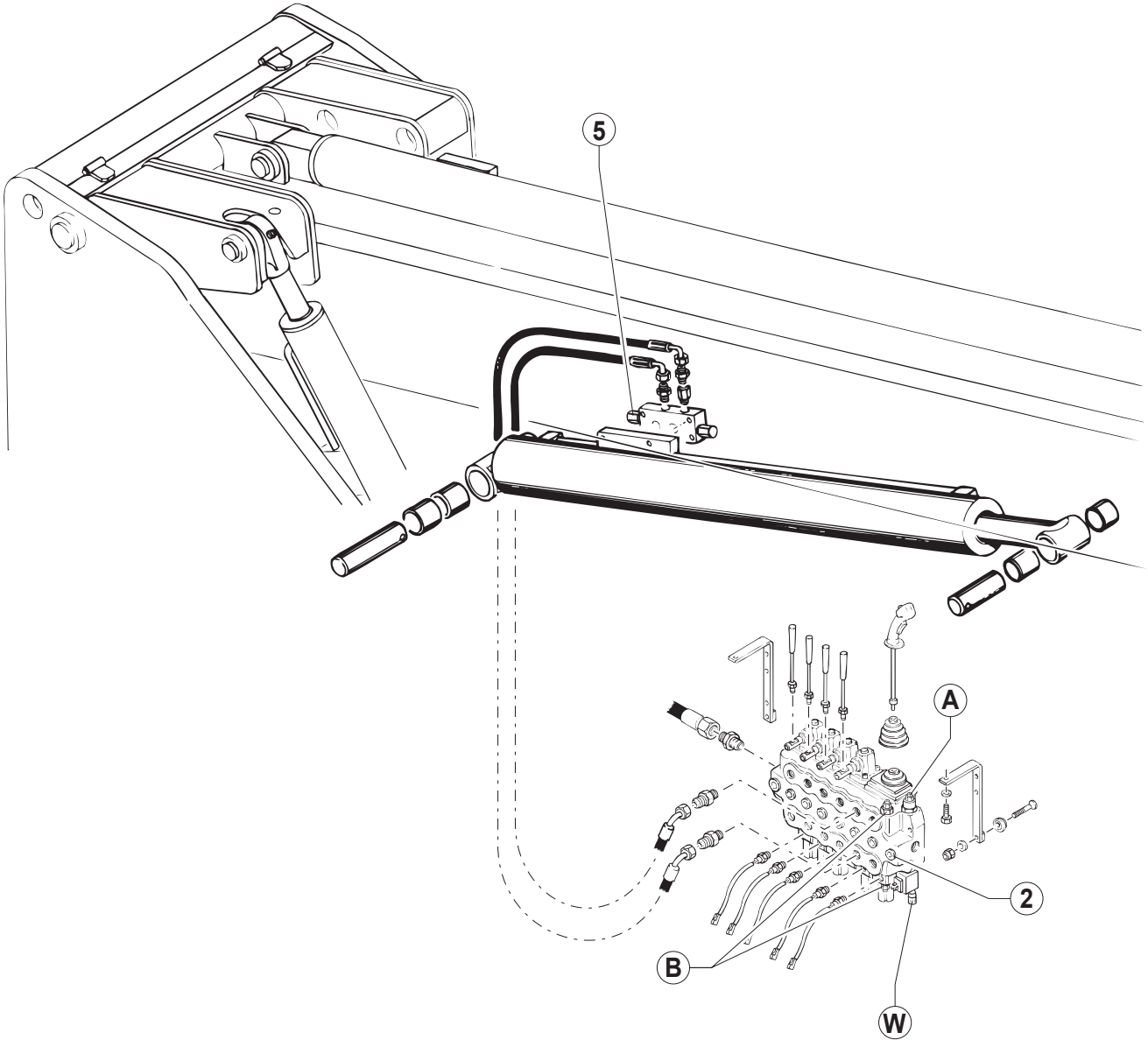
HYDRAULIC SYSTEM - LIFTING

Encl. 1



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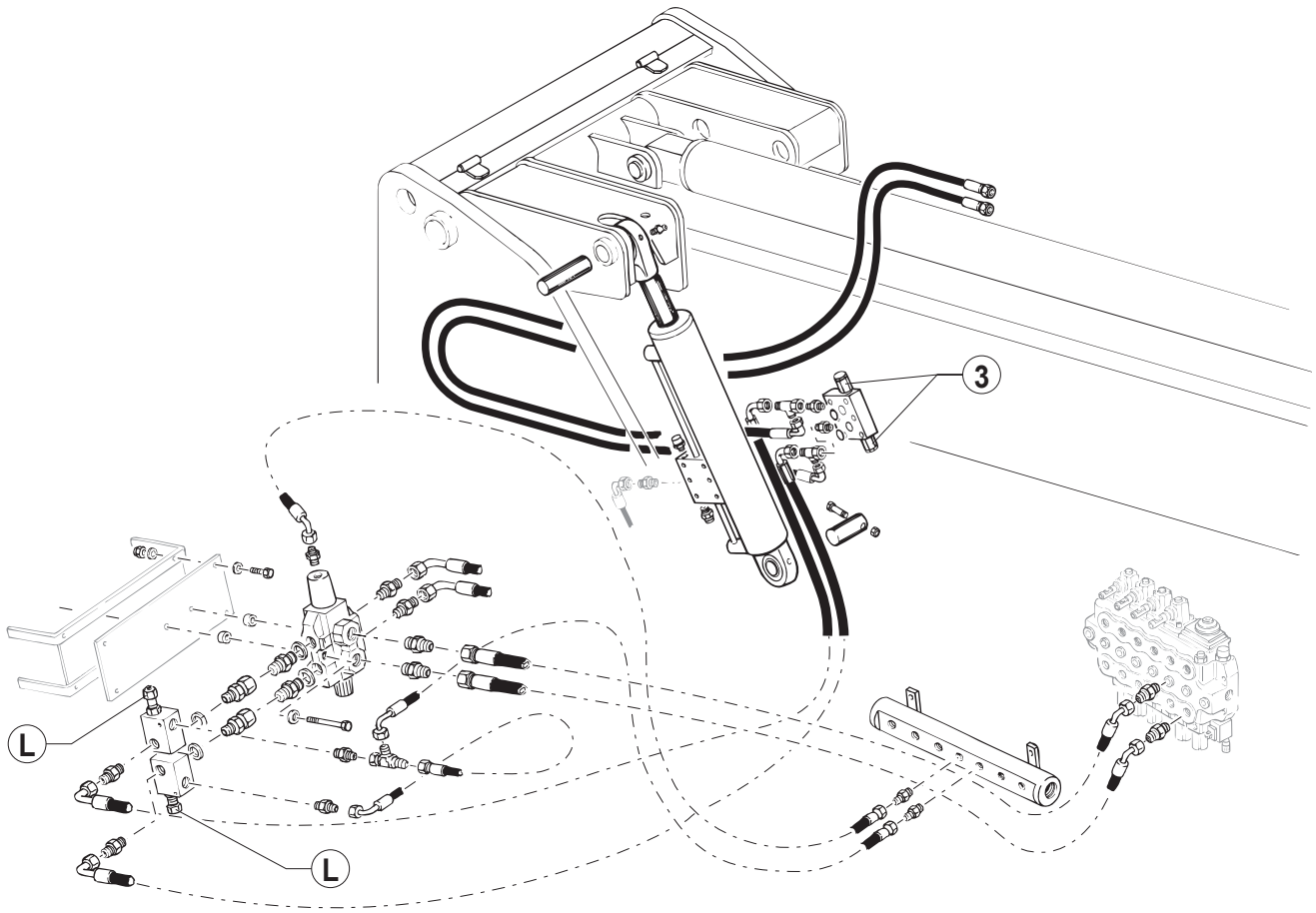
HYDRAULIC SYSTEM - FORK BALANCE

Encl. 2



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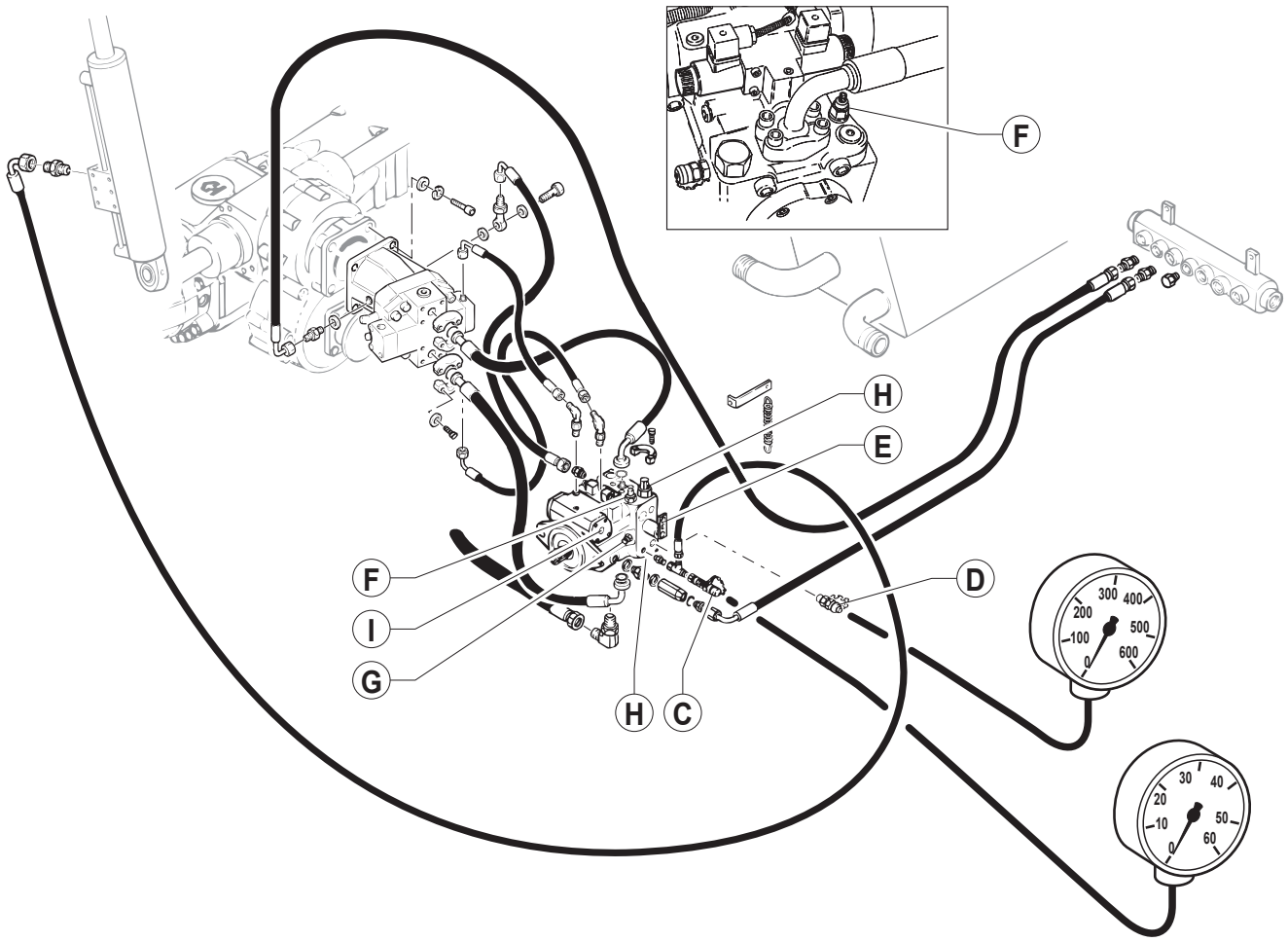
HYDRAULIC SYSTEM - TRANSMISSION	Encl. 3



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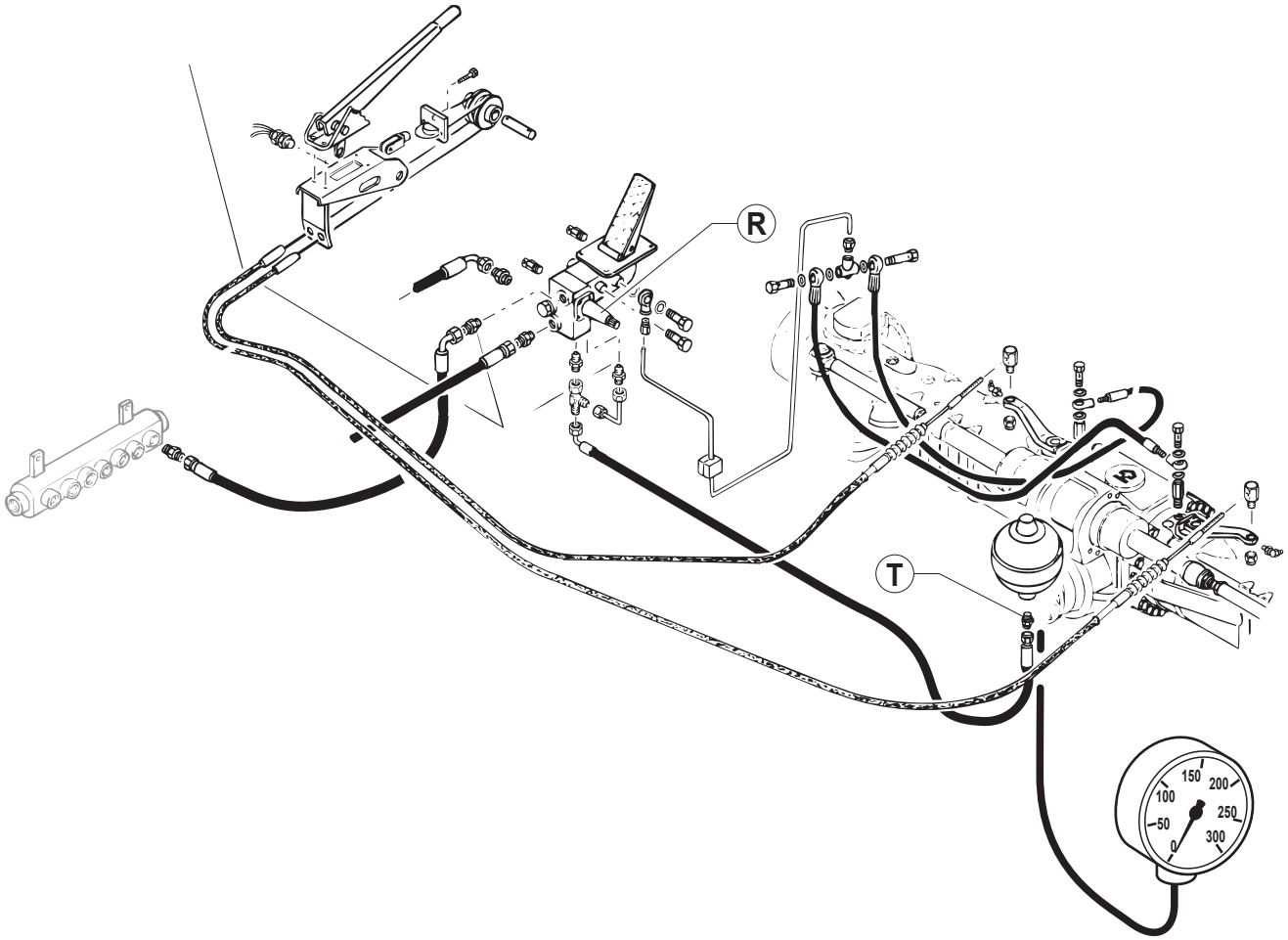
HYDRAULIC SYSTEM - SERVICE AND PARKING BRAKES

Encl. 4



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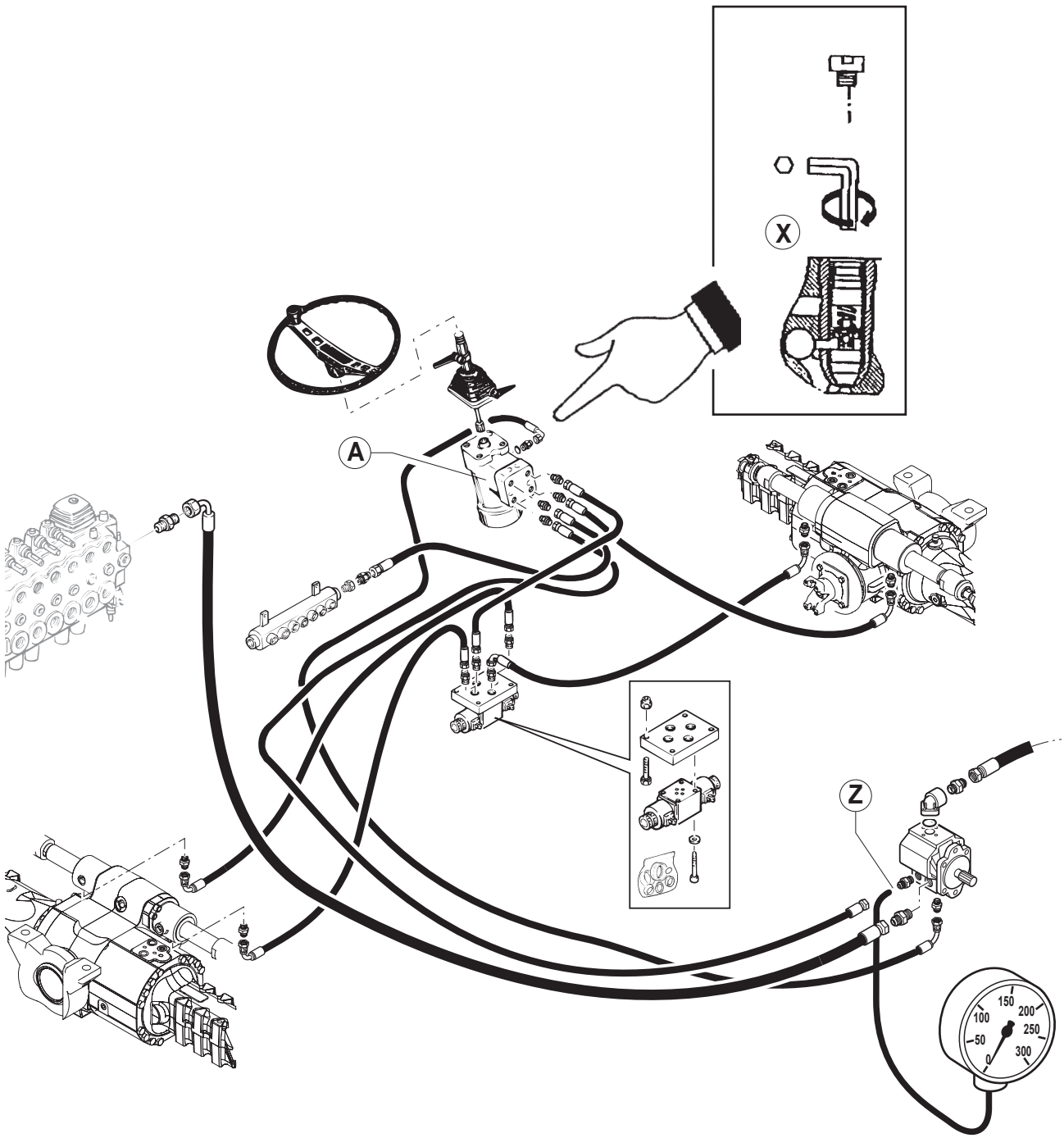
HYDRAULIC SYSTEM - POWER STEERING

Encl. 5



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2.23 ARB-I SYSTEM

1. INTRODUCTION

This technical card describes the procedures for installing, calibrating and troubleshooting the ARB-I Overload Warning System.

The manual is meant for trained and qualified personnel: **Terexlift** technicians or technicians from authorised **Terexlift** service centers.

CAUTION

Since the Overload Warning System is a device of maximum importance for the safety of machine and personnel, any intervention in contrast with the procedures or guidelines contained herein is strictly forbidden.

Circulation of this card is reserved to authorised **Terexlift** service centers and their employees. Reproduction or disclosure of this technical card or of the information contained herein is a violation of agreements.

Additional copies of this manual can be ordered to **Terexlift**.

2. SYSTEM OVERVIEW

The ARB-I Overload Warning System includes:

- a load cell, placed on the rear axle of the machine
- a main module
- a display

The main module **A** (Fig.1) contains the electronics and the trimmers for calibrating the system. The 8-pin screw connector **B** connects the main module to the electric system of the machine and to the load cell. The display **D** is connected to the main module **A** by a flat cable **C**. The connector on the end of the flat cable can be inserted in the display in one way only.

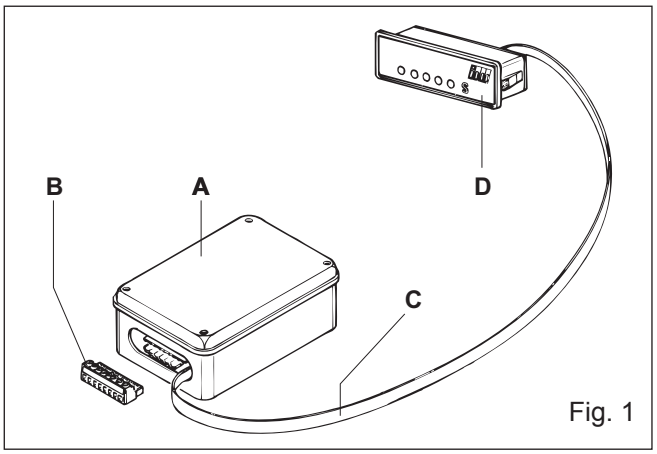

Fig. 1

The display (Fig. 2) indicates the stability of the machine by means of a five-LED (Light Emitting Diode) bar graph: three are green (LED1, LED2, LED3), one yellow (LED4) and one red (LED5). LED1 is always on, therefore indicating presence of the supply voltage. On the right of the display a yellow "**S**" (LED6) lights when both stabilisers are lowered (if fitted on the machine). The alarm buzzer is contained inside the display. Behind the display is located the plug for connecting to the main module.

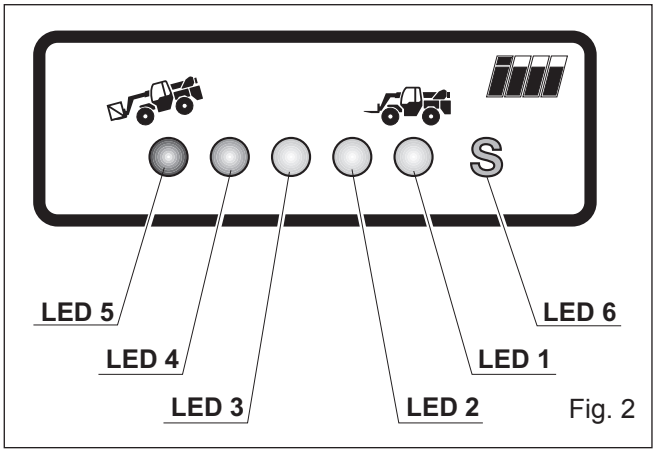

Fig. 2

An external relay, connected to the alarm output, controls the solenoid valve that locks out the extension and descent movements of the boom, which would decrease the stability of the machine.

SPARE PARTS

Part#	*Description*
637275	main module (A-B-C)
637276	display (D)

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3. TECHNICAL SPECIFICATIONS

Electrical specifications

- Supply voltage: 12 ÷ 15 Vdc
- Maximum current: 350 mA
- Fuse (external): 0.5 A F (fast-acting) 5x20mm
- Protected against power inversions

Environmental

- Temperature: -20 ÷ 50 °C
- Humidity (non-condensing): 95%

Inputs/outputs

- Stabiliser status input
  Input voltage: 10 ÷ 15 V
  Input current: 30 mA
- Alarm relay output
  Output voltage: 12 V
  Maximum load: 200 mA

Load cell specifications

- Excitation voltage: 5 V
- Sensitivity: 1 mV/V

4. OPERATION

The output from the load cell is a signal of a few milliVolt, which depends on the weight applied on the cell and on the excitation voltage of the cell. The nominal excitation voltage of the load cell is 5 V; in practice it may vary between 4.75 V and 5.25 V.

Remember that the number of LEDs that are lit is inversely proportional to the output voltage of the load cell. When the load on the cell decreases (because the boom is being extended, for example), the output of the load cell also decreases, but the number of LEDs that are lit increases from right to left.

When the fifth LED lights up, the buzzer sounds and current stops flowing from the alarm output (pin **8** on connector **B**). This output is connected to the coil of a relay which, upon opening, controls a solenoid valve that locks out the extension and descent movements of the boom.

The alarm is deactivated when the stability of the machine returns within safety (the red LED turns off) and after approximately a 3-second delay, in order to allow any oscillations of the machine to dampen out.

When both stabilisers are lowered, a positive voltage (10 V minimum) is present at the stabiliser input (pin **7**). The "**S**" on the display lights up and the instruments changes range.

To ensure a stable display, the turn-on threshold of every LED is different from its turn-off threshold. For example, suppose that a weight of 1010 kg is applied on the cell, that the turn-on threshold of a LED corresponds to a weight of 1000 kg and the turn-off threshold to a weight of 1005 kg. If the weight on the cell is gradually reduced, the LED turns on when the weight is less than 1000 kg. To turn the LED off again, the weight on the cell must increase above the turn-off threshold (1005 kg). This hysteresis ensures that every LED is steadily on or off, in spite of the vibrations of the vehicle.
The fifth LED (alarm) has a greater hysteresis compared to the other LEDs: when the alarm is activated, this ensures that the stability of the vehicle is well back within safety before the alarm is deactivated.

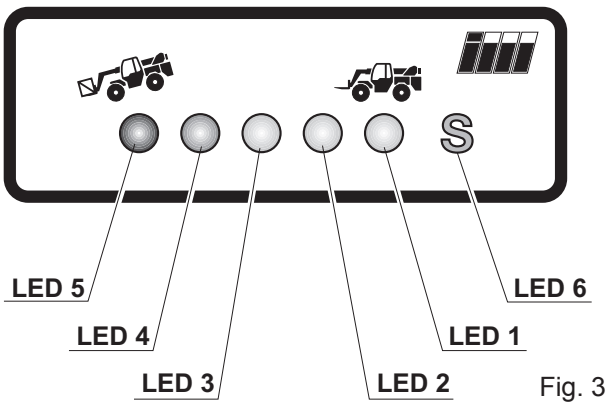

Fig. 3

Courtesy of Crane.Market

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A fact to be held in mind is that, due to inevitable friction between load cell and bushings, the cell can remain slightly loaded, sensing a higher-than-normal weight. The result is that, with the vehicle in the same conditions and with same weight on the forks, the alarm will be activated when the boom is extended at a greater distance than the distance set during calibration.

When the vehicle is moving or operating, the vibrations on the rear axle cancel out the residual tension of the cell, and the system works perfectly. Since during calibration the vehicle is standing still, it is important to “bounce” the vehicle before every calibration step, abruptly lowering and raising the boom. This ensures that the weight sensed by the cell is the actual weight applied on the rear axle.

⚠DANGER

Carry out all maneuvers in safety, making sure the working range of the machine is clear of persons or objects.

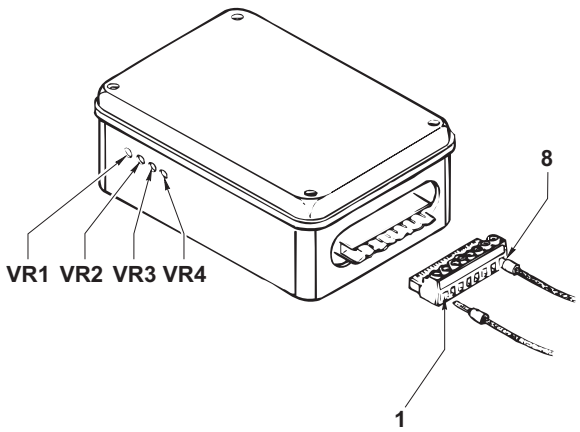
The upper and lower ends of the readout scale are adjusted with multiturn trimmers. The system allows to choose between two ranges, depending whether the stabilisers are up or down. In the former case, trimmers **VR1** and **VR2** will be adjusted; in the latter case (both stabilisers down), trimmers **VR3** and **VR4** will be adjusted (see Fig. 4).

The function of the trimmers is the following:

	Range with	
	stabilisers up	**stabilisers down**
lower setpoint	VR1	VR3
upper setpoint	VR2	VR4

When the lower setpoint of the readout scale is being calibrated, the vehicle must have the forks unloaded and the boom completely retracted. When calibrating the upper setpoint, the vehicle must have a known weight loaded on the forks and the boom must be extended at the distance shown on the appropriate load chart. In either case, the boom shall be perfectly horizontal.

Turning the adjustment screws on the trimmers counterclockwise will turn on more LEDs (from right to left); rotating the screws clockwise turns off more LEDs (from left to right). The adjustment screws have no mechanical stops.



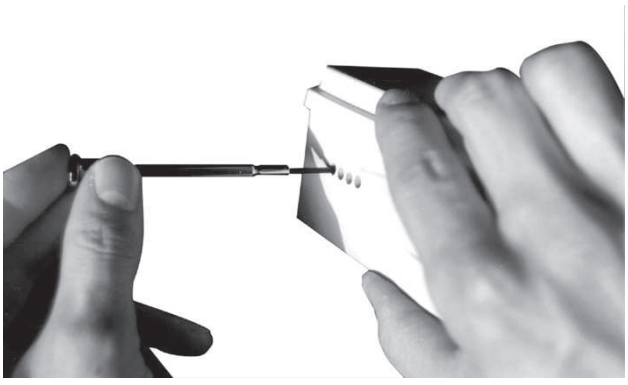


Fig. 4

Courtesy of Crane.Market

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5. INSTALLATION GUIDELINES

WARNING

Before arc-welding on the machine:

- ***disconnect the battery (use the battery cut-out switch if fitted on the machine)***
- ***remove the connector from the main module***

WARNING

Never run the diesel engine when the battery is disconnected, to avoid damage to the electrical system.

- The shielded cable from the load cell to the instrument should be kept as short as possible. By all means avoid coiling the cable, since it could pick up interferences. This is also true for the wires coming from the dashboard.
- Avoid installing the instrument close to devices which generate electromagnetic noise (windshield motor, fan motor etc.).
- Use only a wire stripper to remove insulation from the wires. Scissors can nick the copper conductor and, in the long run, cause the wire to break.
- The cable from the load cell (blue cable) is a four-conductor shielded cable. To remove the external insulation use a pair of scissors or a blade, avoiding to cut through the shield.
- Do not pull on the flat cable that connects the display.
- The electronic circuit inside the main module is extremely sensitive. Soot, dust, fingerprints, oil or grease can compromise the operation of the system. During installation and calibration, ensure maximum cleanness of hands and tools.
- Should the connectors become soiled, clean them with contact-cleaning spray for electronics provided it is not a “lubricant” type of spray.
- Avoid foreign objects from entering the main module. In particular, look out for wire clippings.
- Do not open the main module box.
- Always remove power (turn off the ignition key) before inserting or removing the connector of the main module or display.
- The adjustment screws on the trimmers are delicate: use a small screwdriver with a swivel top and gently turn the screws, without applying excessive pressure.
- The system is protected against polarity inversions. In any case be careful when making connections.
- The relay connected on the alarm output must have a diode mounted across the coil (see connection diagram).
- If arc welders are used after the load cell is installed, make sure the return of the welder is direct and does not cross the load cell.

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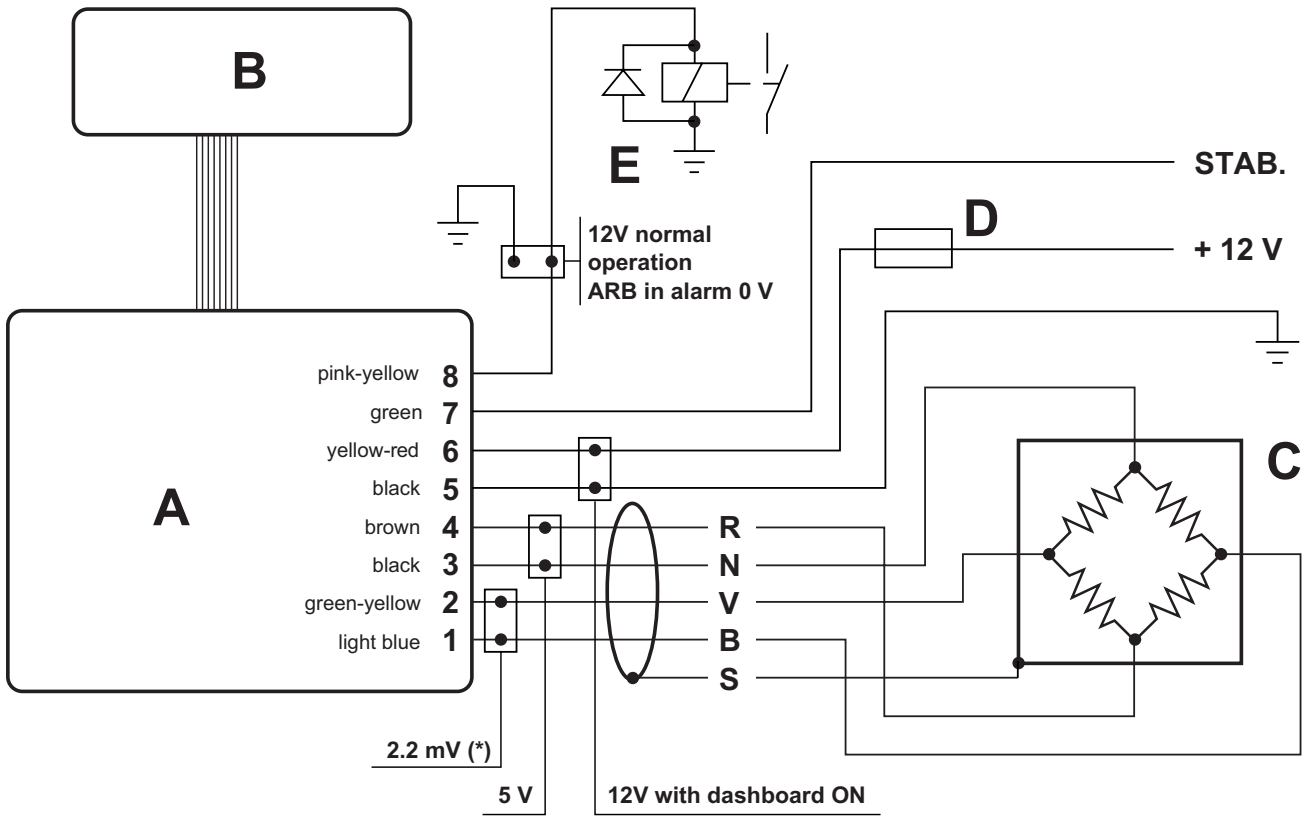

(*) This value is given as a reference and can vary according to cell model (ADOS or NBC). Find the value with the boom horizontal and full retracted without any weight applied on the forks.

Legend:

A - main module
B - display
C - load cell
D - fuse
E - alarm relay + diode

R - red
N - black
V - green
B - white
S - shield

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Connections:

1 - load cell output
2 + load cell output
3 - load cell excitation
4 + load cell excitation
5 - power supply (connected to ground)
6 + power supply (protected by a fuse)
7 stabiliser input (positive signal when both stabilisers are down)
8 alarm output (200 mA max.) A positive voltage is present when the alarm is not activated
S load cell shield (not connected to the instrument). The shield of the cable is connected to the body of the load cell: once the cell is fitted on the rear axle, the shield is connected to ground (chassis).

The **ADOS** or **NBC** load cells are interchageable. Refer to the following table for the wire coulour identification

Pos.	ADOS cell	NBC cell
1	White (cell output)	Yellow
2	Green (cell output)	Green
3	Red (+ 5V cell power supply)	Red and white (join the wires)
4	Black (ground)	Black and blue (join the wires)

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6. INSTALLATION

Tools required for installation:

- 1.2 mm swivel-top screwdriver (Fig. 6a)
- wire stripper (Fig. 6b)
- scissors or a knife (Fig. 6c)
- cutters (Fig. 6d)
- crimping tool for pin terminals (Fig. 6e)
- pin terminals (Fig. 6f)
- cable ties (Fig. 6g)

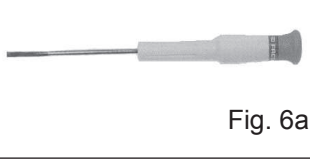
Fig. 6a

Fig. 6b

Fig. 6c

Fig. 6d

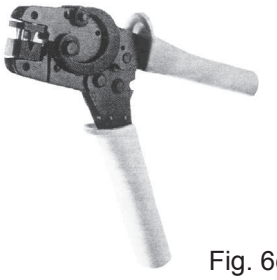
Fig. 6e

Fig. 6f

Fig. 6g

Main module installation:

- mount the main module on the cab.
- open the battery disconnect switch; remove the fuse from the fuse holder on the power supply of the system (see connection diagram).
- gather the load cell cable and the wires coming from the dashboard near the connector on the side of the main module and cut to length.
- strip 30 mm from the outside insulation of the load cell cable (Fig. 7)
- separate the shield from the wires and cut the shield flush with the outside insulation (Fig. 8, item "**A**").
- strip 8 mm of insulation from the four wires of the load cell cable (Fig. 7).
- strip 8 mm of insulation from the wires coming from the dashboard.

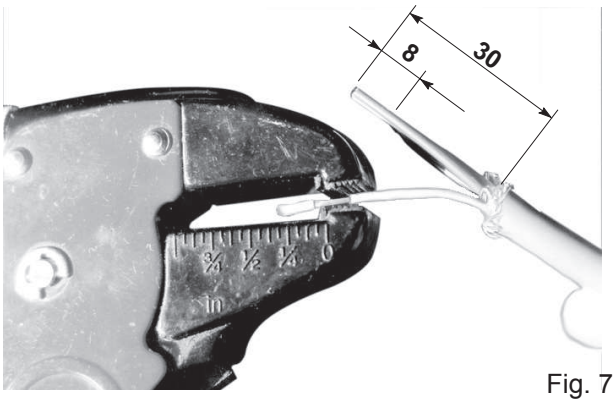

Fig. 7

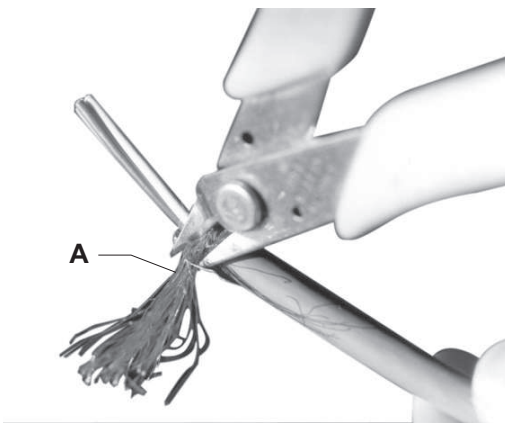

Fig. 8

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- using the crimping tool, secure the pin terminals on every wire (Fig. 9). If the pin terminals are unavailable, it is advisable to tin the tips of the wires before securing them to the screw connector.
- gently pull on the wires to check that the pin terminals are secure.
- connect the wires on the screw connector B following the diagram. Tighten the screws on the connector, checking that all wires are securely fastened. Tie the wires with a cable tie (Fig. 10).

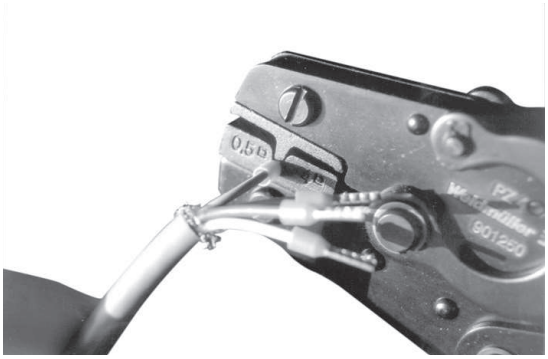

Fig. 9

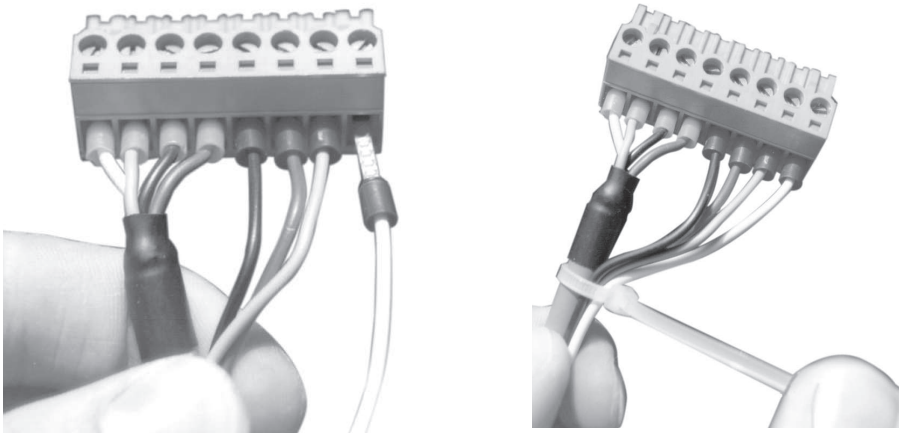

Fig. 10

- after checking that every wire has been connected as shown on the diagram, insert the connector on the plug on the main module. The connector can be inserted in one way only (Fig. 11).
- secure the cell cable, the flat cable and the wires from the dashboard with a cable tie and self-adhesive cable tie mount.

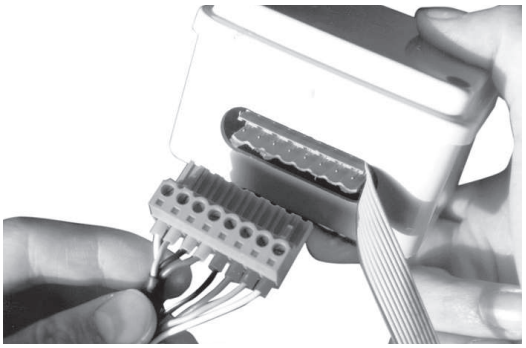

Fig. 11

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Display installation:

- connect the flat cable from the main module to the plug on the display (Fig. 12); the connector can be inserted in one way only.
- insert a cable tie on the mount on the display and secure the flat cable (Fig. 13).
- insert the display in the hole on the dashboard; the display must be locked. Otherwise it should be secured to the dashboard with RTV silicone or hot-melt glue, applied between the lower side of the dashboard and the display housing.

At the end of the installation, close the battery disconnect switch and insert the fuse in the fuse holder. Make sure the fuse is a 0.5 A fast-acting type only.

Fig. 12

Fig. 13

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7. CALIBRATION

⚠ DANGER

Carry out all maneuvers in safety, making sure the working range of the machine is clear of persons or objects.

Calibration must be carried out with the machine on a hard, level surface.
The forks shall be loaded with a known weight. According to the load on the forks, refer to the load charts for the maximum distance the boom can be extended horizontally. If the machine is fitted with stabilisers, there will be two values (one with stabilisers up, one with the stabilisers down).

CAUTION

The distance shall be measured from the front of the tyres to the center of gravity of the load.

Fig. 14 shows an example load chart: without stabilisers on the right side, with stabilisers down on the left. When the stabilisers are up, the maximum extension distance for the boom is 3.2 m with 3000 kg on the forks, 4.4 m with 2000 kg, 5.8 m with 1000 kg, 7 m with 800 kg and so on. When both stabilisers are down, the maximum reach is 3.5 m with 3500 kg on the forks, 5.5 m with 2000 kg and so on.

Example load chart.

Do not use for actual calibration.

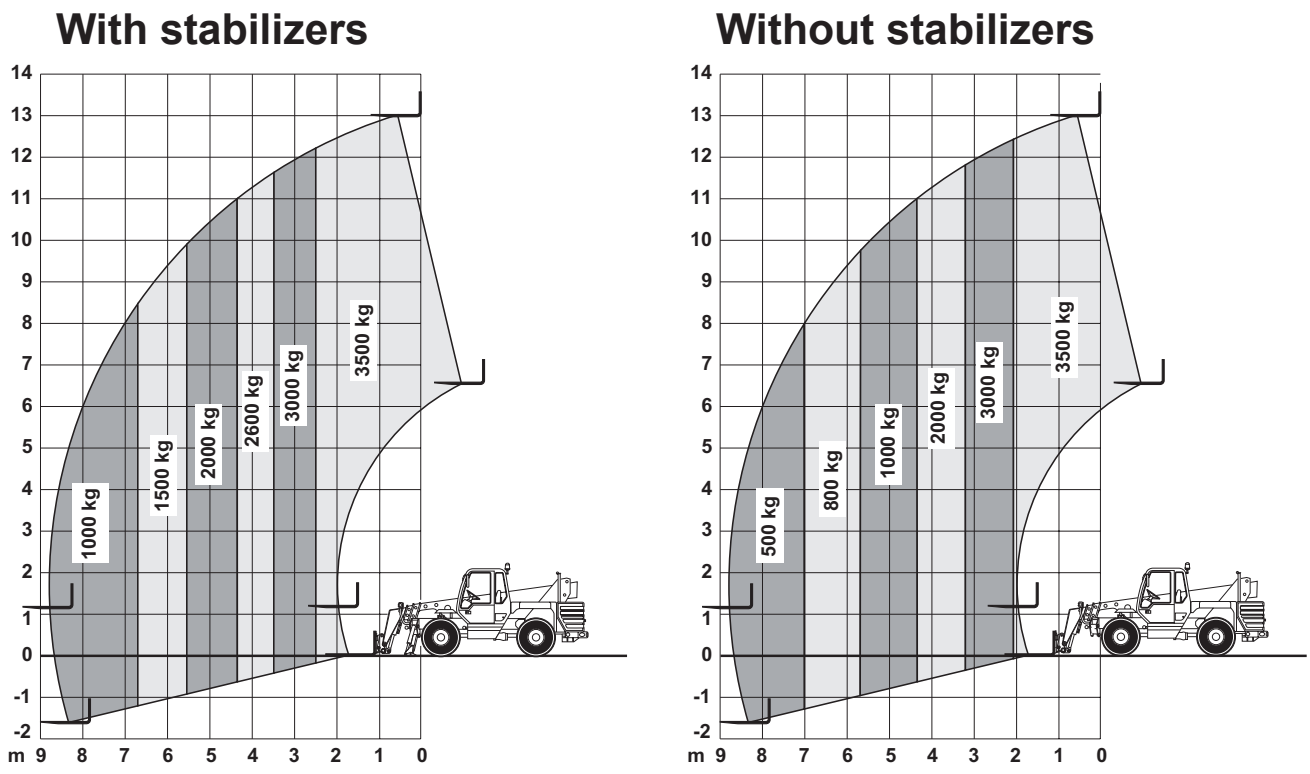

Fig. 14

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Calibration procedure:

1 - Retract the boom all the way, bringing it in a horizontal position.

2 - Lower the boom with an abrupt movement of the control lever, in order to “bounce” the machine; return the boom to the horizontal position and wait for oscillations to dampen out.

3 - Rotate trimmer **VR1** (see Fig.15) until LED2 turns off (rotating the trimmer clockwise turns off more LEDs, and viceversa); after LED2 turns off, rotate the trimmer clockwise two and half turns more.

4 - Load the forks with the known weight.

5 - Extend the boom to the distance previously found on the load chart. If LED5 turns on while the boom is being extended (and therefore the boom locks out), turn trimmer **VR2** clockwise approximately five turns.

6 - Lower the boom with an abrupt movement of the control lever, in order to “bounce” the machine; return the boom to a horizontal position and wait for oscillations to dampen out.

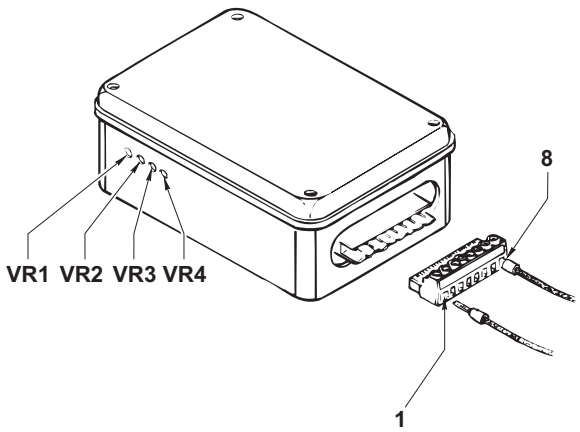
7 - Rotate trimmer **VR2** counterclockwise until LED5 is lit; at this point, rotate **VR2** counterclockwise another half turn.

After completing the calibration procedure, make sure the alarm is activated at the required distance. Then replace the main module on its support.

CAUTION

If, during the calibration procedure, the LEDs light up in an unusual manner (for example, LEDs 2 and 3 off, LEDs 4 and 5 on) proceed as follows:

- ***turn trimmer VR1 counter-clockwise approximately ten turns.***
- ***turn trimmer VR2 clockwise approximately ten turns.***



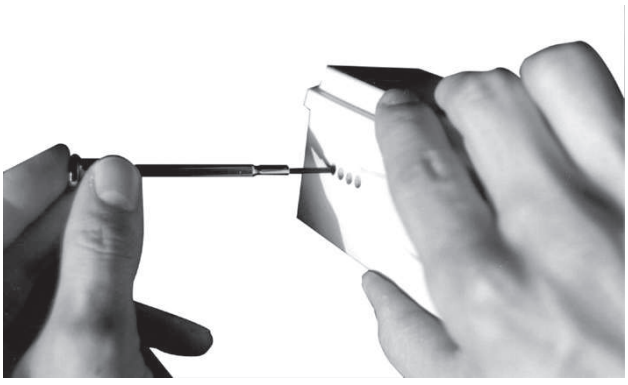


Fig. 15

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Final Inspection

A final inspection must be carried out after any intervention on or calibration of the overload warning system:

- Ensure the system is functioning properly and is correctly calibrated.
- Make sure the main module case and the display are firmly in place inside the cab and are not touching hydraulic hoses or any moving part.
- Make sure all cables are firmly held in place, in order to prevent them from rubbing or vibrating.
- Check the main module and its connector for cleaness. To remove oil residues, use a clean towel and ethyl alcohol; blow off any dust with compressed air.
- Fill out the calibration seal with date and signature.
- Apply the calibration seal on the main module, over the trimmer access holes.

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8. CHECKS AND INSPECTIONS

1) Checking the overload system power supply:

- Check the supply voltage (12÷14.5 V) between pins **6** (+) and **5** (-) on connector **B**.

2) Checking the load cell excitation voltage:

- Check the load cell excitation voltage (from 4.75 V to 5.25 V) between pins **3** (+) and **4** (-) on connector **B**.

3) Checking connections on the main module:

- Remove connector **B** from the main module.
- Ensure all wires are hooked up on the connector exactly as shown on the electrical schematic.
- Gently pull on each wire, to make sure they are securely fastened on the connector.
- Check every wire for nicks, cuts or abrasions.

4) Checking the load cell connections:

- Remove connector **B** from the main module (always remember to cut off main power before removing or inserting the connector).
- Set the multimeter on the resistance ("ohm"Ω) range; the measured resistance between pins **1** and **2** should be 351 ± 5 Ω. Between pins **3** and **4** the measured resistance should be 350 ±20 Ω. If this is not the case, a broken wire in the load cell cable or a defective load cell could be the problem.
- Check for electrical continuity between the shield of the load cell cable and chassis ground.
- Ensure every wire from the load cell is insulated from ground: the reading must show resistance greater than 20 MΩ. Smaller measured values can be caused by a damaged insulation (usually a result of arc-welding): replace the load cell.

5) Checking the weight applied on the load cell:

- Remove any load from the forks, retract the boom all the way and place the machine on a hard, level surface.
- Set the multimeter on the 200 mV range and measure the output of the load cell, between pins **2** (+) and **1** (-) on connector **B**:

- If the voltage is negative, the load cell signal wires (white and green) must be inverted.
- If the voltage exceeds 1.3 mV, go to step 6.
- If the voltage does not exceed 1.3 mV, calculate the corresponding weight (see Appendix A) and make sure it does not exceed the maximum weight on the rear axle (see the identification plate on the machine). If the maximum rear axle weight is exceeded, go to step 6.

- If, after checking the rear axle, the problem still persists, a defective load cell is likely.

6) Checking mechanical components:

- Ensure the oscillation of the rear axle is not restricted by any part or object.
- Check the correct axial positioning of the load cell. The cell should not have any longitudinal play. If this occurs, tighten the locking ring.
- Ensure there is no axial play between load cell and axle support, and between load cell and chassis.
- Lubricate the load cell bushings (see Operator Handbook).

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9. CALCULATING THE WEIGHT APPLIED ON THE CELL

To find out the weight on the load cell, you need to know:

- the excitation voltage (in V)
- the load cell capacity (in kg)
- the sensitivity of the cell (in mV/V)
- the load cell output voltage (in mV)

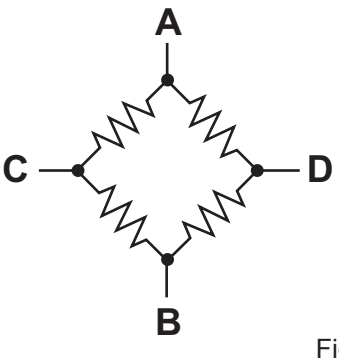

Fig. 16

The excitation voltage is the voltage applied between terminals **A** and **B** of the load cell (Fig. 16). The nominal value is 5 V, but in practice it can vary between 4.75 V and 5.25 V.
The load cell capacity is the maximum weight that can be applied on the cell, resulting in the maximum output from the cell (see following table).
The output voltage is measured between terminals **C** and **D** of the cell.
The sensitivity of the load cell is the ratio between the output voltage (in milliVolt) and the excitation voltage (in Volt), when the cell is loaded with a weight equal to its capacity. All load cells fitted in the rear axle have a 1 mV/V sensitivity. This means that, considering a 10000 kg capacity load cell, under a 10 000 kg load and with a 1 V excitation voltage, the output voltage is 1 mV; if the excitation voltage is 2 V, the output voltage is 2 mV and so on.

Use the following formula to compute the weight:

$$\frac{\textbf{cell capacity}}{\textbf{maximum output}} \textbf{ x output voltage = weight on the cell}$$

The maximum output voltage is:

excitation voltage x sensitivity = maximum output

In this example, since the load cell sensitivity is 1 mV/V and the nominal excitation voltage is 5 V, the full-scale voltage is 5 mV.

Example:

10 000 kg capacity load cell, with 3.2 mV output voltage

the weight on the cell is: $\frac{10000 \text{ kg}}{5 \text{ mV}} \times 3.2 \text{ mV} = 6400 \text{ kg}$

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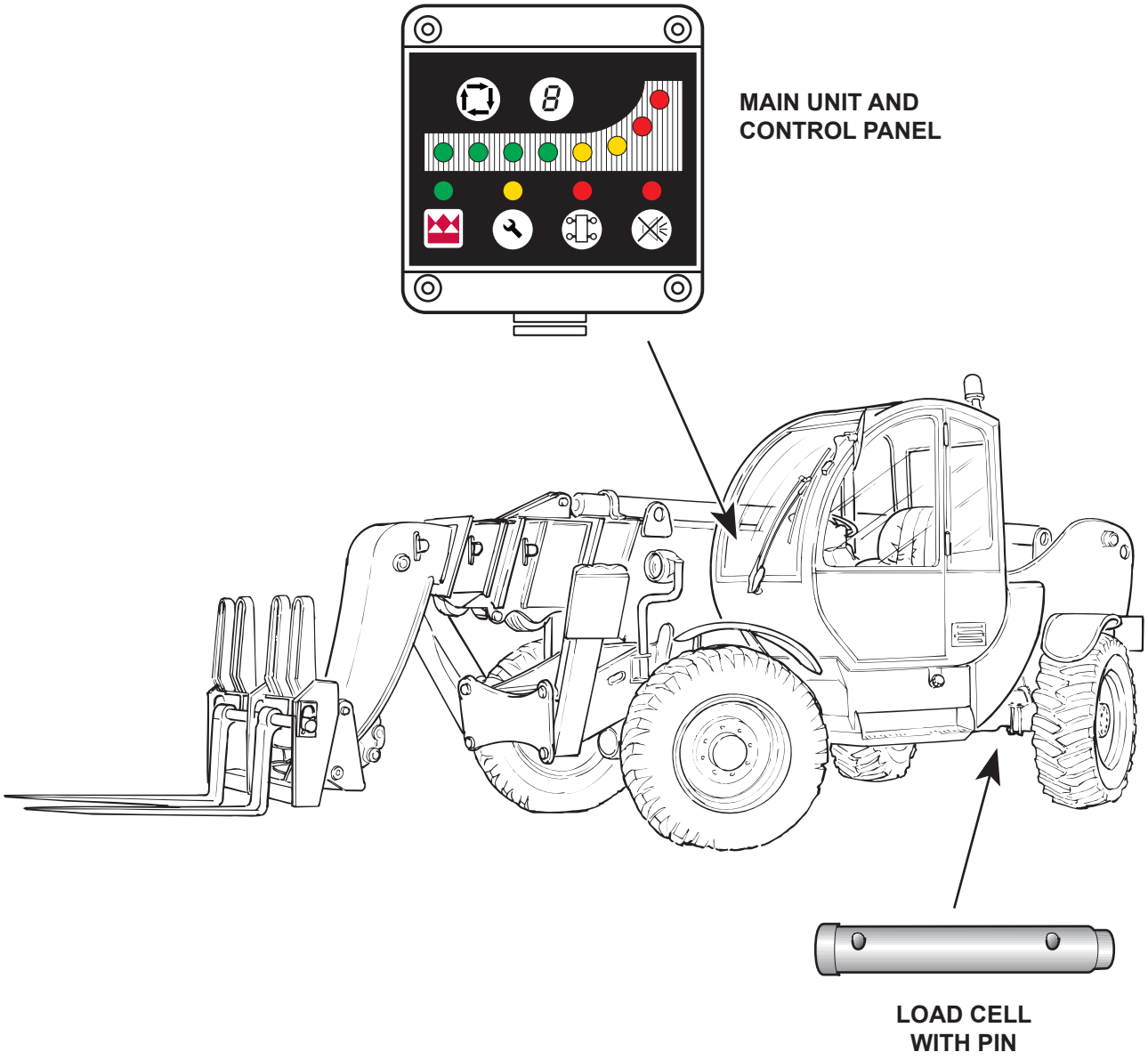
2.23 DLE SYSTEM

COMPONENTS POSITION



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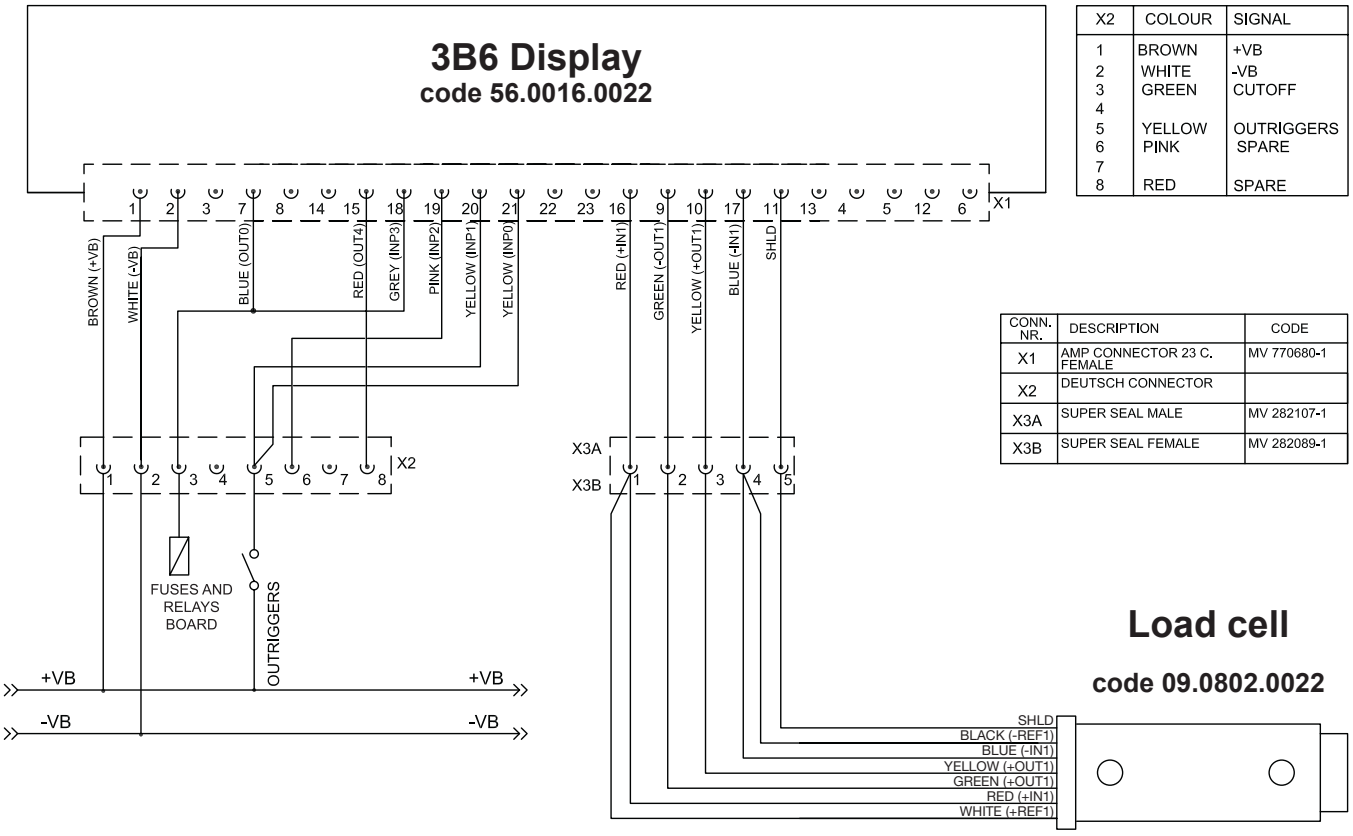

X2	COLOUR	SIGNAL
1	BROWN	+VB
2	WHITE	-VB
3	GREEN	CUTOFF
4		
5	YELLOW	OUTRIGGERS
6	PINK	SPARE
7		
8	RED	SPARE

CONN. NR.	DESCRIPTION	CODE
X1	AMP CONNECTOR 23 C. FEMALE	MV 770680-1
X2	DEUTSCH CONNECTOR	
X3A	SUPER SEAL MALE	MV 282107-1
X3B	SUPER SEAL FEMALE	MV 282089-1

Pin 18 + GND = 12V in work condition
0V in overload condition

Pin 7 + GND = feedback ok (12V)

Pin 9 positive
Pin10
= boom retracted with forks in horizontal position, without load: 1,1÷1,4 mV
= boom extended with forks in horizontal position, without load: 0,1÷0,4 mV

Pin 20 + GND = 12V with lowered stabilisers

Pin 21 + GND = 12V with lowered stabilisers

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CONNECTOR X1 FOR CHECKS WITH TESTER

Electrical power to control unit (DLE)
Pin 1: 12 V
Pin 2: ground

Overload signal (12V generated by the DLE)
Pin 18: 12 V normal conditions, 0 V alarm overload
Pin 7: re-reading overload signal

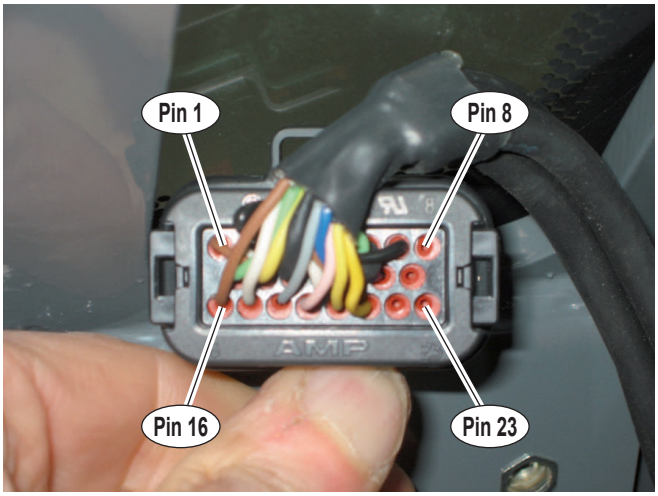
Electrical power to load cell equal to 5 V
Channel 1: Pin 16: positive Pin 17: negative

Load cell signal in range 0,1 - 2,5 mV
Channel 1: Pin 10: positive Pin 9: negative

Machine without load on the forks, non stabilised, with boom horizontal and not extended
Pin 9 and 10: 1,1 - 1,2 - 1,3 - 1,4 mV

Machine without load on the forks, non stabilised, with boom horizontal and fully extended
Pin 9 and 10: 0,1 - 0,2 - 0,3 - 0,4 mV

Lowered stabilisers signal
Pin 20: 12 V
Pin 21: 12 V



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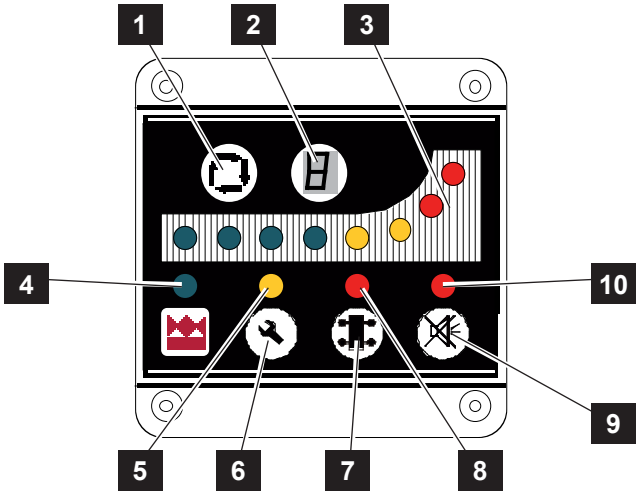
CALIBRATING THE DLE LOAD LIMITER

CAUTION

- ***During the calibration mode the limiter device doesn't block any manoeuvres so the calibration can be done.***
- ***If the machine is equipped with stabilisers, you shall lower the stabilisers to the ground and calibrate the system with the machine "empty" and "loaded" . Therefore, we recommend keeping the load of known weight in the range of action of the machine.***
- ***The calibration of the machine should be done after a few minutes of use, in other words with the machine "warm".***



55.0016.0022

- Enter the calibration mode:

Within 5 seconds from when the instrument is activated (even if the display is still off) you should press the keys on the front panel in the right sequence.
The keys to use and the relevant meaning are shown below:

Press to enter number 0
Press to enter number 1
Press to confirm the sequence entered.

The access code currently used is **1001**. Therefore you should enter the following sequence:

1 0 0 1 CONFIRM

If the sequence is correct the confirmation of the instrument functioning in the calibration mode is given by the LED near lighting with a fixed light.
The display shows a number that ISN'T blinking, starting from "0".

- Description of the controls:

1 Calibration selection button
2 Display
3 Stability indicator with LED-bar
4 Green light - power OK
5 Yellow light - calibration mode
6 Calibration confirmation button
7 Not used
8 Red light - outrigger position
9 Buzzer ON/OFF pushbutton
10 Red light - overload pre-alarm / alarm

The digit on display **2** shows the selected attachment. The user can choose among:

0: Generic

The system recognises the attachment fitted to the machine automatically.

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DISPLAY	FUNCTION
0	The LED bar indicates the type of machine in use: 1 LED on - Telelift 4013 sx To select the machine to be calibrated press to increase the number of LED's lit or press to reduce the number of LED's lit. If you are doing the first calibration, press to reset the system and load the default parameters of the selected machine. **If you are re-calibrating the instrument, directly jump to point 1.** Press to proceed to the next point (1).
1	Lower the stabilisers to the ground, fully retract the boom holding it slightly above the horizontal with respect to the ground. **DON'T** lift loads. Press to confirm the **EMPTY** calibration of the machine. The audible alarm will sound to confirm the command has been executed. Press to proceed to the next point (2).
2	Again with the stabilisers lowered to the ground, place a load on the forks with a weight of 1000 kg, extend the boom while holding it horizontal till reaching the overturning moment corresponding to 7.30 metres (overturning distance = distance from the front part of the wheels to the centre of the load). Press to confirm the **LOADED** calibration of the machine and check that the alarm triggers. The audible alarm will sound to confirm the command has been executed. Move the boom fully in while holding the same in the horizontal position. Press to proceed to the next point (3).
3	With the outriggers raised and the boom horizontal, place a load on the forks with a weight of 1000 kg, and extend the boom up to a distance of 5.10 metres (measured from the front part of the wheels to the centre of the load placed on the forks). Press some times to switch off the LED's showing the load percentage and press to switch them on. By the end of the operation, all LED's from the left to the right must be lit, but for the last red LED. To do this, we recommend starting with the LED's bar on the green area and then press to increase the number of LED's lit. No confirmation is required as the operation is automatically saved at the end of the adjustment. Press several times to proceed to the next point (F).
F	Press to exit calibration and to **SAVE** the changes made (the audible alarm sounds and the LED's come on to confirm that data have been saved). The limiter is no longer in the calibration mode. The LED is not lit fixed any more. You should turn the machine off and then on again to eliminate any alarm messages. Now you can start working.

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	load (kg)	activation of the overload warn. system (m)	
		on outriggers	on wheels
Telelift 3713 SX	1000	7,30	5,10

To test the machine with different weights after a calibration, strictly respect the values shown on the load diagram (lengths are referred to the distance between the front part of the wheels and the centre of the load on the forks).

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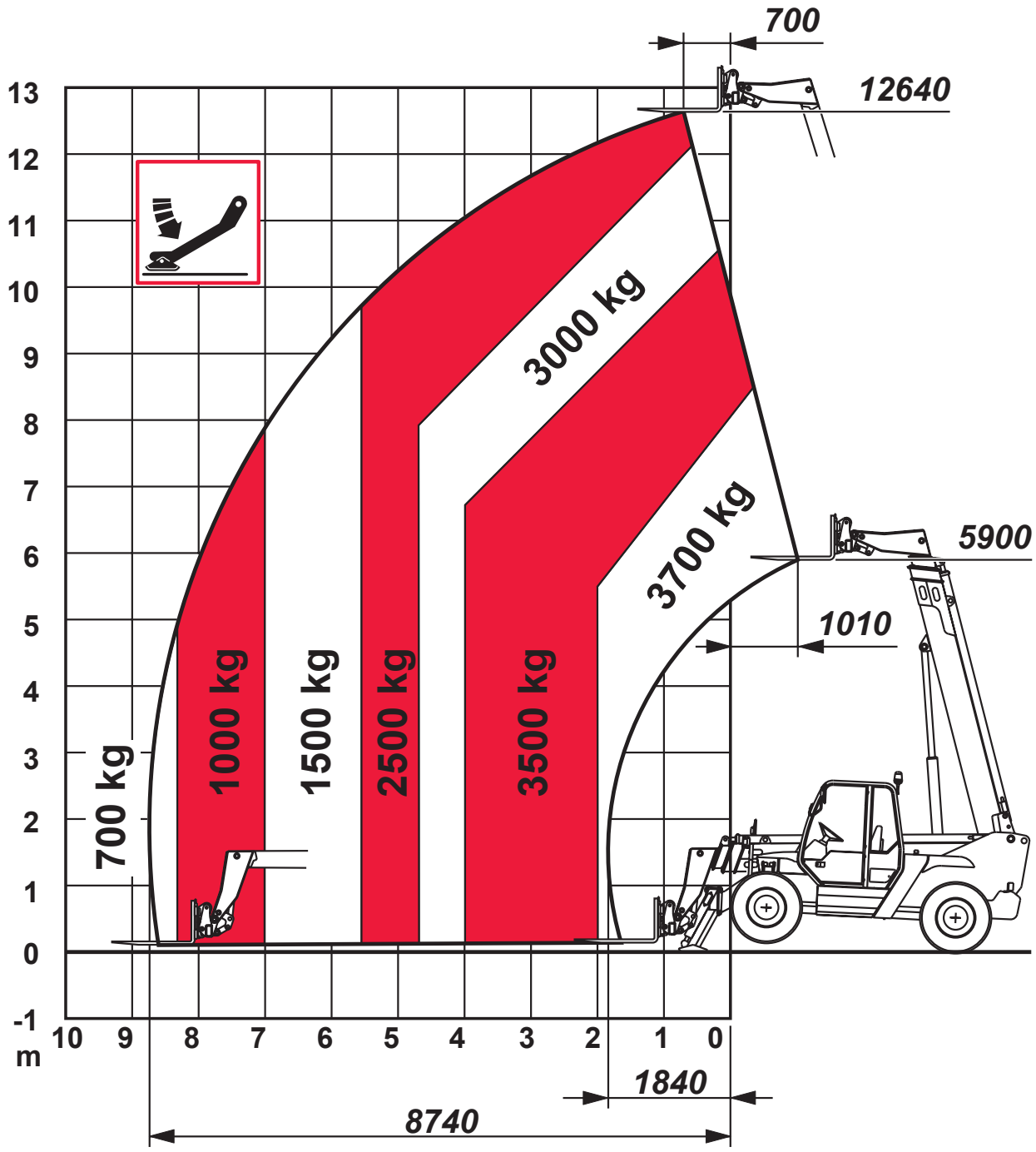
DIAGRAM - TELELIFT 3713 SX WITH STABILISERS LOWERED TO THE GROUND

1000 kg at 7,30 metres

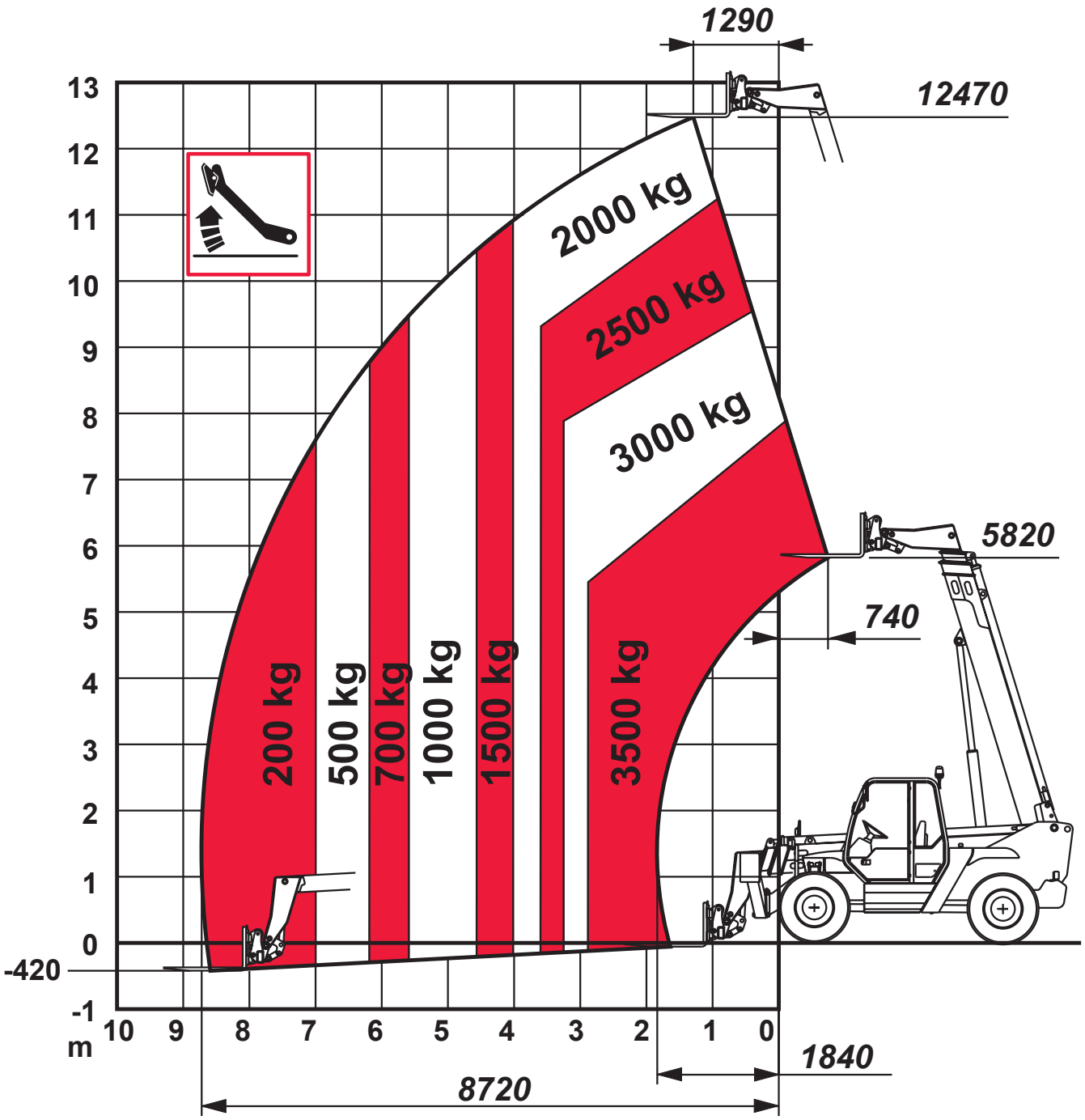


Courtesy of Crane.Market

https://truckmanualshub.com/

DIAGRAM - TELELIFT 3713 SX ON WHEELS

1000 kg at 5,10 metres



Courtesy of Crane.Market

https://truckmanualshub.com/

DIAGNOSTIC FUNCTION IN CALIBRATION MODE

FUNCTION	DISPLAY
A-B	Display of the value read by the ADC converter-cell channel 1 (**A**). This diagnosis function allows you to check proper reading of the load cell. As you move the boom, you can see the LEDs of the load bar progressively go on/off (valid if calibration has already been done). Position the machine for a calibration without load. If the function **A** is setted, the LEDs of the load bar progressively have to go off. If function **A** is activated and the LED is completely ON or OFF, there could be a problem with the connection or in the cell thereof; If it is partly lit but there is no movement in the boom, make sure the cell is fixed.
C	Digital Inputs display: this function allows you to see if the following signals are properly delivered to the DLE device according to the lighted LEDs of the load bar: LED1 and LED2: ON when the machine is stabilized. LED3: lit when the load limiter disconnect key is turned. LED4: ON if the interlock relay is active (machine safe without alarms).
D	Software version existing in the DLE unit: this function allows you to see the software version included in the DLE unit according to the lighted LEDs of the load bar No LED: software 0 One LED: software 1…… Four LEDs: software 4
E	No function.
F	Press to escape from the calibration and **SAVE** all changes. (the buzzer and the LED activate to confirm storage). The limiter has now escaped from the calibration mode. The LED is no longer ON steadily. It is necessary to turn off and turn on the machine to eliminate all alarm messages (display flashing).

ALARM CODES

Alarm code **Description** **Action**	**1** **E2PROM Error.** Internal comparison of data read from E2PROM failed. Switch off and switch on the machine. If the alarm continues, recalibrate the machine, otherwise replace DLE
Alarm code **Description** **Action**	**2** **CELL 1 reading out of range.** Check if the load cell is fixed well. Check the connection between DLE and sensor for short circuits or signal interruptions due to a broken cable. Check the DLE connector for signs of oxidation, short circuits or absence of electrical contact in some pins. If the alarm persists, check if the cell is intact.

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Alarm code	**4**
Description	**Block Relay check error during work.** Check through.re-reading of the block output of the congruence with the current state of the limiter. ***The alarm triggers even in the absence of malfunctions if the load limiter cutout key is usedo***.
Action	The relay or the cable can be shorted; check. The limiter's outputs do not deactivate. Switch off and on the machine and run a complete test of the outputs. If the alarm persists, replace the DLE.
Alarm code	**5-8**
Description	**Block Relay check error at start**. When the instrument is started, the re-reading of the block output is always OFF except when the two outputs of the DLE are connected in series. **5** - DLE output 0V or low voltage - 12V re-reading **8** - DLE output 12V - ow voltage or 0V re-reading ***The alarm triggers even in the absence of malfunctions if the load limiter cutout key is used when the instrument is started.***
Action	The relay or the cable can be shorted; check. The limiter's outputs do not deactivate. Switch off and on the machine and run a complete test of the outputs. If the alarm persists, replace the DLE.
Alarm code	**A**
Description	**RAM data error.** Checks that the parameters load in the RAM at start-up remain unaltered.
Action	Switch off and on the limiter.
Alarm code	**B**
Description	**Outrigger congruence.**
Action	Check that the signal of stabilised machine is congruent between the two inputs used for reading during operation. Display: until the system is turned off. Operations: check wiring, power cable, DLE connector. If the alarm persists, change the DLE (digital input reading malfunction).
Alarm code	**C**
Description	**A.D.C. reading control error.** If the analog/digital converter works fine after special re-reading of the DLE board.
Action	Switch off and on the limiter. If the alarm continues, replace DLE.

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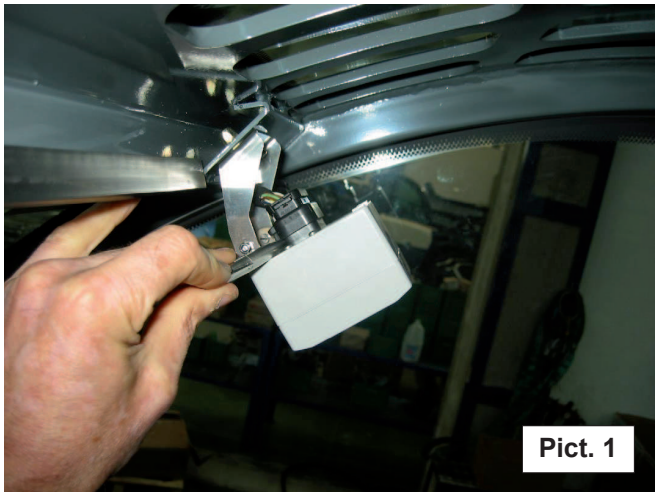
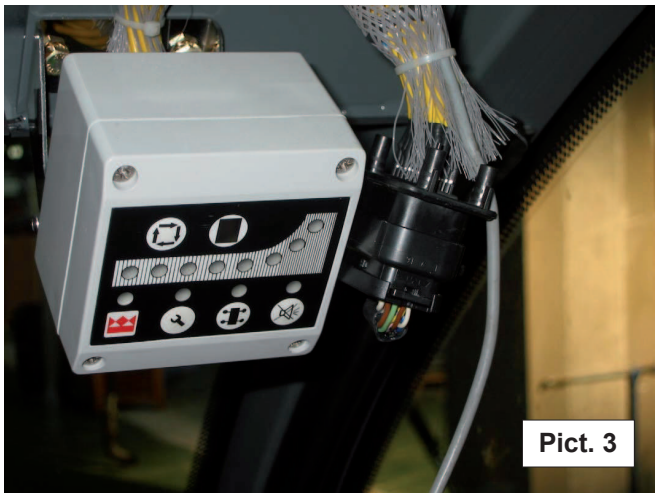
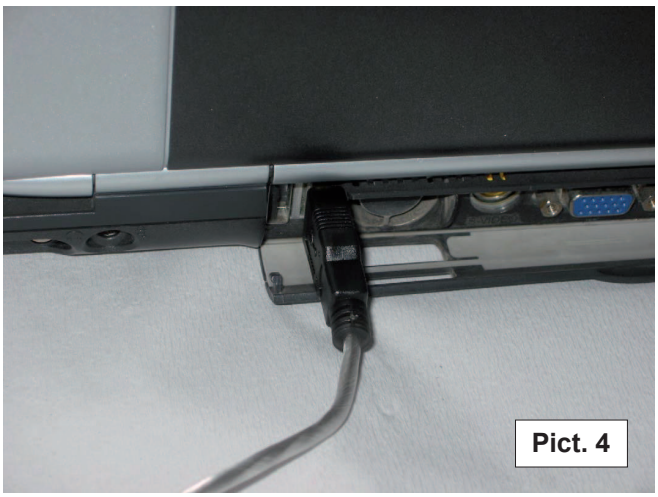
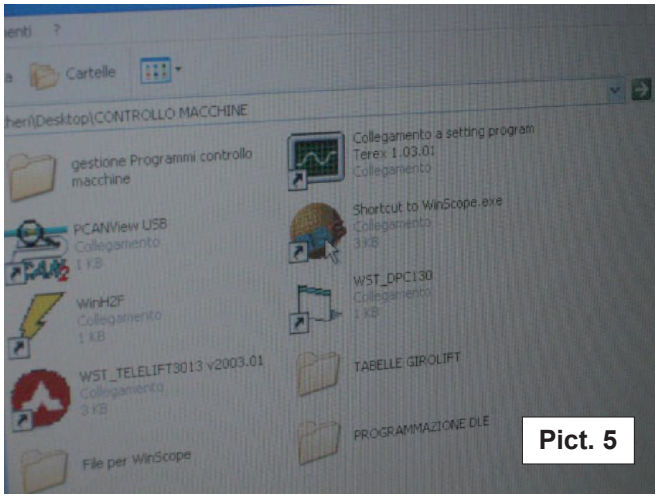
PC CONNECTION (WINSCOPE)


Pict. 1

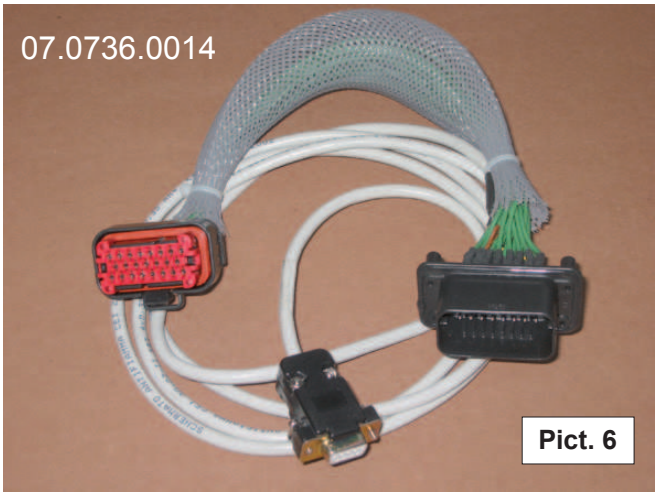
Pict. 2


Pict. 3


Pict. 4



Pict. 5



Pict. 6

If you want to check or save the system parameters and variables, you have to open the relevant windows and check the values contained in these.

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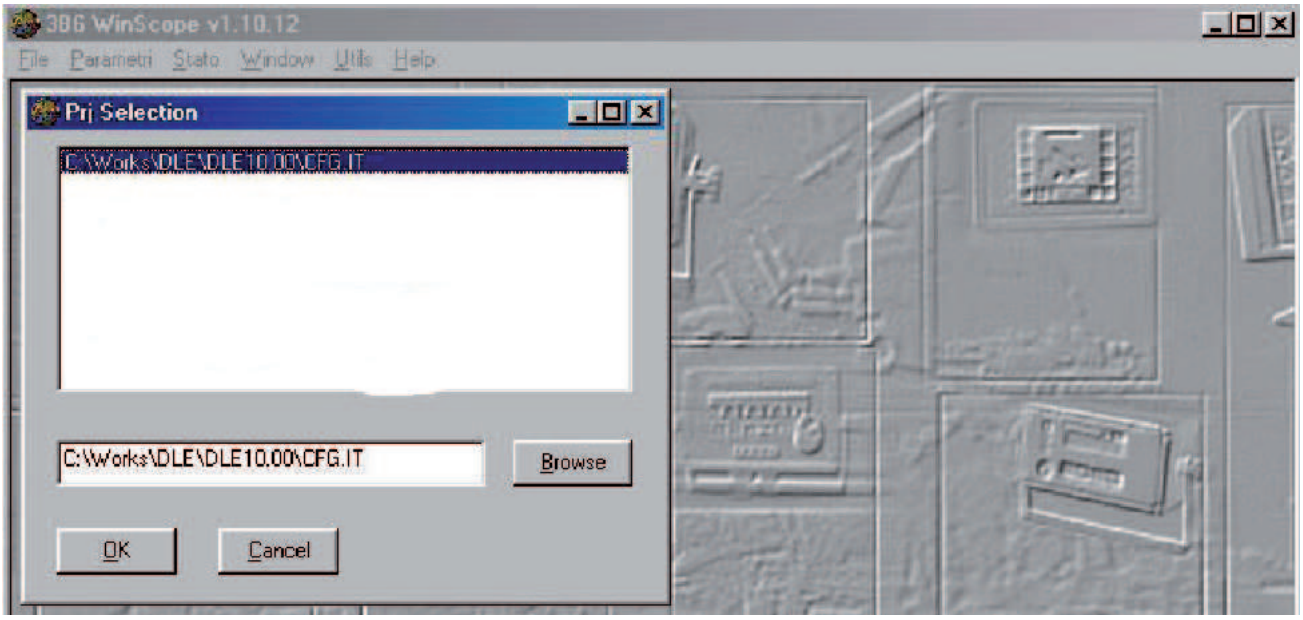
SAVING OR UPLOADING SETTINGS WITH WINSCOPE

When you launch the program the first time, you have to configure some options to guarantee a correct dialogue with the hardware (the machine) used.

Turn on the board to connect the PC and the unit aboard the machine.
From the "**Utils**" menu, select "**Prj Selection**".

Type in the correct path of file **CFG.IT** or look for the same in the Windows folders suing the "Browse" function. The file must not necessarily be in the path shown in the following example as it is at the user's discretion.
It contains the menus and the name of the parameters corresponding to the hardware (and therefore to the machine) in use.



Press OK to close the window.

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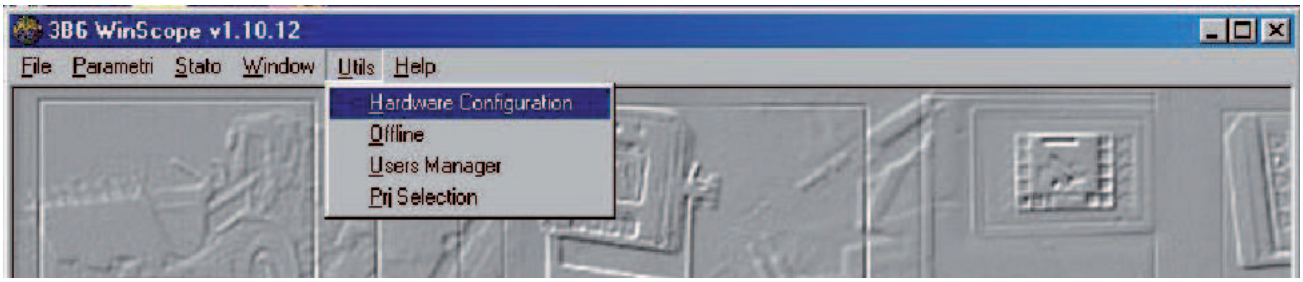
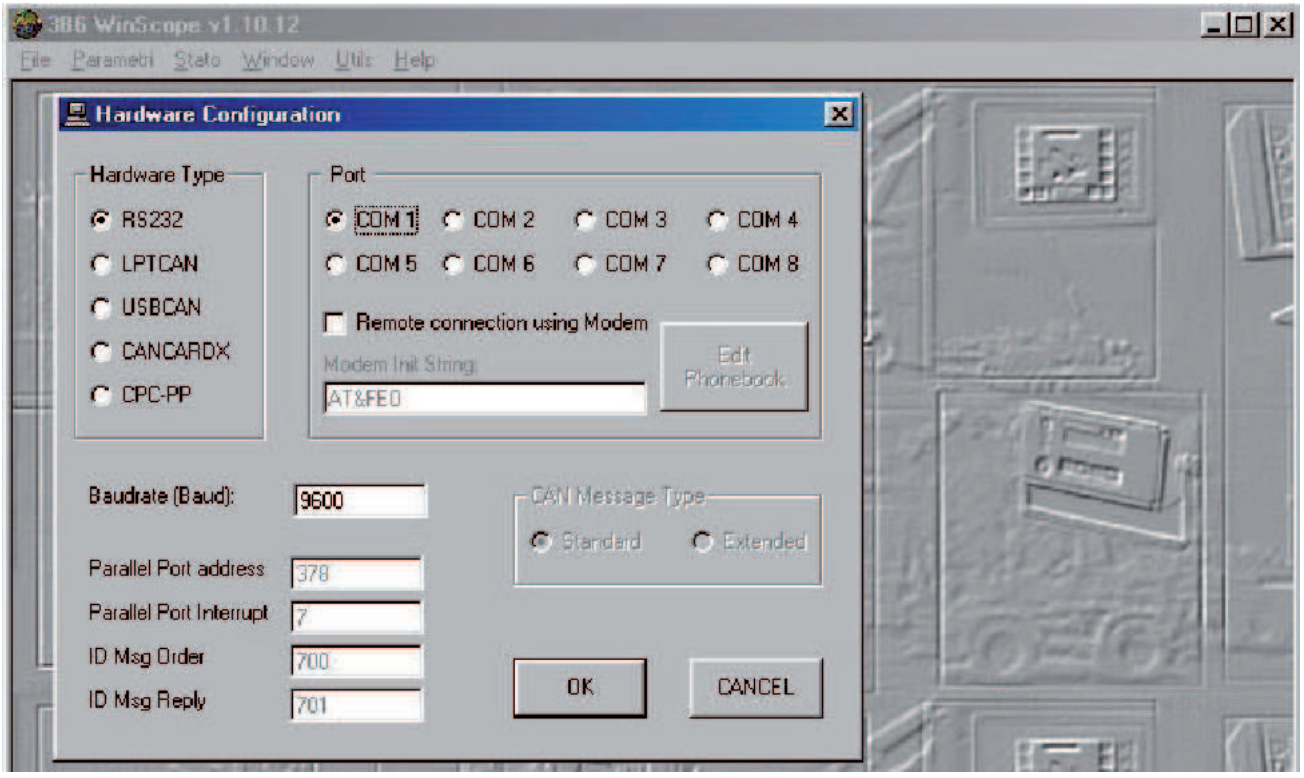
Now highlight “Hardware Configuration” in the “Utils” menu.



The following window will appear:



For each type of machine, you must select adequate parameters, that is:

DLE_01 (version _01 or higher)

- Hardware Type **RS232**
- Port **COM1** (usually this is the port, but it can change in relation to the connected PC)
- Baudrate **19200**

If these parameters are wrongly configured, it won’t be possible to connect the units.
Press OK to confirm and close the window.
Now **close** and re-open the program.

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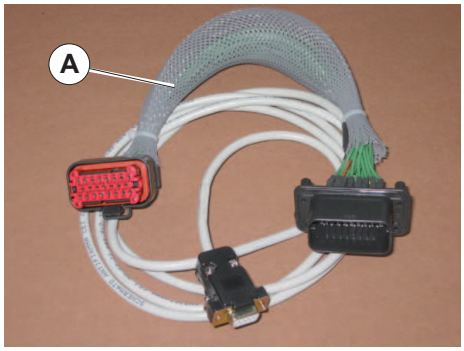
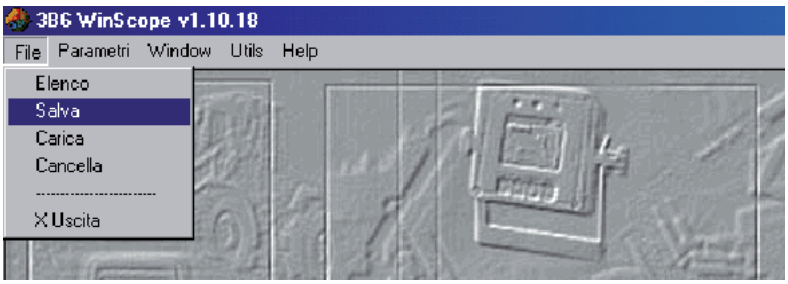
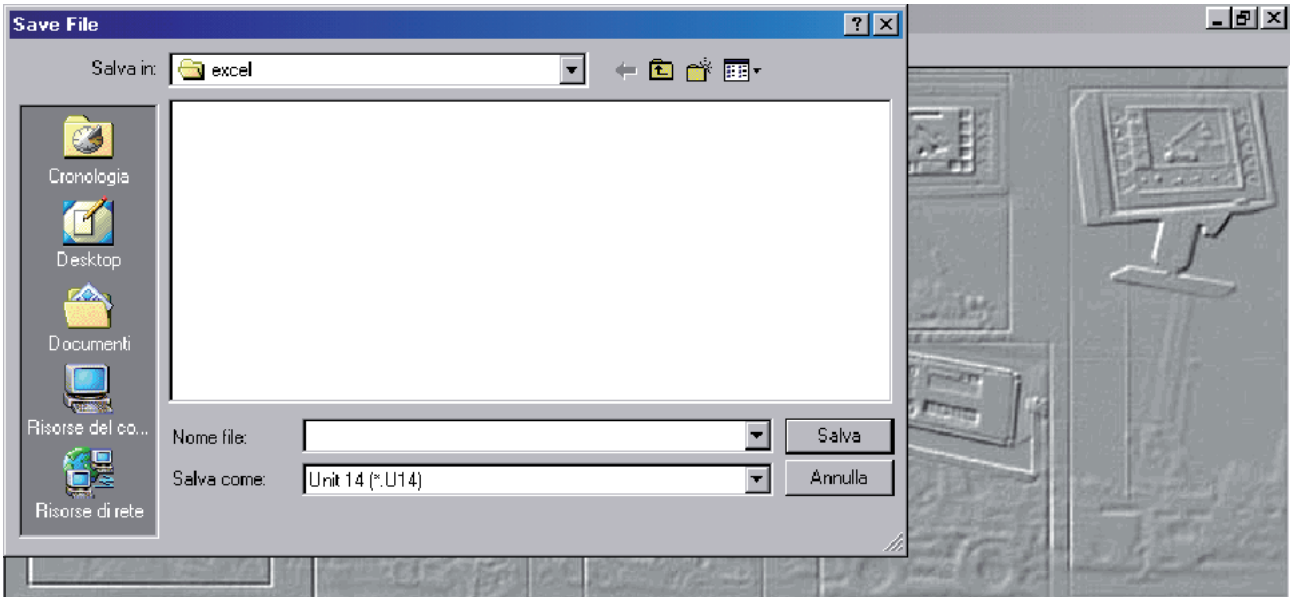
Check that the PC is correctly connected to the relevant serial port and to the DLE unit with the special cord **A** (code 07.0736.0014), and that the unit is supplied with power.
In the “File” menu, select “Salva” (Save) if you want to download a setting of the machine onto a PC or “Carica” (Load) if you want to transfer a setting saved in the PC into the machine.





The following window will be displayed so you can type in the password.
For any changes, you must enter the following data:
User Name: ...(contact the TEREXLIFT Service Centre to get your ID-code)
Password: ....(contact the TEREXLIFT Service Centre to get your ID-code)

Enter the correct data and press OK. If you have selected “Salva” (Save), the following window will be displayed:



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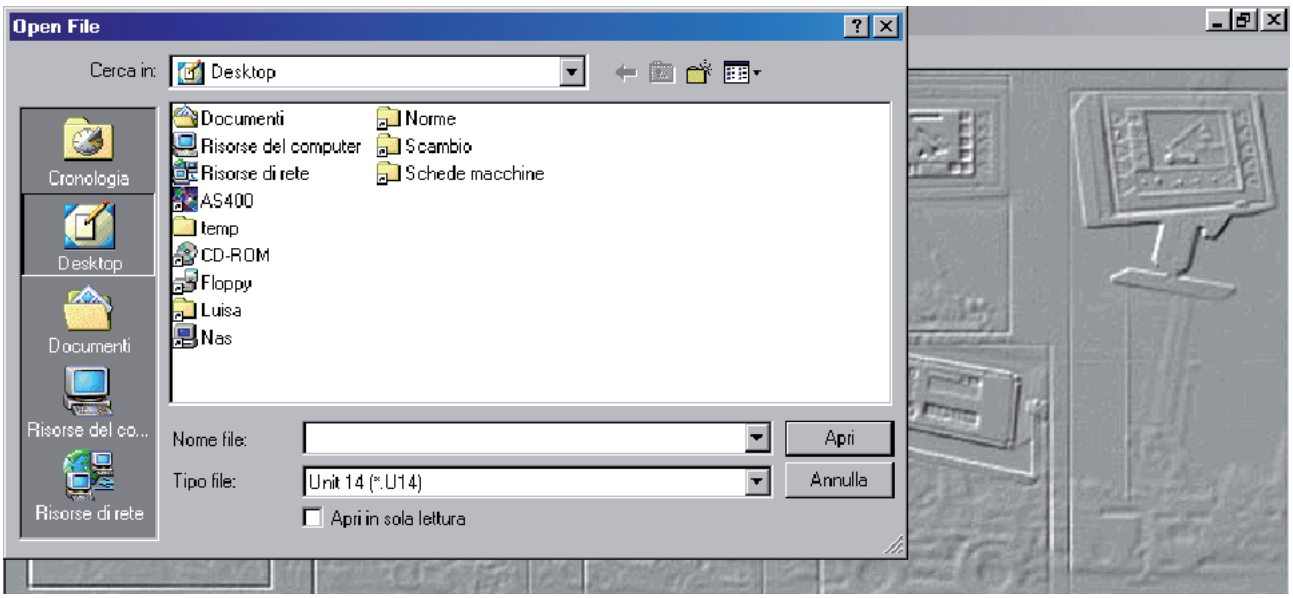
Choose the folder where to save the setting and save the file with a name showing the serial number of the machine (e.g. T3713 SX sn 10578).
Press the Save button.

If you have chosen to upload a setting previously saved in memory, select the “Carica” (Load) command from the File menu. The following window will be displayed:



Choose the setting file you want to upload on the machine and press “Apri” (Open).
Save the setting as explained below:

DLE

- If you want to save the setting, contact the TEREXLIFT Service Centre to get more information and be registered as an authorised user of the system.
- To gain access to the parameters and variables, no password is needed. All you have to do is connecting the DLE display with the power cord supplied by TEREXLIFT (code 07.0736.0014) and proceed as explained below.
- Connect the DLE connecting cable to the electrical system of the machine - see Pict. 1.
- Connect the PC power cord to the DLE and the computer - see Pict. 2 – 3 – 4.
- Turn the ignition key of the machine to position I “board ON” and launch the Winscope program (see Pict. 5). If this is the very first time you use the system, follow the instructions described from the first page of this document. If you want to upload or download the setting from/to the machine DLE, you need a password which must be asked to TEREXLIFT (to avoid any tampering with the system).
  TEREXLIFT has also a database with all the values of the settings saved ordered by serial numbers which can be provided at any time for comparson purposes.

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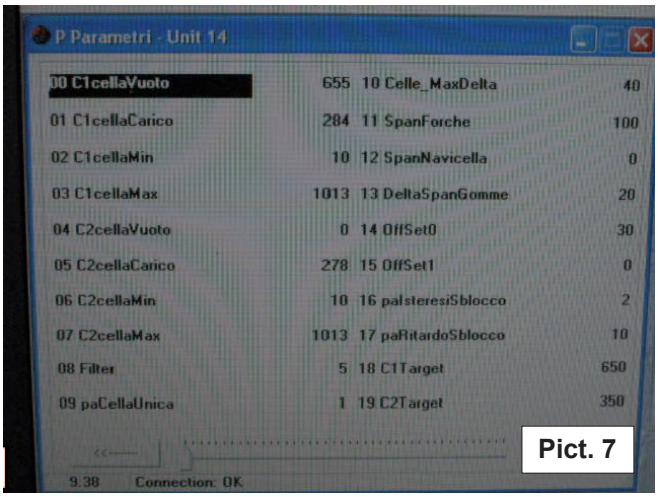
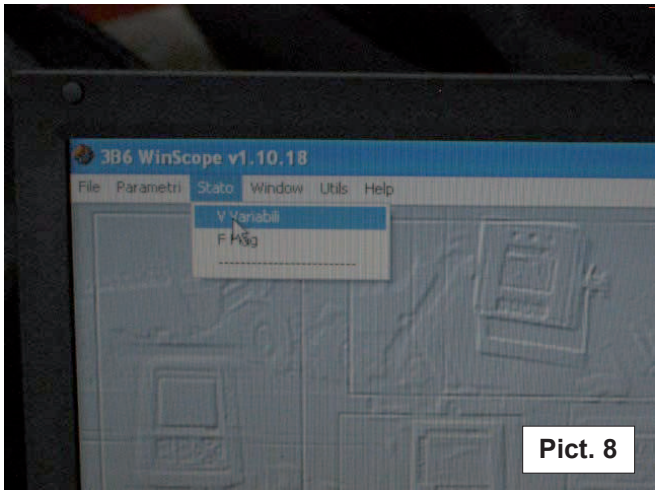
DISPLAYING/CHANGING THE PARAMETERS

A window appears (pict. 7) with the parameters within which the machine can work.

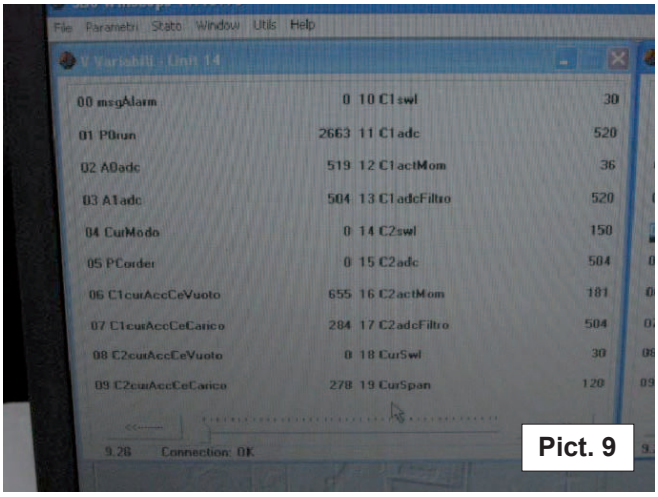


Pict. 7



Pict. 8

If you want to check the variables on the machine, open the “variables” window as shown in picture 8.
Clicking with the mouse, another window opens (see picture 9) which will display the real variations on the machine so you can compare the same with the parameters.



Pict. 9

If, during work, the variables keep within the limits set by the calibration parameters, the system is in efficient order; otherwise, an error message with the relevant identification code is displayed by the DLE.

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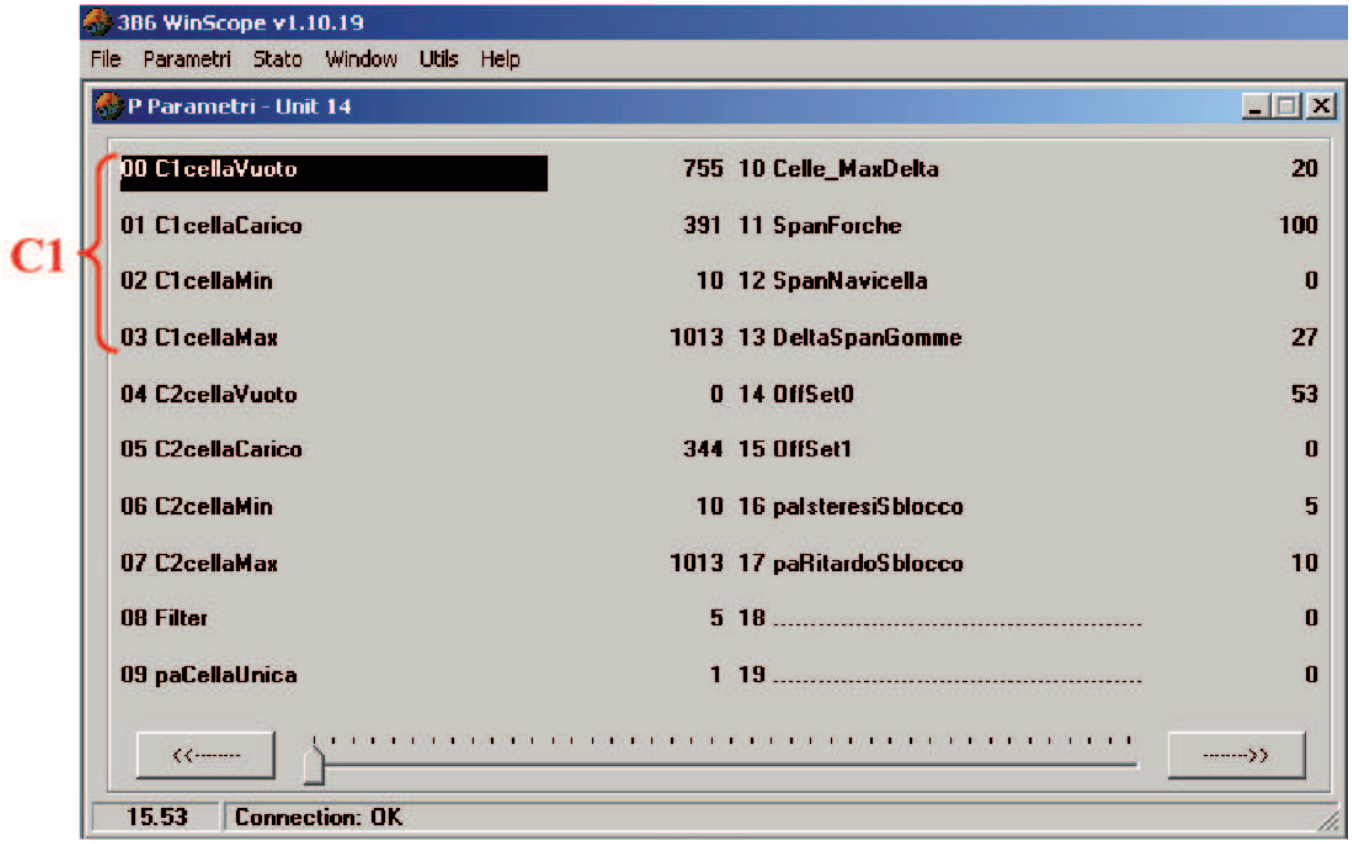
DLE - MONITORING WITH 3B6 WINSCOPE - PARAMETERS

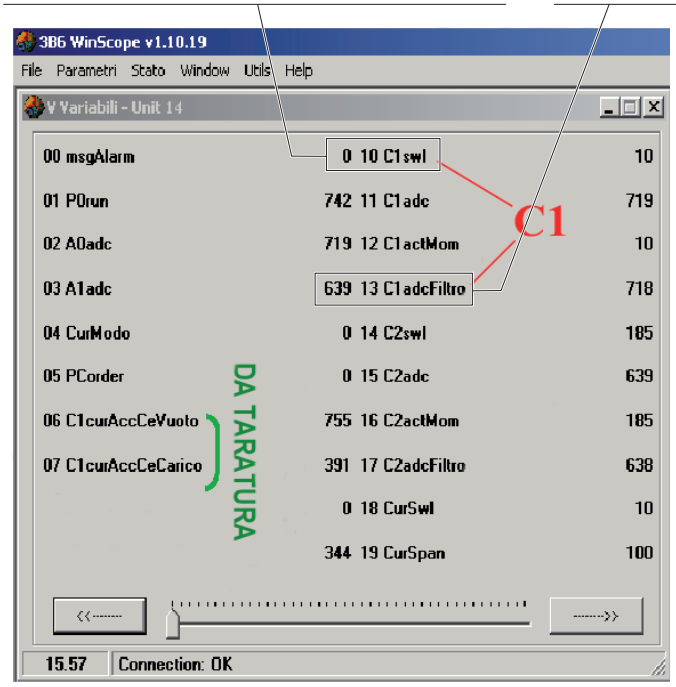
Displaying the parameters



Simulation of the variables

load % calculated in relation to the calibration

value of the analog signal read and converted into bits



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LIST OF THE DLE PARAMETERS

N°	Winscope Name	Description
00	C1cellaVuoto	Value saved in analog channel 1 - calibration with unloaded machine (best setting around 700).
01	C1cellaCarico	Value saved in analog channel 1 - calibration with loaded machine (best setting around 300).
02	C1cellaMin	Min admissible value for analog channel 1 reading (if actual value is below: alarm 2) (value set at 10 roughly).
03	C1cellaMax	Max admissible value for analog channel 1 reading (if actual value is above: alarm 2) (value set at 1010).
04	C2cellaVuoto	Value save in analog channel 2 - calibration with unloaded machine (best setting around 300).
05	C2cellaCarico	Value save in analog channel 2 - calibration with loaded machine (best setting around 700).
06	C2cellaMin	Min admissible value for analog channel 1 reading (if actual value is below: alarm 3) (value set at 10 roughly).
07	C2cellaMax	Max admissible value for analog channel 1 reading (if actual value is above: alarm 3) (value set at 1010).
08	Filter	Number of filter samples, with mobile mean. Load cell reading. Max 5.
09	paCellaUnica	Sets to 1 automatically (during the machine selection) when the DLE is used in single channel mode.
10	Celle_MaxDelta	Max admissible delta between readings of analog channels 1 and 2, expressed as a %, default 10 (current 20).
11	SpanForche	Limiter intervention percentage in case of work with stabilised machine and forks. Default: 100 (as per calibration).
12	SpanNavicella	Limiter intervention percentage in case of work with stabilised machine and platform (changed by the relevant procedure during calibration). When the platform is selected, the limiter uses this % (default 110% - load increase of 10%) instead of the SpanForche datum (current value 125).
13	DeltaSpanGomme	Limiter intervention percentage in case of work with non-stabilised machine (changed by the relevant procedure during calibration). % value that adds to the calibration with forks and outriggers (SpanForche).
14	OffSet0	Command given to the digital potentiometer for cell 1 (value from 0 to 255) to set the reading scale during calibration with unloaded machine to a certain pre-set value (about 900 bit ADC - C1cellaVuoto) (about 700).
15	OffSet1	Command given to the digital potentiometer for cell 2 (value from 0 to 255) to set the reading scale during calibration with unloaded machine to a certain pre-set value (about 200 bit ADC - C2cellaVuoto) (about 300).
16	paIsteresiSblocco	Load % for the reset of the movements once the block condition has been rectified. (default 5% = 95%).
17	paRitardoSblocco	Value expressed in tenths of second corresponding to the time that must elapse between the block condition and the movement reset (default 10 = 1 second).

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20	C1NavicellaVuoto	Parameters 20, 21, 22 and 23 are usually equivalent to parameters 0, 1, 4 and 5. They shall be used for a new calibration of the platform not depending on the proportional % calibration done with the forks. These parameters only apply to the platform. Value saved in analog channel 1 during calibration with empty machine
21	C1NavicellaCarico	Value saved in analog channel 1 during calibration with loaded machine.
22	C2NavicellaVuoto	Value saved in analog channel 2 during calibration with empty machine.
23	C2NavicellaCarico	Value saved in analog channel 2 during calibration with loaded machine.
24	CurMacchina	Machine selected on point “0” of the calibration.
28	VersioneSW	Software version.
29	WPsum	Parameters CHECKSUM used by the safety functions.

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LIST OF THE DLE VARIABLES

N°	Winscope Name	Default	Description
05	PCorder	0	You can save changes effected to the parameters by setting this variable to “1”. The variable will return to 0 once the value has been saved.
10	C1swl		Load percentage of cell 1 (0% = calibration without load; 100% = calibration under load).
13	C1adcFiltro		Current value of cell 1 (analog, converted into bits 0 - 1023).

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Section 3
SCHEDULED MAINTENANCE INSPECTIONS

SECTION INDEX

3.1 Introduction ..... page 2
3.2 About this section 3
3.3 Maintenance table 4
3.4 Maintenance inspection report 7

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3.1 INTRODUCTION

- ***Maintenance inspections shall be completed by a person trained and qualified on the maintenance of this machine.***
- ***Scheduled maintenance must be carried out at the intervals indicated in the MAINTENANCE REPORT.***

⚠WARNING

Failure to properly complete each inspection when required may cause death, serious injury or substantial machine damage.

- ***Immediately tag and remove from service a damaged or malfunctioning machine.***
- ***Repair any machine damage or malfunction before operating machine.***

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3.2 ABOUT THIS SECTION

Intervention times

Maintenance interventions have been divided into 7 different groups in relation to the time at which they must be carried out, say daily, weekly, monthly, every 2 months, every 6 months, yearly and every 5 years (afterwards every 2 years).

For ease of use, the service intervals have been grouped in different tables, as explained below:

Inspection	Table
Daily	A
Weekly	A+B
Monthly	A+B+C
Every two months	A+B+C+D
Every six months	A+B+C+D+E
Yearly	A+B+C+D+E+F
Every 5 years (afterwards every 2 years)	G

Maintenance table

The maintenance table contains general information on the type of intervention to be carried out at a certain interval.

For the explanation of the maintenance jobs to be done, please refer to chapter 4 “Maintenance Procedures”.

Maintenance inspection report

The maintenance report summarises all of the interventions to be carried at a given interval and lets the maintenance technician note the result of the check or intervention carried out.

This card can be photocopied to be used at the different service intervals and to keep a trace of all interventions carried out.

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3.3 MAINTENANCE TABLE

TABLE A

During the first 10 working hours:

A-1	Check the oil level within reduction gears, power divider and differential gears.
A-2	Check the tightening of the wheel bolts.
A-3	Check the tightening of all bolts and nuts.
A-4	Check the couplings for oil leaks.

Every 10 working hours or daily:

A-5	Inspect the Operator Manual.
A-6	Inspect the decals and placards.
A-7	Check the engine oil level.
A-8	Clean the air suction filter.
A-9	Check and clean the radiator.
A-10	Check the hydraulic oil level in the tank.
A-11	Check the greasing of the boom section pads.
A-12	Grease the forks.
A-13	Grease all joints of the boom, the rear axle shaft joint, the transmission shafts, the front and rear axles and any equipment of the machine.
A-14	Check the efficiency of the lighting electric system.
A-15	Check the efficiency of braking system and parking brake.
A-16	Check the efficiency of the steering selection system.
A-17	Check the efficiency of the fork balancing system.
A-18	Make sure the safety devices installed are in efficient working order.
A-19	Check the engine coolant level.
A-20	Check the efficiency of the overload warning system.
A-21	Check or re-sequence the boom telescopes.

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TABLE B

Within the first 50 working hours:

B-1	Change the oil for the first time.

Every 50 working hours or weekly:

B-2	Check the tension of the alternator belt.
B-3	Check the tyre inflation.
B-4	Check the tightening of the wheel nuts.
B-5	Check the tightening of the cardan shaft screws.
B-6	Clean the radiator fins.

TABLE C

Every 250 working hours or monthly:

C-1	Change the engine oil and relevant filter.
C-2	Check the oil level in the front and rear differential gears and in the power divider.
C-3	Check the oil level in the four wheel reduction gears.
C-4	Check the main filtering element of the engine air filter. Replace, if necessary.
C-5	Check the clamping of the cableheads to the battery terminals.
C-6	Check the air suction hose between engine and filter.
C-7	Check the cylinder chromium-plated rods.
C-8	Check the hydraulic lines are not worn because of rubbing against the frame or other mechanical components.
C-9	Check the electric cables do not rub against the frame or other mechanical components.
C-10	Check the wear of the sliding pads of the boom sections.
C-11	Adjust the play of the sliding pads of the boom sections.
C-12	Remove any grease from the boom, then re-grease the sliding parts of the boom sections.
C-13	Check the level of the battery electrolyte.
C-14	Check the efficiency of the block valves.

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TABLE D

Every 500 working hours or every two months:

D-1	Visually check the smoke quantity evacuated from the engine exhaust.
D-2	Check the tightening of the engine fixing screws.
D-3	Check the tightening of the cab fixing screws.
D-4	Check the backlash between pins and bushings in all joints.
D-5	Have the hydraulic system checked by a skilled technician.
D-6	Change the main cartridge of the engine air filter.
D-7	Clean the air filter in the cab.
D-8	Change the hydraulic oil filter of the transmission.

TABLE E

Every 1000 working hours or every six months:

E-1	Change the safety element of engine air filter.
E-2	Change the oil in the front and rear differential gears and in the power divider.
E-3	Change the oil in the four wheel reduction gears.
E-4	Change the hydraulic oil.
E-5	Change the hydraulic oil filter cartridge of the service circuits.

TABLE F

Every 2000 working hours or yearly:

F-1	Change the engine coolant.

TABLE G

At 6000 hours or 5 years and, subsequently, every 2 years:

G-1	Check that the structure is intact paying a special attention to the welded supporting joints and the boom pins.

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3.4 MAINTENANCE INSPECTION REPORT

Model

Serial number

Date

Hour meter

Machine owner

Inspected by

Inspector signature

Inspector title

Inspector company

Instructions:

- *Make copies of this page to use for each inspection.*
- *Select the appropriate checklist(s) for the type of inspection to be performed.*

☐ ***Every 10 hours: A***
☐ ***Every 50 hours: A+B***
☐ ***Every 250 hours: A+B+C***
☐ ***Every 500 hours: A+B+C+D***
☐ ***Every 1000 hours: A+B+C+D+E***
☐ ***Every 2000 hours: A+B+C+D+E+F***
☐ ***At 6000 hours: G***

- *Place a check in the appropriate box after each inspection procedure is completed.*
- *Use the maintenance tables in this section and the step-by-step procedures in section 4 to learn how to perform these inspection.*
- *If any inspection receives an "N", tag and remove the machine from service, repair and re-inspect it. After repair, place a check in the "R" box.*

Legend:

Y = yes, acceptable

N = no, remove from service

R = repaired.

Table A		Y	N	R
Within the first 10 working hours:				
A-1	Oil level within reduction gears, power divider and differential gears.			
A-2	Tightening of the wheel bolts.			
A-3	Tightening of all bolts and nuts.			
A-4	Check the couplings for oil leaks.			
Every 10 working hours:				
A-5	Operator Manual.			
A-6	Decals and placards.			
A-7	Engine oil level.			
A-8	Air suction filter.			
A-9	Radiator.			
A-10	Hydraulic oil level in the tank.			
A-11	Check the greasing of the boom section pads.			
A-12	Grase the forks.			
A-13	Grease all joints of the boom, the rear axle shaft joint, the transmission shafts, the front and rear axles and any equipment of the machine.			
A-14	Lighting electric system.			
A-15	Efficiency of braking system and parking brake.			
A-16	Steering selection system.			
A-17	Fork balancing system.			
A-18	Safety devices.			
A-19	Engine coolant level.			
A-20	Overload warning system.			
A-21	Check or re-sequence the boom telescopes			

Table B		Y	N	R
Within the first 50 working hours:				
B-1	Change the engine oil and renew the fuel filter.			
Every 50 working hours:				
B-2	Alternator belt.			
B-3	Tyre inflation.			
B-4	Tightening of the wheel nuts.			
B-5	Tightening of the cardan shaft screws.			
B-6	Radiator fins.			

Table C		Y	N	R
Every 250 working hours:				
C-1	Engine oil and relevant filter.			
C-2	Oil level in the differential gears and in the power divider.			
C-3	Oil level in the wheel reduction gears.			
C-4	Main filtering element of the engine air filter.			
C-5	Clamping of the cableheads to the battery terminals.			
C-6	Air suction hose between engine and filter.			
C-7	Cylinder chromium-plated rods.			
C-8	Hydraulic lines.			
C-9	Check the electric cables do not rub against the frame or other mechanical components.			
C-10	Wear of the sliding pads of the boom sections.			
C-11	Play of sliding pads.			
C-12	Sliding parts of the boom sections.			
C-13	Level of the battery electrolyte.			
C-14	Block valves.			

Table D		Y	N	R
Every 500 working hours:				
D-1	Smoke quantity evacuated from the engine exhaust.			
D-2	Tightening of the engine fixing screws.			
D-3	Tightening of the cab fixing screws.			
D-4	Backlash between pins and bushings.			
D-5	Check the hydraulic system.			
D-6	Main cartridge of the engine air filter.			
D-7	Cab air filter.			
D-8	Hydraulic oil filter of the transmission.			

Courtesy of Crane.Market

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Model

Serial number

Date

Hour meter

Machine owner

Inspected by

Inspector signature

Inspector title

Inspector company

Instructions:

- *Make copies of this page to use for each inspection.*
- *Select the appropriate checklist(s) for the type of inspection to be performed.*

☐ ***Every 10 hours: A***
☐ ***Every 50 hours: A+B***
☐ ***Every 250 hours: A+B+C***
☐ ***Every 500 hours: A+B+C+D***
☐ ***Every 1000 hours: A+B+C+D+E***
☐ ***Every 2000 hours: A+B+C+D+E+F***
☐ ***At 6000 hours: G***

- *Place a check in the appropriate box after each inspection procedure is completed.*
- *Use the maintenance tables in this section and the step-by-step procedures in section 4 to learn how to perform these inspection.*
- *If any inspection receives an "N", tag and remove the machine from service, repair and re-inspect it. After repair, place a check in the "R" box.*

Legend:

Y = yes, acceptable

N = no, remove from service

R = repaired.

Table E		Y	N	R
Every 1000 working hours:				
E-1	Safety element of engine air filter.			
E-2	Oil in the front and rear differential gears and in the power divider.			
E-3	Oil in the wheel reduction gears.			
E-4	Hydraulic oil.			
E-5	Change the hydraulic oil filter cartridge of the service circuits.			

Table F		Y	N	R
Every 2000 working hours:				
F-1	Change the engine coolant.			

Table G		Y	N	R
At 6000 working hours:				
G-1	Check the structure for damage, in particular check welded points and pins.			

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Section 4
SCHEDULED MAINTENANCE PROCEDURES

SECTION INDEX

4.1	Introduction..... page	2
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4.9	TABLE G procedures	55

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4.1 INTRODUCTION

- ***Maintenance inspections shall be completed by a person trained and qualified on the maintenance of this machine.***
- ***Scheduled maintenance must be carried out at the intervals indicated in the MAINTENANCE REPORT.***

⚠WARNING

Failure to properly complete each inspection when required may cause death, serious injury or substantial machine damage.

- ***Immediately tag and remove from service a damaged or malfunctioning machine.***
- ***Repair any machine damage or malfunction before operating machine.***
- ***Unless otherwise specified, perform each procedure with the machine in the following configuration:***
  - ***machine parked on a flat level surface;***
  - ***boom in the stowed position;***
  - ***key switch in the OFF position with the key removed.***

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4.2 ABOUT THIS SECTION

This section describes the maintenance interventions to be carried out on the machine according to the indications of the maintenance inspection report (see chapter 3).

Safety symbols:

Draws the attention to situations that involve your own as well as the others' safety and that can result in serious or lethal injury.

⚠DANGER

Draws the attention to situations that involve your own as well as the others' safety and that can result in serious or lethal injury.

⚠WARNING

Draws the attention either to situations that involve your own as well as the others' safety and that can result in minor or moderate injury or to situations that involve the machine efficiency.

⚠CAUTION

Draws the attention either to situations that involve your own as well as the others' safety and that can result in minor or moderate injury or to situations that involve the machine efficiency.

CAUTION

Draws the attention to important technical information or practical advice that allows for a safer and more efficient use of the machine.

NOTICE

Draws the attention to important environment-related information.

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4.3 TABLE A PROCEDURES

A-1 CHECK THE OIL LEVEL OF REDUCTION GEARS, DIFFERENTIAL GEARS AND POWER DIVIDER

To check the oil level within the wheel **reduction gears**:

- Stop the machine on a level ground and ensure the parking brake is engaged and plug **A** finds on the horizontal axis.
- Clean the plug all around, then remove it and check if oil is level with the hole.
- If necessary, add new oil through hole **A** until it is level.
- Refit the plug.

NOTICE

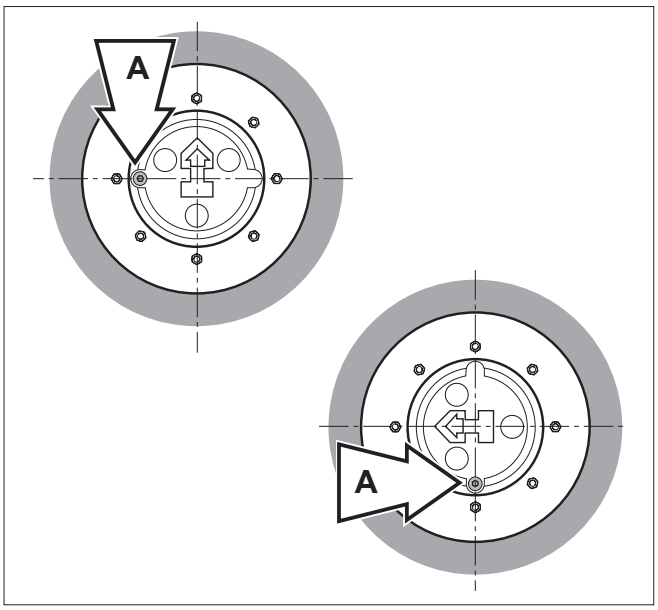
Place a container of suitable size under the plug.

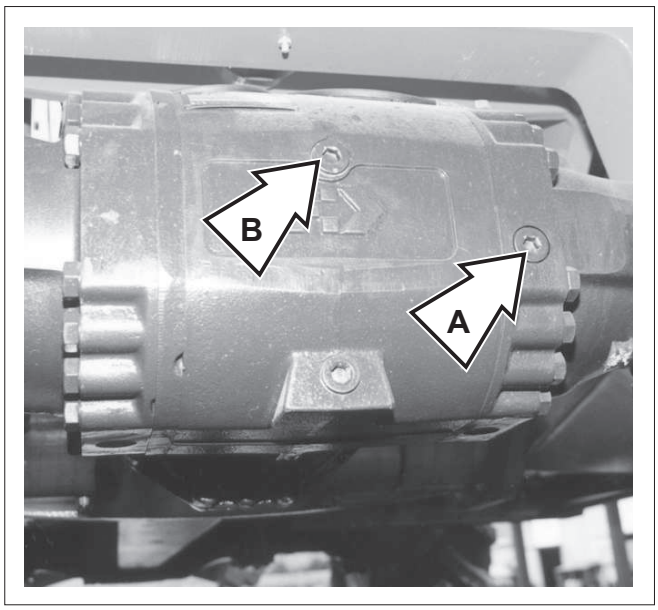
To check the oil level in the front and rear **differential gears**:

- Stop the machine on a level ground and engage the parking brake.
- Loosen level plug **A** and check if oil is level with the hole.
- If necessary, top-up through hole **B** until oil comes out from hole **A**.
- Refit and tighten plugs **A** and **B**.

NOTICE

Place a container of suitable size under the plug.





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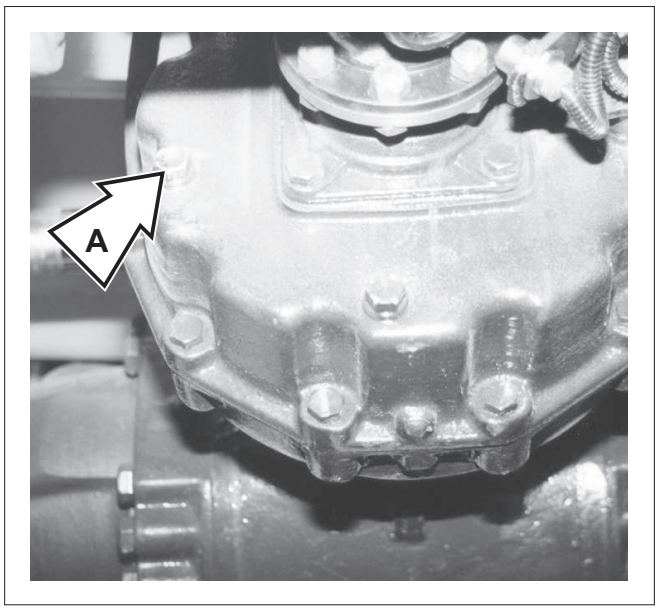
To check the oil level in the **power divider**:

- Stop the machine on a level ground and engage the parking brake.
- Clean the plug **A** all around, then remove it and check if oil is level with the hole.
- If necessary, add new oil through hole **A** until it is level.
- Refit the plug.

NOTICE

Place a container of suitable size under the plug.



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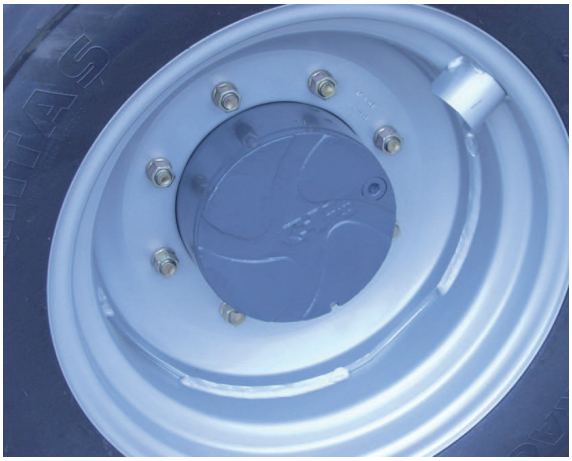
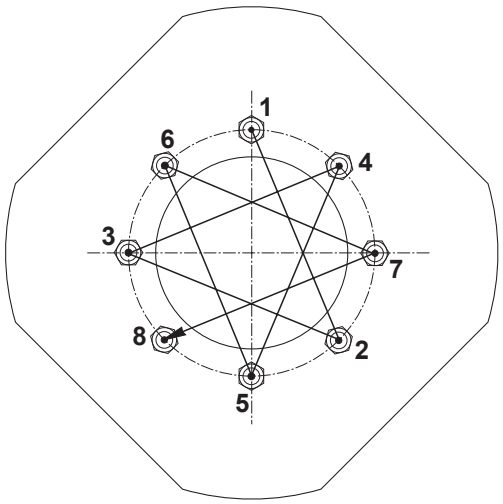
A-2 CHECK THE TIGHTENING OF THE WHEEL BOLTS

If you have to check the tightening of the wheel bolts or replace a wheel, proceed as follows:

- Raise the machine using a hydraulic jack.
- Remove the wheel rolling it on the ground.
- Line up the wheel with the axle and fit the 8 nuts.
- Tighten the nuts following the alternate sequence shown in the picture with a pneumatic screwdriving machine.
- Lower the machine to the ground.

Re-tighten all nuts to a torque 440 Nm.





⚠WARNING

Check the tightening of wheels one hour after the job. They might get loose until they do not stay correct.

⚠WARNING

On new machines, and when a wheel has been disassembled or replaced, check the nut torque of the wheels every 2 hours until they stay correct.

⚠WARNING

Always use tyres having the dimensions indicated in the vehicle registration card.

	STANDARD Telelift 3713 SX	OPTIONAL Telelift 3713 SX
Dimensions (front and rear)	405/70 R20	405/70 R24
P.R. (or load index)	14 pr	14 pr
Rim	13x20	13x24
Wheel disc	8 holes DIN 70361	8 holes DIN 70361
Pressure bar/Psi	5.5/80	4.5/65

Courtesy of Crane.Market

https://truckmanualshub.com/

A-3 CHECK THE TIGHTENING OF ALL BOLTS AND NUTS

Before starting your daily work, proceed with a random check of the bolts.

For the correct tightening torques, please refer to par. 2.13 in section 2 “Technical Specifications”.

A-4 CHECK THE COUPLINGS FOR OIL LEAKS

Before starting your work, do a walk-around inspection and check for oil leaks.

If you find them, rectify before starting using the machine.

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A-5 INSPECT THE OPERATOR MANUAL

Maintaining the operator manual in good condition is essential to safe machine operation.

Manual are included with each machine and should be stored in the cab. An illegible or missing manual will not provide safety and operational information necessary for a safe operating condition.

In particular:

- check to be sure the storage container is in good condition.
- check to make sure that the operator manual are present, complete and in the storage container in the cab.
- examine the pages of each manual to be sure that they are legible and in good condition.
- always return the manual to the storage container after use.

CAUTION

Contact TEREXLIFT Service Centre if replacement manuals are needed.

A-6 INSPECT THE DECALS AND PLACARDS

Maintaining all of safety and instructional decals and placards in good condition is mandatory for safe machine operation. Decals alert operators and personnel to the many possible hazards associated with using this machine.

An illegible decal will fair to alert personnel of a procedure or hazard and could result in unsafe operating conditions.

- refer to the “labels and warning plates applied on the machine” section in the Operator Manual and use the decal list and illustrations to determine that all decals and placards are in place.
- inspect all decals for legibility and damage. Replace any damaged or illegible decal immediately.

CAUTION

Contact TEREXLIFT Service Centre if replacement decals are needed.

A-7 CHECK THE ENGINE OIL LEVEL

CAUTION

For the engine maintenance, please refer to the specific Operator handbook supplied with the machine.

Courtesy of Crane.Market

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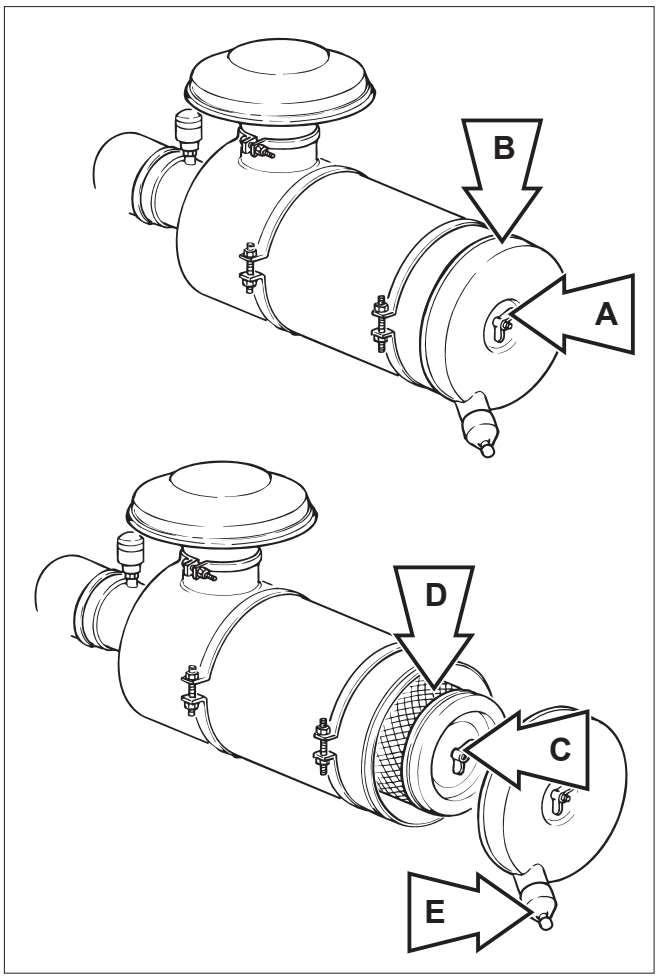
A-8 CLEAN THE AIR INTAKE FILTER

Clean the engine air filter every 10 hours:

- Stop the engine and engage the parking brake.
- Unscrew wing nut **A** and remove cover **B**.
- Unscrew wing nut **C** and remove the outer element **D**.
- Clean the filter bowl.
- Clean the cartridge by beating it some times on the ground paying attention not to damage the filtering element. Do not dry-clean the filtering element.
- Check the filter box for cracks (light showing through).
- Smear the seal with grease, then refit the element.
- Tighten wing nut **C**, close cover **B** and tighten with wing nut **A**.



⚠WARNING

As soon as the warning lamp on the cab dashboard switches on, replace the outer element.

⚠WARNING

Daily remove any dust collected in the filter by pressing the rubber cap E.

⚠WARNING

Never wash the cartridge with water or solvents.

Courtesy of Crane.Market

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A-9 CHECK AND CLEAN THE RADIATOR

⚠ DANGER

When using a steam-washer, always wear protective clothes. Hot steam may cause serious injury.

- Open the radiator panel.
- Check the fins of radiator for sediments.
- If necessary, prepare a compressed air nozzle (max. 2 bar) or a nozzle distributing water under pressure or steam.

Cleaning using compressed air

- Direct a jet of compressed air toward radiator paying attention not to damage its fins.
- Remove any loose particles of dirt with some water.

Cleaning using water under pressure or steam

- Spray radiator with a cold commercial detergent and wait for at least 10 minutes to allow the detergent to react.
- Wash radiator using a jet of water or steam.

CAUTION

The core fouling depends on the dust of the outside environment and the presence of oil and fuel leaks in the motor area. It is therefore advisable to remove oil and fuel leaks immediately in case of very dusty environments.

Courtesy of Crane.Market

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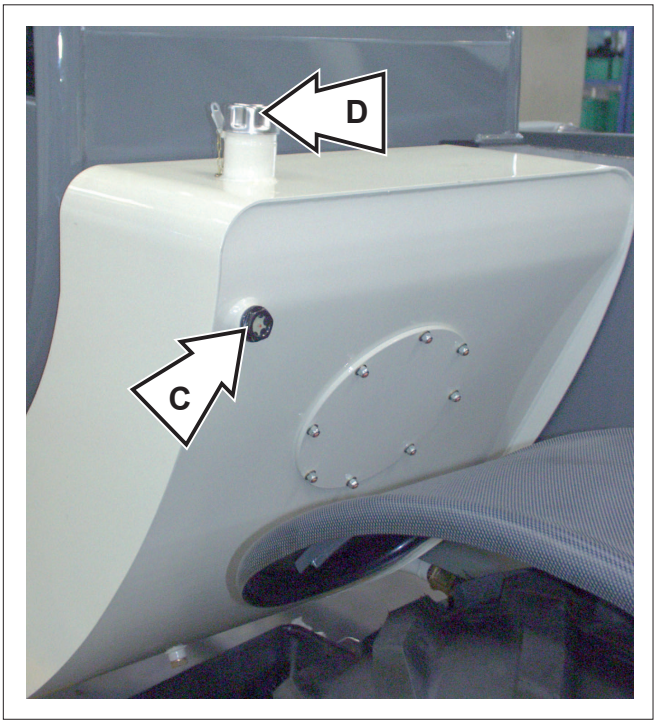
A-10 CHECK THE HYDRAULIC OIL LEVEL IN THE TANK

⚠DANGER

Fine jets of hydraulic oil under pressure can penetrate the skin. Do not use your fingers, but a piece of cardboard to detect oil leaks.

Check the hydraulic oil level (visually) through the special level **C** fitted into the tank.
When necessary, add new oil through filler **D**.



⚠WARNING

Check the oil level with the machine in the travel position, tha is boom lowered and telescopes fully in.

NOTICE

The handling and disposing of used oils can be ruled by local or national regulations. Address to authorised centres.

Courtesy of Crane.Market

https://truckmanualshub.com/

A-11 CHECK THE GREASING OF THE BOOM SECTION PADS

Any boom section is fitted with adjustable pads located on the four sides of the profile. These pads are secured to both fixed and mobile part of every section.

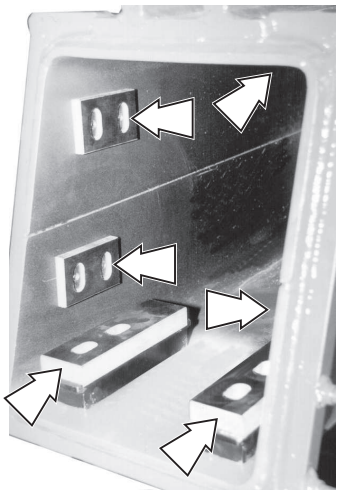
At regular intervals, check that the telescopes are well greased in correspondence of the sliding pads.

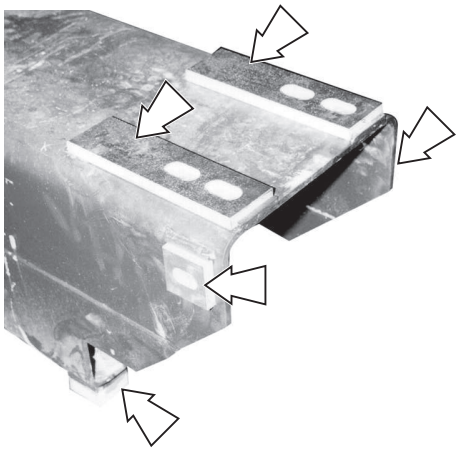
If necessary, scrape off the old grease and brush new grease. We recommend using:

- **PTFE INTERFLON grease FIN GREASE LS 2**

CAUTION

Avoid mixing greases of different type or features and do not use greases of lower quality.





Courtesy of Crane.Market

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A-12 GREASE THE FORKS

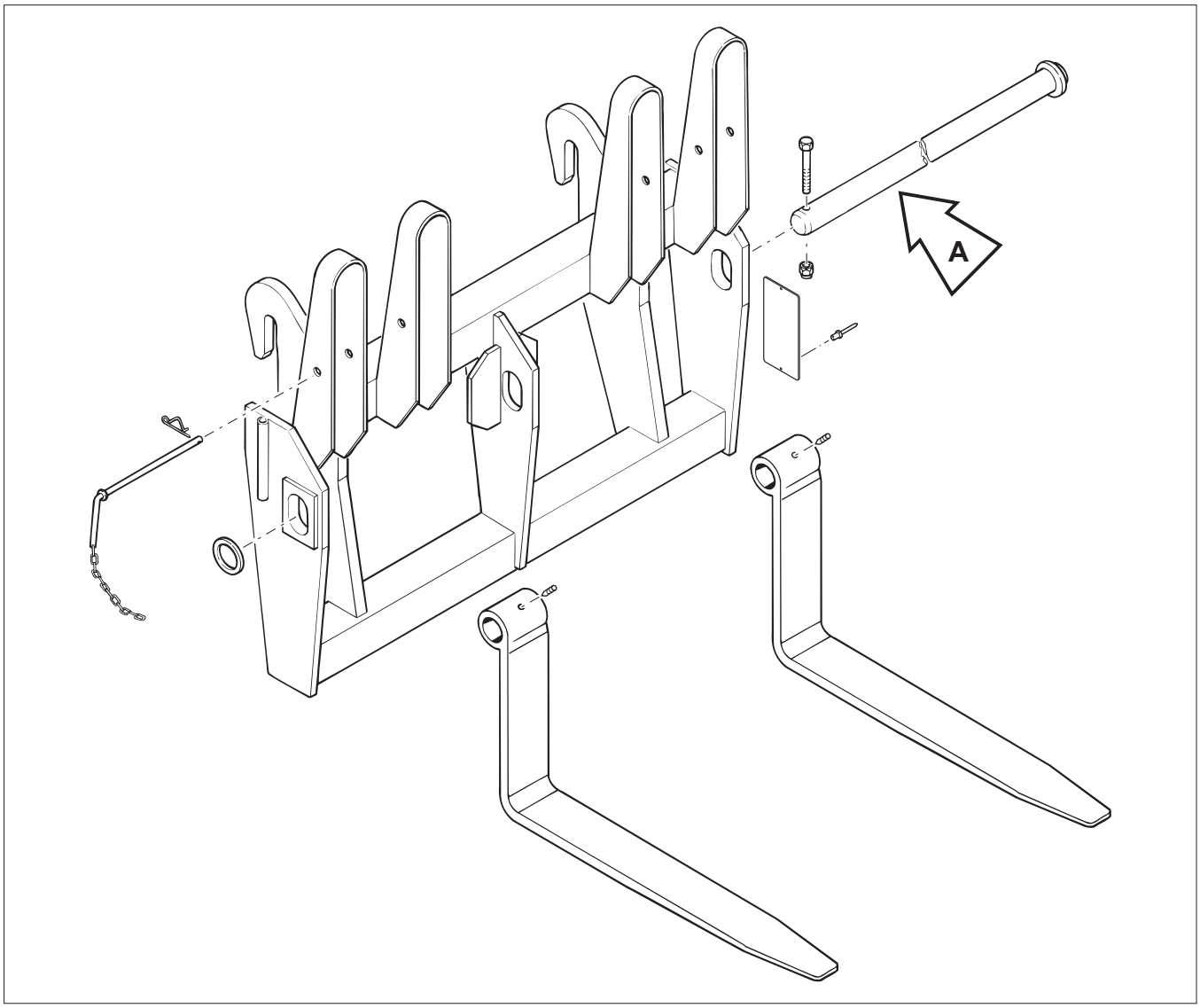
CAUTION

Before use grease, thoroughly clean the intervention zone to avoid that mud, dust or other matters can mix with the lubricant and reduce or annihilate the lubrication effect.
Remove any old grease with a degreaser from the telescopes before smearing them with new grease.

Smear pin **A** with grease to help the forks slide on it.

Recommended grease:

- **AGIP graphitized grease type GR NG 3**



Courtesy of Crane.Market

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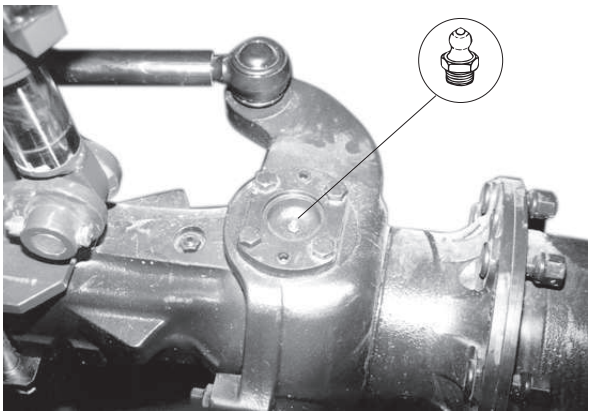
A-13 GREASE ALL JOINTS OF THE BOOM, THE REAR AXLE SHAFT JOINT, THE TRANSMISSION SHAFTS, THE FRONT AND REAR AXLES AND ANY EQUIPMENT OF THE MACHINE



CAUTION

Before injecting grease into the greasers, thoroughly clean them to avoid that mud, dust or other matters can mix with the lubricant and reduce or annihilate the lubrication effect.
Remove any old grease with a degreaser from the telescopes before smearing them with new grease.

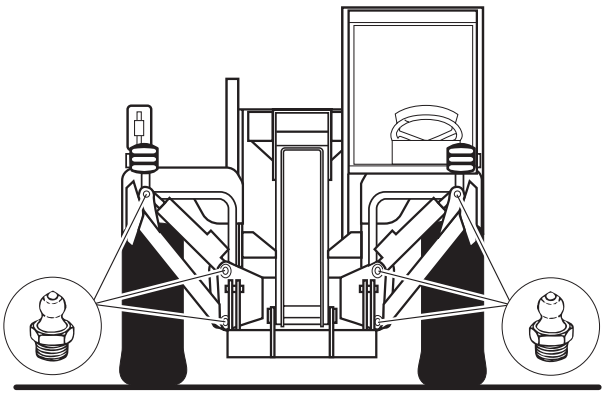
Regularly grease the machine to grant it efficient conditions and a long life.

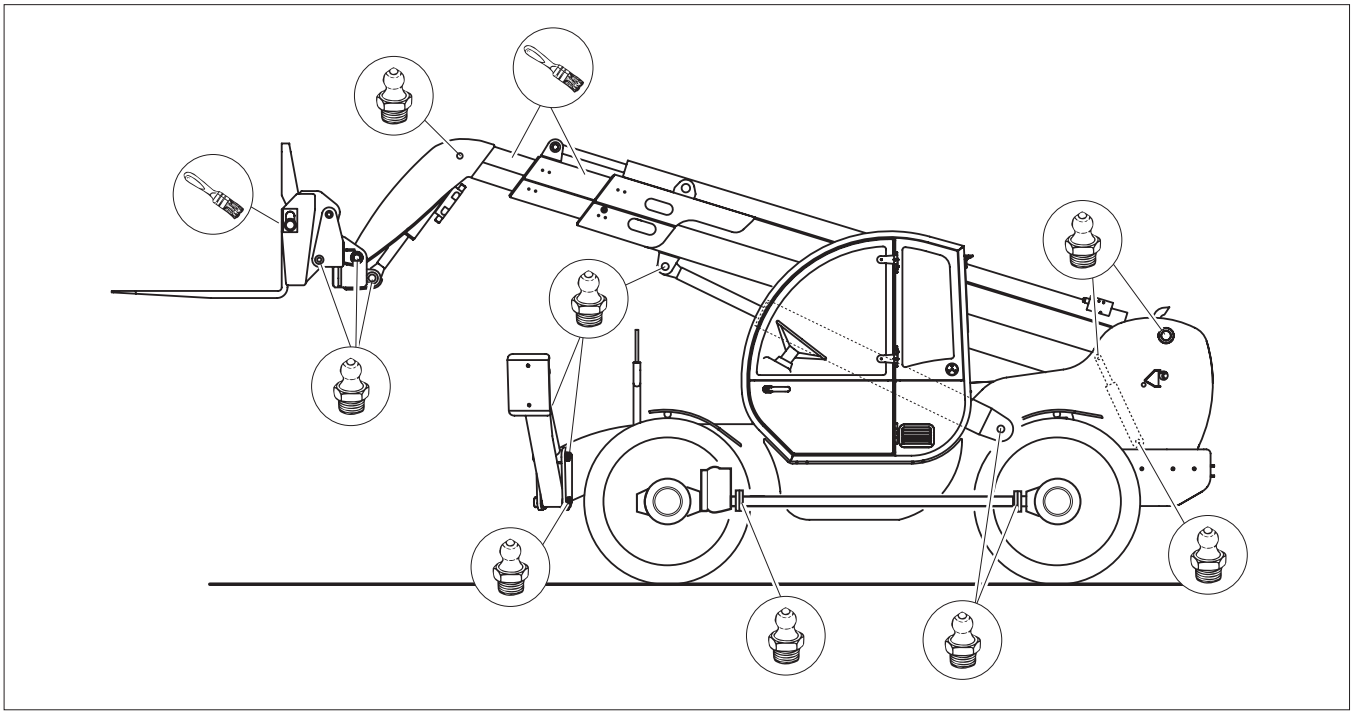
By means of a pump, inject grease into the special greasers.

As the fresh grease comes out, stop the operation.

The greasing points are shown in the following figures:

- the symbol represents the points to be greased by a pump
- the symbol represents the points to be greased by a brush.





Courtesy of Crane.Market

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A-14 CHECK THE EFFICIENCY OF THE LIGHTING ELECTRIC SYSTEM

Check every day that the electrical system powering the lights of the machine is in efficient working order.

Use the assistance of a second technician to check that the front lights (position lights, low and high beams and turn signals) and the rear lights (position lights, stop/tail lights and turn signals) are in excellent state of repair.

Also check beacon located on the cab roof.

If one lamp or more must be replaced, use the table below as a reference.

⚠WARNING

When switched on, lamps get hot. Before touching a lamp with your fingers, let it cool down.

⚠CAUTION

Never touch the bulb of halogen lamps (mount type H3) with your fingers: this may damage the lamp (use of a clean cloth or a paper tissue). If you touch it accidentally, thoroughly clean with a paper tissue and some ethyl alcohol.

Use	Voltage	Mount type	Power
• Front low/high beam	12 V	P45t	45/40 W
• Front position lights	12 V	BA 9s	3 W
• Side/tail turn signals	12 V	BA 15s	21 W
• Stop lights and rear position lights	12 V	BAY 15d	21/5 W
• Beacon - Work lights (OPTIONAL)	12 V	H3	55 W
• Dashboard indicators and cab lighting	12 V	W 2x4,6d	1,2 W
• Interior lamp	12 V	SV 8,5-8	5 W
• License plate lights	12 V	BA 15s	5 W
• Back-up lamps	12 V	BA 15s	21W

Courtesy of Crane.Market

https://truckmanualshub.com/

A-15 CHECK THE EFFICIENCY OF BRAKING SYSTEM AND PARKING BRAKE

For any intervention on the braking system (adjustment and/or substitution of the brake discs) address to the TEREXLIFT Technical Service Centre or the nearest TEREXLIFT authorised workshop.

Courtesy of Crane.Market

https://truckmanualshub.com/

A-16 CHECK THE EFFICIENCY OF THE STEERING SELECTION SYSTEM

During operation, the alignment of the front and rear axles of the machine can be subject to variations. This can depend on an oil blow-by from the steering control circuit, or on a steering of both axles when front and rear wheels are not perfectly aligned.

To fix this problem, rather than checking the alignment visually, follow the procedure below:

1 Move to a solid and level ground.

2 Set the steering selection switch **A to** “four-wheel steer” (pos. **2**).

3 Rotate the steering up to its stop (either to the right or to the left).

4 Set the steering selection switch to “two-wheel steer” (pos. **0**).

5 Rotate the steering up to its stop (turn in the same direction as above).

6 Reset the steering selection switch to “four-wheel steer” (pos. **2**).

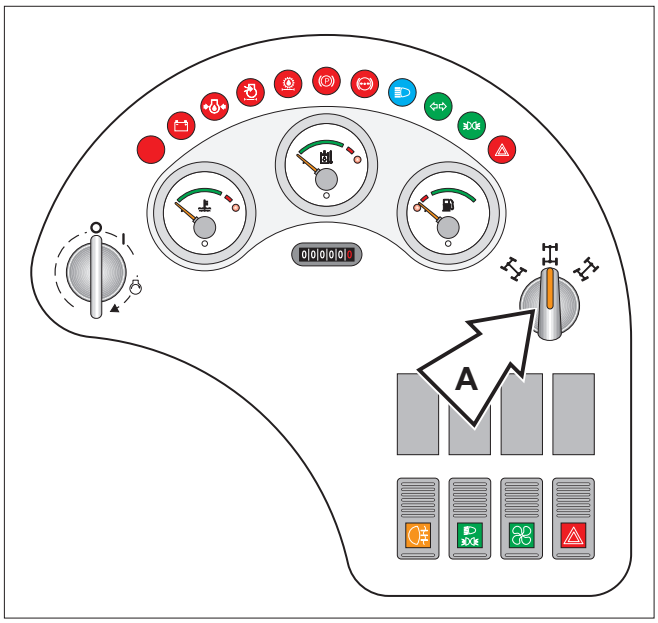
7 Rotate the steering (to the side opposite to point **3**) so that the rear axle reaches its stop.

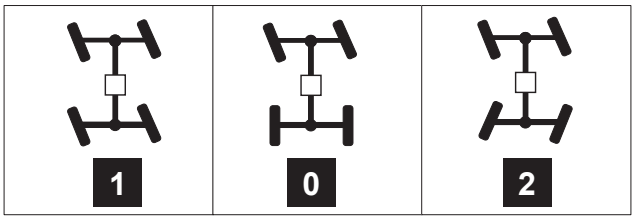
8 Reset the steering selection switch to “two-wheel steer” (pos. **0**).

9 Rotate the steering (to the same side as in point **7**) so that the front axle reaches its stop.

10 Reset the steering selection switch to “four-wheel steer” (pos. **2**).

Now the wheels should be re-aligned.





Courtesy of Crane.Market

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A-17 CHECK THE EFFICIENCY OF THE FORK BALANCING SYSTEM

WARNING

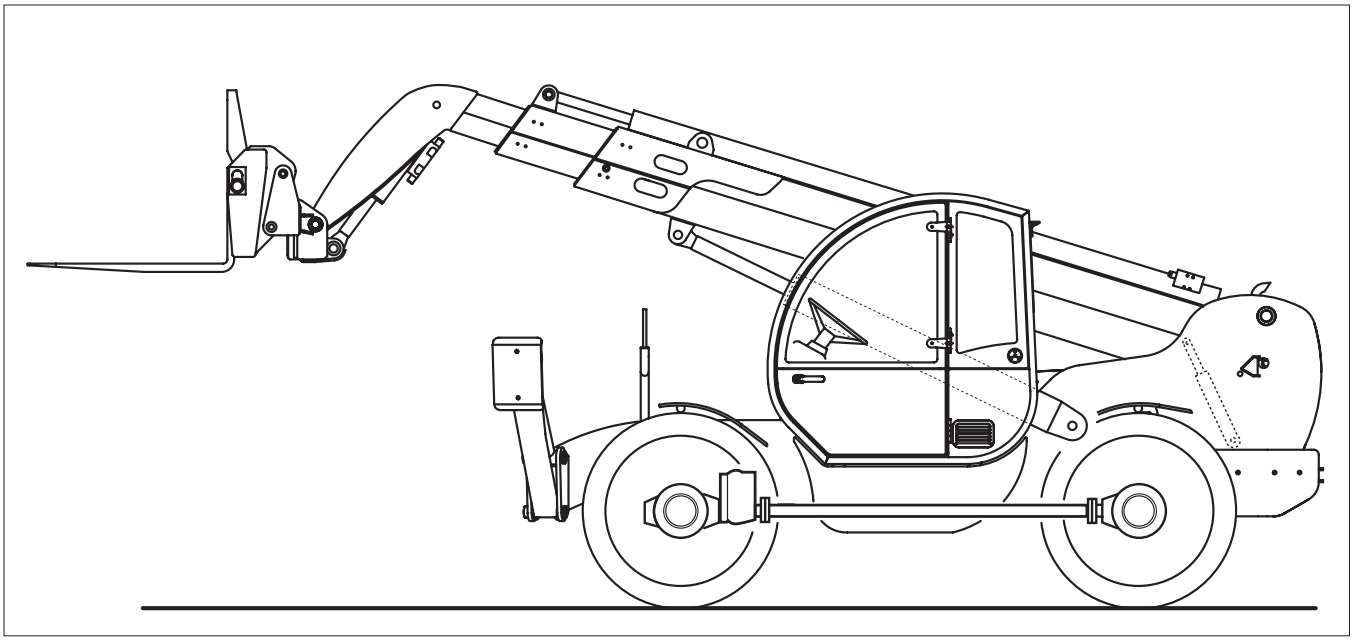
Test the system without any load on the machine's forks.

To check the efficiency of the fork balancing system, obey the instructions below:

- Drive the machine to a flat, smooth ground.
- Move the retracted boom fully down and align the forks with the ground.
- Start lifting the boom and check that the forks remain parallel to the ground.

CAUTION

If the forks do not remain parallel to the ground, consult section 5 "Problems - causes - Solutions".



Courtesy of Crane.Market

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A-18 MAKE SURE THE SAFETY DEVICES INSTALLED ARE IN EFFICIENT WORKING ORDER

Checking the emergency stop pushbutton
(at every use)

To check the efficiency of this pushbutton, simply press it down during a movement. The pressure of the pushbutton shall cause the movement to stop and the engine to shut down.

Checking the machine start control
(at every use)

Attempt to start the engine with the forward or reverse gear put.
The engine must not start. If the engine starts, contact the TEREXLIFT Technical Service.
Repeat the operation putting first one gear, then the other.

Checking the joystick pushbutton
(at every use)

To check if the pushbutton on the control lever is in efficient working order, it will be enough to attempt to operate the lever without pressing this button. In this condition, the lever shall not operate any movement. Should that not be the case, contact the TEREXLIFT Technical Service.

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Checking the limit switches of the outriggers

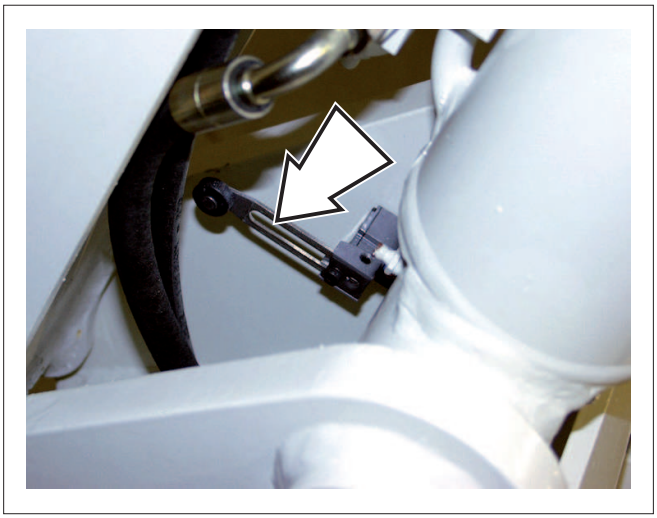
(at every use)

To check the limit switches of the outriggers:

- Lower the outriggers to the ground and attempt to engage a gear.
  If the gear can be engaged, contact the TEREXLIFT Technical Assistance Service.

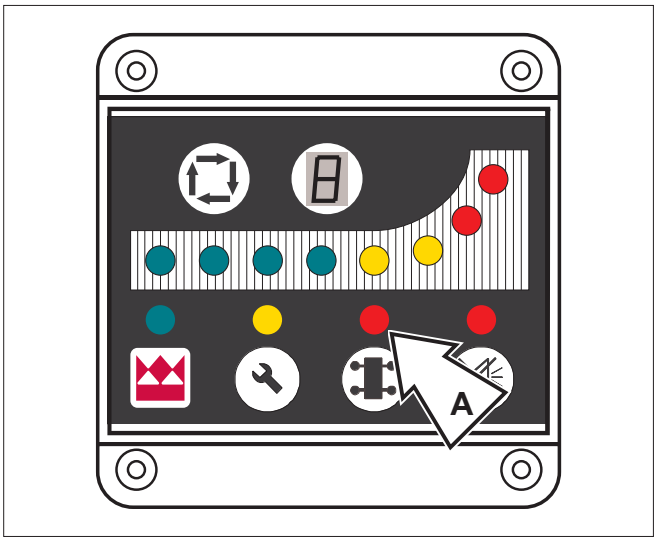
Proceed on one outrigger at a time.

- With the outriggers up, light **A** on the load limiter panel must be off; with the outriggers down to the ground, the same light must be on. Should it not be the case, contact the TEREXLIFT Technical Assistance Service.



DANGER

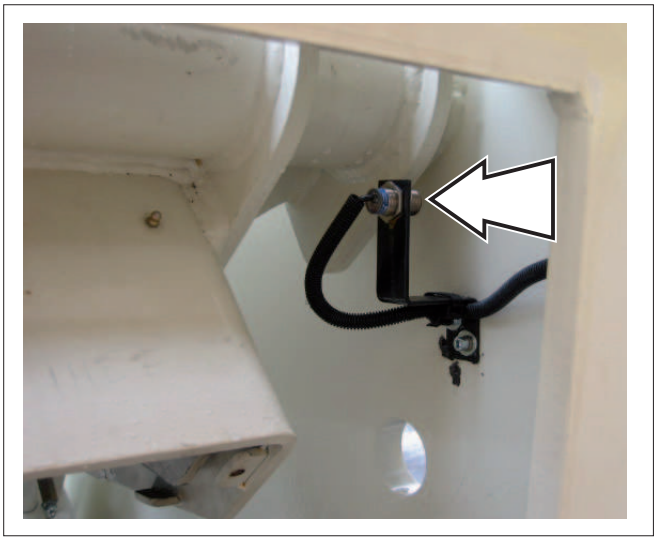
If a limit switch is faulty or a lever is deformed, immediately replace the part.



Checking the sensor on the boom

(at every use)

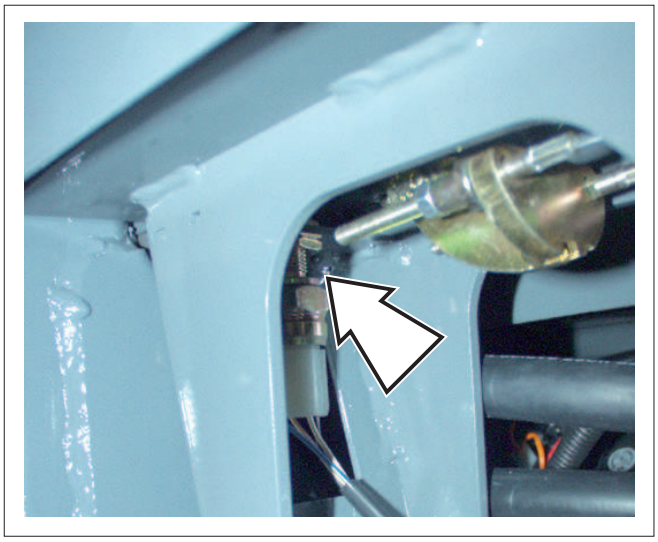
- Raise the boom beyond the horizontal and ensure the sway control and the outrigger control are blocked.
  Should that not be the case, contact the TEREXLIFT Technical Assistance Service.



Courtesy of Crane.Market

https://truckmanualshub.com/

Checking the microswitch on the parking brake
(at every use)



To check the efficiency of the microswitch on the parking brake, proceed as follows:

- sit on the driving place, put the parking brake and attempt to move with the machine. The machine must stand still.
  Shoudl this not be the case, adjust the distance of the brake microswitch or replace it.

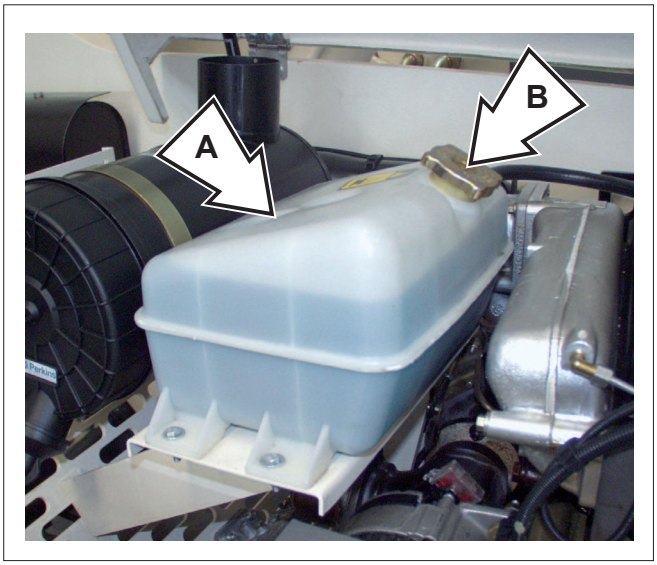
Courtesy of Crane.Market

https://truckmanualshub.com/

A-19 CHECK THE ENGINE COOLANT LEVEL

DANGER

When the coolant is hot, the cooling system is under pressure. With warm engine, loosen the radiator plug slowly and carefully, without removing it, to drain the pressure. Use protection gloves and keep your face at a safe distance.



- Weekly check the coolant level within pan **A** before starting working (when coolant is cold).
- When necessary, add clean water or an antifreeze mixture through cap **B**.

On delivery, the machine is filled with a cooling mixture consisting of 50% water and 50% anti-freeze.

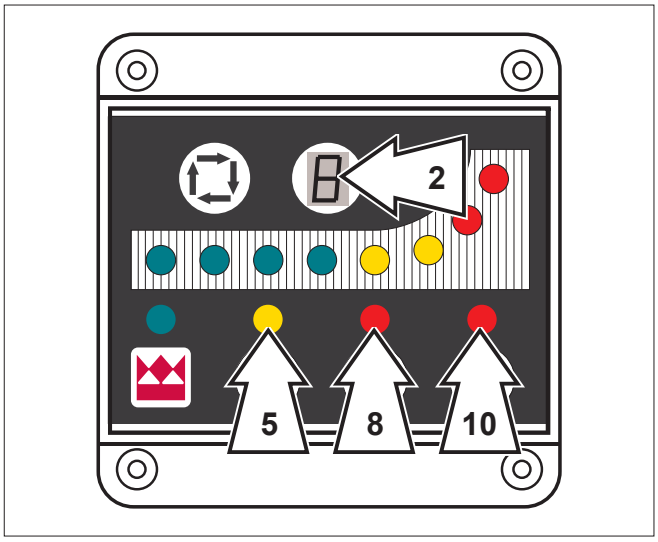
TEREX PRO COOL Protection against boiling / freezing		
Product %	Freezing point	Boiling point
33	-17 °C	123 °C
40	-24 °C	126 °C
50	-36 °C	128 °C
70	-67 °C	135 °C

Courtesy of Crane.Market

https://truckmanualshub.com/

A-20 CHECK THE EFFICIENCY OF THE OVERLOAD WARNING SYSTEM

When power is turned on, the DLE load limiting system runs a self-test. In the case of troubles, LED's **5**, **8** and **10** start flashing, the buzzer sounds, an error code is shown on the display **2** and the machine enters the alarm mode and cannot be operated.
The meaning of the error messages is shown in Section 2.
To do a manual check, it will be enough to load a weight exceeding the maximum permitted with the boom fully out and attempt to lift it. The system shall enter in alarm. If the system does not warn of the alarm, please contact the TEREXLIFT Technical Assistance Service.



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A-21 CHECK OR RE-SEQUENCE THE BOOM TELESCOPES

If, during normal operation, a change in the boom extended lengths of 6 inches or more is noticed when the boom is retracted, proceed as follows:

1 Fully retract the telescope cylinder and hold the system over relief (approx. 15 seconds); the boom sections should become equal.

If after performing this procedure the boom still remains out of sequence, proceed with the steps below:

2 Move the boom to the zero position, fully retract the boom and hold the retract system over relief for approx. 20 seconds.

3 Raise the boom to approx. 60° and operate the retract function over relief for approx. 20 seconds.

4 Lower the fully retracted boom to the lowest angle possible without striking the ground and hold the retract system over relief for approx. 20 seconds.

If, despite these procedures, the boom does not return in sequence, raise the boom to approx. 60°, fully extend and retract it to full stroke and hold the system over relief (approx. 20 seconds) in each direction.
By following these procedures the boom re-sequencing should be correct.

Courtesy of Crane.Market

https://truckmanualshub.com/

4.4 TABLE B PROCEDURES

B-1 CHANGE THE ENGINE OIL

B-2 CHECKTHETENSIONOFTHEALTERNATOR BELT

CAUTION

For the engine maintenance, please refer to the specific Operator handbook supplied with the machine.

Courtesy of Crane.Market

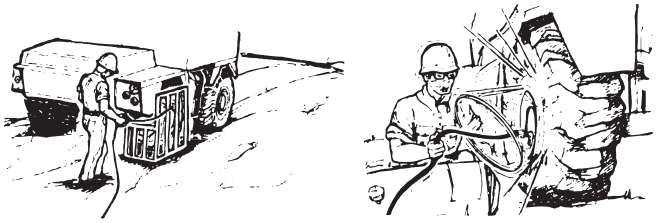
https://truckmanualshub.com/

B-3 CHECK THE TYRE INFLATION

⚠DANGER

Over-inflated or overheated tyres can burst. Do not flame-cut or weld the wheel rims. For any repair work, call in a qualified technician.

OKAY *WRONG*



For the tyre inflation or substitution, please refer to the table below:

	STANDARD Telelift 3713 SX	OPTIONAL Telelift 3713 SX
Dimensions (front and rear)	405/70 R20	405/70 R24
P.R. (or load index)	14 pr	14 pr
Rim	13x20	13x24
Wheel disc	8 holes DIN 70361	8 holes DIN 70361
Pressure bar/Psi	5.5/80	4.5/65

On new machines, and when a wheel has been disassembled or replaced, check the nut torque of the wheels every 2 hours until they stay correct.

⚠WARNING

Always use tyres having the dimensions indicated in the vehicle registration card.

Courtesy of Crane.Market

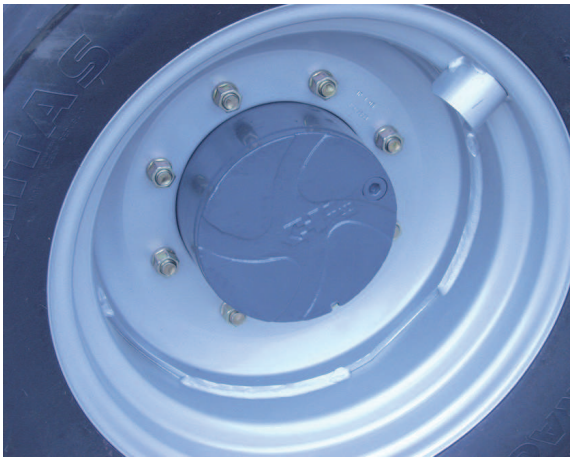
https://truckmanualshub.com/

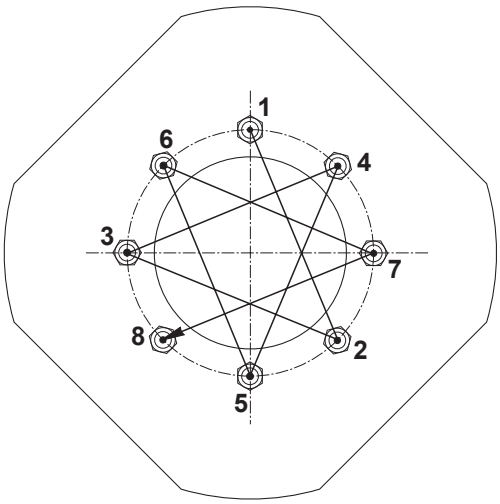
B-4 CHECK THE TIGHTENING OF THE WHEEL NUTS

If you have to check the tightening of the wheel bolts or replace a wheel, proceed as follows:

- Raise the machine using a hydraulic jack.
- Remove the wheel rolling it on the ground
- Line up the wheel with the axle and fit the 8 nuts.
- Tighten the nuts following the alternate sequence shown in the picture with a pneumatic screwdriving machine.
- Lower the machine to the ground.

Re-tighten all nuts to a torque 440 Nm.





⚠WARNING

Check the tightening of wheels one hour after the job. They might get loose until they do not stay correct.

⚠WARNING

On new machines, and when a wheel has been disassembled or replaced, check the nut torque of the wheels every 2 hours until they stay correct.

⚠WARNING

Always use tyres having the dimensions indicated in the vehicle registration card.

	STANDARD Telelift 3713 SX	OPTIONAL Telelift 3713 SX
Dimensions (front and rear)	405/70 R20	405/70 R24
P.R. (or load index)	14 pr	14 pr
Rim	13x20	13x24
Wheel disc	8 holes DIN 70361	8 holes DIN 70361
Pressure bar/Psi	5.5/80	4.5/65

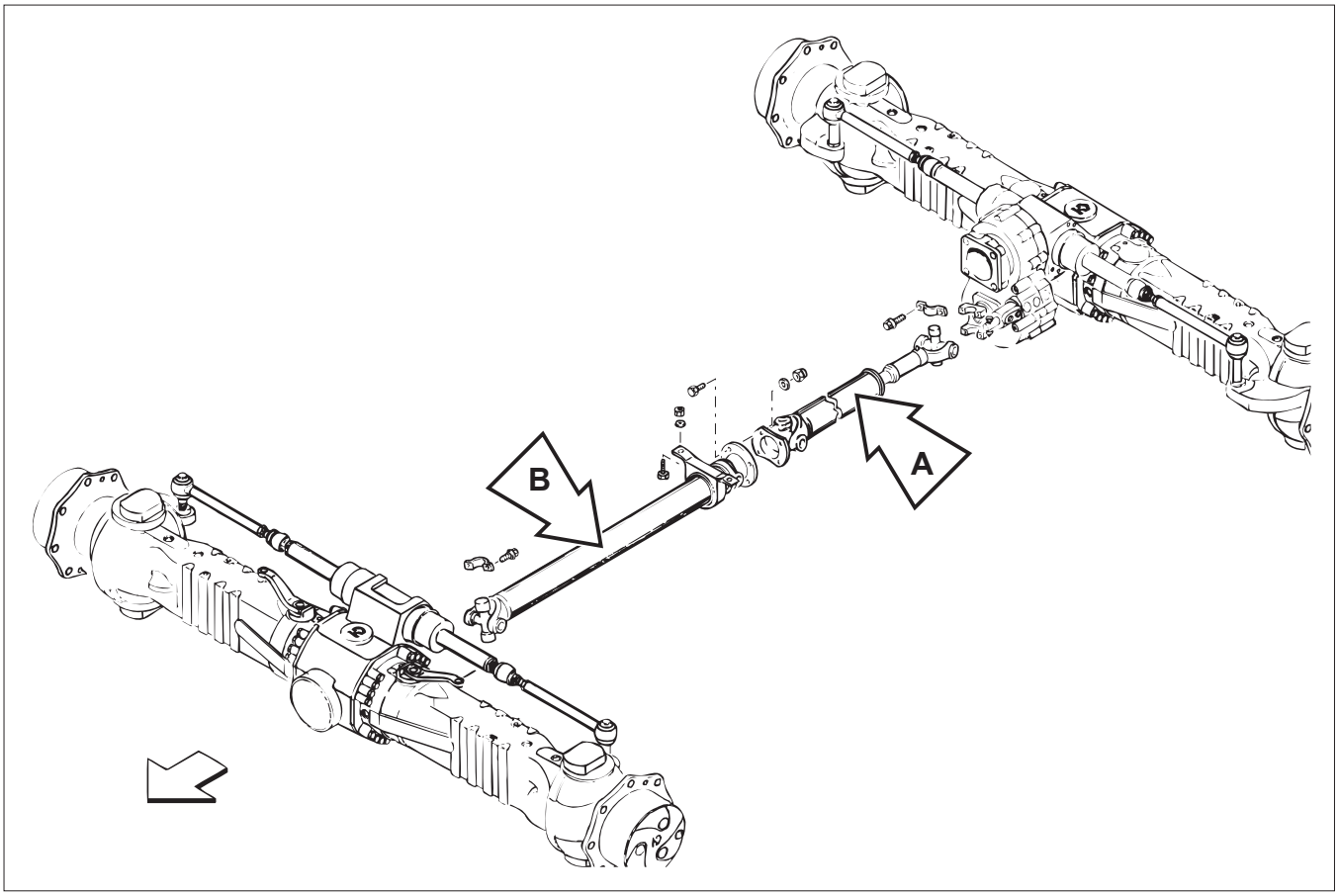
Courtesy of Crane.Market

https://truckmanualshub.com/

B-5 CHECK THE TIGHTENING OF THE CARDAN SHAFT SCREWS

Check every week that the screws of the Cardan shafts **A** and **B** are tight.

For the correct tightening torques, please refer to par. 2.13 in section 2 “Technical Specifications”.



Courtesy of Crane.Market

https://truckmanualshub.com/

B-6 CLEAN THE RADIATOR FINS

⚠DANGER

When using a steam-washer, always wear protective clothes. Hot steam may cause serious injury.

- Open the radiator panel.
- Check the fins of radiator for sediments.
- If necessary, prepare a compressed air nozzle (max. 2 bar) or a nozzle distributing water under pressure or steam.

Cleaning using compressed air

- Direct a jet of compressed air toward radiator paying attention not to damage its fins.
- Remove any loose particles of dirt with some water.

Cleaning using water under pressure or steam

- Spray radiator with a cold commercial detergent and wait for at least 10 minutes to allow the detergent to react.
- Wash radiator using a jet of water or steam.

CAUTION

The core fouling depends on the dust of the outside environment and the presence of oil and fuel leaks in the motor area. It is therefore advisable to remove oil and fuel leaks immediately in case of very dusty environments.

Courtesy of Crane.Market

https://truckmanualshub.com/

4.5 TABLE C PROCEDURES

C-1 CHANGE THE ENGINE OIL AND RELEVANT FILTER

CAUTION

For the engine maintenance, please refer to the specific Operator handbook supplied with the machine.

C-2 CHECK THE OIL LEVEL IN THE FRONT AND REAR DIFFERENTIAL GEARS AND IN THE POWER DIVIDER

To check the oil level in the **front and rear differential gears**:

- Stop the machine on a level ground and engage the parking brake.

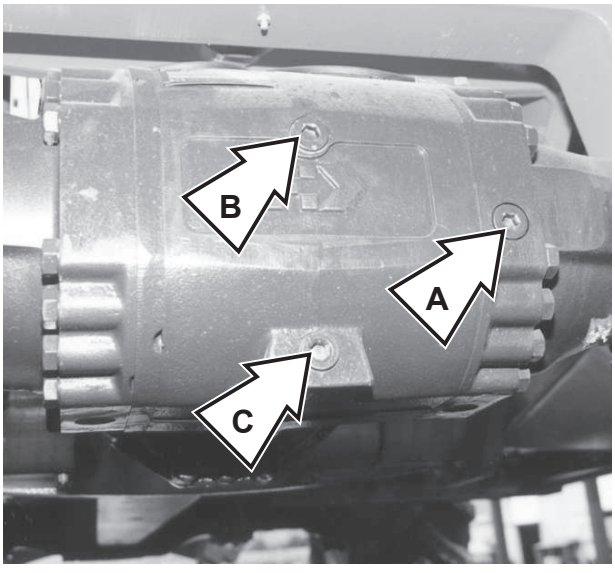
NOTICE

Place a container of suitable size under the plug.

- Loosen the drain plug **C**, the level plug **A** and the filler **B** and allow oil to flow out from the differential gear.
- Refit and tighten drain plug **C**.
- Add new oil through the filler **B** until it is level with hole **A**.
- Refit and tighten plugs **A** and **B**.

Recommended oil:

- **FUCHS TITAN GEAR LS 85 W-90**
  API GL-5 LS / GL-5



Courtesy of Crane.Market

https://truckmanualshub.com/

To change the oil level in the **power divider**:

- Stop the machine on a level ground and engage the parking brake.

NOTICE

Place a container of suitable size under the plug.

- Remove the level plug **A**.
- Remove the drain plug **B** and allow oil to flow out from the power divider.
- Refit and tighten the drain plug **B**.
- Add new oil through plug **A** until it is level with the hole.
- Refit and tighten filler/level plug **A**.

Recommended oil:

- **FUCHS TITAN GEAR LS 85 W-90**
  API GL-5 LS / GL-5

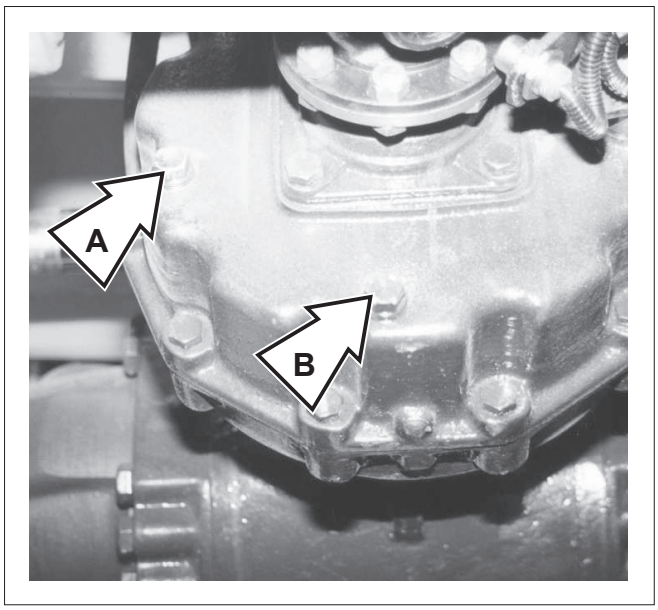
C-3 CHECK THE OIL LEVEL IN THE FOUR WHEEL REDUCTION GEARS

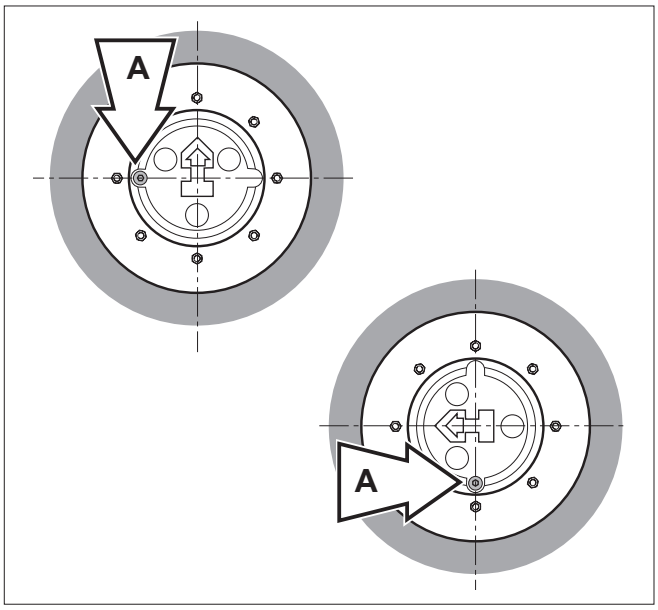
To check the oil level within the **wheel reduction gears**:

- Stop the machine on a level ground and ensure the parking brake is engaged and plug **A** finds on the horizontal axis.
- Clean the plug all around, then remove it and check if oil is level with the hole.
- If necessary, add new oil through hole **A** until it is level.
- Refit the plug.

NOTICE

Place a container of suitable size under the plug.





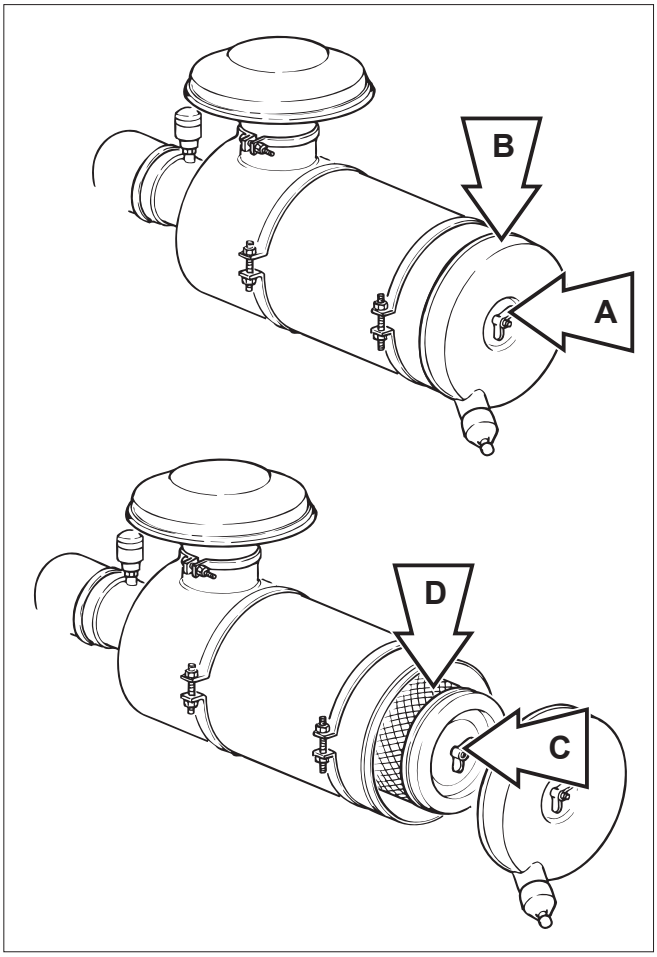
Courtesy of Crane.Market

https://truckmanualshub.com/

C-4 CHECK AND CLEAN THE ENGINE AIR FILTER

To check and clean the engine air filter:

- Stop the engine and engage the parking brake.
- Unscrew wing nut **A** and remove cover **B**.
- Unscrew wing nut **C** and remove the outer element **D**.
- Clean the filter bowl.
- Clean the cartridge by beating it some times on the ground paying attention not to damage the filtering element. Do not dry-clean the filtering element.
- Check the filter box for cracks (light showing through).
- Smear the seal with grease, then refit the element.
- Tighten wing nut **C**, close cover **B** and tighten with wing nut **A**.



⚠WARNING

As soon as the warning lamp on the cab dashboard switches on, replace the outer element.

⚠WARNING

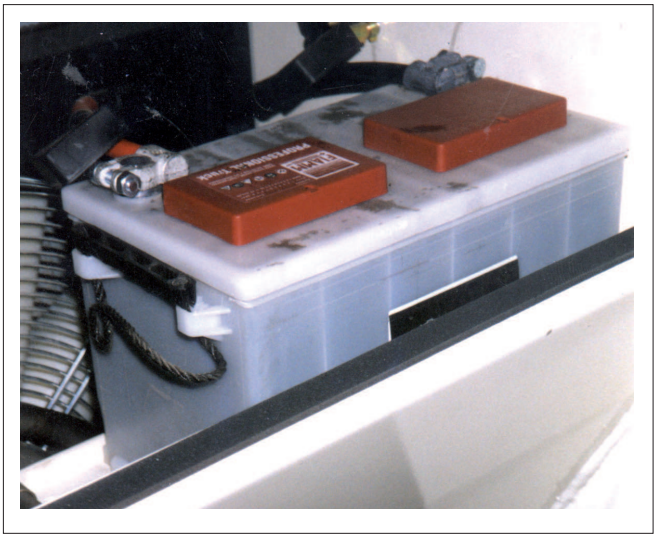
Never wash the cartridge with water or solvents.

Courtesy of Crane.Market

https://truckmanualshub.com/

C-5 CHECK THE CLAMPING OF THE CABLEHEADS TO THE BATTERY TERMINALS

Check the cable clips are well secured to the battery terminals. To tighten the clips, always use a box wrench, never pliers.



⚠ DANGER

- ***Keep out of items which can produce sparks, of naked flames or lit cigarettes.***
- ***Do not rest metal objects onto the battery. This can result in a dangerous short especially during a recharge.***

Courtesy of Crane.Market

https://truckmanualshub.com/

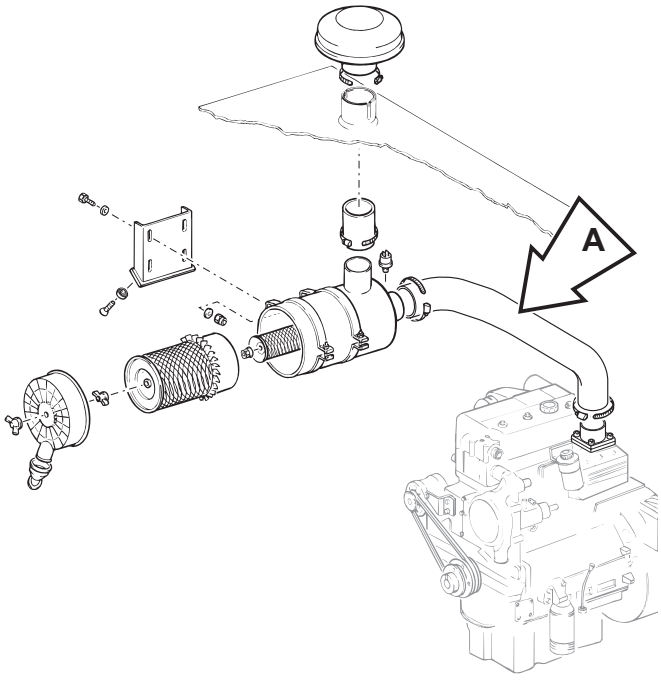
C-6 CHECK THE AIR SUCTION HOSE BETWEEN ENGINE AND FILTER

Check the state of sleeves **A** forming the air suction line between engine and filter every month.

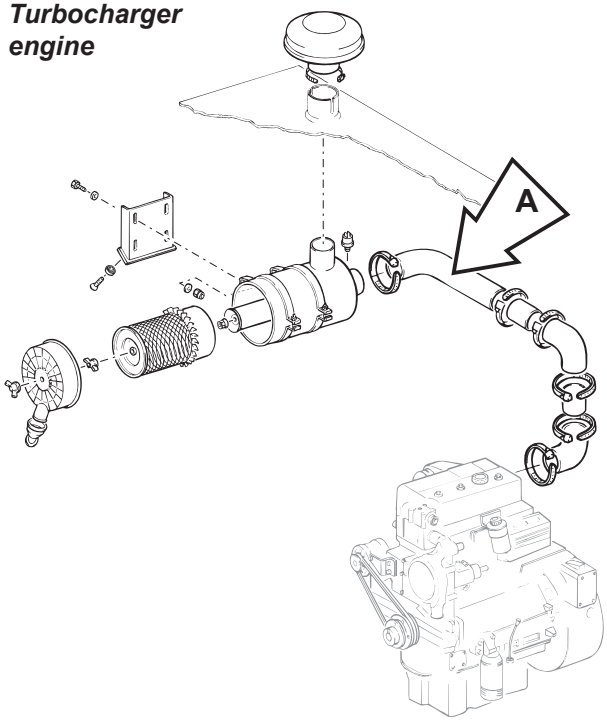
CAUTION

If you use the machine continuously for several days, check these sleeves, as well as the hose clamps more frequently.

Aspirated engine



Turbocharger engine



Courtesy of Crane.Market

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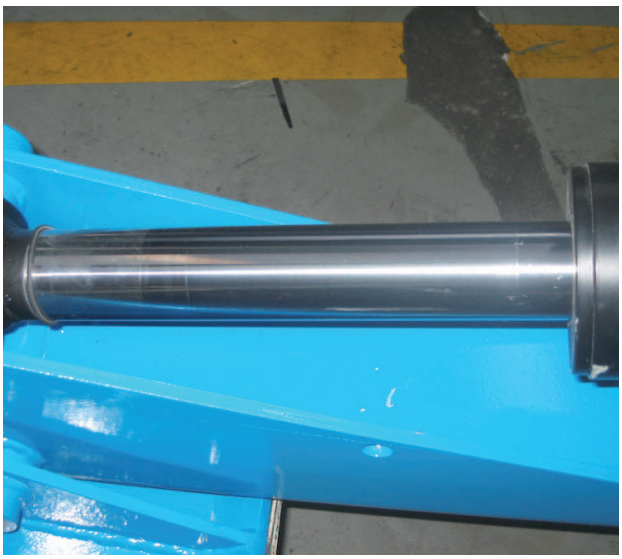
C-7 CHECK THE CYLINDER CHROMIUM-PLATED RODS

Visually check the cylinder rods for scoring every month.

For this operation, fully extend all of the cylinders and check that their rods are intact.



Courtesy of Crane.Market

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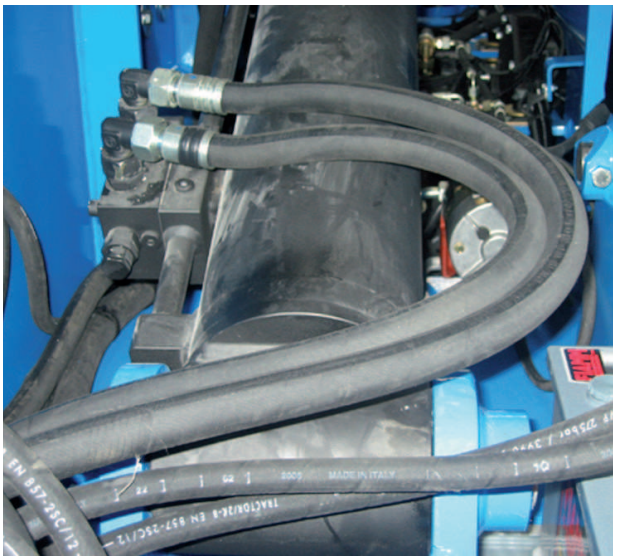
C-8 CHECK THE HYDRAULIC LINES

Every month, do a random check of the oil-dynamic hoses to be sure they are not worn. In particular, we recommend checking the hoses located near moving mechanical parts as they could rub against such parts and get damaged.

CAUTION

Replace any worn hoses immediately before using the machine again.

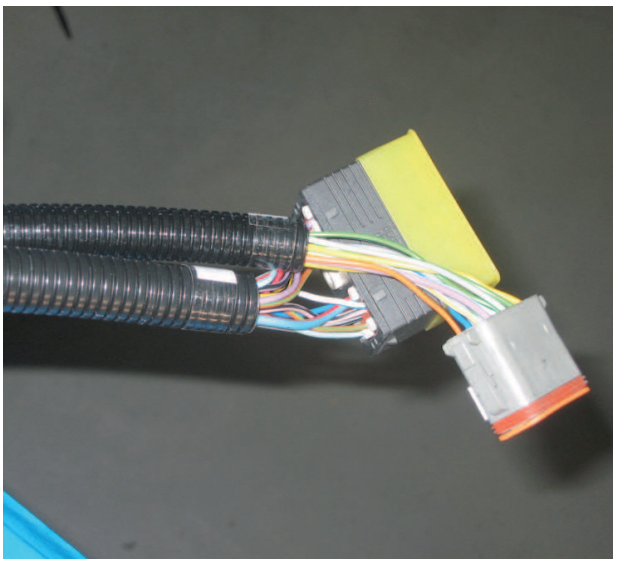


C-9 CHECK THE ELECTRIC CABLES

Every month, do a random check of the electrical cables to be sure they are not damaged. In particular, we recommend checking the cables located near moving mechanical parts as they could rub against such parts and get damaged.

CAUTION

Replace any worn cables immediately before using the machine again.



Courtesy of Crane.Market

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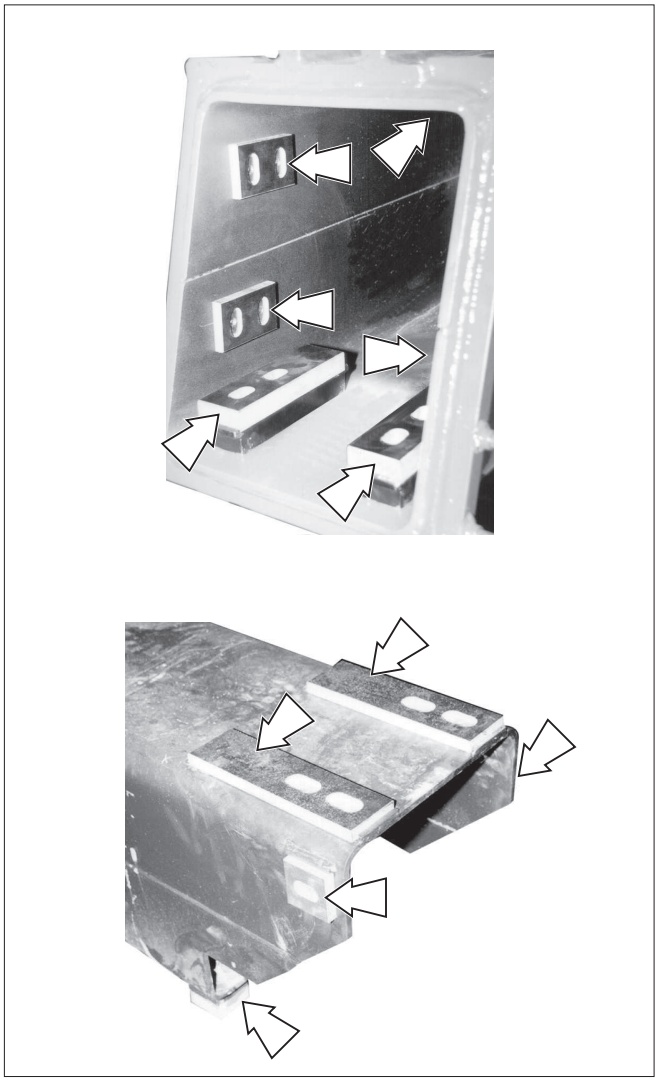
C-10 CHECK THE WEAR OF THE SLIDING PADS OF THE BOOM SECTIONS

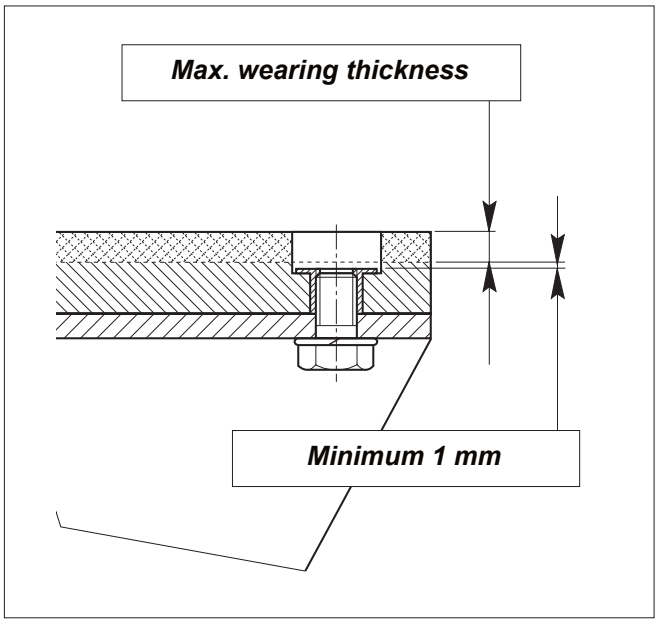
Any boom section is fitted with adjustable pads located on the four sides of the profile. These pads are secured to both fixed and mobile part of every section.

All pads can be adjusted by the special shims not supplied by TEREXLIFT.

CAUTION

Pads must compulsorily be replaced if the residual thickness of the plastic layer with respect to the iron bush fixing the block is equal or inferior to 1 mm.





Courtesy of Crane.Market

https://truckmanualshub.com/

C-11 ADJUST THE PLAY OF THE SLIDING PADS OF THE BOOM SECTIONS

Any boom section is fitted with adjustable pads located on the four sides of the profile. These pads are secured to both fixed and mobile part of every section.

All pads can be adjusted by the special shims.

Adjusting the pads:

- Remove or loosen the screws fixing the pads in relation to type of shims used (with or without slots).
- Fit the necessary amount of shims.
- If the residual thickness of the pad is insufficient or near the maximum wearing limit, renew the pad.
- Tighten the screws fixing the pads at the recommended torque (see below). Use a dynamometric wrench.

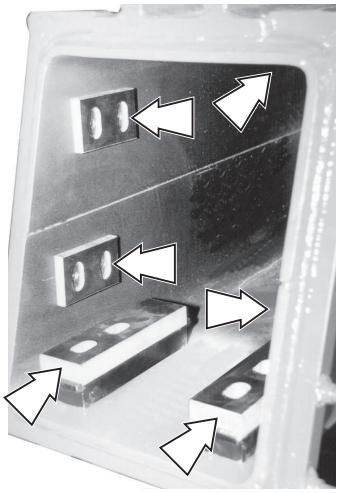
Tightening torques of the pad screws in relation to the screw diameter

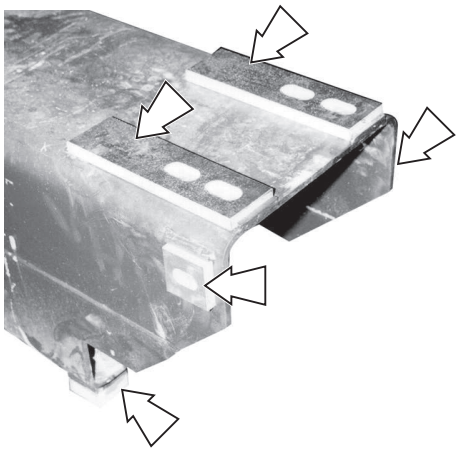
Screws M10	Nm 30
Screws M14	Nm 50

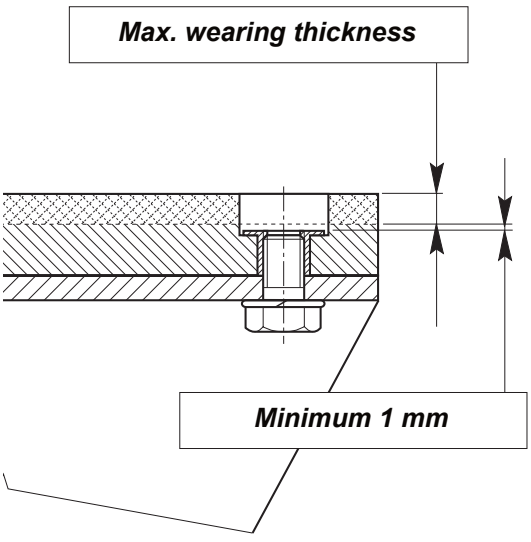
Tightening torques higher than those recommended can cause the break of the pad or of the locking threaded bush.

CAUTION

Pads must compulsorily be replaced if the residual thickness of the plastic layer with respect to the iron bush fixing the block is equal or inferior to 1 mm.







Courtesy of Crane.Market

https://truckmanualshub.com/

C-12 GREASE THE SLIDING PARTS OF THE BOOM SECTIONS

Check every month that the telescopes are well greased in correspondence of the sliding pads.

If necessary, scrape off the old grease and brush new grease. We recommend using:

- **INTERFLON grease code 640772** **FIN GREASE LS 2**

CAUTION

Avoid mixing greases of different type or features and do not use greases of lower quality.

Courtesy of Crane.Market

https://truckmanualshub.com/

C-13 CHECK THE LEVEL OF THE BATTERY ELECTROLYTE

- Check the electrolyte level every 250 working hours; if necessary, add distilled water.
- Ensure the fluid is 5÷6 mm above the plates and the cell levels are correct.
- Protect the terminals smearing them with pure vaseline.
- Remove the battery and store it in a dry place, when the machine is not used for a long time.

⚠ DANGER

Battery electrolyte contains sulphuric acid. It can burn you if it touches your skin and eyes. Always wear goggles and protective gloves, and handle the battery with caution to prevent spillage. Keep metal objects (watch straps, rings, necklaces) clear of the battery leads, since they can short the terminals and burn you.

⚠ DANGER

- ***Before disconnecting the battery, set all switches within the cab to OFF.***
- ***To disconnect the battery, disconnect the negative (-) lead from the frame earth first.***
- ***To connect the battery, connect the positive (+) lead first.***
- ***Recharge the battery far from the machine, in a well-ventilated place.***
- ***Keep out of items which can produce sparks, of naked flames or lit cigarettes.***
- ***Do not rest metal objects onto the battery. This can result in a dangerous short especially during a recharge.***
- ***Because the electrolyte is highly corrosive, it must never come in contact with the frame of the handler or electric/electronic parts. If the electrolyte comes in contact with these parts, contact the nearest authorised assistance centre.***

⚠ DANGER

Risk of explosion or shorts. During the recharge, an explosive mixture with release of hydrogen gas forms.

⚠ DANGER

Do not add sulphuric acid; add only distilled water.

Courtesy of Crane.Market

https://truckmanualshub.com/

C-14 CHECK THE EFFICIENCY OF THE BLOCK VALVES

The piloted blocking valves allow to held the load in position in case of burst of a flexible hose.

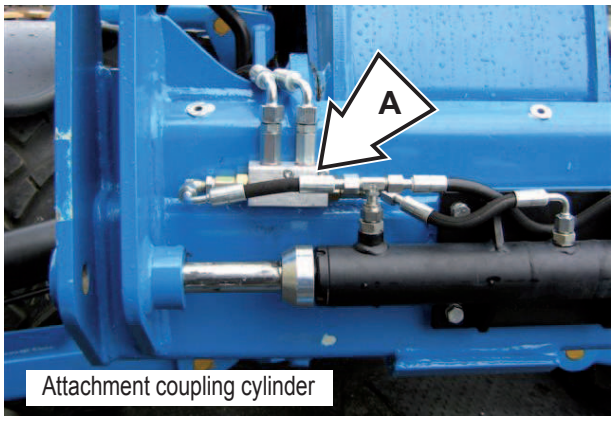
To check the efficiency of a valve, proceed as follows:

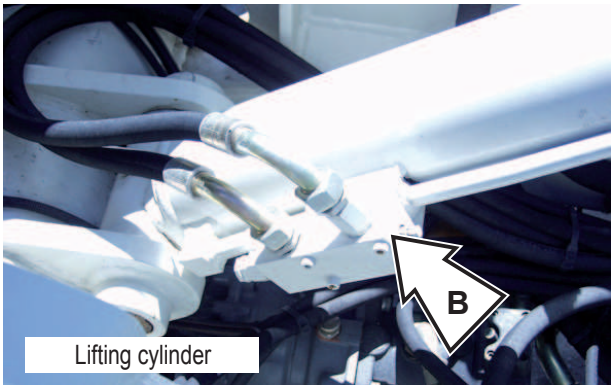
- Load a weight near the maximum payload (3700 kg roughly) onto the boom.
- Raise the load some centimetres above the ground (max 10 cm). To check the valve on the telescope extension cylinder move the boom to maximum height and extend it some centimetres.
- Loosen the oil hoses to the cylinder of which you are checking the valve with caution.
- To check the efficiency of the block valves of the outriggers, lower them to the ground and unload the weight of the tyres without raising them. Loosen the cylinder hoses to check the efficiency of the valve.

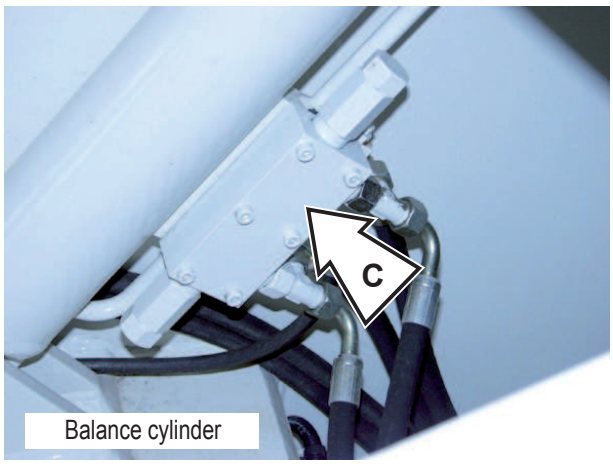
During the check, the oil will flow out of the hoses and the load shall remain blocked in position.
Should that not be the case, the valve must be replaced. Contact TEREXLIFT Technical Service.

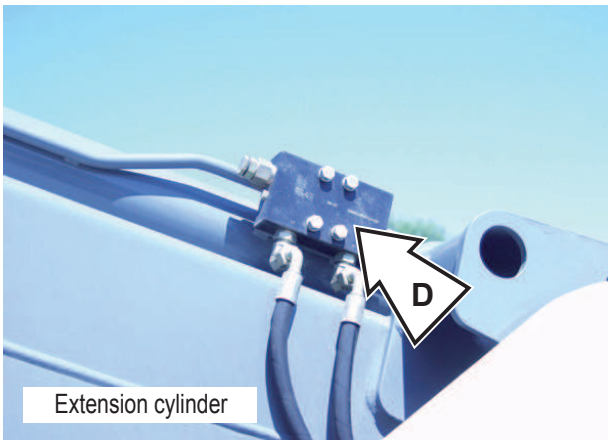
NOTICE

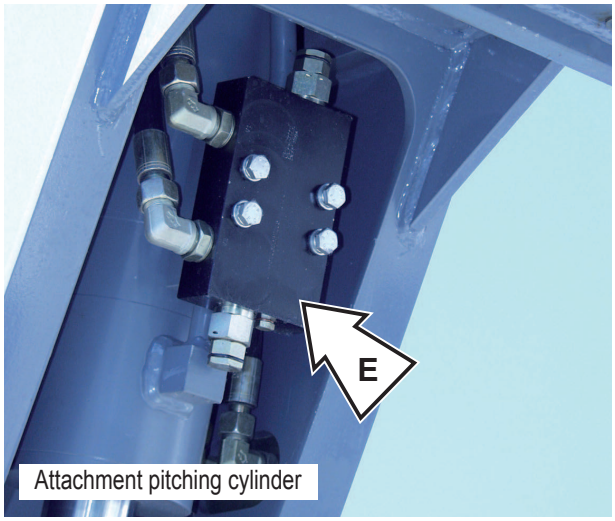
Place a container of suitable size under the hoses.











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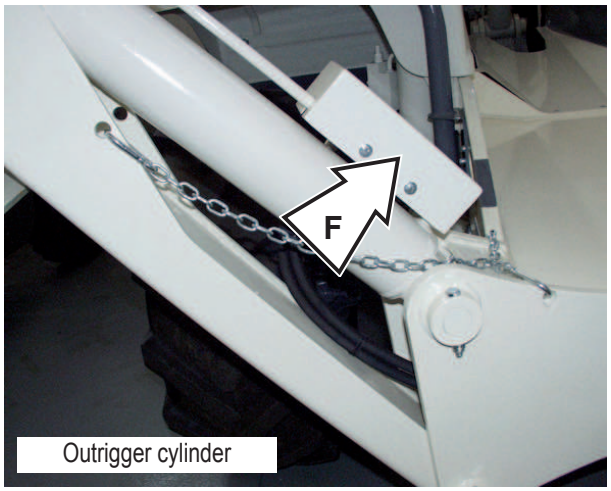
⚠ DANGER

Do the check of the valves taking all the possible precautionary measures:

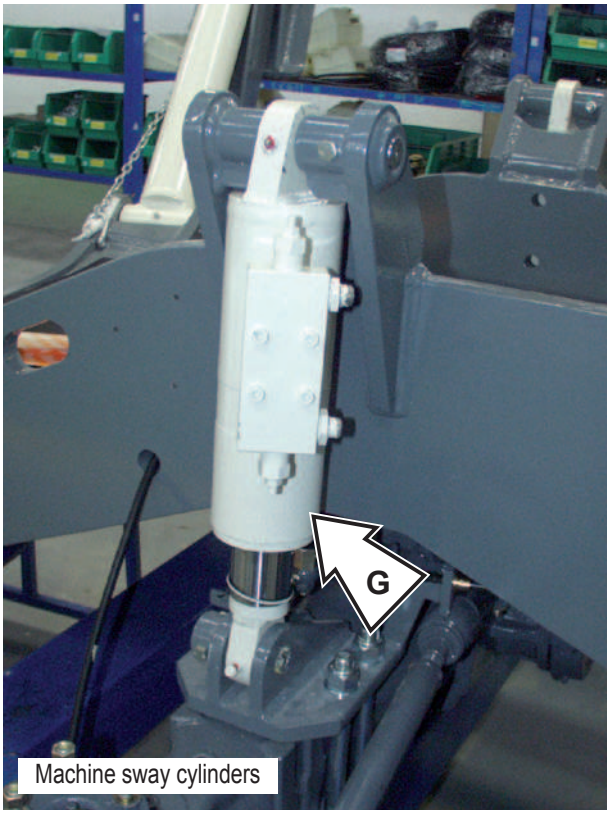
- ***Wear safety glasses***
- ***Wear safety gloves***
- ***Wear safety shoes***
- ***Wear suitable working clothes***
- ***Use guards against leaks of oil at high pressure***
- ***Do the check in a free space with barriers all around to keep non-authorised people away***
- ***Ensure that the part to be checked is in safe condition and that the action generated does not result in an uncontrolled movement of the machine.***

TO REMOVE THE BLOCK VALVES OR THE CYLINDERS

- ***Lower the boom to the ground in a firm way since the removal of the block valve or the cylinder can cause an uncontrolled down-movement.***
- ***After refitting the valve or the cylinder, replenish the circuit and eliminate any air before starting working. To eliminate the air from the circuit, move the involved cylinders to end-of-stroke in the two directions (opening/closing. To eliminate the air from the fork balance cylinder, move the boom up and down and tilt the fork plate forwards/back.***



Outrigger cylinder



Machine sway cylinders

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4.6 TABLE D PROCEDURES

D-1 VISUALLY CHECK THE SMOKE QUANTITY EVACUATED FROM THE ENGINE EXHAUST

To check the quantity of smoke evacuated from the engine exhaust, proceed as follows:

- Start the engine of the machine.
- Wait for a few minutes so the engine can warm up correctly.
- Visually check that the amount of smoke coming out of the exhaust is normal; repeat the check while accelerating the engine.

⚠CAUTION

Do this check outdoors or use an adequate smoke extraction system.

CAUTION

In case of excess smoke, strictly obey the instructions provided in the relevant Use and maintenance manual enclosed with the technical literature of the machine.

D-2 CHECK THE TIGHTENING OF THE ENGINE FIXING SCREWS

Every 6 months, check that the screws fixing the engine to the machine chassis are tight.

For this operation, use a torque wrench and tighten the screws to a torque of **146 Nm**.

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D-3 CHECK THE TIGHTENING OF THE CAB FIXING SCREWS

Every 6 months, check that the screws fixing the cab to the machine chassis are tight.

For this operation, use a torque wrench and tighten the screws to a torque of **218 Nm**.

D-4 CHECK THE BACKLASH BETWEEN PINS AND BUSHINGS IN ALL JOINTS

Every 6 months, check the machine randomly to be sure the backlash between pins and relevant bushings on the joints is not too high.

CAUTION

If you have to change some parts, please refer to the spare parts catalogue enclosed with the technical literature of the machine.

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D-5 HAVE THE HYDRAULIC SYSTEM CHECKED BY A SKILLED TECHNICIAN

Every 6 months, we recommend have the efficiency of the hydraulic system checked by a skilled technician.

CAUTION

In case of need, please contact the TEREXLIFT Technical Service.

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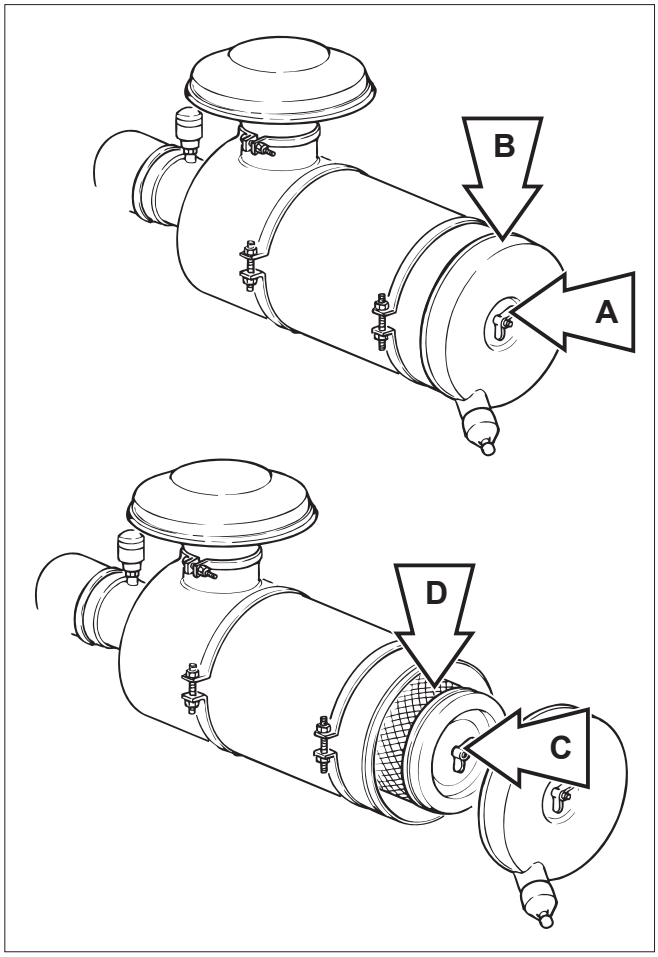
D-6 CHANGE THE MAIN CARTRIDGE OF THE ENGINE AIR FILTER

To change the cartridge of the engine air filter:

- Stop the engine and engage the parking brake.
- Unscrew wing nut **A** and remove cover **B**.
- Unscrew wing nut **C** and remove the outer element **D**.
- Clean the filter bowl.
- Fit a new cartridge **D**, smear a thin coat of grease on its seals and check it is properly fitted.
- Tighten wing nut **C**, close cover **B** and tighten with wing nut **A**.



⚠WARNING

As soon as the warning lamp on the cab dashboard switches on, replace the outer element.

⚠WARNING

Never wash the cartridge with water or solvents.

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D-7 CLEAN THE CAB AIR FILTER

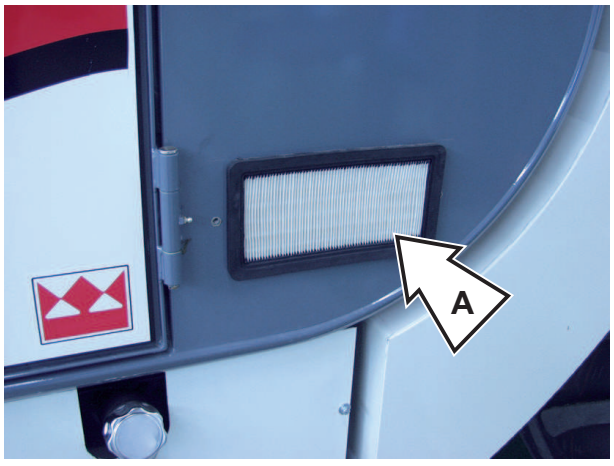
Every six months clean the air filter in the cab. Replace the cartridge if the filtering cloth is damged.

Cleaning and changing the cartridge:

- Shut the engine down and engage the parking brake.
- Pull filter **A** out of the housing accessible from the outside of the cab.
- Clean the filter bowl.
- Clean the filter cartridge by beating it against a piece of wood. Replace the cartridge if damaged.

CAUTION

Paper filters must never be cleaned using compressed air or washed with water and/or solvents.



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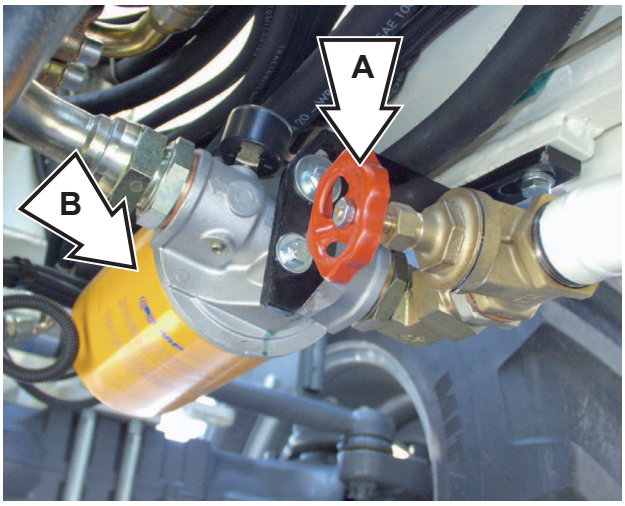
D-8 CHANGE THE HYDRAULIC OIL FILTER OF THE TRANSMISSION

To change the hydraulic oil filter of the transmission, proceed as follows:

- Stop the machine on a level ground and engage the parking brake.

NOTICE

Place a container of suitable size under the plug.



- Close cock **A**.
- Remove the filter canister **B** with the special wrench provided.
- Renew the canister. Before fitting a new canister, thoroughly clean and grease both bowl and gasket.
- Hand-tighten and re-open cock **A**.

NOTICE

The handling and disposing of used oils may be ruled by local or national regulations. Address to authorised centres.

NOTICE

When changing the oil, drain it when it is still hot and the polluting substances are in suspension

⚠WARNING

Hydraulic oil filter canisters cannot be cleaned or washed and refitted.
They must be replaced with new ones of the type recommended by the manufacturer .

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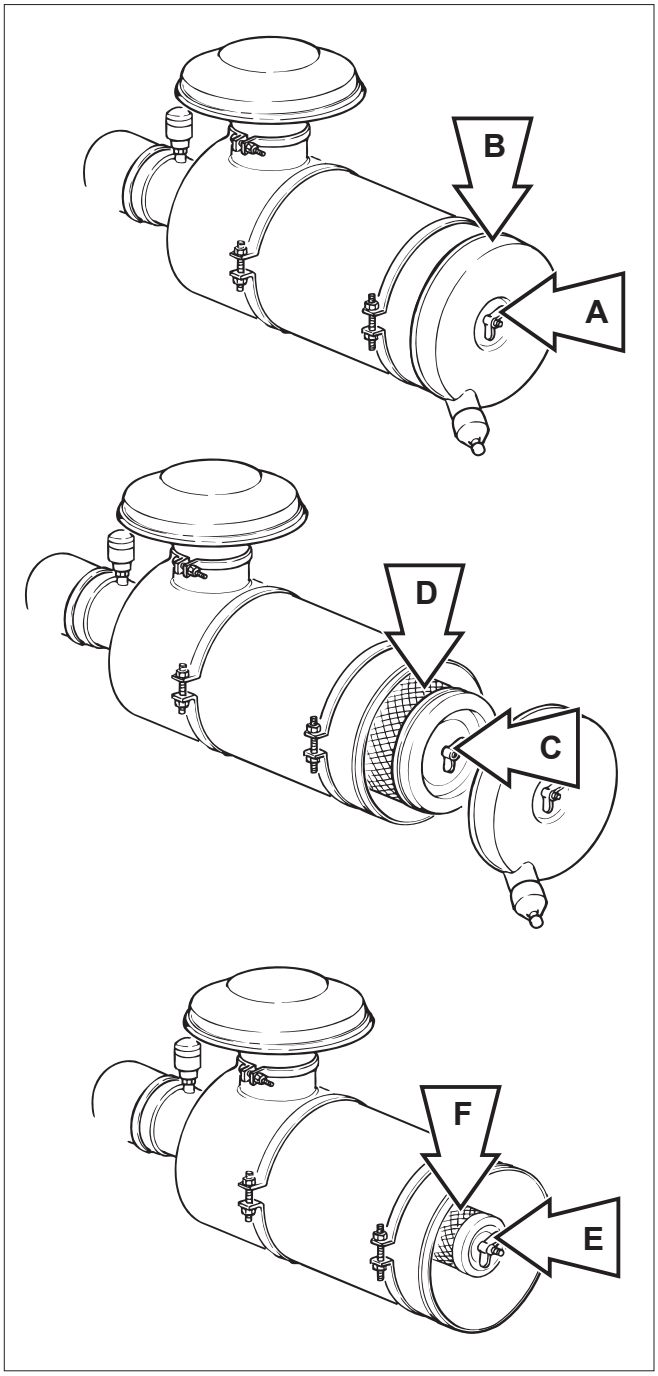
4.7 TABLE E PROCEDURES

E-1 CHANGE THE SAFETY ELEMENT OF ENGINE AIR FILTER

To change the safety element:

- Stop the engine and engage the parking brake.
- Unscrew wing nut **A** and remove cover **B**.
- Unscrew wing nut **C** and remove the outer element **D**.
- Loosen wing nut **E** and remove the inner element **F**.
- Clean the filter bowl.
- Smear the seal with grease, then mount the new element and make sure it is correctly positioned.
- Tighten wing nut **E**.
- Refit the external cartridge **D** and tighten wing screw **C**.
- Refit cover **B** and lock in place with wing nut **A**.



⚠WARNING

The inner element should be replaced every second time the outer element is replaced.

⚠WARNING

Never wash the cartridge with water or solvents.

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E-2 CHANGE THE OIL IN THE POWER DIVIDER AND THE DIFFERENTIAL GEARS AND IN THE POWER DIVIDER

To change the oil in the **front and rear differential gears**:

- Stop the machine on a level ground and engage the parking brake.

NOTICE

Place a container of suitable size under the plug.

- Loosen the drain plug **C**, the level plug **A** and the filler **B** and allow oil to flow out from the reduction gear.
- Refit and tighten drain plug **C**.
- Add new oil through the filler until it is level with hole **A**.
- Refit and tighten plugs **A** and **B**.

Recommended oil:

- **FUCHS TITAN GEAR LS 85 W-90**
  API GL-5 LS / GL-5

To change the oil level in the **power divider**:

- Stop the machine on a level ground and engage the parking brake.

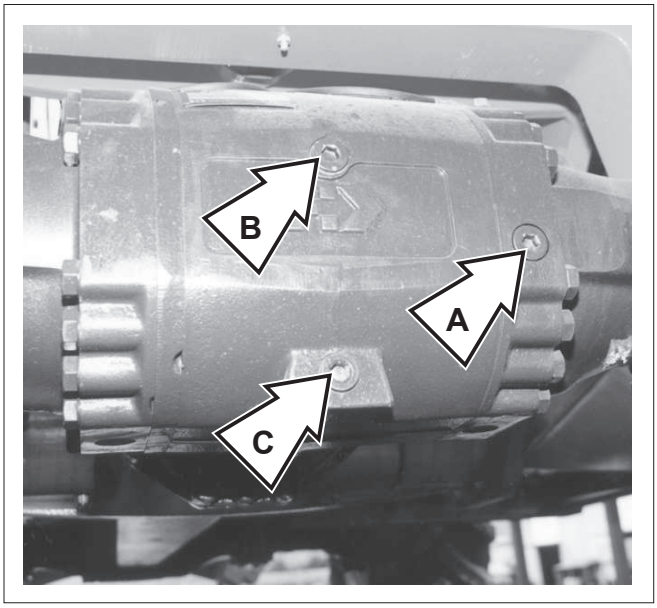
NOTICE

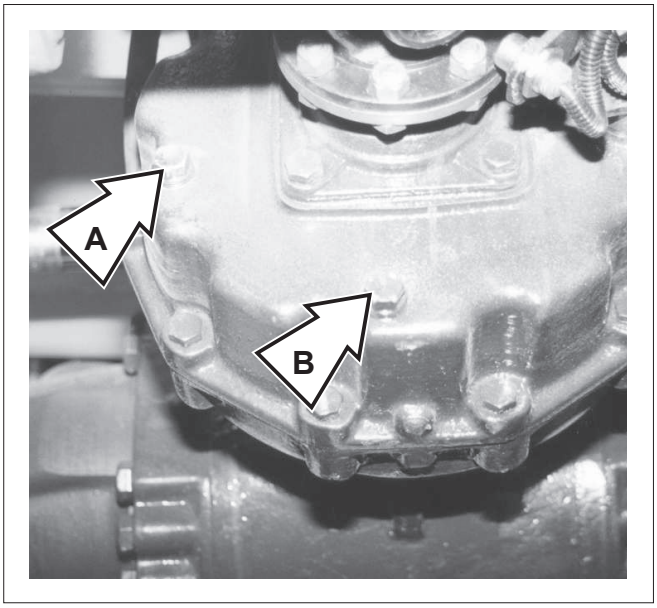
Place a container of suitable size under the plug.

- Remove the level plug **A**.
- Remove the drain plug **B** and allow oil to flow out from the power divider.
- Refit and tighten the drain plug **B**.
- Add new oil through plug **A** until it is level with the hole.
- Refit and tighten filler/level plug **A**.

Recommended oil:

- **FUCHS TITAN GEAR LS 85 W-90**
  API GL-5 LS / GL-5





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E-3 CHANGE THE OIL IN THE FOUR WHEEL REDUCTION GEARS

To change the oil in the **wheel reduction gears**:

- Stop the machine on a level ground and ensure the parking brake is engaged and plug **A** is oriented along the vertical axis.

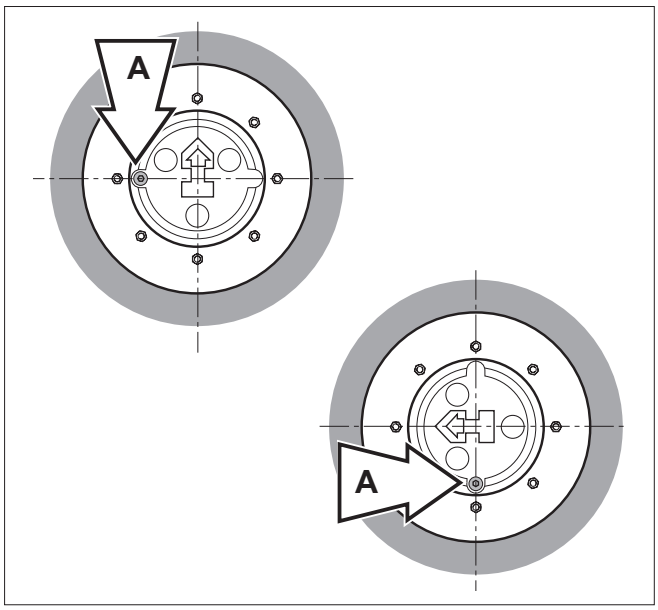
NOTICE

Place a container of suitable size under the plug.

- Unscrew plug **A** and drain any oil from the reduction gear.
- Rotate the wheel by 90° until the plug finds again on the horizontal axis.
- Add new oil through hole **A**.
- Refit and tighten plug **A**.

Recommended oil:

- **TRACTORENAULT THFI 208 LF SAE 80W API GL-4 / FORD M2C 86 B / Massey Ferguson M 1135**



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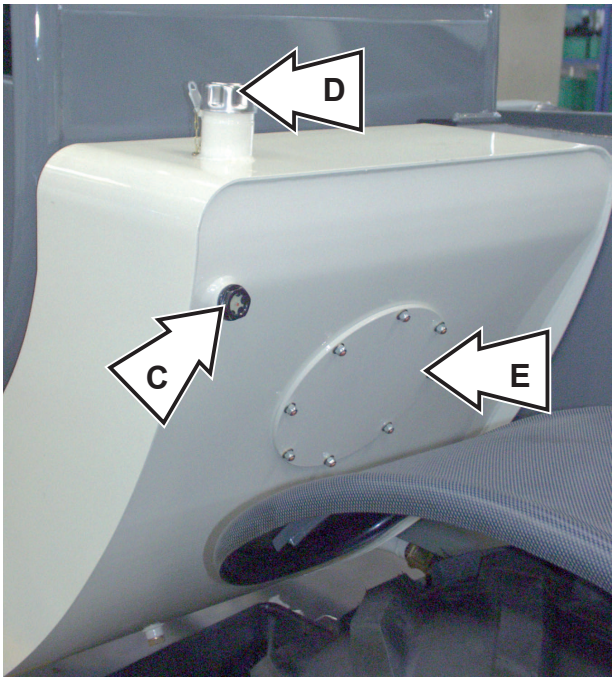
E-4 CHANGE THE HYDRAULIC OIL

To change the hydraulic oil:

- Stop the machine on a level ground and make sure the parking brake is engaged.
- Release the pressure from the hydraulic circuit.
- Place a container of suitable size under the drain plug, placed in the lower part of the reservoir, and collect any oil leaks.
- Remove the drain plug and allow oil to flow out into the container.
- Remove the inspection cover **E** of tank.
- Carefully wash the tank with Diesel oil and blow a jet of compressed air.
- Refit the drain plug and the inspection cover **E**.
- Add new oil of the type recommended through hole **D** until it is level with **C**.



Recommended oil:

- **SHELL TELLUS T22 (temperatures below -10° C)**
- **SHELL TELLUS T46 (temperatures from -15°C to +45°C)**
- **SHELL TELLUS T68 (temperatures above +30° C)**

NOTICE

The handling and disposing of used oils can be ruled by local or national regulations. Address to authorised centres.

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E-4 CHANGE THE HYDRAULIC OIL FILTER CARTRIDGE OF THE SERVICE CIRCUITS

To change the hydraulic oil filter cartridge of the service circuits, proceed as follows:

- Stop the machine on a level ground and make sure the parking brake is engaged.
- Place a container of suitable size under the tank, then allow oil to flow out until its level is under the inspection hatch **E** (90 litres approx).
- Remove the inspection hatch and unscrew the oil filter fitted inside the tank.
- Check the tank is clean, then fit a new filtering element and refit the inspection hatch.
- Check the oil level within the tank. Add new oil, if necessary.

NOTICE

The handling and disposing of used oils can be ruled by local or national regulations. Address to authorised centres.

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4.8 TABLE F PROCEDURES

F-1 CHANGE THE ENGINE COOLANT

⚠ DANGER

When the coolant is hot, the cooling system is under pressure. With warm engine, loosen the radiator plug slowly and carefully, without removing it, to drain the pressure. Use protection gloves and keep your face at a safe distance.

To drain the antifreeze:

- Let the engine cool down.
- Unscrew the plug at the bottom of the radiator or disconnect the rubber hose, if no plug is present. Allow the coolant to flow out into a special container.
- Refit the plug or the hose and pour new antifreeze (50% water-antifreeze). This proportion will provide protection up to -38°C.

On delivery, the machine is filled with a cooling mixture consisting of 50% water and 50% anti-freeze.

TEREX PRO COOL Protection against boiling / freezing		
Product %	Freezing point	Boiling point
33	-17 °C	123 °C
40	-24 °C	126 °C
50	-36 °C	128 °C
70	-67 °C	135 °C

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4.9 TABLE G PROCEDURES

G-1 CHECKING THE STATE OF THE STRUCTURE

Five years or 6000 hours after the first placing into operation of the machine (whichever occurs first), check the state of the structure paying an extreme attention to the welded supporting joints and the pins of both boom and platform (if present).

⚠DANGER

After the first 5 years, repeat this check every 2 years.

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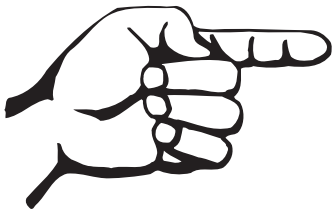

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Section 5
TROUBLESHOOTING

SECTION INDEX

5.1 Introduction.....page 2
5.2 About this section.....3
5.3 Electrical faults.....4
5.4 Hydraulic faults.....11

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5.1 INTRODUCTION

- *Maintenance inspections shall be completed by a person trained and qualified on the maintenance of this machine.*
- *Immediately tag and remove from service a damaged or malfunctioning machine.*
- *Repair any damage or malfunction before operating machine.*
- *Unless otherwise specified, perform each procedure with the machine in the following configuration:*
  - *machine parked on a flat level surface;*
  - *boom in the stowed position;*
  - *key switch in the OFF position with the key removed.*

Before troubleshooting:

- *Read, understand and obey the safety rules and operating instructions printed in the Operator Manual of the machine.*
- *Be sure that all necessary tools are available and ready for use.*
- *Read each appropriate flow chart thoroughly.*
- *Pay special attention to the following warnings:*

⚠DANGER

Crushing hazard. When testing or replacing any hydraulic component, always support the structure and secure it from movement.

⚠WARNING

Electrocution hazard. Contact with electrically charged circuits may result in death or serious injry. Remove all rings, watches and other jewerly.

⚠WARNING

Spraying hydraulic oil can penetrate and burn skin; loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

CAUTION

Perform all troubleshooting on a firm level surface.

CAUTION

Two person will be required to safely perform some troubleshooting procedures.

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5.2 ABOUT THIS SECTION

The tables on the following pages should be used to find and rectify problems that can occur when using the machine.

Prepare adequate tools, and especially a voltmeter and a pressure gauge to carry out the checks explained on next pages.

The initials of the electrical and hydraulic parts indicated in the following tables are given to help you find such parts on the schemes and diagrams in chapter 6.

The tables should be read as follows:

- once you have identified the problem, search this problem in the "**problem**" column;
- analyse the possible causes explained in the "**causes**" column;
- proceed with the check or replacement according to the instructions provided in the "**solutions**" column;
- check that the machine runs well;
- if the problem cannot be eliminated, check again all indications in the "**causes**" column and proceed accordingly.

CAUTION

For any further information, contact the TEREXLIFT Service Centre.

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5.3 ELECTRICAL FAULTS

Problem	Cause	Solution
Turning the ignition key no power is supplied to the dashboard	Battery discharged.	Check the battery charge and replace the battery if necessary.
	Battery disconnect switch turned to wrong position or damaged.	Turn to correct position or repair if damaged.
	Ground clamp defective.	Check the ground clamp connected to the frame.
	50A maxi-fuse **F2G** interrupted.	Check the fuse and replace if necessary.
	Ignition key block damaged.	Check input **30** of the key and output **15/54**; replace the ignition key if necessary.
	Electric line defective.	Check the line continuity up to the fuse-relay board input.
Turning the ignition key the machine doesn't start	Ignition key block damaged.	Check the block and verify you have 12V on output **50** of the key when the machine is started.
	Emergency stop button damaged.	Check the button and change the contacts or the button if necessary.
	Relay **K11** and 70A relay **K01** (inside the box near the engine) interrupted.	Check the relays and replace if necessary.
	Electrical line between dashboard and 70A relay **K01** defective.	Check the line continuity and repair if necessary.
	Speed selector damaged.	Check the selector and verify it is in the neutral position.
	10A fuse **F24** feeding the emergency stop button interrupted.	Check the fuse and replace if necessary.
	10A fuse **F14** interrupted.	Check the fuse and replace if necessary.
	70A relay **K01** interrupted.	Check the relay in the box inside the engine compartment; replace if necessary.
	Electric line between relay **K11** and relay **K01** defective.	Check the line continuity and repair if necessary.

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Problem	Cause	Solution
	Starting motor protection relay **M1** interrupted.	Check the relay and replace if necessary.
	Starting motor **M1** damaged.	Check the starting motor and replace if necessary.
	Ground clamp defective.	Check the ground clamp connected to the frame.
	Battery disconnect switch turned to wrong position or damaged.	Turn to correct position or repair the battery disconnect switch.
The engine runs but doesn't start	No fuel.	Refuel.
	Injection pump of the Perkins engine damaged.	Check the pump; replace if necessary, according to the instructions provided in the Perkins manual.
	Air in the tank suction system.	Bleed the system.
	Engine stop solenoid damaged.	Check the solenoid and replace if necessary
The battery gets discharged rapidly	Internal cells broken.	Replace with a new equivalent battery.
	The alternator charge is not sufficient.	Check the alternator and replace if necessary.
	Wrong absorption of the system.	Check and rectify.
The machine does not move forward/ back	Speed selector **SX12** damaged.	Check and replace if necessary.
	10A fuse **F14** interrupted.	Check the fuse and replace if necessary.
	Relays **K7** - **K8** - **K9** - **K10** interrupted.	Check all the relays and replace those damaged.
	Parking brake micro-switch damaged.	Check the micro-switch and replace if necessary.
	Rexroth pump solenoid valves damaged.	Check the solenoid valves and replace if necessary.
	Electric connecting lines.	Check the line continuity and repair if necessary.

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Problem	Cause	Solution
	Outrigger micro-switches damaged.	Check the micro-switches and replace if necessary.
	10A fuse **F18** interrupted.	Check the fuse and replace if necessary.
	Relays board damaged.	Check the board and replace if necessary.
No shifting between first and second mechanical gear and vice versa	10A fuse **F14** interrupted.	Check the fuse and replace if necessary.
	Mechanical gearbox button **S14** damaged.	Check the button and replace if necessary.
	Gearbox sensor **S53** damaged.	Check the sensor and replace if necessary.
	Relay **K5** interrupted.	Check the relay and replace if necessary.
	Stopped machine relay **K24** interrupted.	Check the relay and replace if necessary.
	Gearbox valve solenoids damaged.	Check and replace if necessary.
	Electric connecting lines.	Check the line continuity and repair if necessary.
The boom doesn't move	Road/Jobsite selector on "Road" or damaged.	Check the position; change the selector if damaged.
	10A fuse **F19** interrupted.	Check the fuse and replace if necessary.
	"Dead man" button damaged.	Check the operation of the button on the control lever; replace if necessary
	"Dead man" solenoid of the main valve damaged	Check the efficiency of the solenoid and replace if necessary.
	Electric connecting lines.	Check the line continuity and repair if necessary.

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Problem	Cause	Solution
The 3B6 system doesn't change scale when the machine is on wheels or stabilised	10A fuse **F18** interrupted.	Check the fuse and replace if necessary.
	Outrigger micro-switches damaged.	Check the micro-switches and replace if necessary.
	Electric line connecting the micro-switches to the DLE.	Check the line continuity and repair if necessary.
	Socket **X25** on DLE defective.	Check the pins of the signal inputs; if damaged, replace the socket.
	DLE display damaged.	Change the DLE.
No steering mode selction (two-wheels, four-wheels, crab)	10A fuse **F5** interrupted.	Check the fuse and replace if necessary.
	Road/Jobsite selector **S2** damaged.	Check the selector and replace if necessary.
	Steer mode selector **S22** damaged.	Check the selector and replace if necessary.
	Spools **Y20**-**Y21** of the crab or four-wheel steering selection solenoid damaged.	Check the spools and replace if necessary.
	Electric connecting lines.	Check the line continuity and repair if necessary.
The horn doesn't work	10A fuses **F10** or 15A **F21** interrupted.	Check the fuses and replace if necessary.
	Relay **K5** interrupted.	Check the relay and replace if necessary.
	Horn button **SX11** on speed selector damaged.	Check the button and replace if necessary.
	Horn **H20** damaged.	Check the horn and replace if necessary.
	Electric connecting lines.	Check the line continuity and repair if necessary.
The beacon doesn't work	7.5A fuse **F11** interrupted.	Check the fuse and replace if necessary.
	Beacon **X101** damaged.	Check the beacon and replace if necessary.

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Problem	Cause	Solution
	Electric connecting lines.	Check the line continuity and repair if necessary.
The heating fan doesn't work	15A fuse **F2** interrupted.	Check the fuse and replace if necessary.
	Fan control switch **S20** damaged.	Check the switch and replace if necessary.
	Heating fan motor M5 damaged.	Check the fan motor and replace if necessary.
	Electric connecting lines.	Check the line continuity and repair if necessary.
The sensor checking the low boom position doesn't work	10A fuse **F18** interrupted.	Check the fuse and replace if necessary.
	Sensor **B38** damaged.	Check the sensor and replace if necessary.
	Electric connecting lines.	Check the line continuity and repair if necessary.
The air filter restriction indicator light doesn't work	Dashboard indicator light **X1** defective.	Check the indicator light and replace if necessary.
	Filter restriction sensor **B15** damaged.	Check the sensor and replace if necessary.
	Electric connecting lines.	Check the line continuity and repair if necessary.
The engine cooling oil temperature indicator light doesn't work	Temperature sensing bulb **B13** damaged.	Check the bulb and replace if necessary.
	Dashboard indicator light **X1** defective.	Check the indicator light and replace if necessary.
	Electric connecting lines.	Check the line continuity and repair if necessary.
The Perkins engine oil pressure light indicator doesn't work	Pressure switch **B11** for low engine oil pressure damaged.	Check the pressure switch on the engine and replace if necessary.
	Dashboard indicator light **X1** defective.	Check the indicator light and replace if necessary.

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Problem	Cause	Solution
	Electric connecting lines.	Check the line continuity and repair if necessary.
The Perkins engine oil thermometer doesn't work	Dashboard thermometer **P1** damaged.	Check the thermometer and replace if necessary.
	Engine oil temperature transducer **B17** damaged.	Check the transducer and replace if necessary.
	Electric connecting lines.	Check the line continuity and repair if necessary.
The hydraulic oil thermometer doesn't work	Dashboard thermometer **P2** damaged.	Check the thermometer and replace if necessary.
	Hydraulic oil temperature transducer **B16** damaged.	Check the transducer and replace if necessary.
	3A fuse **F8** interrupted.	Check the fuse and replace if necessary.
	Electric connecting lines.	Check the line continuity and repair if necessary.
The fuel gauge doesn't work	3A fuse **F8** interrupted.	Check the fuse and replace if necessary.
	Dashboard fuel gauge **P3** damaged.	Check the fuel gauge and replace if necessary.
	Fuel detector **B12** fitted to a damaged tank.	Check the fuel detector and replace if necessary.
	Electric connecting lines.	Check the line continuity and repair if necessary.
The hour-meter doesn't work	Hour-meter damaged.	Check the hour-meter and replace if necessary.
	Alternator **A1** damaged.	Check the alternator and replace if necessary.
	Electric connecting lines.	Check the line continuity and repair if necessary.

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Problem	Cause	Solution
The display of the overload warning system does not turn on	10A fuse **F25** blown.	Check the fuse and replace if necessary.
	DLE display damaged.	Change the DLE.
	Electric connecting lines.	Check the line continuity and repair if necessary.

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5.4 HYDRAULIC FAULTS

Problem	Cause	Solution
The machine does not move forward/ back	Low pressure from the transmission pump.	Re-calibrate the pump as indicated in section 2 "Technical specifications".
	DA valve damaged.	Check and replace if necessary.
	Hydraulic oil filter clogged.	Check and replace if necessary.
Low boost supply	Pump damaged.	Change the pump.
	Hydraulic motor damaged.	Change the motor.
	Booster pump wrongly calibrated.	Re-calibrate the pump as indicated in section 2 "Technical specifications".
Machine traction is low	Hydraulic oil filter clogged.	Change the filter.
	Low hydraulic oil level.	Top up.
	Oil in the tank soiled.	Clean tank and pipes, empty the pumps and add new oil.
	Transmission pump wrongly calibrated.	Re-calibrate the pump as indicated in section 2 "Technical specifications".
No shifting between first and second gear	Low boost pressure.	Check the boost pressure of the transmission pump.
	Gearbox solenoid valve **6** damaged.	Check the mechanical movement of the pin of solenoid valve **6**.
	Mechanical gearbox piston **5** damaged.	Check piston **5**.
	Gearbox gears damaged.	Check the gears and replace those damaged.
The steering mode cannot be selected	Solenoid valve defective.	Check the mechanical movement of the pin of solenoid valve.

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Problem	Cause	Solution
Poor parking brake action	Loose cables.	Tension the cables and check the relevant clamps.
	Brake control lever in the cab damaged.	Check the control lever and replace if necessary
The stabilisers do not work	Stabilisers cylinders damaged.	Check cylinders and their internal seals.
	Problems to the cylinder block valves.	Check the valves are in efficient working order and the internal pistons slide correctly.
	Main valve defective.	Check the elements of the Walvoil main valve.
The machine does not steer	Main boom pump damaged.	Check the operation of main gear pump.
	The priority valves doesn't select the oil delivery.	Check the priority valve and replace if necessary.
	Power steering damaged.	Check power steering is in efficient working order and verify the pilot activates the priority valve of pump. If necessary change the power steering.
	Problems with the axle cylinders.	Check cylinders and their internal seals.
The boom does not move	Main gear pump damaged.	The pump doesn't deliver oil. Check and replace if necessary.
	Priority valve defective.	The pump priority valve is clogged or damaged; remove, check its seals and refit or change the valve.
	Main valve damaged.	Check the solenoid valve of main valve is in efficient working order.
	Pressure relief valve of main valve damaged.	Check the pressure relief valve is in efficient working order, eliminate any foreign matters which may hinder a proper operation.

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Problem	Cause	Solution
Stepping down on the brake pedal, the machine does not brake	Auxiliary boom pump damaged.	Carefully check the pump and replace if necessary.
	Brake pump damaged.	Carefully check the pump (refer to section “brake pump”).
	Problems to the axle brakes.	Check the brake disks (see Dana manual supplied with the machine).
The attachment locking cylinder does not work (if presents)	Seals of cylinder damaged.	Check the cylinder’s internal seals and replace if necessary.
	Quick couplings damaged.	Check and replace if necessary.
	The hydraulic line between control block and quick couplings is defective.	Check and repair any damaged or clogged hoses.
The fork pitching system doesn’t work properly	Seals of cylinder **19** damaged.	Check the cylinder’s internal seals and replace if necessary.
	Block valve of cylinder **19** damaged.	Check the valve; clean or replace.
	Problems to the hydraulic line from main valve to block valve.	Check and repair any damaged or clogged hoses.
	Safety valves maladjusted or damaged.	Check the efficiency of the safety valves fitted after the DFE **20** switch module; re-calibrate or replace.
The boom extension system doesn’t work	Extension cylinder inside the boom damaged (third telescope extension).	Check the seals of cylinder, rod and re-sequencing valve (located at the top of the rod); replace any defective parts.
	Extension cylinder outside the boom damaged (second telescope extension).	Check the seals of cylinder, rod and re-sequencing valve (located at the top of the rod); replace any defective parts.

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Problem	Cause	Solution
	Block valve of the boom internal extension cylinder damaged.	Check the valve, clean or replace if necessary.
	Block valve of the boom external extension cylinder damaged.	Check the valve, clean or replace if necessary.
	Diverting valve DFE **20** damaged.	Check the valve, clean or replace if necessary. Check the efficiency of the internal slider.
	Hydraulic line feeding the boom defective.	Check and replace the hoses if damaged or clogged.
	Main valve damaged.	Check the efficiency of the internal sliders of the Walvoil main valve.
The boom lifting system doesn't work properly	Boom lifting cylinder damaged.	Check the cylinder's internal seals, rod and liner; repair any damaged components or change the cylinder.
	Block valve of the boom lifting cylinder damaged.	Remove and clean the valve and check its seals; replace if necessary.
The boom lowers jerkily	Block valve damaged.	Check the valve calibration and replace the valve if necessary.
The boom sections are frequently out of sequence when the boom is extended/retracted	Cylinder seals worn.	Change the seals.
	Seals of the cylinder re-sequencing valves.	Check the re-sequencing valves, clean or replace if worn out.
	Air in the circuit.	Bleed as indicated in the operator manual.
When the boom is moved up or down, the forks cannot be levelled	Levelling cylinder damaged.	Check the cylinder's internal seals and rod; repair any damaged components or change the cylinder.
	Safety valves on the DFE module damaged.	Check that the safety valves fitted to the ports of the main valve are in efficient working order. Remove and clean, or re-calibrate or replace the valves if necessary.

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Problem	Cause	Solution
	One-way valves fitted to the valve holding plate of the levelling cylinder damaged.	Remove the valves and check for foreign matters. Change the valves if broken.
	Block valves of the fork levelling and control cylinders damaged.	Remove and clean the valves and check their seals; replace if necessary
	Fork levelling line hoses damaged.	Check and replace the hoses if damaged or clogged.
The booms swings when moved out.	Sliding pads worn out.	Check the pads for wear and replace if worn.
	Boom not greased.	Smear a thin coat of grease of the type recommended by TEREXLIFT on the sliding area of the boom pads.
	Paint or abrasion on the pad sliding rail.	Grind and polish the pad's sliding zone on the boom, then grease.
The boom moves hardly in when fully extended and horizontal.	Sliding pads worn out.	Carefully check all the pads fitted to the front bottom part and the rear high part of the boom; carefully clean the sliding zone of the boom sections and lubricate with the special grease "INTERFLON FIN GREASE LS 2".
The radiator fan doesn't work	Auxiliary gear pump on motor distribution damaged.	Carefully check the pump and replace if necessary.
	Accumulator filling slider of the brake pump damaged.	Carefully check the pump and replace if necessary.
	Fan motor damaged.	Check the fan motor and replace if necessary.

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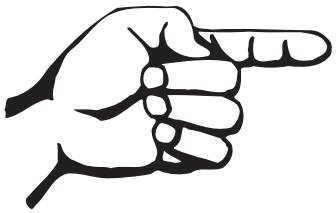

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Section 6
SCHEMATICS

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6.2 HYDRAULIC SYMBOLS

MOTORS

Fixed motor with one direction of flow

Fixed motor with two directions of flow

Variable motor with two directions of flow

Reversible fixed motor with two directions of flow

PUMP

Fixed displacement pump with one direction of flow

Fixed displacement pump with two directions of flow

Variable displacement pump with one direction of flow

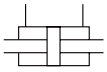
Variable displacement pump with flow regulator

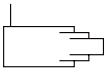
CYLINDERS

Single-acting cylinder

Single-acting cylinder with spring return

Double-acting cylinder


Double-acting cylinder with bilateral rod


Telescopic cylinder

COMMANDS AND CONTROLS

Shaft rotating in one direction

Shaft rotating in two directions

Hand-operated control

Hand-operated control with pushbutton

Hand-operated control with lever

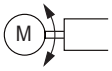
Hand-operated control with pedal

Mechanical control with pushbutton

Mechanical control with spring

Mechanical control with roller

Electro-magnetic control with winding (solendoid)



Control with electric motor

Direct pressure control

Indirect (piloted) pressure control

Control with electromagnet and piloted distributor

PIPES AND CONNECTIONS

Induction and return pipe

Piloting pipe

Blow-by pipe

Flexible hose

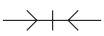
Connecting point

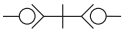
Pipe cross without connection

Breather

Closed pressure fitting

Pressure fitting with connected pipe


Quick fitting


Quick fitting with check valves

DISTRIBUTION - SETTING ELEMENTS

Non-return valve

Calibrated non-return valve

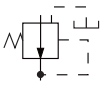
Unlockable non-return valve

Combined non-return and throttle valve

Switching valve

Pressure relief valve with direct control

Pressure relief valve with hydraulic control


Pressure reducing valve

Sequence valve

Adjustable throttle valve

Two-way flow regulator

Cut-out cock

POWER SOURCES

Electric motor

Thermal engine

OTHER EQUIPMENT

Accumulator

Water tank

Compressor

Filter

Cooler

Pressure gauge

Thermometer

Flowmeter

Pressure switch

Drain to tank indication

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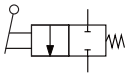
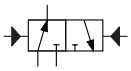
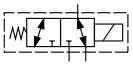
DISTRIBUTION - SETTING ELEMENTS



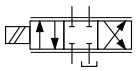
Two-position and two-way distributor, with manual lever control and spring return



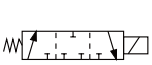
Three-way and two-position distributor, with hydraulic control



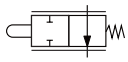
Two-position, three-way distributor, with electro-magnetic control and spring return



Distributor with mechanical control and span proportional to the action of the same control



Two-position, three-way distributor, with representation of transient connection during passage phase



Electro-hydraulic single-acting servo valve

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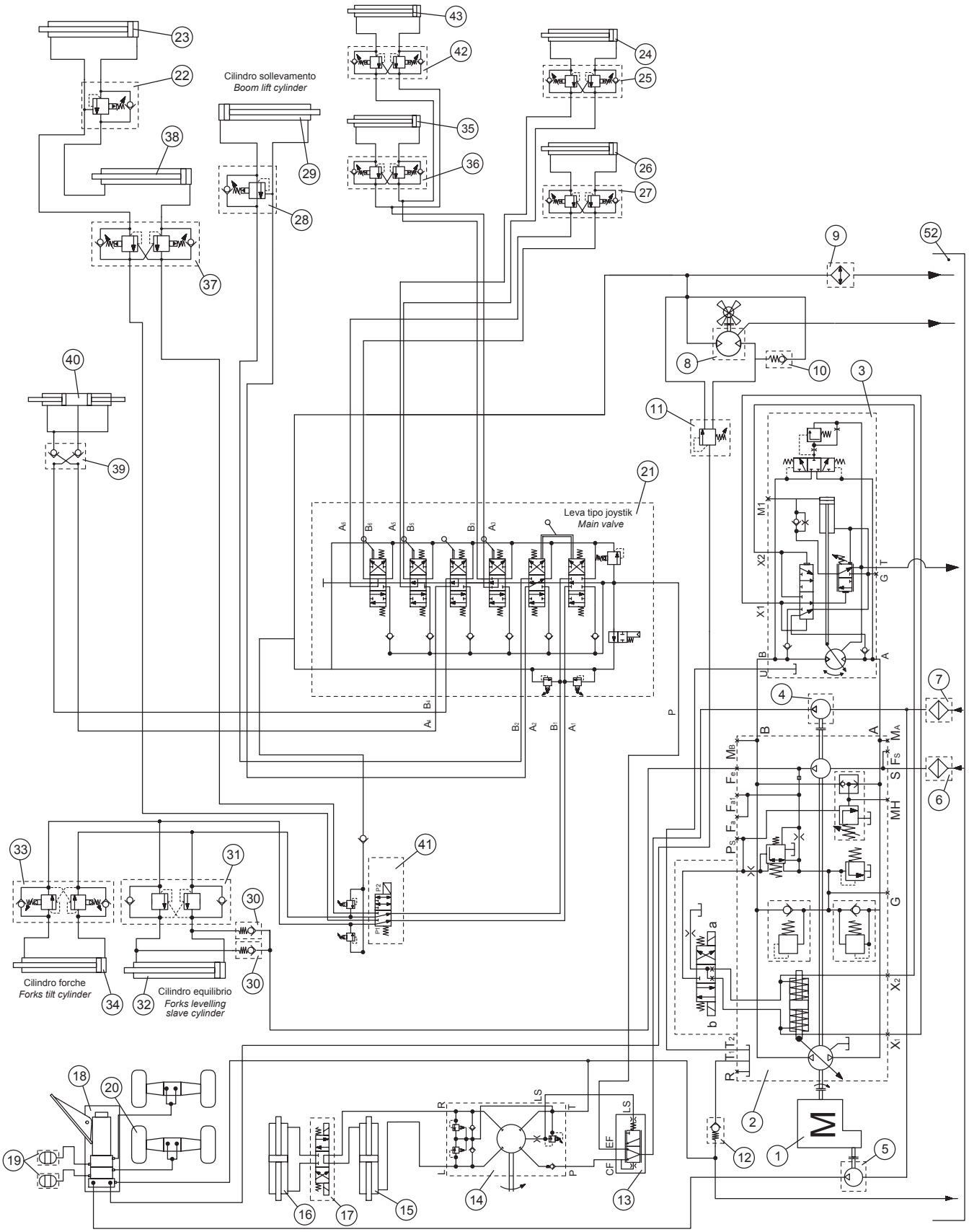
6.2 HYDRAULIC SCHEMES

6.2.1 Telelift 3713 SX (with old cab)



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6.2.1.1 Hydraulic schemes - Component description

Ref.	Description
1	Diesel engine
2	Transmission hydraulic pump
3	Transmission hydraulic motor
4	Hydraulic pump for auxiliary circuits
5	Second hydraulic pump for auxiliary circuits
6	Intake filter (150 p10)
7	Submersed intake filter
8	Thermal exchanger fan motor
9	Thermal exchanger
10	One-way valve
11	Pressure relief valve
12	One-way valve
13	Load sensing priority valve
14	Power steering
15	Front axle steering cylinder
16	Rear axle steering cylinder
17	Steering selection solenoid
18	Servo-assisted brake pump
19	Accumulator
20	Axle
21	Walvoil monolithic distributor
22	Locking valve for 3rd telescope extension cylinder
23	3rd telescope extension cylinder
24	Right outrigger cylinder
25	Right outrigger cylinder block valve
26	Left outrigger cylinder
27	Left outrigger cylinder block valve
28	Locking valve for lifting cylinder
29	Lifting cylinder
30	One-way valves
31	Locking valve for sway cylinder
32	Sway cylinder
33	Locking valve for fork motion cylinder
34	Fork motion cylinder
35	Left sway cyilinder block valve
36	Left sway cyilinder
37	Locking valve for 2nd telescope extension cylinder
38	2nd telescope extension cylinder
39	Locking valve for attachment locking cylinder
40	Attachment locking cylinder
41	Flow divider
42	Right sway cyilinder block valve
43	Right sway cyilinder

Ref.	Description
44	
45	
46	
47	
48	
49	
50	1st / 2nd speed selection solenoid
51	Mechanical gears hydraulic operator
52	Hydraulic oil tank
53	
54	
55	
56	
57	
58	
59	

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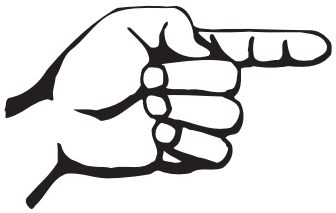

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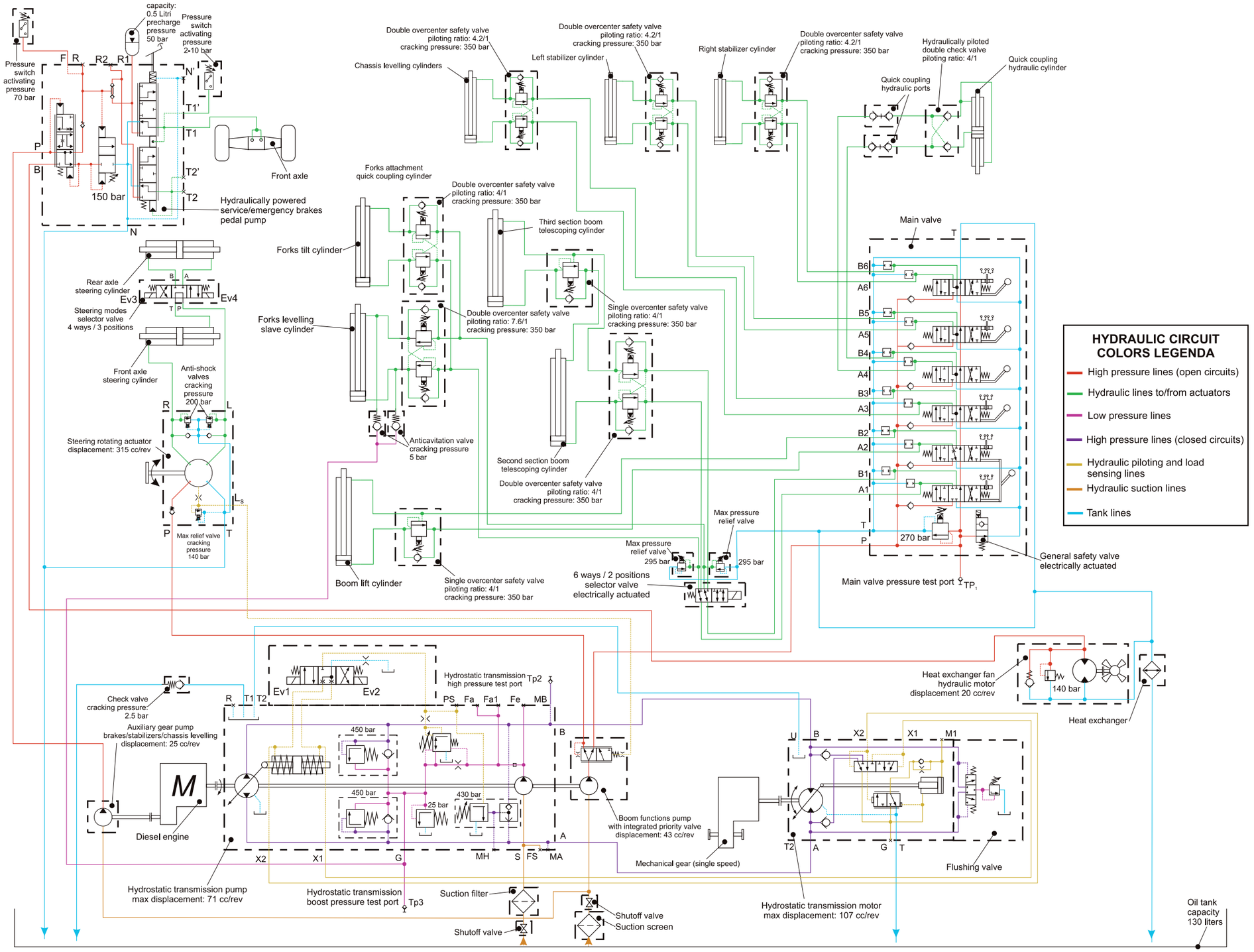
6.2.2 Telelift 3713 SX (from serial no. 12076 up to serial no. 14845)

TELELIFT 3713 SX	
From serial no.	12076
To serial no.	14845



HYDRAULIC CIRCUIT COLORS LEGENDA

- High pressure lines (open circuits)
- Hydraulic lines to/from actuators
- Low pressure lines
- High pressure lines (closed circuits)
- Hydraulic piloting and load sensing lines
- Hydraulic suction lines
- Tank lines

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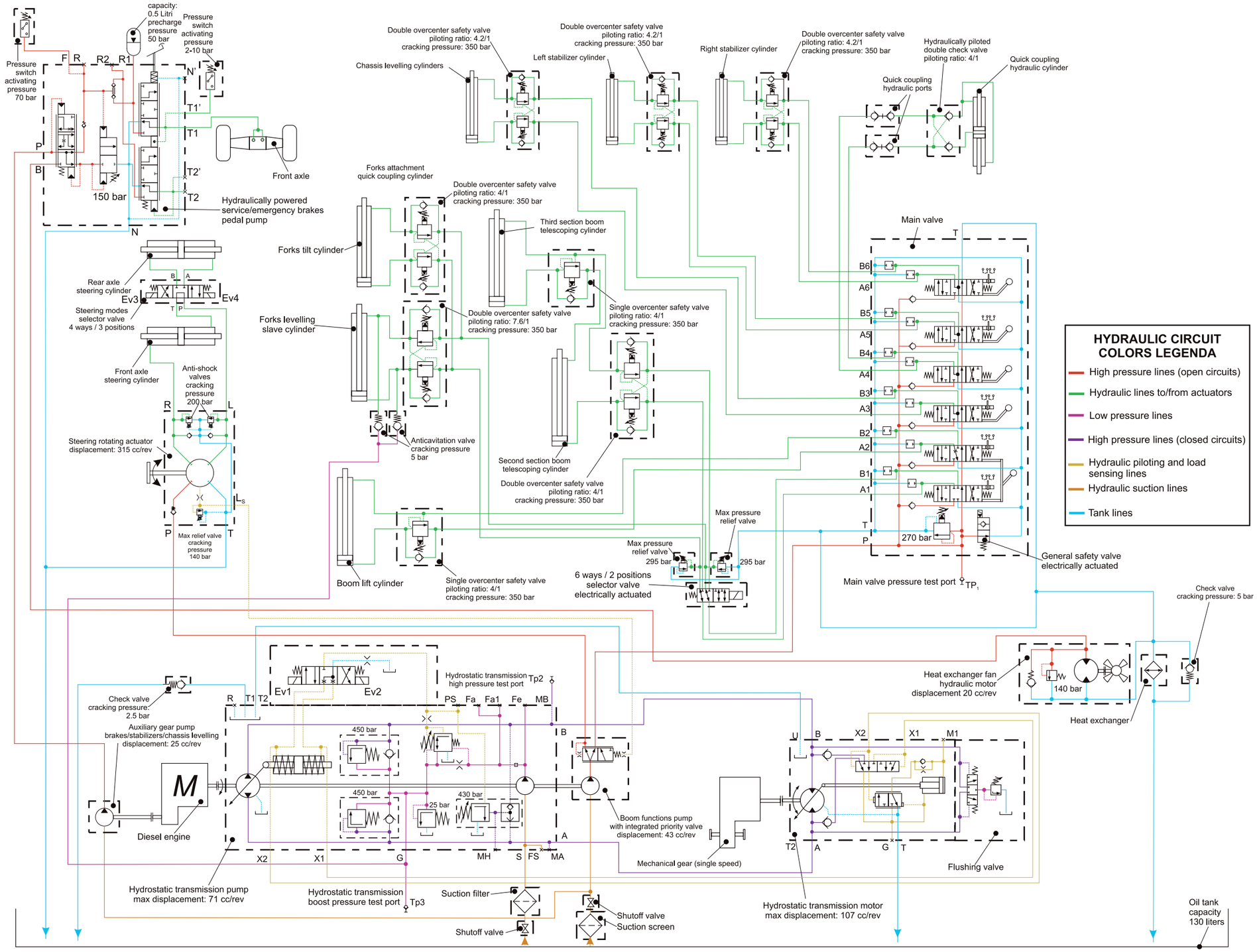
6.2.3 Telelift 3713 SX (from serial no. 14846)

TELELIFT 3713 SX	
From serial no.	14846
To serial no.	xxxxx



HYDRAULIC CIRCUIT COLORS LEGENDA

- High pressure lines (open circuits)
- Hydraulic lines to/from actuators
- Low pressure lines
- High pressure lines (closed circuits)
- Hydraulic piloting and load sensing lines
- Hydraulic suction lines
- Tank lines

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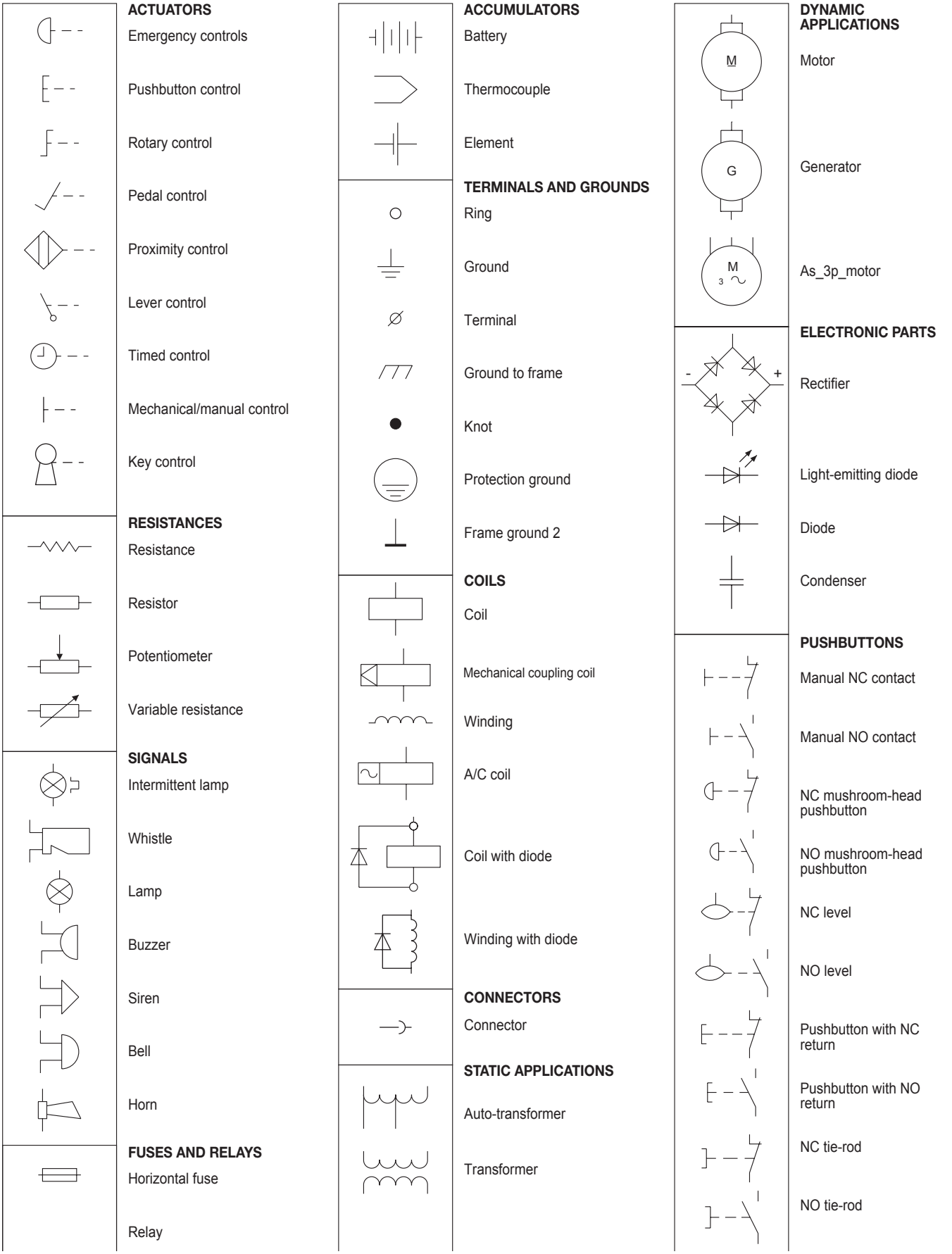
6.3 ELECTRICAL SYMBOLS



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CONTACTS

Thermal

Normally open (NO)

Normally closed (NC)

NO limit switch

NC limit switch

Contactor

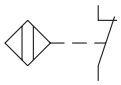
Magneto-thermal closure

Magneto-thermal opening

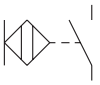
Thermal closure

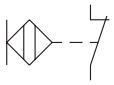
Thermal opening

Exchange


NC proximity

NO proximity


NO mechanical


NC mechanical

Selector

Selector2

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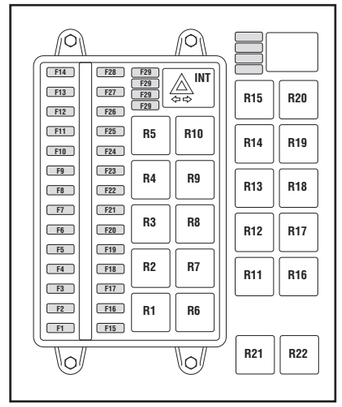
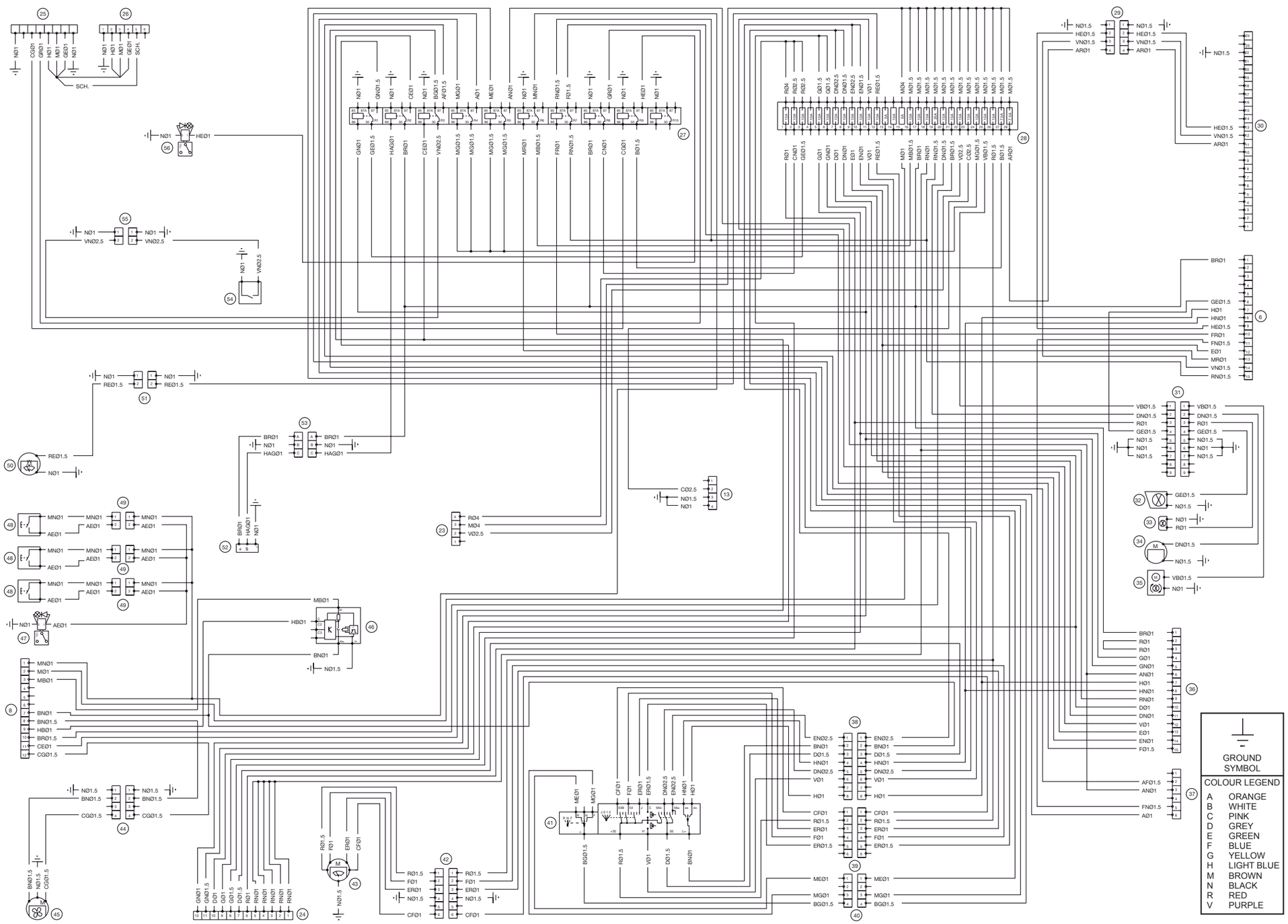
6.4 WIRING DIAGRAMS

6.4.1 Wiring diagrams (for machines with old cab)

Sheet 1 of 3





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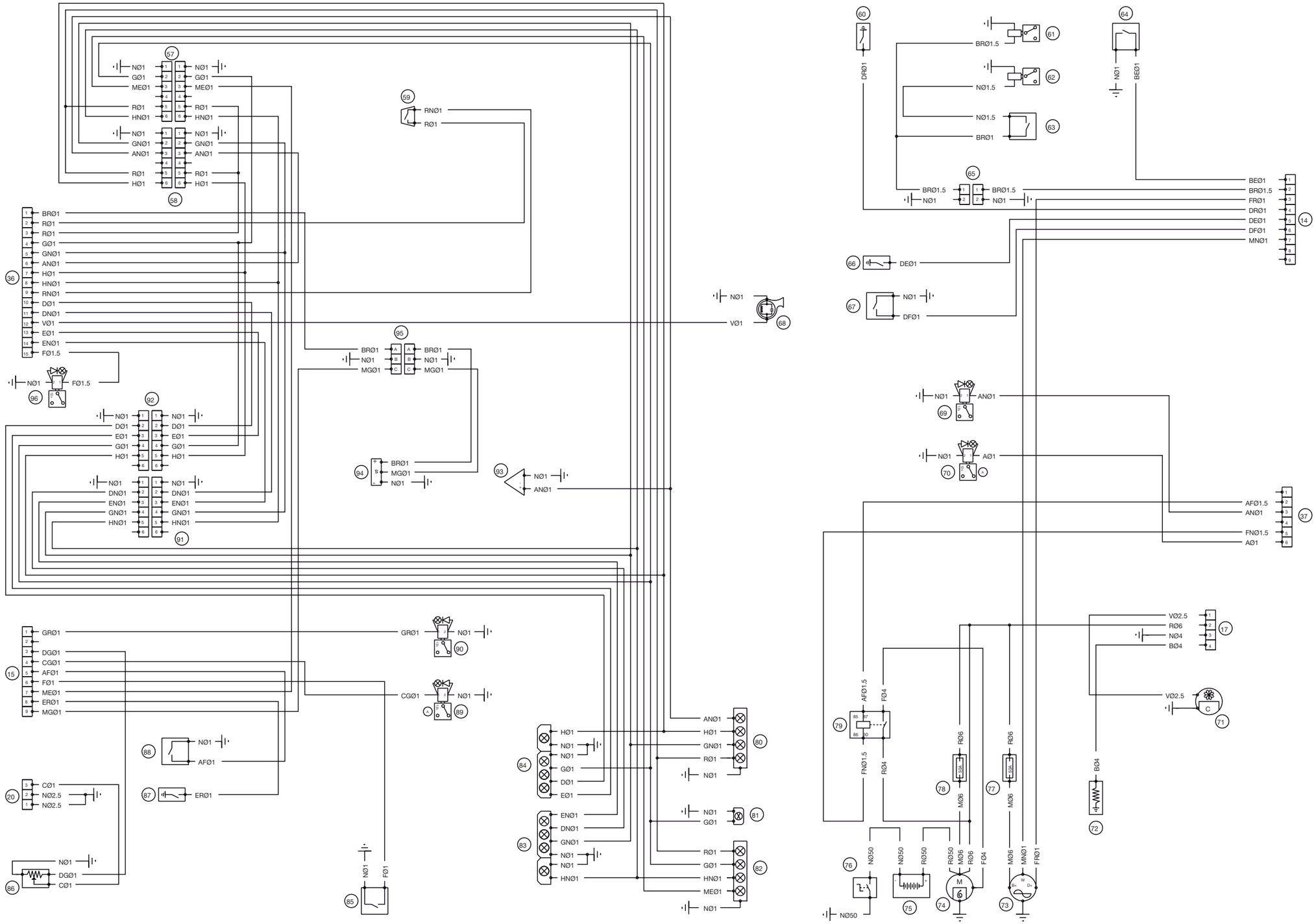
Sheet 2 of 3



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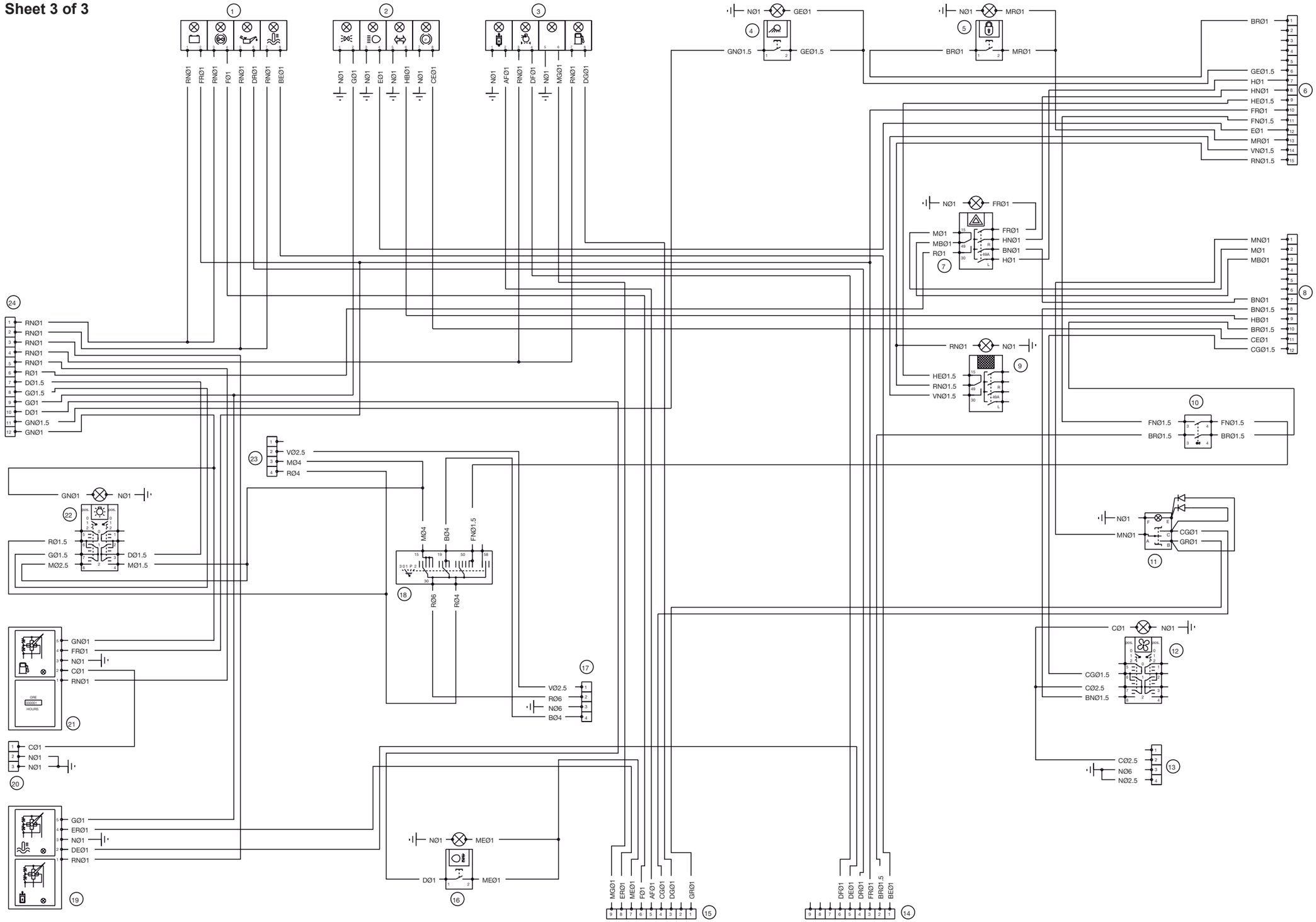
Sheet 3 of 3



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6.4.1.1 Wiring diagram - Component description

Ref.	Description
1	WARNING LIGHTS: GEN-SET, BRAKE FAILURE, ENGINE OIL PRESSURE, WATER TEMPERATURE
2	WARNING LIGHTS: POSITION LIGHTS, HIGH BEAM, TURN SIGNALS, PARKING BRAKE
3	WARNING LIGHTS: HYDRAULIC OIL TEMPERATURE, AIR FILTER SOILED, WHEEL SHAFTING, FUEL RESERVE
4	OPTIONAL WORK LIGHT SWITCH
5	ROAD SAFETY SWITCH
6	15-WAY CONNECTOR - FUSE BOX LINE - DASHBOARD LINE
7	TURN SIGNALS FLASHING
8	12-WAY CONNECTOR - FUSE BOX LINE - DASHBOARD LINE
9	EXTENSION JIB AND HYDRAULIC WINCH OPTIONAL LINE SWITCH
10	MUSHROOM-HEAD EMERGENCY PUSHBUTTON
11	CRAB/4-WHEEL STEERING SELECTOR
12	FAN SWITCH
13	4-WAY CONNECTOR - FUSE BOX LINE (BLACK)
14	9-WAY CONNECTOR - ENGINE LINE-DASHBOARD LINE
15	9-WAY CONNECTOR - REAR LINE - DASHBOARD LINE
16	FOG LAMP SWITCH
17	4-WAY CONNECTOR - ENGINE LINE (BLACK)
18	IGNITION KEY SWITCH
19	WATER TEMPERATURE GAUGE, HYDRAULIC OIL GAUG
20	3-WAY CONNECTOR - REAR LINE -DASHBOARD LINE (BLACK)
21	FUEL GAUGE, HOURMETER
22	POSITION LIGHTS SWITCH
23	4-WAY CONNECTOR - FUSE BOX LINE (BLACK)
24	12-WAY CONNECTOR - FUSE BOX LINE - DASHBOARD LINE
25	ARB1 CONNECTOR
26	LOADING CELL
27	FUSES AND RELAYS BOX
28	FUSES AND RELAYS BOX
29	4-WAY CONNECTOR - EXTENSION JIB LINE CONNECTION
30	24-PIN ILME CONNECTOR - EXTENSION JIB AND OPTIONAL WINCH LINE
31	9-WAY CONNECTOR - CAB CONNECTION
32	WORK LIGHT
33	INTERIOR LIGHTS
34	REAR WINDSCREEN WIPER MOTOR
35	BEACON
36	15-WAY CONNECTOR - REAR LINE - FUSE BOX LINE
37	6-WAY CONNECTOR - ENGINE LINE - FUSE BOX LINE
38	8-WAY CONNECTOR - LIGHT SWITCH CONNECTION - SPEED SWITCH
39	6-WAY CONNECTOR - LIGHT SWITCH CONNECTION - SPEED SWITCH
40	4-WAY CONNECTOR - LIGHT SWITCH CONNECTION - SPEED SWITCH
41	LIGHT SWITCH - SPEED SWITCH
39	6-WAY CONNECTOR - WINDSCREEN WIPER MOTOR CONNECTION
43	WINDSCREEN WIPER/WASHER MOTOR
44	4-WAY CONNECTOR - FAN MOTOR CONNECTION
45	FAN MOTOR
46	TURN SIGNALS FLASHING
47	ATTACHMENT LOCKING SOLENOID
48	ATTACHMENT LOCKING DISTRIBUTOR LEVERS ENABLING SWITCH
49	2-WAY CONNECTOR - ATTACHMENT BLOCKAGE CONTROL LEVERS CONNECTION
50	WINDSCREEN WASHER MOTOR
51	2-WAY CONNECTOR - WINDSCREEN WIPER MOTOR CONNECTION
52	PARKING BRAKE SENSOR
53	3-WAY CONNECTOR - PARKING BRAKE CONNECTION
54	SEAT SWITCH
55	2-WAY CONNECTOR - SEAT SWITCH CONNECTION
56	OVERLAOD WARNING SYSTEM SOLENOID
57	6-WAY CONNECTOR - LEFT REAR LIGHTS CONNECTION
58	6-WAY CONNECTOR - RIGHT REAR LIGHTS CONNECTION
59	HYDROSTOP
60	ENGINE OIL PRESSURE SENSOR
61	ENGINE STOP SOLENOID
62	COLD-START SOLENOID
63	COLD-START SENSOR
64	WATER TEMPERATURE SENSOR
65	2-WAY CONNECTOR - ENGINE STOP CONNECTION
66	WATER TEMPERATURE GAUGE SENSOR
67	AIR FILTER CLOGGING SENSOR
68	HORN
69	REVERSE SPEED SOLENOID
70	FORWARD SPEED SOLENOID
71	COMPRESSED AIR COMPRESSOR
72	THERMAL STARTER
73	ALTERNATOR
74	STARTING MOTOR
75	12V BATTERY
76	BATTERY CUTOUT SWITCH
77	MAXI FUSE FOR ALTERNATOR PROTECTION
78	MAXI FUSE FOR SYSTEM PROTECTION
79	STARTING RELAY
80	RIGHT REAR LIGHT
81	LICENCE PLATE LIGHT
82	LEFT REAR LIGHT
83	FRONT LIGHT-LEFT TURN SIGNAL
84	FRONT LIGHT-RIGHT TURN SIGNAL
85	BRAKE FAILURE SENSOR
86	FUEL LEVEL FLOAT

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Ref.	Description
84	HYDRAULIC OIL TEMPERATURE GAUGE SENSOR
88	HYDRAULIC OIL FILTER CLOGGING SENSOR
89	CRAB SOLENOID
90	4-WHEEL STEERING SOLENOID
91	6-WAY CONNECTOR - LEFT FRONT LIGHTS CONNECTION
92	6-WAY CONNECTOR - RIGHT FRONT LIGHTS CONNECTION
93	BACK-UP HORN
94	WHEEL SHAFTING SENSOR
95	3-WAY CONNECTOR - WHEEL SHAFTING CONNECTION

WIRE COLOURS

A LIGHT BLUE
B WHITE
C ORANGE
G YELLOW
H GREY
L BLUE
M BROWN
N BLACK
R RED
S PINK
V GREEN
Z PURPLE

REMARK: Two-colour wires are indicated through a combination of the aforesaid initials as follows:

G/V = YELLOW/GREEN (Crosswise colouring)
G-V = YELLOW-GREEN (Lengthswise colouring)

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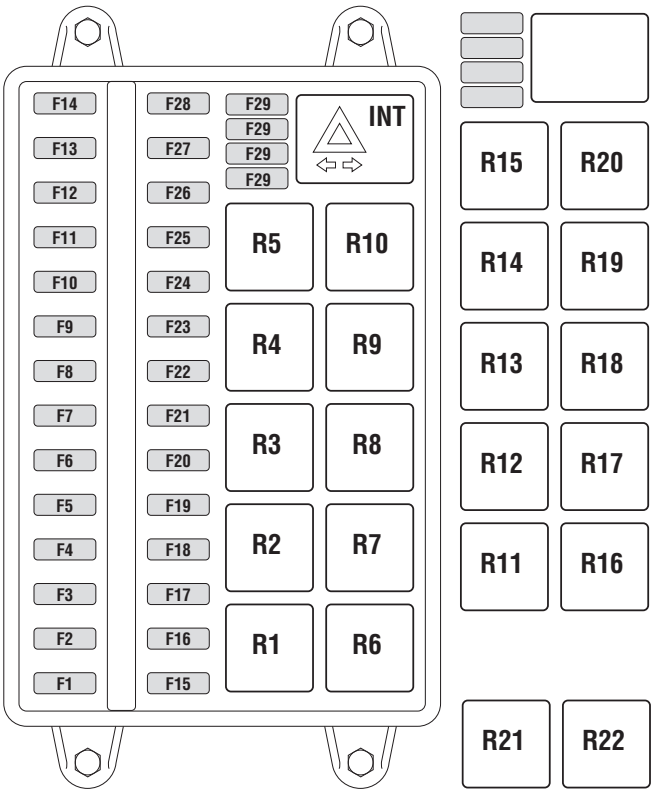
6.4.1.2 Fuses and relays



FUSES

Ref.	Circuit	Amp.
F1	Power supply: cab lights, hazard warning lights switch, turn signals +30	**15**
F2	Power supply: **R8** relay	**10**
F3	Power supply: **R1** relay	**10**
F4	Blank for optional accessories	**10**
F5	Front right/rear left position lights, license plate lights, position lights indicator, water temperature and hydraulic oil temperature gauge lighting	**10**
F6	Front left/rear right position lights, fuel gauge-hourmeter lighting, position lights switch lighting, **R1** relay pickup	**10**
F7	Right low beam, fog lamp switch power supply	**10**
F8	Left low beam	**10**
F9	Right high beam, high beam indicator	**10**
F10	Left high beam	**10**
F11	Horn	**10**
F12	Windscreen washer motor	**10**
F13	Blank for optional accessories	**5**
F14	Blank for optional accessories	**15**
F15	Power supply: hazard warning lights and turn signals +15	**5**
F16	Power supply: **R6** relay	**10**
F17	Power supply: **R2**, road safety switch, shafting sensor, parking brake sensor, **R8** relay pickup	**10**
F18	Power supply: fuel reserve indicator, air filter clogging indicator, hydraulic oil temperature indicator, water temperature indicator, engine oil pressure indicator, brake fault indicator, gen-set indicator, water temperature and hydraulic oil temperature indicator light, fuel gauge and hourmeter, hydrostop	**15**
F19	Power supply: **R7** relay, optional attachment switch	**25**
F20	Power supply: rear windscreen wiper motor	**15**
F21	Power supply: emergency pushbutton switch	**15**
F22	Power supply: A/C compressor	**15**
F23	Power supply and lighting of the heating fan switch	**15**
F24	Power supply: **R4** relay, **R5** relay	**10**
F25	Power supply: beacon	**15**
F26	Power supply: windscreen wiper/washer motor, lights switch	**15**
F27	Power supply: **R9** relay	**7.5**
F28	Power supply: extension jib and optional winch	**7.5**
F29	Spare fuses	

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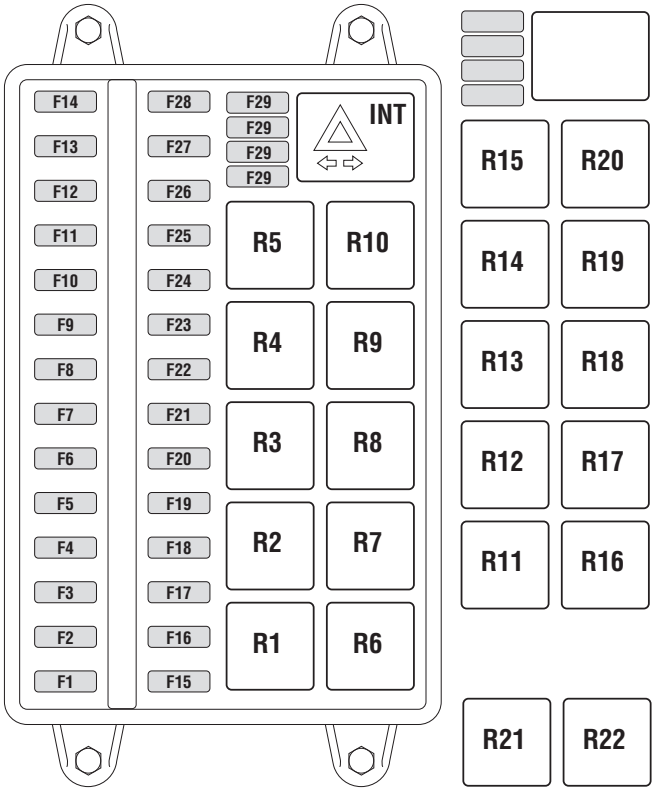
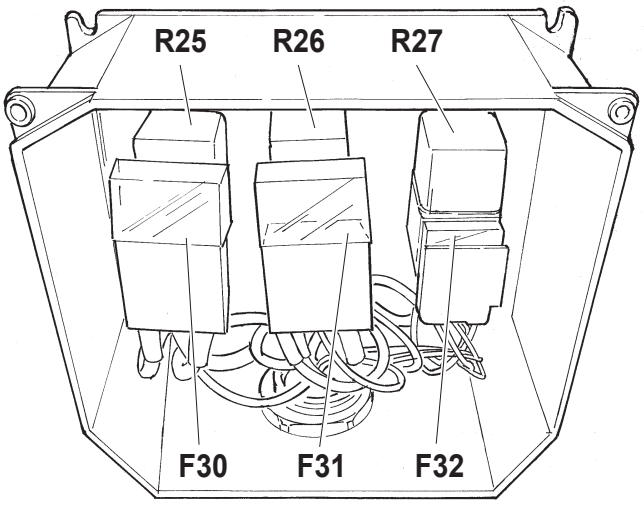
RELAYS

Ref.	Circuit
R1	Work lights switch power supply enabling
R2	Parking brake indicator, **R3** pickup enabling command
R3	Engine start with parking brake engaged
R4	Forward speed
R5	Reverse speed
R6	Power supply enabling command: **R7** relay
R7	Outrigger enabling command
R8	Power supply enabling command: **R6** relay, Crab/4-wheel steering selector
R9	Overload warning system
R10	ARB connector power supply enabling
INT	Flashing
R11	Platform power supply enabling command
R12	TÜV solenoid valve enabling command
R13	Enabling command to **R16** relay
R14	Engine stop with platform enabled
R15	Engine stop enabled by platform key
R16	**R20** relay power supply enabling command, ARB connector
R17	Start relay pickup enabling command
R18	Rear axle locking
R19	Enabling command for outriggers' down-movement with machine ARB in alarm and boom lowered
R20	**R11** relay power supply enabling command
R21	Boom extraction proportional SV enabling command
R22	Boom retraction proportional SV enabling command



6.4.1.3 Engine compartment fuses and relays

Ref.	Circuit	Amp.
F30	Fuse	**50**
F31	Fuse	**50**
F32	Fuse	**15**
R25	Relay	
R26	Relay	
R27	Relay	



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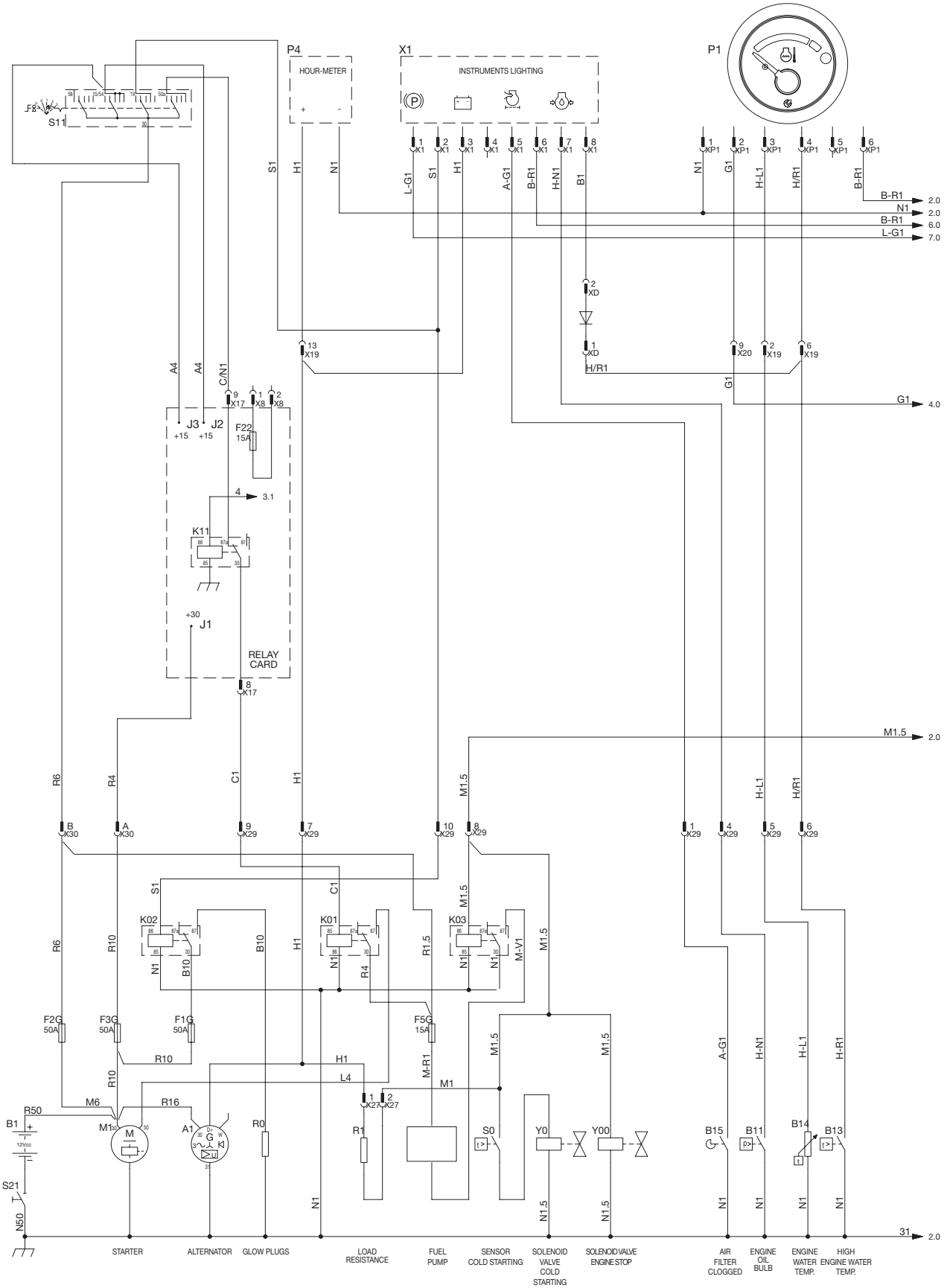
6.4.2 Wiring diagrams (for machines with new cab)

Sheet 1 of 9



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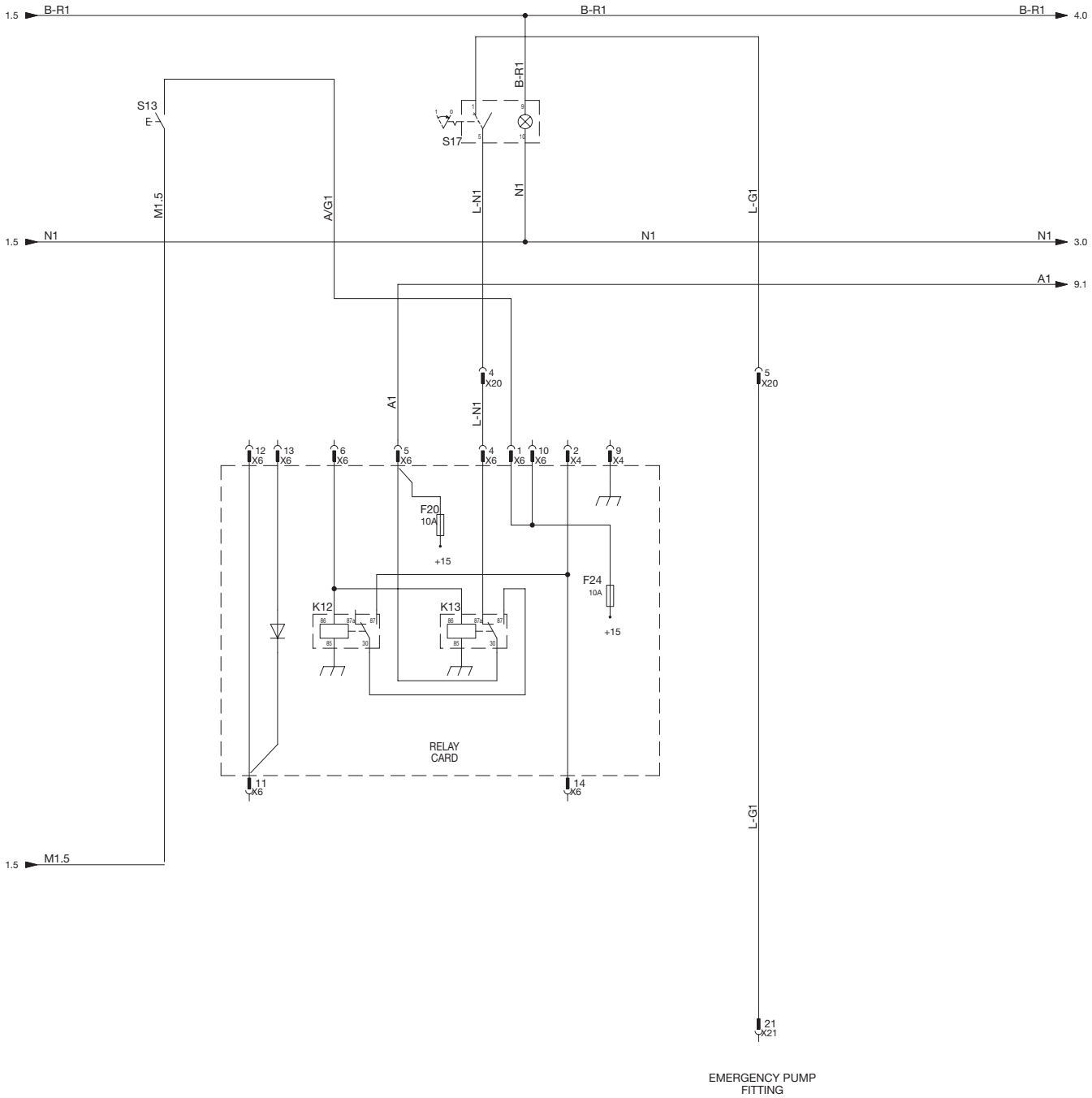
Sheet 2 of 9



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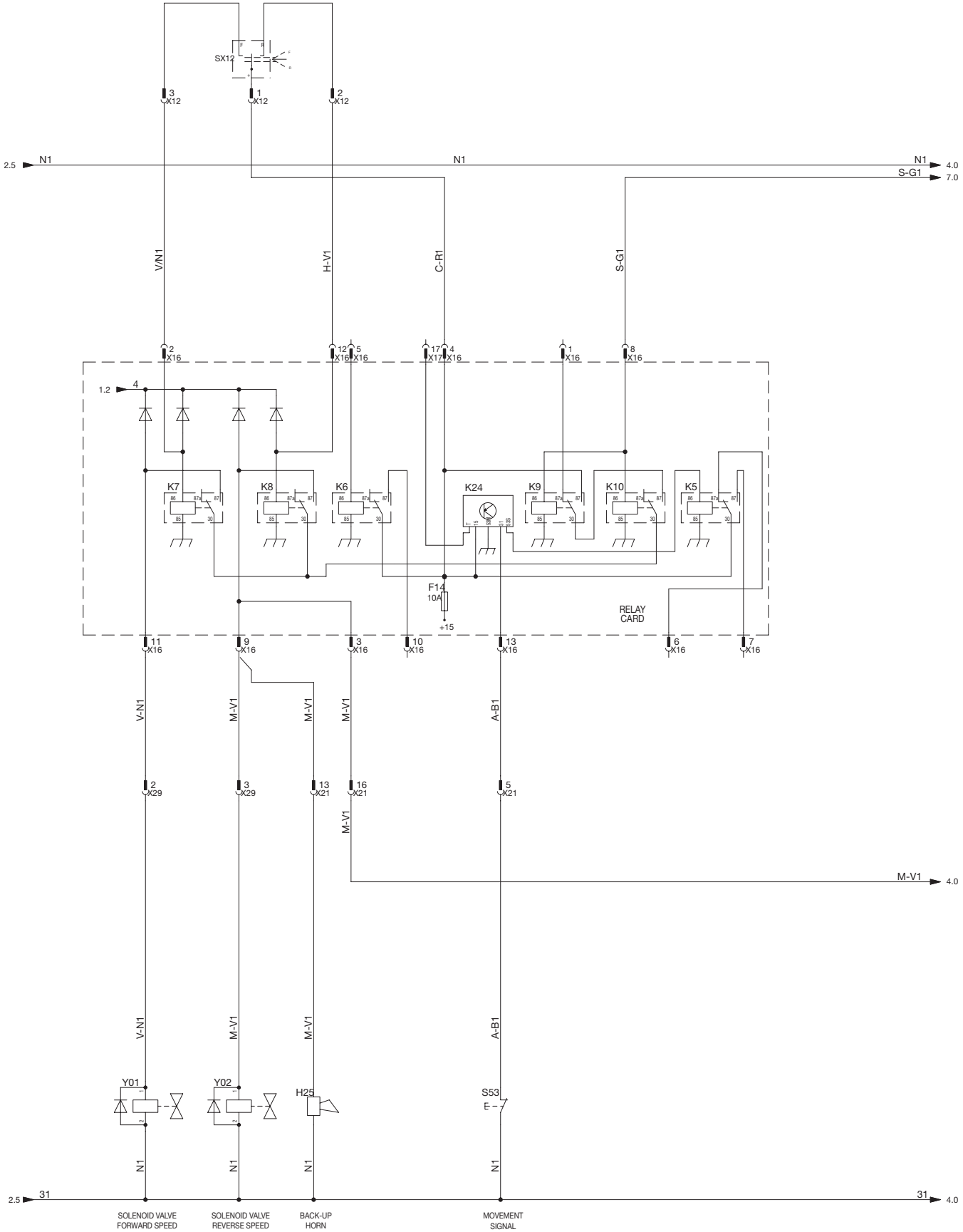
Sheet 3 of 9



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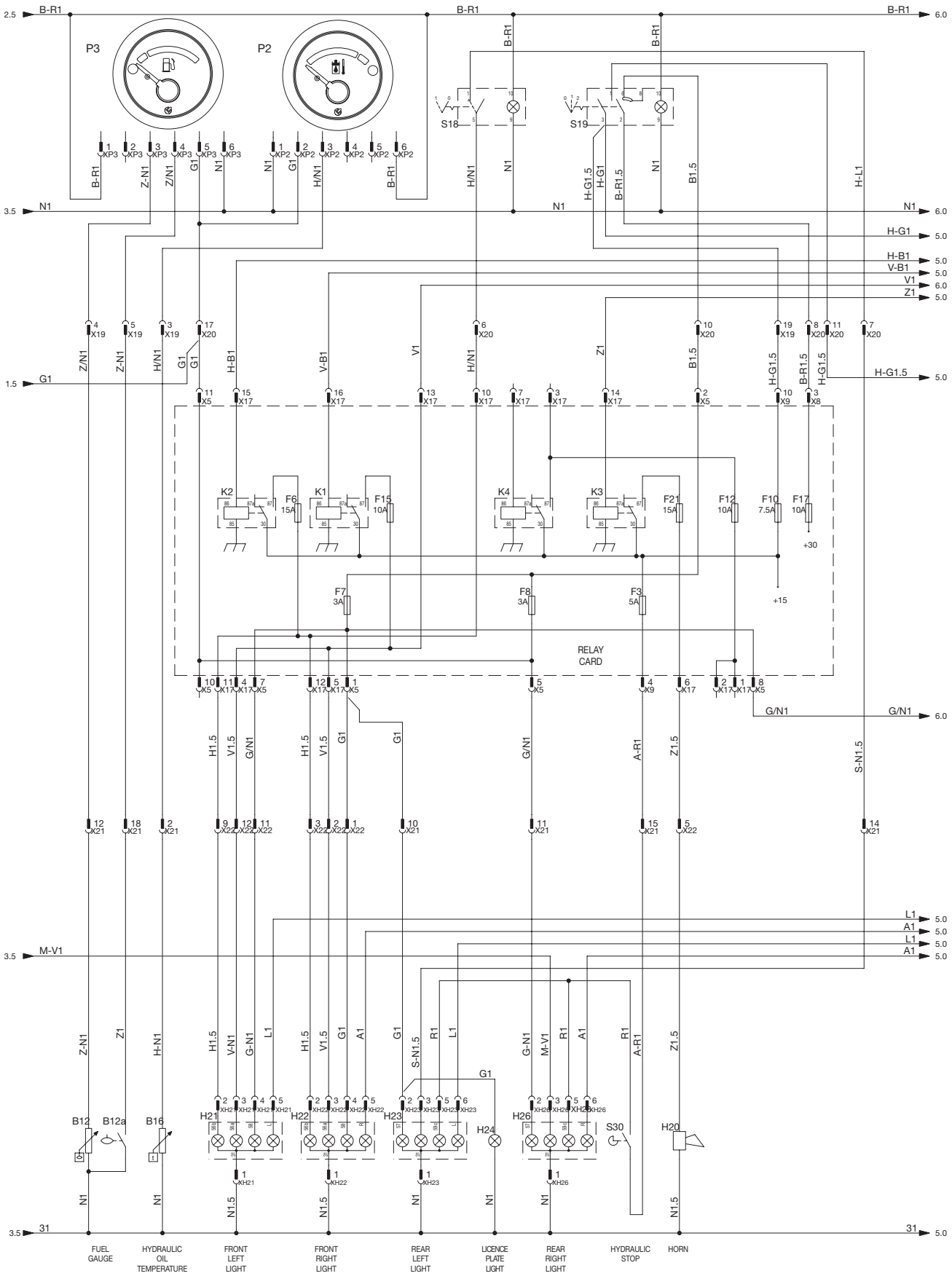

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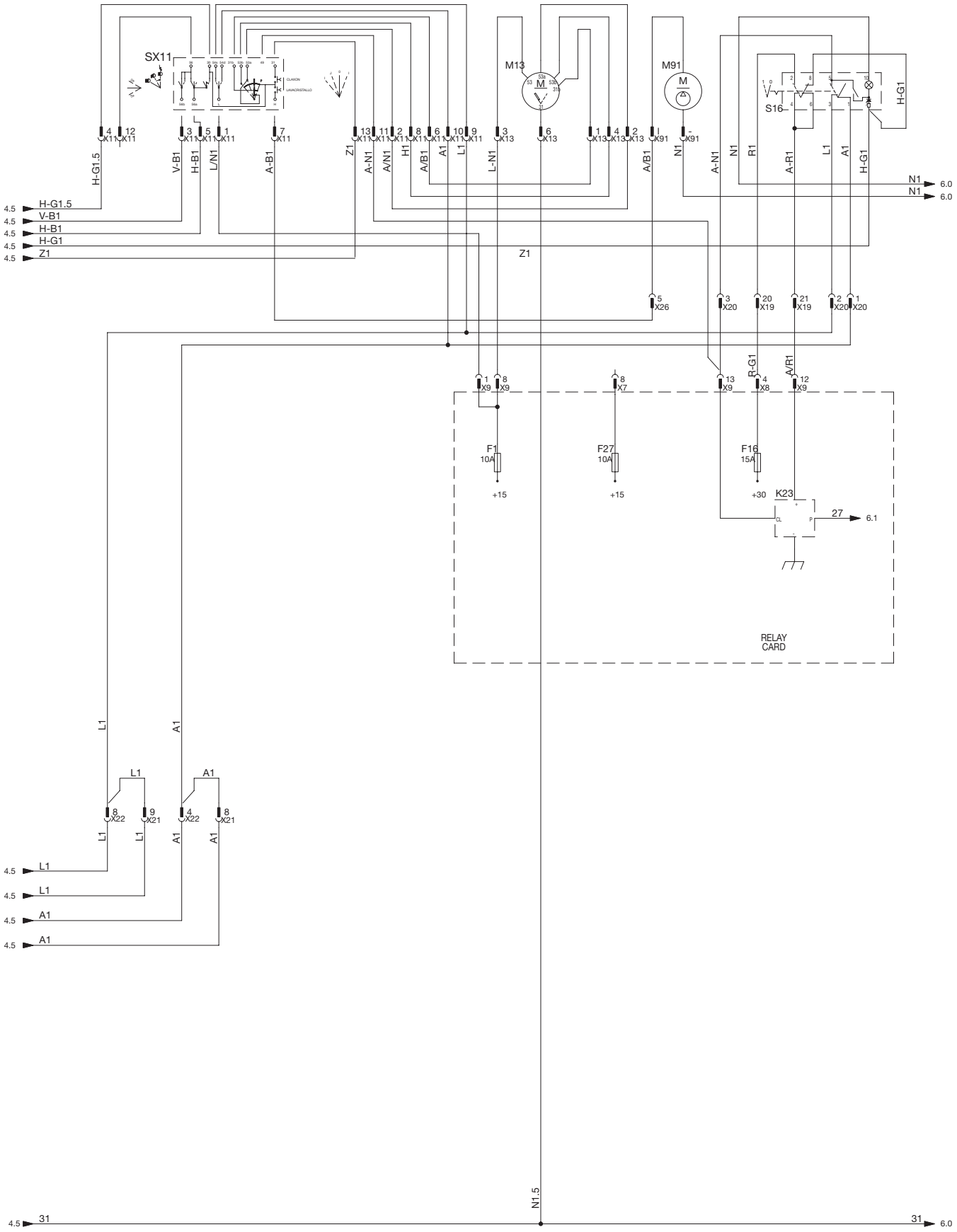
Sheet 5 of 9



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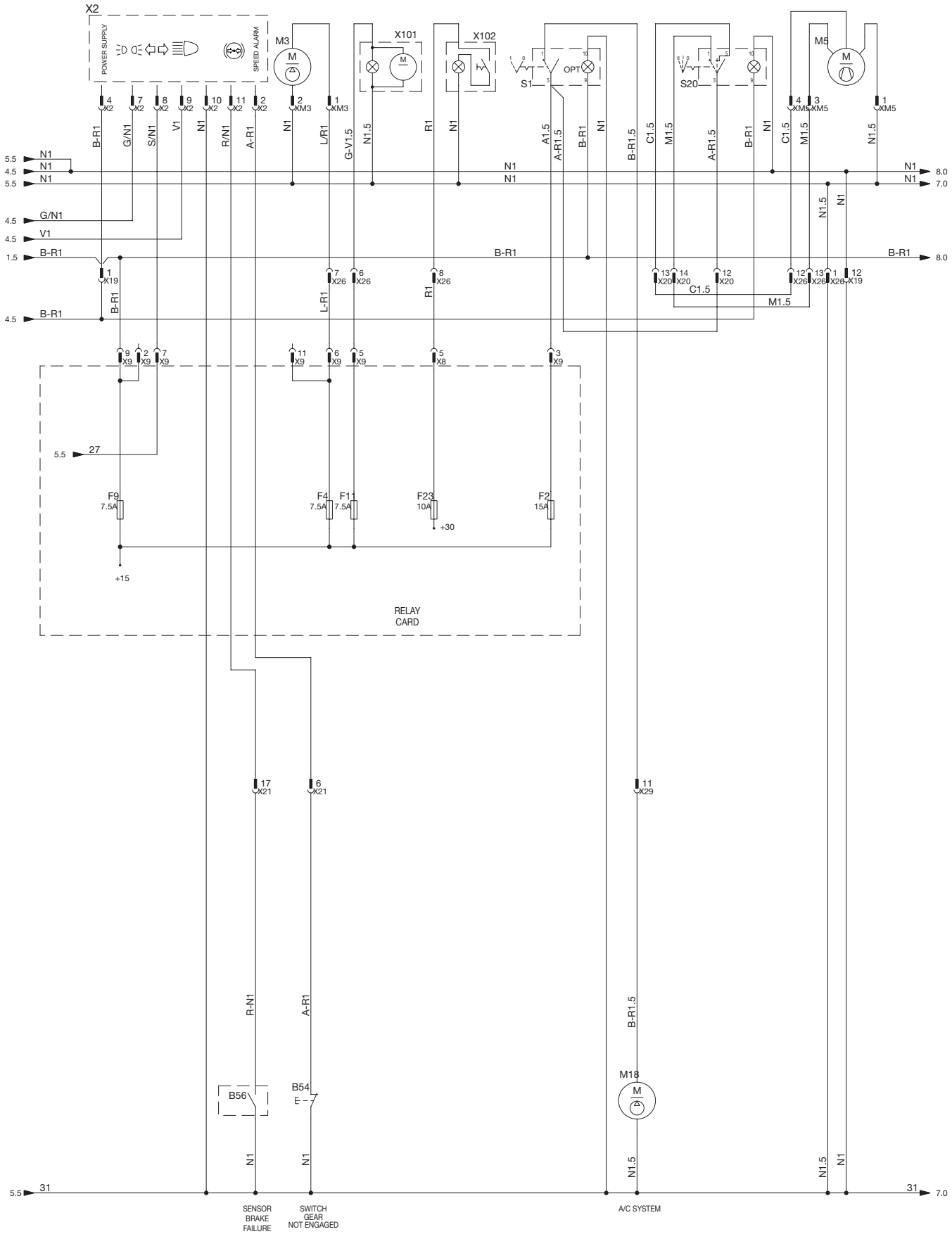
Sheet 6 of 9



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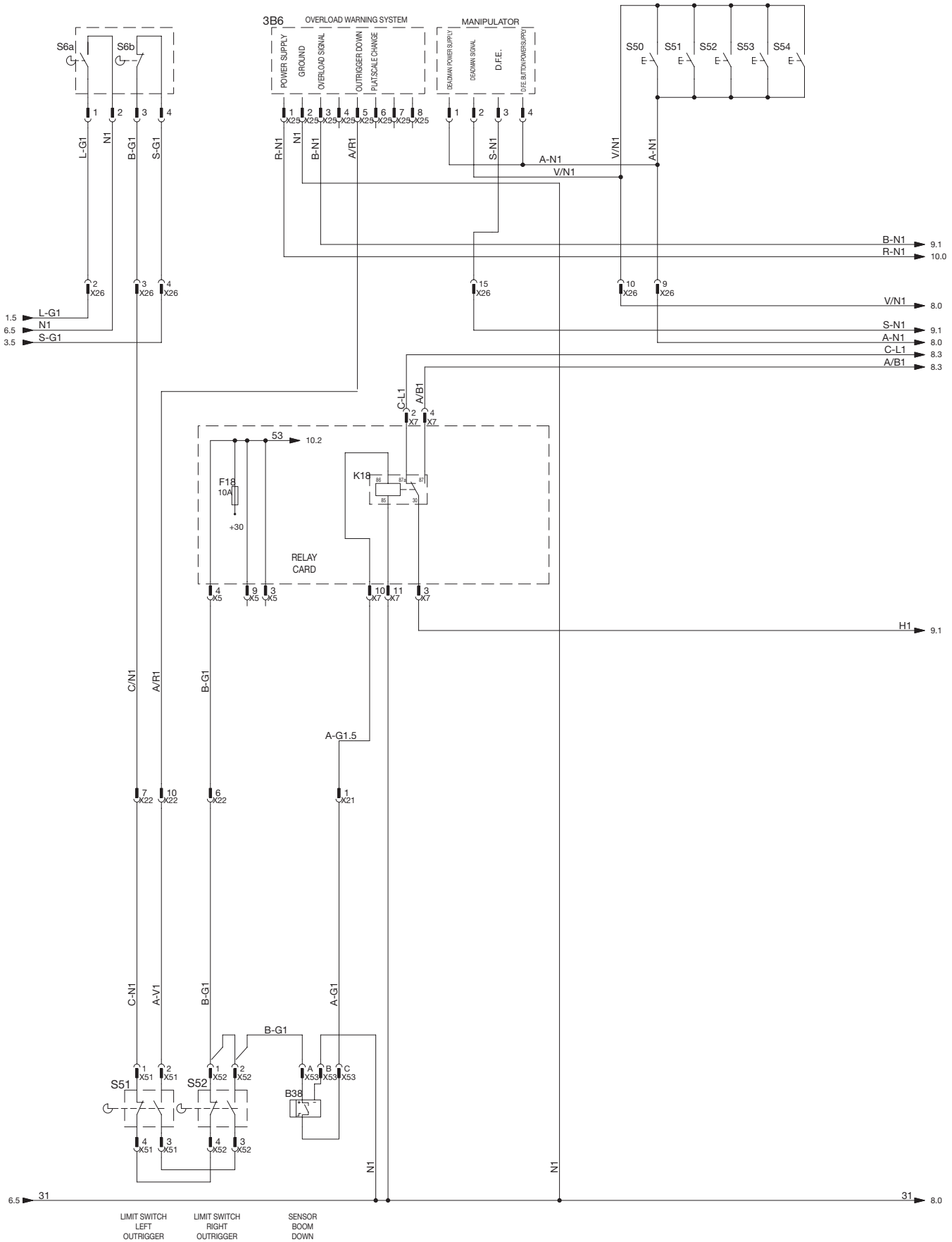

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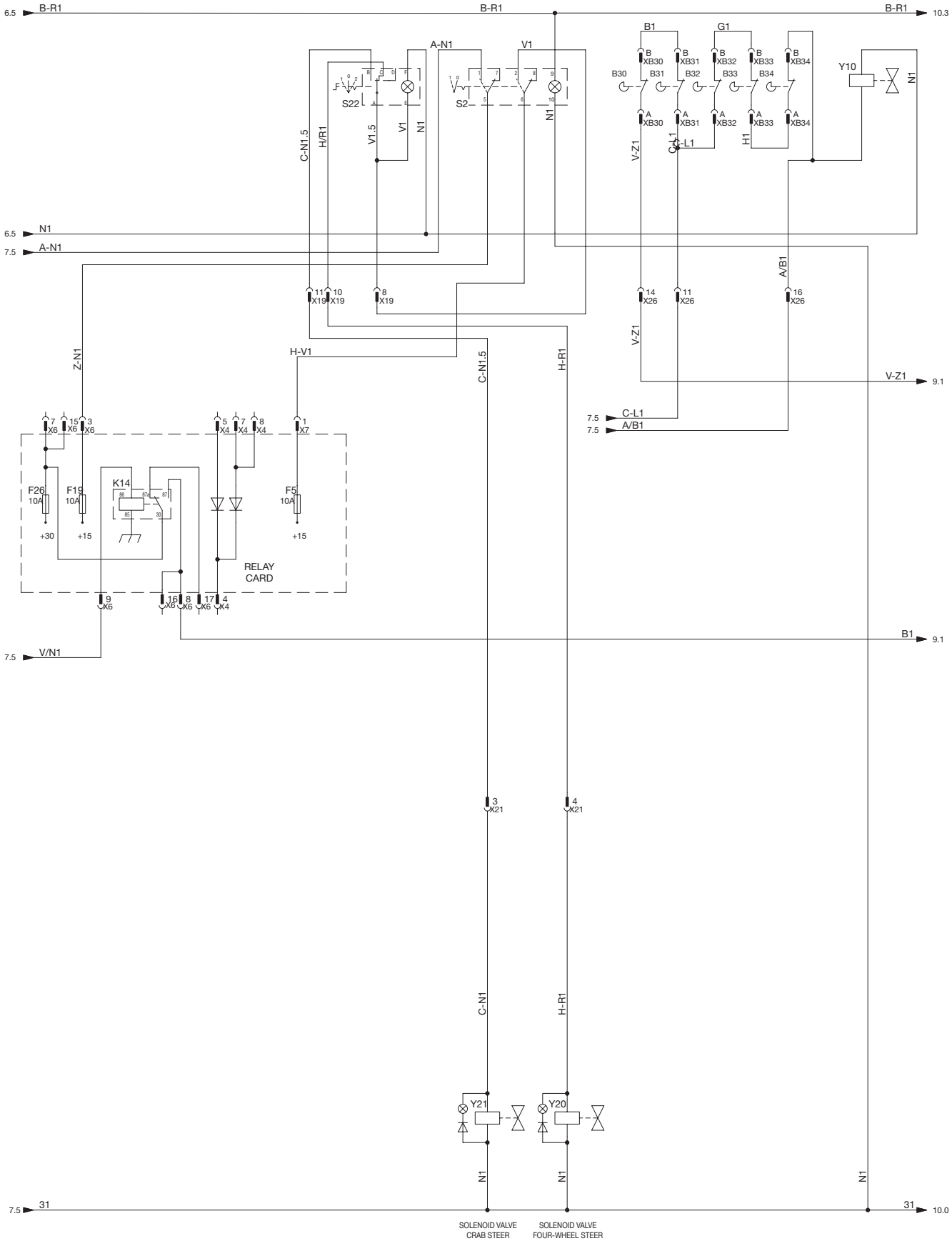
Sheet 8 of 9



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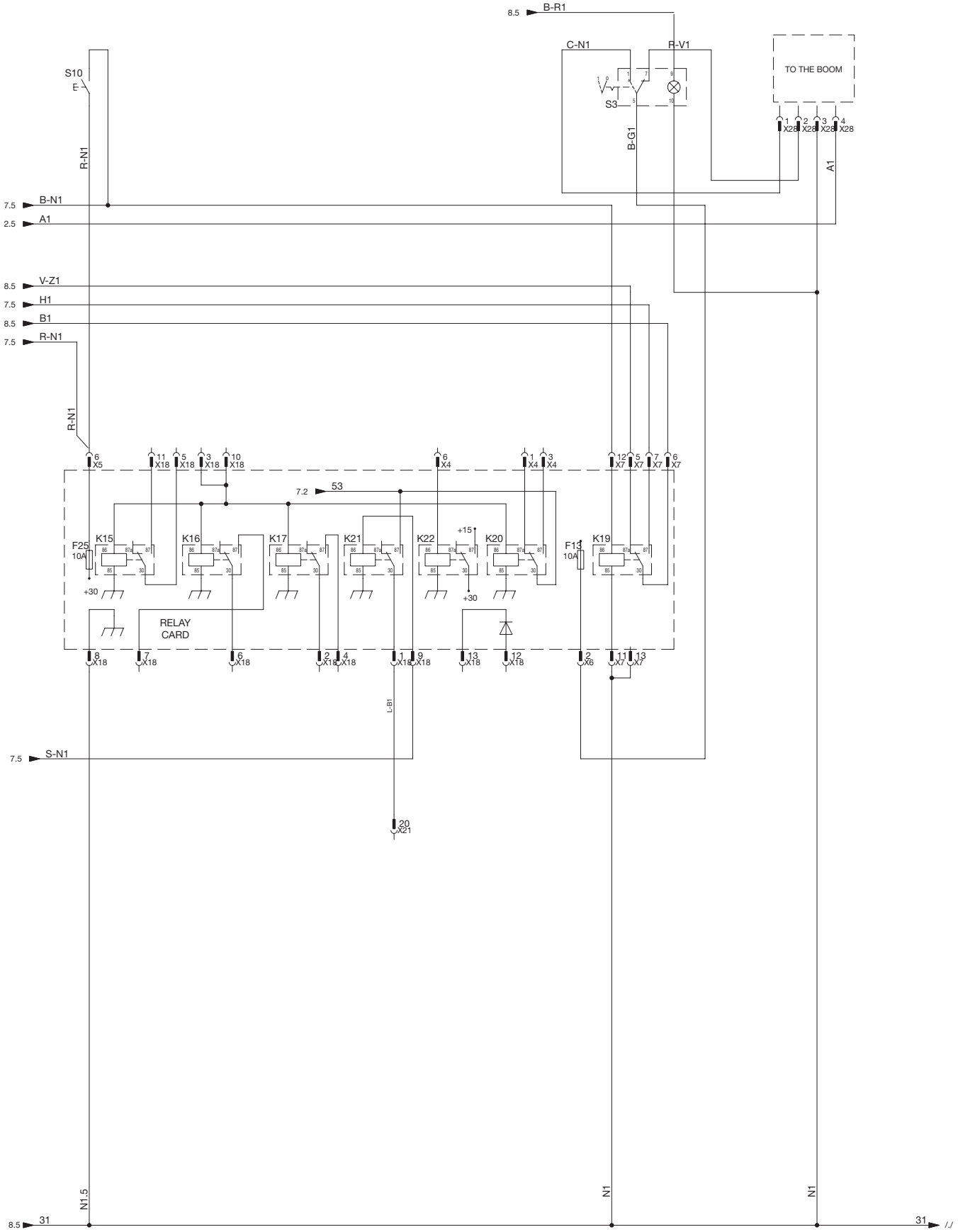
Sheet 9 of 9



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6.4.2.1 Wiring diagram - Component description

Ref.	Description	Sheet
A1	ALTERNATOR	1
B1	BATTERY	1
B11	PRESSURE SWITCH - ENGINE OIL FILTER	1
B12	FUEL GAUGE	4
B12A	FUEL RESERVE	4
B13	THERMOSTAT - HIGH ENGINE WATER TEMPERATURE	1
B14	THERMOMETER - HIGH ENGINE WATER TEMP.	1
B15	MICRO-SWITCH - AIR FILTER CLOGGED	1
B16	THERMOMETER - HIGH HYDRAULIC OIL TEMP.	4
B30	MICRO-SWITCH - EXTENSION	8
B31	MICRO-SWITCH - DOWN-MOVEMENT	8
B32	MICRO-SWITCH - SWAY	8
B33	MICRO-SWITCH - RIGHT OUTRIGGER	8
B34	MICRO-SWITCH - LEFT OUTRIGGER	8
B38	BOOM LIFTING SENSOR	7
B54	SWITCH - SPEED NOT ENGAGED	6
F1	10A FUSE - HAZARD WARNING LIGHTS	5
F2	15A FUSE - HEATING	6
F3	5A FUSE - STOP LIGHT MICRO-SWITCH	4
F4	7.5A FUSE - REAR WIPER	6
F5	10A FUSE - HYDRAULIC ACTIVATION	8
F6	15A FUSE - LOW BEAM	4
F7	3A FUSE - RIGHT POSITION LIGHTS	4
F8	3A FUSE - INSTRUMENT LIGHTING	4
F9	7.5A FUSE - INDICTAOR LIGHTS POWER SUPPLY	6
F10	7.5A FUSE - LIGHTS SWITCH	4
F11	7.5A FUSE - BEACON	6
F12	10A FUSE - WORK LIGHTS	4
F13	10A FUSE - WALVOIL CONTROL UNIT	9
F14	10A FUSE - SPEED SWITCH	3
F15	10A FUSE - HIGH BEAM	4
F16	15A FUSE - EMERGENCY	5
F17	10A FUSE - LIGHTS AND FLASHING	4
F18	10A FUSE - OUTRIGGERS	7
F19	10A FUSE - WORK MODE SELECTOR	8
F20	10A FUSE - PLATFORM EMERGENCY BUTTON	2
F21	15A FUSE - HORN	4
F22	15A FUSE - OPTIONAL	1
F23	10A FUSE - CAB LIGHTS	6
F24	10A FUSE - EMWERGENCY STOP	2
F25	10A FUSE - 3B6 CONTROL UNIT	9
F26	10A FUSE - OPTIONAL	8
F27	10A FUSE - OPTIONAL	5
F1G	MAIN FUSE 50A	1
F2G	MAIN FUSE 50A	1
F3G	MAIN FUSE 50A	1
F5G	MAIN FUSE 15A	1
H20	HORN	4
H21	FRONT LEFT LIGHT	4
H22	FRONT RIGHT LIGHT	4
H23	REAR LEFT LIGHT	4
H24	LICENCE PLATE LIGHT	4
H25	BACK-UP HORN	3
H26	REAR RIGHT LIGHT	4
K01	RELAY - START-UP	1
K02	RELAY - PRE-HEATING	1
K03	RELAY - ENGINE STOP	1
K1	RELAY - HIGH BEAM	4
K2	RELAY - LOW BEAM	4
K3	RELAY - HORN	4
K4	RELAY - OPTIONAL	4
K7	RELAY - FORWARD SPEED	3
K8	RELAY - REVERSE SPEED	3
K9	RELAY - TRANSMISSION DISCONNECTED	3
K10	RELAY - TRANSMISSION DISCONNECTED	3
K11	RELAY - START-UP ENABLING COMMAND	1
K14	RELAY - DEADMAN	8
K18	RELAY - LOW BOOM SENSOR	7
K19	RELAY - OVERLOAD WARNING SYSTEM	9
K21	RELAY - D.F.E.	9
K23	INTERMITTENCE	5
M1	STARTING MOTOR	1
M3	REAR WINDSCREEN WIPER/WASHER	6
M5	HEATING FAN	6
M13	WINDSCREEN WIPER/WASHER MOTOR	5
M18	A/C SYSTEM	6
M91	PUMP MOTOR	5
P1	ENGINE WATER THERMOSTAT	1
P2	HYDRAULIC OIL TEMPERATURE	4
P3	FUEL GAUGE	4
P4	HOUR-METER	1
R0	GLOW PLUGS	1
R1	LOAD RESISTANCE	1
S0	COLD STARTING TEMPERATURE SENSOR	1
S01	START-UP PANEL	1
S1	SWITCH - OPT. AIR CONDITIONER	6
S2	SWITCH - HYDRAULIC ACTIVATION	8
S3	SWITCH - JIB	9
S4	START-UP PANEL	8
S6A	PARKING BRAKE MICRO-SWITCH	7
S6B	PARKING BRAKE MICRO-SWITCH	7
S7	SWITCH - A/C SYSTEM	6
S10	OVERLOAD CUTOUT	9
S13	EMERGENCY MUSHROOM-HEAD PUSHBUTTON	2
S14	SWITCH - MECHANICAL GEARBOX	3
S16	SWITCH - HAZARD WARNING LIGHT	5
S17	SWITCH - EMERGENCY PUMP	2
S18	SWITCH - BACK-UP LAMP	4
S19	SWITCH - LIGHTS	4
S20	SWITCH - HEATER	6
S21	BATTERY CUTOUT	1
S22	SWITCH - STEERING	8
S30	HYDROSTOP	4
S50	DEADMAN BUTTON	7

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Ref.	Description	Sheet
S51	DEADMAN BUTTON	7
S52	DEADMAN BUTTON	7
S53	DEADMAN BUTTON	7
S53	MOVEMENT SIGNAL	3
S54	DEADMAN BUTTON	7
SX12	SPEED SWITCH	3
SX11	LIGHTS -WIPERS-HORN SELECTOR	5
SX12	SPEED SELECTOR	3
X1	CONNECTOR INDICATOR LIGHTS	
X2	CONNECTOR INDICATOR LIGHTS	
X4	9-WAY MARK CONNECTOR	
X5	11-WAY MARK CONNECTOR	
X6	17-WAY MARK CONNECTOR	
X7	9-WAY MARK CONNECTOR	
X8	5-WAY MARK CONNECTOR	
X9	13-WAY MARK CONNECTOR	
X11	13-WAY MARK CONNECTOR	
X12	5-WAY MARK CONNECTOR	
X13	6-WAY CONNECTOR	
X16	13-WAY MARK CONNECTOR	
X17	17-WAY MARK CONNECTOR	
X18	13-WAY MARK CONNECTOR	
X19	21-WAY MARK CONNECTOR	
X20	17-WAY MARK CONNECTOR	
X21	40-WAY DEUTSCH CONNECTOR - TYPE B	
X22	12-WAY DEUTSCH CONNECTOR	
X25	8-WAY CONNECTOR	
X26	17-WAY MARK CONNECTOR	
X27	2-WAY CONNECTOR	8
X28	4-WAY DEUTSCH CONNECTOR	
X29	24-WAY DEUTSCH CONNECTOR	
X30	2-WAY CONNECTOR	
X34	2-WAY 90° CONNECTOR	
X51	4-WAY DEUTSCH CONNECTOR	
X52	4-WAY DEUTSCH CONNECTOR	
X53	3-WAY DEUTSCH CONNECTOR	
X91	2-WAY 90° CONNECTOR	
X101	BEACON	6
X102	CAB LIGHTS	6
XB30	2-WAY DT CONNECTOR	8
XB31	2-WAY DT CONNECTOR	8
XB32	2-WAY DT CONNECTOR	8
XB33	2-WAY DT CONNECTOR	8
XB34	2-WAY DT CONNECTOR	8
XH21	6-WAY DEUTSCH CONNECTOR	
XH22	6-WAY DEUTSCH CONNECTOR	
XH23	6-WAY DEUTSCH CONNECTOR	
XH26	6-WAY DEUTSCH CONNECTOR	
XM3	2-WAY CONNECTOR	
XM5	4-WAY CONNECTOR	
XP1	6-WAY CONNECTOR	
XP2	6-WAY CONNECTOR	
XP3	6-WAY CONNECTOR	
XV1	3-WAY CONNECTOR	

Ref.	Description	Sheet
Y0	SOLENOID VALVE - COLD STARTING	1
Y00	SOLENOID VALVE - ENGINE STOP	1
Y01	SOLENOID VALVE - FORWARD SPEED	3
Y02	SOLENOID VALVE - REVERSE SPEED	3
Y20	SOLENOID VALVE - FOUR-WHEEL STEER	8
Y21	SOLENOID VALVE - CRAB STEER	8

WIRE COLOURS

A LIGHT BLUE
B WHITE
C ORANGE
G YELLOW
H GREY
L BLUE
M BROWN
N BLACK
R RED
S PINK
V GREEN
Z PURPLE

REMARK: Two-colour wires are indicated through a combination of the aforesaid initials as follows:

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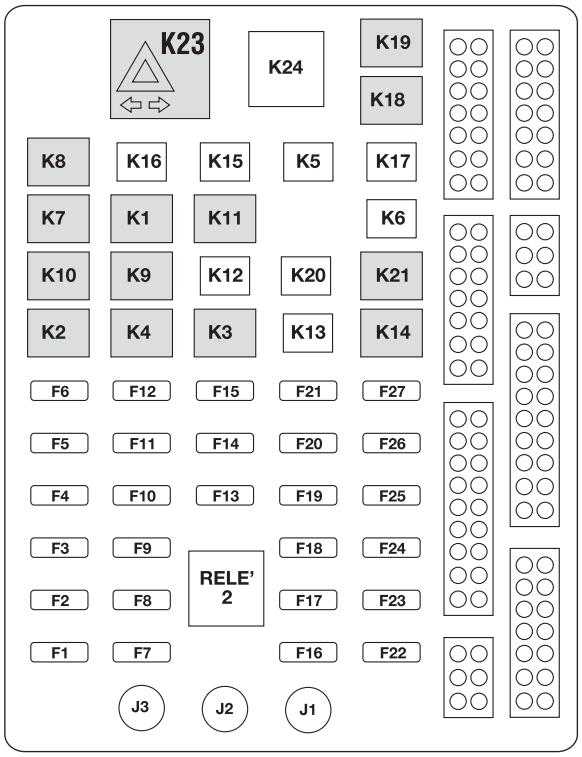
6.4.2.2 Fuses and relays



FUSES

Ref.	Circuit	Amp.
F1	Power supply: light switch and front wiper/washer motor	**10**
F2	A/C system and heater switch	**15**
F3	Stop light switch	**5**
F4	Power supply: rear wiper/washer motor	**7.5**
F5	Steer selector	**10**
F6	Right low beam	**15**
F7	Front right, rear right, front left position light; position light indicator	**3**
F8	Rear left position light, instrument backlight	**3**
F9	Power supply: instruments and warning lights	**7.5**
F10	Hazard warning lights	**7.5**
F11	Beacon power supply	**7.5**
F12	Blank for optional accessories	**10**
F13	Extension jib and winch line switch (optional)	**10**
F14	Power supply: **K9**, **K5**, **K6** relays, speed selector, **K24** relay pickup	**10**
F15	High beam indicator, right/left high beam	**10**
F16	Hazard warning light switch	**15**
F17	Position light and signal function switch	**10**
F18	Outrigger down limit switch	**10**
F19	Hydraulic operation switch	**10**
F20	Power supply: **K13** relay	**10**
F21	Horn	**15**
F22	Blank for optional accessories	**15**
F23	Cab ceiling fixture	**10**
F24	Power supply: mushroom-head emergency stop button	**10**
F25	Power supply: load limiting system cutout switch	**10**
F26	Power supply: **K14** relay	**10**
F27	Blank for optional accessories	

RELAYS

Ref.	Circuit
K1	High beam indicator
K2	Right high beam
K3	Horn
K4	Blank
K5	Blank
K6	Blank
K7	Forward speed solenoid valve
K8	Reverse speed solenoid valve
K9	**K7**, **K8** relay power supply enabling cmd
K10	**K7**, **K8** relay power supply enabling cmd
K11	Engine start-up enabling cmd with gear in neutral
K12	Blank
K13	Blank
K14	Relay dead man
K15	Blank
K16	Blank
K17	Blank
K18	Outrigger and sway function cutout
K19	Control block sensor power supply
K20	Blank
K21	DFE solenoid valve power supply
K22	Blank
K23	Turn signal flashing
K24	Blank

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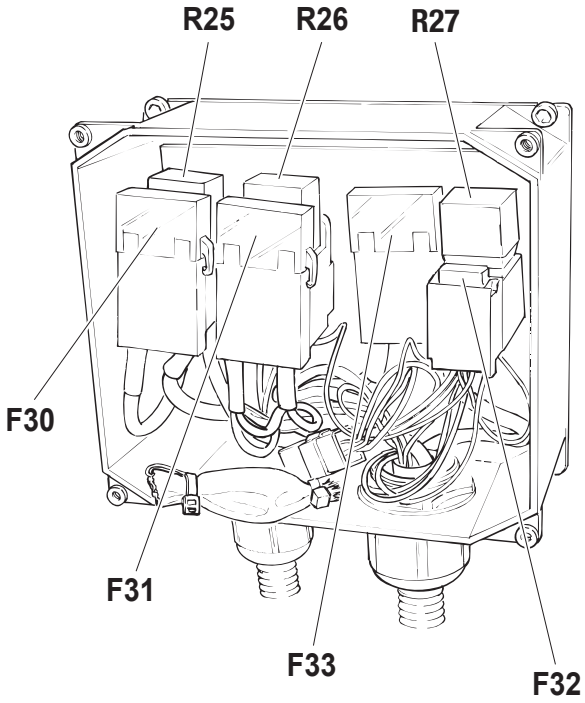
6.4.2.3 Engine compartment fuses and relays

Ref.	Circuit	Amp.
F30	Fuse	**50**
F31	Fuse	**50**
F32	Fuse	**15**
F33	Fuse	**50**
R25	Relay	**70**
R26	Relay	**70**
R27	Relay	**40**



Courtesy of Crane.Market

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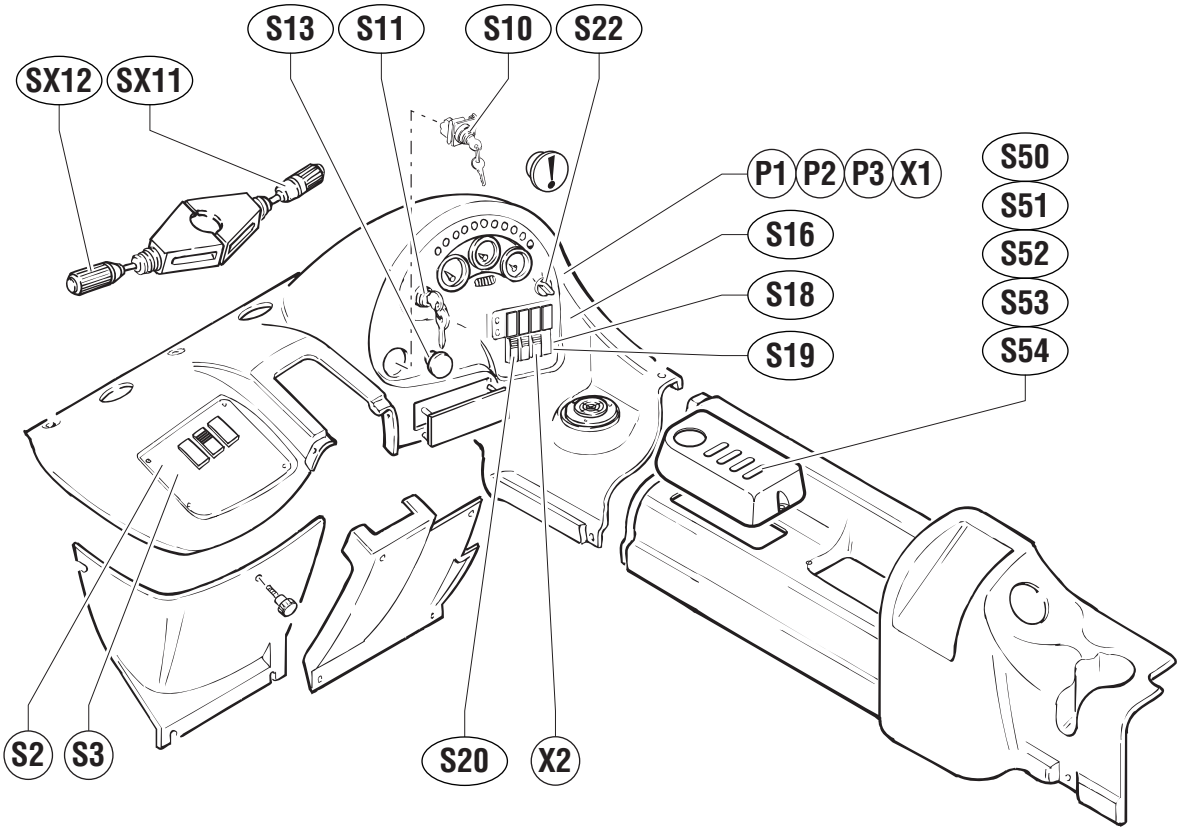
6.5 POSITION OF THE ELECTRIC AND HYDRAULICAL COMPONENTS ON THE MACHINE

CAUTION

All references under form of a digit are referred to hydraulic components; the remaining references are initials which can be found on the wiring diagram of the machine.

6.5.1 Electric components



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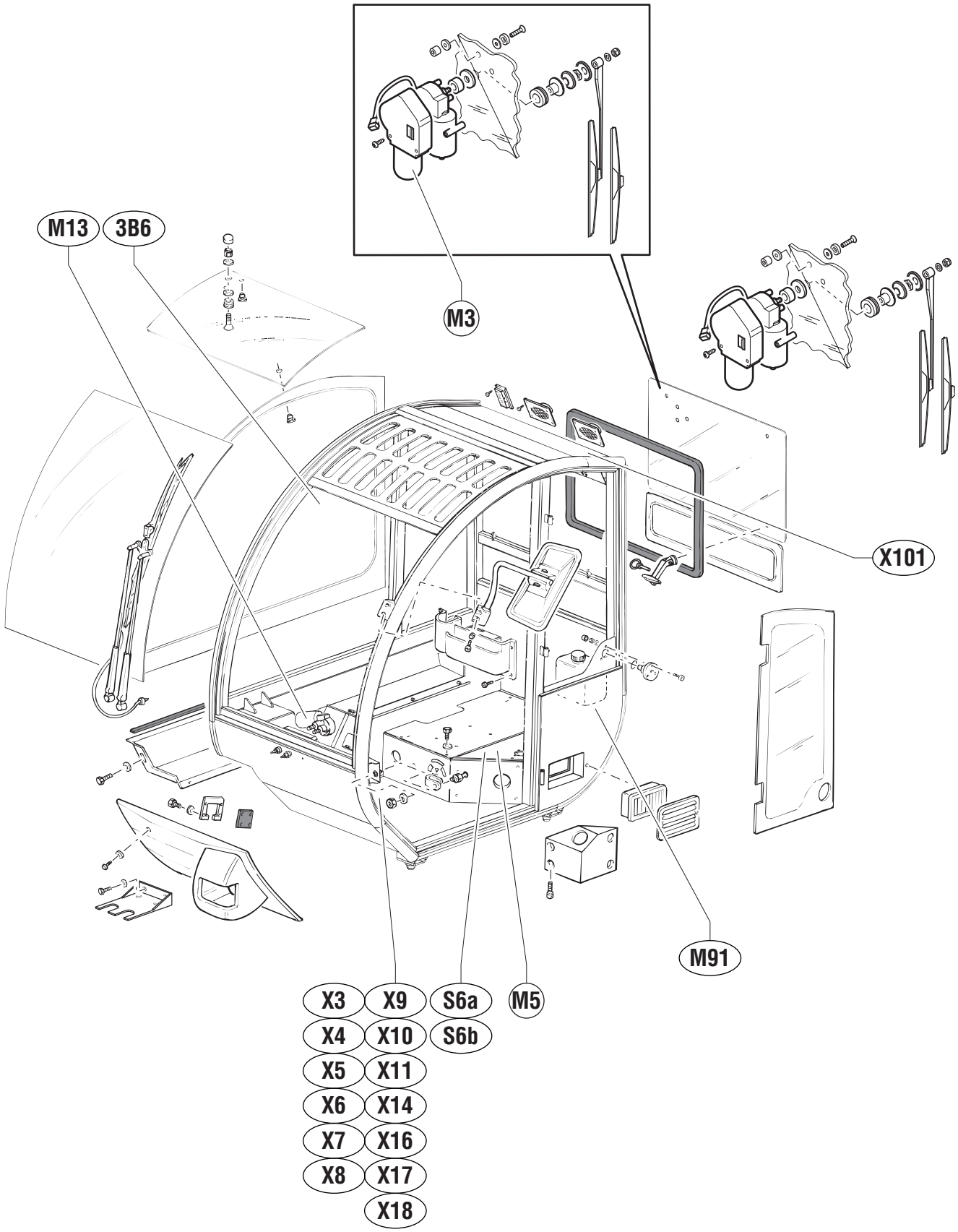

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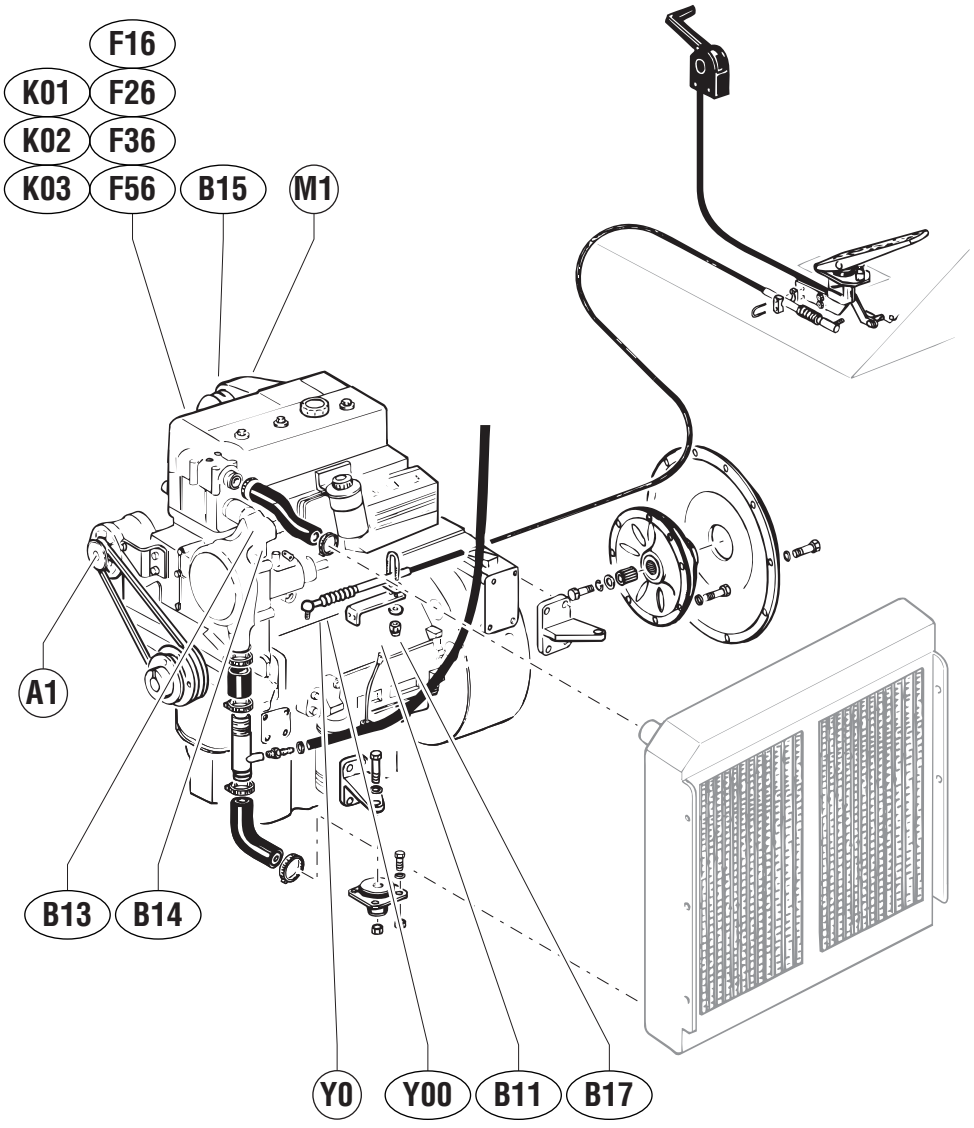

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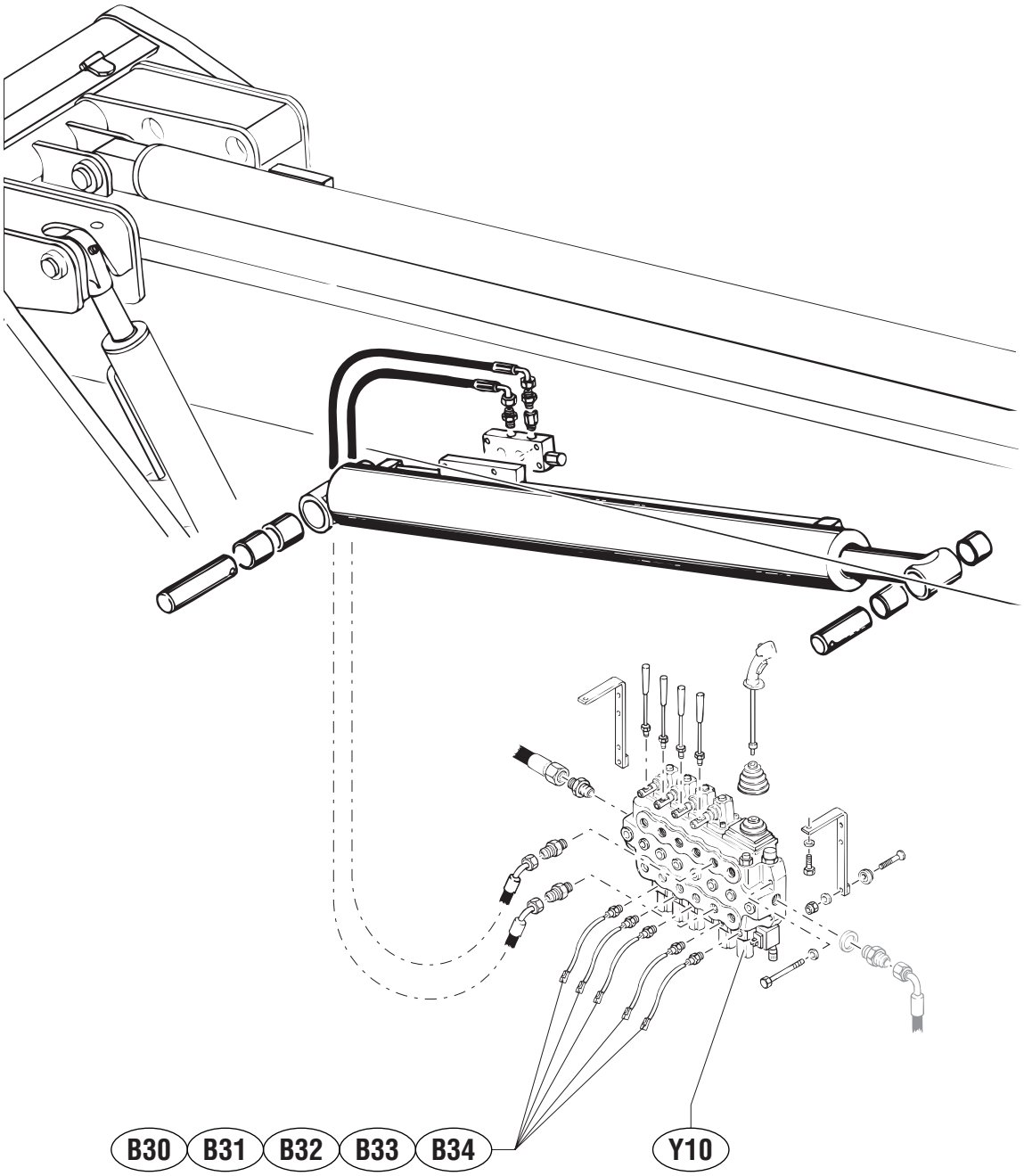

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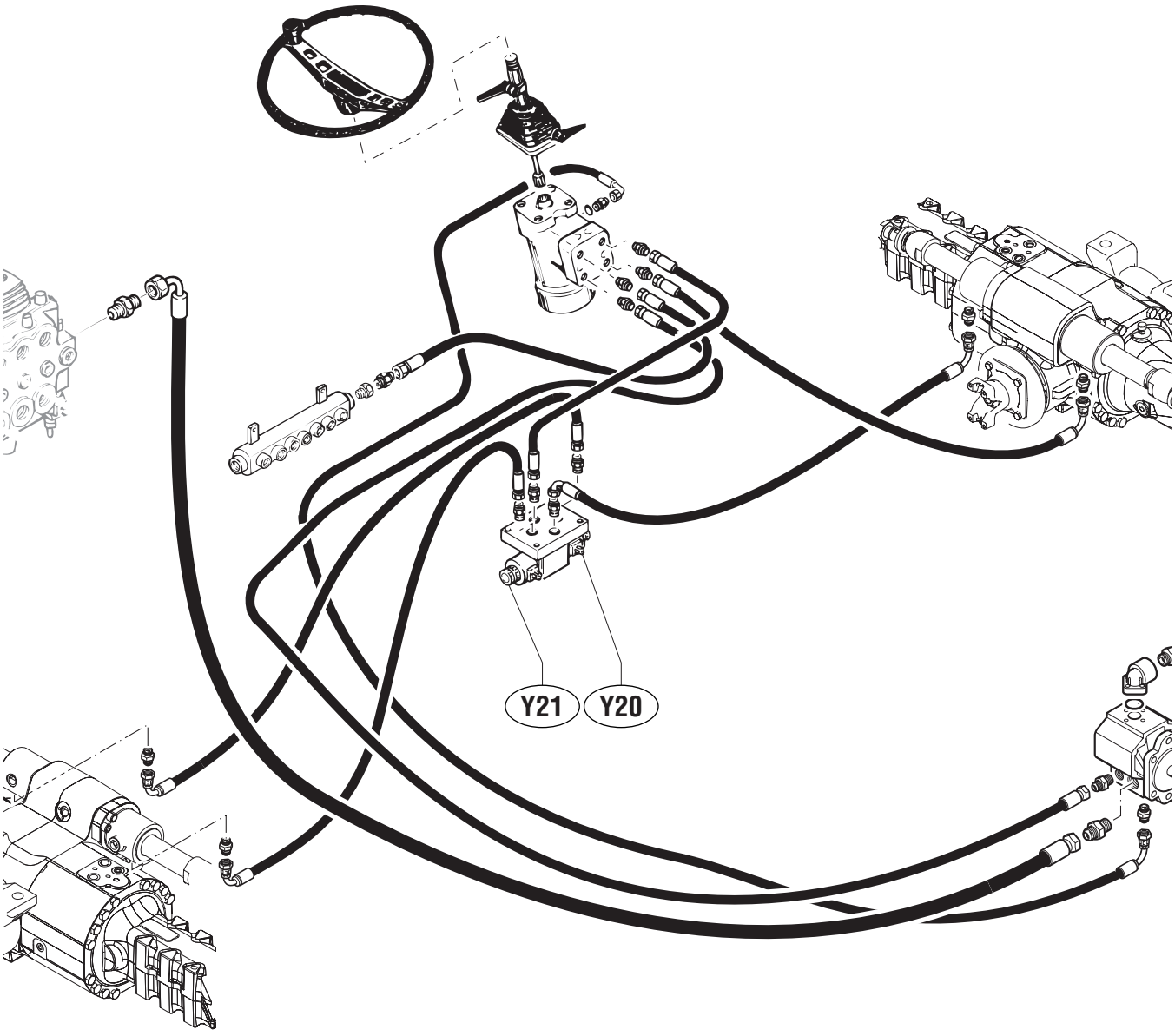

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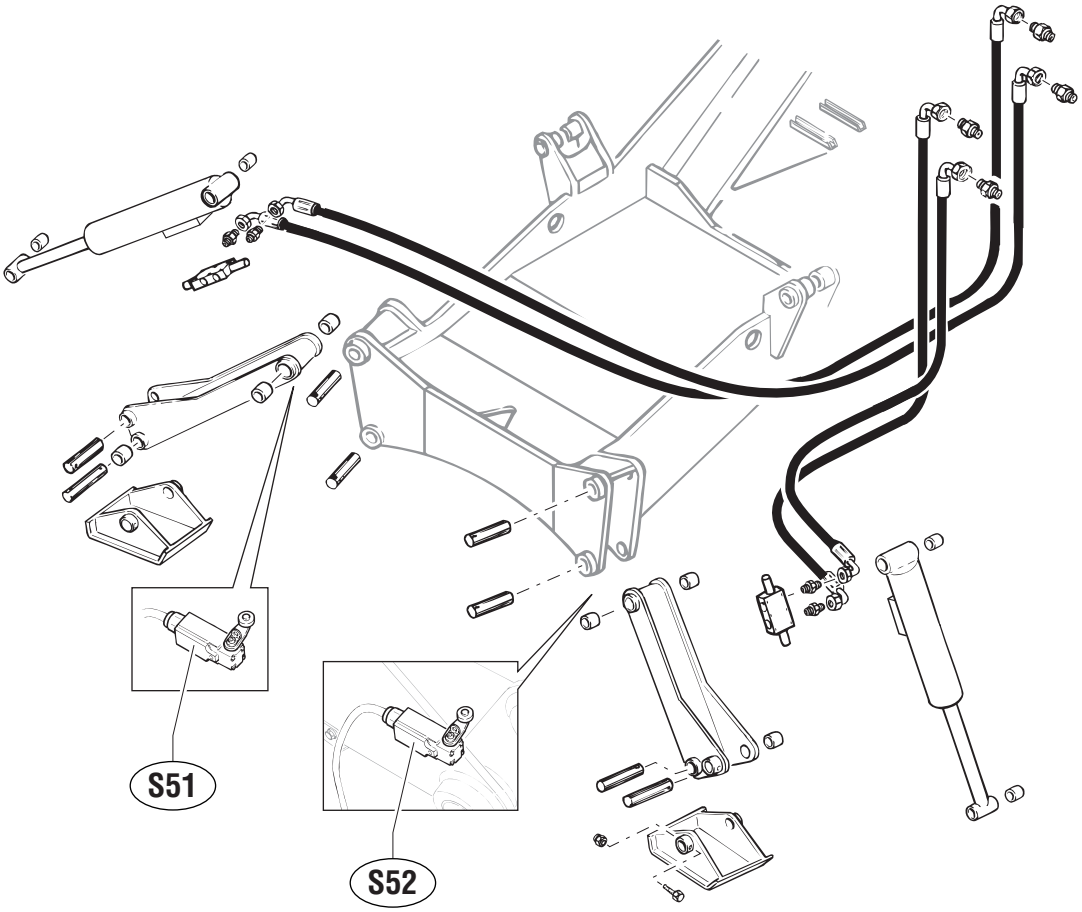

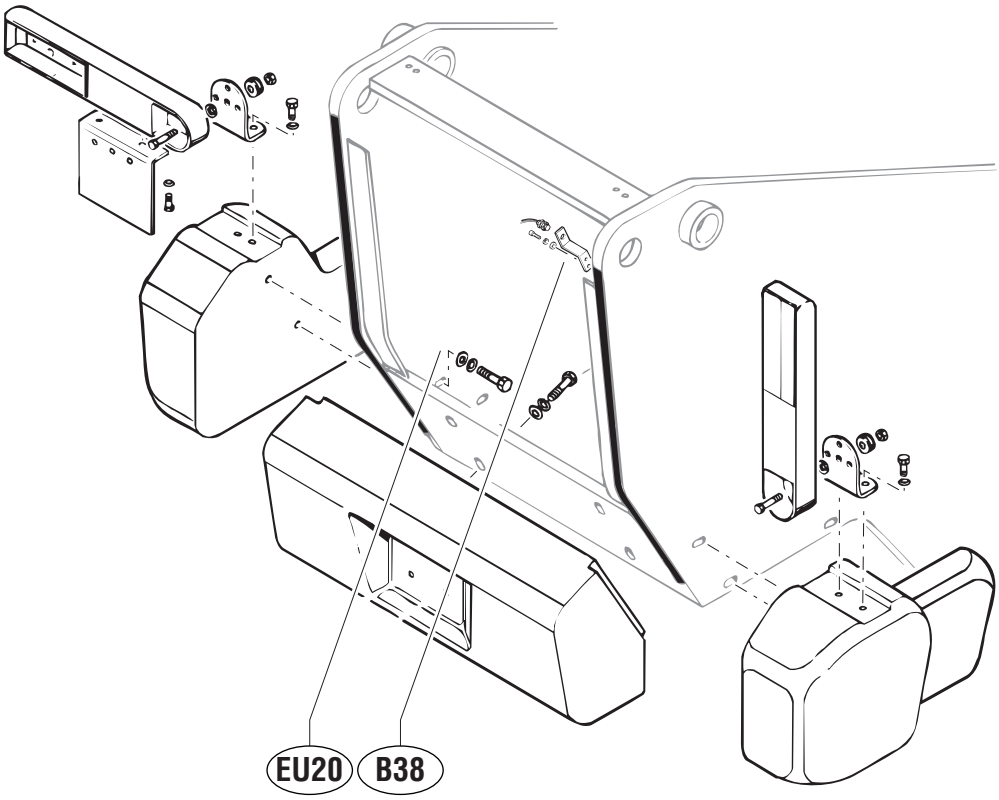

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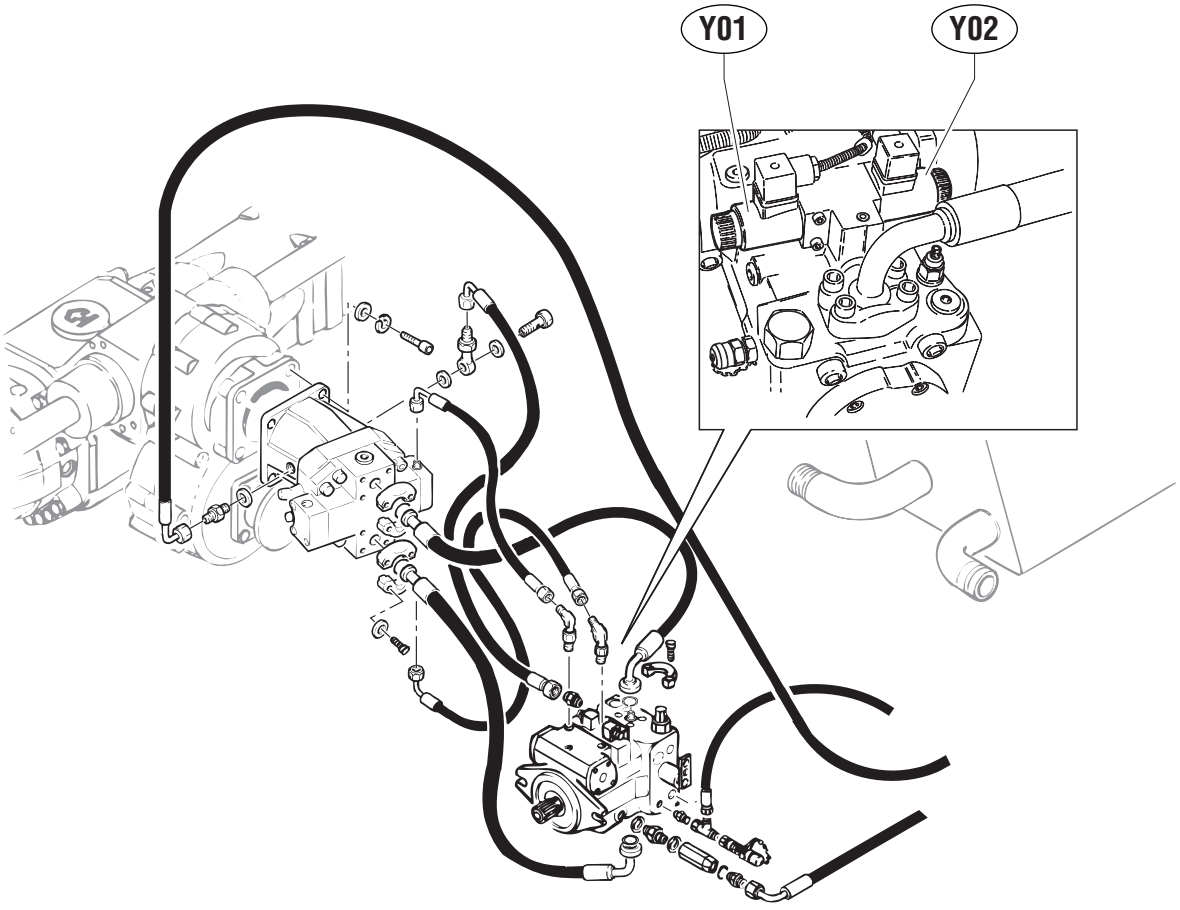

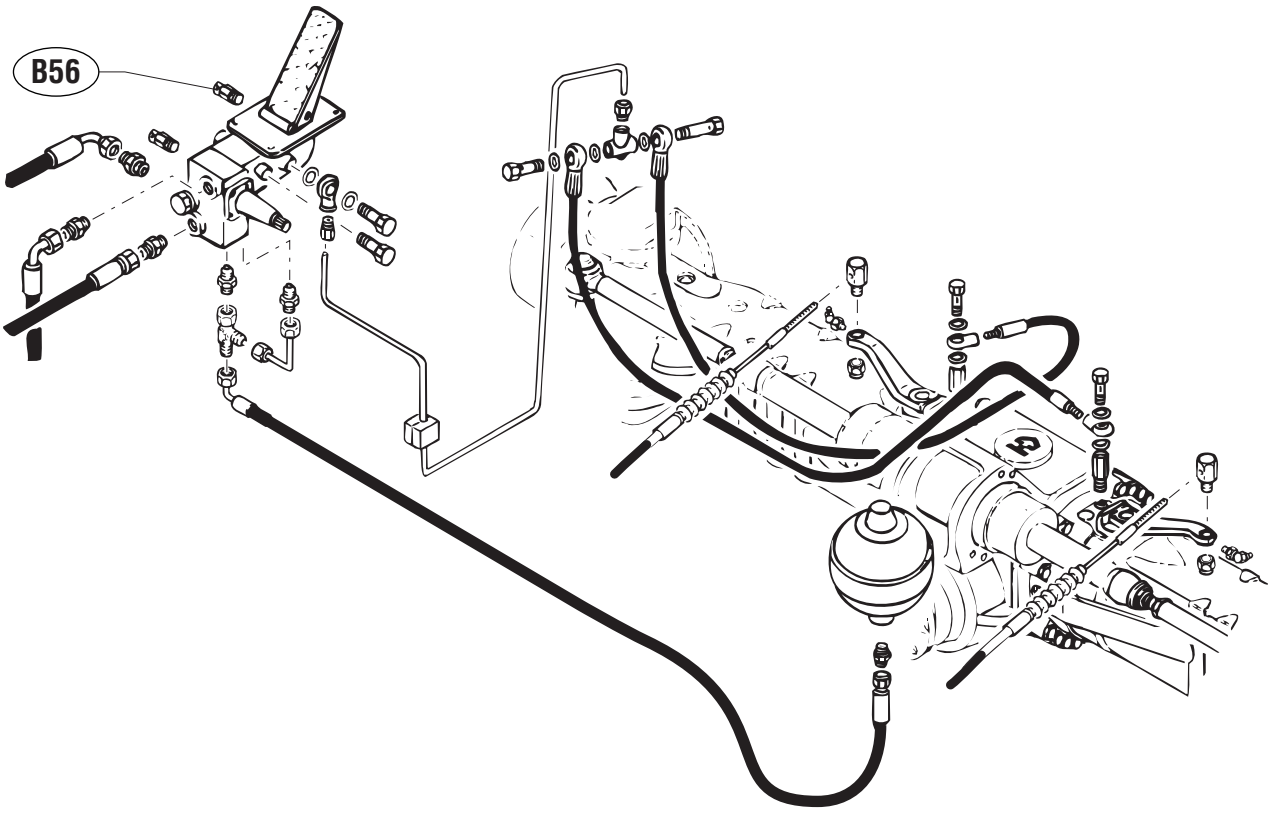

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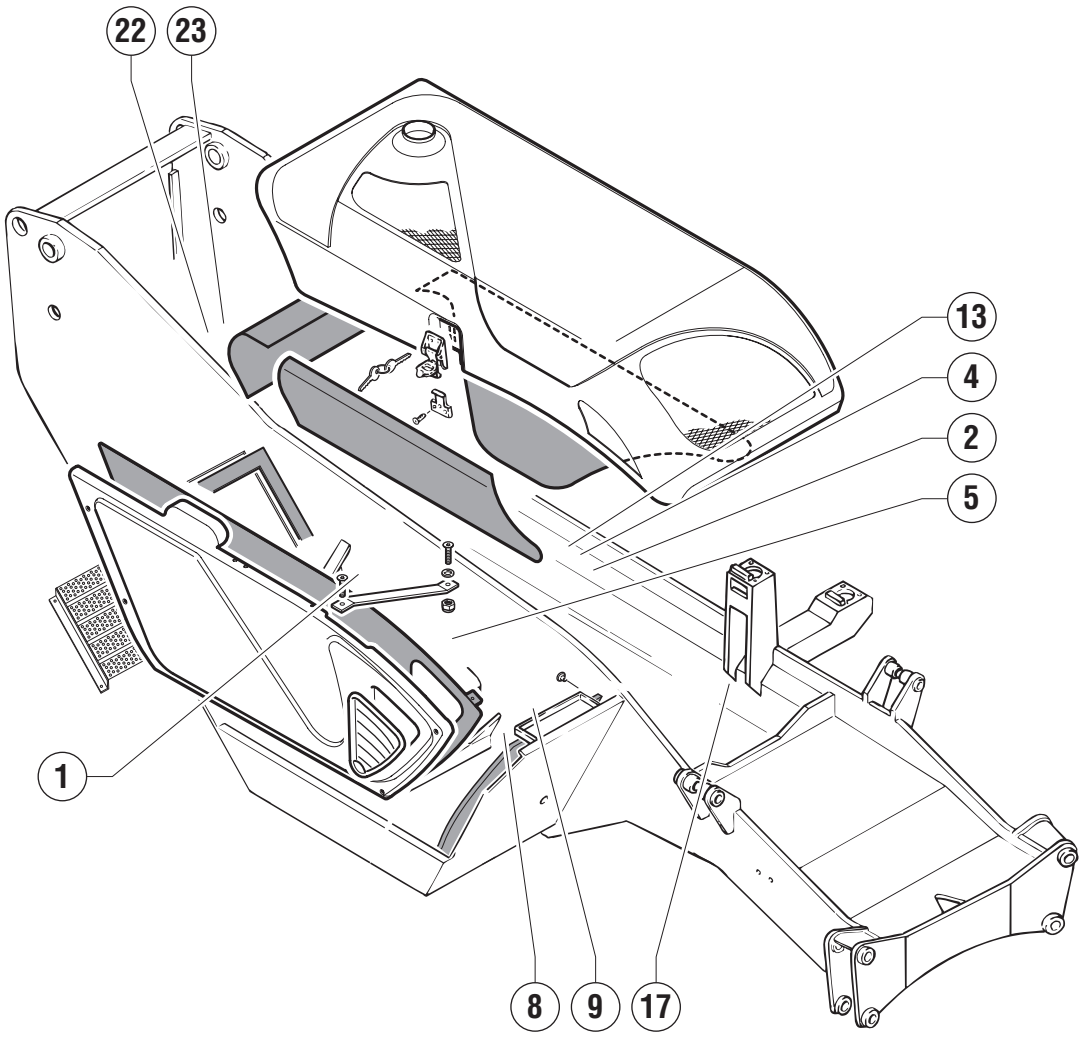
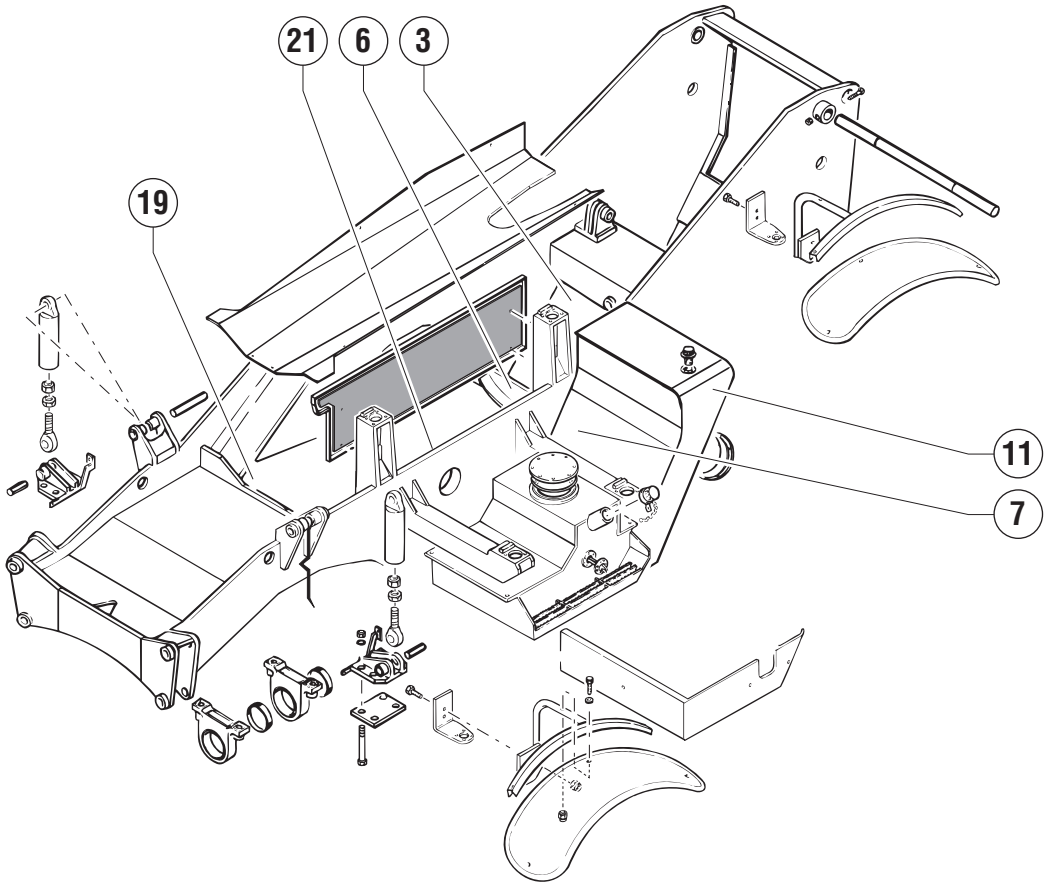
6.5.2 Hydraulic components

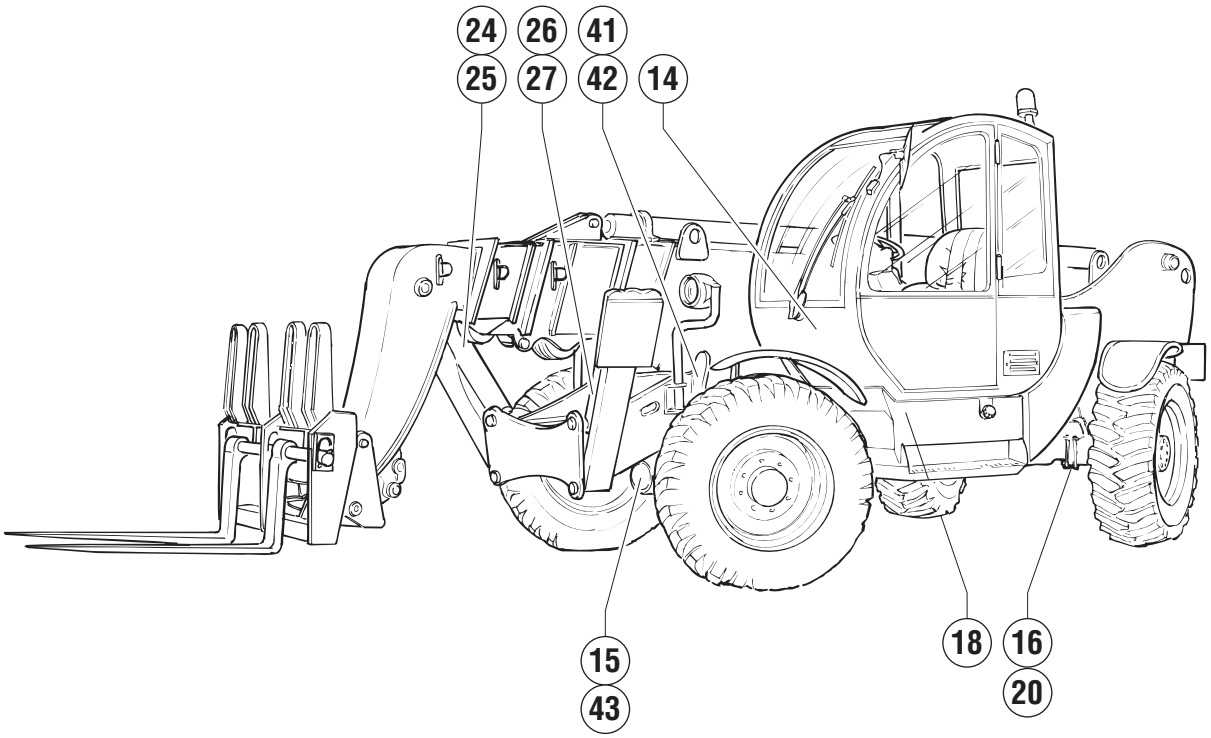
CAUTION

The numbering in the following pictures refers to the hydraulic components listed in section "Introduction", paragraph "Description of the machine operation" in this manual.



Courtesy of Crane.Market





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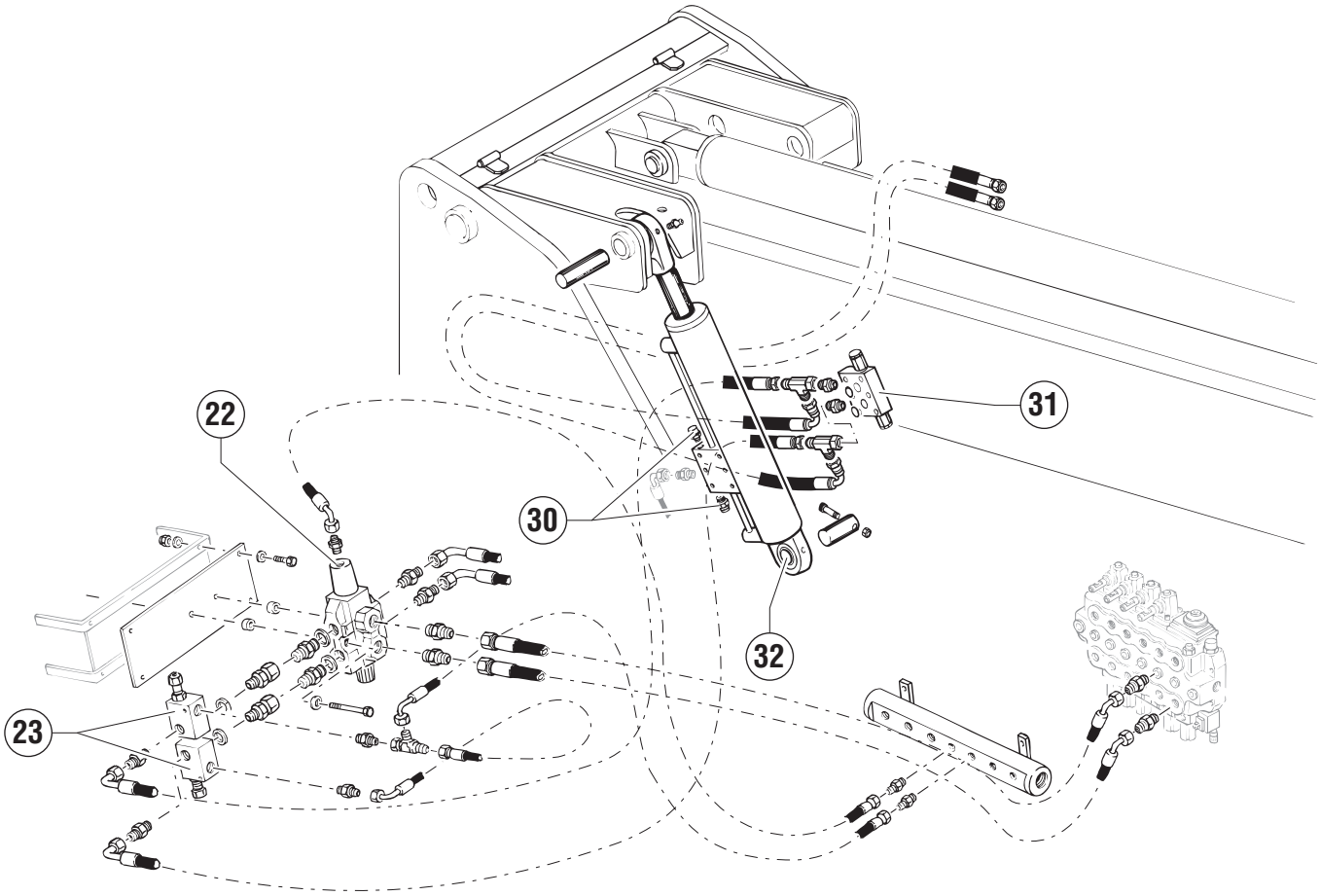

Courtesy of Crane.Market

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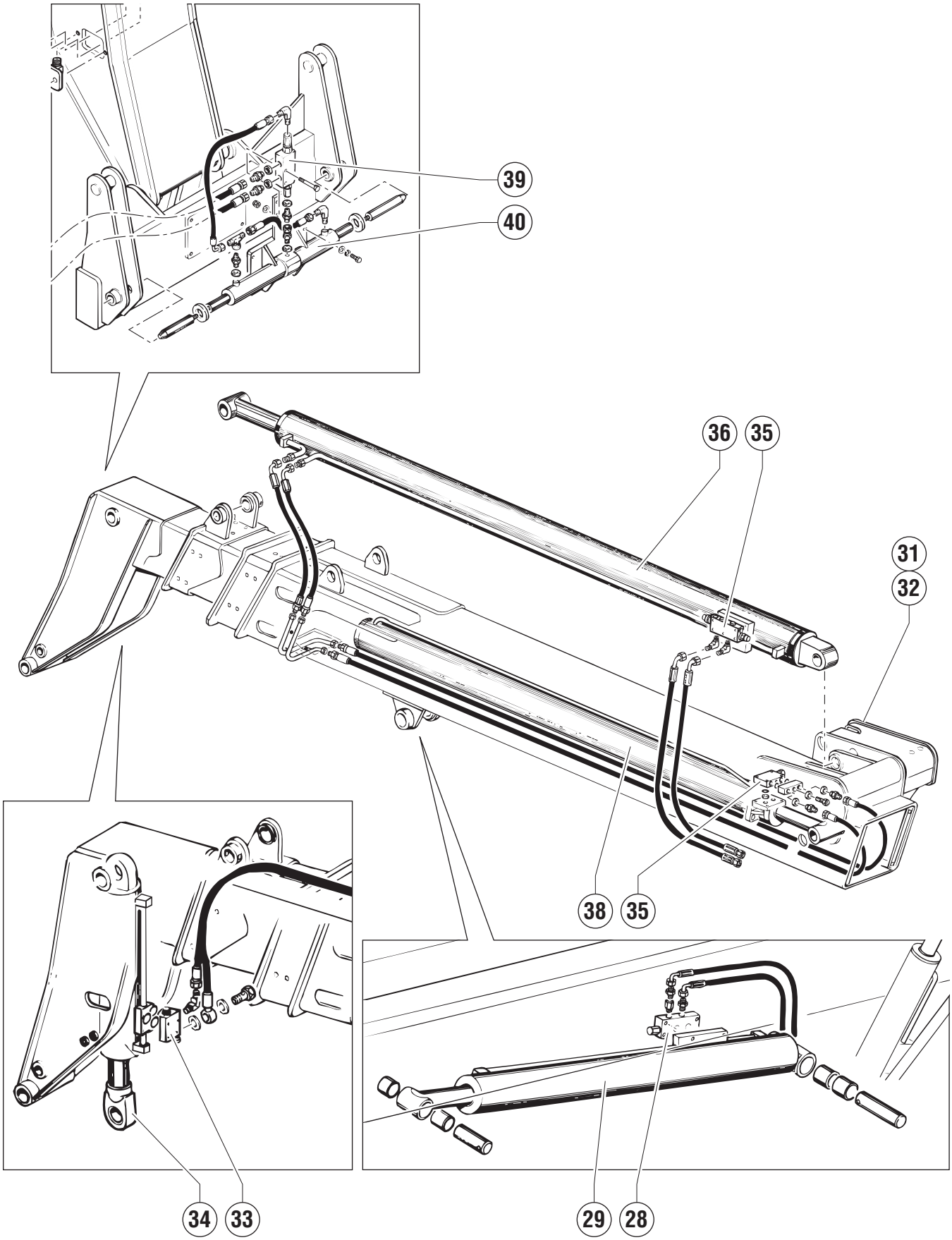

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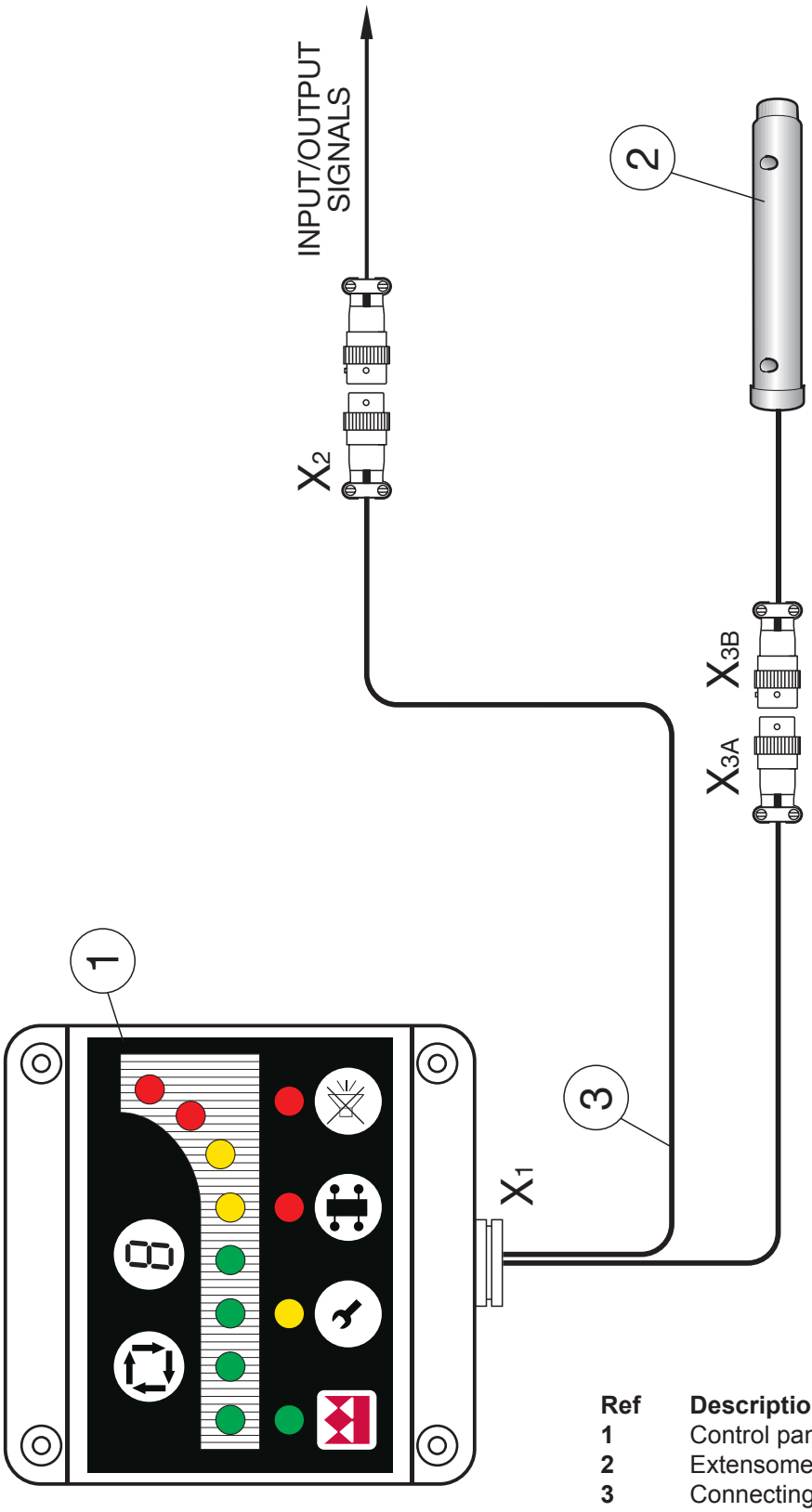
6.6 LOAD LIMITING SYSTEM

6.6.1 Wiring diagram - lay-out



Ref	Description
1	Control panel
2	Extensometric sensor - double bridge
3	Connecting cable

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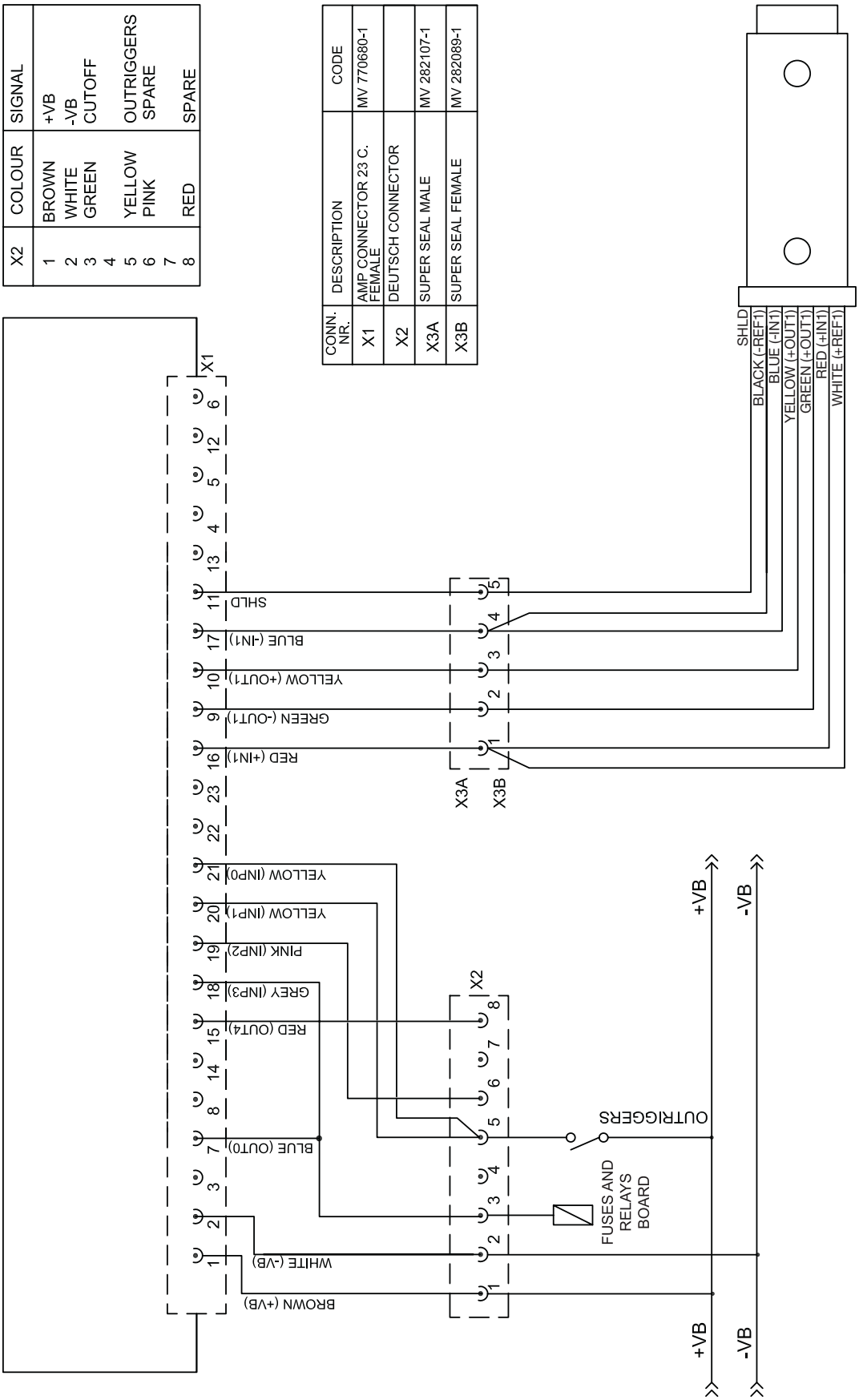
6.6.2 Wiring diagram - External connections



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Section 7
REPAIR PROCEDURES

SECTION INDEX

7.1 Time schedule ..... page 2

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7.1 TIME SCHEDULE

Job	Operators needed	Expected time (h)
change the ignition key	1	1,00
change the speed switch	1	0,30
change the lights and horn switch	1	0,30
change the overload warning system display	1	0,15
re-calibrate the 3B6 system	1	1,00
change the load cell	1	2,00
change the overload warning system display and calibrate	1	1,00
change the joystick levers	1	0,30
change the deadman button	1	0,30
change the joystick movement switch pushbutton	1	0,30
change the brake pump	1	1,00
change the low boom sensor	1	0,30
change the boom lifting cylinder	2	2,15 each
change the boom lifting cylinder kit (complete overhaul)	1	1,30
change the block valve of the boom lifting cylinder	1	0,30
change the cylinder inside the boom	2	2,50 each
change the extension cylinder kit inside the boom	1	1,30
change the block valve of the extension cylinder inside the boom	1	0,30
change the extension cylinder on the boom	2	1,00 each
change the extension cylinder kit on the boom	1	1,30
change the valve of the extension cylinder on the boom	1	0,30
change the re-sequencing valve of the extension cylinder inside the boom	1	2,30
change the re-sequencing valve of the extension cylinder on the boom	1	2,30
change the fork pitching cylinder	1	1,30
change the fork pitching cylinder kit	1	1,30
change the valve of the fork pitching cylinder	1	0,30
change the attachment locking cylinder	1	1,00
change the attachment locking cylinder kit	1	1,30
change the block valve of the attachment locking cylinder	1	0,30
change the outrigger up/down mov. cylinder	1	1,30
change the outrigger up/down mov. cylinder kit	1	1,30
change the valve of the outrigger up/down mov. cylinder	1	0,30

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Job	Operators needed	Expected time (h)
change the fork compensation cylinder	1	2,00
change the fork compensation cylinder kit	1	1,30
change the valve of the fork compensation cylinder	1	0,45
check the one-way valves of the fork compensation cylinder	1	0,30
change the machine sway cylinder	1	1,30
change the machine sway cylinder kit	1	1,30
change the machine sway cylinder valve	1	0,30
change the boom internal line for the boom extension	1	1,30
change the boom internal line for the fork pitching	1	1,30
change the boom internal line for the fork locking	1	2,00
change the boom slide pads	1	3,00
check the pressure of the drive pump	2	0,30 each
check the pressure of the main actuator operating the boom movements	2	0,30 each
check the pressure of brake pump and hydrostatic steering unit	1	0,30
check the safety valves	1	0,30
change the drive pump	1	3,00
change the drive motor	1	3,00
change and test motor, pump and transmission lines	1	6,00
change the actuator control pump	1	1,30
change and calibrate the actuator	1	2,00
change the pump on the engine injection line	1	1,00
change the boom movement selector switch	1	0,30
change relays and fuses	1	0,15 each
change the windscreen wiper motor	1	1,00
change a solenoid valve	1	0,30
change the gas pedal complete with cord	1	1,00
change the manual throttle complete with cord	1	1,00
change the front axle shaft	1	3,00
change the rear axle shaft	1	3,00
change 1 cardan joint	1	1,00
change the axle shaft hub	1	1,30
change the boom assy	2	5,00 each
change the boom anchoring pin	2	1,00 each
change the attachment locking cylinder pins	1	0,30

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Job	Operators needed	Expected time (h)
change the outrigger cylinder pin	1	0,30
change a cab pushbutton	1	0,30
change and test the actuator pressure relief valve or the sliders	1	0,30
change and test the actuator safety valve	1	0,30
change the one-way valve	1	0,30
change the maxi-fuses and search for troubles	1	0,30
bleed the braking system	2	0,30 each
change the return filter of the hydraulic oil tank	1	0,30
change the hydrostatic steering unit	1	1,30
change the beacon	1	0,20
change the battery	1	0,30
change the exhaust pipe	1	0,30
change the mud-guard supports	1	0,30
change the mud-guards	1	0,30
change the parking brake cord	1	0,30
change the steering wheel	1	0,30
dismantle the hydraulic oil tank	2	2,00 each
dismantle the fuel tank	2	2,00 each
change a wheel (n°1)	1	0,30
change the outriggers	1	1,00
change flexible hoses	1	0,30
change the parking brake lever	1	0,30

Courtesy of Crane.Market