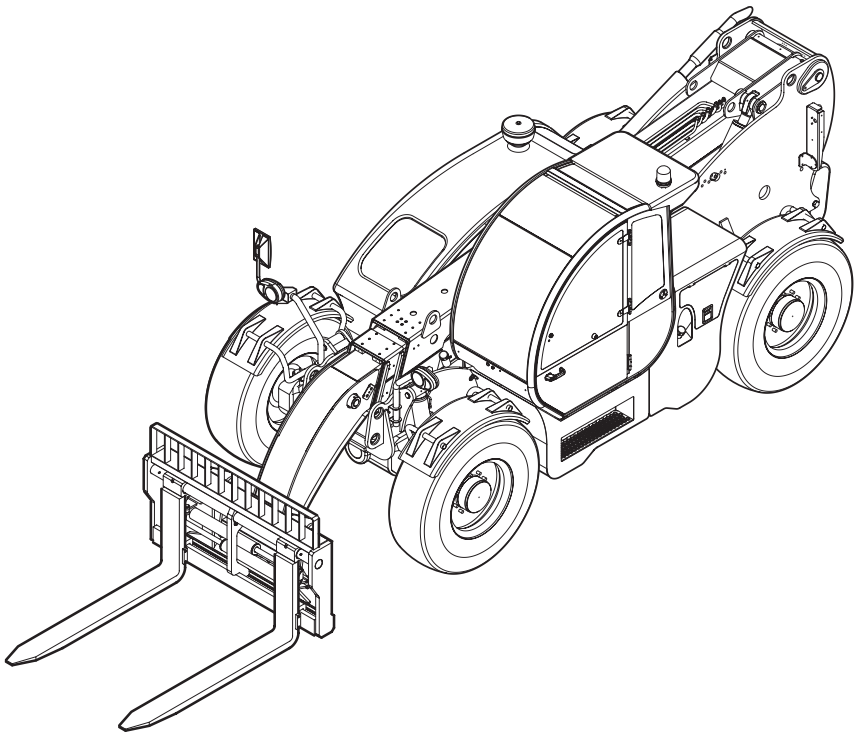
TEREX®

SERVICE MANUAL

Code 57.4403.0200 - 1st Edition 10/2006

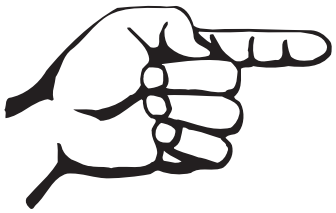
Handler with telescopic boom

Telelift 4013 SX *(From serial n. 15641)*



English
Edition

INDEX



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SERVICE MANUAL

Code 57.4403.0200 - 1st Edition 10/2006

Number: .....

Consigned to: .....

DECLARATION

I, the undersigned.....

declare that I have received the ***Service manual for TEREXLIFT lifts series Telelift 4013 SX.***

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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

The consignee	Company stamp and signature of the Legal representative
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LIST OF REVISED PAGES

Revision		Revised pages	Notes	Issued by
No.	Date			
1	10-2006		Publication	
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Sect. 2 TECHNICAL SPECIFICATIONS

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Sect. 5 TROUBLESHOOTING

Sect. 6 SCHEMES

Sect. 7 REPAIR PROCEDURES

SERIAL NUMBER IDENTIFICATION

Machine denomination	Literature valid up to serial number
Telelift 4013 SX	15641

INTRODUCTION

Important
Read, understand and obey the safety rules and operating instructions in the **Telelift 4013 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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Contact Us
http://www.terexlift.com
e-mail: info@terexlift.it

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DESCRIPTION OF THE MACHINE OPERATION

The source of mechanical energy of this machine is a Cummins turbo-compressed diesel engine (**1**), model B4.5, which supplies 74 kW at 2200 rev/min and with a max torque of 414 Nm at 1500 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) (**3**) with priority valve integrated in the housing. 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) (**4**) 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 (**25**). The suction lines of the open-loop pumps (**3**) and (**4**) are protected by an immersed filter (**8**), placed inside the hydraulic fluid tank (**10**) whose capacity is 130 litres. Just upstream of the connection with the three suction lines mentioned above, there is a gate valve with ball valve (**9**) which lets you cut out the hydraulic oil tank in order to perform maintenance interventions on the machine's hydraulic system. The drive pump (**2**) is protected by a special filter (**34**), placed on the pump drain line (**3**). This filter purifies the oil coming from the main open-loop circuit of the machine (telescopic boom operating circuit) and, when needed, supplies oil at a minimum pressure of 0.5 bar to the transmission suction line. This construction feature of the filter guarantees important advantages in terms of absence of cavitation in the transmission suction line, especially when the machine is started from cold.
The one-way valve (**11**) 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-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 (**5**) 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 (**26**), which is fixed with brackets to the central zone of the chassis. The mechanical torque at the gearbox output is transmitted to the front axle and the rear axle (**27**), both model 212 manufactured by Dana, through Cardan shafts. The hydraulic drive (**12**) of "load sensing" type with a displacement of 315 cm^3/rev., receives oil from the priority line of the pump (**3**) 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 (**12**) and cannot be regulated from the outside. The steering circuit is completed by the front steering cylinder (**14**), the rear steering cylinder (**15**) (these cylinders being integral part of the front axle (**6**) and the rear axle (**27**) respectively) and by a 4-way/3-position solenoid valve **(13)** 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 (**13**) 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 (**13**) 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 (**16**) receives oil from the secondary line of the pump (**3**) 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/retraction, attachment locking/unlocking, outriggers and chassis sway function).

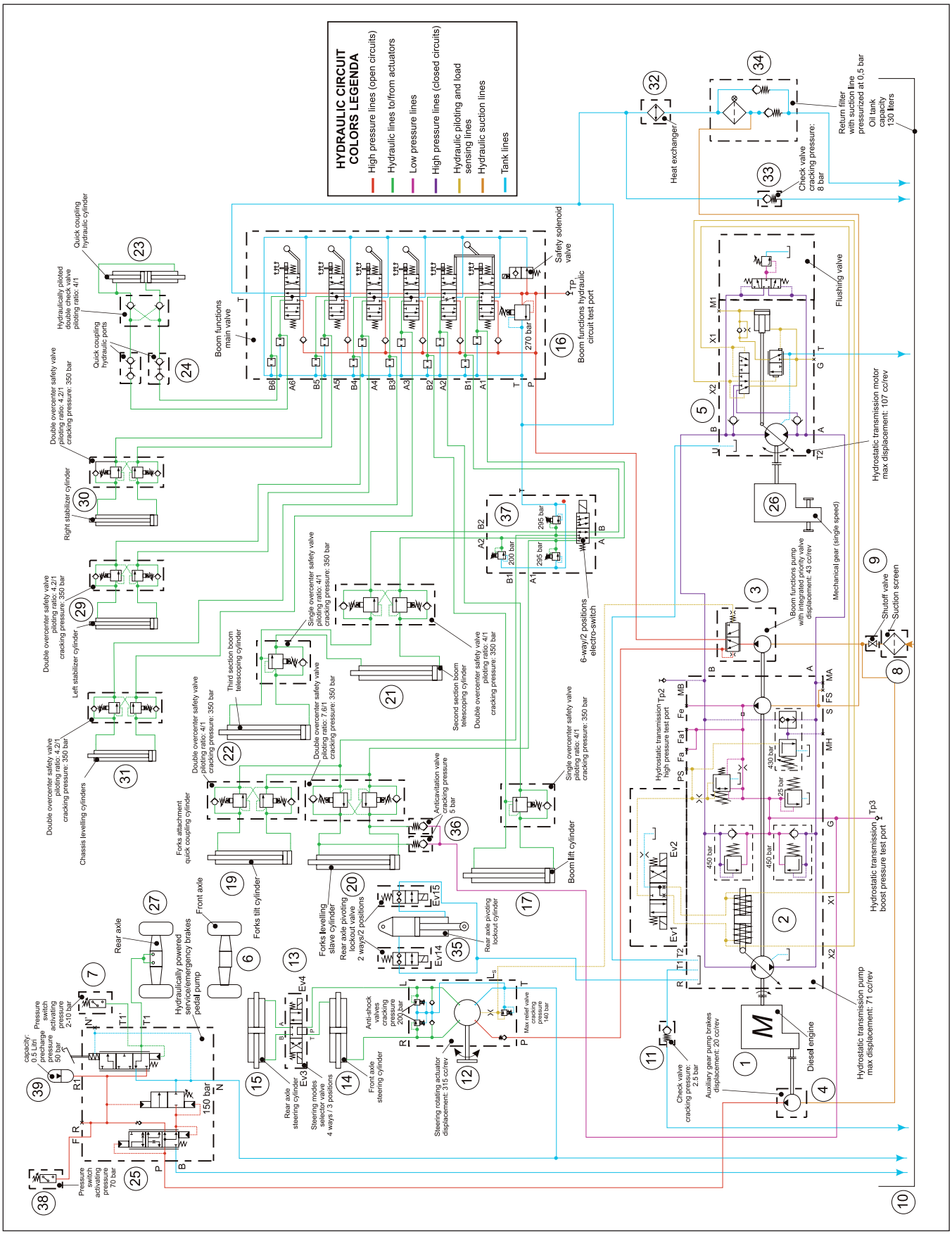
In the head there is a pressure relief valve set at 280 bar also serving as a safety valve of the circuit which directly acts on the main line of the hydraulic oil. Again in the input head of the main valve there is a solenoid valve discharging the main flow which activates the movements of the main 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.
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 (37) consisting of a 6-way/2-position electrical switch block and 3 pressure relief valves. Two of these valves, calibrated at 295 bar, are mounted on the lines controlling the rotation of the attachment holding frame; the third one, set at 200 bar, is installed on the extension line of the telescopic boom lifting cylinder. When the coil of the electrical switch block is not energised, the oil coming from section 1 of the main valve is sent to the extension cylinders (21) and (22) of the telescopic boom, connected in series with each other. Cylinder (21), which activates the second telescope of the boom, is equipped with a double-acting compensation valve serving also as a safety valve, while cylinder (22), which activates the third telescope of the boom, is equipped with a single-acting compensation valve again serving also as a safety valve. This pressure relief valve set at 200 bar and fitted to the oil-dynamic block (37), reduces the maximum load during the boom extension phase in those work areas where the electronic moment limiting system cannot detect overload conditions with respect to the admissible load chart of the machine.
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, oil is sent to the attachment holding frame cylinder (19) of the telescopic boom. This cylinder is equipped with a double-acting compensation valve serving also as a safety valve. Parallel to this cylinder, there is the fork levelling compensation cylinder (20) (also called balancing cylinder) which is equipped with a special double-acting compensation valve. 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 (36), 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 set at 295 bar and mounted in the oil-dynamic block (37), protect the automatic fork levelling 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 (16) controls the telescopic boom lifting cylinder (17) through the longitudinal displacement of the main lever placed in the driving cab. This cylinder has one single-acting compensation valve with safety function.
Section 3 of the main valve controls the chassis sway cylinder (31) mounted on the right side of the machine and equipped with a double-acting compensation valve serving also as a safety valve, through the lateral displacement of the special lever installed in the driving place.
Section 4 of the main valve controls the left outrigger cylinder (29) equipped with double-acting compensation valve serving also as a safety valve, through the longitudinal displacement of the special lever placed in the driving cab.
Section 5 of the main valve controls the right outrigger cylinder (30) equipped with double-acting compensation valve serving also as a safety valve, through the longitudinal displacement of the special lever placed in the driving cab.
Section 6 of the control valve controls the attachment locking cylinder (23) through the lateral displacement of the special lever placed in the driving place. This cylinder has a double one-way valve with hydraulic release and safety function.
On the feeding lines of this cylinder, there are two quick-fit connectors (**24**) for the connection of the hydraulic lines to those optional attachments necessitating 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. All the sections of the main valve (**16**) 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 (**25**) receives oil from pump (**4**) and uses this oil to pressurise a hydraulic accumulator (**39**) connected to the same system. The oil at pressure contained in this accumulator is then used to operate the service brake placed inside the rear axle (**27**). The braking effect produced by the braking axle is then transferred to the front axle through Cardan shafts connecting the axles to reduction gear (**26**).
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 to line B for other uses.
The brake pedal located in the driving cab, which is an integral part of the braking system S6, is connected to a slider of proportional type which controls the line of the service brake. In relation to the stroke of this slider, a gradual communication between the feeding line, connected to an accumulator (**39**) with 0.5 lt. capacity and a fill pressure of 50 bar, connected, at its turn, 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 (**7**), 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 (**38**) 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 (**16**) is cooled down by heat exchanger (**32**) 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 is sent back to the special filter (**34**) which is also used to deliver fluid at pressure to the transmission booster pump, and finally drained into tank (**10**).
A one-way valve calibrated at 8 bar **(33)**, 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. The oscillation of the rear axle of the machine is controlled by a block cylinder (**35**) whose two chambers are equipped with sealed 2-way/2-position solenoid valves.
When the two solenoid valves are de-energised, the circular and annular chambers of the cylinder are closed toward the outside and the cylinder behaves like a strut/tie-rod blocking in this way the rear axle.
This happens when the inclination of the telescopic boom exceeds a certain pre-set value (58° for Telelift 4013 SX) and the side stability of the machine must be improved.
When, on the contrary, the boom inclination is below such pre-set value, the two solenoids of the solenoid valves are energised thus letting the oil circulating freely from/to the two chambers of the cylinder. In this way, the axle can oscillate, thus making the machine drive more comfortable even in case of rough terrains.
The chambers of the cylinder are always kept filled with oil by a single hydraulic line connected to the housing of the drive pump (**2**).

This allows to have a minimum pressure capable of keeping the circuit of the rear axle block cylinder full of oil but incapable of producing overloads on the same axle.

Telelift 4013 SX hydraulic schematic



Section 1
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.

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.

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.

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.

- 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.

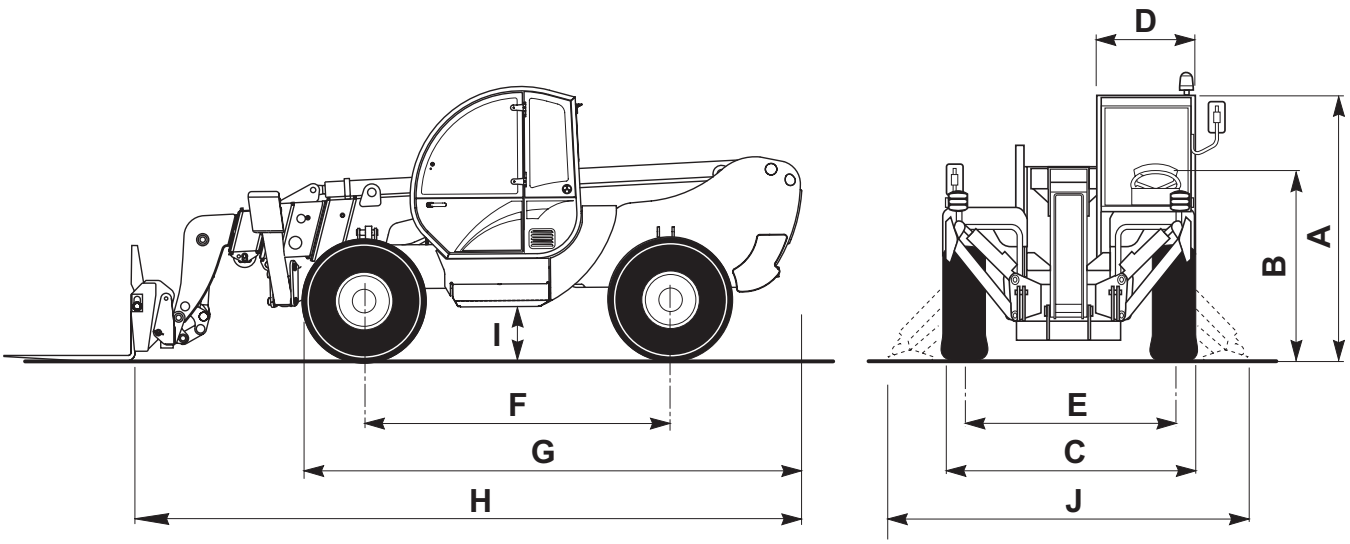
- Use the assistance of a second person to handle loads weighing 30 to 50 kg.
- For loads over 50 kg, the use of special hoisting equipment in good condition and equipped as per enforced regulations is mandatory.

Section 2
TECHNICAL SPECIFICATIONS

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2.1 MAIN DIMENSIONS



			Telelift 4013 SX
A	Overall height	mm	2425
B	Height to the steering wheel	mm	1600
C	Overall width	mm	2330
D	Cab width	mm	910
E	Track	mm	1920
F	Wheel-base	mm	2950
G	Length to the front tyres	mm	4830
H	Length to the attachment holding plate	mm	6100
I	Ground clearance	mm	430
J	Max width with extended outriggers	mm	2890
•	Internal steering radius	mm	1140
•	External steering radius	mm	3790

2.2 TYRES

		Telelift 4013 SX	
		Standard	**Optional**
- Dimensions		400/70 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

2.3 LIMIT OF USE

			Telelift 4013 SX
•	Angle of approach	°	38
•	Departure angle	°	46
•	Ambient temperature	°C	-20÷+40

2.4 WEIGHT

			Telelift 4013 SX
•	Weight in working order	kg	9820

2.5 SPEED

			Telelift 4013 SX
•	Working speed (*)	km/h	0÷8
•	Travel speed	km/h	0÷35
•	Max. slope with full load	%	60

(*) either forward or reverse motion.

2.6 PAYLOAD AND REACH

			Telelift 4013 SX
•	Max lifting height:		
	with outriggers	mm	13000
	without outriggers	mm	12810
•	Reach at max height without outriggers	mm	650
•	Max reach forward with outriggers	mm	9020
•	Attachment holding plate rotation	°	138
•	Maximum payload with outriggers	kg	4000
•	Payload at max height with outriggers	kg	3000
•	Payload at max reach with outriggers	kg	1250

2.7 FORKS (floating type)

			Telelift 4013 SX
•	Dimensions	mm	1200x120x50
•	Weight	kg	70
•	Fork holding frame - class		FEM III

2.8 DIESEL ENGINE

			Telelift 4013 SX
•	Make		CUMMINS
•	Model/Type		4B 4,5T
•	Features		Diesel 4 cylinders in line 4 strokes direct injection
•	Bore x Stroke	mm	102x120
•	Total displacement	cc	4500
•	Power at 2300 rpm	kW	74

2.9 ELECTRICAL SYSTEM

			Telelift 4013 SX
•	Voltage	V	12
•	Battery	Ah	120

2.10 MACHINE SOUND LEVELS

			Telelift 4013 sx
•	Guaranteed sound power level (in accordance with the Directive 2000/14/CE)	dB	Lwa = ...
•	Measured sound pressure level (in accordance with the Directive 98/37/CE)	dB	Lpa = ...

2.11 VIBRATION LEVELS

			Telelift 4013 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 4013 SX
•	Diesel engine	l	12
•	Engine cooling system	l	15
•	Fuel tank	l	150
•	Hydraulic oil tank	l	135
•	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: **TRACTORENAULT THFI 208 LF SAE 80W (API GL-4 / FORD M2C 86B - Massey Ferguson M 1135)**

Hydraulic system and brakes: **SHELL TELLUS T 46 (DENISON HF-1 DIN 51524 part 2 & 3)**

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

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

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

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)

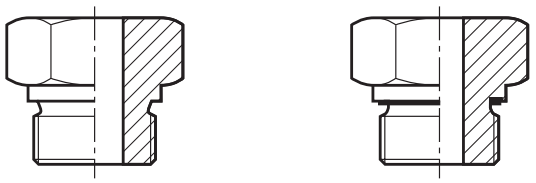
Thread diameter		TIGHTENING TORQUES (0+10%)
inc.	mm	37° CONICAL SEALS (JIC) Nm
7/16"-20	M10x1	15
1/2"-20	M12x1.5	20
9/16"-18	M14x1.5	28
	M16x1.5	62
3/4"-16	M18x1.5	62
7/8"-14	M22x1.5	80
1.1/16"-12	M27x2	110
1.3/16"-12		141
1.5/16"-12	M33x2	160
1.5/8"-12	M42x2	225
1.7/8"-12	M48x2	270
2.1/4"-12	M10x1	360

■ 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

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*	*tipo*	*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

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.

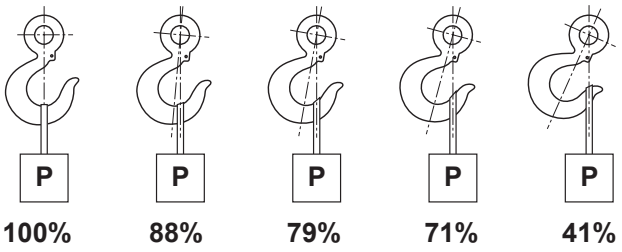
Before removing parts of the machine, make sure that:
- all fixing bolts have been removed
- all hydraulic and electrical parts have been disconnected
- the part to be removed is not blocked.

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:

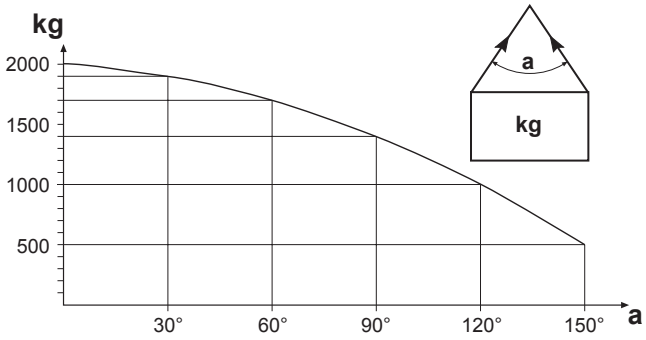
STRANDED ROPES	
Rope diameter mm	Max admissible load kg
10	1000
11.2	1400
12.5	1600
14	2200
16	2800
18	3600
20	4400
22.4	5600
30	10000
40	18000
50	28000
60	40000

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.



2.18 ADVICE TO RENEW FLEXIBLE HOSES

NOTICE

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

CAUTION

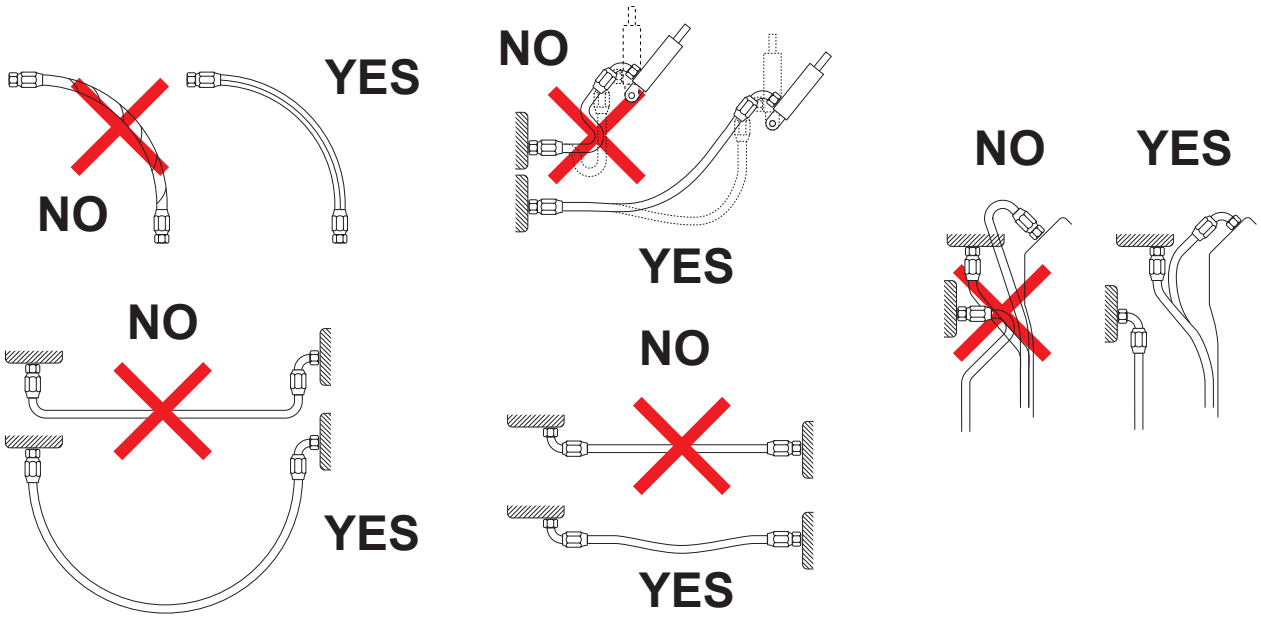
Plug all disconnected parts to prevent dust or impurities from entering the circuit. They can cause serious damage.

⚠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.

Consigli per il montaggio di tubi flessibili:



2.19 LISTS OF RECOMMENDED SPARE PARTS

Telelift 4013 SX

Code	Description	Q.ty
07.0740.0066	Cab air filter	2
07.0700.0023	Hydraulic oil filter	2
07.4501.0085	Engine air filter	2
07.4501.0084	Engine air filter	2
07.4501.0100	Engine oil filter	2
07.4501.0096	Fuel filter	2
07.0740.0041	Door glass	1
07.0703.0485	Relay	2
56.0012.0017	Micro-switch	2
07.0740.0089	Wiper blade	1
07.0703.0023	Ignition switch	1
07.0740.0267	Micro-switch (parking brake)	1
54.0702.0000	Sliding guide	8
54.0702.0001	Sliding guide	8
54.0702.0003	Sliding guide	2
54.0702.0004	Sliding guide	2
54.0200.0001	Bushing	8
637650	3A fuse	2
07.0703.0193	5A fuse	1
634972	7,5 A fuse	4
634974	10A fuse	15
634973	15A fuse	5
07.0703.0487	Relay	1
56.0021.0073	Control unit	1
07.0703.0486	Relay	1
07.0741.0010	Plug	1
07.0741.0011	Pushbutton	3
07.0741.0012	Pushbutton	1
09.4604.0000	Oil filter	1

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

2.21 CHECKING THE CYLINDER MOVEMENT TIMES

CAUTION

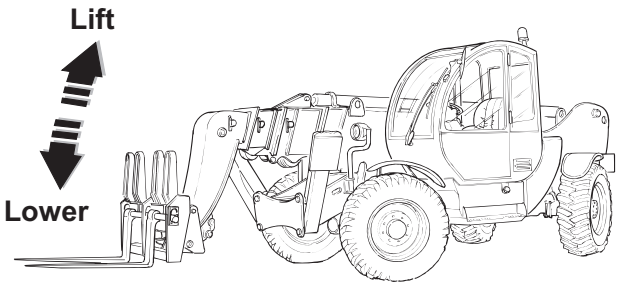
The check of the movement times of the cylinders shall be done with the hydraulic oil at a temperature of 60°.

CAUTION

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

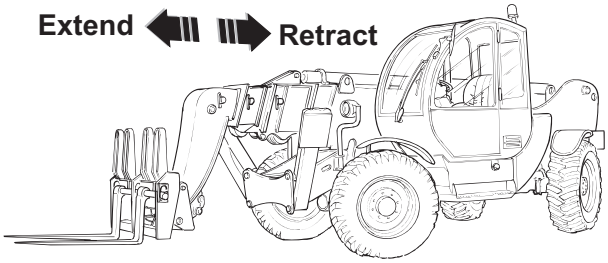
BOOM LIFTING/LOWERING

Telelift 4013 SX	Time (s)	
	up	down
Max engine speed	11”	7,5”
Min. engine speed	29”	19”



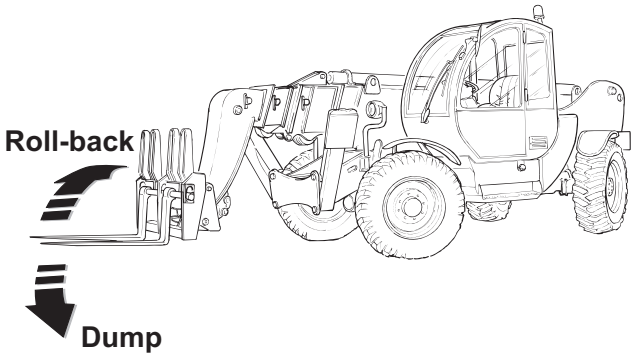
BOOM EXTENSION/RETRACTION

Telelift 4013 SX	Time (s)	
	out	in
Max engine speed	17,5”	18”
Min. engine speed	45”	20”



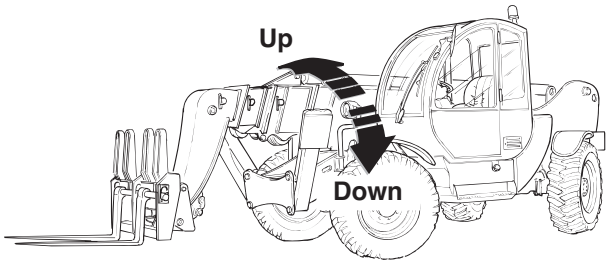
ATTACHMENT DUMPING

Telelift 4013 SX	Time (s)	
	dumping	roll-back
Max engine speed	4”	3”
Min. engine speed	9”	7”



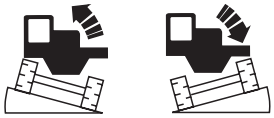
OUTRIGGERS MOVEMENT

Telelift 4013 SX	Time (s)	
	up	down
Max engine speed	6”	7”
Min. engine speed	13”	16”



MACHINE SWAY

Telelift 4013 SX	Time (s)	
	right to left	left to right
Max engine speed	13”	12”
Min. engine speed	17”	17”



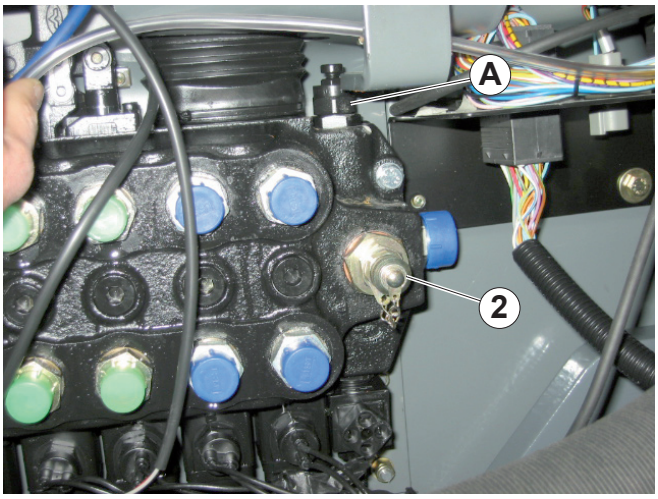
2.22 HYDRAULIC CALIBRATIONS

1. PRELIMINARY OPERATIONS

Warm up the hydraulic oil to 60°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.

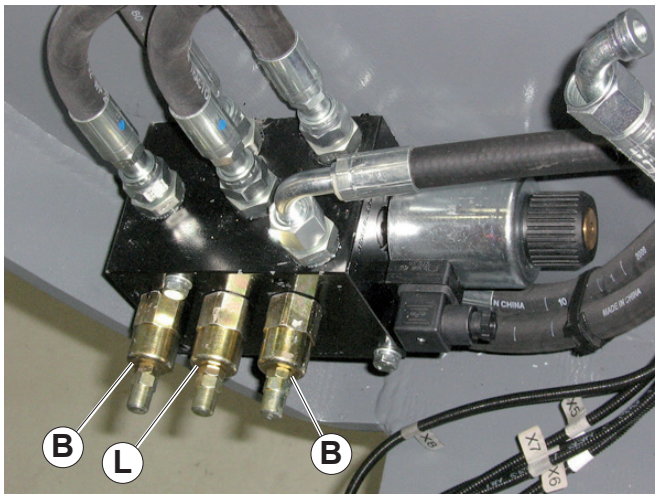


2.1 CALIBRATING THE CONTROL VALVE OF THE MAIN VALVE

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 diesel engine running at max speed.

Also calibrate the fork inclination safety valves (position **B**) of the main valve (encl. 2):

- 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** (encl. 1) of the Walvoil main valve 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.

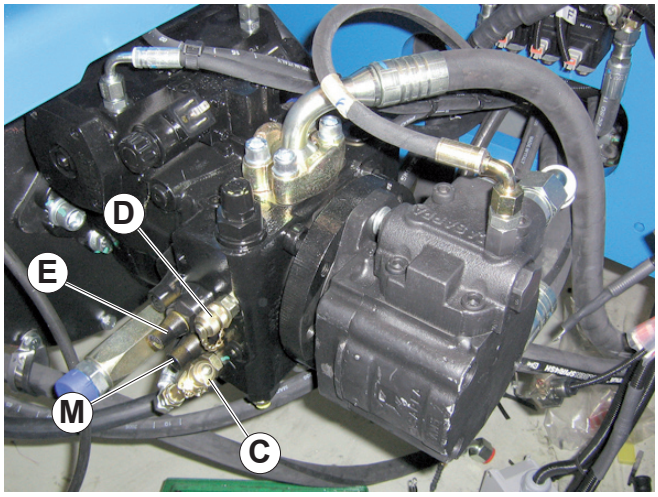
4. CALIBRATING THE BOOM EXTENSION SAFETY VALVE (tab. 603446)

Connect a 0-400 bar pressure gauge to port ref. **2**. Extend the boom to end of stroke and, with the diesel engine fully accelerated, hold the boom in this position and check that the pressure gauge connected to port ref. **2** shows a value of 200 bar.
If the value is not correct, act on the safety valve **L** (encl. 2).

5. CALIBRATING THE HYDROMATIK HYDROSTATIC TRANSMISSION PUMP

Adjust the hydrostatic transmission with the hydraulic oil at a temperature of 80°C and the mechanical gear put in.

- 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 30 bar with the engine running at max speed (2400 rpm). If this value is not reached, act on valve **M**.
  Note: In these machines, the low pressure is also used for the re-sequencing cylinder and for the main valve.
- Engage the forward speed and fully depress the brake pedal with the left foot to bring the machine to a stop. Do not use the parking brake.

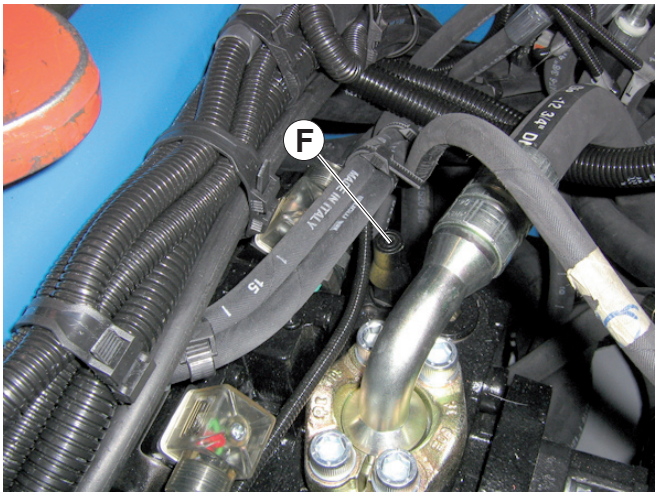
PRIOR TO CALIBRATION

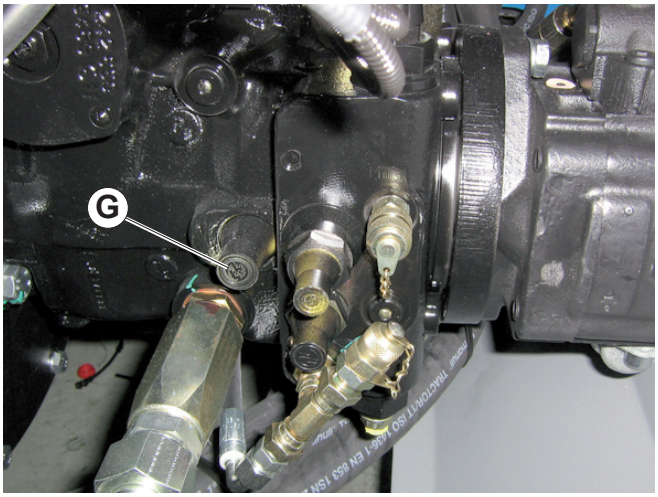
- Turn the speed selector to the forward speed position.
- Using the gas lever, run the engine at 1100 rev./min checking the value on the tachometer.
- Adjust the choke valve **E** acting on the adjustment screw until the high pressure manometer **D** shows a value of 50 bar.

5.1 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 1950 revs, adjust the spark advance valve **G**.

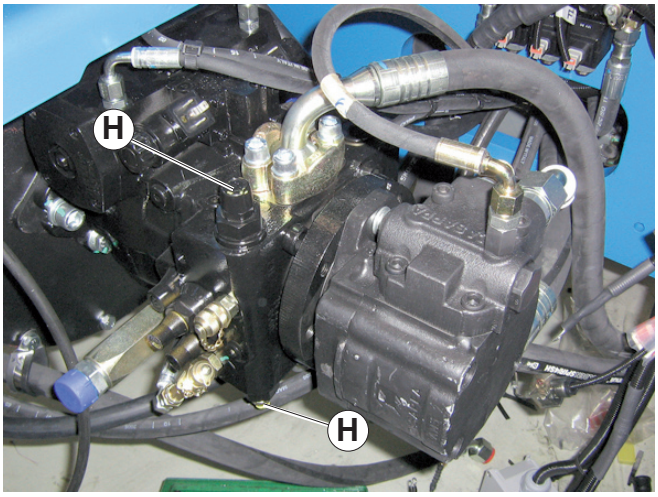




5.2 CHECKING THE SAFETY VALVE

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

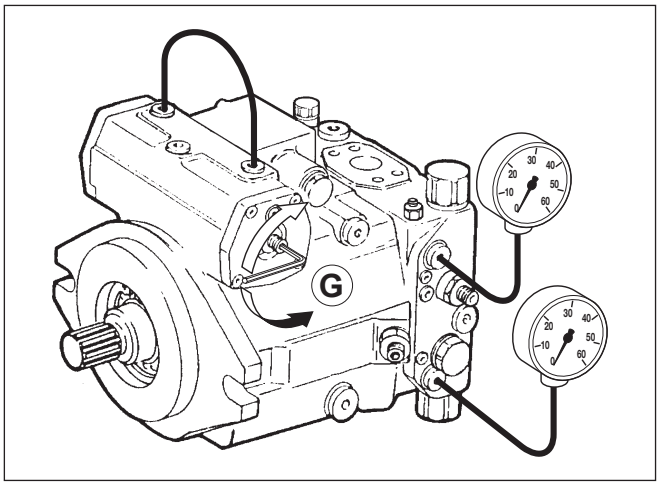
  The two pressure control valves **H** (encl. 3) are the cartridge type and already set at 450 bar by Rexroth; therefore they do not require any calibration.



5.3 CALIBRATING THE MECHANICAL ZERO

The calibration of the mechanical zero **G** 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 **G** by rotating it until the high-pressure manometer reads the same value measured by the boost pressure manometer.



6. CALIBRATING THE BRAKING SYSTEM PRESSURE (encl. 4)

- 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** should be 150 bar. If the value is below 150 bar, loosen valve **R**; if the value is above 150 bar, tighten the valve.

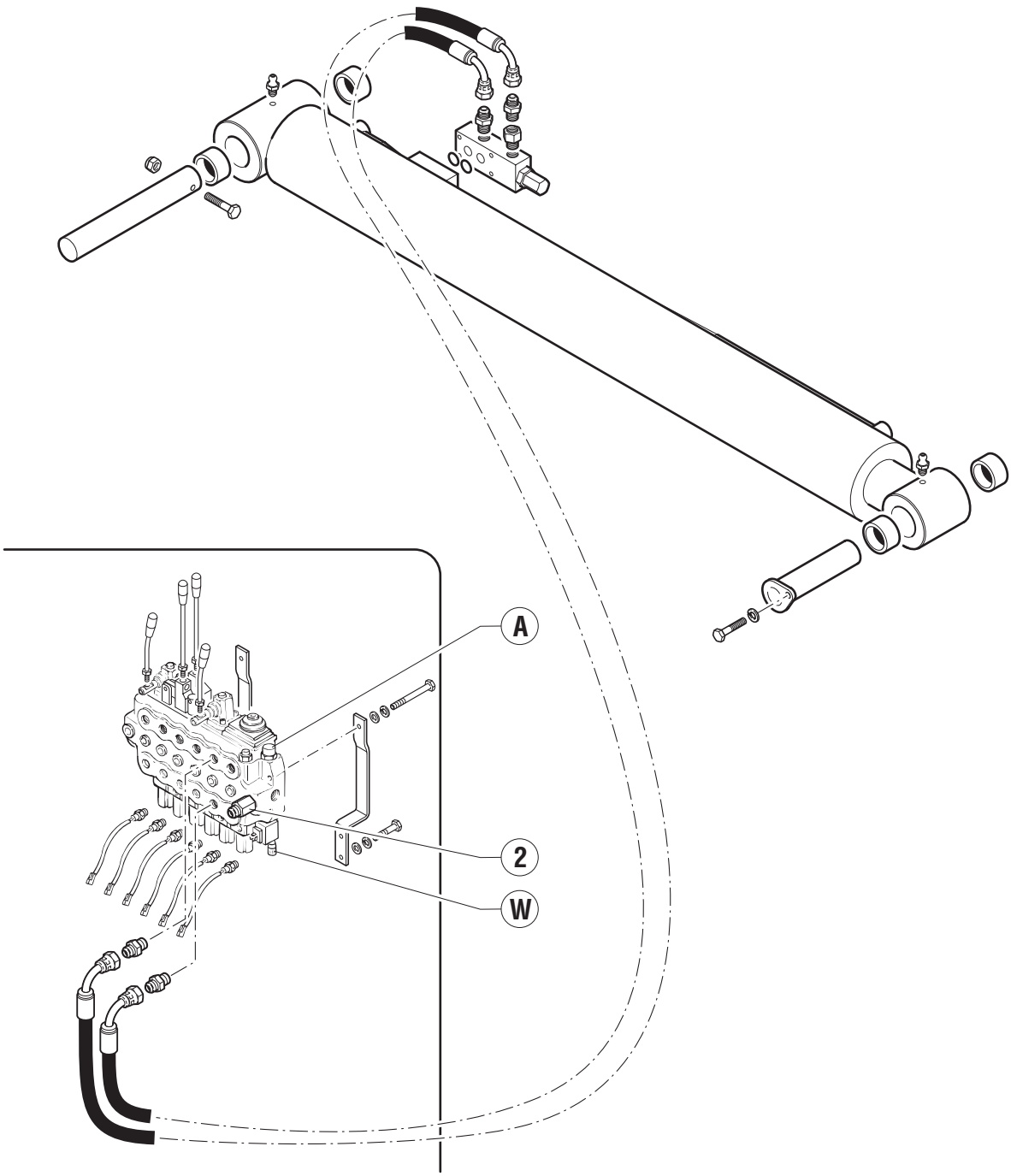
  Note: To check the pressure, it is necessary to depress the foot brake some times until the pressure gauge restarts increasing; when it stops in stable position, it shows the calibration value.
  Pay special attention while disconnecting the hose from the accumulator. Oil can splash all around. First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

7. 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.

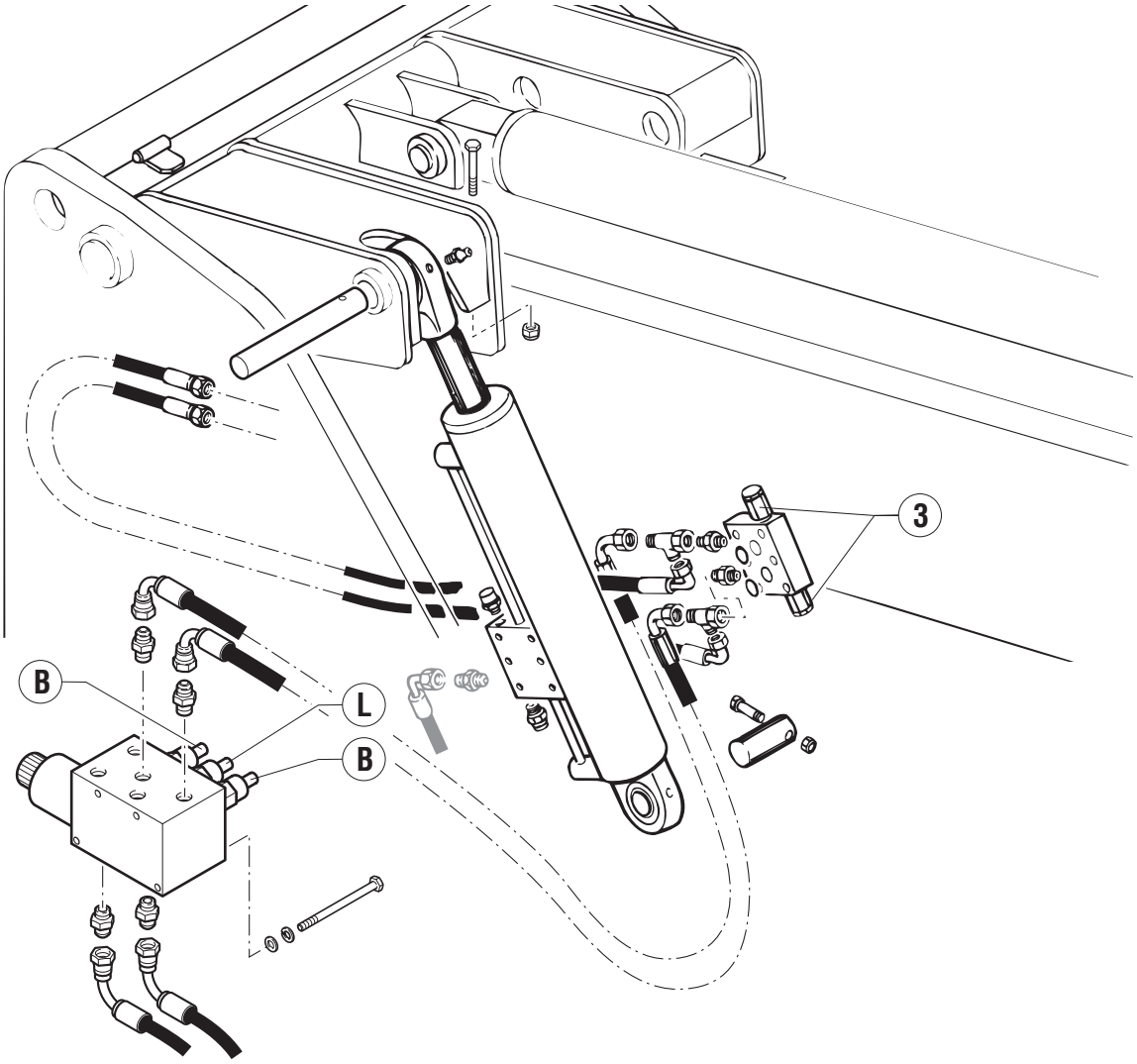
  Note: To reach valve **X**, remove the protection cap (encl. 5).

HYDRAULIC SYSTEM - LIFTING	Encl. 1

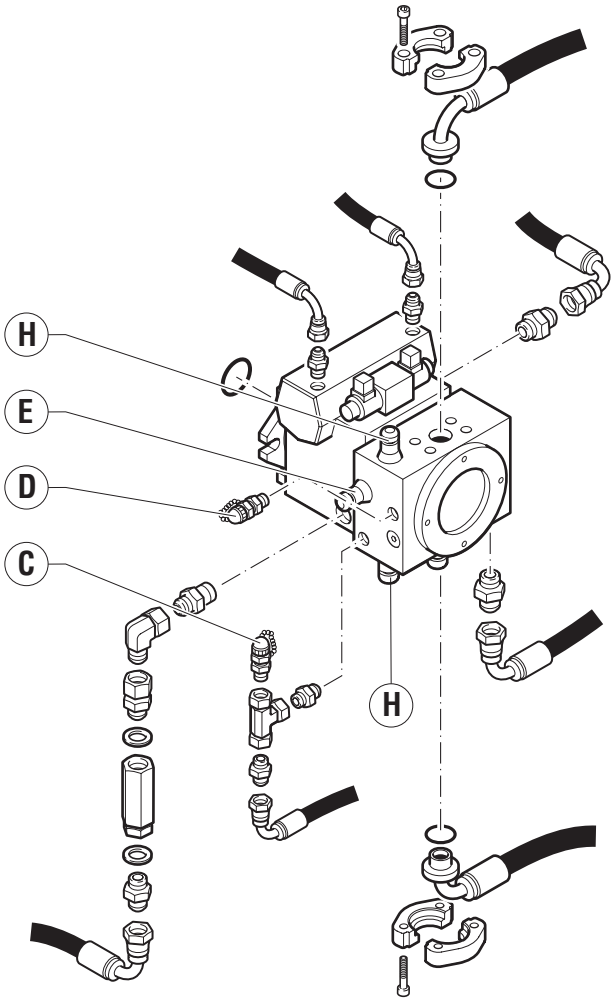


HYDRAULIC SYSTEM - FORK BALANCE

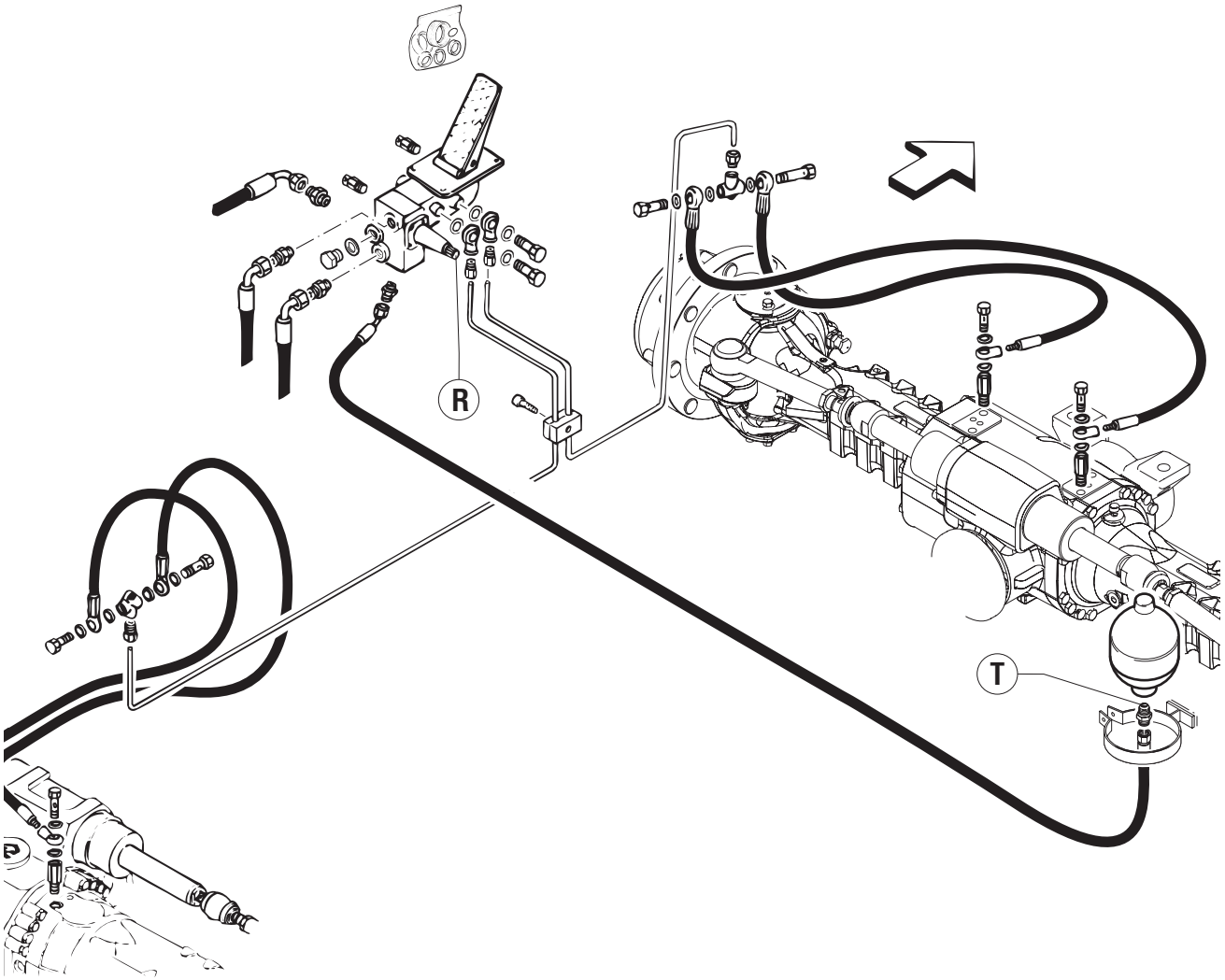
Encl. 2



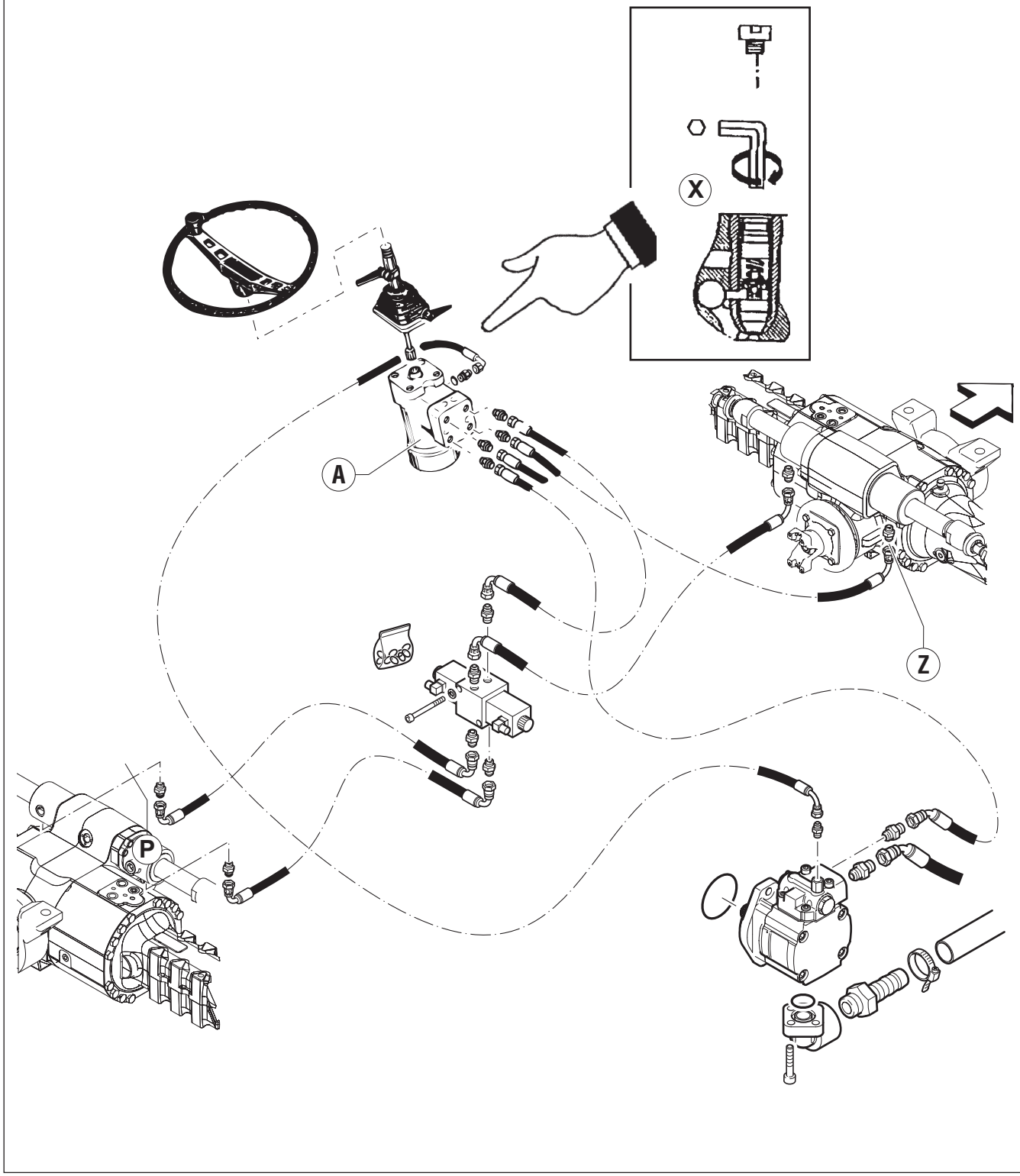
HYDRAULIC SYSTEM - TRANSMISSION	Encl. 3



HYDRAULIC SYSTEM - SERVICE BRAKE	Encl. 4



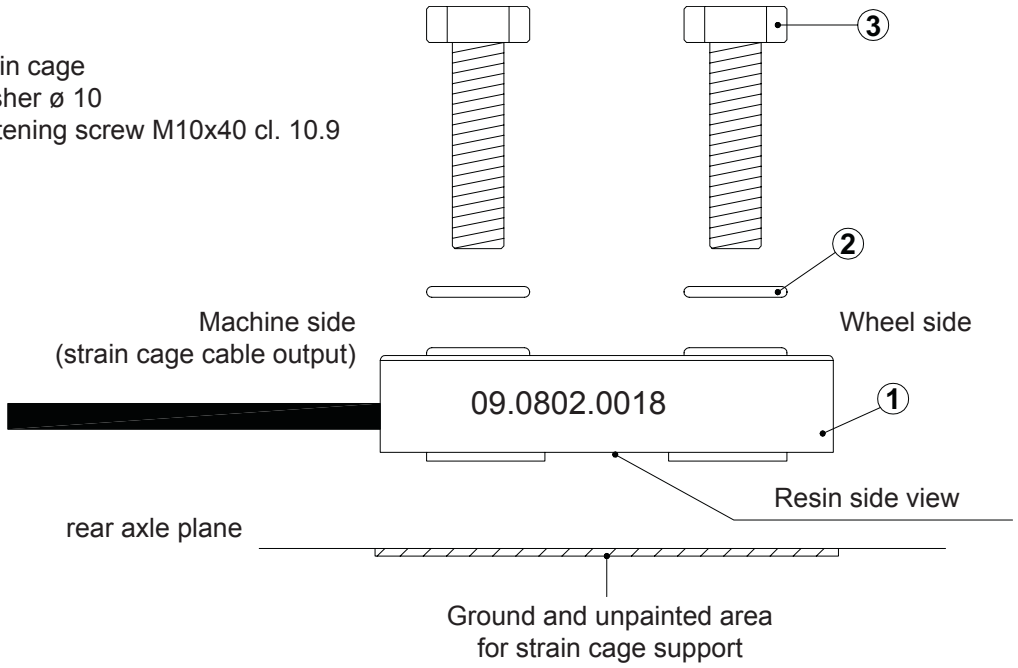
HYDRAULIC SYSTEM - POWER STEERING	Encl. 5



2.23 DLE SYSTEM

INSTALLING THE EXTENSIMETRIC CELL

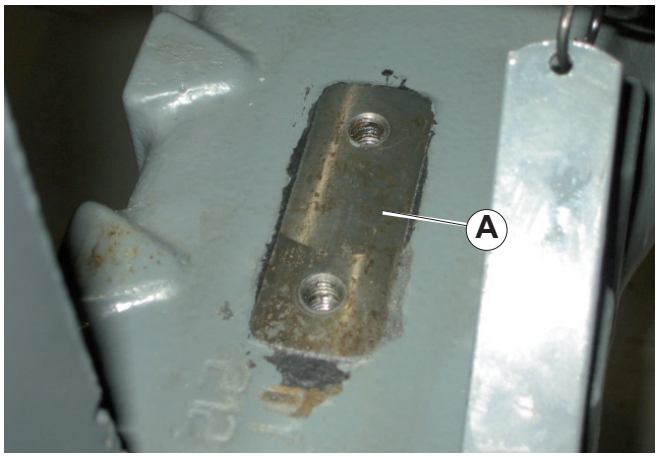
1 = Strain cage
2 = Washer ø 10
3 = Fastening screw M10x40 cl. 10.9



In order to get the best results and avoid damaging the strain cage, follow these precautionary measures:

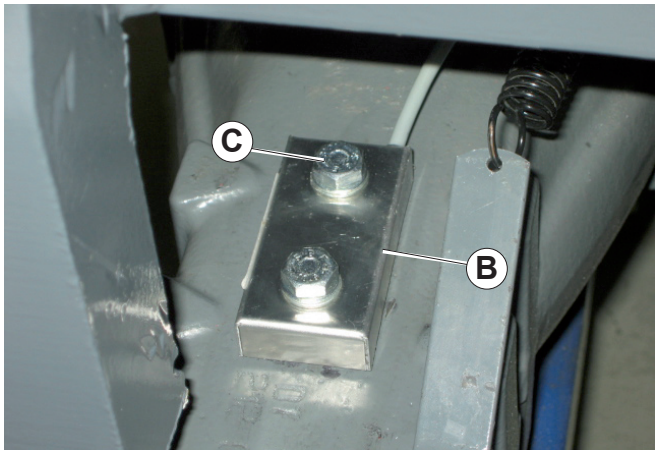
1 - PREPARATION:

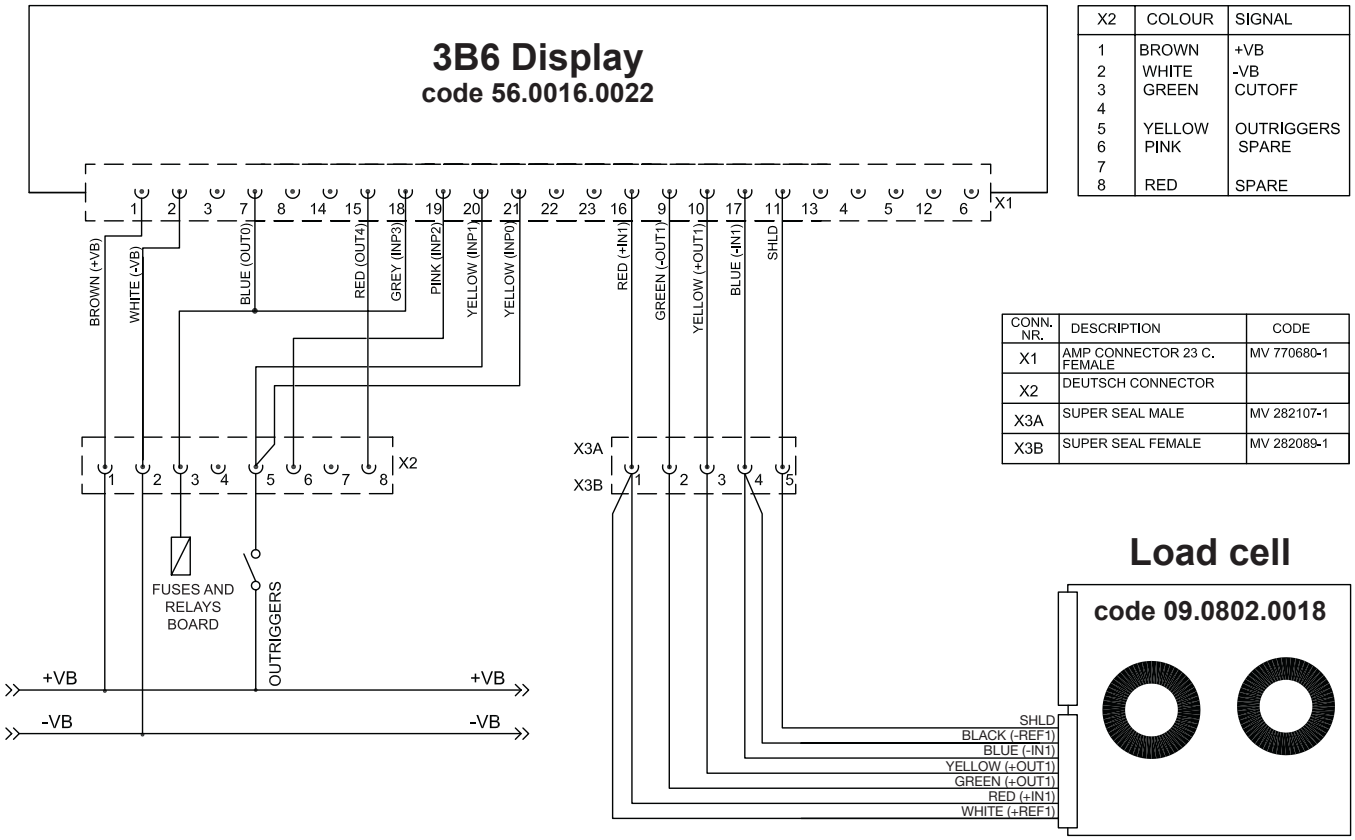
- Thoroughly clean the whole tightening system, especially the ground unpainted zone **A** of the rear axle



2 - ASSEMBLY:

- Apply the strain cage **B** with its resinated side facing the axle and holding the cable(s) toward the machine.
- Tighten the two screws **C** with a torque wrench at **70 Nm**.
- Mark the position of the screws with paint in order to make possible loosening visible to the eye.





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



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

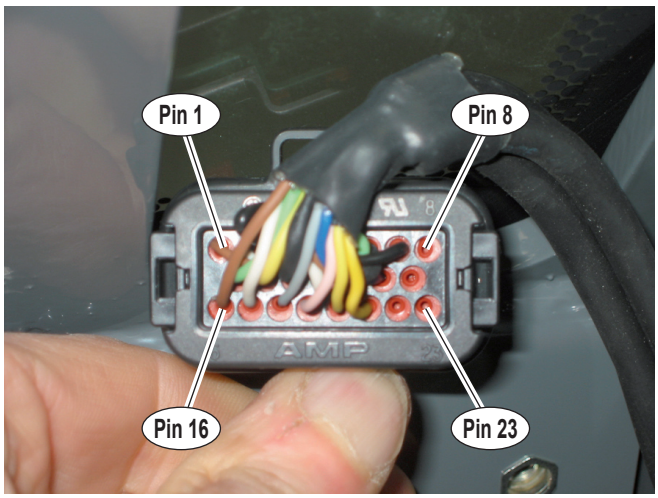
Electrical power to load cell equal to 5 V
Channel 1: Pin 16: positive Pin 17: negative

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 e 10: 0,1 - 0,2 - 0,3 - 0,4 mV

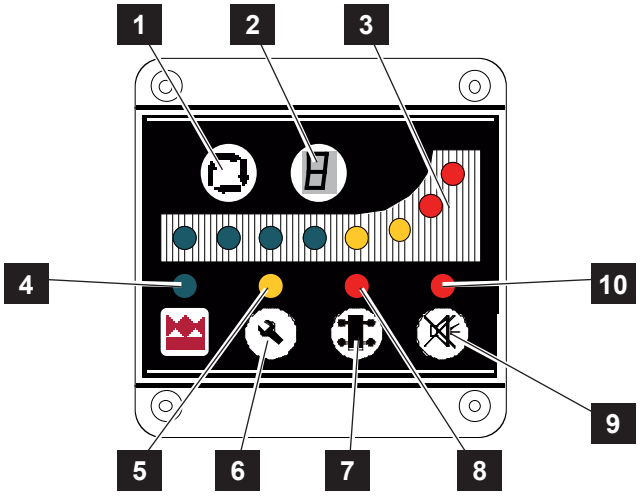
Lowered stabilisers signal
Pin 20: 12 V
Pin 21: 12 V



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.

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 1500 kg, extend the boom while holding it horizontal till reaching the overturning moment corresponding to 7.80 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 1500 kg, and extend the boom up to a distance of 4.80 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.

	load (kg)	activation of the overload warn.system (m)	
		on outriggers	on wheels
Telelift 4013 SX	1500	7,80	4,80

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).

DIAGRAM - TELELIFT 4013 SX WITH STABILISERS LOWERED TO THE GROUND

1500 kg at 7.80 metres

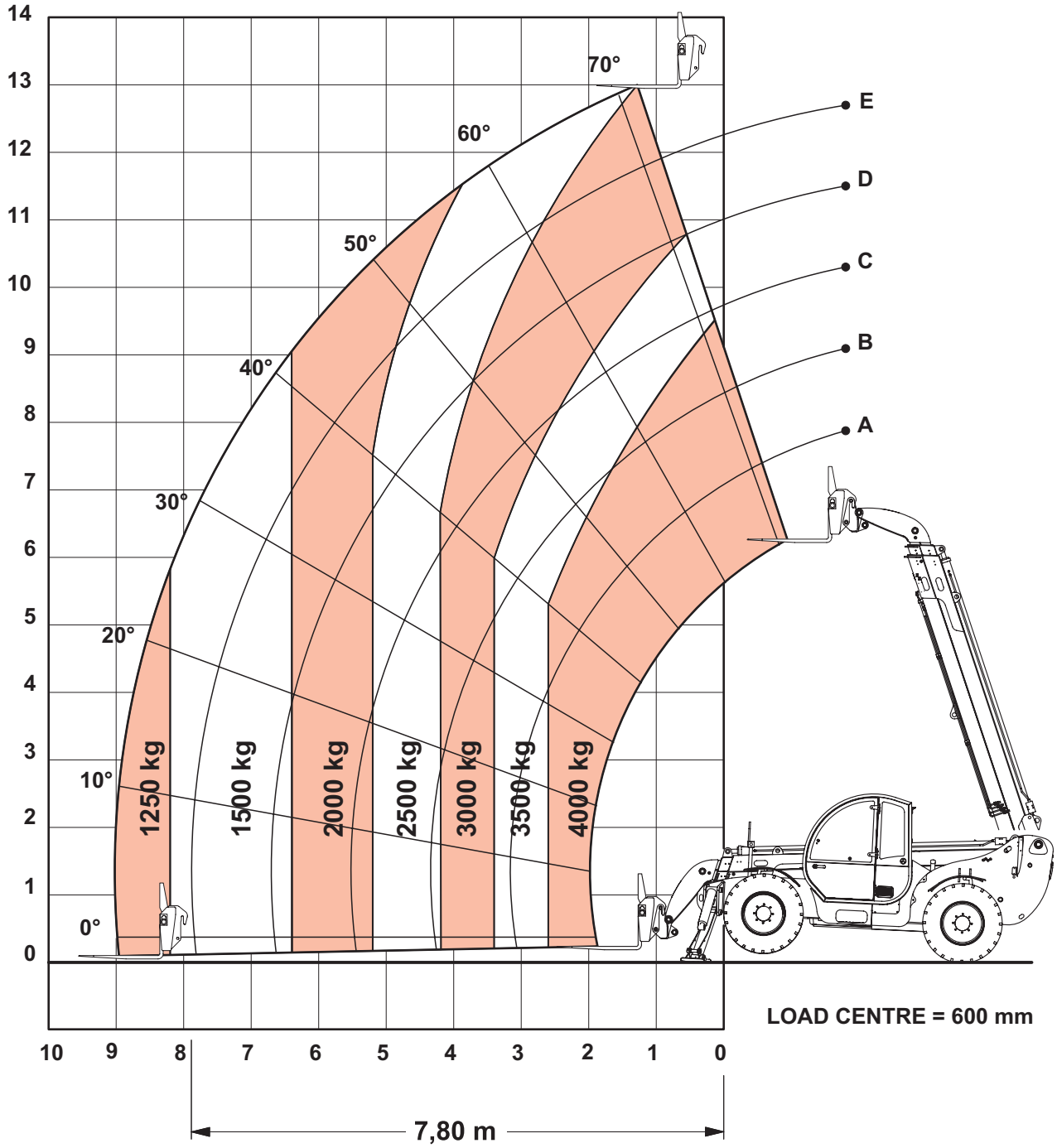
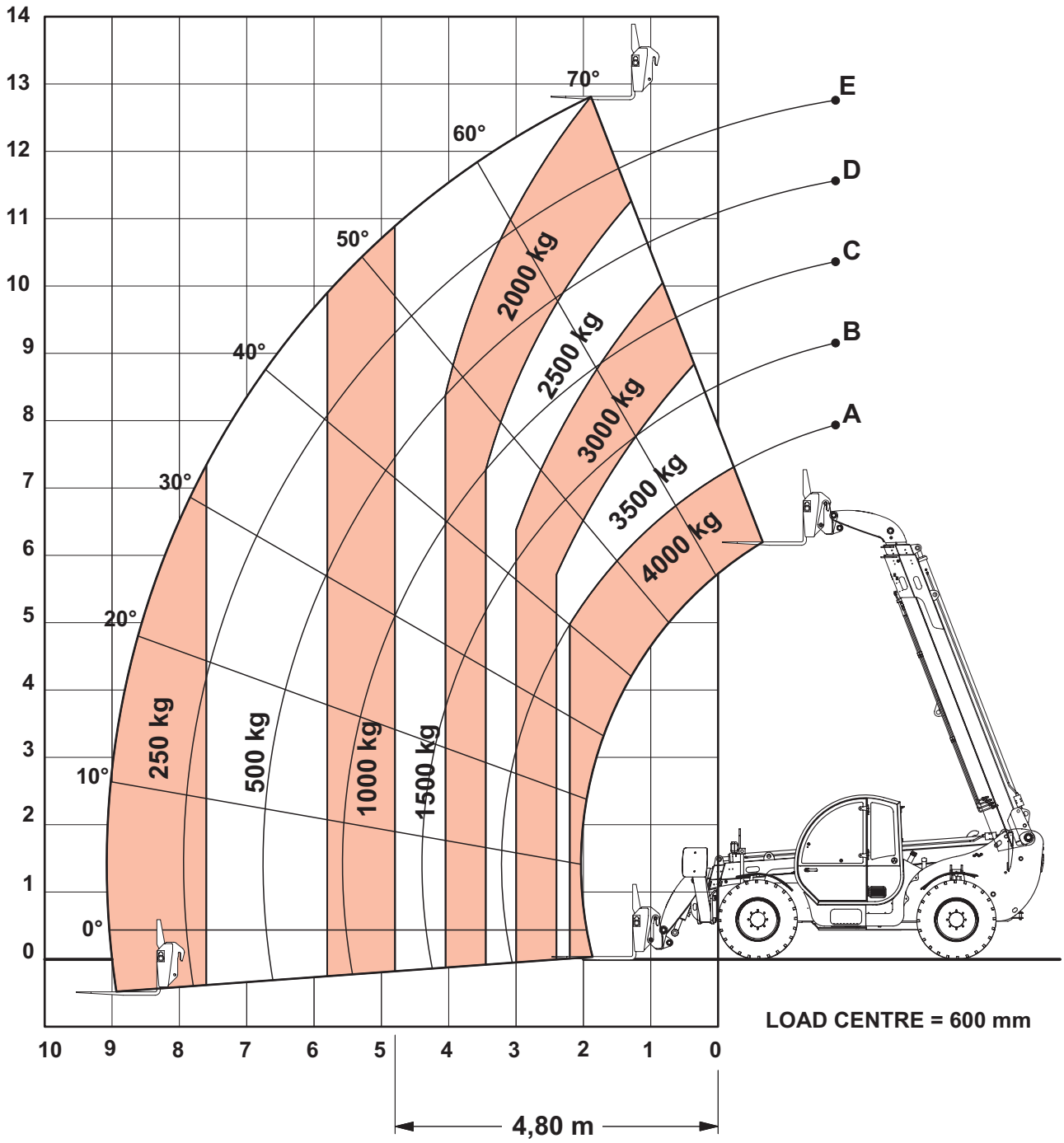


DIAGRAM - TELELIFT 4013 SX ON WHEELS

1500 kg at 4.80 metres



DIAGNOSTIC FUNCTION IN CALIBRATION MODE

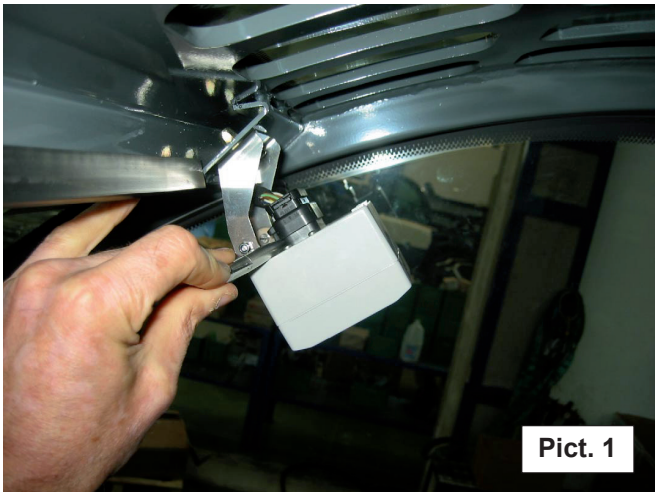
FUNCTION	DISPLAY
A-B	Display of the value read by the ADC converter-cell channel 1 (**A**). This diagnosis function allows you to check proper reading of the load cell. As you move the boom, you can see the LEDs of the load bar progressively go on/off (valid if calibration has already been done). Position 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

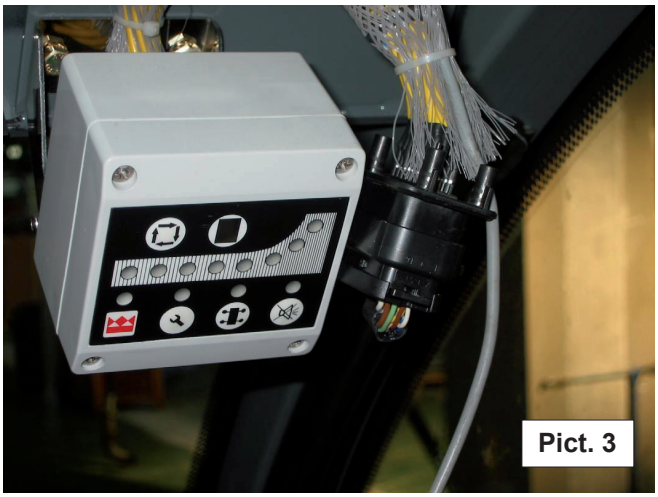
Alarm code **Description** **Action**	**1** **E2PROM Error.** Internal comparison of data read from E2PROM failed. Switch off and switch on the machine. If the alarm continues, recalibrate the machine, otherwise replace DLE
Alarm code **Description** **Action**	**2** **CELL 1 reading out of range.** 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.

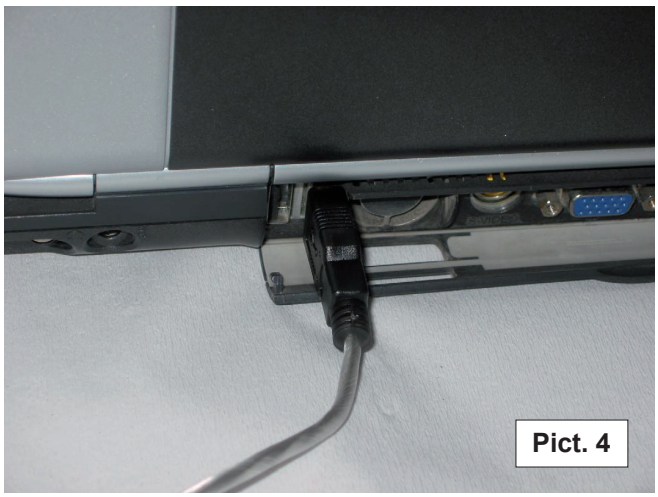
Alarm code	**4**
Description	**Block Relay check error during work.** Check through.re-reading of the block output of the congruence with the current state of the limiter. ***The alarm triggers even in the absence of malfunctions if the load limiter cutout key is usedo***.
Action	The relay or the cable 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.

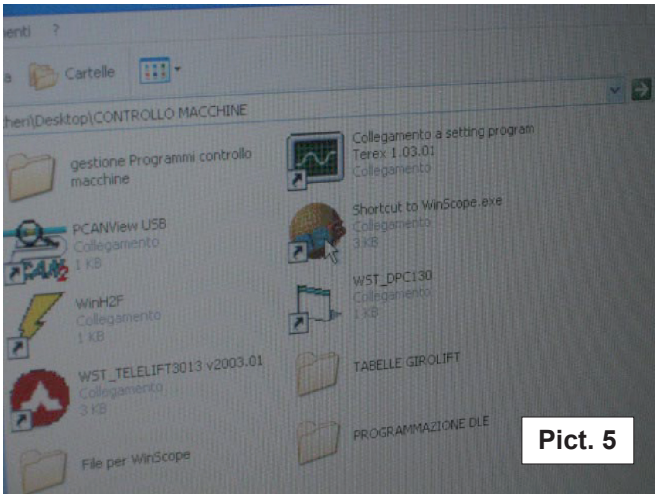
PC CONNECTION (WINSCOPE)


Pict. 1

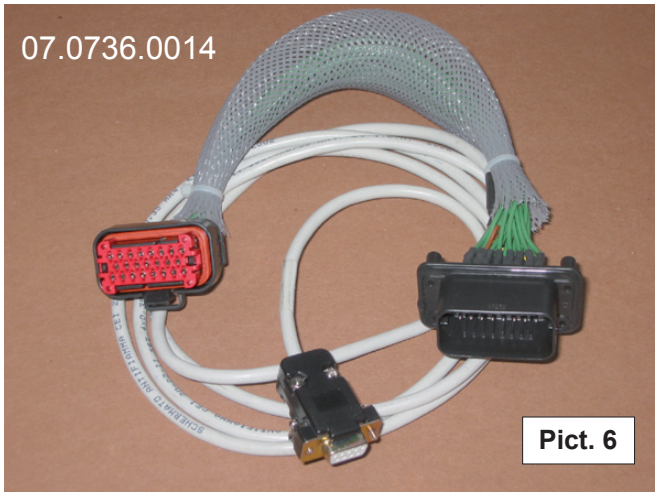

Pict. 2


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.

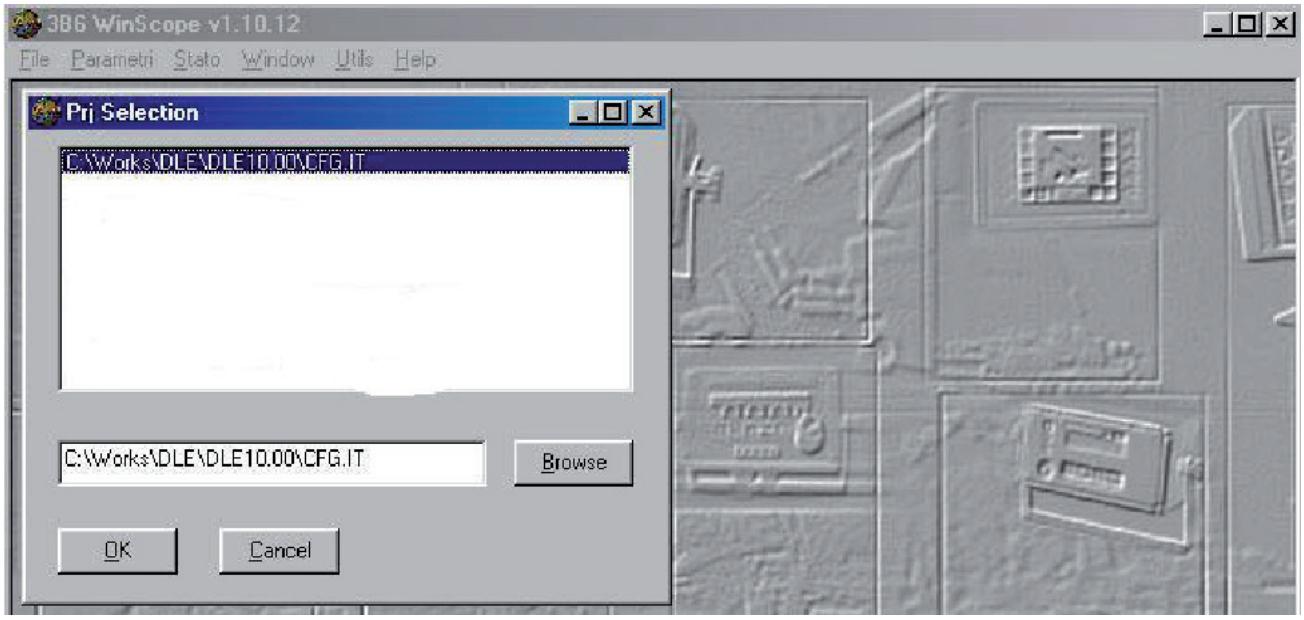
SAVING OR UPLOADING SETTINGS WITH WINSCOPE

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**".

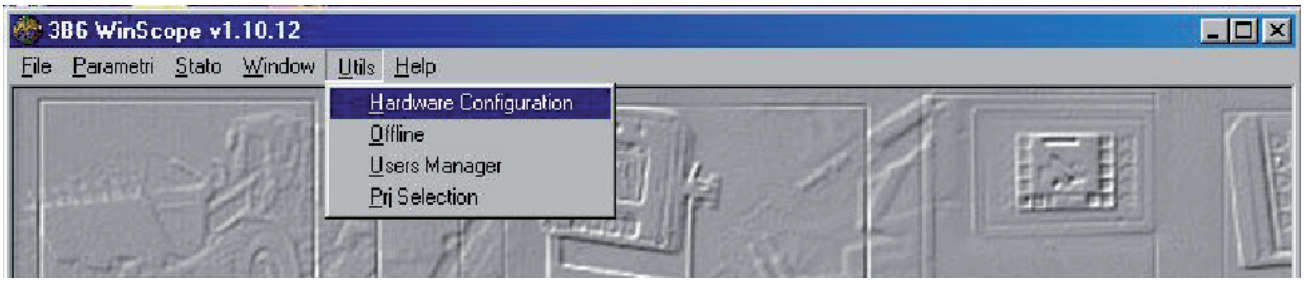


Type in the correct path of file **CFG.IT** or look for the same in the Windows folders suing the "Browse" function. The file must not necessarily be in the path shown in the following example as it is at the user's discretion.
It contains the menus and the name of the parameters corresponding to the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

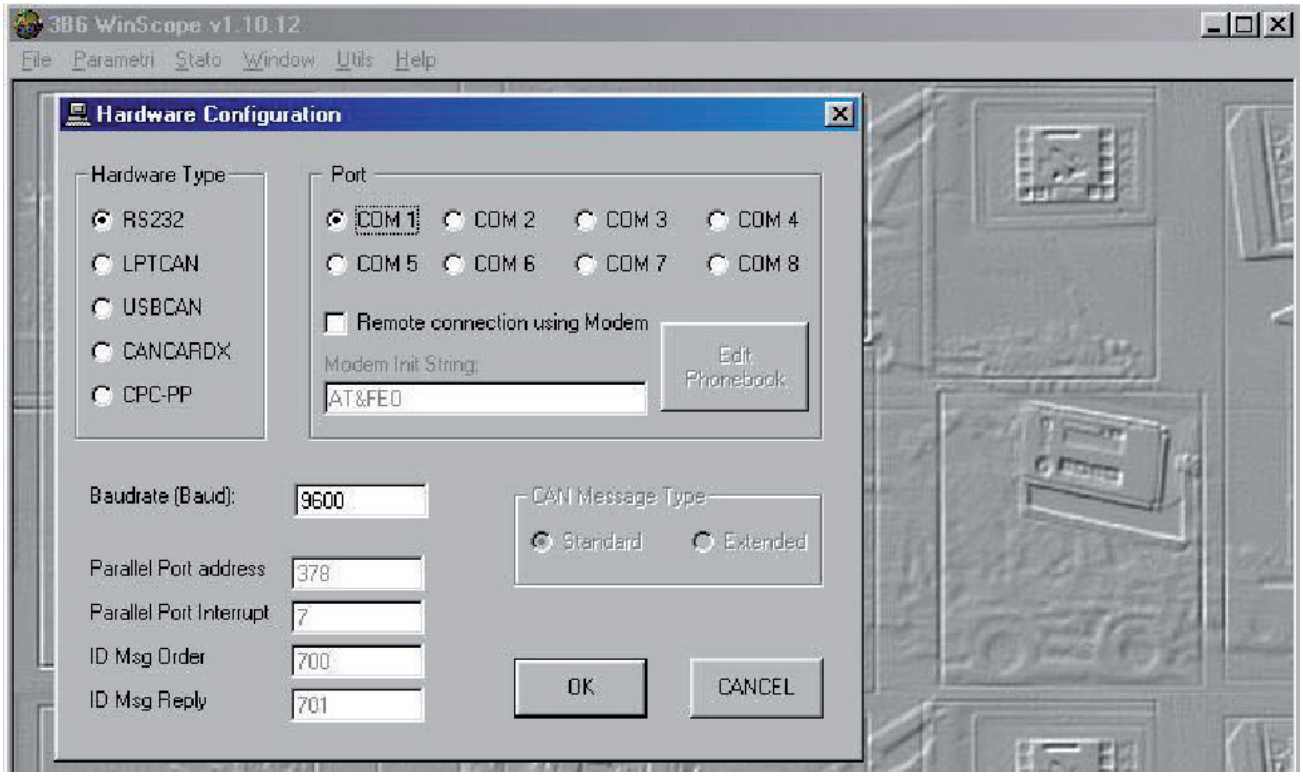


Press OK to close the window.

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



The following window will appear:



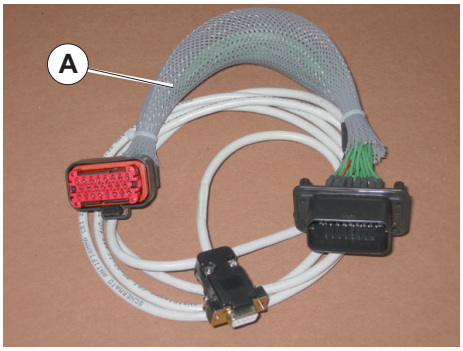
For each type of machine, you must select adequate parameters, that is:

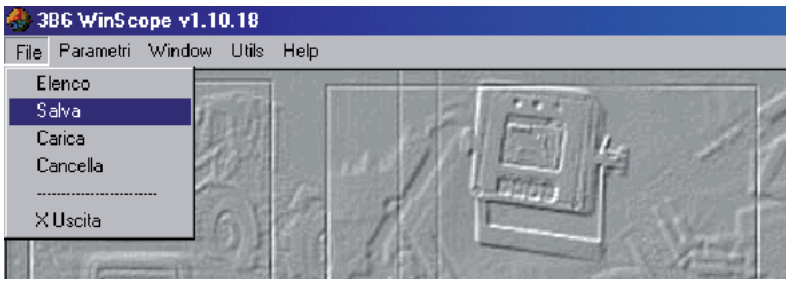
DLE_01 (version _01 or higher)

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

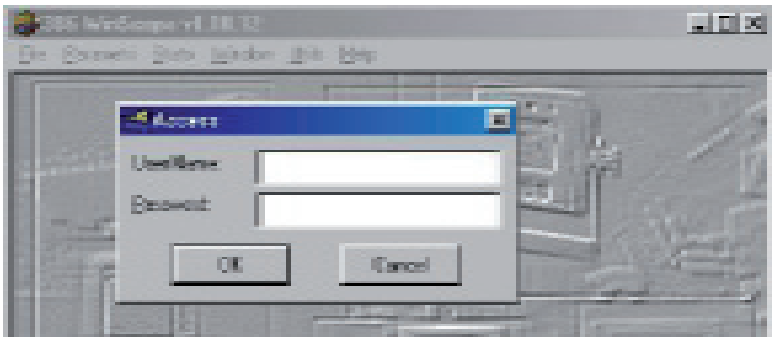
If these parameters are wrongly configured, it won’t be possible to connect the units.
Press OK to confirm and close the window.
Now **close** and re-open the program.

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.

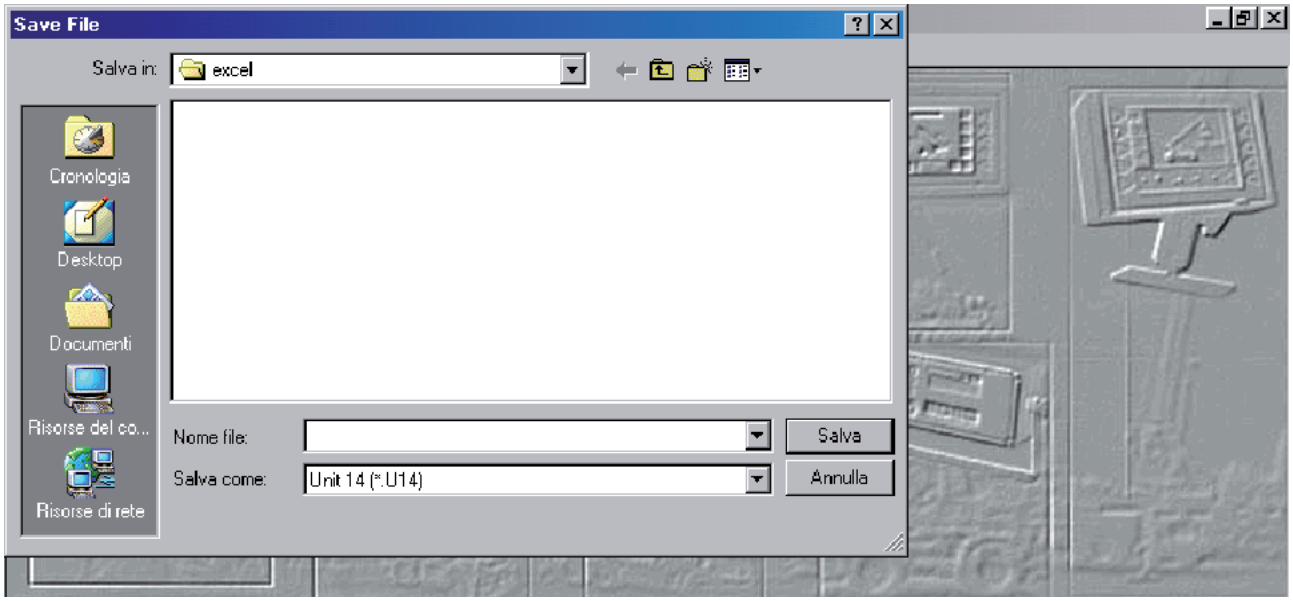




The following window will be displayed so you can type in the password.
For any changes, you must enter the following data:
User Name: ...(contact the TEREXLIFT Service Centre to get your ID-code)
Password: ....(contact the TEREXLIFT Service Centre to get your ID-code)

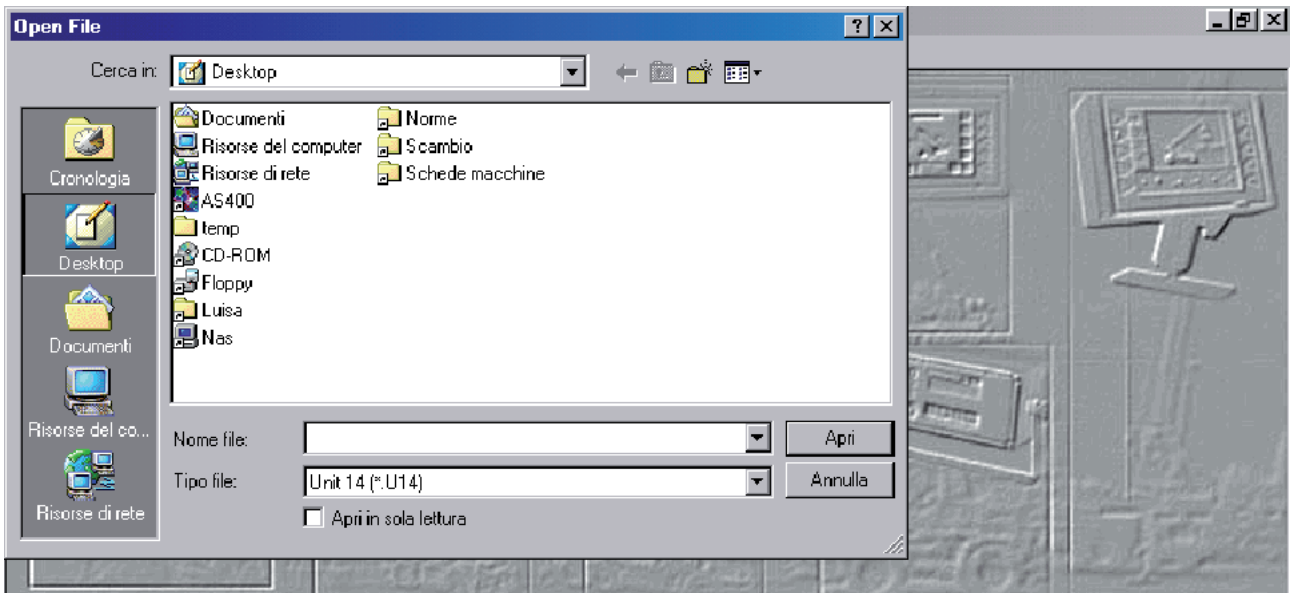


Enter the correct data and press OK. If you have selected “Salva” (Save), the following window will be displayed:



Choose the folder where to save the setting and save the file with a name showing the serial number of the machine (e.g. T4013 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:



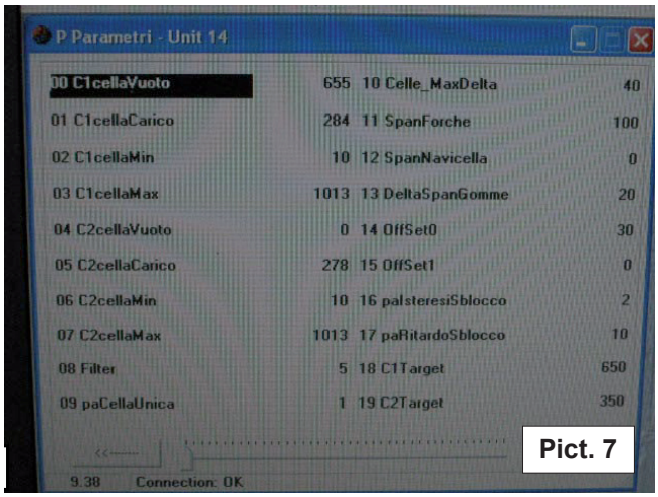
Choose the setting file you want to upload on the machine and press “Apri” (Open).
Save the setting as explained below:

DLE

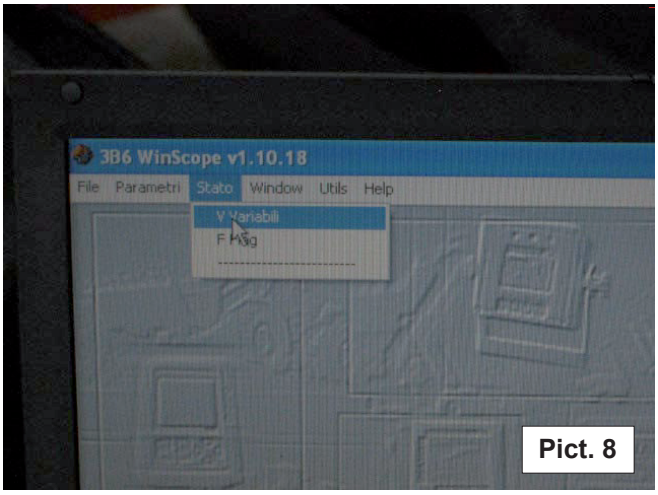
- If you want to save the setting, contact the TEREXLIFT Service Centre to get more information and be registered as an authorised user of the system.
- To gain access to the parameters and variables, no password is needed. All you have to do is connecting the DLE display with the power cord supplied 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.

DISPLAYING/CHANGING THE PARAMETERS

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

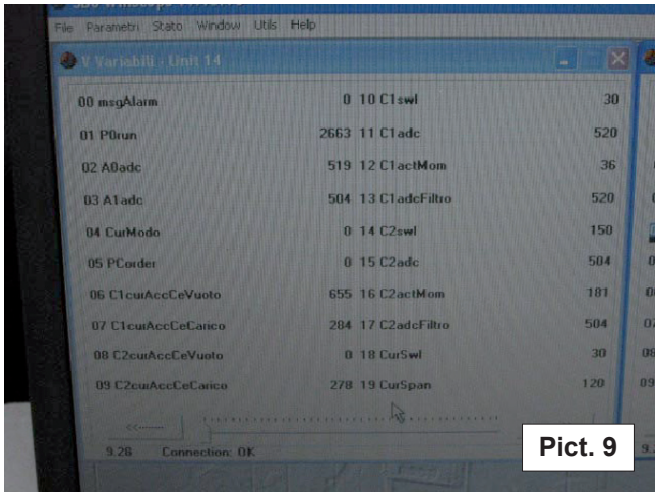


Pict. 7



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.

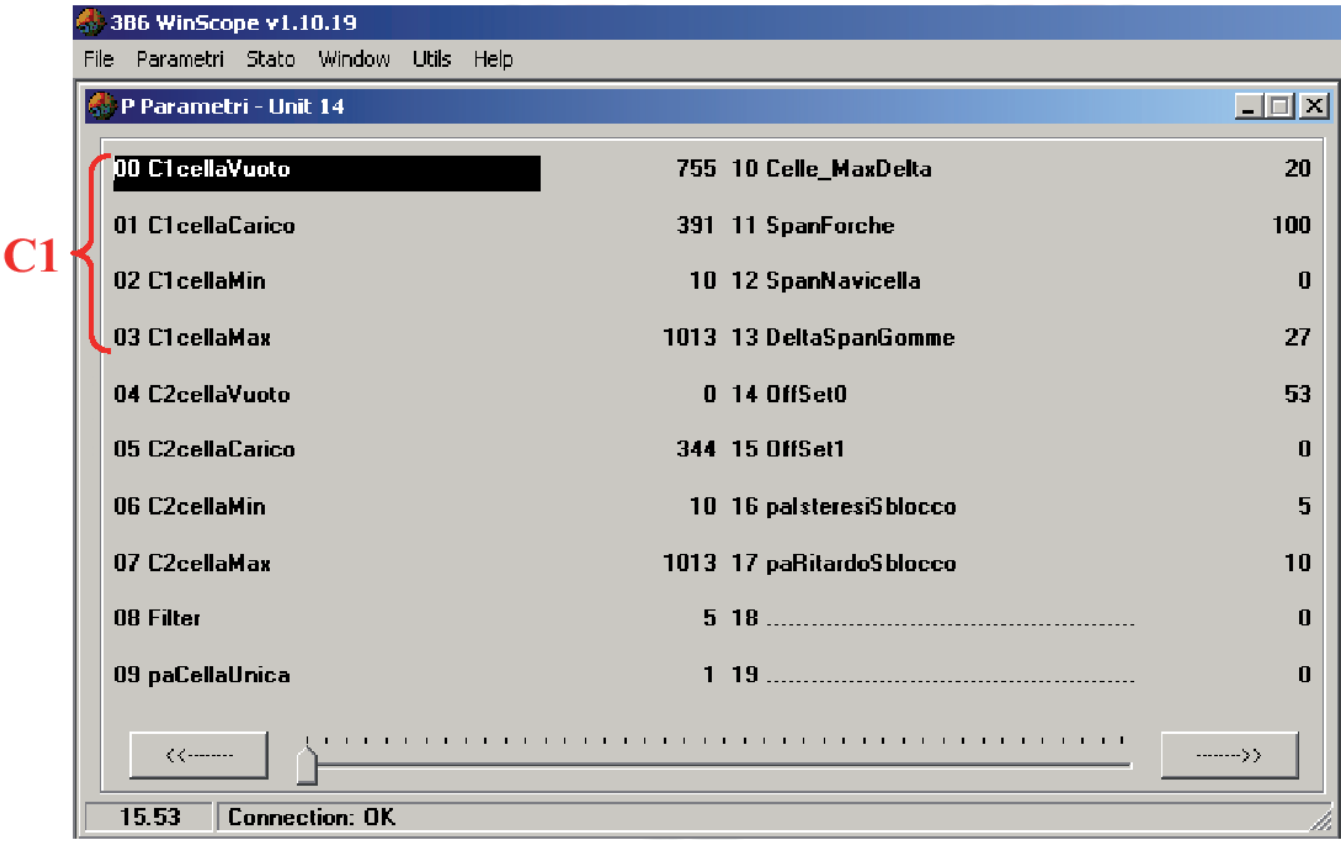


Pict. 9

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.

DLE - MONITORING WITH 3B6 WINSCOPE - PARAMETERS

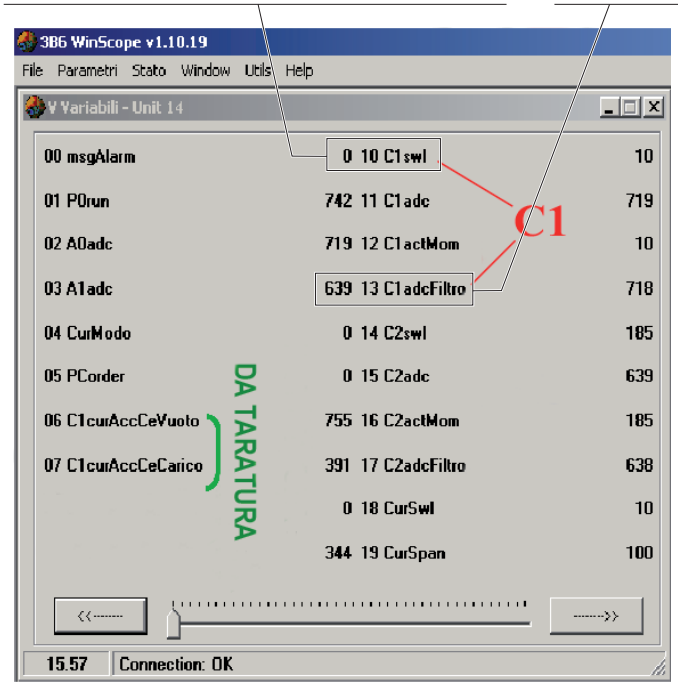
Displaying the parameters



Simulation of the variables

load % calculated in relation to the calibration

value of the analog signal read and converted into bits



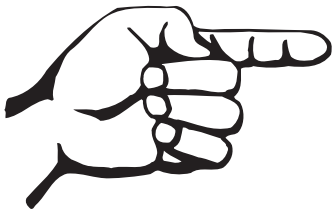
LIST OF THE DLE PARAMETERS

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).

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.

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

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.***

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.

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.

TABLE B

Within the first 50 working hours:

B-1	Change the engine oil and renew the fuel filter.

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

Within the first 100 working hours:

C-1	Change the oil of the differential casing, the wheel reduction gears and the power diver reduction gear

Every 250 working hours or monthly:

C-2	Change the engine oil and relevant filter.
C-3	Check the oil level in the front and rear differential gears.
C-4	Check the oil level in the four wheel reduction gears.
C-5	Check the main filtering element of the engine air filter. Replace, if necessary.
C-6	Check the clamping of the cableheads to the battery terminals.
C-7	Check the air suction hose between engine and filter.
C-8	Check the cylinder chromium-plated rods.
C-9	Check the hydraulic lines are not worn because of rubbing against the frame or other mechanical components.
C-10	Check the electric cables do not rub against the frame or other mechanical components.
C-11	Check the wear of the sliding pads of the boom sections.
C-12	Adjust the play of the sliding pads of the boom sections.
C-13	Remove any grease from the boom, then re-grease the sliding parts of the boom sections.
C-14	Check the level of the battery electrolyte.
C-15	Check the efficiency of the block valves.

TABLE D

Every 500 working hours or every six 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	Change the hydraulic oil filter in the tank.
D-6	Have the hydraulic system checked by a skilled technician.
D-7	Change the main cartridge of the engine air filter.
D-8	Renew the cartridge of the engine oil filter and the fuel filter.
D-9	Clean the air filter in the cab.
D-10	Change the oil in the differential gears.

TABLE E

Every 1000 working hours or yearly:

E-1	Change the safety element of engine air filter.
E-2	Change the oil in the power divider reduction gear.
E-3	Change the oil in the four wheel reduction gears.
E-4	Change the hydraulic oil.

TABLE F

Every 2000 working hours or every two years:

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.

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
Within the first 100 working hours:				
C-1	Oil of differentials, wheels and power divider reduction gears			
Every 250 working hours:				
C-2	Engine oil and relevant filter.			
C-3	Oil level in the differential gears.			
C-4	Oil level in the wheel reduction gears.			
C-5	Main filtering element of the engine air filter.			
C-6	Clamping of the cableheads to the battery terminals.			
C-7	Air suction hose between engine and filter.			
C-8	Cylinder chromium-plated rods.			
C-9	Hydraulic lines.			
C-10	Check the electric cables do not rub against the frame or other mechanical components.			
C-11	Wear of the sliding pads of the boom sections.			
C-12	Play of sliding pads.			
C-13	Sliding parts of the boom sections.			
C-14	Level of the battery electrolyte.			
C-15	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	Hydraulic oil filter in the tank.			
D-6	Check the hydraulic system.			
D-7	Main cartridge of the engine air filter.			
D-8	Cartridge of the engine oil filter and the fuel filter.			
D-9	Cab air filter.			
D-10	Oil level in the differential gears.			

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 power divider reduction gear			
E-3	Oil in the wheel reduction gears.			
E-4	Hydraulic oil.			

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.			

Section 4
SCHEDULED MAINTENANCE PROCEDURES

SECTION INDEX

4.1	Introduction..... page	2
4.2	About this section	3
4.3	TABLE A procedures	4
4.4	TABLE B procedures.....	25
4.5	TABLE C procedures.....	30
4.6	TABLE D procedures.....	44
4.7	TABLE E procedures.....	52
4.8	TABLE F procedures	56
4.9	TABLE G procedures	57

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.*

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.

4.3 TABLE A PROCEDURES

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

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

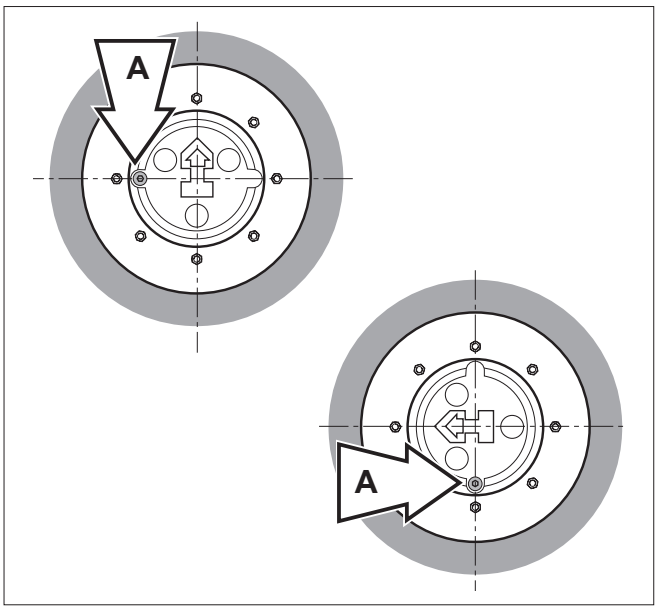
Place a container of suitable size under the plug.

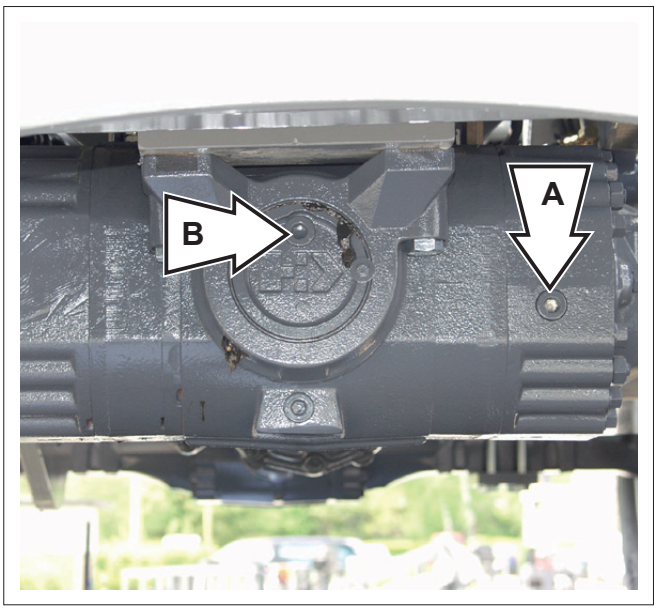
To check the oil level in the front and rear **differential gears**:

- 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.



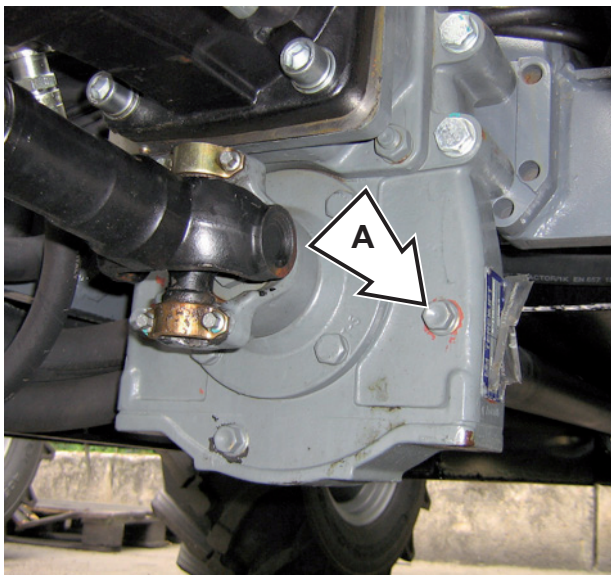


To check the oil level in the **power divider reduction gear**:

- 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.

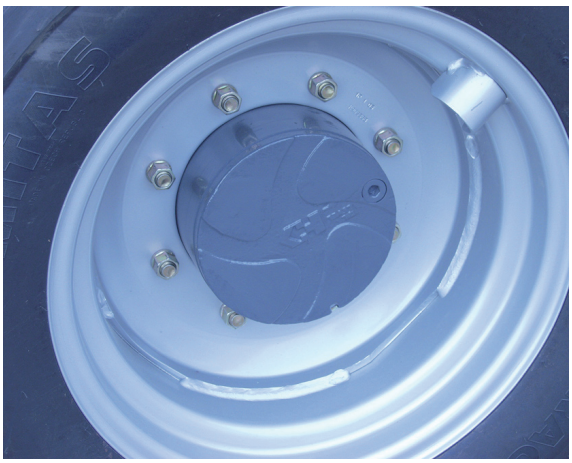


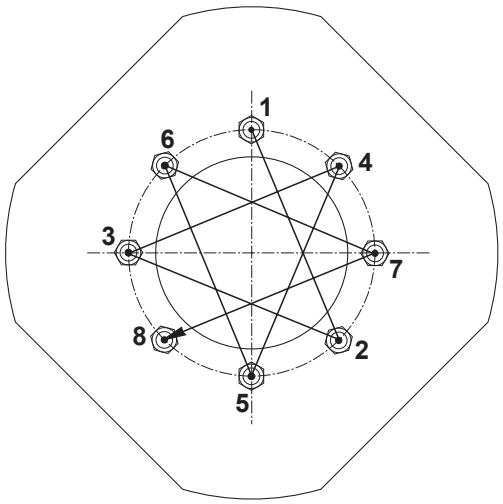
A-2 CHECK THE TIGHTENING OF THE WHEEL BOLTS

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.
- Raise the outrigger and 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 4013 SX	OPTIONAL Telelift 4013 SX
Dimensions (front and rear)	405/70 R20	400/70 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

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.

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

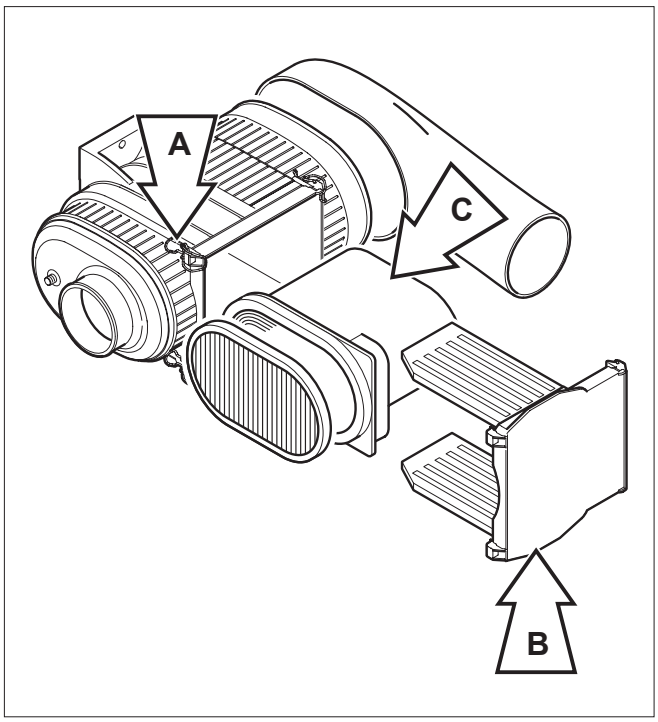
CAUTION

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

A-8 CLEAN THE AIR SUCTION FILTER

Clean the engine air filter every 10 hours:

- Stop the engine and engage the parking brake.
- Open the four latches **A**.
- Remove the protection cap **B**.
- Extract the external cartridge **C**.
- Clean the filter bowl.
- Beat the cartridge against a piece of wood surface to eliminate any dust.
- Dry clean the cartridge (max. pressure: 6 bar).
- Check for cracks in the filtering element.
- Before refitting the cleaned cartridge or a new one, smear its seal with a thin coat of grease; fit the cartridge and make sure it is properly positioned.
- Refit cap **B**.



⚠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.

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.

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.

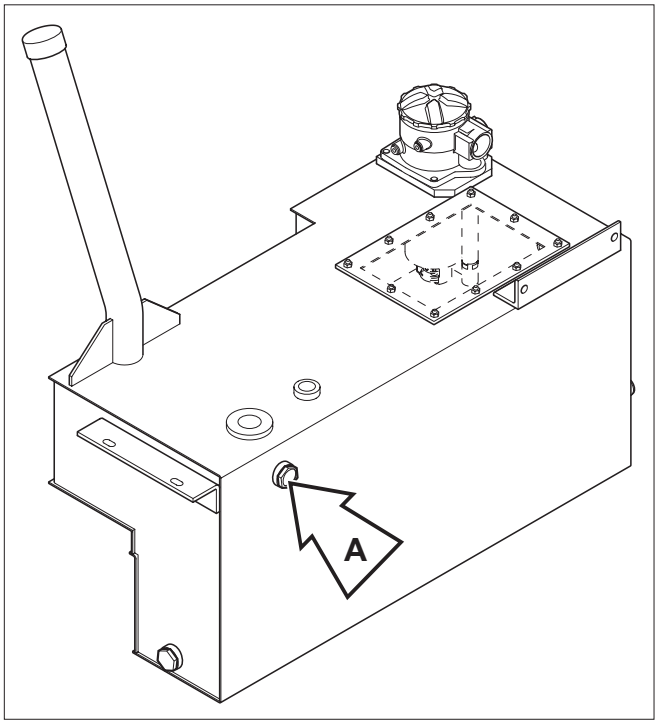
Visually check the hydraulic oil level through level **A** located on the reservoir and visible through the slot on the right side of the chassis.
When necessary, add new oil through filler **B**.

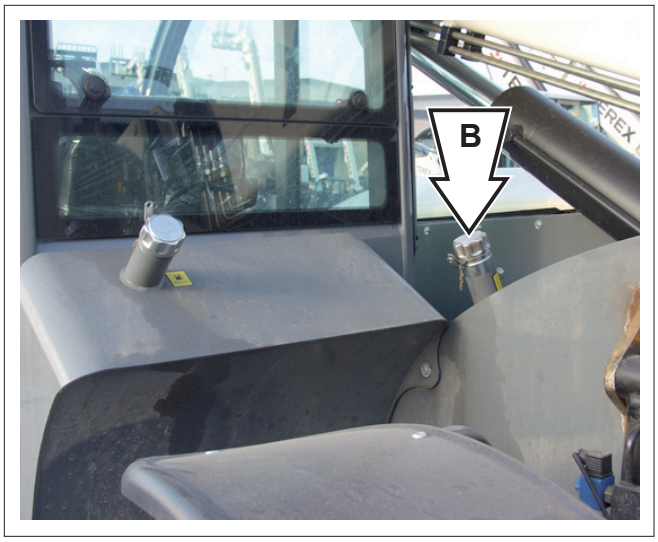
WARNING

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.





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.

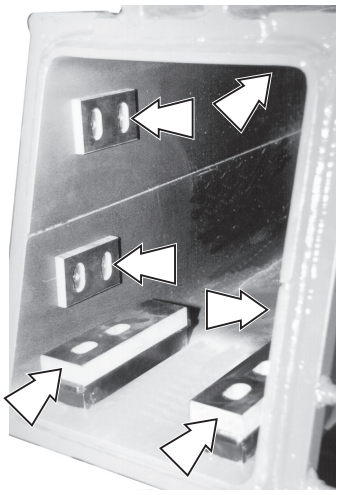
At regular intervals, check that the telescopes are well greased in correspondence of the sliding pads.

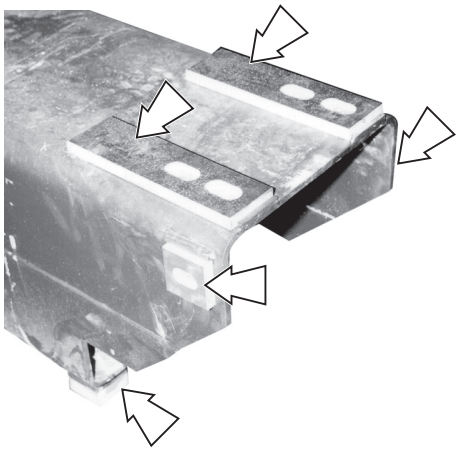
If necessary, scrape off the old grease and brush new grease. We recommend using:

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

CAUTION

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





A-12 GREASE THE FORKS

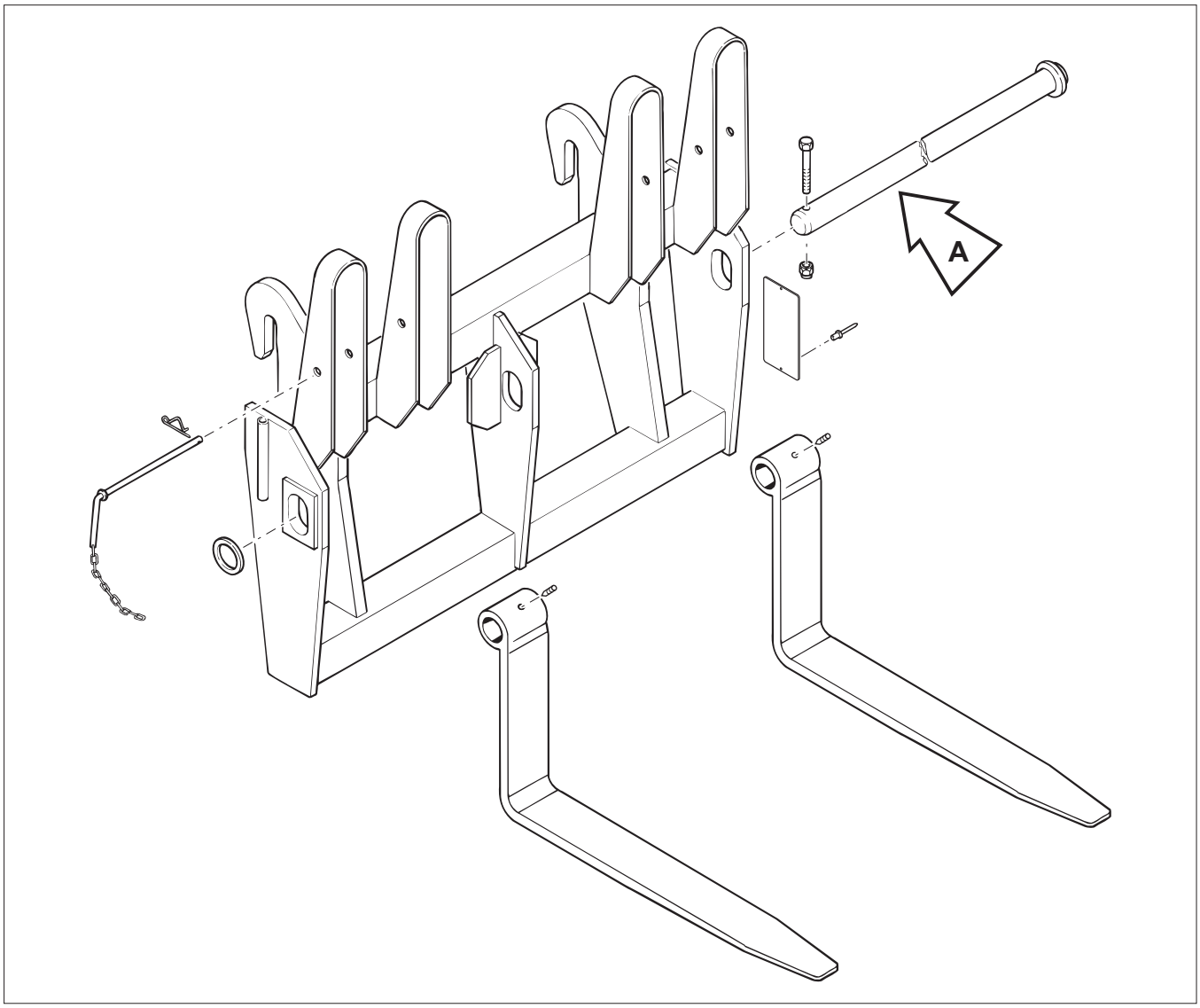
CAUTION

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.

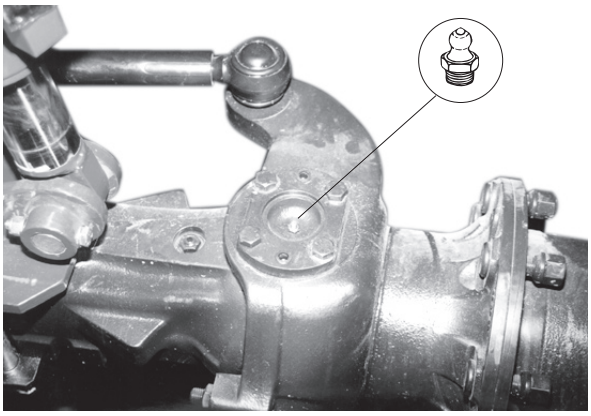
Smear pin **A** with grease to help the forks slide on it.

Recommended grease:

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



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.

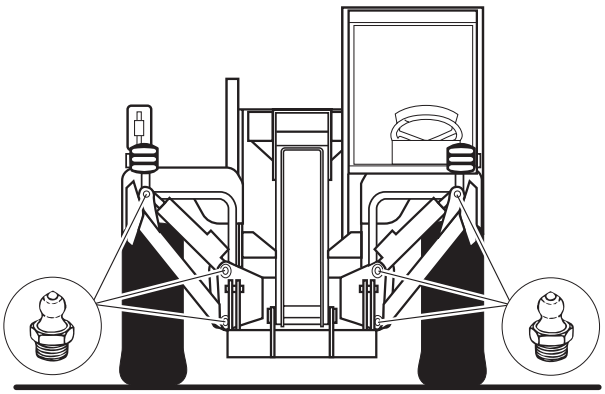
Regularly grease the machine to grant it efficient conditions and a long life.

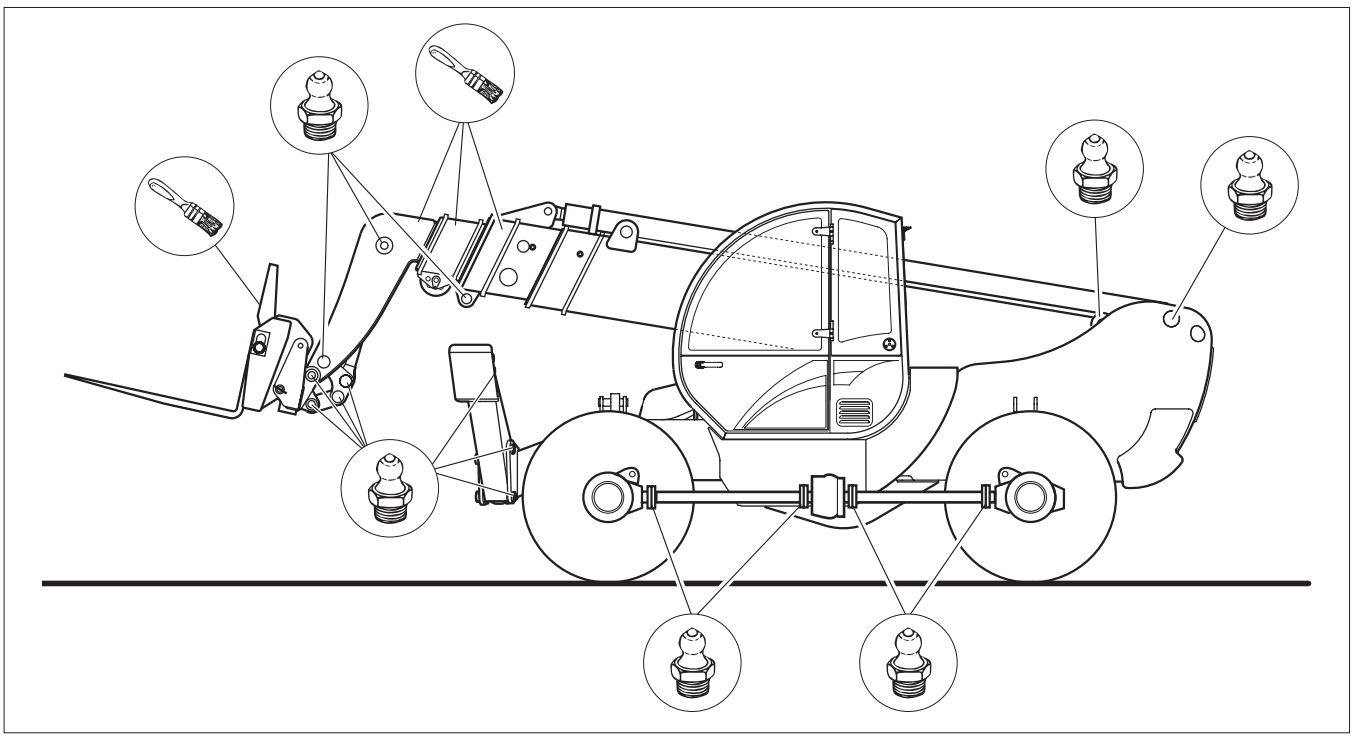
By means of a pump, inject grease into the special greasers.

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.





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

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.

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**).

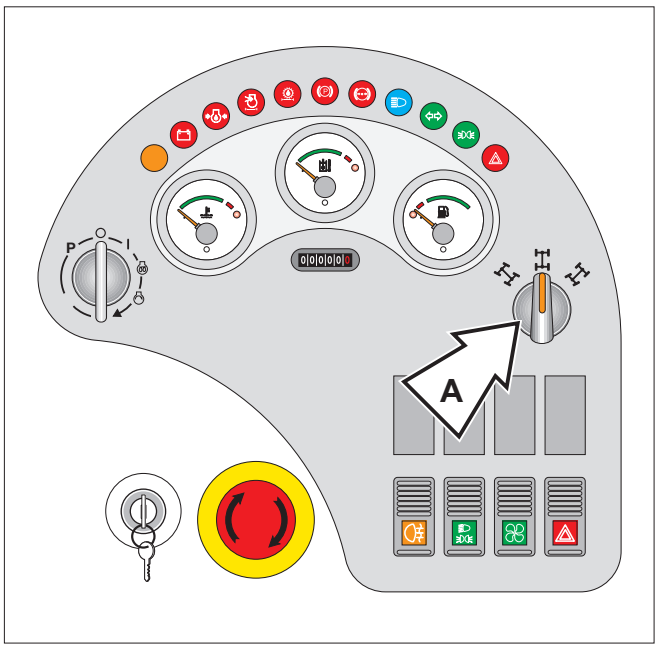
7 Rotate the steering (to the side opposite to point **3**) so that the rear axle reaches its stop.

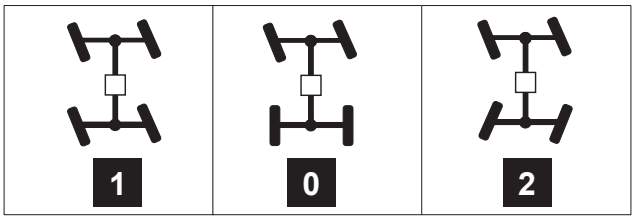
8 Reset the steering selection switch to “two-wheel steer” (pos. **0**).

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.





A-17 CHECK THE EFFICIENCY OF THE FORK BALANCING SYSTEM

WARNING

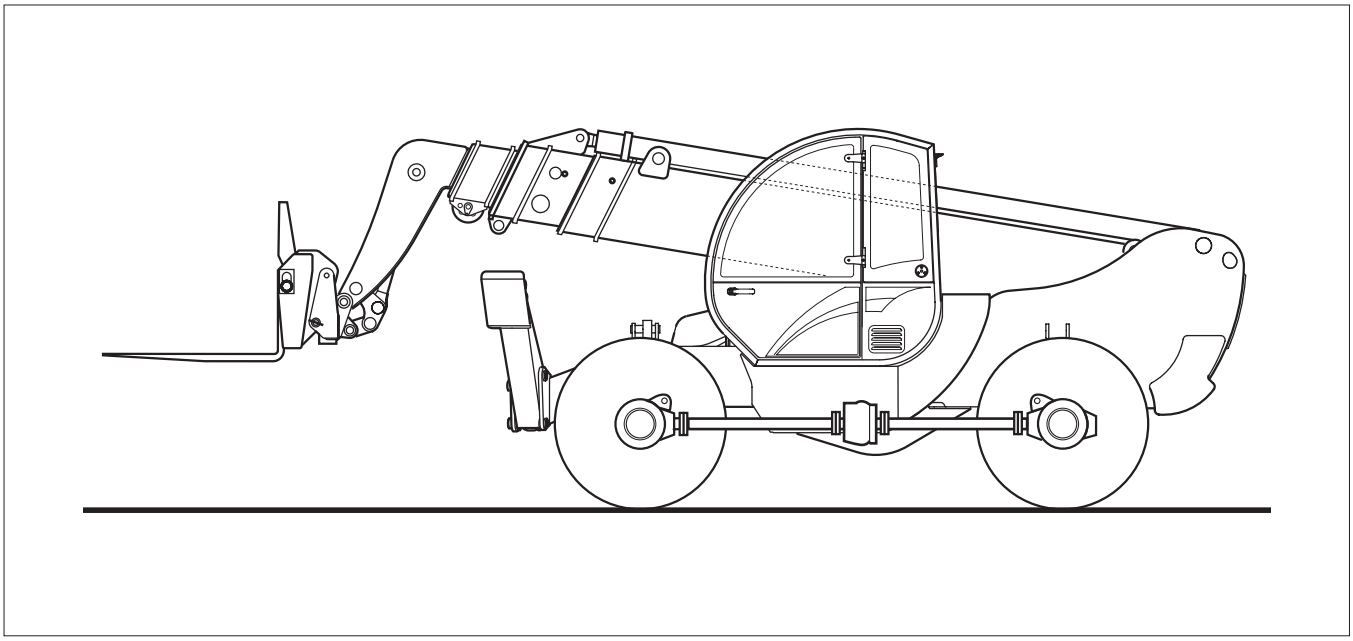
Test the system without any load on the machine's forks.

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".



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 push-button 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 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.

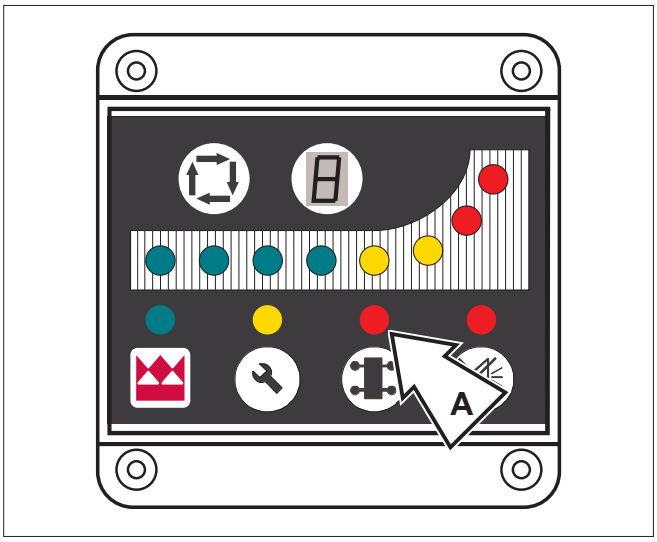
Proceed on one outrigger at a time.

- 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 Service.



DANGER

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



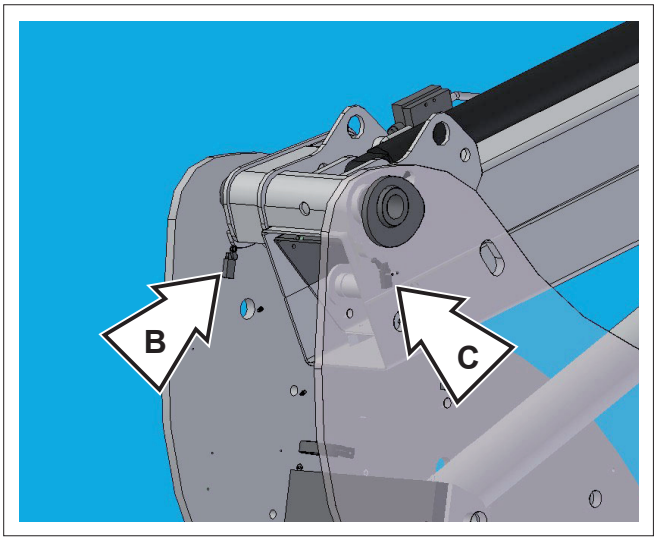
Checking the limit switches
(at every use)

Limit switch B on the boom

- Raise and tilt the boom more than 40° and check if the axle is blocked.
  Should this not be the case, contact the TEREXLIFT Technical Assistance Service.

Limit switch C on the boom

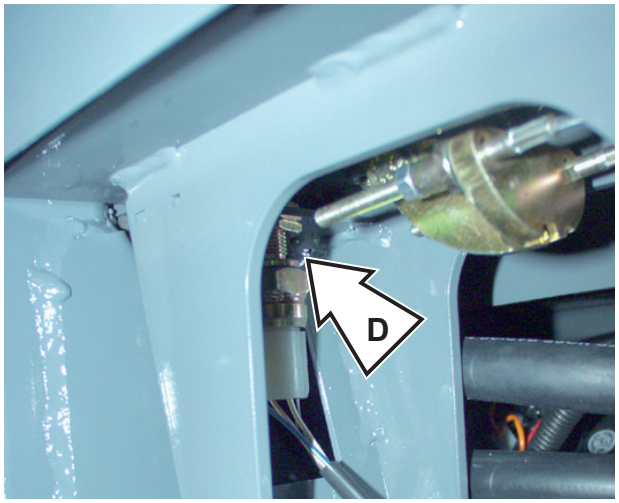
- Raise the boom beyond the horizontal and ensure the sway control and the outrigger conttrol are blocked.
  Should this not be the case, contact the TEREXLIFT Technical Assistance Service.



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

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

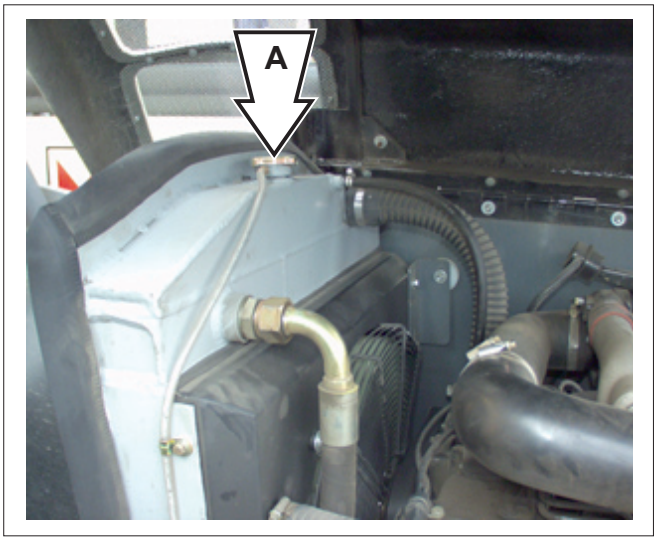
- sit on the driving place, put the parking brake and attempt to move with the machine. The machine must stand still.
  Shoudl this not be the case, adjust the distance of the brake microswitch or replace it.



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.



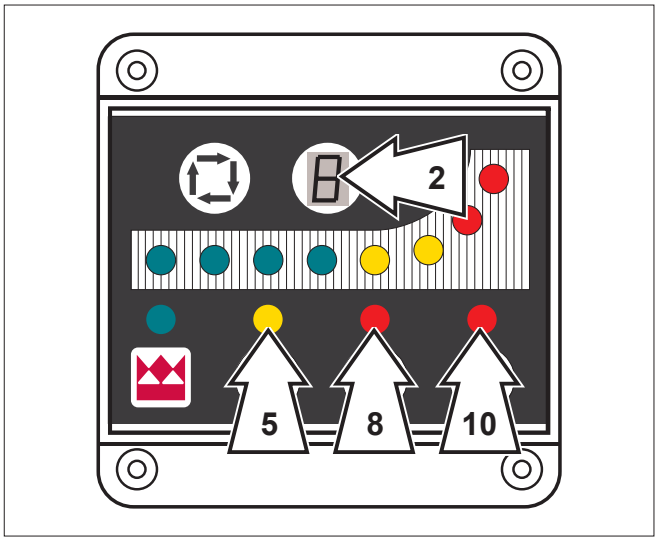
- Every week, before starting working (when the coolant is cold), check the coolant level which shall be kept at 2 centimetres from plug **A**.
- When necessary, add clean water or an antifreeze mixture through cap **A**.

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

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 Service Centre.



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.

4.4 TABLE B PROCEDURES

B-1 CHANGE THE ENGINE OIL AND RENEW THE FUEL FILTER

B-2 CHECKTHETENSIONOFTHEALTERNATOR BELT

CAUTION

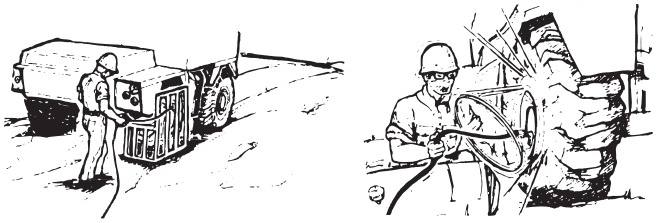
For the engine maintenance, please refer to the specific Operator handbook supplied with the machine.

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 4013 SX	OPTIONAL Telelift 4013 SX
Dimensions (front and rear)	405/70 R20	400/70 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

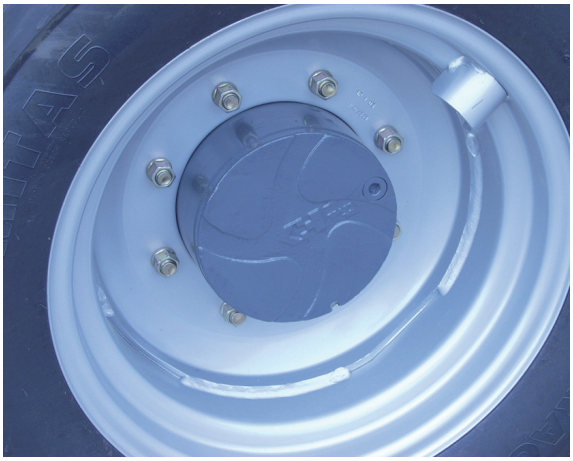
Always use tyres having the dimensions indicated in the vehicle registration card.

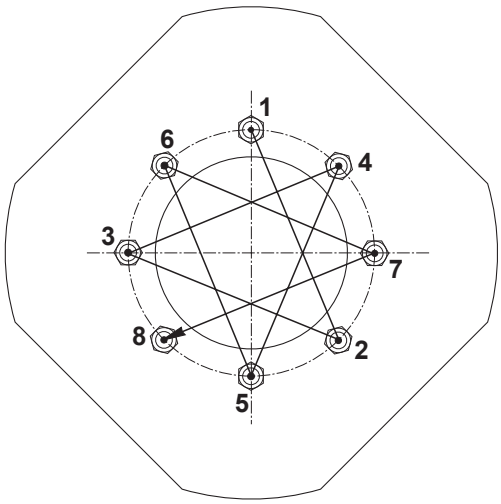
B-4 CHECK THE TIGHTENING OF THE WHEEL NUTS

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.
- Raise the outrigger and 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

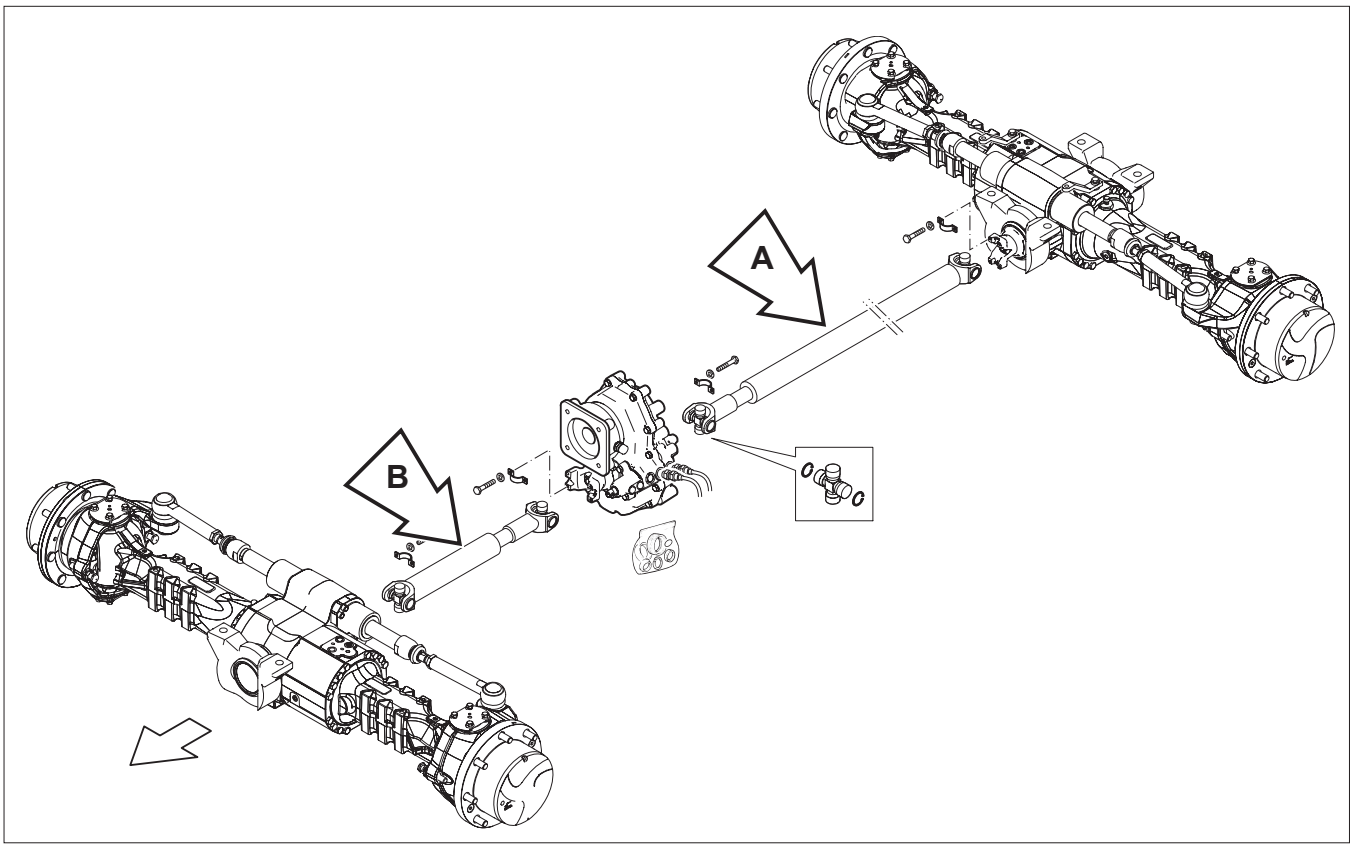
Always use tyres having the dimensions indicated in the vehicle registration card.

	STANDARD Telelift 4013 SX	OPTIONAL Telelift 4013 SX
Dimensions (front and rear)	405/70 R20	400/70 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

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”.



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.

4.5 TABLE C PROCEDURES

C-1 CHANGE THE OIL OF THE DIFFERENTIAL GEARS, THE WHEEL REDUCTION GEARS AND THE POWER DIVIDER REDUCTION GEAR

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**

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

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

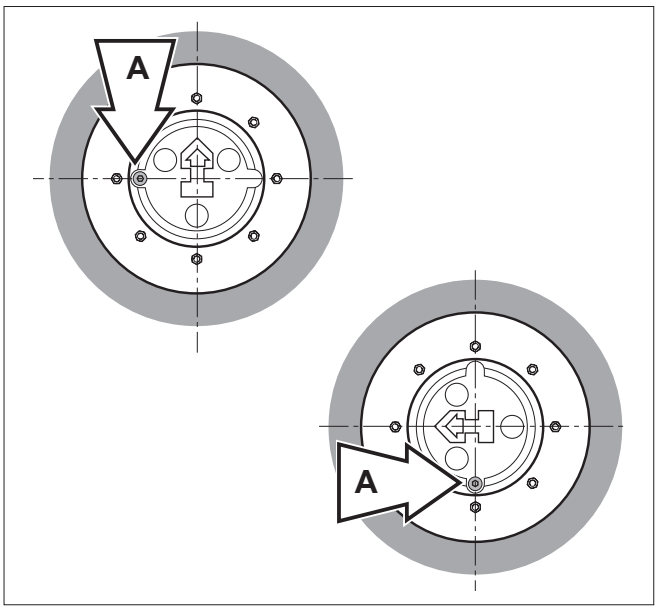
NOTICE

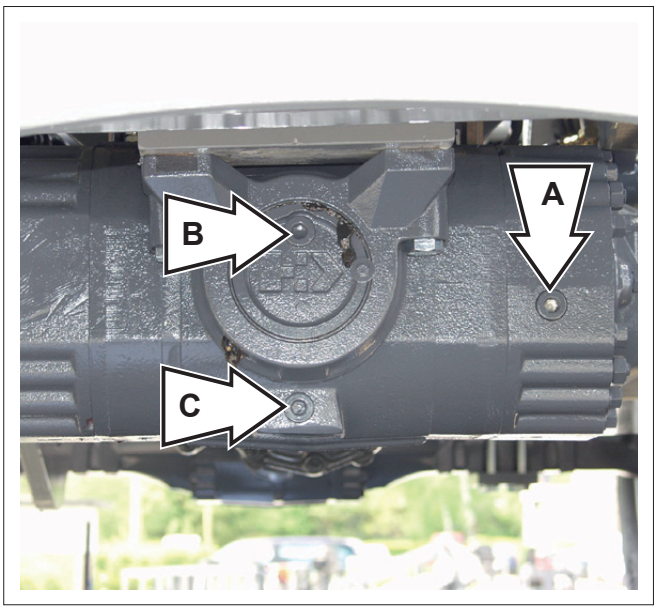
Place a container of suitable size under the plug.

- 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:

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





To change the oil in the **power divider reduction gear**:

- Stop the machine on a level ground and make sure the parking brake is engaged.

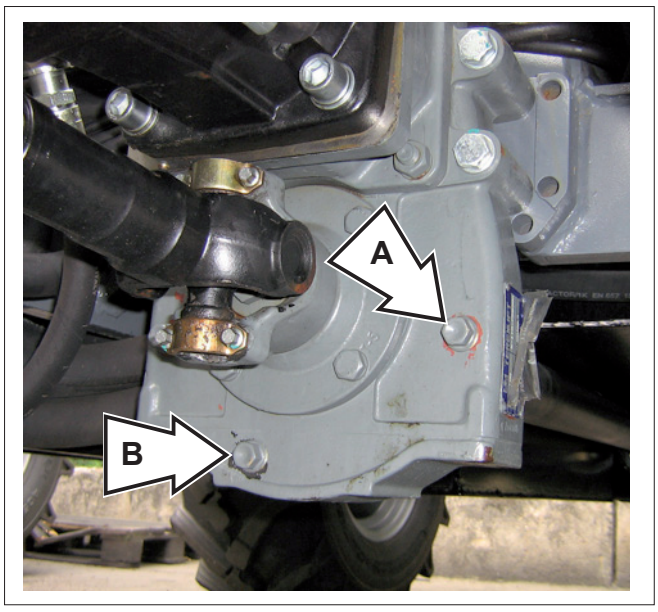
NOTICE

Place a container of suitable size under the plug.

- Remove the plug **A**.
- Remove the drain plug **B** and let the oil flow out completely.
- Refit and tighten the drain plug **B**.
- Add new oil through plug **A** until it is level with the hole.
- Refit and tighten plug **A**.

Recommended oil:

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



C-2 CHANGE THE ENGINE OIL AND RELEVANT FILTER

CAUTION

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

C-3 CHECK THE OIL LEVEL IN THE FRONT AND REAR DIFFERENTIAL GEARS

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.

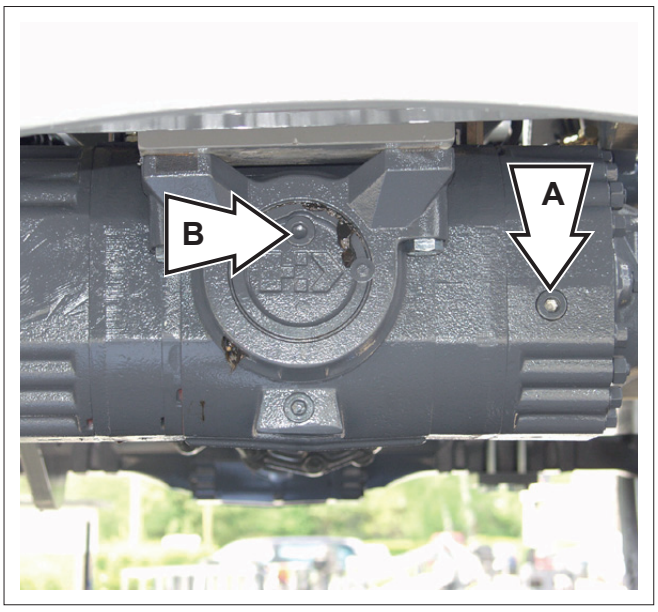
C-4 CHECK THE OIL LEVEL IN THE FOUR WHEEL REDUCTION GEARS

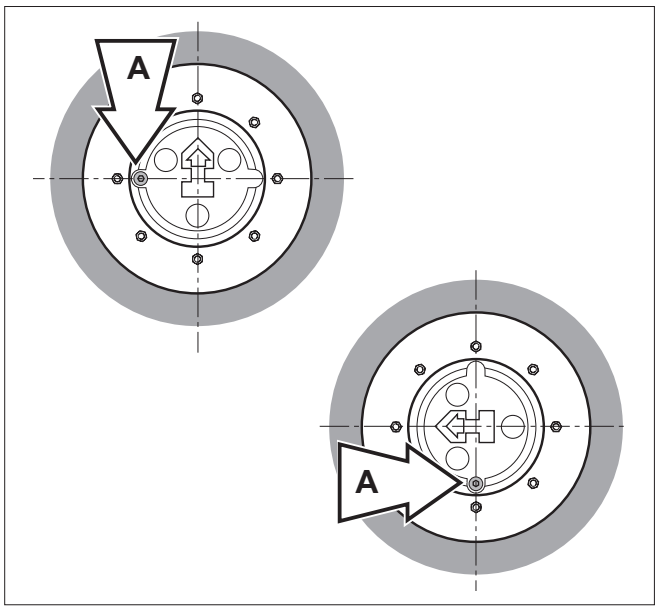
To check the oil level within the **wheel reduction gears**:

- 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.

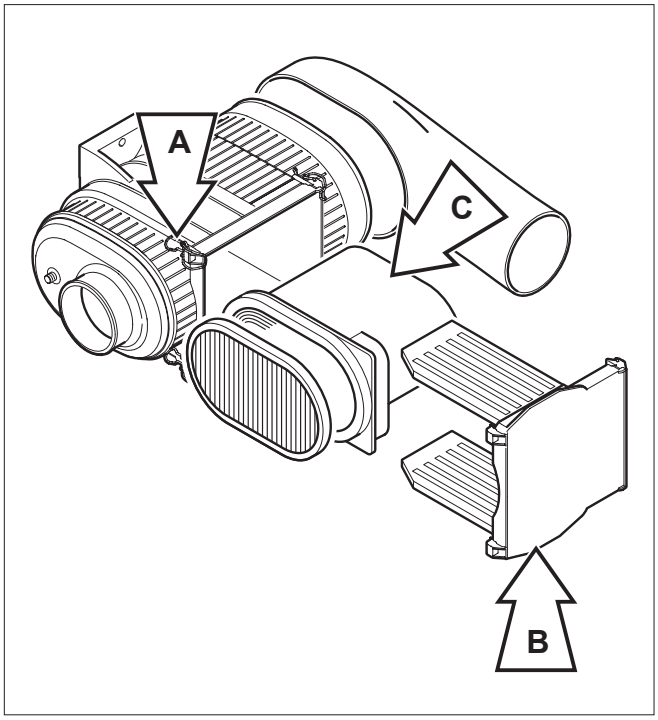
NOTICE

Place a container of suitable size under the plug.





C-5 CHECK AND CLEAN THE ENGINE AIR FILTER



To check and clean the engine air filter:

- Stop the engine and engage the parking brake.
- Open the four latches **A**.
- Remove the protection cap **B**.
- Extract the external cartridge **C**.
- Clean the filter bowl.
- Beat the cartridge against a piece of wood surface to eliminate any dust.
- Dry clean the cartridge (max. pressure: 6 bar).
- Check for cracks in the filtering element.
- Before refitting the cleaned cartridge or a new one, smear its seal with a thin coat of grease; fit the cartridge and make sure it is properly positioned.
- Refit cap **B**.

⚠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.

C-6 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

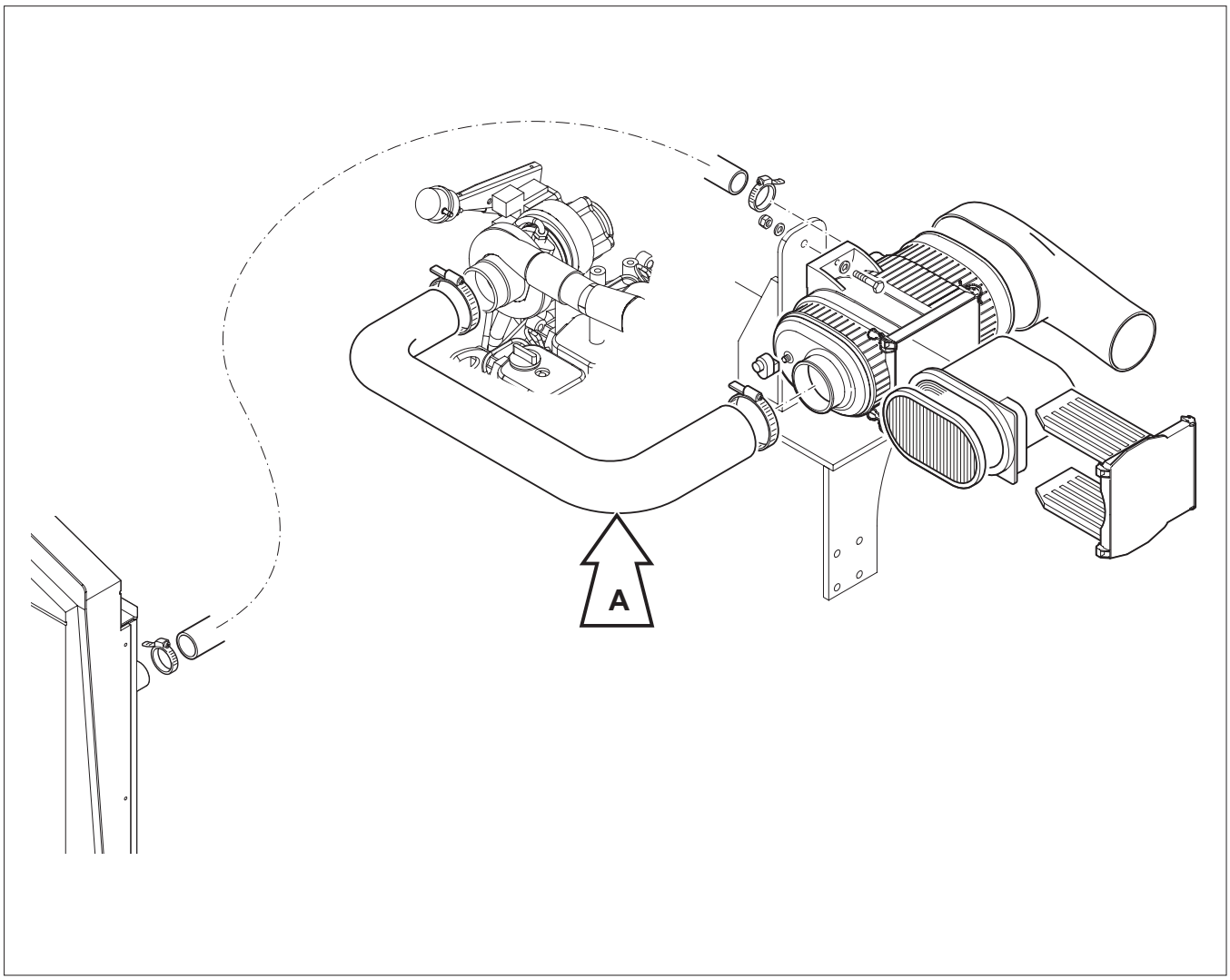
- ***Keep out of items which can produce sparks, of naked flames or lit cigarettes.***
- ***Do not rest metal objects onto the battery. This can result in a dangerous short especially during a recharge.***

C-7 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

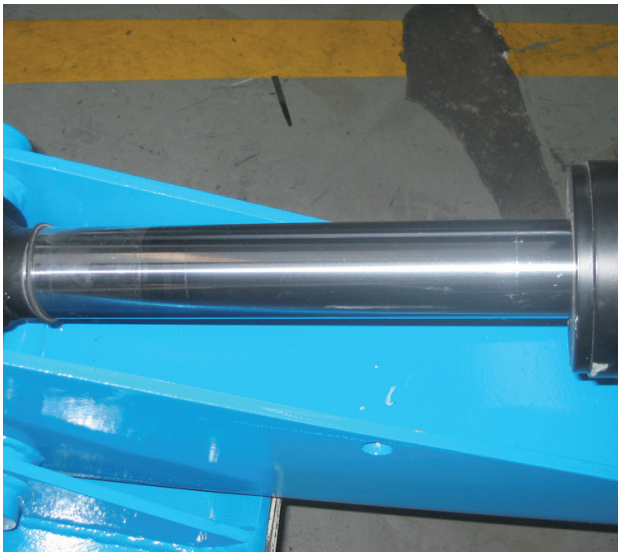
If you use the machine continuously for several days, check these sleeves, as well as the hose clamps more frequently.



C-8 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.

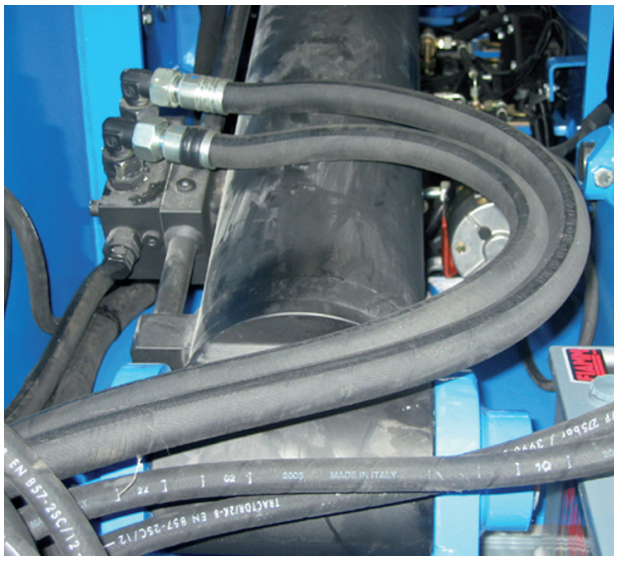


C-9 CHECK THE HYDRAULIC LINES

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.

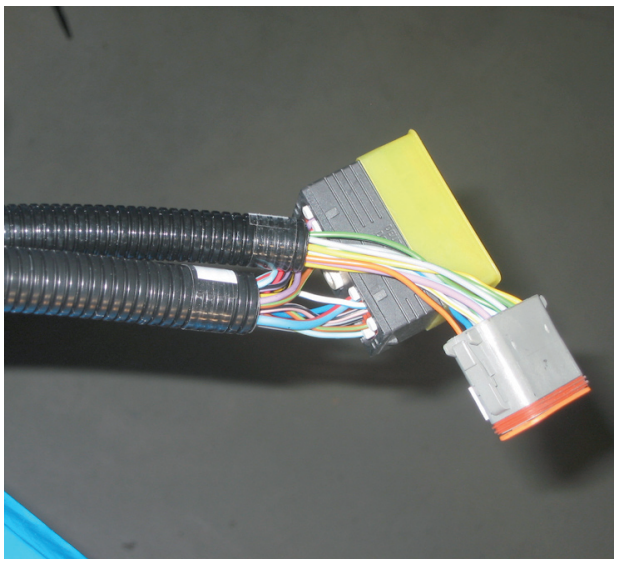


C-10 CHECK THE ELECTRIC CABLES

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.



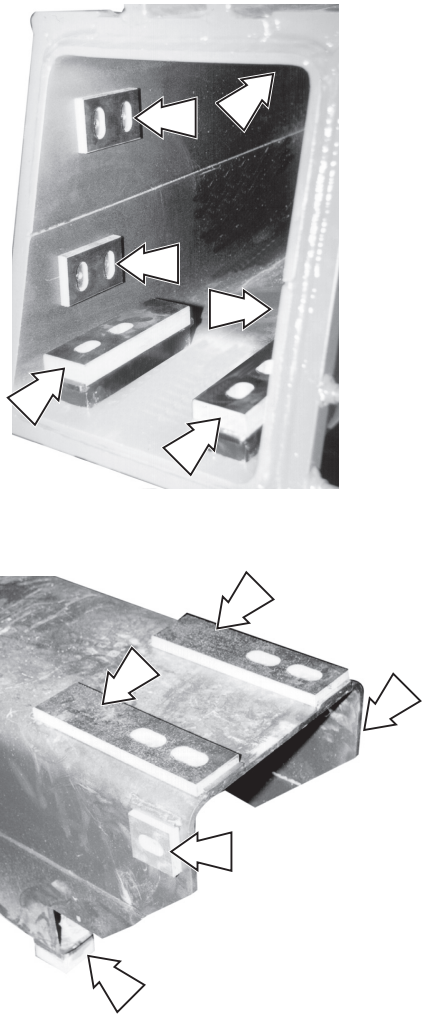
C-11 CHECK THE WEAR OF THE SLIDING PADS OF THE BOOM SECTIONS

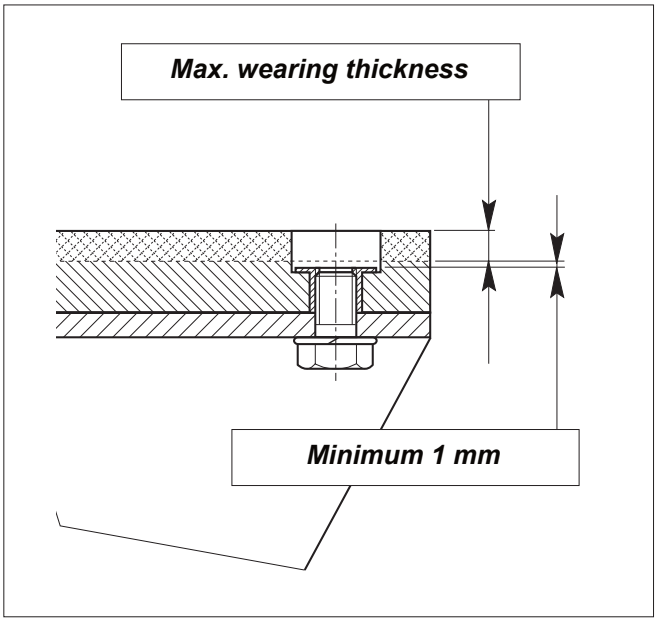
Any boom section is fitted with adjustable pads located on the four sides of the profile. These pads are secured to both fixed and mobile part of every section.

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.





C-12 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.

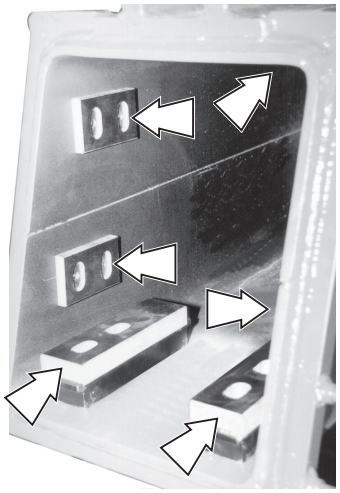
Tightening torques of the pad screws in relation to the screw diameter

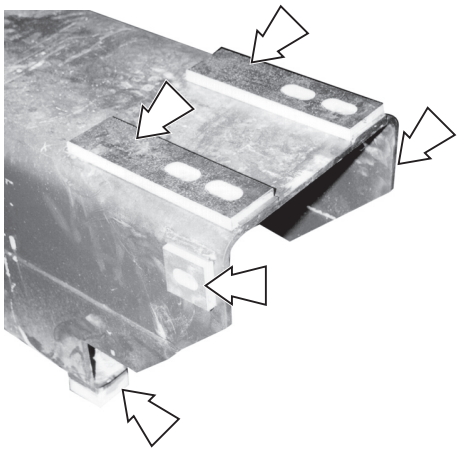
Screws M10	Nm 30
Screws M14	Nm 50

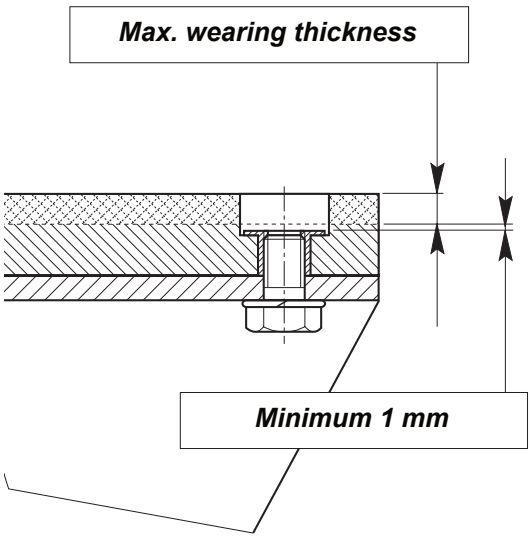
Tightening torques higher than those recommended can cause the break of the pad or of the locking threaded bush.

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.







C-13 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.

C-14 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.

C-15 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.

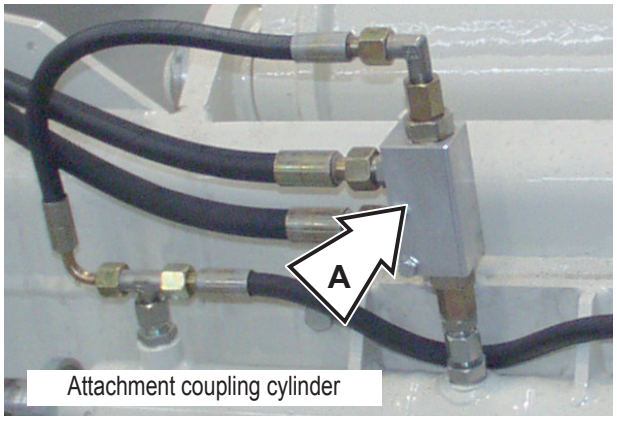
To check the efficiency of a valve, proceed as follows:

- Load a weight near the maximum payload (3500 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.

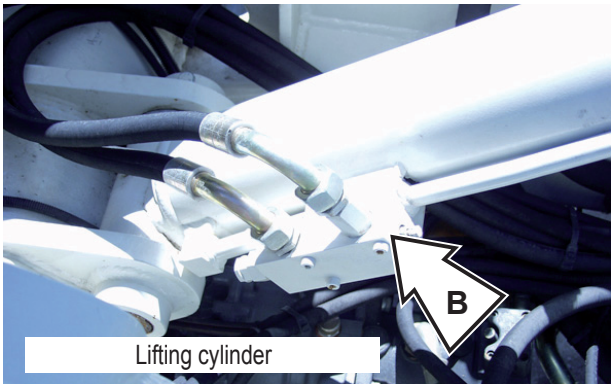
During the check, the oil will flow out of the hoses and the load shall remain blocked in position.
Should that not be the case, the valve must be replaced. Contact TEREXLIFT Technical Service.

NOTICE

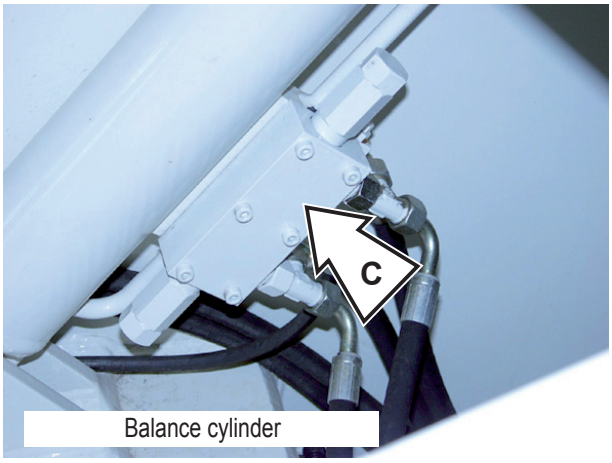
Place a container of suitable size under the hoses.



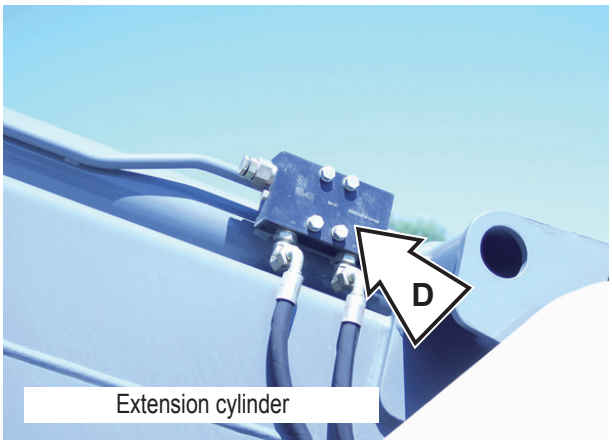
Attachment coupling cylinder



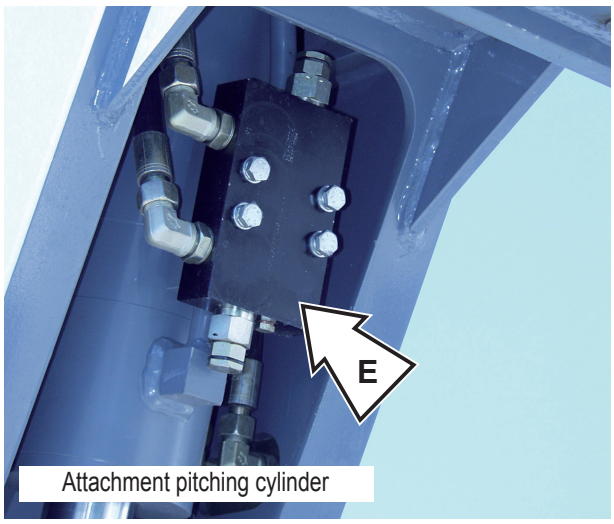
Lifting cylinder



Balance cylinder



Extension cylinder



Attachment pitching cylinder

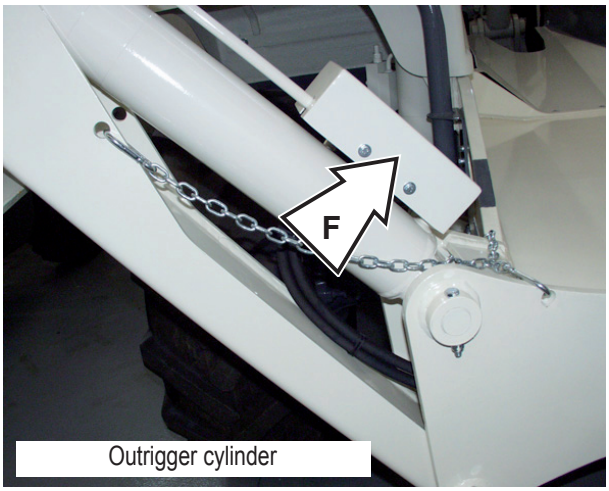
⚠ DANGER

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

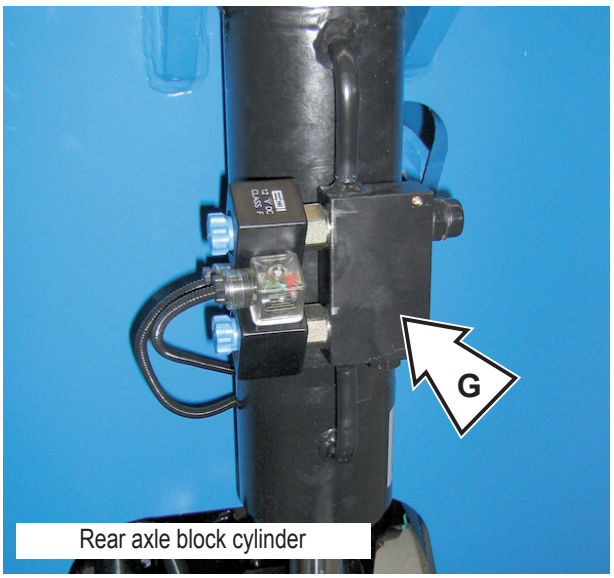
- ***Wear safety glasses***
- ***Wear safety gloves***
- ***Wear safety shoes***
- ***Wear suitable working clothes***
- ***Use guards against leaks of oil at high pressure***
- ***Do the check in a free space with barriers all around to keep non-authorised people away***
- ***Ensure that the part to 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

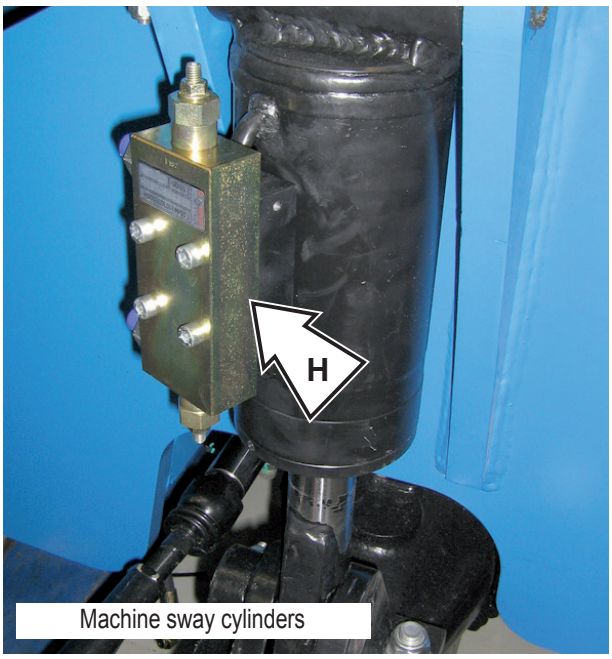
- ***Lower the boom to the ground in a firm way since the removal of the block valve or the cylinder can cause an uncontrolled down-movement.***
- ***After refitting the valve or the cylinder, replenish the circuit and eliminate any air before starting working. To eliminate the air from the circuit, 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



Rear axle block cylinder



Machine sway cylinders

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**.

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.

D-5 CHANGING THE HYDRAULIC OIL FILTER

To change the hydraulic oil filter element, proceed as follows:

- Stop the machine on a level ground and engage the parking brake.
- Place a container of suitable size under the filter to collect any oil leaks.
- Remove the filter cover **B** to get access to the filter element.
- Change the filter element, then, before fitting a new one, thoroughly clean and grease both seat and gasket.
- Refit and tighten the filter cover.

NOTICE

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

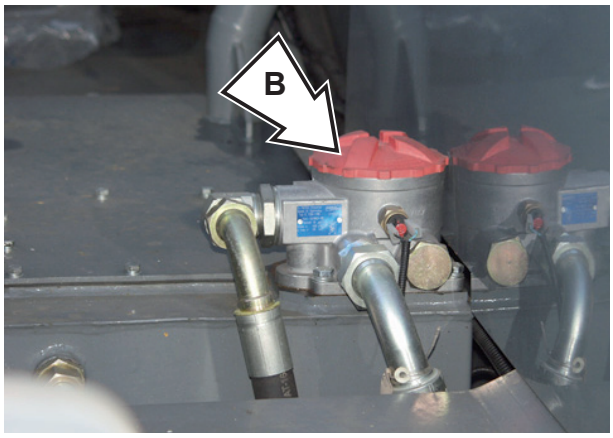
CAUTION

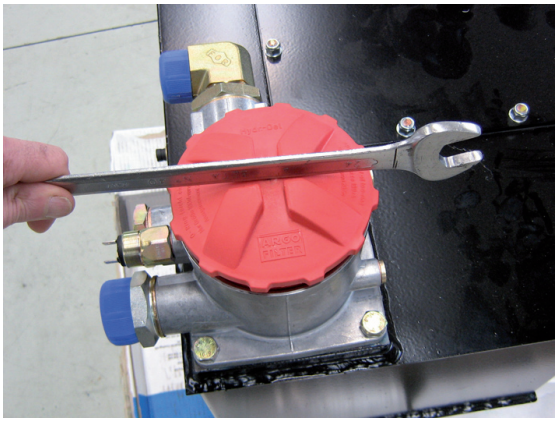
Hydraulic oil filter canisters cannot be cleaned or washed and refitted.
They must be replaced with new ones of the type recommended by the manufacturer:

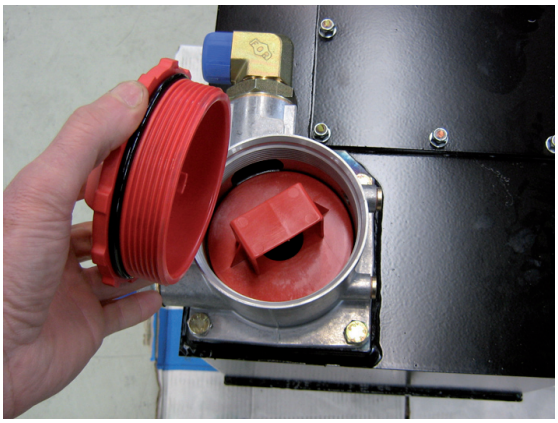
Flow rate l/1' = 150
Filtering = 10 µ
Coupling = 1" 1/4 BSP

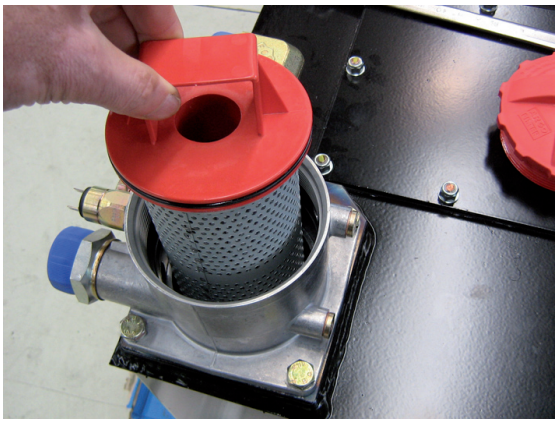
CAUTION

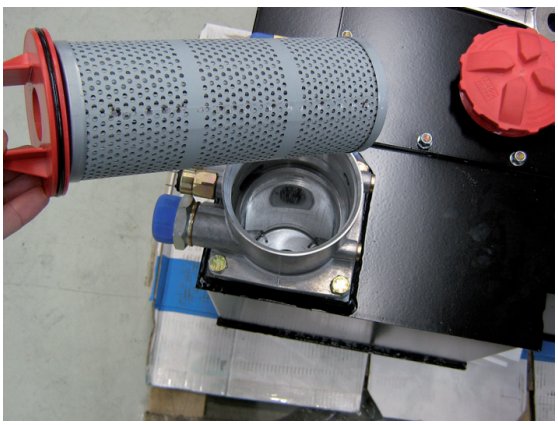
When changing the oil, drain it when it is still hot and the polluting substances are in suspension.











D-6 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.

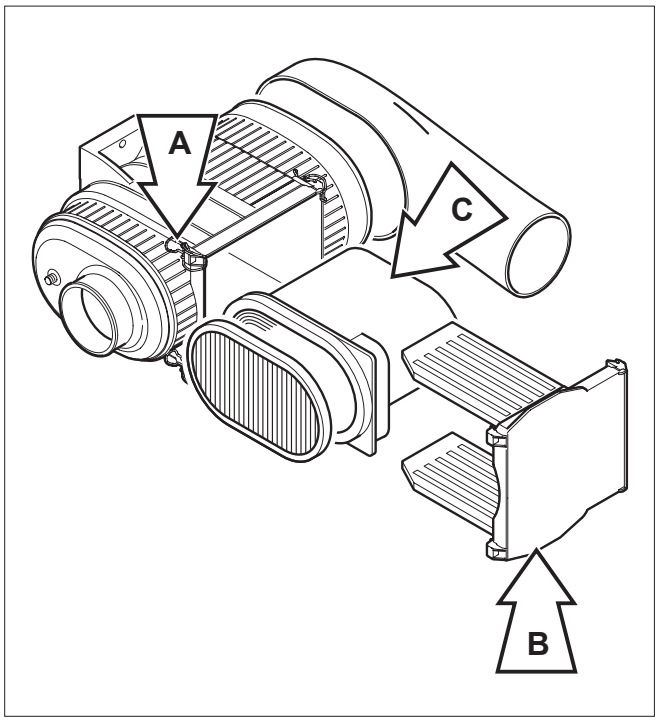
CAUTION

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

D-7 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.
- Open the four latches **A**.
- Remove the protection cap **B**.
- Extract the external cartridge **C**.
- Clean the filter bowl.
- Before refitting the cleaned cartridge or a new one, smear its seal with a thin coat of grease; fit the cartridge and make sure it is properly positioned.
- Refit cap **B**.



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.

D-8 RENEW THE CARTRIDGE OF THE ENGINE OIL FILTER AND THE FUEL FILTER

CAUTION

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

D-9 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:

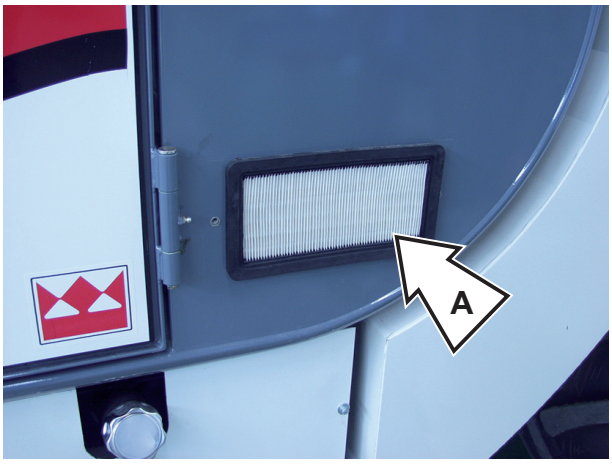
- Shut the engine down and engage the parking brake.
- Pull filter **A** out of the housing accessible from the outside of the cab.
- Clean the filter bowl.
- Clean the filter cartridge by beating it against a piece of wood. Replace the cartridge if damaged.

CAUTION

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







D-10 CHANGE THE OIL IN THE DIFFERENTIAL GEARS

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

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

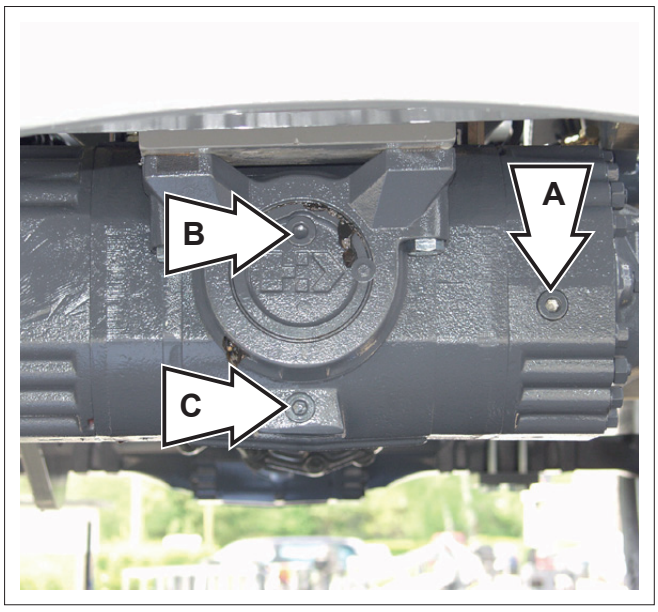
NOTICE

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**.

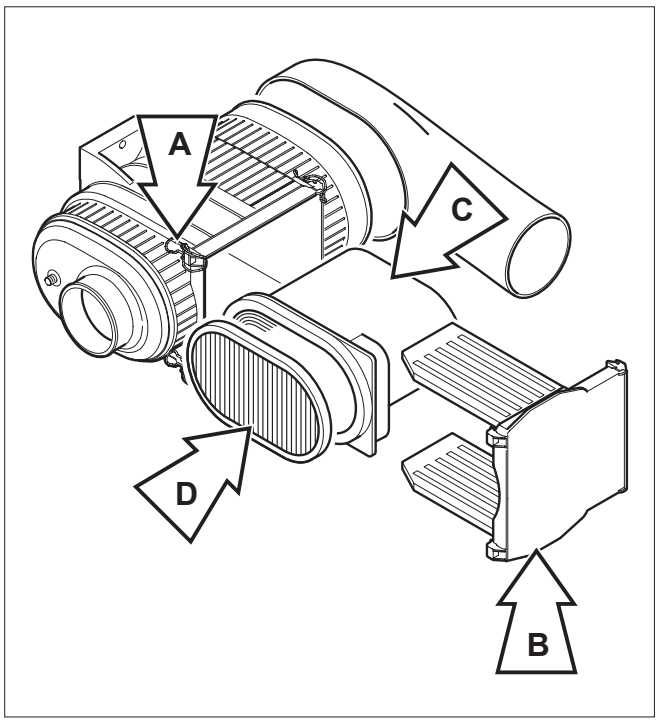
Recommended oil:

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



4.7 TABLE E PROCEDURES

E-1 CHANGE THE SAFETY ELEMENT OF ENGINE AIR FILTER

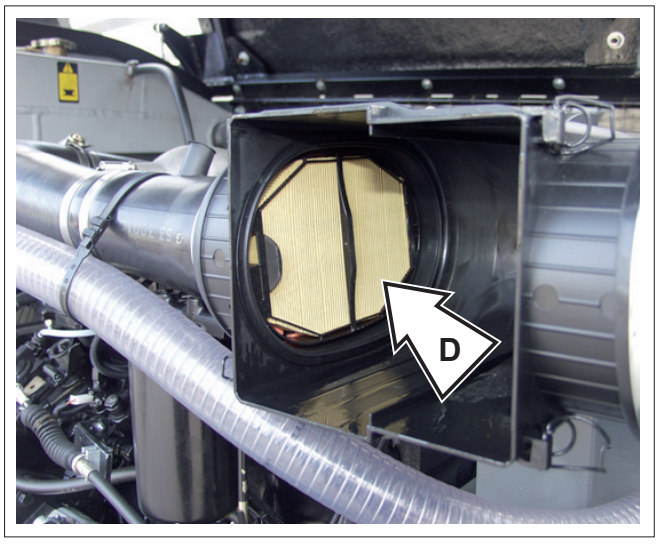


To change the safety element:

- Stop the engine and engage the parking brake.
- Open the four latches **A**.
- Remove the protection cap **B**.
- Extract the external cartridge **C**.
- Extract the internal cartridge **D**.
- Clean the filter bowl.
- Smear the seal with grease, then mount the new element and make sure it is correctly positioned.
- Refit the main filter and the cap.

WARNING

The inner element should be replaced every two times the outer element is replaced.



WARNING

Never wash the cartridge with water or solvents.

E-2 CHANGE THE OIL IN THE POWER DIVIDER REDUCTION GEAR

To change the oil in the **power divider reduction gear**:

- Stop the machine on a level ground and make sure the parking brake is engaged.

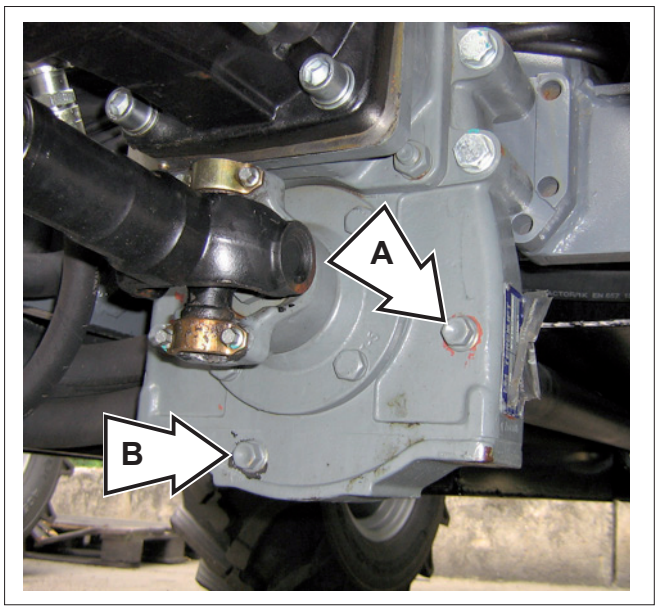
NOTICE

Place a container of suitable size under the plug.

- Remove the plug **A**.
- Remove the drain plug **B** and let the oil flow out completely.
- Refit and tighten the drain plug **B**.
- Add new oil through plug **A** until it is level with the hole.
- Refit and tighten plug **A**.

Recommended oil:

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



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.

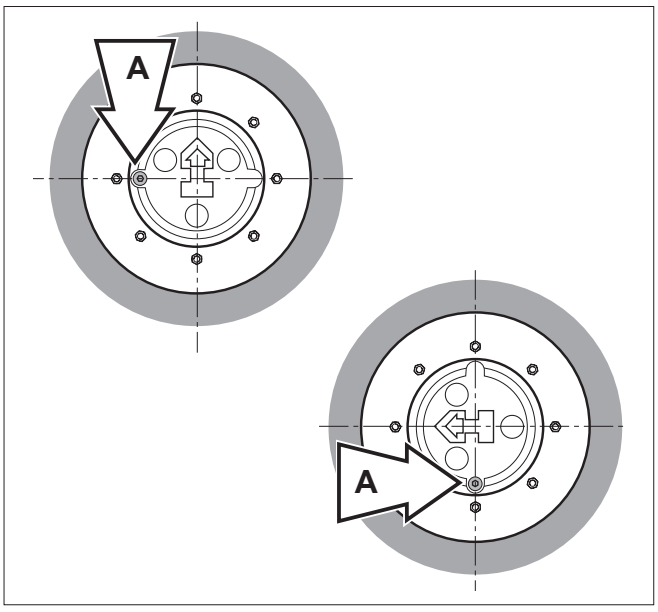
NOTICE

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:

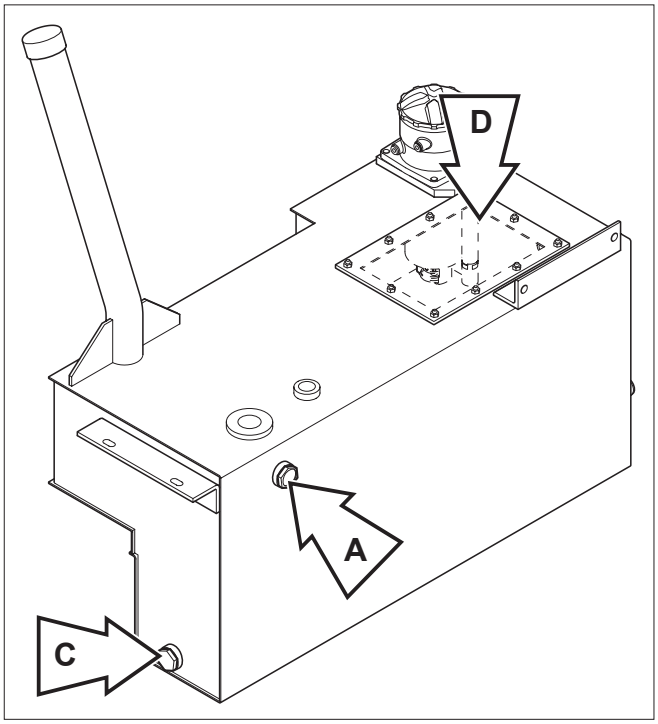
- **TRACTORENAULT THFI 208 LF SAE 80W API GL-4 / FORD M2C 86 B / Massey Ferguson M 1135**



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 **C** and allow oil to flow out into the container.
- Remove the inspection cover **D** of tank.
- Carefully wash the tank with Diesel oil and blow a jet of compressed air.
- Refit the drain plug **C** and the inspection cover **D**.
- Add new oil by making sure that it matches the recommended type indicated until it is level with **A**.

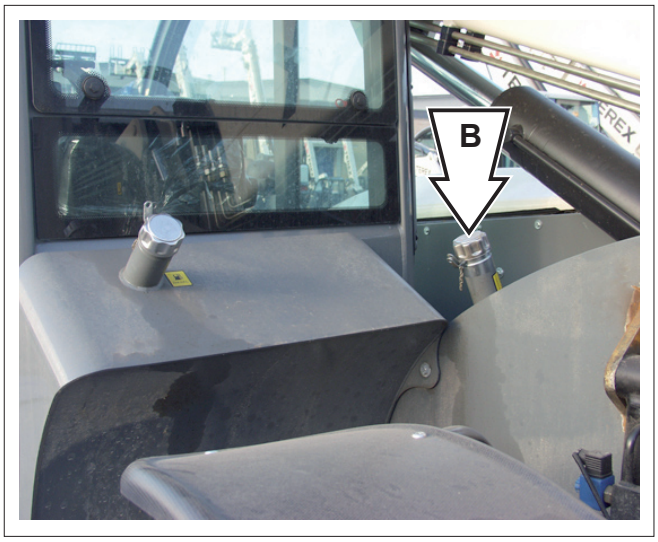


Recommended oil:

- **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.

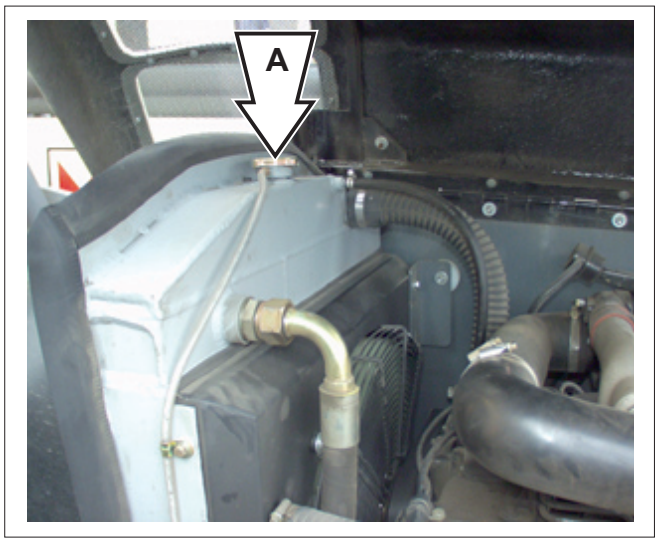


4.8 TABLE F PROCEDURES

F-1 CHANGE THE ENGINE COOLANT

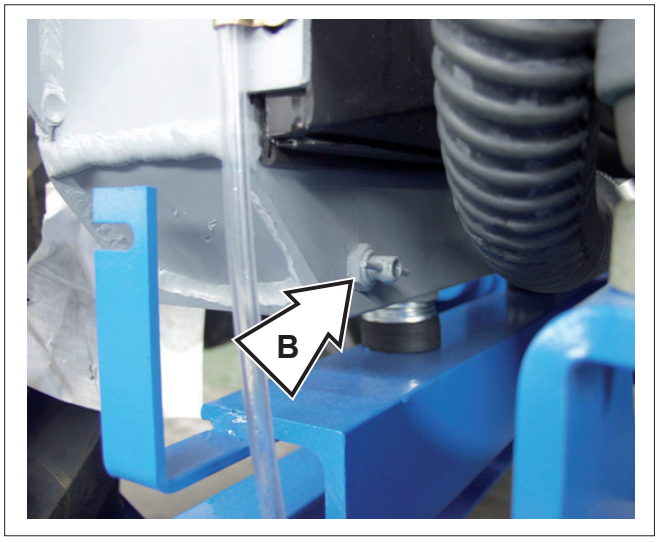
⚠ DANGER

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

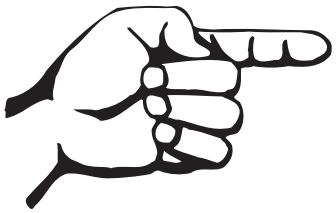
4.9 TABLE G PROCEDURES

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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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

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.

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.

5.3 ELECTRICAL FAULTS

Problem	Cause	Solution
When key is turned to 1, the dashboard is not powered	Battery discharged.	Check the battery, replace if necessary.
	Battery disconnect switch.	Check that the disconnect switch is in the correct position and works fine. Replace if damaged.
	Ground.	Check that the ground braid between chassis and engine is correctly connected and intact.
	50A fuse blown.	Check the fuse in the box inside the engine compartment; replace if necessary.
	Ignition key block.	Check that contact **30** of the ignition key is powered; if you have not 12V on contact **15/54**, change the key.
	Problem of the wiring line.	Check the wiring up to the input of the fuses and relays board for continuity.
The machine cannot be started	Ignition key.	Check that contact **50** of the key supplies 12V when the key is in the start position (turned right).
	Emergency stop button activated or damaged	Check if the button has been pressed accidentally; check the efficiency of the contacts.
	Relay **K11** damaged.	Check the relay; replace if necessary.
	70A relay **K01** damaged.	Check the relay in the box inside the engine compartment; replace if necessary.
	Problem of the wiring line from relay **K11** to relay **K01**.	Check the wiring for continuity.
	Speed selector not in neutral position.	Check if the speed is engaged or change the speed selector.

Problem	Cause	Solution
	10A fuse **F24** feeding the emergency button blown.	Check the fuse; replace if necessary.
	Problem of the wiring line from dashboard to 70A relays in the engine box.	Check the wiring for continuity.
	Starting motor relay **M1** damaged.	Check the starting motor coil is powered. If the coil is powered and the motor doesn't work, change the motor.
	Starting motor damaged.	Check and replace if necessary.
	Efficiency of the grounding system.	Check and, if necessary, reconnect the grounding system to the chassis.
The starting motor runs but the engine doesn't start	No fuel.	Refuel.
	Injection pump of engine damaged.	Check the pump; replace if necessary, according to the instructions provided in the Cummins manual.
	Air in the tank suction system.	Check the suction line and bleed the system.
	Engine stop solenoid **Y00** damaged.	Check and replace if necessary.
The battery gets discharged too fast	Internal elements broken.	Change the battery.
	The alternator doesn't recharge.	Check the efficiency of the alternator and replace if necessary.
	Excessive absorption of the system.	Check and rectify.
The machine doesn't move	10A fuse **F14** blown.	Check the fuse; replace if necessary.
	Parking brake micro-switch **S6b** damaged.	Check the micro-switch and replace, if necessary; with the parking brake released, you must have 12V on the pink-yellow wire.
	Speed selector damaged.	Check and replace the speed selector if necessary.

Problem	Cause	Solution
	Outrigger limit switches **S51-S52** damaged.	Check the mechanical operation of the limit switches; replace if necessary.
	10A fuse **F18** blown.	Check the fuse; replace if necessary.
	The solenoid valves of the forward and reverse speeds are damaged.	Check you have 12V on solenoid, when the forward gear is put, and, 12V on solenoid when the reverse gear is put. If necessary, change the coils of the solenoid valves.
	Relays **K7** and **K8** damaged.	Check the relays and replace if necessary.
	Relays **K9** and **K10** damaged.	Check the relays and replace if necessary.
	Relays board damaged.	Check the board and replace if necessary.
	Problem of the wiring line.	Check the wiring for continuity.
The boom doesn't move	Road/Jobsite selector turned to a wrong position.	The key-selector must be turned to “Jobsite".
	Road/Jobsite selector damaged.	Check the contacts and replace, if necessary.
	Boom movements go-ahead valve solenoid **Y10** damaged.	Check the solenoid and replace if necessary.
	10A fuse **F19** blown.	Check the fuse; replace if necessary.
The rear steering axle of the machine remains locked	"High boom" micro-switch damaged.	Check the micro-switch and replace if necessary.
	Problem of the wiring line to the "high boom" micro-switch.	Check the wiring for continuity.
	Machine control board damaged	Check the board inputs and outputs; replace the board if necessary.
	Rear axle cylinder solenoid valves **Y30** damaged.	Check the solenoid valves and replace if necessary.

Problem	Cause	Solution
The 3B6 moment limiter doesn't change scale when passing from the "machine on wheels" condition to the "stabilised machine" condition	10A fuse **F18** blown.	Check the fuse; replace if necessary.
	Outrigger micro-switches damaged.	Check the micro-switches and replace if necessary.
	Problem of the DLE wiring line to the outrigger micro-switches.	Check the wiring for continuity.
	Socket **X25** on DLE defective.	Check the socket and replace if necessary.
	DLE display damaged.	Change the DLE.
The steer mode selection of the machine doesn't work	10A fuse **F5** blown.	Check the fuse; replace if necessary.
	Steering solenoid valves damaged.	Check the spools and replace if necessary.
	Road/Jobsite key-selector damaged.	Check that the selector is in the "Jobsite" position; if damaged, change the selector.
	Steering selector damaged.	Check the selector and replace if necessary.
	Problem of the wiring line.	Check the wiring for continuity.
	Solenoids **Y20** and **Y21** damaged.	Check the solenoids and replace if necessary.
The horn doesn't work	10A fuse **F10** blown.	Check the fuse and replace if necessary.
	15A fuse **F21** blown.	Check the fuse and replace if necessary.
	Relay **K3** damaged.	Check the relay and replace if necessary.
	Horn button damaged.	Check and replace the speed selector if necessary.
	Horn **H20** damaged.	Check you have 12V between the two wires connected to the horn; if there is power, change the horn.
	Problem of the wiring line.	Check the wiring for continuity.

Problem	Cause	Solution
The beacon doesn't work	7,5A fuse **F11** blown.	Check the fuse and replace if necessary.
	Beacon damaged.	Check the beacon and replace if necessary.
	Beacon lamp damaged.	Check the lamp and replace if necessary.
	Problem of the wiring line.	Check the wiring for continuity.
The heating fan doesn't work	15A fuse **F2** blown.	Check the fuse and replace if necessary.
	Fan control switch damaged.	Check the switch and replace if necessary.
	Heating fan motor damaged.	Check the fan motor and replace if necessary.
	Problem of the wiring line.	Check the wiring for continuity.
The limit switch sensing when the boom is in the low position doesn't work	10A fuse **F18** blown.	Check the fuse and replace if necessary.
	Limit switch damaged.	Check the limit switch and replace if necessary.
	Problem of the wiring line.	Check the wiring for continuity.
The limit switch sensing when the boom is in the high position doesn't work	10A fuse **F18** blown.	Check the fuse and replace if necessary.
	Limit switch damaged.	Check the limit switch and replace if necessary.
	Problem of the wiring line.	Check the wiring for continuity.
The air filter restriction warning light doesn't work	Dashboard indicator light **X1**.	Check the indicator light and replace the lights group if necessary.
	Filter restriction sensor **B15** damaged.	Check the sensor and replace if necessary.
	Problem of the wiring line.	Check the wiring for continuity.

Problem	Cause	Solution
The light warning of a low engine oil pressure doesn't work	Pressure switch for low engine oil pressure **B11** damaged. Dashboard indicator light **X1**. Problem of the wiring line.	Check the pressure switch and replace if necessary. Check the indicator light and replace the lights group if necessary. Check the wiring for continuity.
The engine cooling water temperature indicator light doesn't work	Temperature sensing bulb **B13** damaged. Dashboard indicator light **X1**. Problem of the wiring line.	Check the efficiency of the bulb and replace, if necessary. Check the indicator light and replace the lights group if necessary. Check the wiring for continuity.
The engine water thermometer doesn't work	Engine oil thermometer on dashboard damaged. Engine oil temperature transducer **B14** damaged. Problem of the wiring line.	Check the thermometer and replace if necessary. Check the transducer and replace if necessary. Check the wiring for continuity.
The hydraulic oil thermometer doesn't work	Hydraulic oil thermometer on dashboard damaged. Hydraulic oil temperature transducer **B16** damaged. 3A fuse **F8** blown. Problem of the wiring line.	Check the thermometer and replace if necessary. Check the transducer and replace if necessary. Check the fuse and replace if necessary. Check the wiring for continuity.
The fuel gauge doesn't work	3A fuse **F8** blown. Dashboard fuel gauge damaged. Fuel detector **B12/B12a** damaged. Problem of the wiring line.	Check the fuse and replace if necessary. Check the fuel gauge and replace if necessary. Check the fuel detector and replace if necessary. Check the wiring for continuity.

Problem	Cause	Solution
The hour-meter doesn't work	Hour-meter **P4** damaged.	Check the hour-meter and replace if necessary.
	Alternator **A1** damaged.	Check the alternator and replace if necessary.
	Problem of the wiring line.	Check the wiring for continuity.
The display of the overload warning system cannot be turned on	10A fuse **F25** blown.	Check the fuse and replace if necessary.
	DLE display damaged.	Change the DLE.
	Problem of the wiring line.	Check the wiring for continuity.
The back-up horn doesn't work	Back-up horn **H25** damaged.	Check the efficiency of the back-up horn and replace, if necessary.
	Problem of the wiring line.	Check the wiring for continuity.
The hydraulic oil filter restriction indicator light doesn't work	Bulb **B17** damaged.	Check the efficiency of the bulb and replace, if necessary.
	Indicator light **H118**.	Check the indicator light.
	Problem of the wiring line.	Check the wiring for continuity.

5.4 HYDRAULIC FAULTS

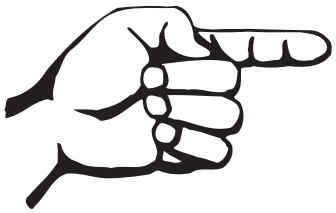
Problem	Cause	Solution
The machine doesn't move	Transmission pump maladjusted.	Re-calibrate the pump as indicated in section 2 "Technical specifications".
	DA valve damaged.	Check and replace, if necessary.
	Hydraulic oil filter restricted.	Check the cartridge; replace if restricted.
Poor boost pressure	Booster 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".
The machine drive is low	Hydraulic oil filter restricted.	Check the cartridge; replace if restricted.
	Low oil level.	Top up.
	Hydraulic oil soiled.	Clean the tank and the pipes, empty the pumps and add new oil.
	Transmission pump wrongly calibrated.	Re-calibrate the pump as indicated in section 2 "Technical specifications".
No steering selection	Steering selection solenoid valve damaged.	Check the movement of the pin inside the solenoid valve and the coil.
Poor action of the parking brake	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 right - left sway function doesn't work	Sway cyilinders damaged.	Check or replace the internal seals, if necessary.
	Block valves damaged.	Check the sliders and the coils of the solenoid valves.

Problem	Cause	Solution
	The solenoid valves do not work.	Check the sliders and the efficiency of the solenoid valves.
The outriggers do not work	Outrigger cylinders damaged.	Check the efficiency and the internal seals of the cylinder.
	Outrigger cylinders' block valves damaged.	Check the efficiency of the valves and that the internal pistons slide correctly.
	Main valve damaged.	Check the efficiency of the internal sliders of the Walvoil main valve.
The machine doesn't steer	Main pump damaged.	Check the operation of main gear pump.
	Load-sensing priority valve damaged.	The priority valve doesn't deliver hydraulic oil to the hydraulic drive; change the valve unit.
	Hydraulic drive damaged.	Check the efficiency of the hydraulic drive and if the pilot activates the priority valve.
	Steering cylinders damaged.	Check the efficiency and the internal seals of the cylinders.
The boom doesn't move	Main gear pump damaged.	The pump doesn't deliver oil. Check the max output pressure of the pump. Replace if damaged.
	Load-sensing priority valve damaged.	Valve restricted or damaged; remove and check the seals and the efficiency of the slider.
	Tecnord control block damaged.	Check the efficiency of the control block (see par. 2 - sect. "Technical Specifications"). Remove the pressure relief valve and eliminate any dirt.
	Pressure relief valve of main valve damaged.	Check the efficiency of the valve and the proper sliding of the internal piston.
When the brake pedal is stepped down, the machine doesn't brake	Auxiliary gear pump damaged.	Check the pump thoroughly.

Problem	Cause	Solution
	Brake pump damaged.	Check the pump thoroughly (see section 2 "Technical specifications" for calibration).
	Brakes damaged or worn out.	Check the efficiency of the disks; replace, if necessary.
The attachment locking cylinder doesn't work (if any)	Attachment locking cylinder damaged.	Check the efficiency of the cylinder; replace the internal seals, if necessary.
	Quick couplings damaged.	Check and replace, if necessary.
	The hydraulic line between control block and quick couplings is defective.	Check and replace any damaged or restricted hose.
The forks cannot be pitched perfectly	Fork cylinder damaged.	Change the seals and check the tightness of the cylinder.
	Fork cylinder block valve damaged.	Remove and clean the valve; check its seals and replace if necessary.
	The hydraulic line between control block and block valve is defective.	Check and replace any damaged or restricted hose.
	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.
	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.

Problem	Cause	Solution
	6-way/2-position electrical switch block damaged.	Check the efficiency of the valve and the proper sliding of the internal piston.
	Main valve maladjusted.	Check if the main valve reaches the max working pressure (see par. 2 - section "Technical Specifications"). Check the efficiency of the internal sliders of the Walvoil main valve.
	Mechanical jamming.	Check the boom. In case of mechanical jamming, rectify.
	The line feeding the cylinders is defective or damaged.	Check and replace any defective parts which stop the flow of the hydraulic oil to the cylinders.
The boom cannot be moved up	Lifting cylinder damaged.	Change the seals and check the tightness of the cylinder.
	Block valve damaged.	Remove and clean the valve; check its seals and replace if necessary.
	Main valve maladjusted.	Check if the main valve reaches the max working pressure (see par. 2 - section "Technical Specifications"). Check the efficiency of the internal sliders of the Walvoil main valve.
The boom jerks when moved down	Block valve damaged.	Remove and clean the valve; check its seals and replace if necessary.
The boom telescopes are frequently out of sequence	Seals of the extension cylinder damaged.	Change the seals and check the tightness of the cylinder.
	Re-sequencing valves damaged.	Remove and clean the valves; check their seals and replace if necessary.
	Air in the circuit.	Bleed (see Use and Maintenance manual).
When the boom is moved up or down, the forks cannot be levelled	Balancing cylinder damaged.	Check the cylinder efficiency and the state of the internal seals.

Problem	Cause	Solution
	Safety valves of the 6-way/2-position electrical switch block damaged.	Check the efficiency of the safety valves fitted to ports A and B of the module; re-calibrate or replace.
	Check valve dirty or damaged.	Remove and clean the valve; check its seal and replace if necessary.
	Block valves damaged.	Remove and clean the valves; check their seals and replace if necessary.
	Hydraulic line defective.	Check and replace any damaged or restricted hose.
The booms swings when moved out	Pads worn.	Check the pads for wear and replace if necessary.
	Poor lubrication of the boom.	Smear the sliding zone of the pad with the grease recommended by Terex.
	Paint or abrasion on the pad sliding rail.	Grind out amy signs of abrasion on the boom and polish the sliding area of the pad, then smear with grease.
The boom moves hardly in when fully extended and horizontal	Pads worn.	Carefully check all of the front and rear pads of the boom; lubricate with the grease recommended by Terex.
The rear axle unlocking device doesn't work	Cylinder damaged.	Change the seals and check the tightness of the cylinder.
	Block valve damaged.	Remove and clean the valve; check its seal and replace if necessary.



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Section 6
SCHEMATICS

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6.6.2	Wiring diagram - External connections	30

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

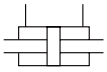

Variable displacement pump with flow regulator

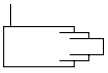
CYLINDERS


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

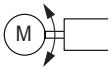

Hand-operated control with pedal


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

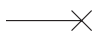
Blow-by pipe


Flexible hose

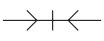

Connecting point

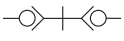

Pipe cross without connection


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

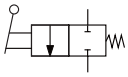
Thermometer

Flowmeter

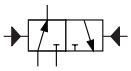
Pressure switch

Drain to tank indication

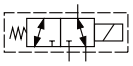
DISTRIBUTION - SETTING ELEMENTS



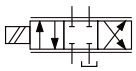
Two-position and two-way distributor, with manual lever control and spring return



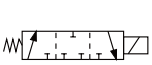
Three-way and two-position distributor, with hydraulic control



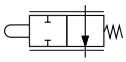
Two-position, three-way distributor, with electro-magnetic control and spring return



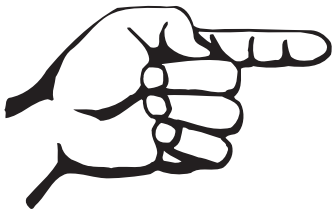
Distributor with mechanical control and span proportional to the action of the same control



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



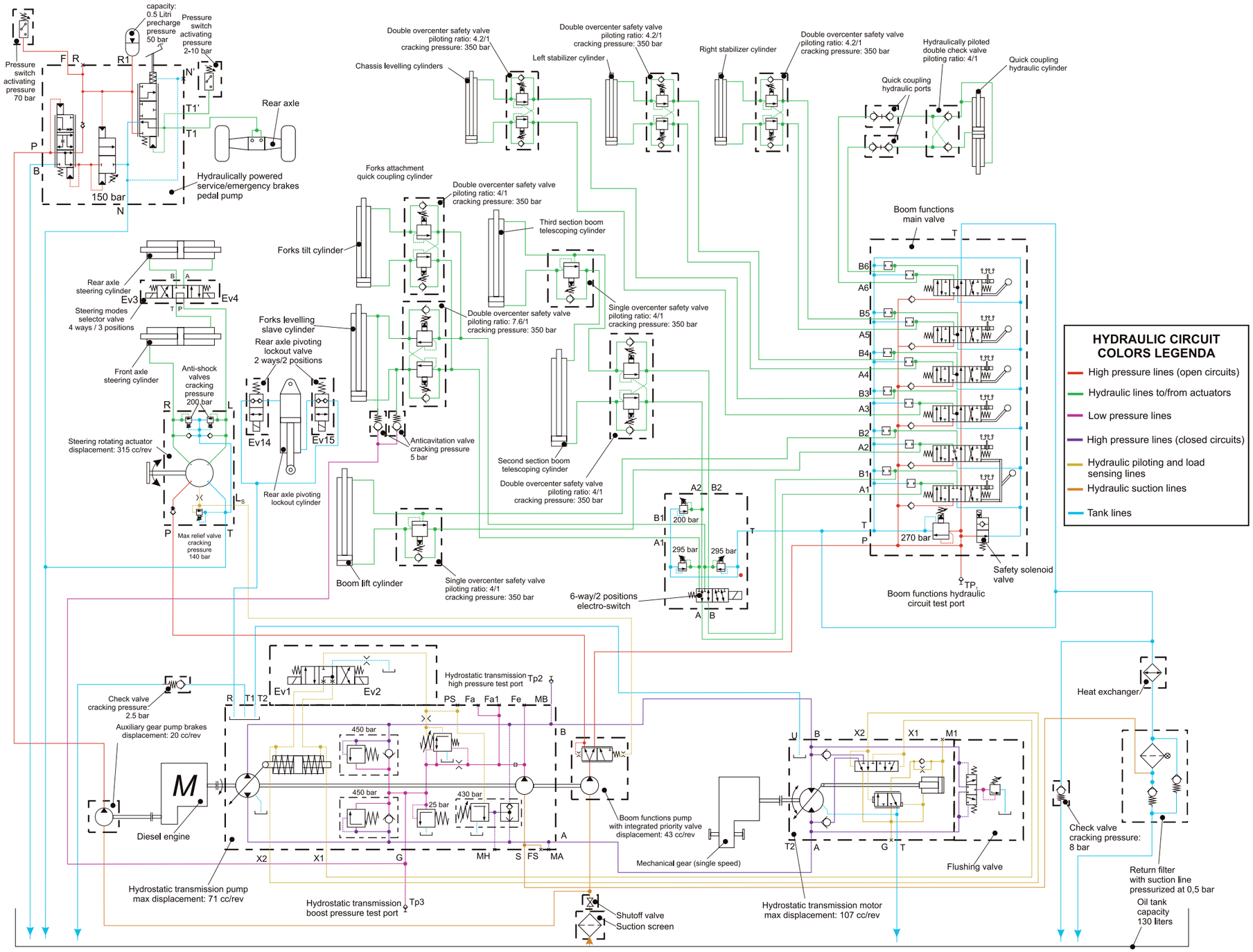
Electro-hydraulic single-acting servo valve



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6.2 HYDRAULIC SCHEMATIC

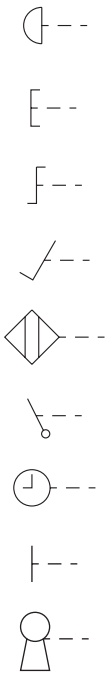
6.2.1 Telelift 4013 SX



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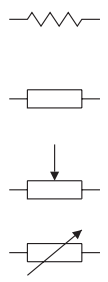
6.3 ELECTRICAL SYMBOLS

ACTUATORS



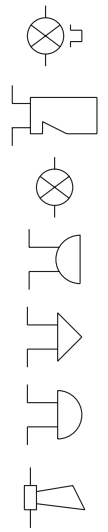
Emergency controls
Pushbutton control
Rotary control
Pedal control
Proximity control
Lever control
Timed control
Mechanical/manual control
Key control

RESISTANCES



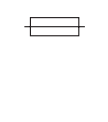
Resistance
Resistor
Potentiometer
Variable resistance

SIGNALS



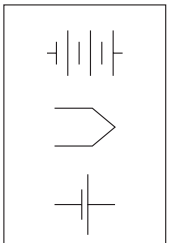
Intermittent lamp
Whistle
Lamp
Buzzer
Siren
Bell
Horn

FUSES AND RELAYS



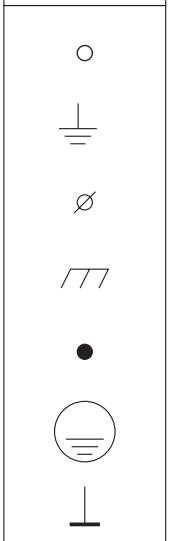
Horizontal fuse
Relay

ACCUMULATORS



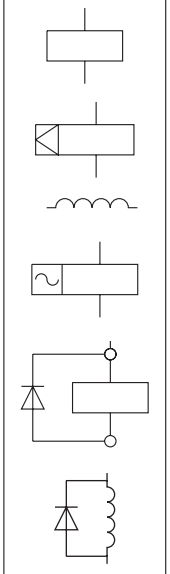
Battery
Thermocouple
Element

TERMINALS AND GROUNDS



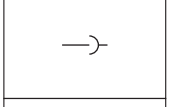
Ring
Ground
Terminal
Ground to frame
Knot
Protection ground
Frame ground 2

COILS



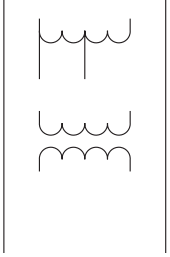
Coil
Mechanical coupling coil
Winding
A/C coil
Coil with diode
Winding with diode

CONNECTORS



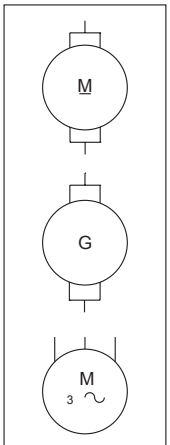
Connector

STATIC APPLICATIONS



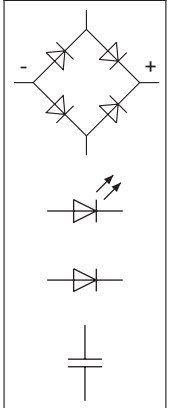
Auto-transformer
Transformer

DYNAMIC APPLICATIONS



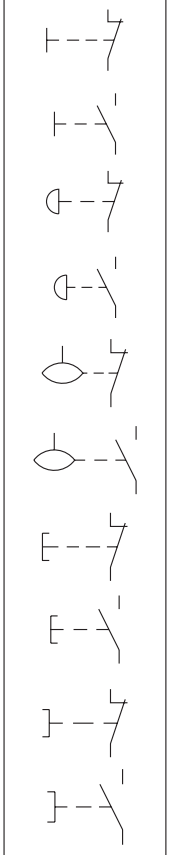
Motor
Generator
As_3p_motor

ELECTRONIC PARTS



Rectifier
Light-emitting diode
Diode
Condenser

PUSHBUTTONS



Manual NC contact
Manual NO contact
NC mushroom-head pushbutton
NO mushroom-head pushbutton
NC level
NO level
Pushbutton with NC return
Pushbutton with NO return
NC tie-rod
NO tie-rod

CONTACTS


Thermal


Normally open (NO)


Normally closed (NC)


NO limit switch


NC limit switch


Contactor

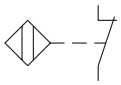

Magneto-thermal closure


Magneto-thermal opening

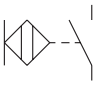

Thermal closure

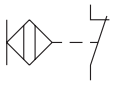

Thermal opening


Exchange


NC proximity


NO proximity


NO mechanical

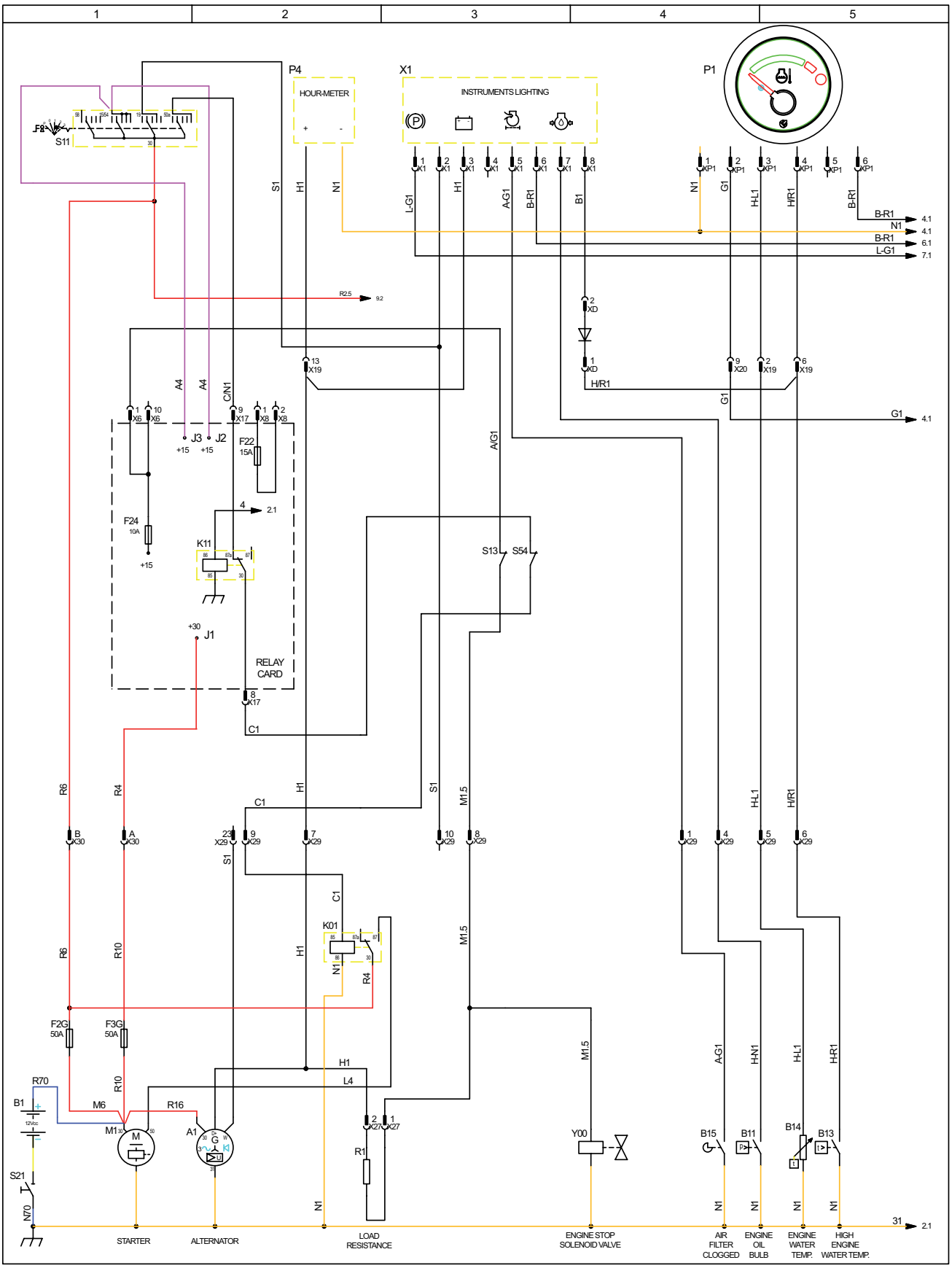

NC mechanical


Selector

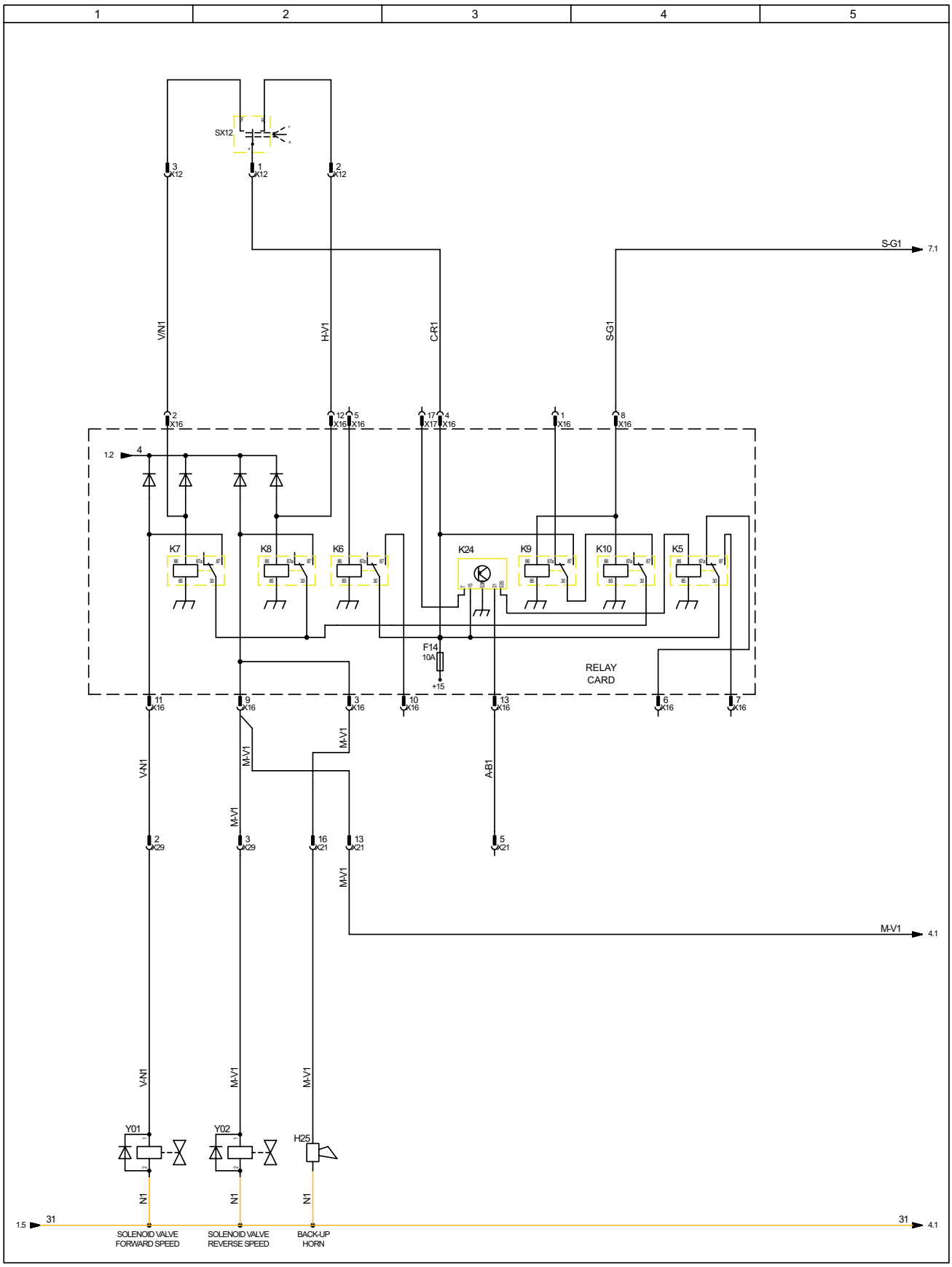

Selector2

6.4 WIRING DIAGRAMS

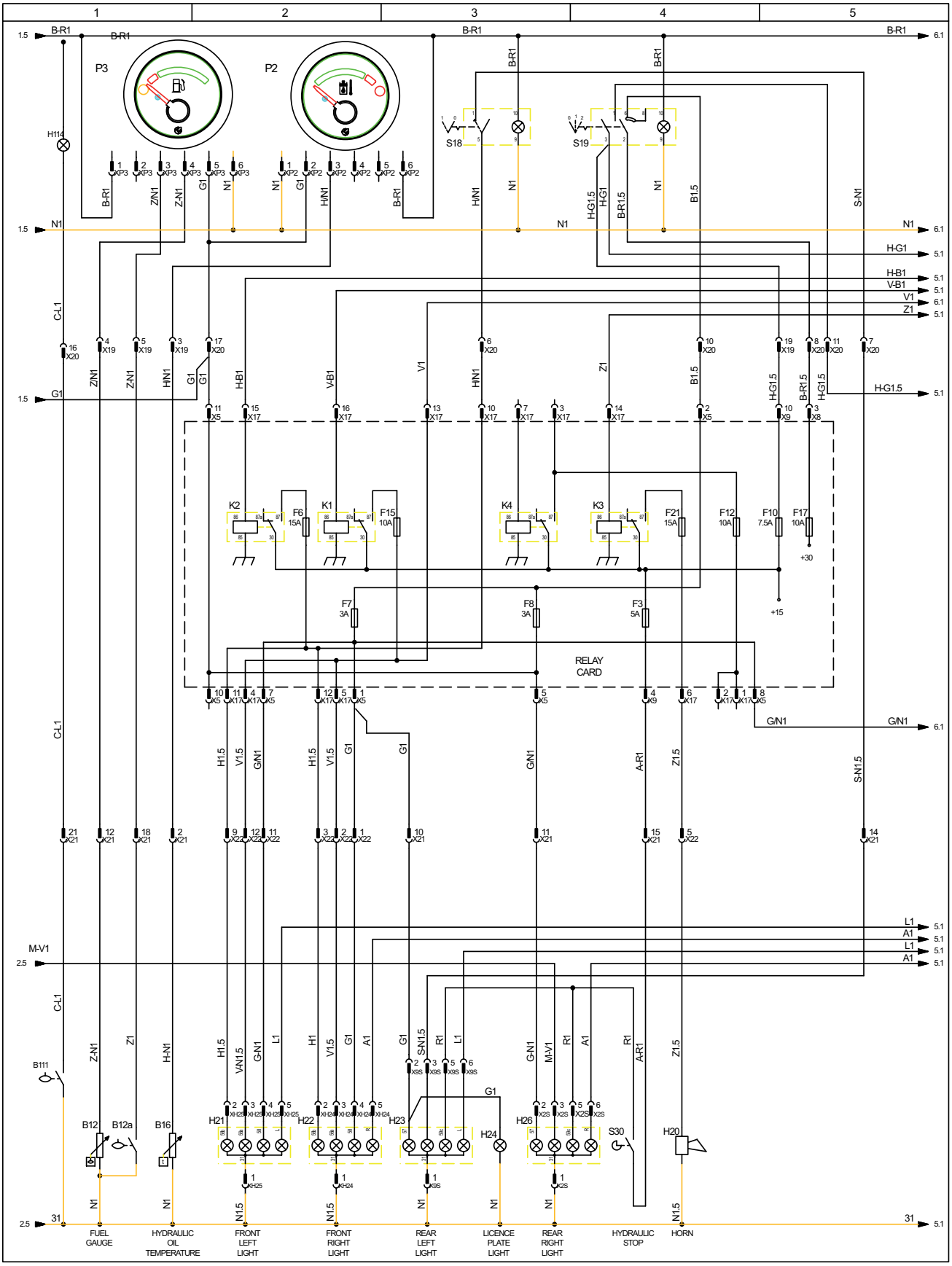
6.4.1 Sheet 1 of 8



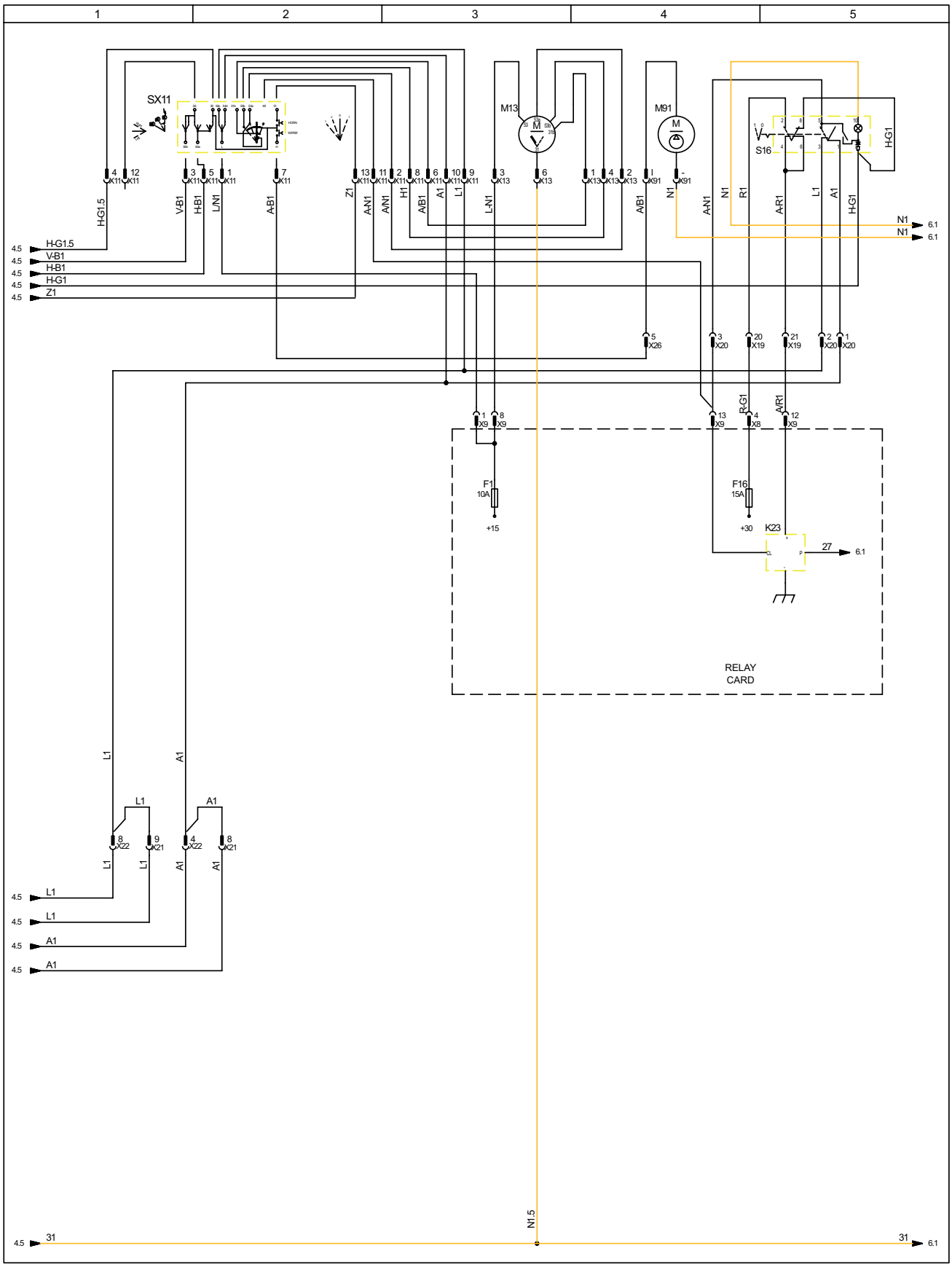
6.4.2 Sheet 2 of 8



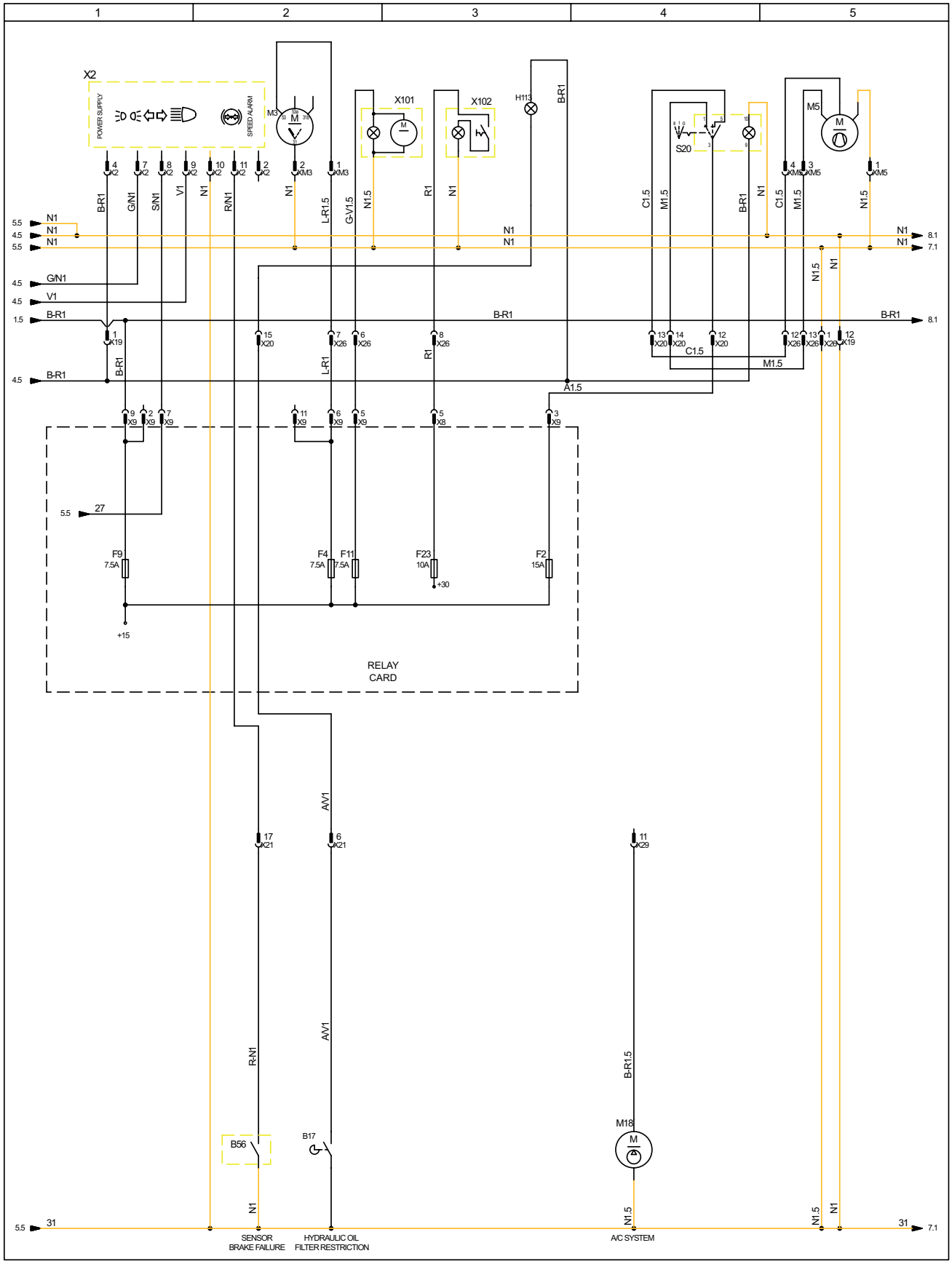
6.4.3 Sheet 3 of 8



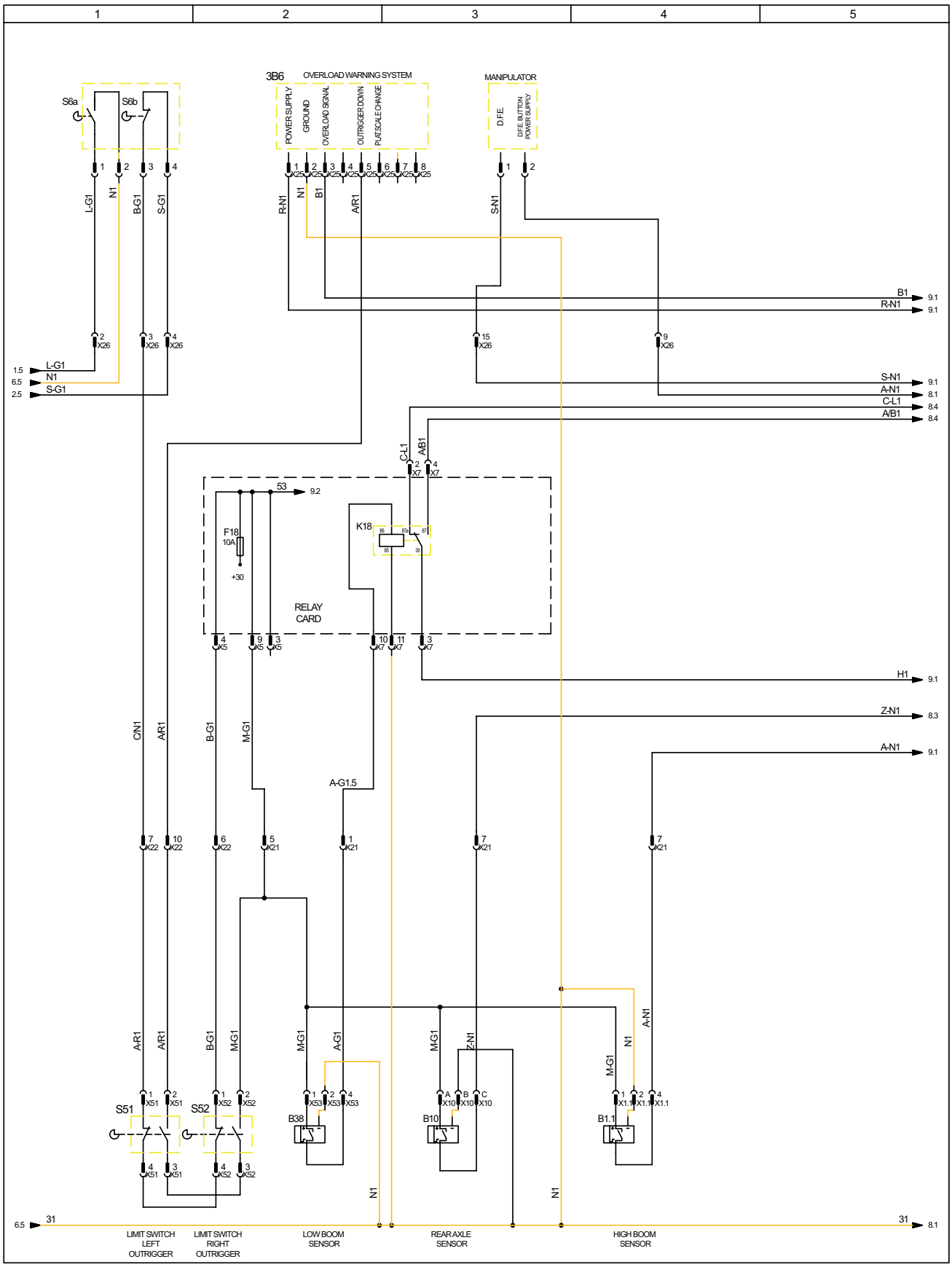
6.4.4 Sheet 4 of 8



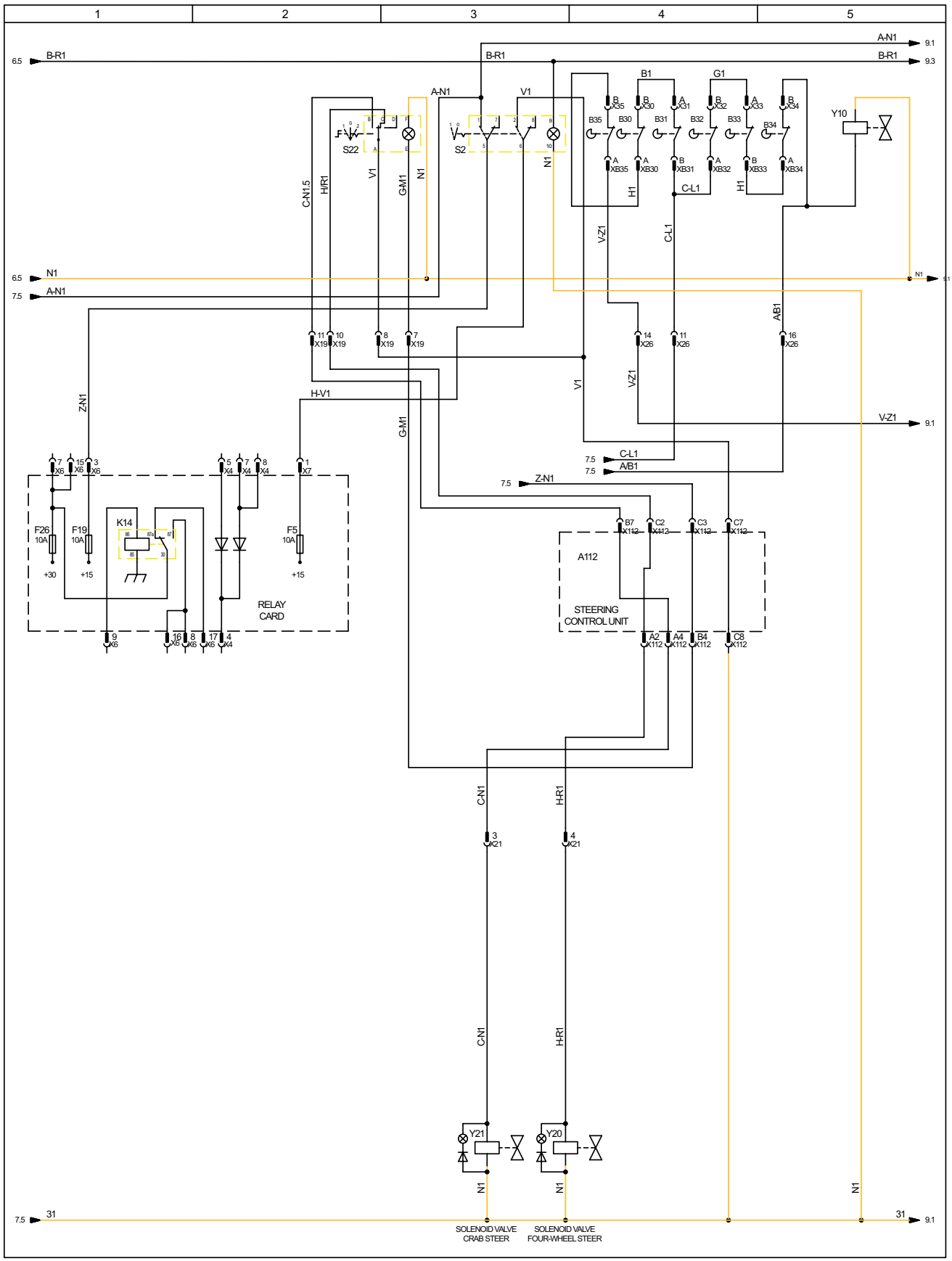
6.4.5 Sheet 5 of 8



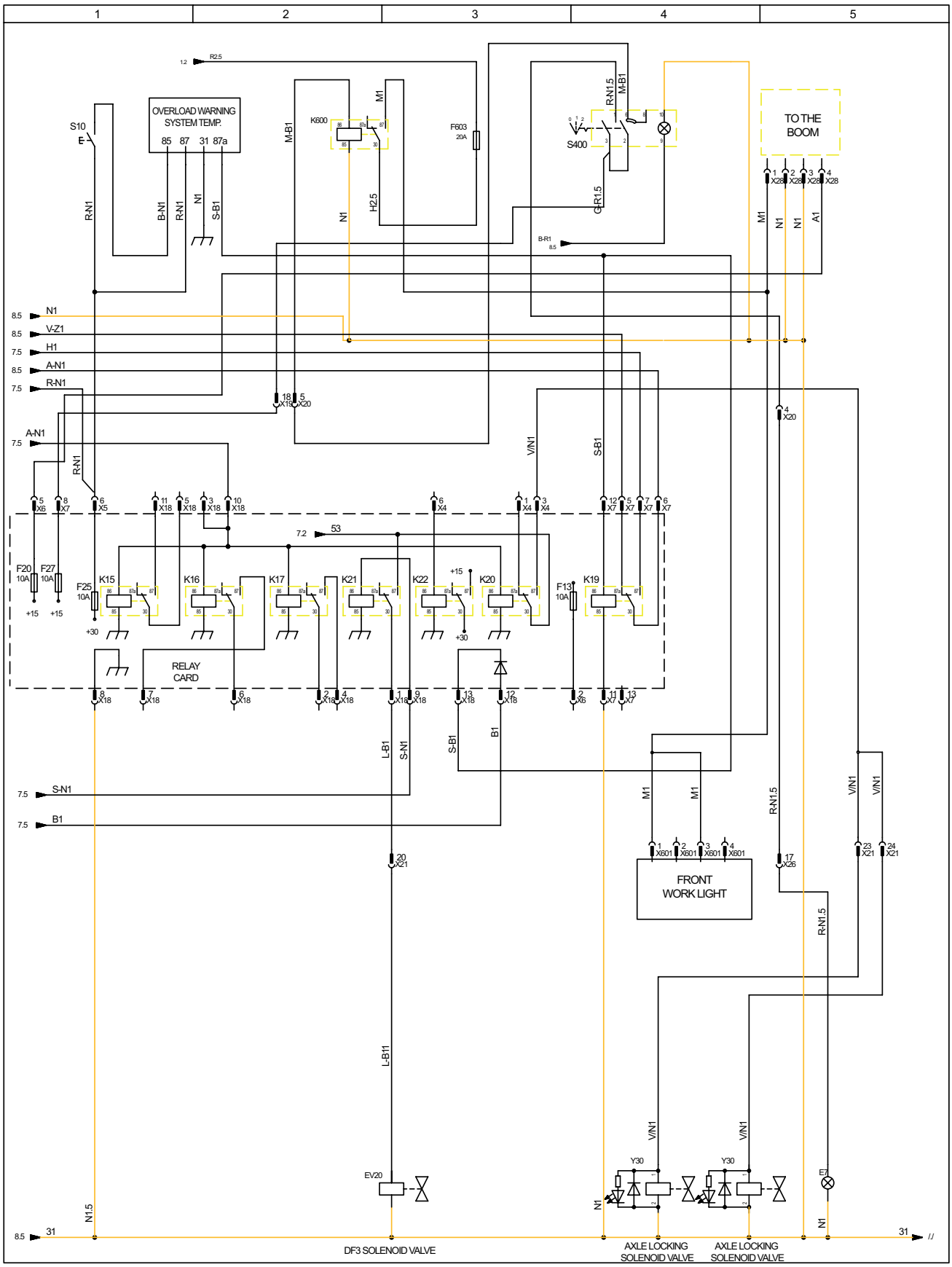
6.4.6 Sheet 6 of 8



6.4.7 Sheet 7 of 8



6.4.8 Sheet 8 of 8



6.4.9 Wiring diagram - Component description

Ref.	Description
A1	ALTERNATOR
A112	STEERING CONTROL UNIT
B1	BATTERY
B1.1	HIGH BOOM SENSOR
B10	REAR AXLE SENSOR
B11	PRESSURE SWITCH - ENGINE OIL FILTER
B12	FUEL GAUGE
B12a	FUEL RESERVE
B13	THERMOSTAT - HIGH ENGINE WATER TEMPERATURE
B14	THERMOMETER - HIGH ENGINE WATER TEMPERATURE
B15	MICRO-SWITCH - AIR FILTER CLOGGED
B16	THERMOMETER - HIGH HYDRAULIC OIL TEMPERATURE
B30	MICRO-SWITCH - EXTENSION
B31	MICRO-SWITCH - DOWN-MOVEMENT
B32	MICRO-SWITCH - SWAY
B33	MICRO-SWITCH - LEFT OUTRIGGER
B34	MICRO-SWITCH - LEFT OUTRIGGER
B35	MICRO-SWITCH - UNLOCKING
B38	BOOM LIFTING SENSOR
B54	SWITCH - SPEED NOT ENGAGED
B111	HYDRAULIC OIL LEVEL RESERVE
EV20	DF3 SOLENOID VALVE
F1	FUSE - HAZARD WARNING LIGHTS 10A
F2	FUSE - HEATING 15A
F3	FUSE - STOP LIGHT MICRO-SWITCH 5A
F4	FUSE - REAR WIPER 7.5A
F5	FUSE - HYDRAULIC ACTIVATION 10A
F6	FUSE - LOW BEAM 15A
F7	FUSE - RIGHT POSITION LIGHTS 3A
F8	FUSE - INSTRUMENT LIGHTING 3A
F9	FUSE - INDICTAOR LIGHTS POWER SUPPLY 7.5A
F10	FUSE - LIGHTS SWITCH 7.5A
F11	FUSE - BEACON 7.5A
F12	FUSE - WORK LIGHTS 10A
F13	FUSE - WALVOIL CONTROL UNIT 10A
F14	FUSE - SPEED SWITCH 10A
F15	FUSE - HIGH BEAM 10A
F16	FUSE - EMERGENCY 15A
F17	FUSE - LIGHTS AND FLASHING 10A
F18	FUSE - OUTRIGGERS 10A
F19	FUSE - WORK MODE SELECTOR 10A
F20	FUSE - PLATFORM EMERGENCY BUTTON 10A
F21	FUSE - HORN 15A
F22	FUSE - OPTIONAL 15A
F23	FUSE - CAB LIGHTS 10A
F24	FUSE - EMERGENCY STOP 10A
F25	FUSE - 3B6 CONTROL UNIT 10A
F26	FUSE - OPTIONAL 10A
F27	FUSE - WORK LIGHTS 10A
F603	FUSE - FRONT WORK LIGHTS 20A
F2G	MAIN FUSE 50A
F3G	MAIN FUSE 50A

Ref.	Description
H20	HORN
H21	FRONT LEFT LIGHT
H22	FRONT RIGHT LIGHT
H23	REAR LEFT LIGHT
H24	LICENCE PLATE LIGHT
H25	BACK-UP HORN
H26	REAR RIGHT LIGHT
H114	WARNING LIGHT - LOW HYDRAULIC OIL LEVEL
H113	WARNING LIGHT - ENGINE OIL FILTER
K02	RELAY - PRE-HEATING
K1	RELAY - HIGH BEAM
K2	RELAY - LOW BEAM
K3	RELAY - HORN
K4	RELAY - OPTIONAL
K7	RELAY - FORWARD SPEED
K8	RELAY - REVERSE SPEED
K9	RELAY - TRANSMISSION DISCONNECTED
K10	RELAY - TRANSMISSION DISCONNECTED
K11	RELAY - START-UP ENABLING COMMAND
K14	RELAY - DEADMAN
K18	RELAY - LOW BOOM SENSOR
K19	RELAY - OVERLOAD WARNING SYSTEM
K21	RELAY - D.F.E.
K23	INTERMITTENCE
K600	RELAY - FRONT WORK LIGHTS
K610	OVERLOAD WARNING SYSTEM TEMP.
M1	STARTING MOTOR
M3	REAR WINDSCREEN WIPER/WASHER
M5	HEATING FAN
M13	WINDSCREEN WIPER/WASHER MOTOR
M18	A/C SYSTEM
M91	PUMP MOTOR
P1	ENGINE WATER THERMOSTAT
P2	HYDRAULIC OIL TEMPERATURE
P3	FUEL GAUGE
P4	HOUR-METER
R1	LOAD RESISTANCE
S01	START-UP PANEL
S2	SWITCH - HYDRAULIC ACTIVATION
S3	SWITCH - JIB
S6a	PARKING BRAKE MICRO-SWITCH
S6b	PARKING BRAKE MICRO-SWITCH
S7	SWITCH - AIR CONDITIONER
S10	EMERGENCY MUSHROOM-HEAD PUSHBUTTON
S11	START-UP PANEL
S13	EMERGENCY BUTTON
S14	SWITCH - MECHANICAL GEARBOX
S16	SWITCH - HAZARD WARNING LIGHT
S18	SWITCH - BACK-UP LAMP
S19	SWITCH - LIGHTS
S20	SWITCH - HEATER
S21	BATTERY CUTOUT

Ref.	Description
S22	STEERING SELECTOR
S30	HYDROSTOP
S54	EMERGENCY BUTTON
SX11	SWITCH - LIGHTS -WIPERS-HORN
SX12	SPEED SWITCH
Y00	SOLENOID VALVE - ENGINE STOP
Y01	SOLENOID VALVE - FORWARD SPEED
Y02	SOLENOID VALVE - REVERSE SPEED
Y10	SOLENOID VALVE - PPC
Y20	SOLENOID VALVE - FOUR-WHEEL STEER
Y21	SOLENOID VALVE - CRAB STEER
Y30	SOLENOID VALVE - AXLE LOCKING
Y31	SOLENOID VALVE - AXLE LOCKING
Y53	SOLENOID VALVE - REAR AXLE LOCKING (OPT.)
Y54	SOLENOID VALVE - REAR AXLE UNLOCKING (OPT.)
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
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
X102	CAB LIGHTS
XB30	2-WAY DT CONNECTOR
XB31	2-WAY DT CONNECTOR
XB32	2-WAY DT CONNECTOR
XB33	2-WAY DT CONNECTOR
XB34	2-WAY DT CONNECTOR
XH9S	6-WAY DEUTSCH CONNECTOR
XH24	6-WAY DEUTSCH CONNECTOR
XH25	6-WAY DEUTSCH CONNECTOR
XH28	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 DT CONNECTOR

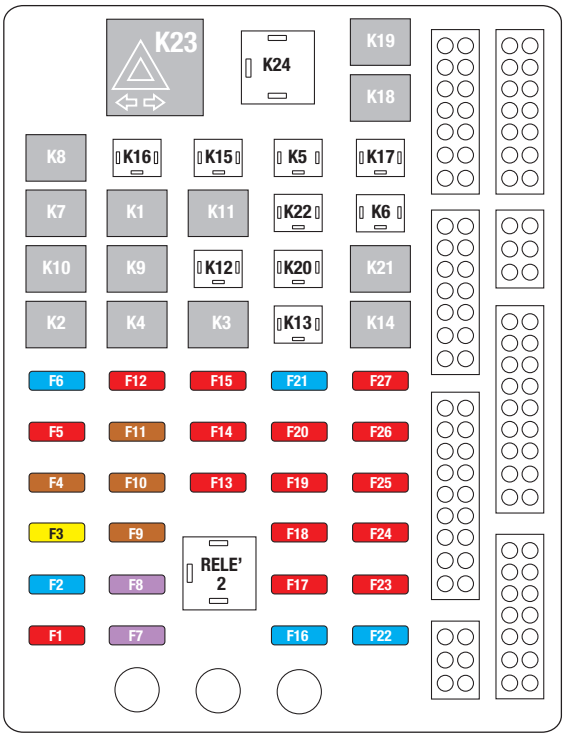
WIRE COLOURS

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)

6.4.10 Fuses and relays



FUSES

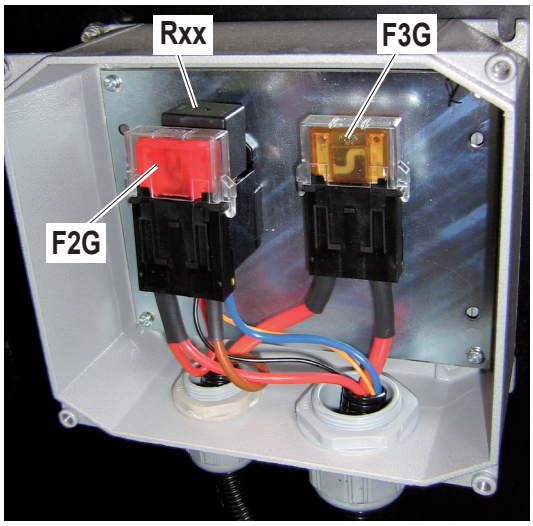
Ref.	Circuit	Amp.
F1	HAZARD WARNING LIGHTS	10
F2	HEATING	15
F3	STOP LIGHT MICRO-SWITCH	5
F4	REAR WIPER	7.5
F5	HYDRAULIC ACTIVATION	10
F6	LOW BEAM	15
F7	RIGHT POSITION LIGHTS	3
F8	INSTRUMENT LIGHTING	3
F9	INDICATOR LIGHTS POWER SUPPLY	7.5
F10	LIGHTS SWITCH	7.5
F11	BEACON	7.5
F12	WORK LIGHTS	10
F13	WALVOIL CONTROL UNIT	10
F14	SPEED SWITCH	10
F15	HIGH BEAM	10
F16	EMERGENCY	15
F17	LIGHTS AND FLASHING	10
F18	OUTRIGGERS	10
F19	WORK MODE SELECTOR	10
F20	PLATFORM EMERGENCY BUTTON	10
F21	HORN	15
F22	OPTIONAL	15
F23	CAB LIGHTS	10
F24	EMERGENCY STOP	10
F25	3B6 CONTROL UNIT	10
F26	OPTIONAL	10
F27	WORK LIGHTS	10
F603	FRONT WORK LIGHTS	20

RELAYS

Ref.	Circuit
K02	PRE-HEATING
K1	HIGH BEAM
K2	LOW BEAM
K3	HORN
K4	OPTIONAL
K7	FORWARD SPEED
K8	REVERSE SPEED
K9	TRANSMISSION DISCONNECTED
K10	TRANSMISSION DISCONNECTED
K11	START-UP ENABLING COMMAND
K14	DEADMAN
K18	LOW BOOM SENSOR
K19	OVERLOAD WARNING SYSTEM
K21	D.F.E.
K23	INTERMITTENCE
K610	OVERLOAD WARNING SYSTEM TEMP.
K600	FRONT WORK LIGHTS

6.4.11 Engine compartment fuses and relays

Ref.	Circuit	Amp.
F2G	MAIN FUSE	**50**
F3G	MAIN FUSE	**50**
Rxx	RELAY	**70**

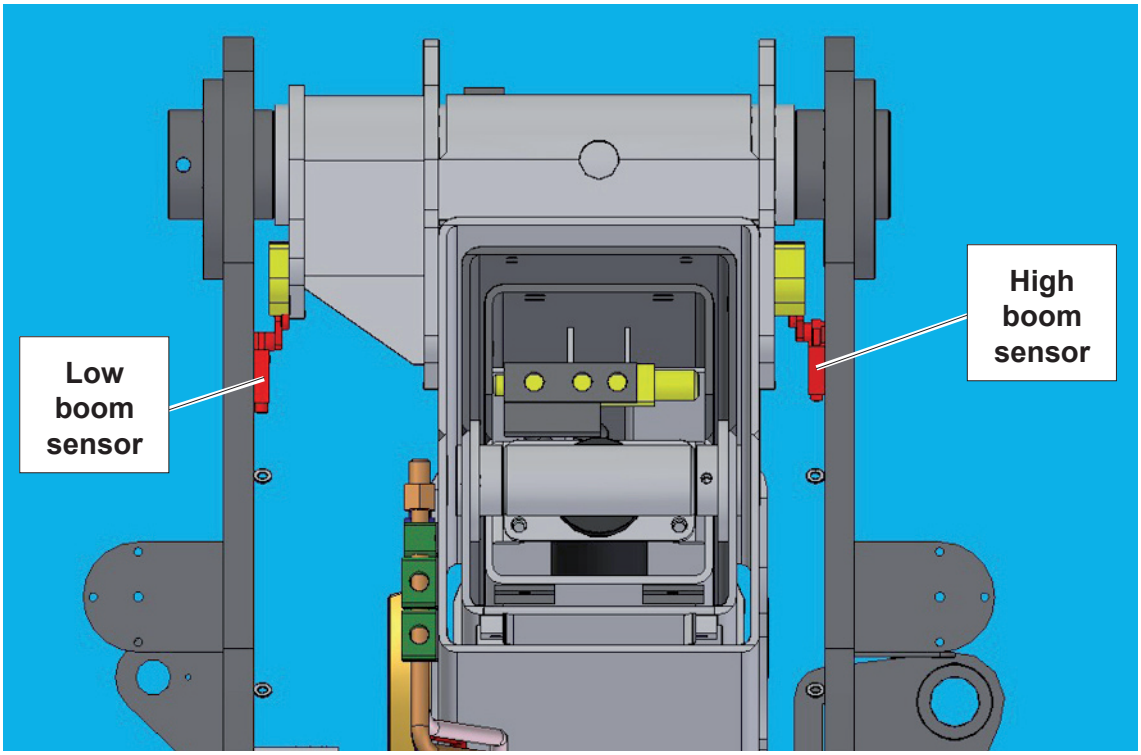


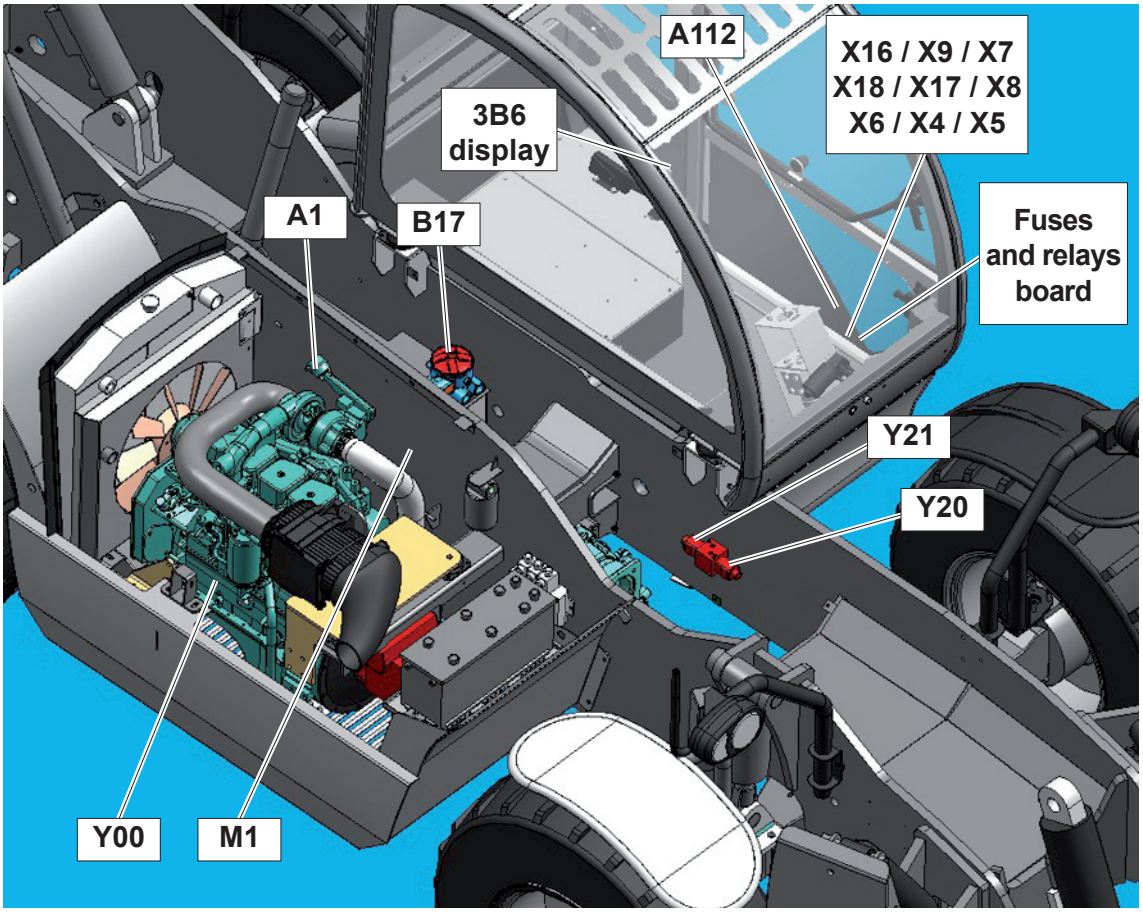
6.5 POSITION OF THE ELECTRIC AND HYDRAULICAL COMPONENTS ON THE MACHINE

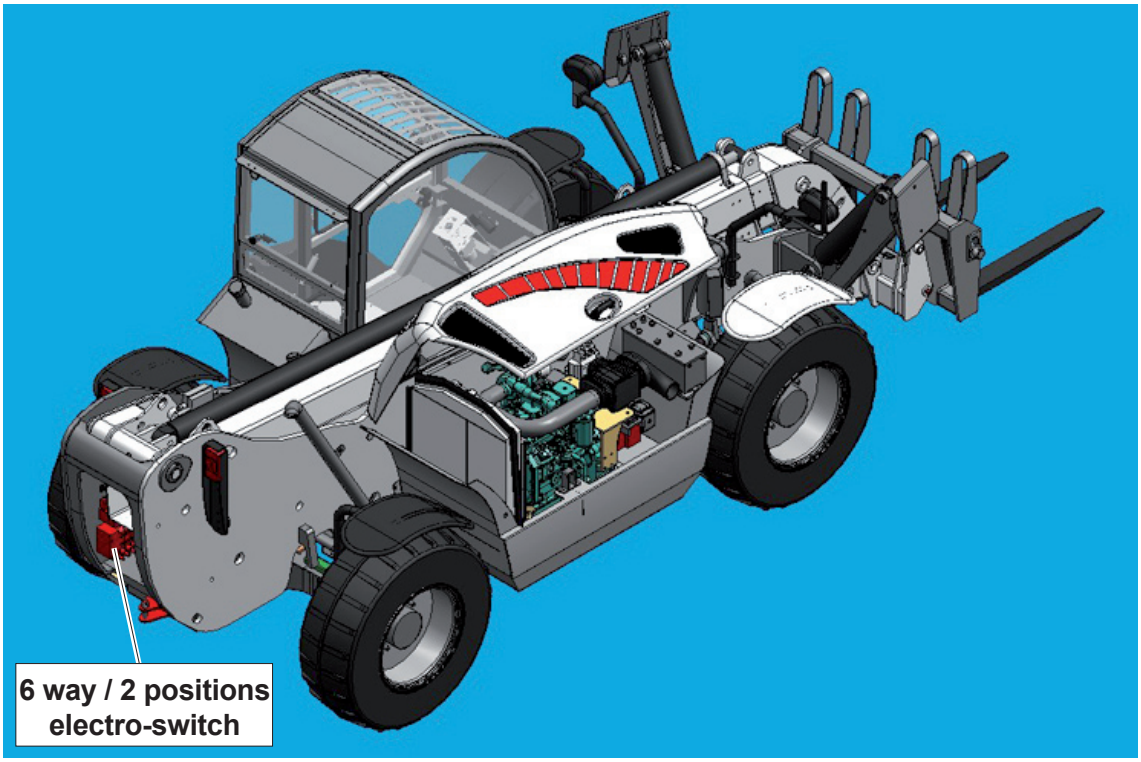
CAUTION

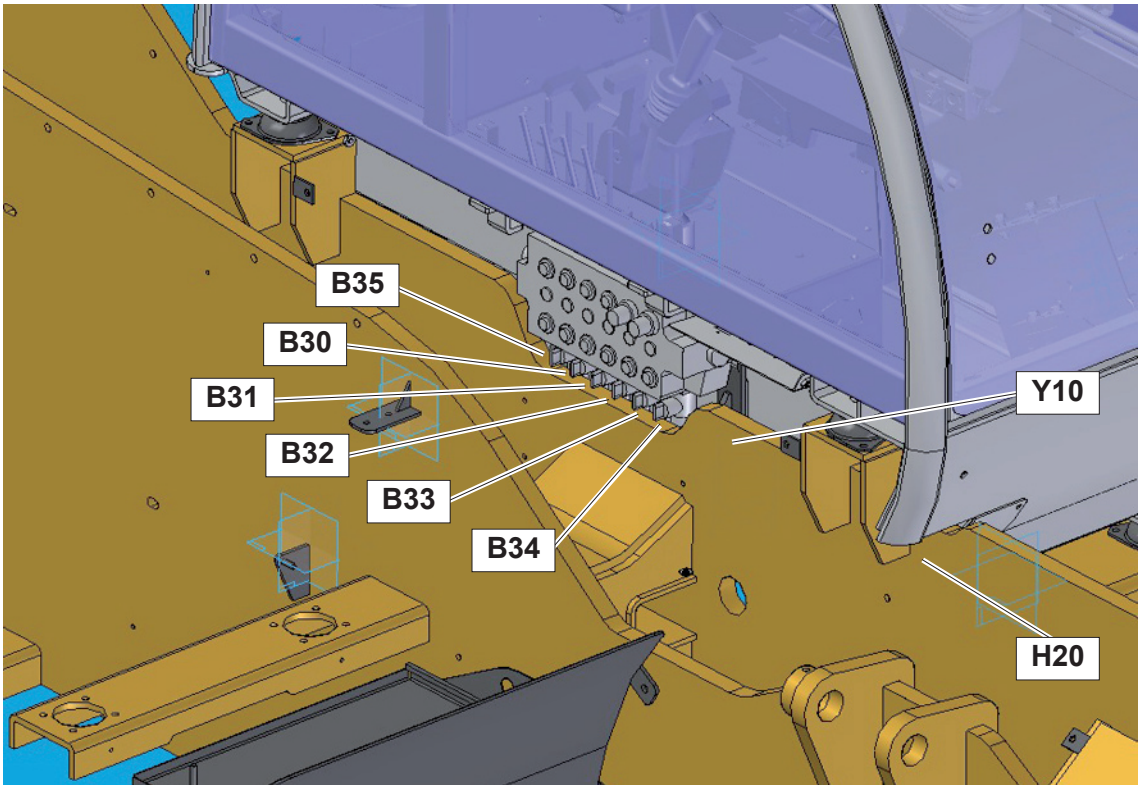
All references under form of a digit are referred to hydraulic components; the remaining references are initials which can be found on the wiring diagram of the machine.

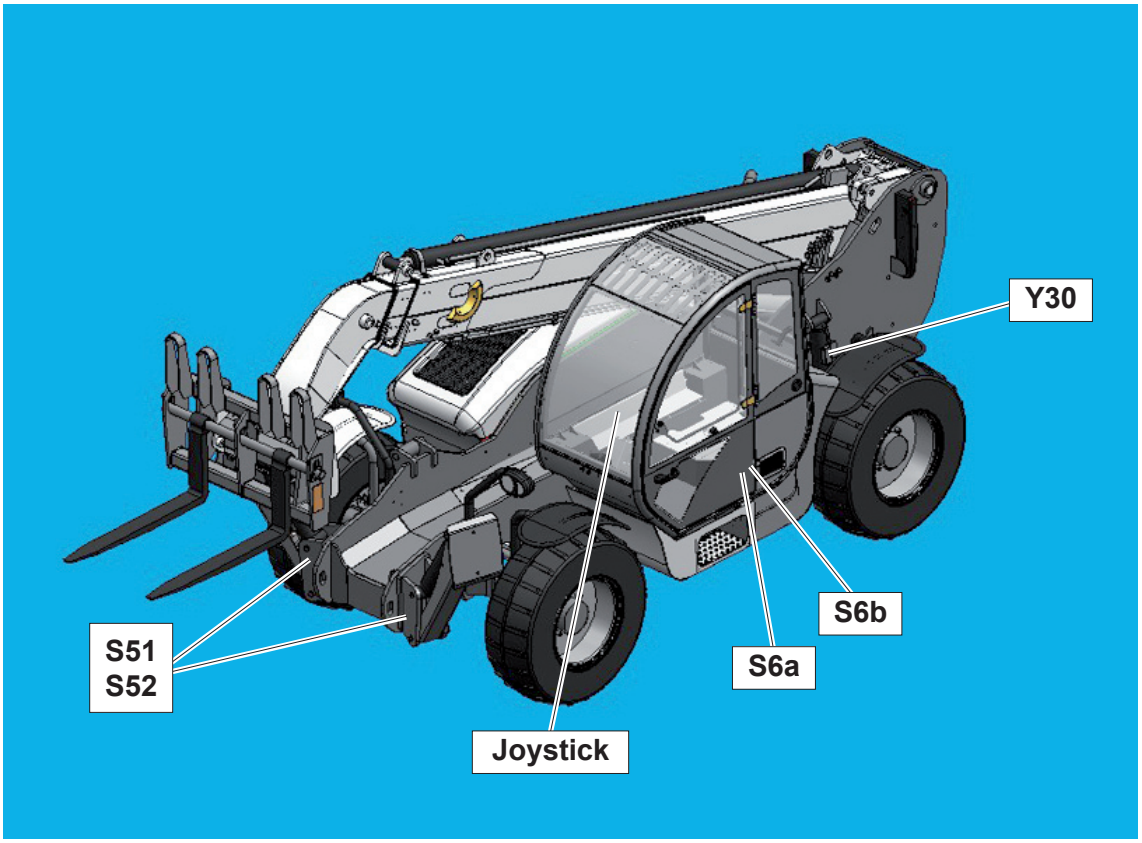
6.5.1 Electric components

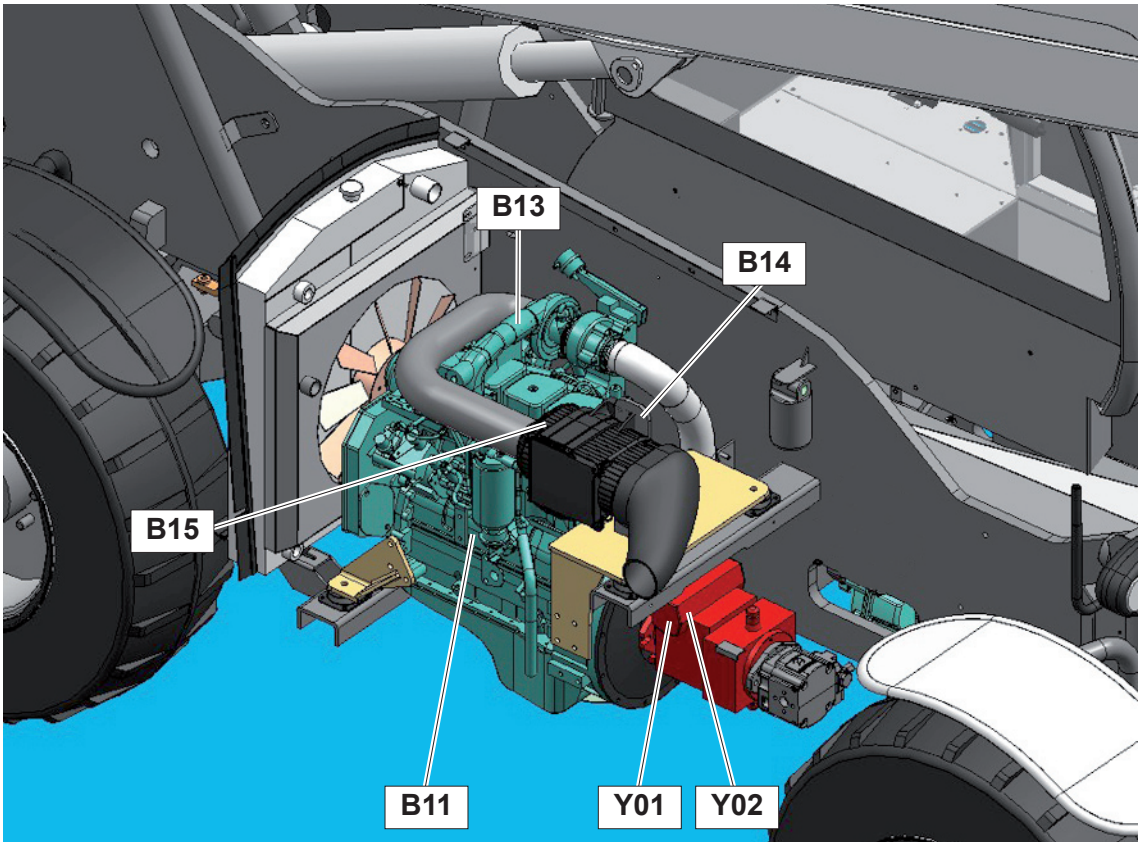


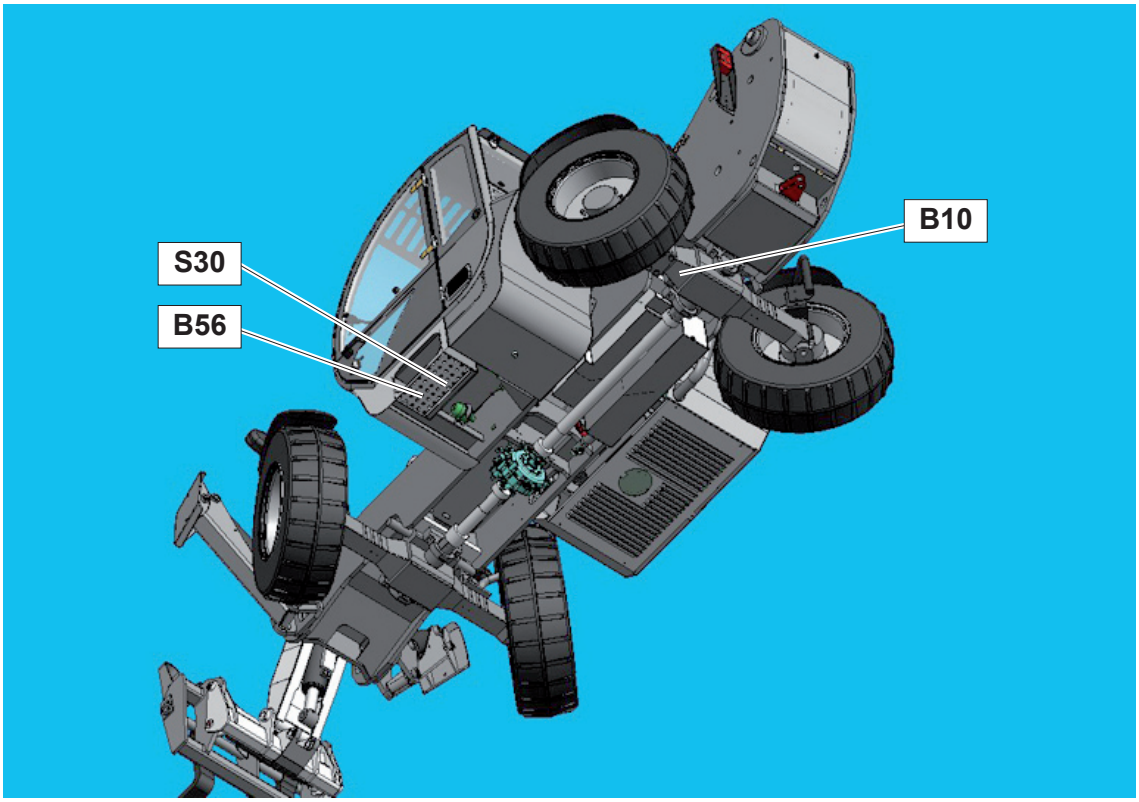

A112
X16 / X9 / X7
X18 / X17 / X8
X6 / X4 / X5
3B6
display
A1
B17
Fuses
and relays
board
Y21
Y20
Y00
M1


6 way / 2 positions
electro-switch


B35
B30
B31
B32
B33
B34
Y10
H20


Y30
S6b
S6a
S51
S52
Joystick

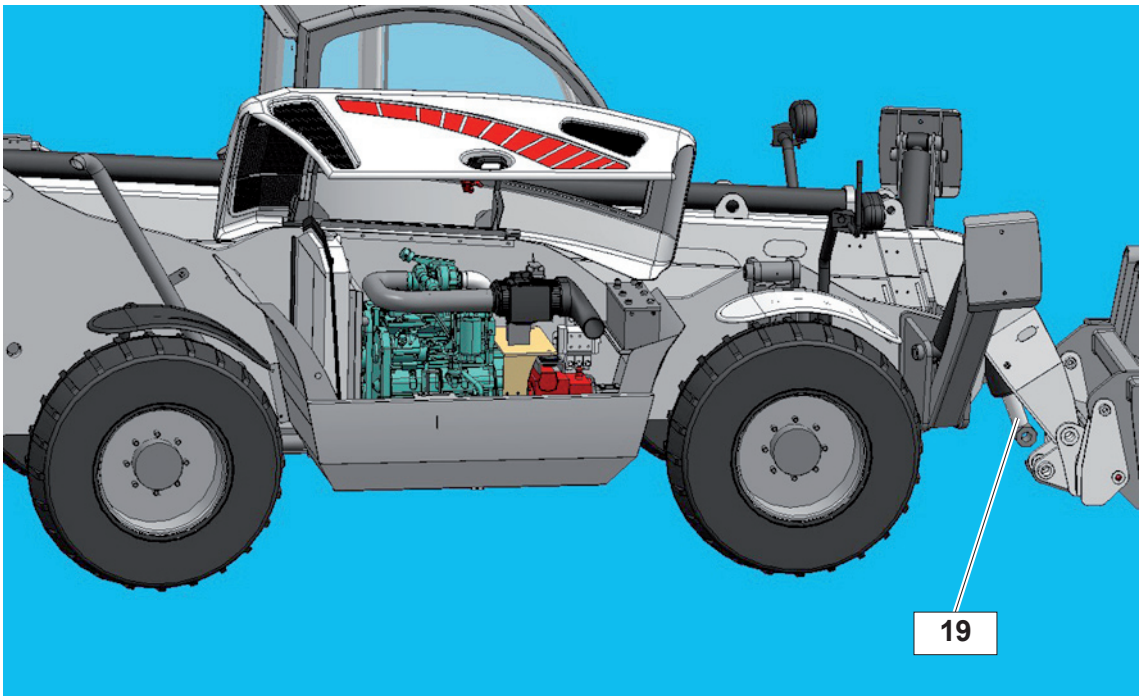

B13
B14
B15
B11
Y01
Y02

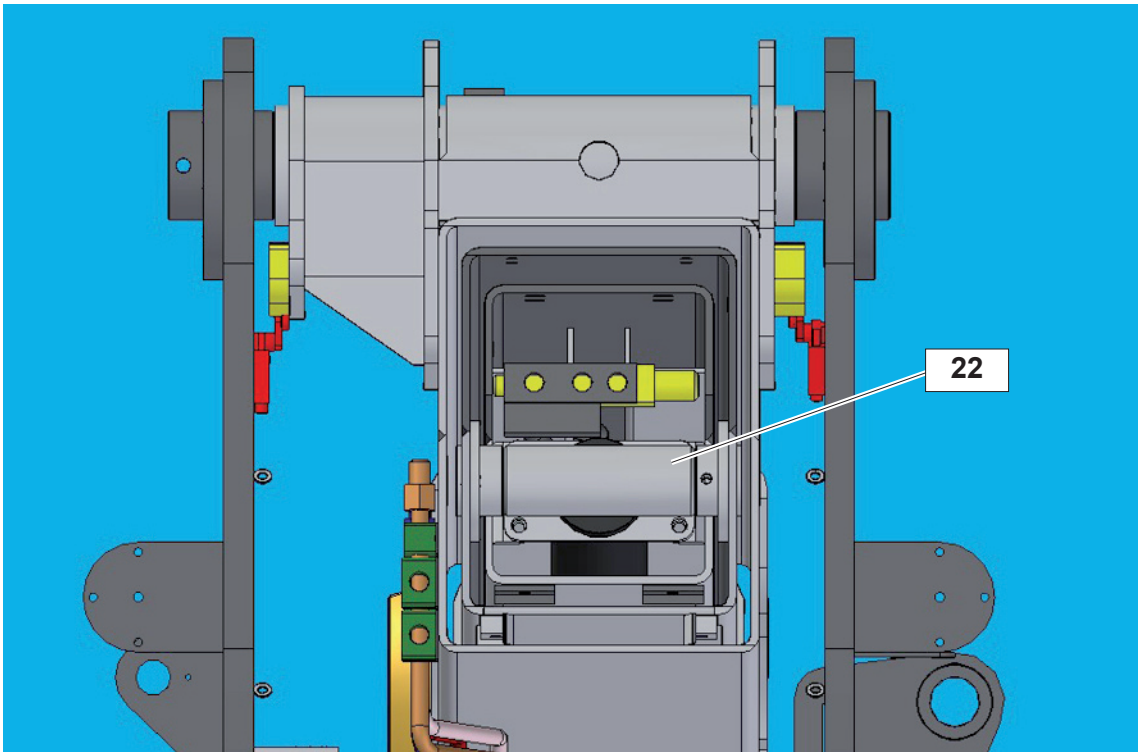

B10
S30
B56

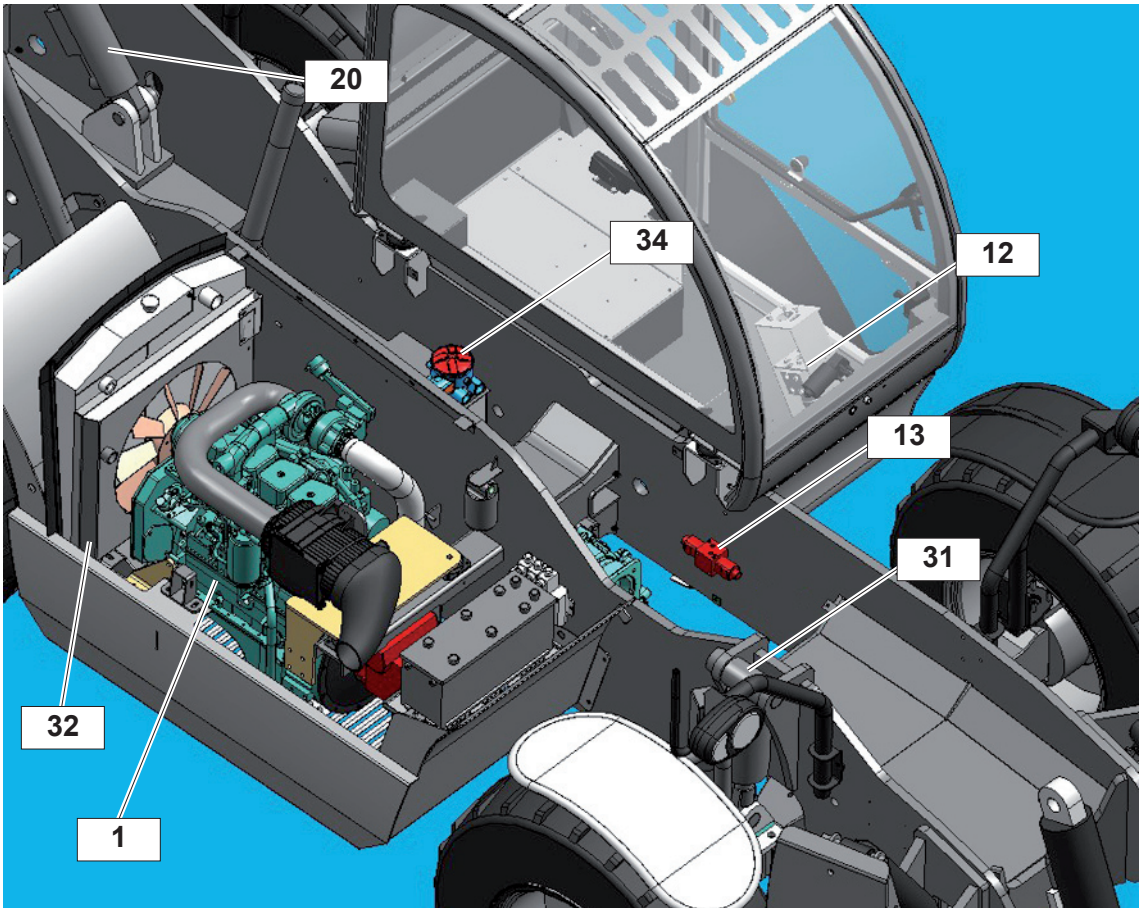
6.5.2 Hydraulic components

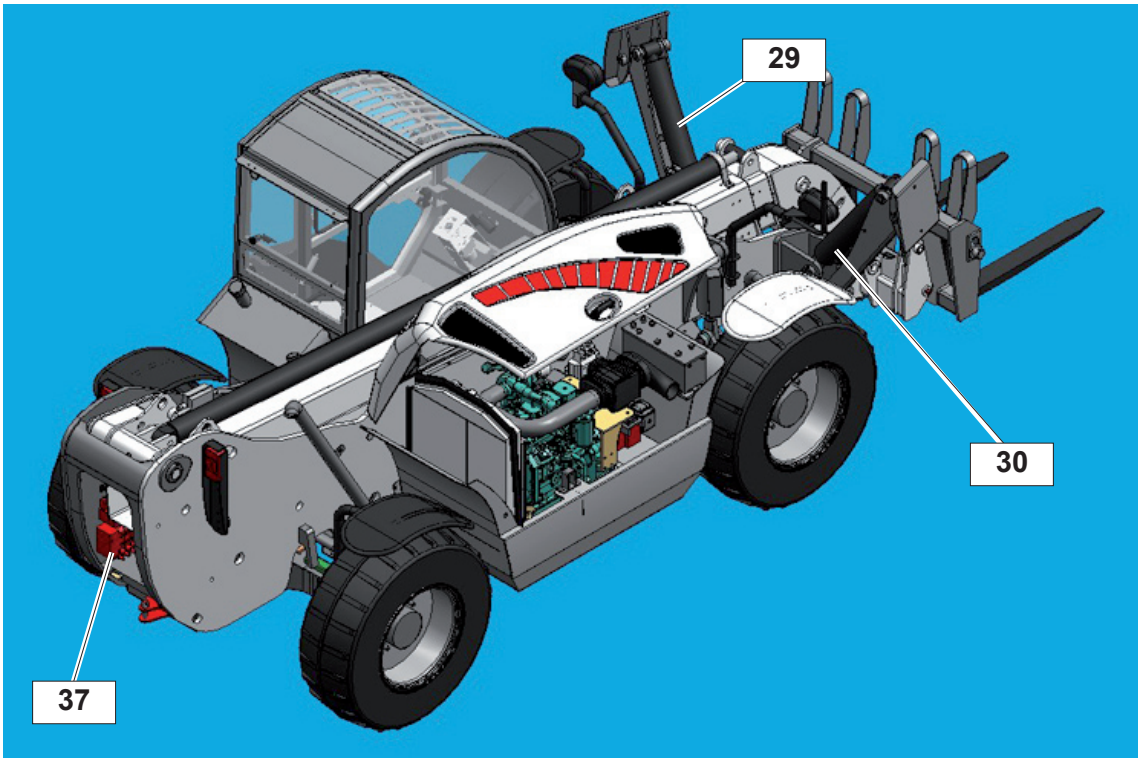
CAUTION

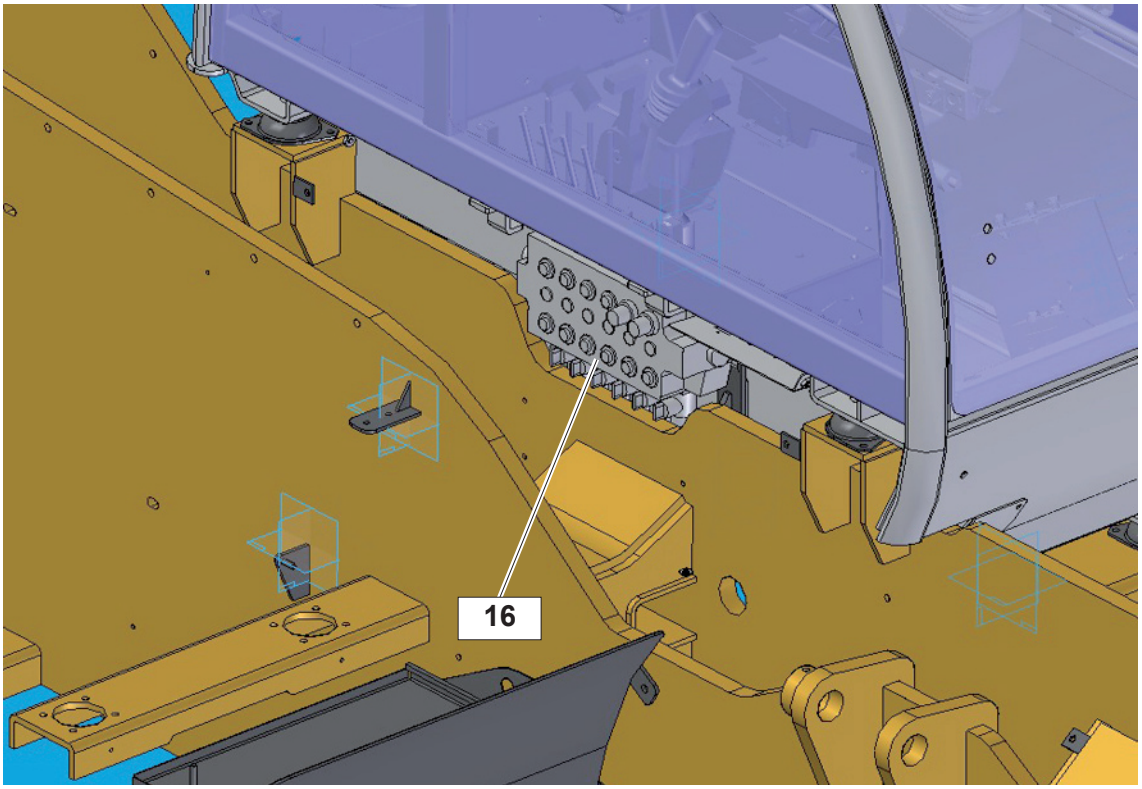
The numbering in the following pictures refers to the hydraulic components listed in section "Introduction", paragraph "Description of the machine operation" in this manual.

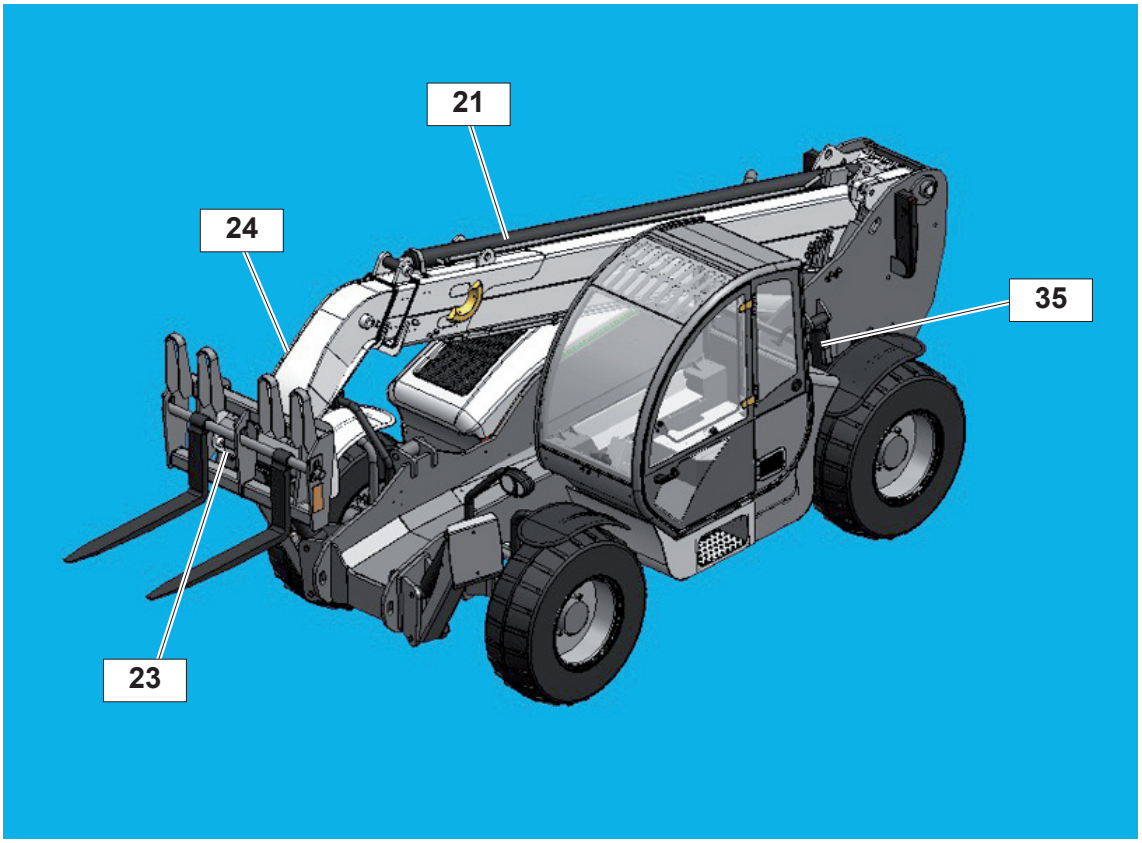


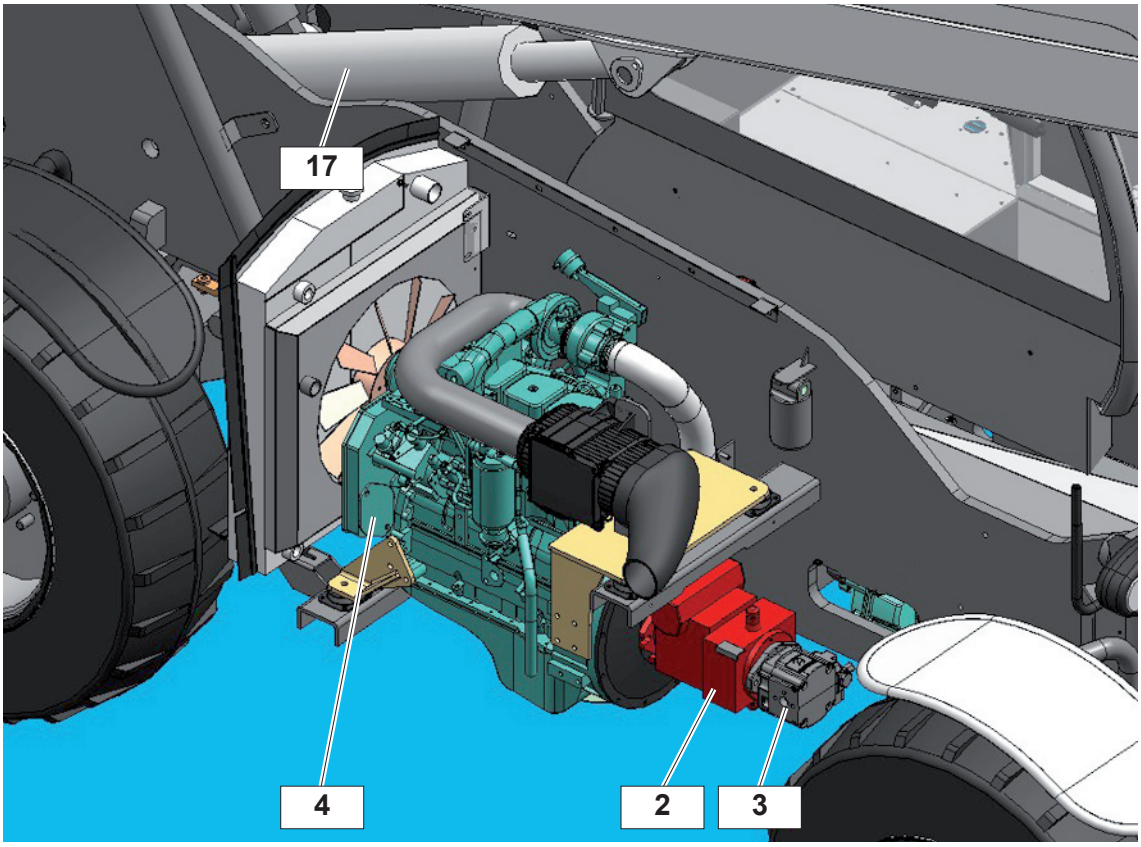


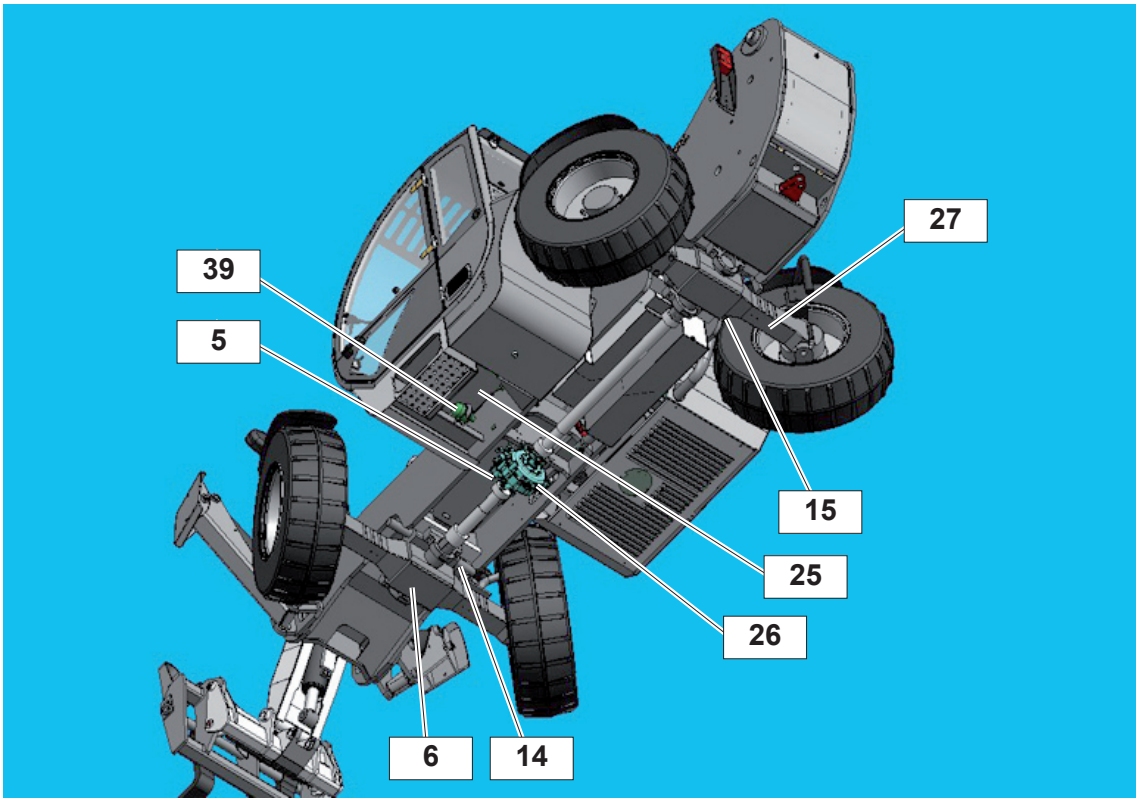

20
34
12
13
31
32
1


29
30
37


16

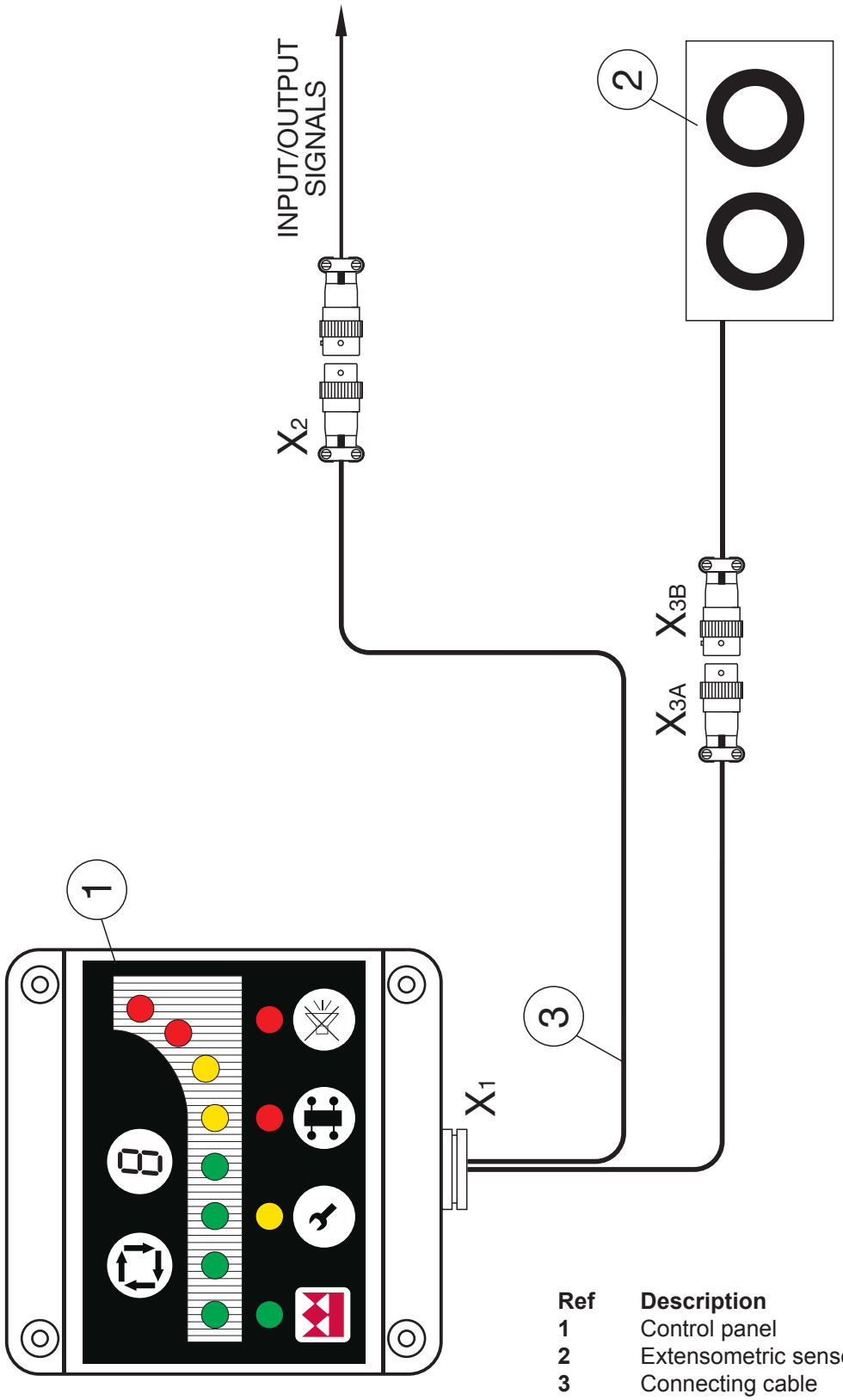

21
24
35
23


17
4
2
3


39
5
27
15
25
26
6
14

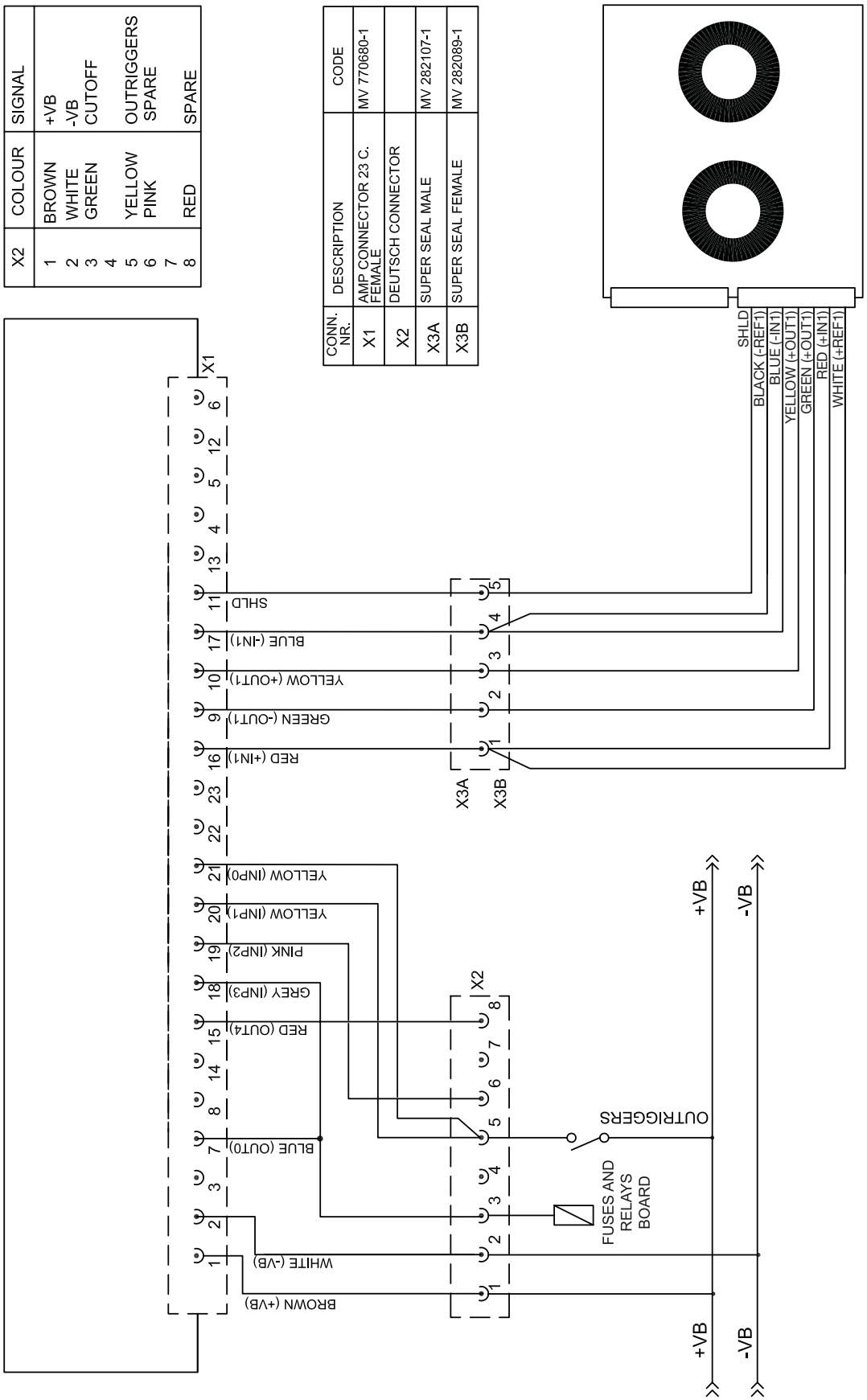
6.6 LOAD LIMITING SYSTEM

6.6.1 Wiring diagram - lay-out



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

6.6.2 Wiring diagram - External connections



Section 7
REPAIR PROCEDURES

SECTION INDEX

7.1 Time schedule ..... page 2

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 displayand calibrate	1	1.00
change the joystick levers	1	0.30
change the joystick movement switch pushbutton	1	0.30
change the brake pump	1	1.00
change the low boom micro-switch	1	0.30
change the high boom micro-switch	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 cyl. 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

Job	Operators needed	Expected time (h)
change the valve of the outrigger up/down mov. cylinder	1	0.30
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	2.00
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 cardan joints	1	2.00
change the axle shaft hub	1	1.30
change the boom assy	2	5.00 each

Job	Operators needed	Expected time (h)
change the boom anchoring pin	2	1.00 each
change the attachment locking cylinder pins	1	0.30
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 rear axle locking cylinder	1	1.00
change the outriggers	1	1.00
change flexible hoses	1	0.30
change the parking brake lever	1	0.30