TEREX LIFT

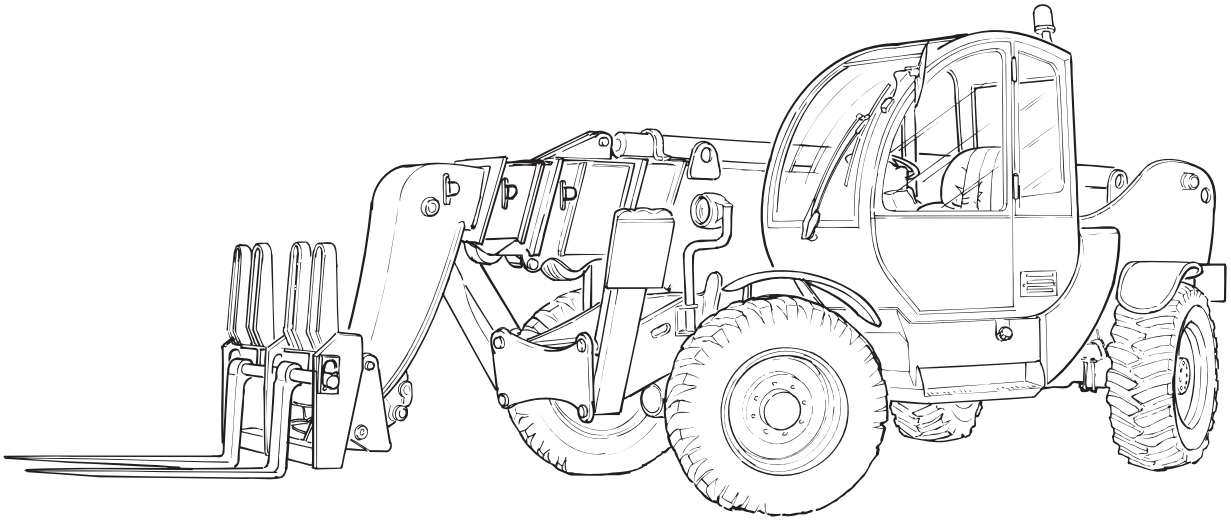
WORKSHOP MANUAL

Code 57.4401.0200 - 1st Edition 02/2006

Handler with telescopic boom

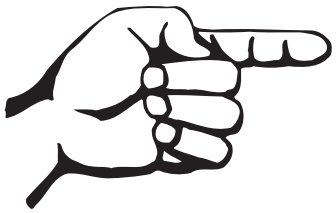
TELELIFT 3512 *(From serial n. 11248)*

TELELIFT 4010 *(From serial n. 12088)*



English
Edition

INDEX



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WORKSHOP MANUAL

Code 57.4401.0200 - 1st Edition 02/2006

Number: .....

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DECLARATION

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declare that I have received the ***Workshop Manual for TEREXLIFT handlers of the Telelift 3512 - 4010 series***.

Copies consigned: n° ..... on paper

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Yours sincerely

Date .....

For acceptance

The consignee

Company stamp
and signature of the Legal representative

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Revision No.	Revision date	Revised pages	Notes	Issued by
1	02-2006		Publication	
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Sect. 6 SCHEMES

Sect. 7 REPAIR PROCEDURES

Machine denomination	Literature valid up to serial number
TELELIFT 3512	11248
TELELIFT 4010	12088

INTRODUCTION

Important
Read, understand and obey the safety rules and operating instructions in the Telelift 3512 - 4010 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.it
e-mail: info@terexlift.it

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DESCRIPTION OF THE MACHINE OPERATION

The source of mechanical energy of this machine is a Deutz turbo-compressed diesel engine **(1)**, model BF4M2011, with a max torque of 270 Nm at 1600 rev/min. and a power rating of 60 kW at 2500 rev/min.
On the engine flywheel side, and connected to the engine by a Technodrive coupler with elastic joint and with a 1-to-1 ratio, there is Bosch-Rexroth closed-loop pump for hydrostatic drives, model A4VG56 **(2)** with adjustment valve of the DA type.
The max displacement of this swash-plate pump is 56 cm^3 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 engine shaft, cooling fan pulley side, there is a Casappa open-loop gear pump (with fixed displacement) **(3)** with priority "load sensing" valve integrated in the housing.
The displacement of this pump is 43 cm^3.
Its function is to provide hydraulic power, under form of pressure and flow rate, to the steering and braking circuits of the machine (priority side) and to the telescopic boom movement cylinder (secondary side).
The pump is connected to the pulley by an elastic joint which reduces overloads and impulsive loads.
The assembly of the two pumps involves they have a rotation velocity equal to the one of the diesel engine.
The suction line of the open-loop pump **(3)** is protected by an immersed filter **(7)**, placed inside the hydraulic oil tank **(9)** with a capacity of 90 litres.
The transmission pump **(2)** is protected by a cartridge-filter **(8)**, placed on the suction line of the boost pump, such pump being integral part of the drive pump.
The one-way valve **(10)** 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 its the temperature.
From port “G” of the transmission pump **(2)** low-pressure oil (25-30 bar) is taken and used for the anti-cavitation circuit of the automatic levelling system of the forks and for feeding the 4-way/3-position ON/OFF solenoid valve **(6)** which controls the gear engagement of the mechanical two-speed gearbox.
The hydraulic energy produced by transmission pump **(2)** is converted into mechanical power by a closed-loop hydrostatic motor, model Bosch-Rexroth A6VM80 **(4)** with a maximum displacement of 80 cm^3, equipped with adjustment valve of DA1 type and with flush valve for reducing the max temperatures inside the transmission circuit.
The drain line of motor **(4)** is directly connected to tank **(9)**.

The motor is flanged to a two-speed mechanical gearbox, model 357 **(5)** manufactured by Dana.
The mechanical gearbox is flanged to the front axle **(29)**, again manufactured by Dana.
Speeds are engaged by a special oil-dynamic cylinder placed inside the gearbox, while the selection of the first and second speed is controlled by a 4-way/3-position ON/OFF solenoid valve **(6)**.
The mechanical torque at the gearbox output is transmitted to the front axle **(29)** directly and to the rear axle **(28)**, again manufactured by Dana, through a Cardan shaft. The change-over valve **(11)** always sends the priority valve built in the pump **(3)** the highest pressure signal (load sensing signal) among those coming from the steering circuit and the braking circuit.
The "load sensing" power steering **(12)** with a displacement of 315 cm^3, receives oil from the priority line of pump **(3)** in relation to the highest “load sensing” signal sent by the power steering and the service brake circuit and connected to such pump through the change-over valve **(11)** with function of pilot signal.
In this way, the input flow to the power steering will be exactly the one needed for the instantaneous steering functions and the filling of the accumulators of the service brake line.
Any excess flow of the pump will be used for operating 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, there are other two reducing valves with anti-shock function set at 200 bar.
The function of these two valves is limiting possible shocks on the steering wheel in case of 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 **(29)** and the rear axle **(28)** 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 steering effect.

The Walvoil 5-section monoblock main valve **(16)** with mechanical control, receives oil from the secondary line of pump **(3)** and feeds all the movements of the telescopic boom and of the outriggers.
On the inlet head, there are a direct-action pressure relief valve, set at 280 bar, and a discharge solenoid valve, used as "deadman" and blocking control in case of movements of the telescopic boom affecting the machine stability.
The movement block is controlled by the moment limiter, and the solenoid valve is operated by the relevant button on the cab's joystick.
Slider 1 of the main valve controls the hydraulic block **(18)** which, in turn, manages the rotation of the attachment holding plate and the extension/retraction of the telescopic boom.
This hydraulic block consists of a 6-way/2-position electrical valve and three pressure relief valves, two of them installed on the rotation cylinder line of the attachment holding plate and one installed on the line feeding the bottom side of the extension cylinder of the 2nd boom section.
When the electric valve, built in the hydraulic block, is not energised, the two lines from the 1st element of the main valve **(16)** are connected to the lines feeding the extension cylinders of the second and third boom section **(21)** and **(22)**.
When, on the contrary, the electric valve is energised, the two lines from the 1st element of the main valve **(16)** are connected to the lines feeding the rotation cylinder of the attachment holding plate **(19)**.
This cylinder is equipped with a double-acting compensation valve with safety function.
Paralleled to this cylinder there is the fork levelling (or balancing) cylinder **(20)** equipped with a special double-acting compensation valve.
Inside this valve, the one-way valves are installed in a reverse manner with respect to the normal position to avoid the pressurisation of the cylinder when the rotation command of the attachment holding plate is operated.
Again inside this valve, there are other two one-way valves set at 5 bar with anti-cavitation function.
These are used to deliver oil, sucked from the low pressure line coming from the transmission pump **(2)**, to the fork levelling compensation circuit, when such circuit cannot do it alone.

On the two control lines of cylinder **(19)**, and inside the hydraulic block **(18)**, there are two pressure relief valves set at 295 bar which protect the automatic levelling system of the forks when the boom is moved up and down and in case of overload of the attachment holding plate (ex. use of the bucket).

Only for Telelift 3512
The extension cylinder of the 2nd boom section **(21)** is equipped with a double-acting compensation valve with safety function. The bottom side of this cylinder is connected to the hydraulic block **(18)** while its rod side is connected to the 3rd boom section extension cylinder **(22)**, equipped with single-acting compensation valve with safety function. The two cylinders are connected in series, that is the oil flowing out of the annular chamber of the 2nd boom section extension cylinder is used to feed the circular chamber of the 3rd boom section extension cylinder and vice versa.

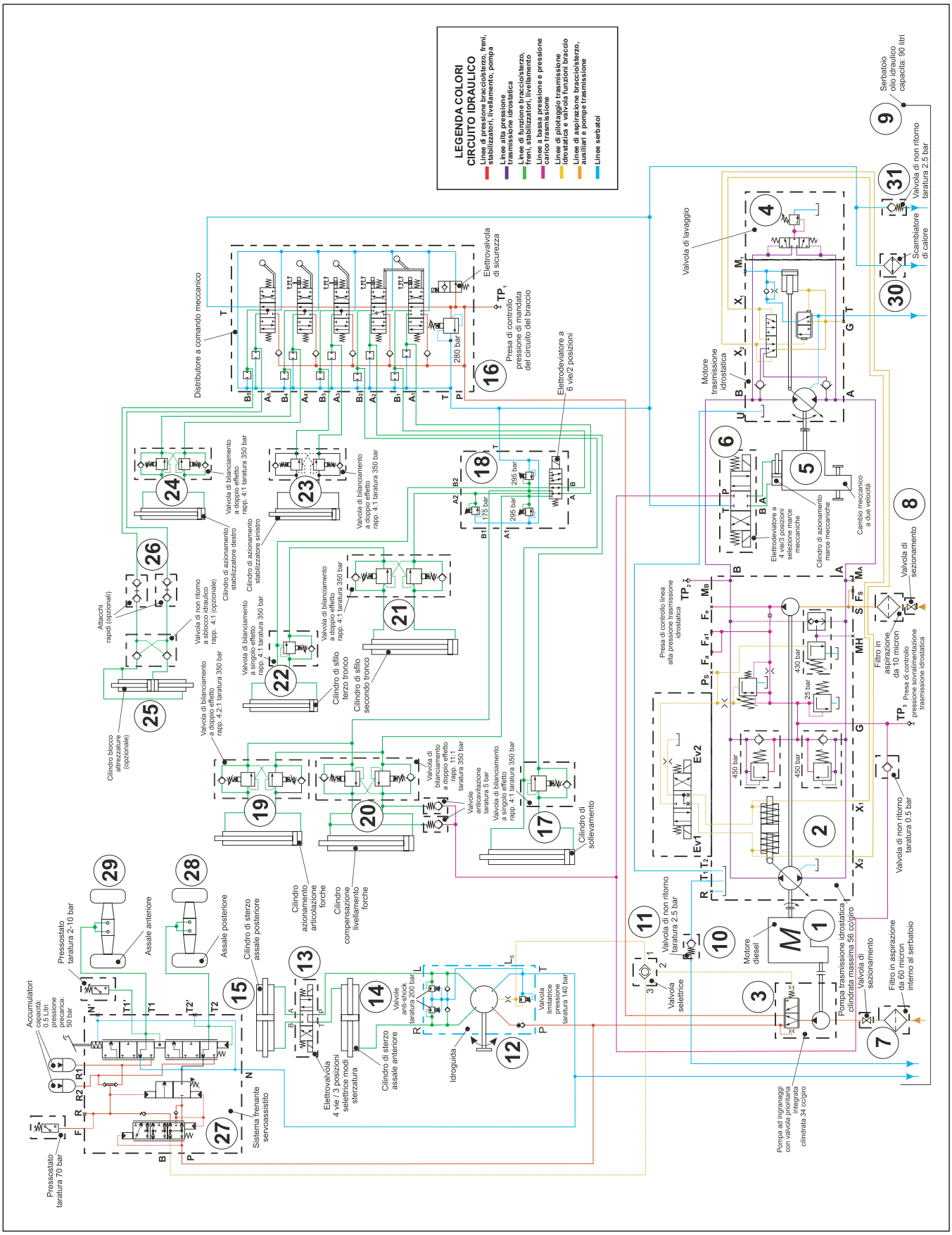
Only for Telelift 4010
The extension cylinder of the 2nd boom section **(21)** is equipped with a double-acting compensation valve with safety function. The bottom and rod sides of this cylinder is connected to the hydraulic block **(18)**.

On the control line of the circular chamber of cylinder **(21)** and built in the hydraulic block **(18)**, there is a pressure relief valve set at 175 bar which limits the load when the boom is extended in those working zones where the electronic load limiting system cannot detect overload conditions with respect to the load chart of the machine.
Slider 2 of the main valve controls the telescopic boom lifting cylinder **(17)**.
This cylinder has one single-acting compensation valve with safety function.
Through special mechanical gears, sliders 1 and 2 are operated at the same time by a single lever with double-axis movement which, at least theoretically, allows the simultaneous control of the boom lifting/lowering and extension/retraction movements or the boom lifting/lowering and attachment holding plate rotation movements in relation to the de-energisation or energisation of the electric valve of hydraulic block **(18)**.
Slider 3 of main valve **(16)** controls the cylinder of the left stabiliser **(23)** which is equipped with a double-acting compensation valve with safety function.
Slider 4 of main valve **(16)** controls the cylinder of the right stabiliser **(24)** which is equipped with a double-acting compensation valve with safety function.
Slider 5 of the main valve **(16)** controls the optional attachment locking cylinder **(25)**.

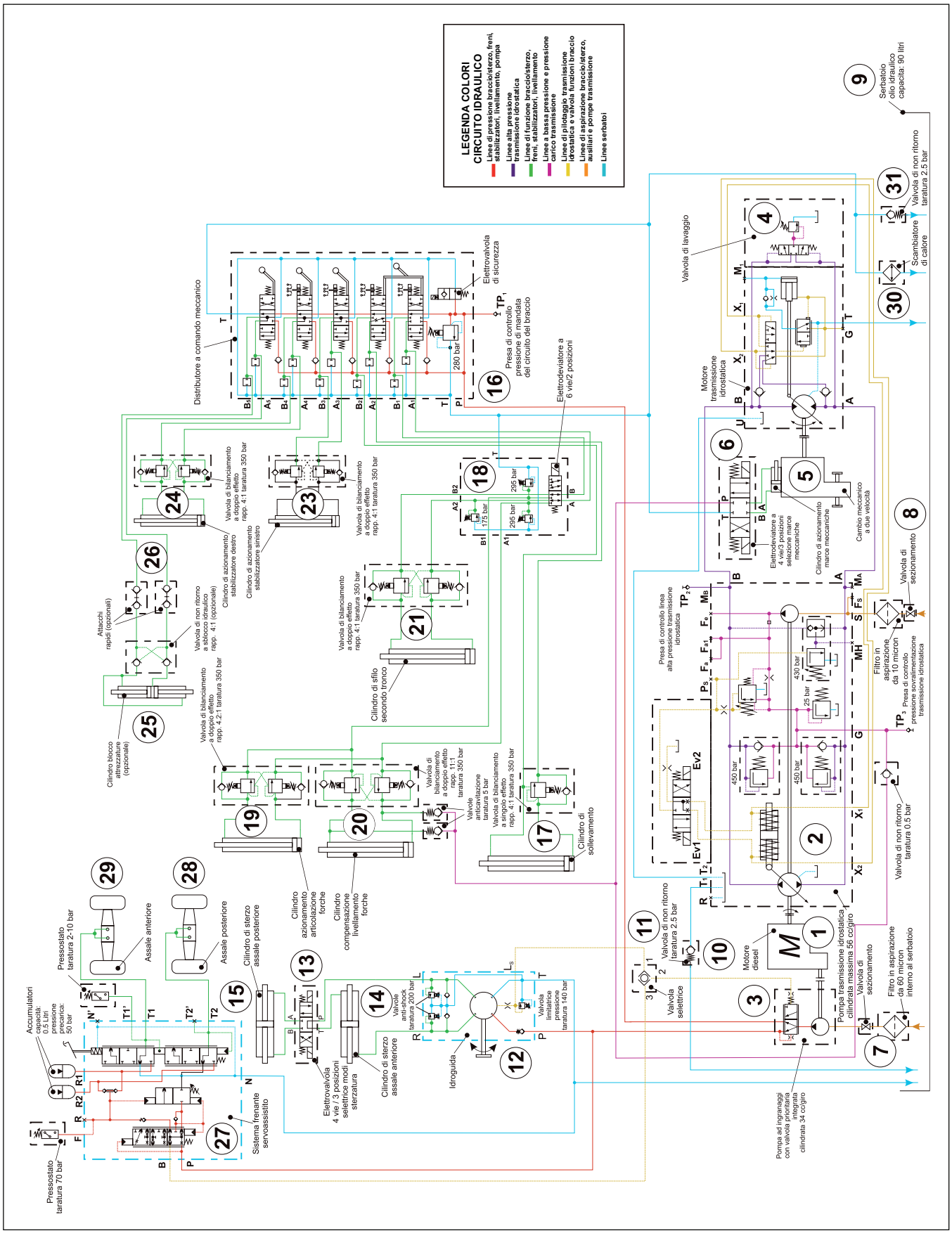
This cylinder has a double one-way valve with hydraulic release and safety function.
On the feeding lines of this cylinder, there are two quick-fit connectors **(26)** for the hydraulic lines of those optional attachments which need hydraulic power for their operation (ex. hydraulic winch and maintenance jib, mixing bucket, etc.).
The SAFIM S6 "load sensing" pedal-assisted braking system **(27)** receives oil from pump **(3)** and uses this oil to pressurise 2 hydraulic accumulators connected to this system.
The oil at pressure contained in these accumulators is then used to operate the service brakes placed inside the two axles **(28)** and **(29)**.
The fill valve inside the braking system receives the flow from the feeding line until the pressure in the accumulator line reaches the calibration value of the cut-out valve set at 150 bar.
When this pressure is reached, the valve gradually increases the "load sensing" pilot signal which minimise the inlet flow through the action of the priority valve built in pump **(3)**.
The brake pedal located in the driving cab, which is an integral part of the S6 braking system, is connected to two proportional sliders which control the two separated lines of the service brake, one for each axle.
In relation to the stroke of these sliders, a gradual communication between the feeding line, connected to two accumulators which, at their turn, are connected to ports R1 and R2 (the accumulators have a 0.5-lt. capacity and a fill pressure of 50bar), and the service brake lines is established so the flow is distributed to such lines and the discharge line increasing, in this way, the pressure (and as a result the braking force) on the lines of the service brakes.
When the sliders are in the rest position, the lines of the service brakes are connected to the discharge.
The pressure switch set at 2-10 bar and connected in parallel to one of the two lines of the service brake, sends an electrical signal when the service brake is activated.
The pressure switch set at 70 bar and connected to port F sends an electrical signal when the pressure inside the feeding circuit of the brake lines is not enough to guarantee the minimum breaking capacity.
The heat exchanger **(30)** is divided into two sectors; one absorbs heat from the cooling circuit of the diesel engine, and the other absorbs heat from the hydraulic circuit of the machine.
The flow of pump **(3)** is conveyed to this second sector.
The one-way valve **(31)** with opening pressure set at 2.5 bar, is used as by-pass valve for heat exchanger **(30)** and protects it against high pressures which may derive from the use of a too cold oil or the restriction of the internal lines of the heat exchanger.

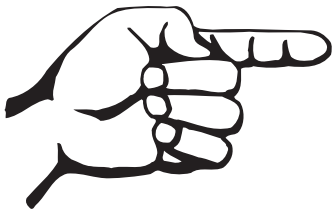
The oil cooled down by the heat exchanger is sent back to tank **(9)**.

Telelift 3512 hydraulic schematic



Telelift 4010 hydraulic schematic





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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.

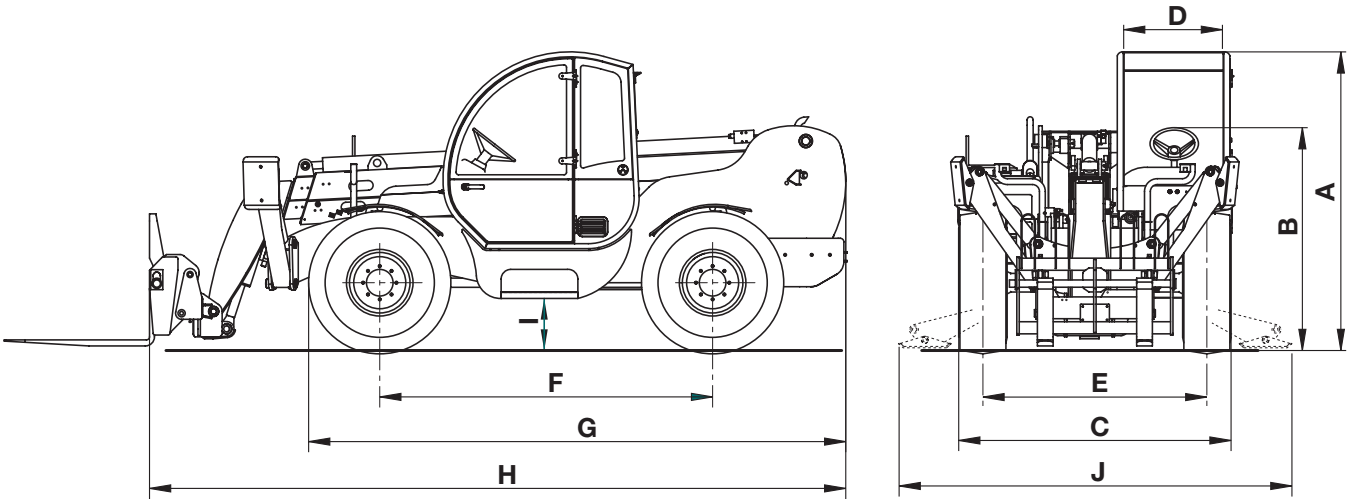
- Use the assistance of a second person to handle loads weighing 30 to 50 kg.
- For loads over 50 kg, the use of special hoisting equipment in good condition and equipped as per enforced regulations is mandatory.

Section 2
TECHNICAL SPECIFICATIONS

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2.1 MAIN DIMENSIONS



	TELELIFT		3512	4010
A	Overall height	mm ft	2450	2450
B	Height to the steering wheel	mm ft	1840	1840
C	Overall width	mm ft	2250	2250
D	Cab width	mm ft	860	860
E	Track	mm ft	1850	1850
F	Wheel-base	mm ft	2750	2750
G	Length to the front tyres	mm ft	4440	4440
H	Length to the attachment holding plate	mm ft	5750	6030
I	Ground clearance	mm ft	430	430
J	Max width with extended outriggers	mm ft	2930	2930
•	Internal steering radius	mm ft	2425	2425
•	External steering radius	mm ft	4500	4500

2.2 TYRES

	TELELIFT		3512 std	3512 opt	4010 std	4010 opt
-	Dimensions (front and rear)		405/70-20	405/70-24	405/70-20	405/70-24
-	P.R. (or load index)		14 pr	14 pr	14 pr	14 pr
-	Wheel disc		8 holes DIN 70361	8 holes DIN 70361	8 holes DIN 70361	8 holes DIN 70361
-	Pressure	bar	5.5	4.5	5.5	4.5
-	Pressure	Psi	80	65	80	65

2.3 LIMIT OF USE

TELELIFT		3512	4010
• Angle of approach		37°	37°
• Departure angle		39°	39°
• Min/max ambient temperature	°C	-20°/+40°	-20°/+40°

2.4 WEIGHT

TELELIFT		3512	4010
• Weight in working order	kg lbs	9000	9265

2.5 SPEED

TELELIFT		3512	4010
- Transfer speed with 24" tyres (either forward or reverse motion)	km/h	0÷32	0÷32
- Max. slope with full load	%	54	54

2.6 PAYLOAD AND REACH

TELELIFT		3512	4010
- Max lifting height:			
with outriggers	mm ft	12120	9820
without outriggers	mm ft	12000	9750
- Reach at max height (without outriggers)	mm ft	2050	1260
- Max reach forward (with outriggers)	mm ft	8530	6170
- Attachment holding plate rotation		132°	132°
- Maximum payload (with outriggers)	kg	3500	4000
- Payload at max height (with outriggers)	kg	2500	3500
- Payload at max reach (with outriggers)	kg	1000	2500

2.7 FORKS

TELELIFT		3512	4010
- Dimensions	mm ft	1200x120x45	1200x120x45
- Weight	kg lbs	70	70
- Fork holding frame - class		FEM III	FEM III

2.8 DIESEL ENGINE

TELELIFT		3512	4010
- Make		DEUTZ AG	DEUTZ AG
- Model/Type		BF4M 2011	BF4M 2011
- Features:		Diesel	Diesel
		4 cylinders in line 4 strokes direct injection	4 cylinders in line 4 strokes direct injection
- Bore x Stroke	mm ft	94 x 112	94 x 112
- Total displacement	cc	3108	3108
- Power at 2300 rpm	kW	60	60

2.9 ELECTRICAL SYSTEM

TELELIFT		3512	4010
- Voltage	V	12	12
- Battery	Ah	100	100

2.10 MACHINE SOUND LEVELS

TELELIFT		3512	4010
- Guaranteed sound power level (in accordance with the Directive 2000/14/CE)	dB	Lwa = 101	Lwa = 101
- Measured sound pressure level (in accordance with the Directive 98/37/CE)	dB	Lpa = 80	Lpa = 80

2.11 VIBRATION LEVELS

TELELIFT		3512	4010
- Mean assessed vibration level transmitted to arms	m/s^2	< 2.5	< 2.5
- Mean assessed vibration level transmitted to body	m/s^2	< 0.5	< 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 REFILLING

TELELIFT		3512	4010
- Diesel engine	l	11+3,5	11+3,5
- Fuel tank	l	92	92
- Hydraulic system tank	l	90	90
- Gearbox	l	1,5	1,5
- Differential gears (each)	l	8,7	8,7
- Wheel reduction gears (each)	l	0,75	0,75

Products:

Engine oil: **SHELL RIMULA SAE 15W-40 (API CH-4/ CG-4/ CF-4/CF, ACEA E3, MB 228.3)**

Power divider-Differential gears-Reduction gears: **FUCHS TITAN GEAR LS 85 W-90 (API GL-5 LS / GL-5)**

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

2.13 TIGHTENING TORQUES

Thread diameter	Pitch	Wrench measure mm				Tightening torques Material class					
		S		S		8.8		10.9		12.9	
mm	mm		UNI 5931/32	UNI 5933÷36	UNI 5923÷30	Normal Nm	Galvanized Nm	Normal Nm	Galvanized Nm	Normal Nm	Galvanized 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 Nm	8G Nm	5S Nm	8G 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 max	min	DRILL BIT DIAMETER
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)

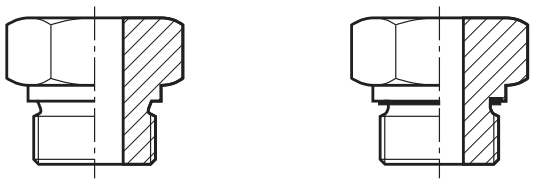
Thread diameter		TIGHTENING TORQUES (0+10%)
inc.	mm	37° CONICAL SEALS (JIC) Nm
7/16"-20	M10x1	15
1/2"-20	M12x1.5	20
9/16"-18	M14x1.5	28
	M16x1.5	62
3/4"-16	M18x1.5	62
7/8"-14	M22x1.5	80
1.1/16"-12	M27x2	110
1.3/16"-12		141
1.5/16"-12	M33x2	160
1.5/8"-12	M42x2	225
1.7/8"-12	M48x2	270
2.1/4"-12	M10x1	360

■ SEALS WITH GRIP-RING

Thread diameter inc.	Thread diameter mm	Fitting Series	Pipe ø mm	TIGHTENING TORQUE (0+10%) SEALS WITH GRIP-RING 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 inc.	Thread diameter mm	TIGHTENING TORQUES (0+10%) JOINTS A Nm	JOINTS B 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*	*type*	*Locking speed*	*Disassembly difficulty*
Loctite 511	Fitting sealant	150°	M80	Con./Cyl.	Rapid	Low
Loctite 542	Fitting sealant	150°	M36	Con./Cyl.	Rapid	Moderate
Loctite 545	Fitting sealant	150°	M36	Con./Con.	Moderate	Low
Loctite 565	Fitting sealant	150°	M80	Con./Cyl.	Instantaneous	Low
Loctite 572	Fitting sealant	150°	M80	Con./Cyl.	Moderate	Low
Loctite 577	Fitting sealant	150°	M80	Con./Cyl.	Rapid	Moderate

GASKETS *Total sealing in 24-72 hours*

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

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.

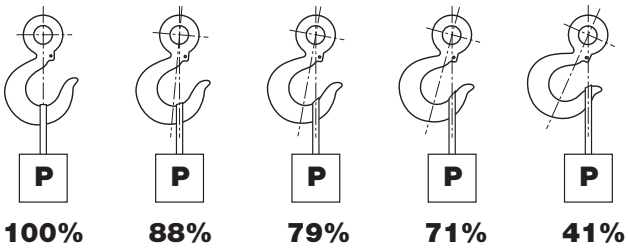
Before removing parts of the machine, make sure that:
- all fixing bolts have been removed
- all hydraulic and electrical parts have been disconnected
- the part to be removed is not blocked.

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:

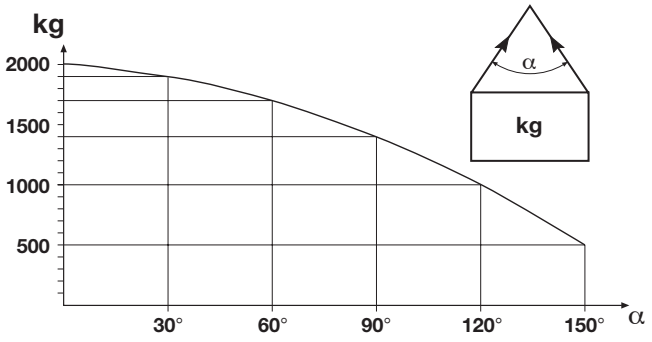
STRANDED ROPES	
Rope diameter mm	Max admissible load kg
10	1000
11.2	1400
12.5	1600
14	2200
16	2800
18	3600
20	4400
22.4	5600
30	10000
40	18000
50	28000
60	40000

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

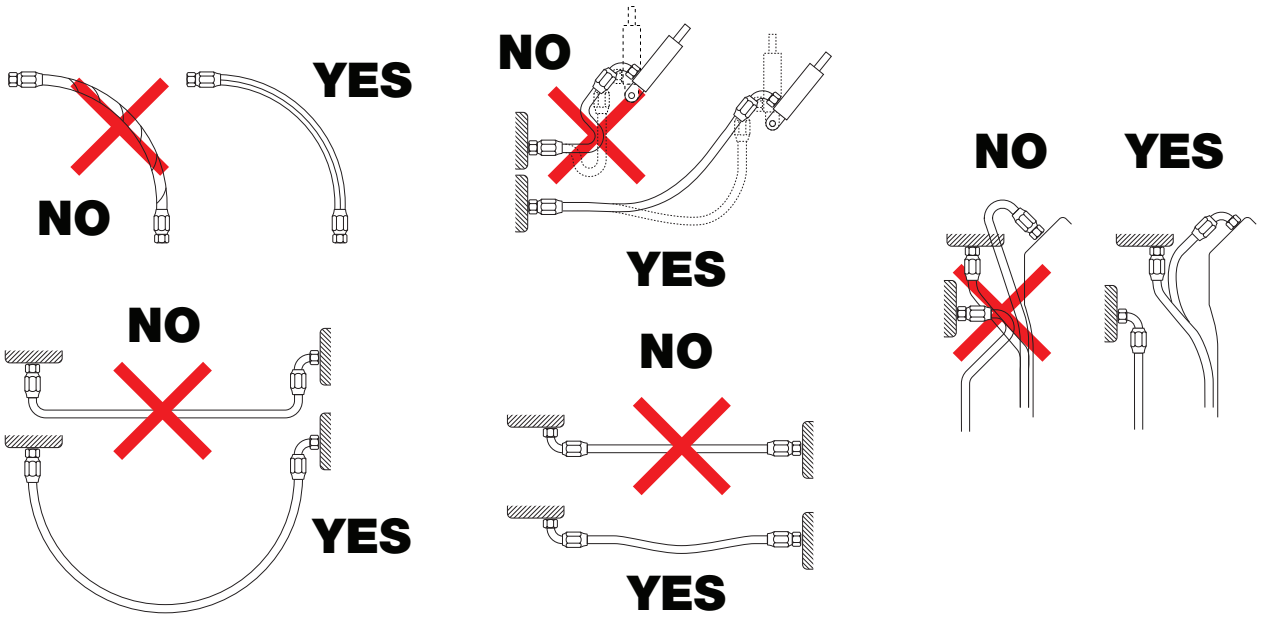
Plug all disconnected parts to prevent dust or impurities from entering the circuit. They can cause serious damage.

⚠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.

Useful advice for mounting flexible hoses:



2.19 LISTS OF RECOMMENDED SPARE PARTS

Telelift 3512

Code	Description	Q.ty
640536	Fork pitching cylinder seal kit - part n. 640536	1
636455	Fork balancing cylinder seal kit - part n. 636455	1
07.0704.0075	Movement main valve spool (boom extension - fork pitching)	1
640101	Second boom section extension cylinder seal kit - part n. 640101	1
640102	Third boom section extension cylinder seal kit - part n. 640102	1
639395	Attachment locking cylinder seal kit - part n. 639395	1
56.0012.0009	Outrigger limit switches	2
640537	Outrigger cylinder seal kit - part n. 640537	1
04.0605.0303	Attachment locking double-hose	1
07.0740.0218	Heating fluid tap	1
07.0738.0000	Star wheel	1
992989	Fork pitching cylinder seal kit	1
56.0013.0028	Level indicator	1
640100	Boom lifting cylinder seal kit - part n. 640100	1
05.4329.0001	Pressure switch	1
05.4329.0002	Pressure switch	1
07.0709.0442	Safety switch - gear engaged	1
640270	Steering cylinder seal kit - p. 212	1
56.0016.0022	DLE 3B6 display	1
09.0802.0018	Load cell	1
09.0803.0225	Screw M10x40 cl.10.9 - load cell fixing	2
07.0703.0425	Hydraulic oil temperature indicator	1
07.0703.0426	Engine coolant temperature indicator	1
07.0703.0427	Fuel gauge indicator	1
07.0703.0029	Starting switch	1
07.0703.0428	Hourmeter	1
638226	Steering mode switch	1
07.0703.0429	Selector	1
07.0703.0430	Mechanical gearbox pushbutton	1
07.0703.0433	Lights switch	1
07.0703.0434	Glass	1
09.4661.0010	Diesel oil tank plug	1
56.0013.0001	Fuel level indicator	1
09.4661.0014	Oil tank plug	1
09.4604.0004	Oil filter	2
07.0740.0054	Stop belt	1
07.0740.0050	Handle	1
07.0740.0051	Lever-fitted lock	1
07.0703.0490	Glass	1
07.0703.0494	Road/Jobsite switch	1
07.0703.0418	Light switch	1
07.0703.0096	Removing battery	1
07.0703.0306	Light	2
07.0703.0321	Light	1
56.0010.0005	Pivoting beacon	1
07.0703.0302	Light	1

Code	Description	Q.ty
56.0009.0009	Back-up horn	1
56.0010.0006	Rear left-hand light	1
56.0010.0004	License plate lamp	1
56.0010.0007	Rear right-hand light	1
56.0010.0000	Front left light	1
56.0010.0001	Front right light	1
07.0703.0535	Relay	1
07.0703.0178	Start relay (70 A)	1
07.0703.0060	Maxi-fuse (50 A)	2
07.0703.0061	Maxi-fuse (50 A)	2
07.4501.0059	Relay	1
07.0703.0304	Bulb	3
07.0703.0305	Bulb	3
07.0703.0306	Bulb	3
07.0703.0309	Light	1
637650	Fuse 3 A	5
07.0703.0193	Fuse 5 A	5
634972	Fuse 7.5 A	5
07.0703.0148	Fuse 10 A	5
634973	Fuse 15 A	5
07.0703.0485	Relay 30 A	5
07.0703.0487	Intermittence	1
56.0021.0040	Drive control board	1
07.4501.0067	Engine oil filter	2
07.4501.0068	Fuel filter	2
640885	Air filter	2
55.0208.0030	Manifold	1
09.4645.0000	Gas lever cord	1
07.4501.0041	Cartridge	2
07.0701.0007	Rexroth transmission pump spool	2
07.0700.0000	Cartridge	12
06.0401.0214	O-ring for high-pressure pipe - transmission pump side	2
04.4229.0035	Flanged high-pressure pipe	1
06.0401.0219	O-ring for high-pressure pipe - transmission motor side	2
04.4229.0034	Flanged high-pressure pipe	1
07.0740.0029	Handle	1
07.0740.0041	Glass	1
07.0703.0484	Seat micro-switch	1
07.0740.0202	Driving mirror	1
07.0740.0157	Wiper blade	1
07.0740.0066	Filter	2
07.0740.0072	Wiper motor	1
07.0740.0089	Wiper blade	1
54.0200.0001	Bushing	6
54.0702.0003	Sliding guide	6
54.0702.0004	Sliding guide	6
54.0702.0000	Sliding guide	6
54.0200.0000	Bushing	6
54.0702.0001	Sliding guide	6
02.0117.0101	Grease nipple	6

Telelift 4010

Code	Description	Q.ty
640536	Fork pitching cylinder seal kit - part n. 640536	1
636455	Fork balancing cylinder seal kit - part n. 636455	1
07.0704.0075	Movement main valve spool (boom extension - fork pitching)	1
640101	Second boom section extension cylinder seal kit - part n. 640101	1
640102	Third boom section extension cylinder seal kit - part n. 640102	1
639395	Attachment locking cylinder seal kit - part n. 639395	1
56.0012.0009	Outrigger limit switches	2
640537	Stabiliser cylinder seal kit - part n. 640537	1
04.0605.0303	Attachment locking double-hose	1
07.0740.0218	Heating fluid tap	1
07.0738.0000	Star wheel	1
992989	Power steering seal kit	1
56.0013.0028	Level indicator	1
640100	Boom lifting cylinder seal kit - part n. 640100	1
05.4329.0001	Pressure switch	1
05.4329.0002	Pressure switch	1
07.0709.0442	Safety switch - gear engaged	1
640270	Steering cylinder seal kit - p. 212	1
56.0016.0022	DLE 3B6 display	1
09.0802.0018	Load cell	1
09.0803.0225	Screw M10x40 cl.10.9 - load cell fixing	2
07.0703.0425	Hydraulic oil temperature indicator	1
07.0703.0426	Engine coolant temperature indicator	1
07.0703.0427	Fuel gauge indicator	1
07.0703.0029	Starting switch	1
07.0703.0428	Hourmeter	1
638226	Steering mode switch	1
07.0703.0429	Selector	1
07.0703.0430	Mechanical gearbox pushbutton	1
07.0703.0433	Lights switch	1
07.0703.0434	Glass	1
09.4661.0010	Diesel oil tank plug	1
56.0013.0001	Fuel level indicator	1
09.4661.0014	Oil tank plug	1
09.4604.0004	Oil filter	2
07.0740.0054	Stop belt	1
07.0740.0050	Handle	1
07.0740.0051	Lever-fitted lock	1
07.0703.0490	Glass	1
07.0703.0494	Road/Jobsite switch	1
07.0703.0418	Light switch	1
07.0703.0096	Removing battery	1
07.0703.0306	Light	2
07.0703.0321	Light	1
56.0010.0005	Beacon	1
07.0703.0302	Light	1

Code	Description	Q.ty
56.0009.0009	Back-up horn	1
56.0010.0006	Rear left-hand light	1
56.0010.0004	License plate lamp	1
56.0010.0007	Rear right-hand light	1
56.0010.0000	Front left light	1
56.0010.0001	Front right light	1
07.0703.0535	Relay	1
07.0703.0178	Start relay (70 A)	1
07.0703.0060	Maxi-fuse (50 A)	2
07.0703.0061	Maxi-fuse (50 A)	2
07.4501.0059	Relay	1
07.0703.0304	Bulb	3
07.0703.0305	Bulb	3
07.0703.0306	Bulb	3
07.0703.0309	Light	1
637650	Fuse 3 A	5
07.0703.0193	Fuse 5 A	5
634972	Fuse 7.5 A	5
07.0703.0148	Fuse 10 A	5
634973	Fuse 15 A	5
07.0703.0485	Relay 30 A	5
07.0703.0487	Intermittence	1
56.0021.0040	Drive control board	1
07.4501.0067	Engine oil filter	2
07.4501.0068	Fuel filter	2
640885	Air filter	2
55.0208.0030	Manifold	1
09.4645.0000	Gas lever cord	1
07.4501.0041	Cartridge	2
07.0701.0007	Rexroth transmission pump spool	2
07.0700.0000	Cartridge	12
06.0401.0214	O-ring for high-pressure pipe - transmission pump side	2
04.4229.0035	Flanged high-pressure pipe	1
06.0401.0219	O-ring for high-pressure pipe - transmission motor side	2
04.4229.0034	Flanged high-pressure pipe	1
07.0740.0029	Handle	1
07.0740.0041	Glass	1
07.0703.0484	Seat micro-switch	1
07.0740.0202	Driving mirror	1
07.0740.0157	Wiper blade	1
07.0740.0066	Filter	2
07.0740.0072	Wiper motor	1
07.0740.0089	Wiper blade	1
54.0200.0001	Bushing	6
54.0200.0000	Bushing	6
54.0702.0000	Sliding guide	6
54.0702.0001	Sliding guide	6
54.0702.0004	Sliding guide	2
54.0702.0005	Sliding guide	6
02.0117.0101	Grease nipple	6

Filters for Telelift 3512-4010

Code	Description	Q.ty
09.4604.0004	Oil filter	2
07.4501.0067	Engine oil filter	2
07.4501.0068	Fuel filter	2
640885	Air filter	2
07.4501.0041	Cartridge	2
07.0740.0066	Filter	2

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 MERCEDES 5928

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°.

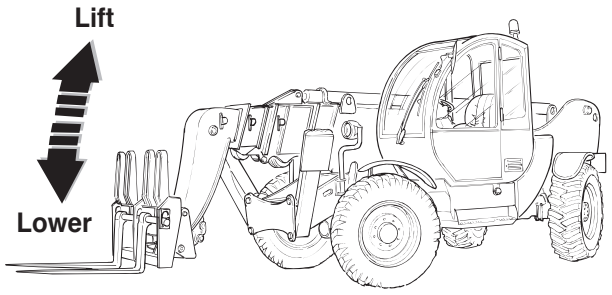
CAUTION

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

BOOM LIFTING/LOWERING

Telelift 3512	Time (s)	
	up	down
Max engine speed	13”	8”
Min. engine speed	36”	25”

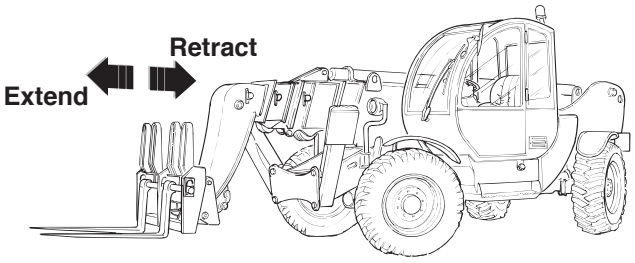
Telelift 4010	Time (s)	
	up	down
Max engine speed	13”	8”
Min. engine speed	36”	25”



BOOM EXTENSION/RETRACTION

Telelift 3512	Time (s)	
	out	in
Max engine speed	20”	24”
Min. engine speed	57”	32”

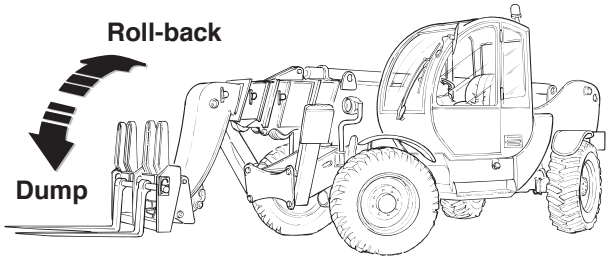
Telelift 4010	Time (s)	
	out	in
Max engine speed	20”	24”
Min. engine speed	57”	32”



ATTACHMENT DUMPING

Telelift 3512	Time (s)	
	dumping	roll-back
Max engine speed	5”	4”
Min. engine speed	12”	10”

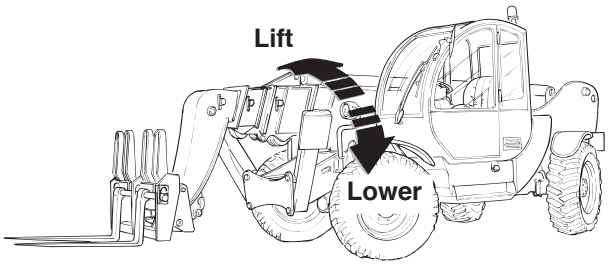
Telelift 4010	Time (s)	
	dumping	roll-back
Max engine speed	5”	4”
Min. engine speed	12”	10”



STABILISER LIFTING/LOWERING

Telelift 3512	Time (s)	
	up	down
Max engine speed	4”	5”
Min. engine speed	9”	11”

Telelift 4010	Time (s)	
	up	down
Max engine speed	4”	5”
Min. engine speed	9”	11”



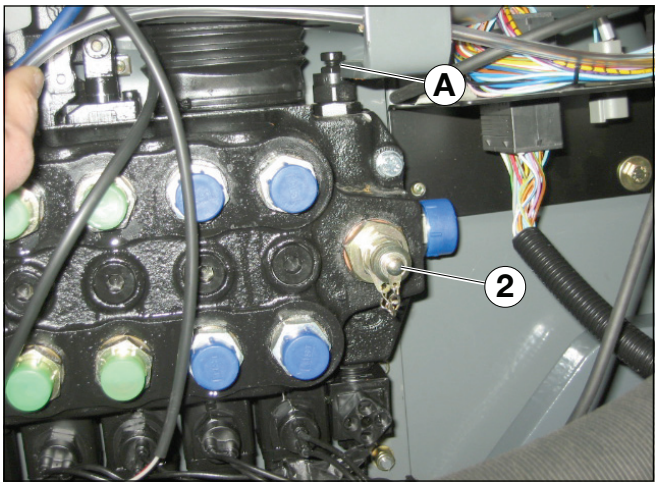
2.22 HYDRAULIC CALIBRATION

1. PRELIMINARY OPERATIONS

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

2. CALIBRATING THE BOOM MAIN VALVE

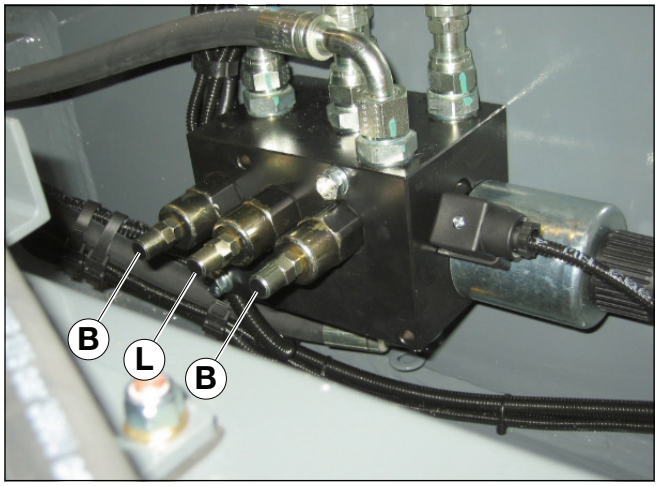
Locate port **ref. 2** on the **Walvoil** main valve (encl. **1**).



2.1 CALIBRATING THE CONTROL VALVE OF THE MAIN VALVE

Connect a 0-400bar 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 175 bar.
If the value is not correct, act on the safety valve **L** (encl. **2**).

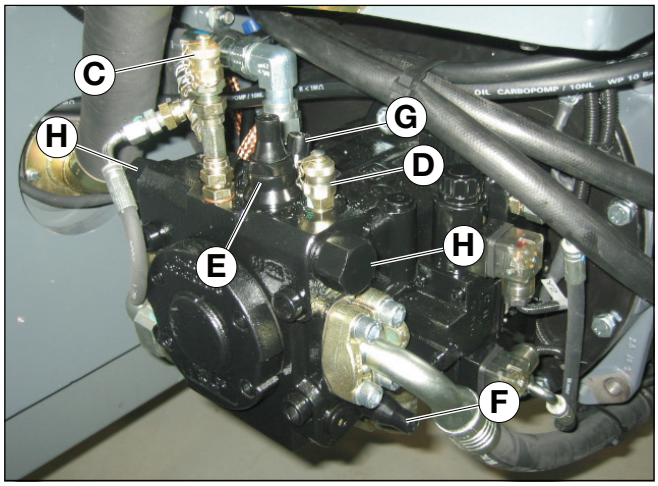
5. CALIBRATING THE HYDROMATIK HYDROSTATIC TRANSMISSION PUMP

Adjust the hydrostatic transmission with the hydraulic oil at a temperature of 80°C and the 2nd mechanical gear put in.

- Connect a 0-60 bar manometer to the mini-socket **ref. C** (encl. **3**) to measure the low pressure.
- Connect a 0-600 bar manometer to the mini-socket **ref. D** to measure the high pressure.
- Hold the selector to neutral position and make sure the max engine speed does not exceed 2600 rev/min. At idle, the engine must run at 900 rev/min. Should this not be the case, adjust the idle position.
- With the engine running at idle, the boost pressure should some 26/28 bar.
  The value of the boost pressure varies from pump to pump.
- Fully depress the brake pedal with the left foot to block the machine. Do not put the parking brake as the transmission would be deactivated.

PRIOR TO CALIBRATION

- Turn the speed selector to the forward speed position.
- Using the gas lever, run the engine at 1200 rev./min checking the value on the tachometer.
- Adjust the choke valve **E** acting on the adjustment screw until the high pressure manometer **D** (encl. **3**) shows a value of 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 2000 revs, adjust the spark advance valve **G** (encl. **3**).

⚠WARNING

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

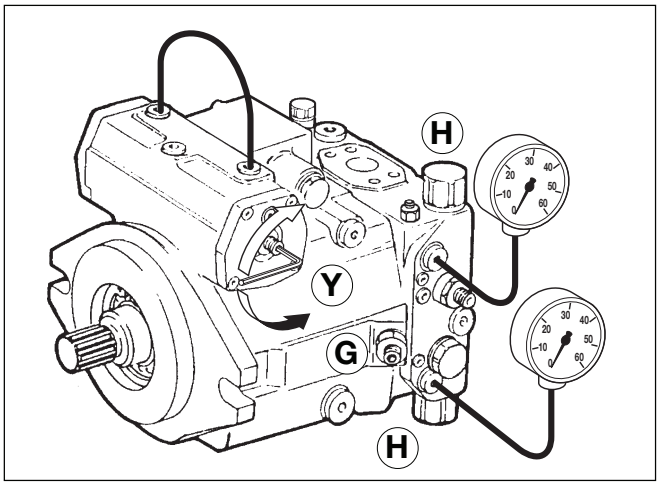
5.2 CHECKING THE SAFETY VALVE

- 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** 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 is required if the machine moves when the forward/reverse speed lever is in the neutral position.

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



6. CALIBRATING THE BRAKING SYSTEM PRESSURE

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

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

7. CALIBRATING THE POWER STEERING

- Connect a 0-250 bar 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.

  N.B.: To gain access to valve **X**, remove the protection cap (encl. **5**).

8. CALIBRATING THE DLE LOAD LIMITER

For the calibration of DLE load limiter installed on the **Telelift 3512** handlers, place a load of 1000 kg on the forks.

With the machine **on the stabilisers**:

- Extend the boom to 7.90 m measured from the front of the wheels to the centre of the load on the forks, while holding the boom horizontal.
- Calibrate the load limiter.

With the machine **on the wheels**:

- Extend the boom to 5.40 m measured from the front of the wheels to the centre of the load on the forks, while holding the boom horizontal.
- Calibrate the load limiter.

For the calibration of DLE load limiter installed on the **Telelift 4010** handlers, place a load of 3000 kg on the forks.

With the machine **on the stabilisers**:

- Extend the boom to 4.80 m measured from the front of the wheels to the centre of the load on the forks, while holding the boom horizontal.
- Calibrate the load limiter.

With the machine **on the wheels**:

- Extend the boom to 2.90 m measured from the front of the wheels to the centre of the load on the forks, while holding the boom horizontal.
- Calibrate the load limiter.

CAUTION

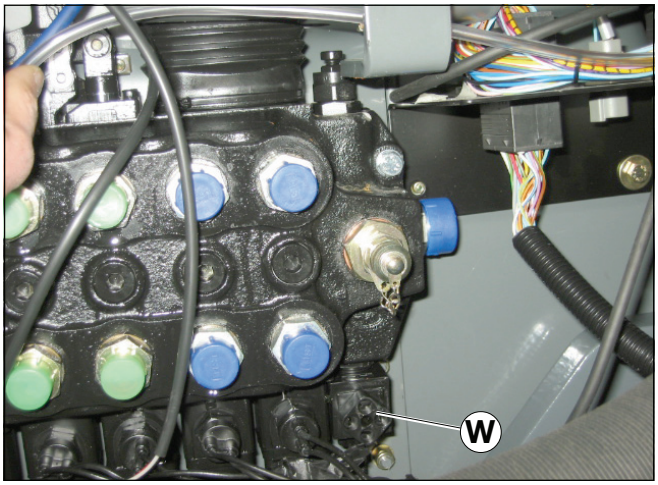
For a correct calibration of the system, please refer to paragraph 2.23.

9. CHECKING THE SAFETY VALVE OF THE MAIN VALVE (deadman)

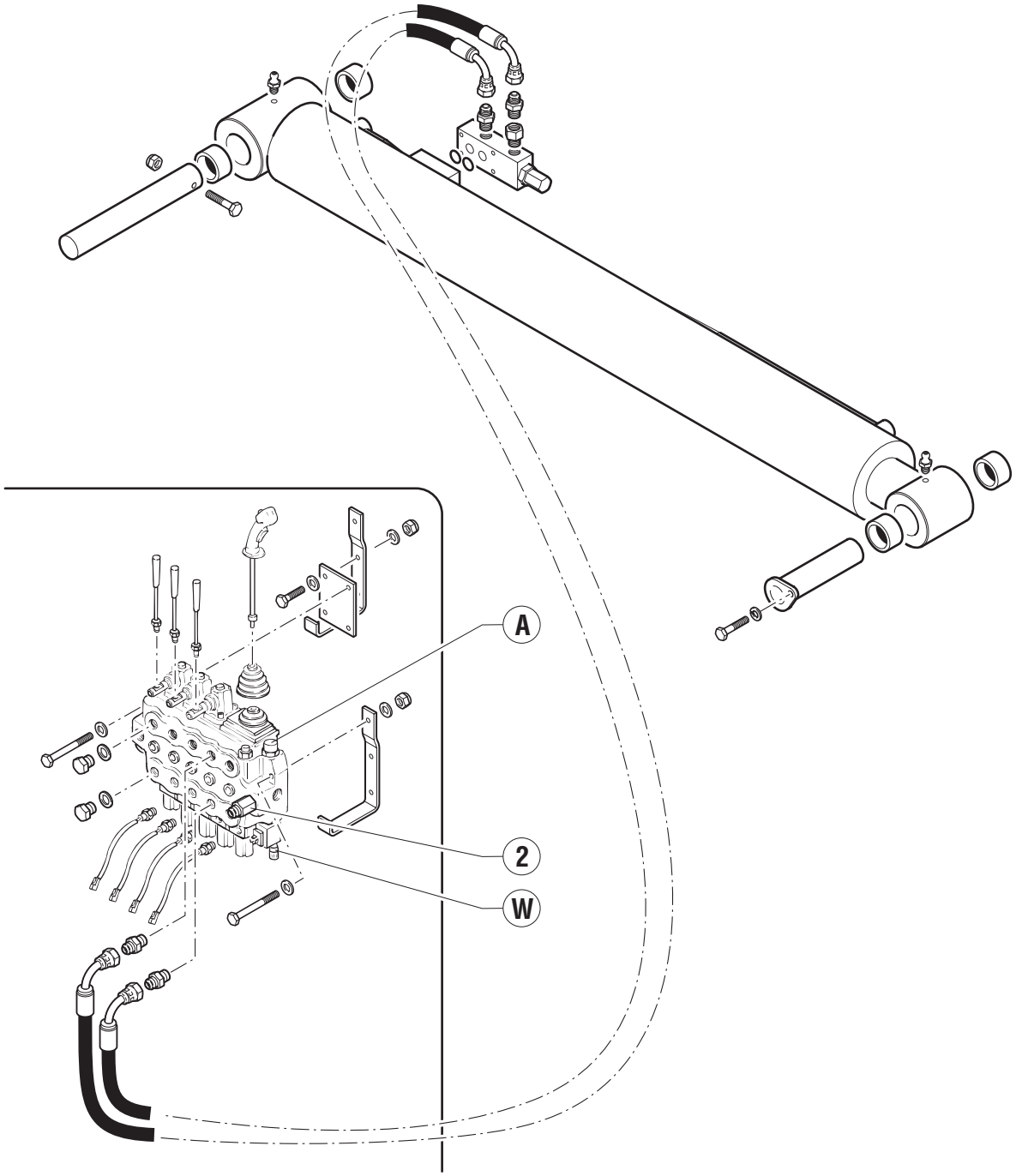
- Valve **W** (encl. **1**) is an electric valve which activates when the joystick's deadman button is pressed.
  If the deadman button is faulty and the joystick's functions cannot be activated, but you shall go on working, push the valve cap upwards so you can continue your work.

WARNING

Repair the electrical system as soon as possible, as working under these conditions is highly hazardous.

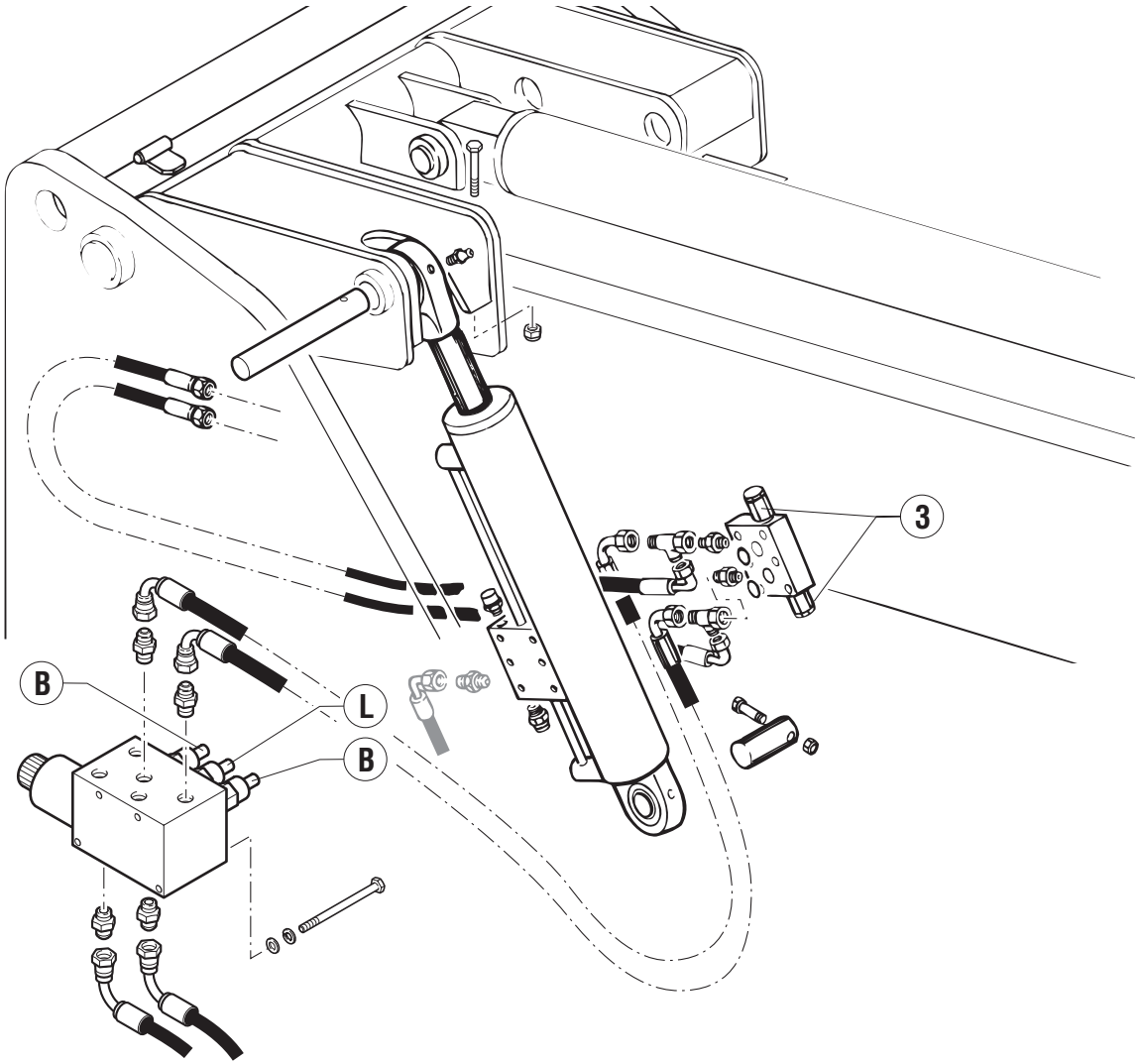


HYDRAULIC SYSTEM - LIFTING	annex 1



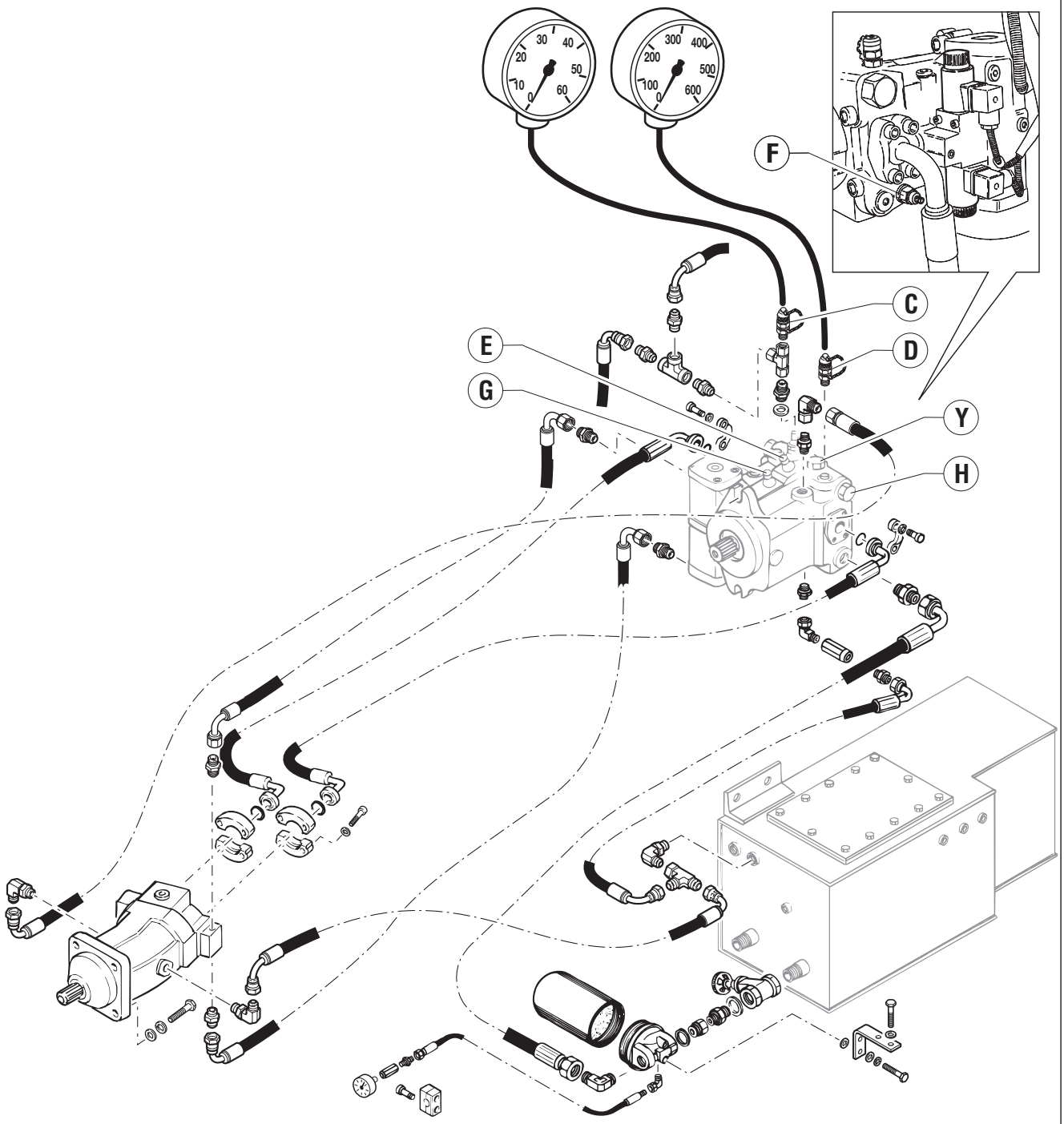
HYDRAULIC SYSTEM - FORK BALANCE

annex 2

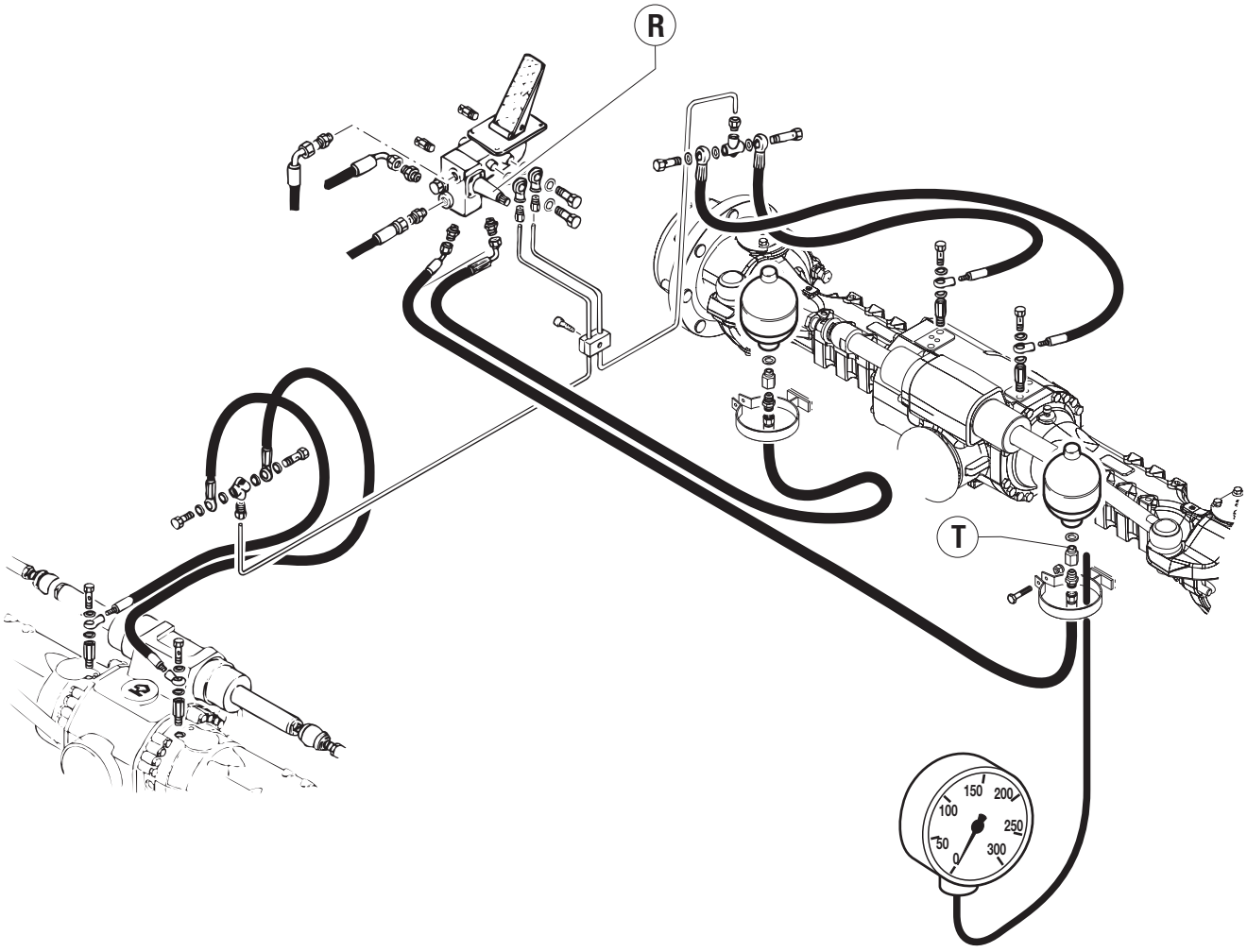


HYDRAULIC SYSTEM - TRANSMISSION

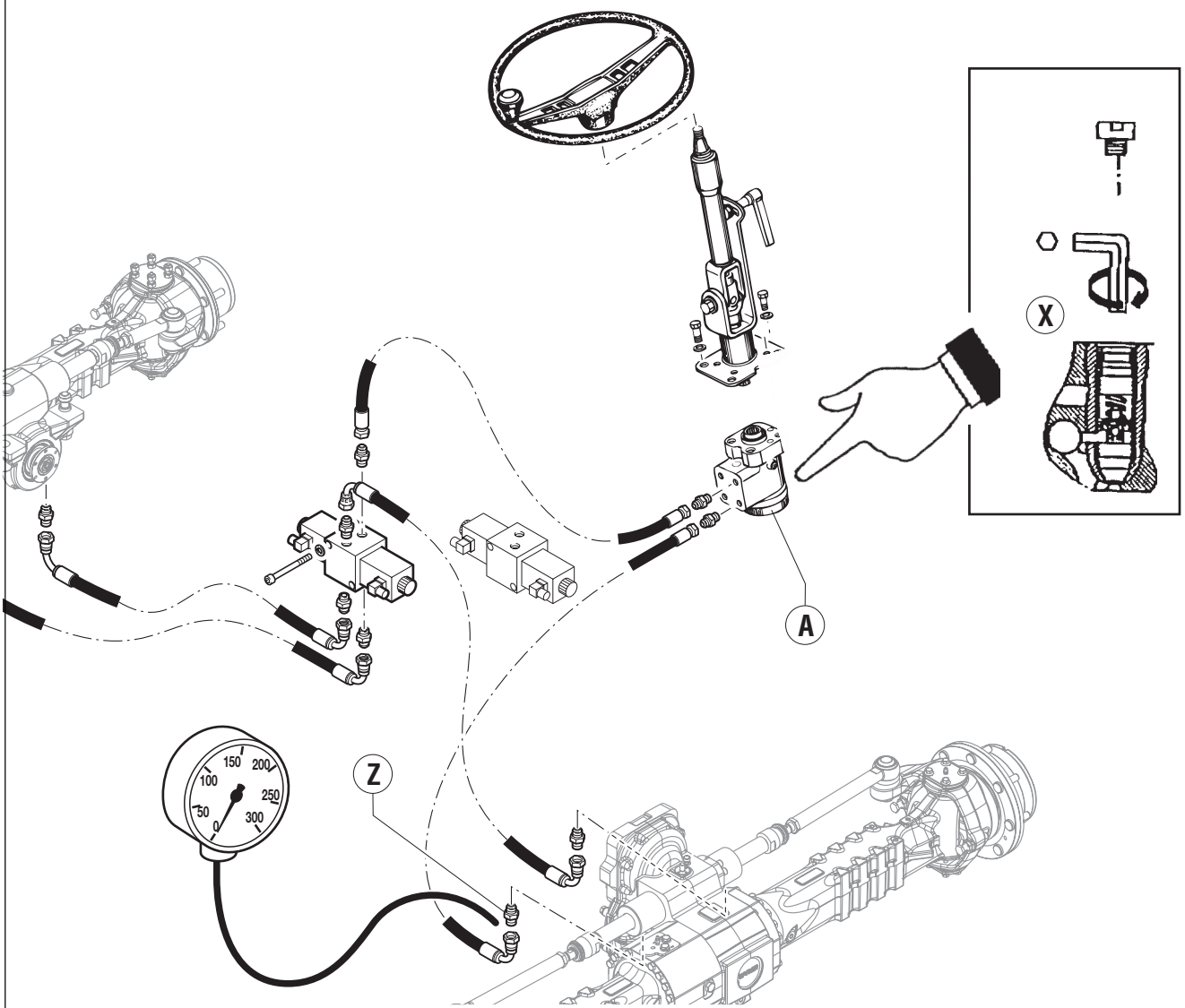
annex 3



HYDRAULIC SYSTEM - SERVICE BRAKE	annex 4



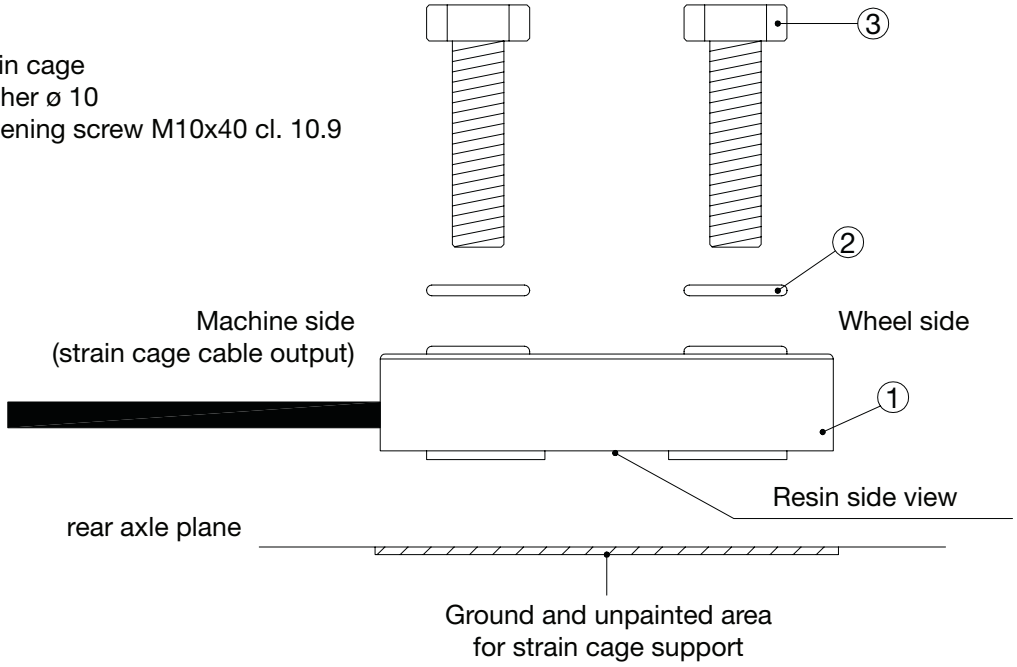
POWER STEERING SYSTEM	annex 5



2.23 DLE SYSTEM

INSTALLING THE EXTENSIMETRIC CELL

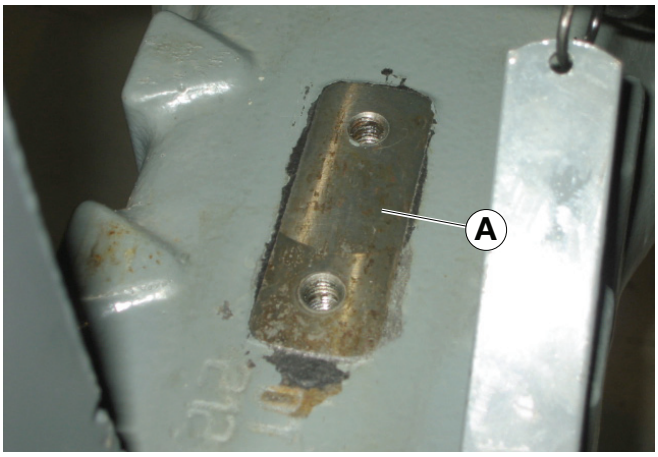
1 = Strain cage
2 = Washer ø 10
3 = Fastening screw M10x40 cl. 10.9



In order to get the most out of the system and avoid damaging the strain cage, obey the following measures:

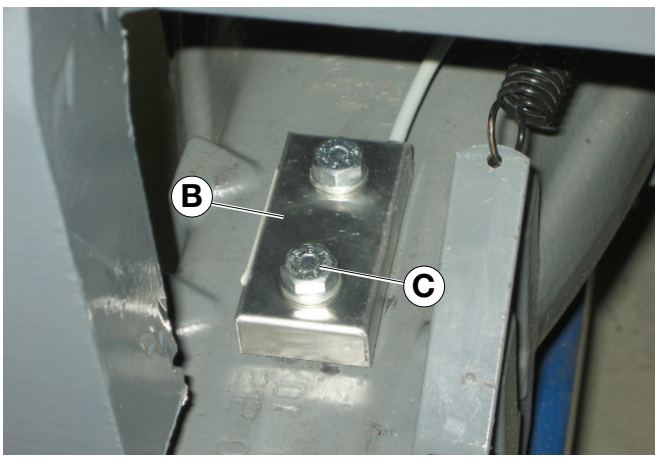
1 - PREPARATION:

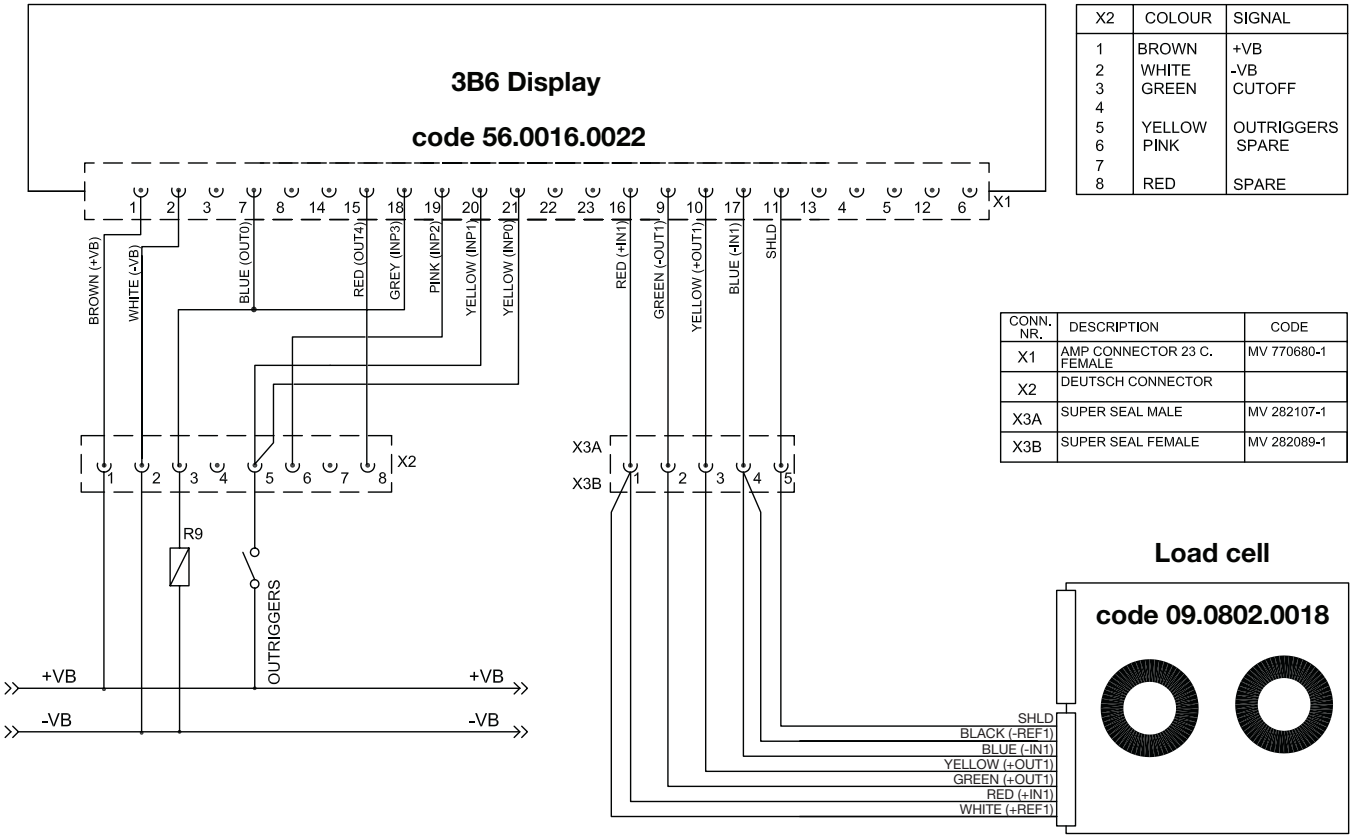
- Thoroughly clean the whole tightening system, especially the ground unpainted zone **A** of the rear axle.



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 N/m**.
- 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

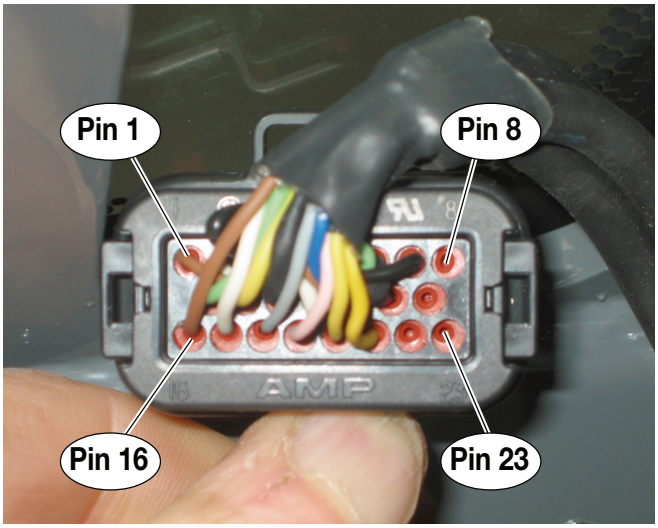
Pin 7 + GND = feedback ok (12V)

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: overload signal feedback

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
Pins 9 and 10: 1.1 - 1.2 - 1.3 - 1.4 mV

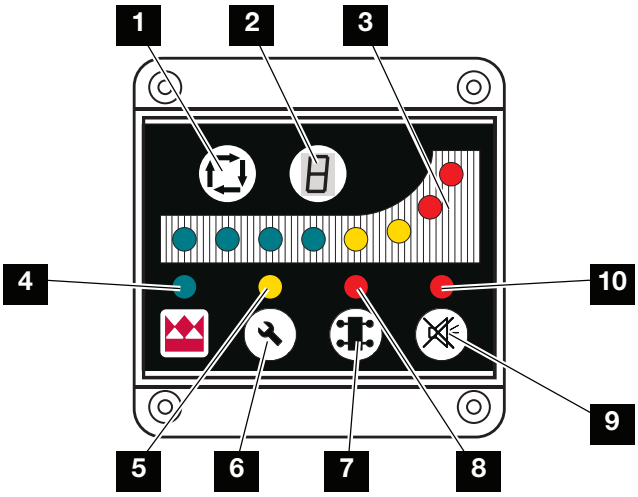
Machine without load on the forks, non stabilised, with boom horizontal and fully extended
Pins 9 and 10: 0.1 - 0.2 - 0.3 - 0.4 mV

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.***
- ***We recommend having the known load 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".***



- 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 3512/4010 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	Fully retract the boom holding it slightly above the horizontal with respect to the ground, and lower the stabilisers. **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, place a load on the forks with a weight corresponding to the table on the next page (in relation to the model), extend the boom while holding it horizontal till reaching the overturning moment (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. Press to proceed to the next point (3).
3	Raise the stabilisers and place a load on the forks with a weight corresponding to the value indicated on the next page (in relation to the model), then extend the boom while holding it horizontal until reaching the overturning moment (distance from the front part of the wheels to the centre of the load). Press 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 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 time to proceed to the next point (F).
F	Press to exit calibration and **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. Now you can start working.

	load (kg)	activation of the overload warn. system (m) on stabilisers	on wheels
Telelift 3512	1000	7.90	5.40
Telelift 4010	3000	4.80	2.90

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

DIAGRAM - TELELIFT 3512 WITH LOWERED STABILISERS

1000 kg at 7.90 metres

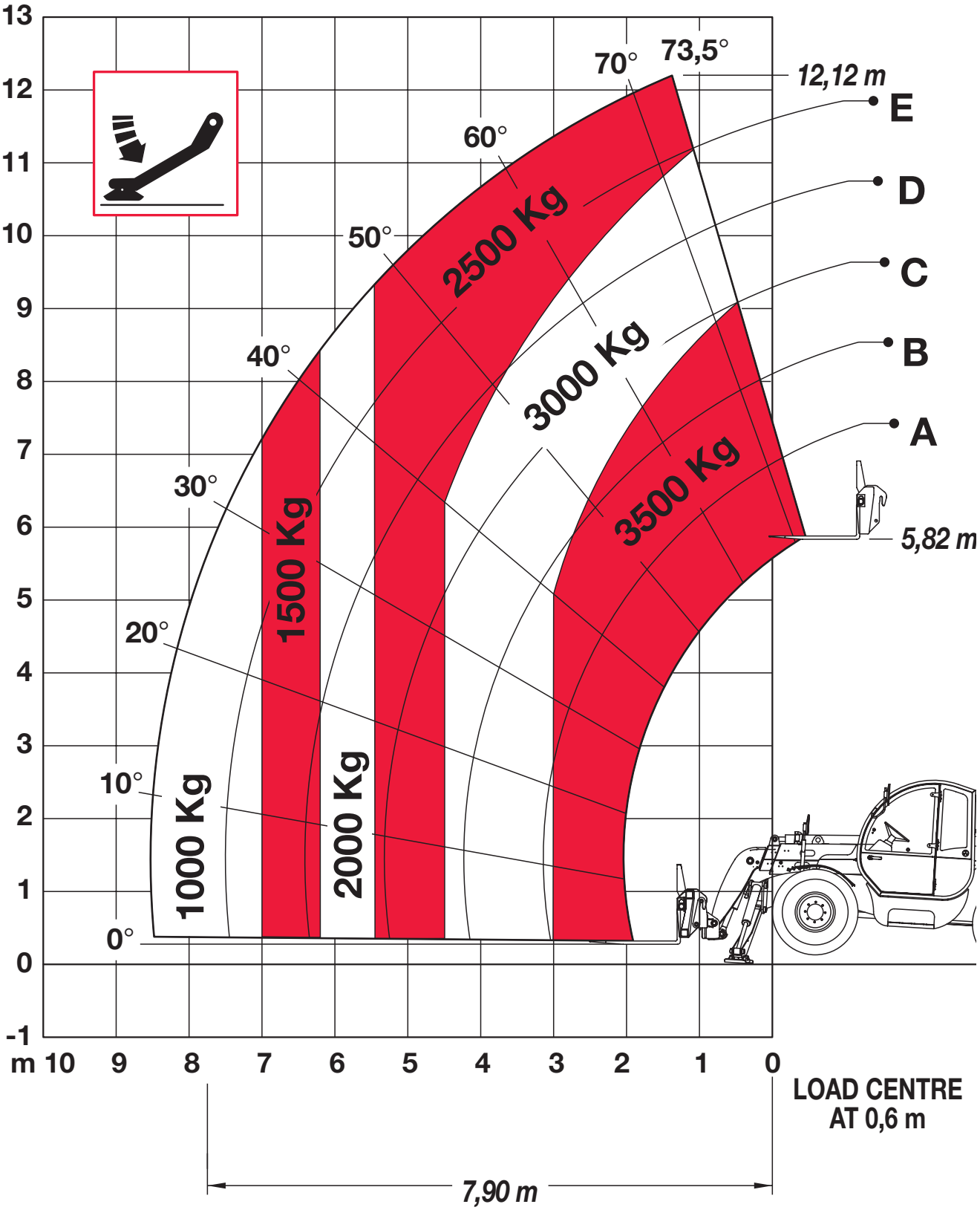


DIAGRAM - TELELIFT 3512 ON WHEELS

1000 kg at 5.40 metres

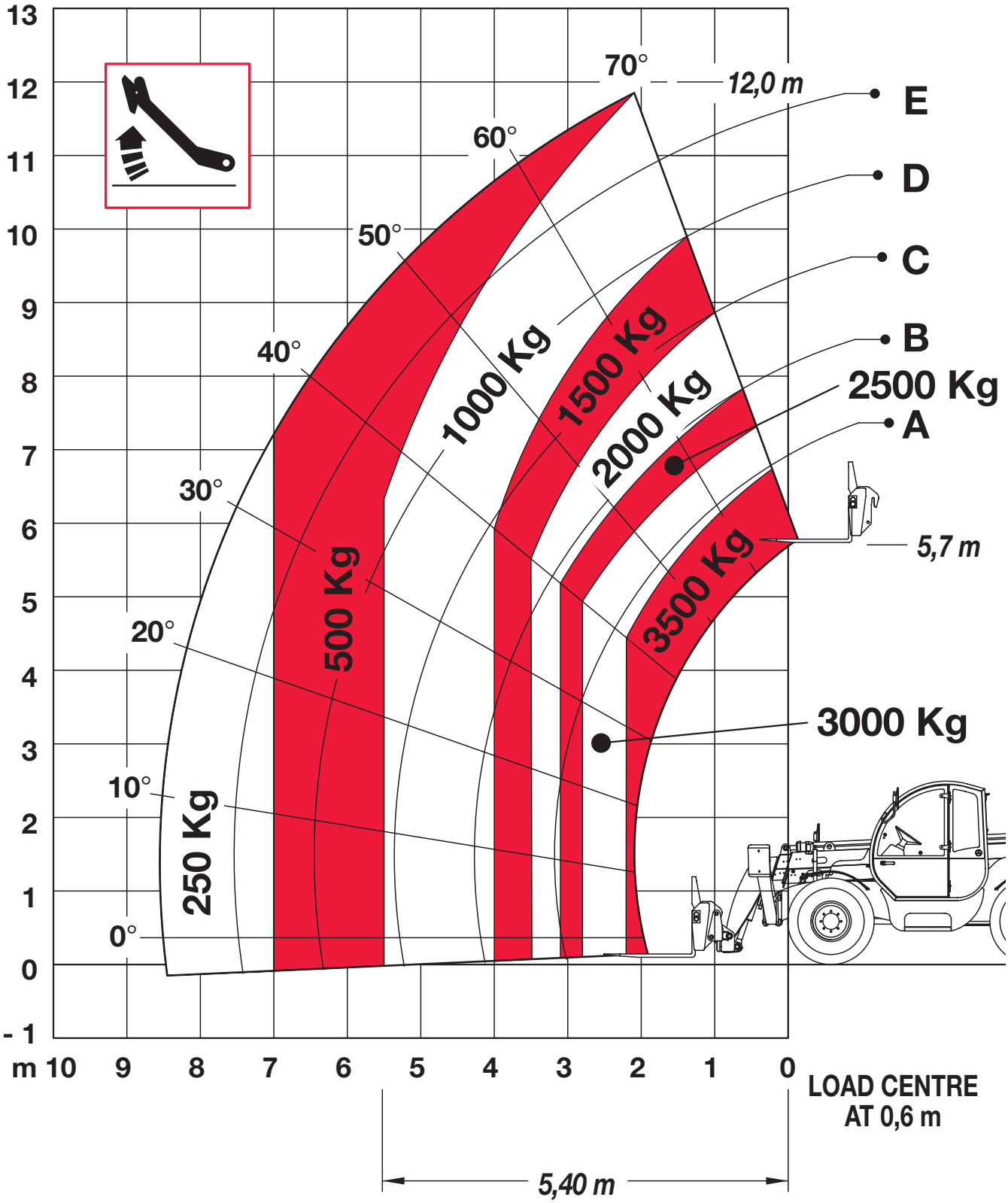


DIAGRAM - TELELIFT 4010 WITH LOWERED STABILISERS

3000 kg at 4.80 metres

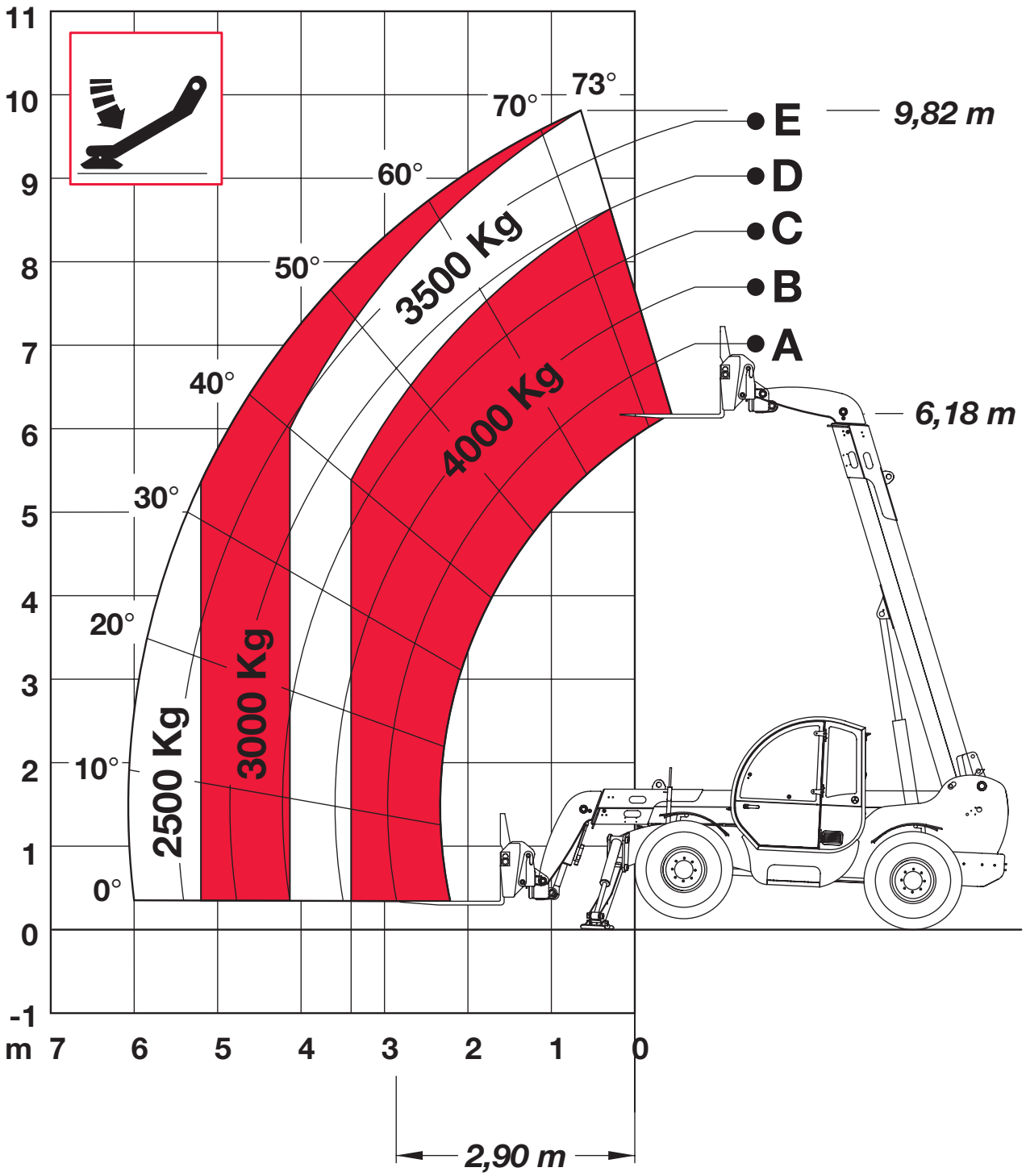
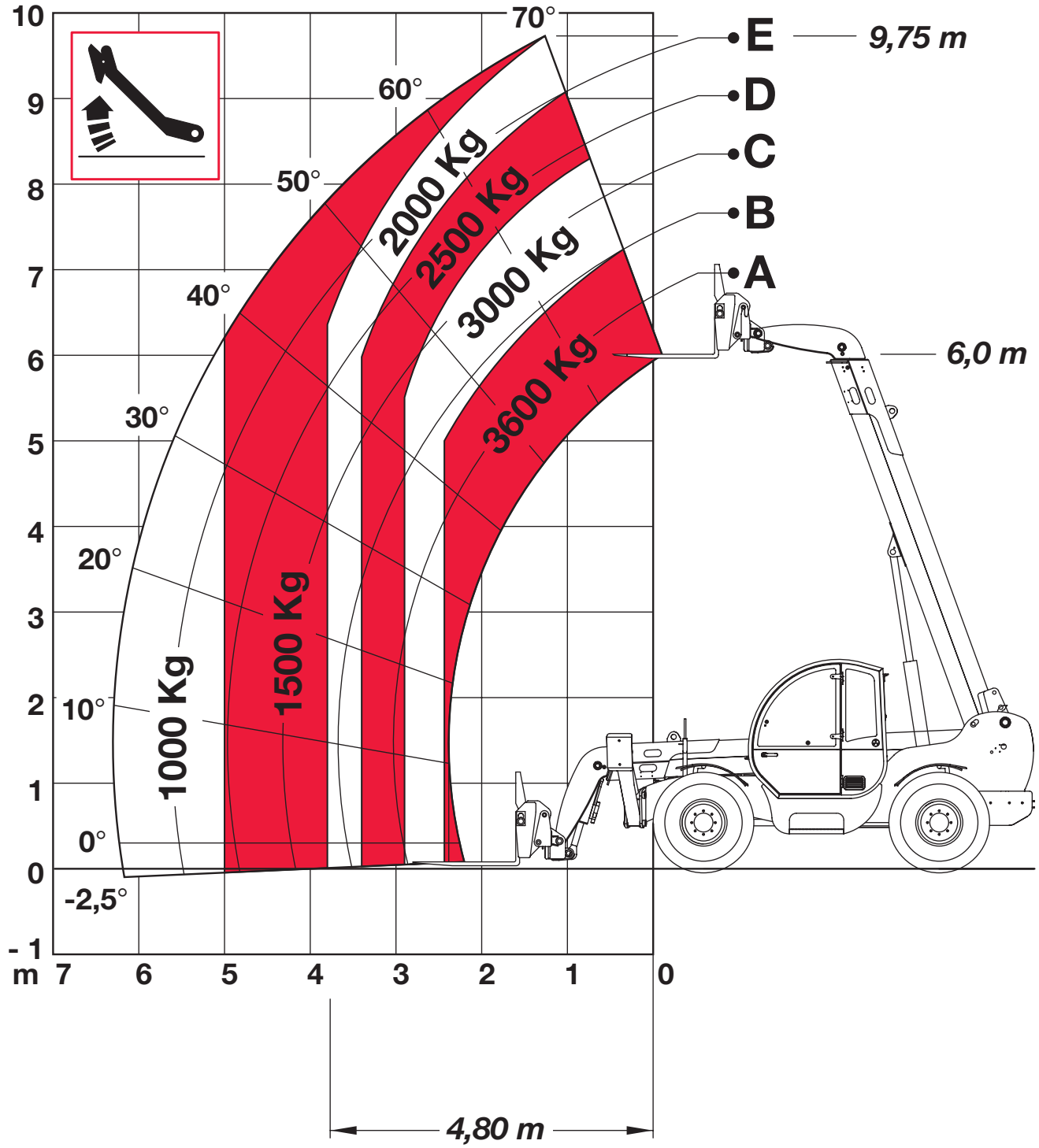


DIAGRAM - TELELIFT 4010 ON WHEELS

3000 kg at 2.90 metres



SETTINGS

FUNCTION	DISPLAY
A	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. In **A** a gradual extension of the boom causes a proportional reduction of the LED's lit. 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: lit with the machine stabilised 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 ..... **1** **Description** ..... **E2PROM Error.** Internal comparison of data read from E2PROM failed. **Action** ..... Switch off and switch on the machine. If the alarm continues, recalibrate the machine, otherwise replace DLE.
Alarm code ..... **2** **Description** ..... **CELL 1 reading out of range.** **Action** ..... 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 used.
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.

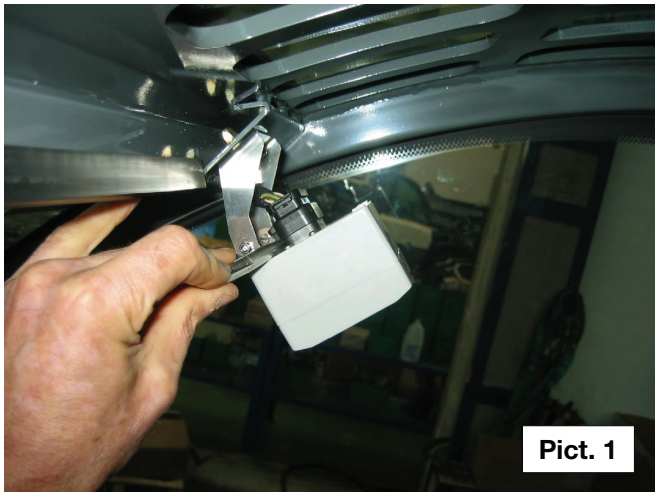
Alarm code **5-8**
Description ..... **Block Relay check error at start**. When the instrument is started, the re-reading of the block output is always OFF except when the two outputs of the DLE are connected in series.
5 - DLE output 0V or low voltage - 12V re-reading
8 - DLE output 12V - ow voltage 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.

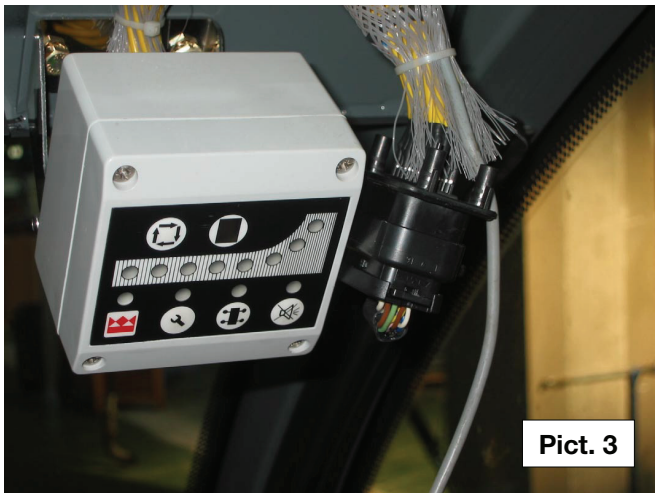
Alarm code ..... **B**
Description ..... **Outrigger congruency**
Action ..... Check that the signal of stabilised machine is congruent between the two inputs used for reading during operation.
Display: until the system is turned off
Operations: check wiring, power cable, DLE connector. If the alarm persists, change the DLE (digital input reading malfunction)

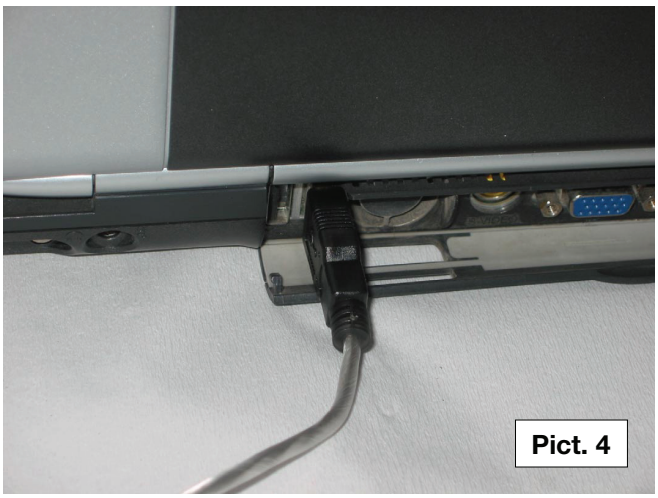
Alarm code ..... **C**
Description ..... **A.D.C. reading control error.** If the analog/digital converter works fine after special re-reading of the DLE board.
Action ..... Switch off and on the limiter.
If the alarm continues, replace DLE.

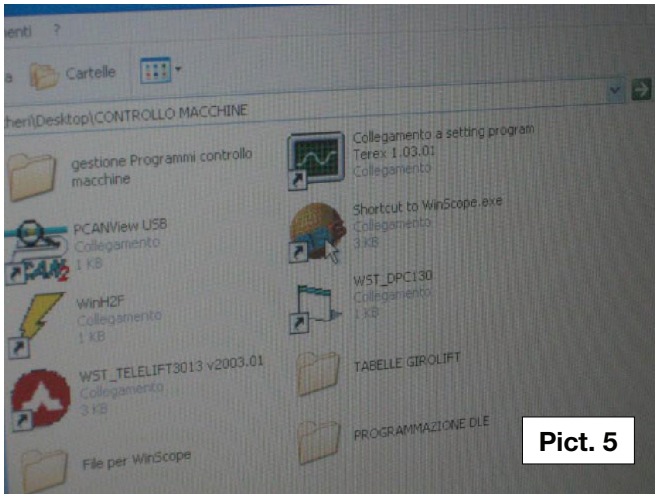
PC CONNECTION (WINSCOPE)


Pict. 1

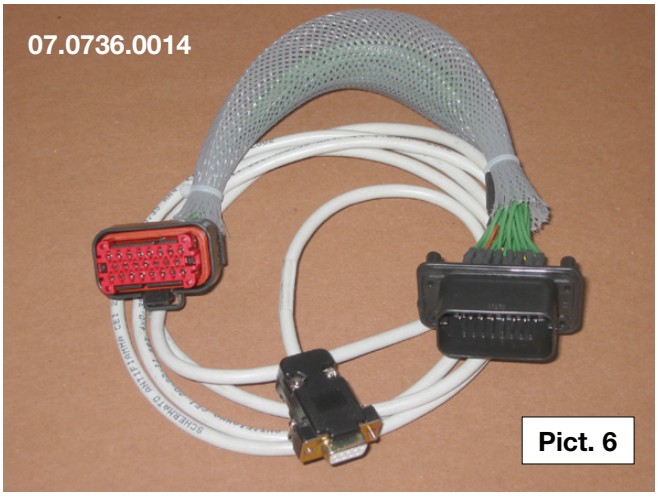

Pict. 2


Pict. 3


Pict. 4



Pict. 5



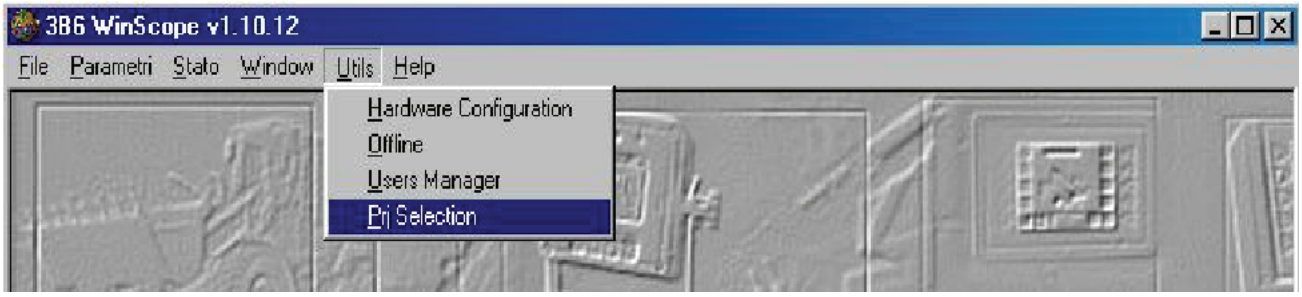
Pict. 6

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.

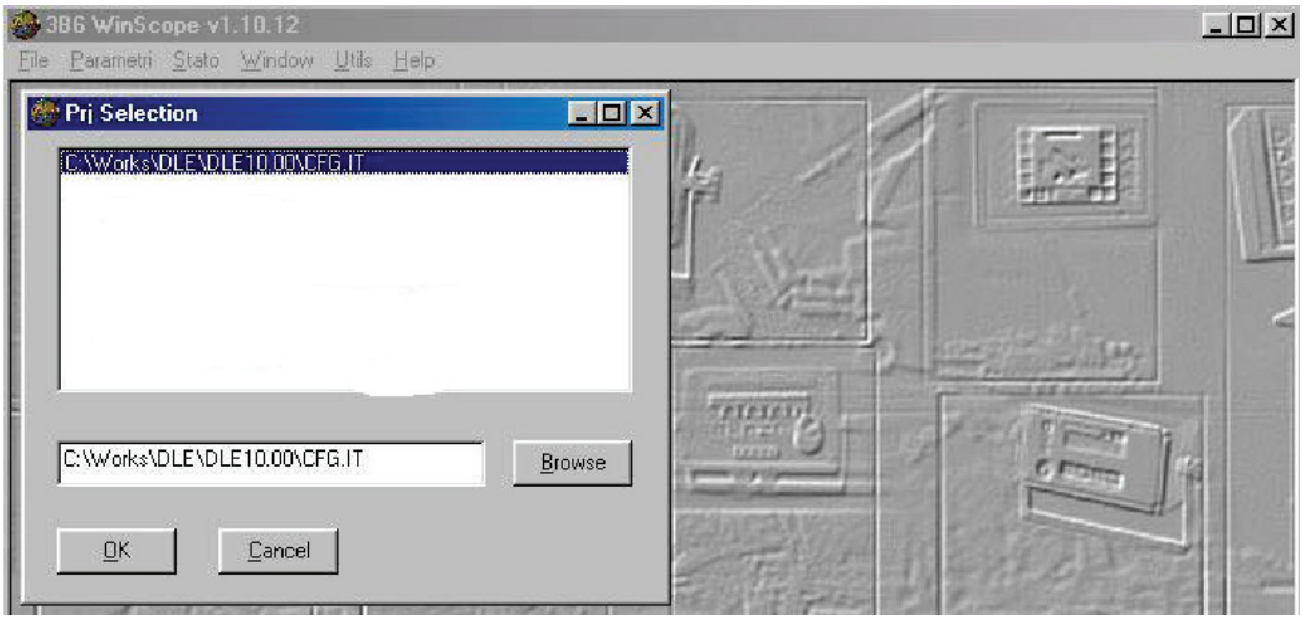
SAVING OR UPLOADING SETTINGS WITH WINSCOPE

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**".

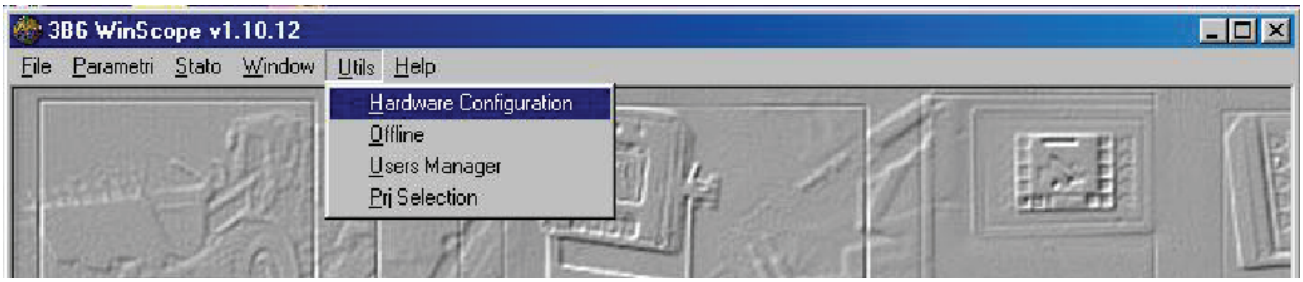


Type in the correct path of file **CFG.IT** or look for the same in the Windows folders suing the "**Browse**" function. The file must not necessarily be in the path shown in the following example as it is at the user's discretion.
It contains the menus and the name of the parameters corresponding to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

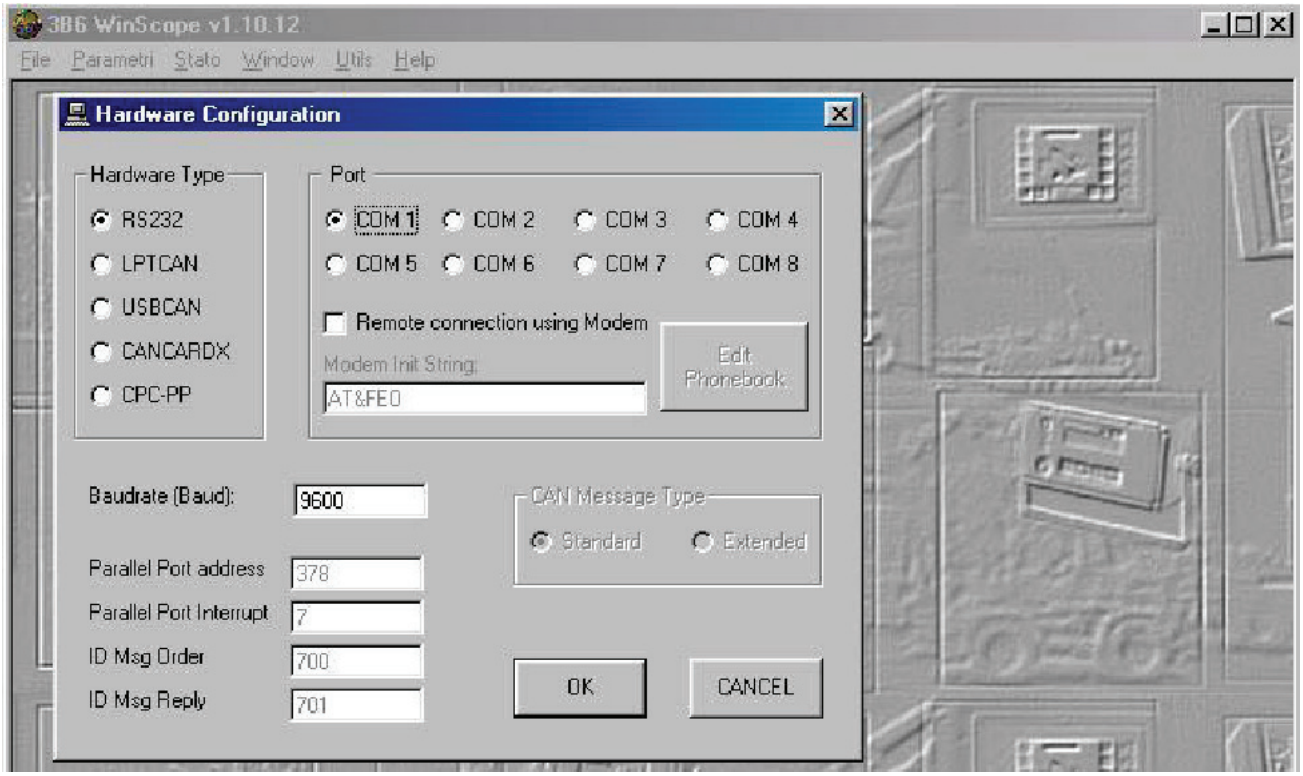


Press OK to close the window.

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



The following window will appear:



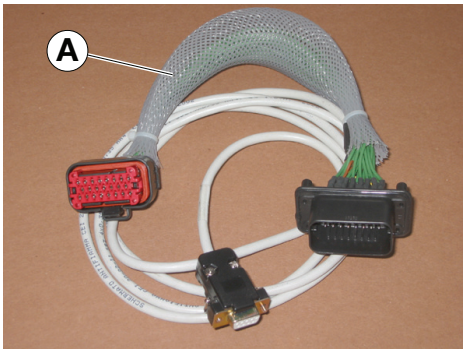
For each type of machine, you must select adequate parameters, that is:

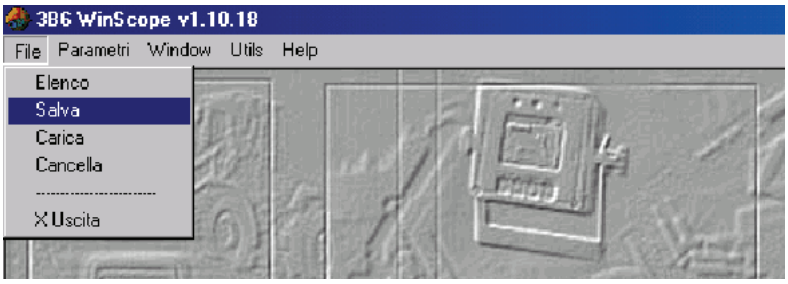
DLE (version _01 or higher)

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

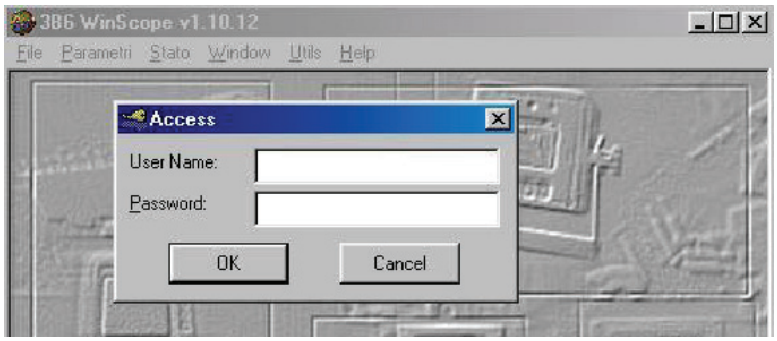
If these parameters are wrongly configured, it won't be possible to connect the units.
Press OK to confirm and close the window.
Now **close** and re-open the program.

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.

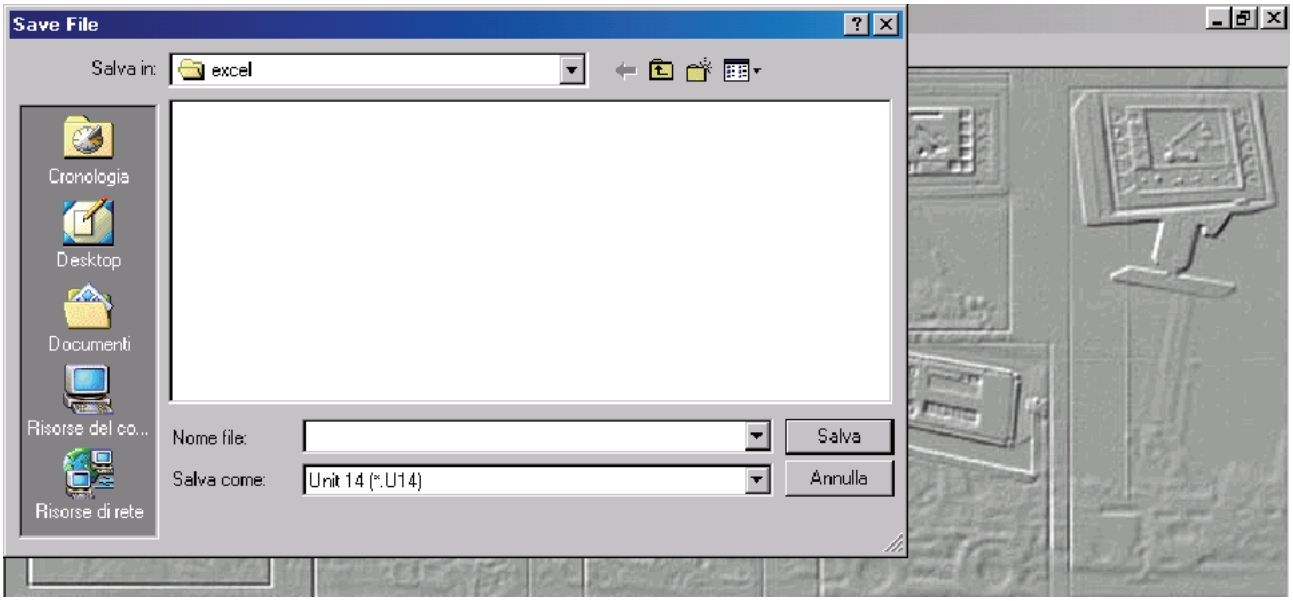




The following window will be displayed so you can type in the password.
For any changes, you must enter the following data:
User Name: ...(contact the TEREXLIFT Service Centre to get your ID-code)
Password: ....(contact the TEREXLIFT Service Centre to get your ID-code)

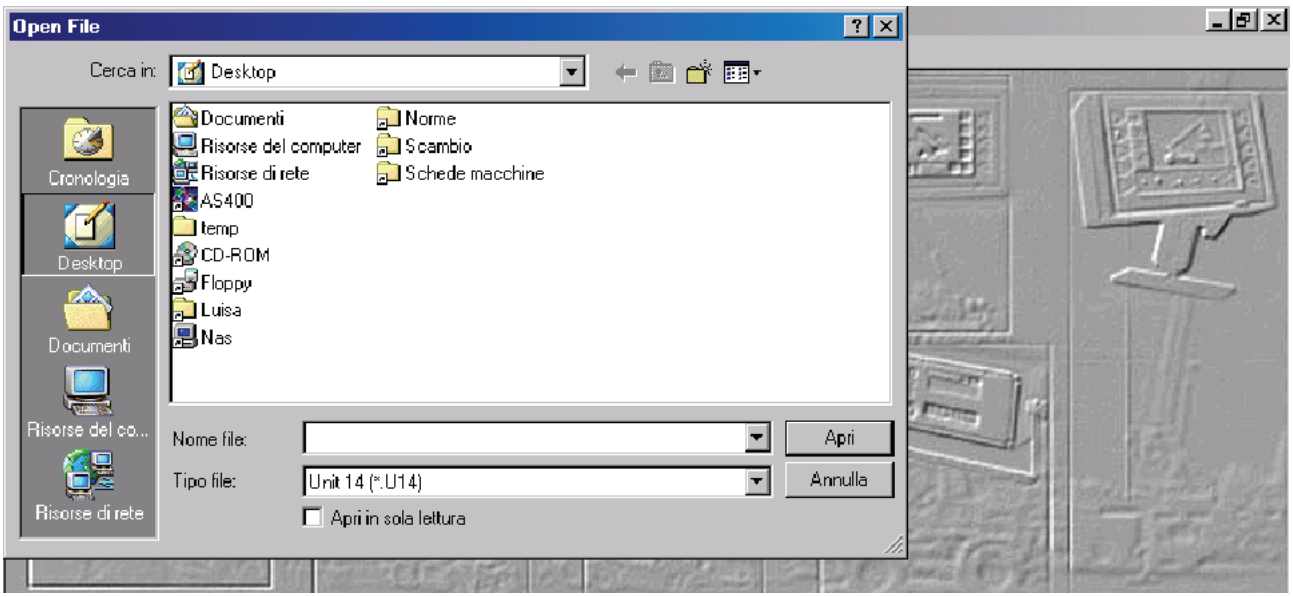


Enter the correct data and press OK. If you have selected "Salva" (Save), the following window will be displayed:



Choose the folder where to save the setting and save the file with a name showing the serial number of the machine (e.g. T3512 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:



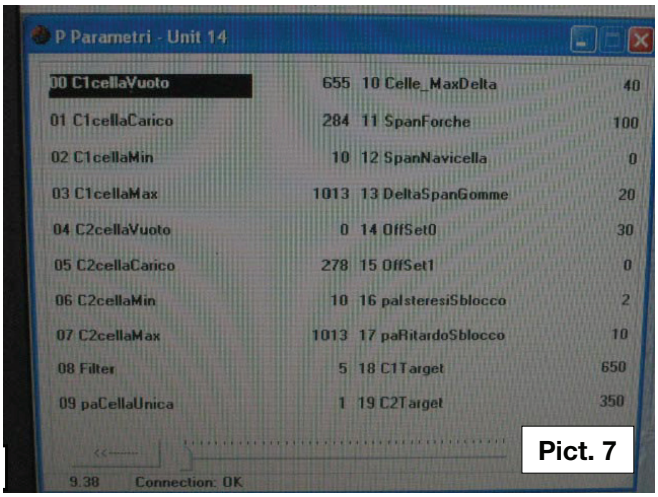
Choose the setting file you want to upload on the machine and press "Apri" (Open).
Save the setting as explained below:

DLE

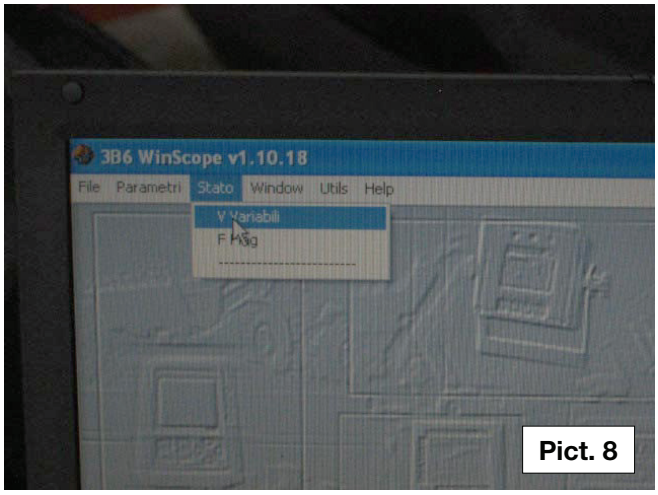
- If you want to save the setting, contact the TEREXLIFT Service Centre to get more information and be registered as an authorised user of the system.
- To gain access to the parameters and variables, no password is needed. All you have to do is connecting the DLE display with the power cord supplied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

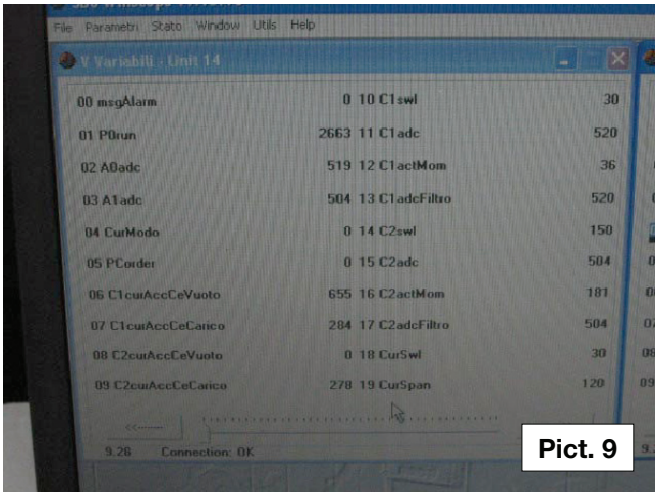


Pict. 7



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.

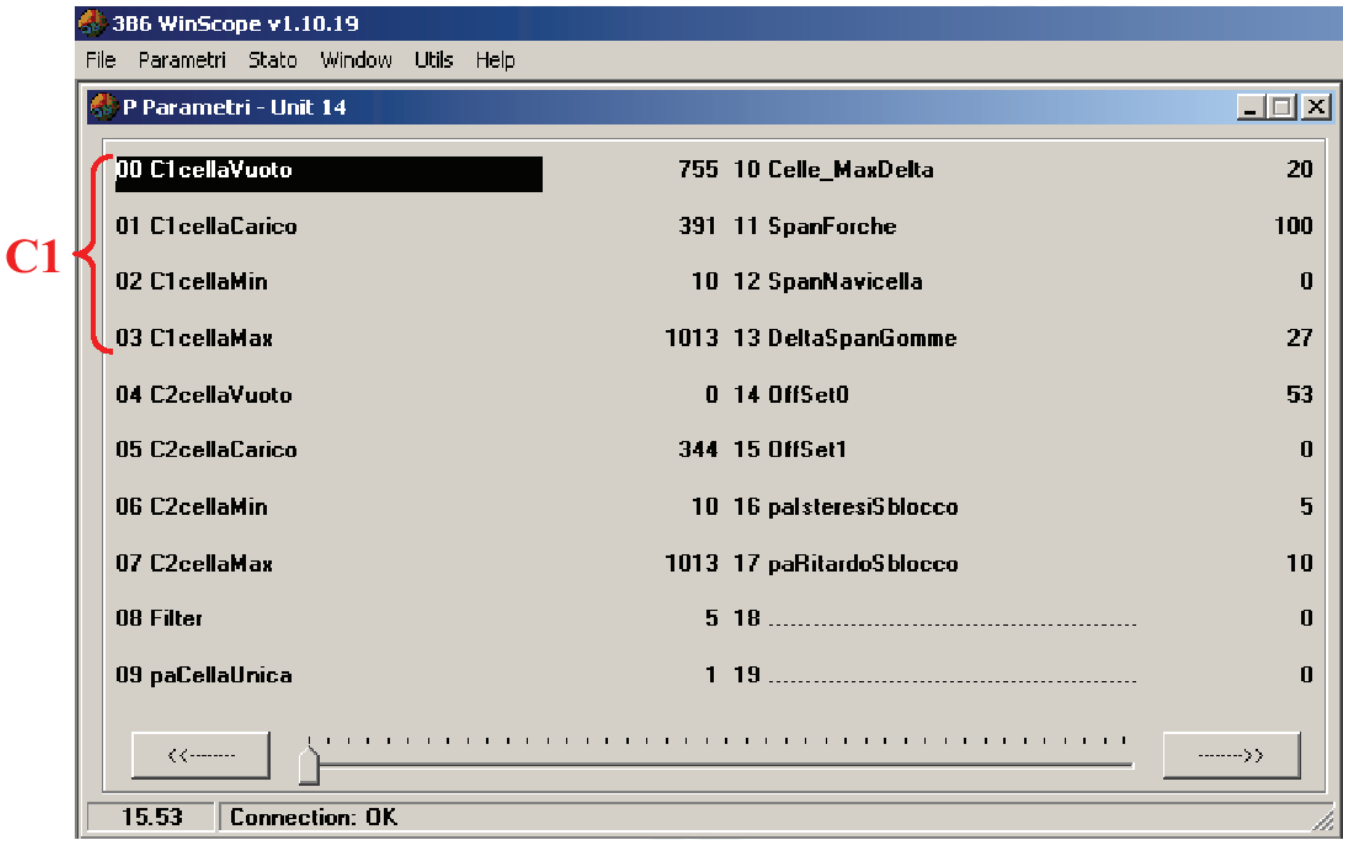


Pict. 9

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.

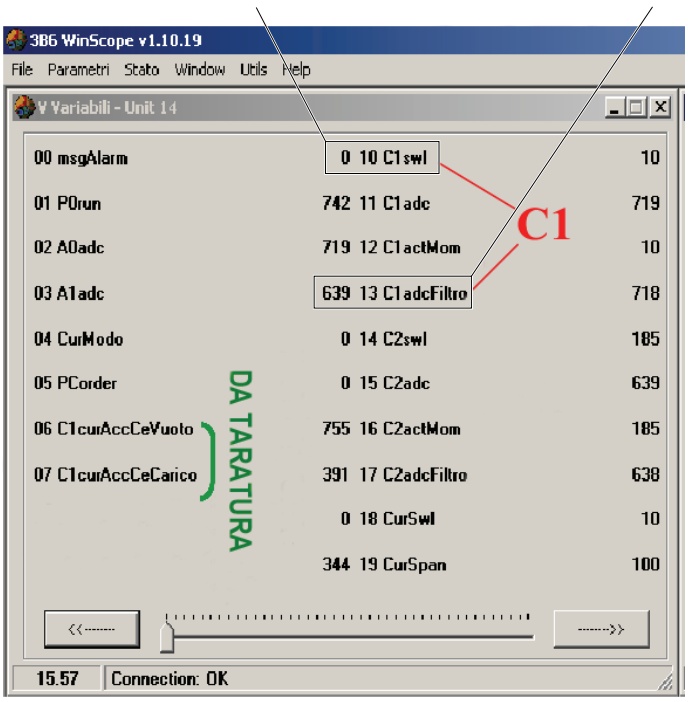
DLE - MONITORING WITH 3B6 WINSCOPE - PARAMETERS

Displaying the parameters



Simulation of the variables

load % calculated in relation to the calibration *value of the analog signal read and converted into bits*

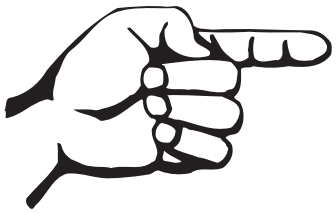


LIST OF THE DLE PARAMETERS

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 value 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 (about900 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	palsteresiSblocco	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, and they are used when the platform must be calibrated regardless of the calibration done with the forks. 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 (useful for the diagnosis)

N°	Winscope Name	Typical value	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	C1adcFilter	-	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 6 different groups in relation to the time at which they must be carried out, say daily, weekly, monthly, every 6 months, yearly or every two 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
Six month	A+B+C+D
Yearly	A+B+C+D+E
Two years	A+B+C+D+E+F

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 or re-sequence the boom telescopes.
A-10	Check and clean the radiator.
A-11	Check the hydraulic oil level in the tank.
A-12	Check the greasing of the boom section pads.
A-13	Grease the forks.
A-14	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-15	Check the efficiency of the overload warning system.
A-16	Check the efficiency of the lighting electric system.
A-17	Check the efficiency of braking system and parking brake.
A-18	Check the efficiency of the steering selection system.
A-19	Check the efficiency of the fork balancing system.
A-20	Make sure the safety devices installed are in efficient working order.

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.
B-7	Check the restriction of the drive hydraulic oil filter.

TABLE C

Within the first 100 working hours:

C-1	Change the oil in differential gears, wheel reduction gears and power divider.

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.

TABLE C

Every 250 working hours or monthly:

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.
C-16	Check the oil level of the power divider.

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 of the transmission.
D-6	Change the hydraulic oil filter in the tank.
D-7	Have the hydraulic system checked by a skilled technician.
D-8	Change the main cartridge of the engine air filter.
D-9	Renew the cartridge of the engine oil filter and the fuel filter.
D-10	Change the oil of the front and rear differential casings.

TABLE E

Every 1000 working hours or yearly:

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

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***

- *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
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:				
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 or re-sequence the boom telescopes.			
A-10	Check and clean the radiator.			
A-11	Check the hydraulic oil level in the tank.			
A-12	Check the greasing of the boom section pads.			
A-13	Grease the forks.			
A-14	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-15	Check the efficiency of the overload warning system.			
A-16	Check the efficiency of the lighting electric system.			
A-17	Check the efficiency of braking system and parking brake.			
A-18	Check the efficiency of the steering selection system.			
A-19	Check the efficiency of the fork balancing system.			
A-20	Make sure the safety devices installed are in efficient working order.			

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	Check the tension of the alternator belt.			
B-3	Check the tyre inflation.			

Table B		Y	N	R
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.			
B-7	Check the drive oil filter.			

Table C		Y	N	R
Within the first 100 working hours:				
C-1	Check the oil level of differential gears, wheel reduction gears and power divider			
Every 250 working hours:				
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.			
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.			
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.			
C-16	Check the oil level of the power divider			

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***

- *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 D		Y	N	R
Every 500 working hours:				
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 of the transmission.			
D-6	Change the hydraulic oil filter in the tank.			
D-7	Have the hydraulic system checked by a skilled technician.			
D-8	Change the main cartridge of the engine air filter.			
D-9	Renew the cartridge of the engine oil filter and the fuel filter.			
D-10	Change the oil of the front and rear differential casings.			

Table E		Y	N	R
Every 1000 working hours:				
E-1	Change the safety element of engine air filter.			
E-2	Change the oil			
E-3	Change the oil in the four wheel reduction gears.			
E-4	Change the hydraulic oil.			

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 23
4.5 TABLE C procedures 29
4.6 TABLE D procedures 44
4.7 TABLE E procedures 51

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 OF REDUCTION GEARS, DIFFERENTIAL GEARS AND POWER DIVIDER

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

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

NOTICE

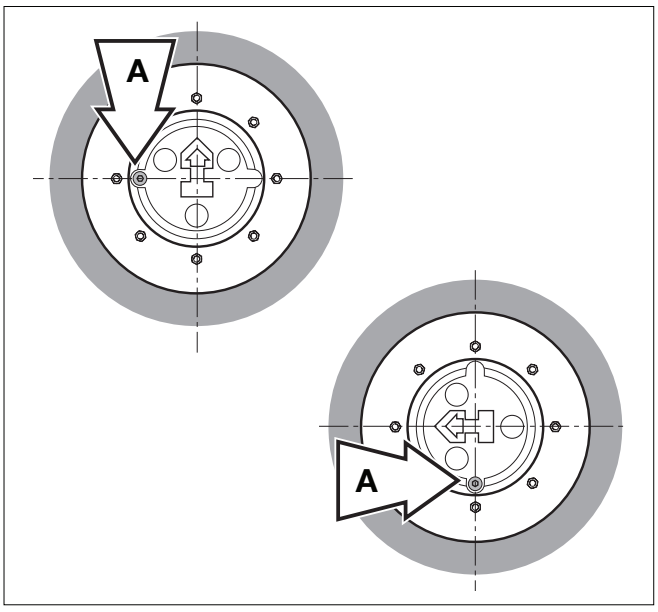
Place a container of suitable size under the plug.

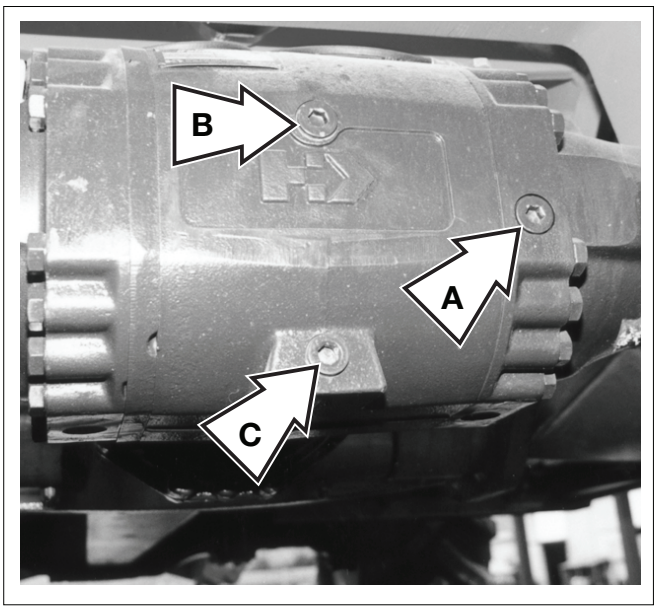
To check the oil level in the **front and rear differential gears**:

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

NOTICE

Place a container of suitable size under the plug.



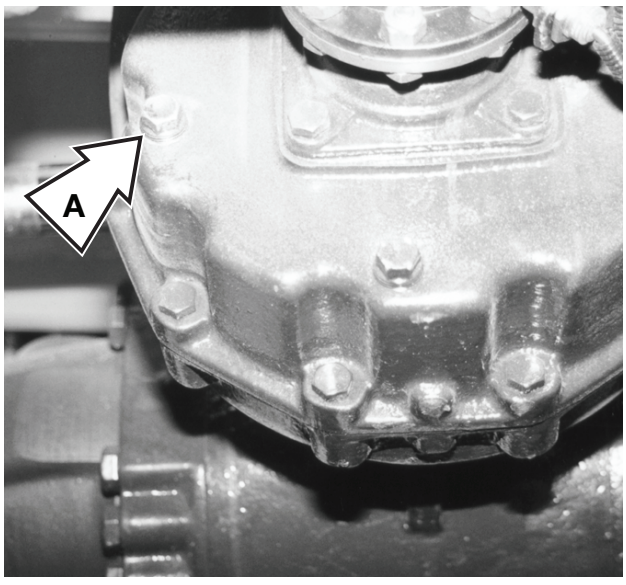


To check the oil level in the **power divider**:

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

NOTICE

Place a container of suitable size under the plug.

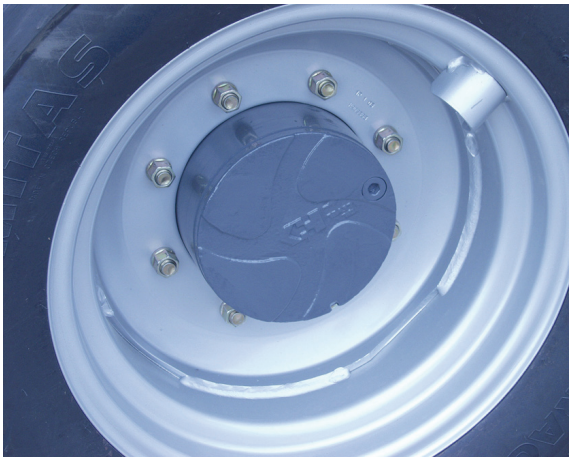


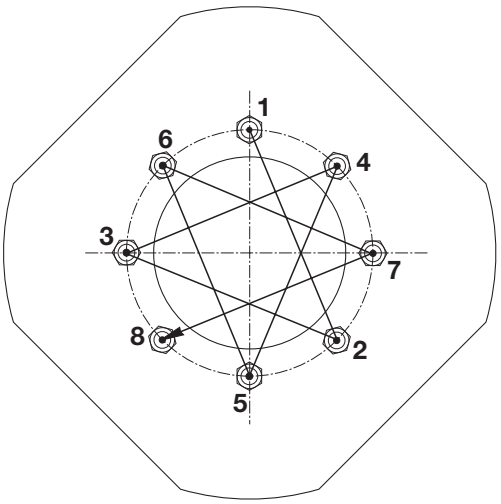
A-2 CHECK THE TIGHTENING OF THE WHEEL BOLTS

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

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

Re-tighten all nuts to a torque 440 Nm.





AWARNING

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

AWARNING

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.

AWARNING

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

	STANDARD Telelift 3512-4010	OPTIONAL Telelift 3512-4010
Dimensions (front and rear)	405/70 R20	405/70 R24
P.R. (or load index)	14 pr	14 pr
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 visually check for oil leaks.

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

A-6 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-8 CHECK THE ENGINE OIL LEVEL

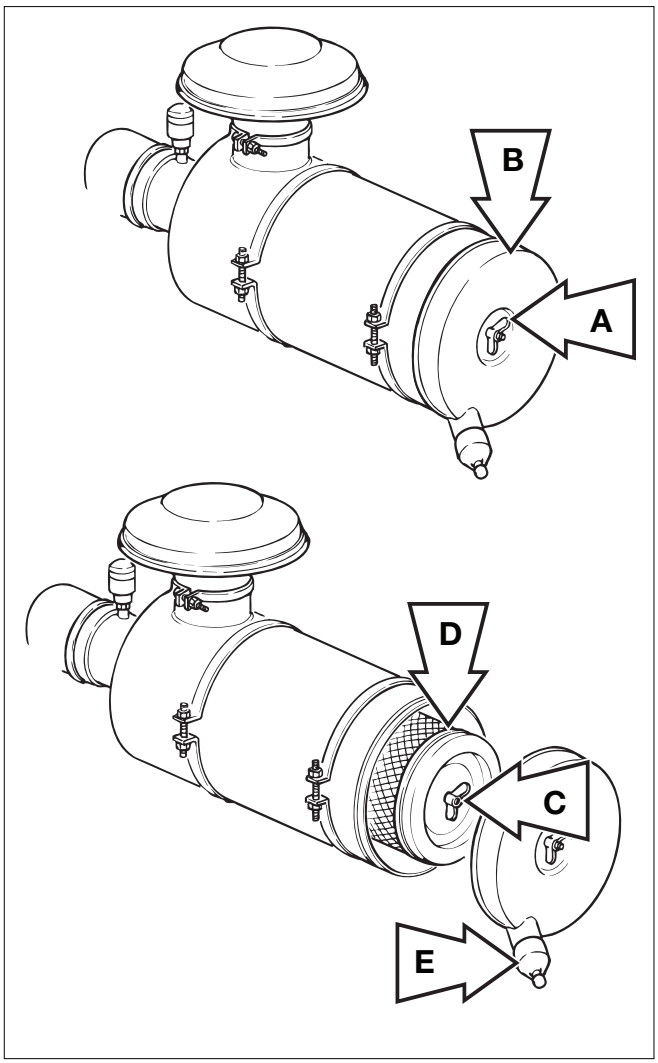
CAUTION

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

A-8 CLEAN THE AIR INTAKE FILTER

Clean the engine air filter every 10 hours:

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



⚠WARNING

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

⚠WARNING

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

A-9 CHECK THE BOOM EXTENSION SEQUENCE

If, during normal operation, a change in the boom extended lengths of 150 mm 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.

A-10 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.

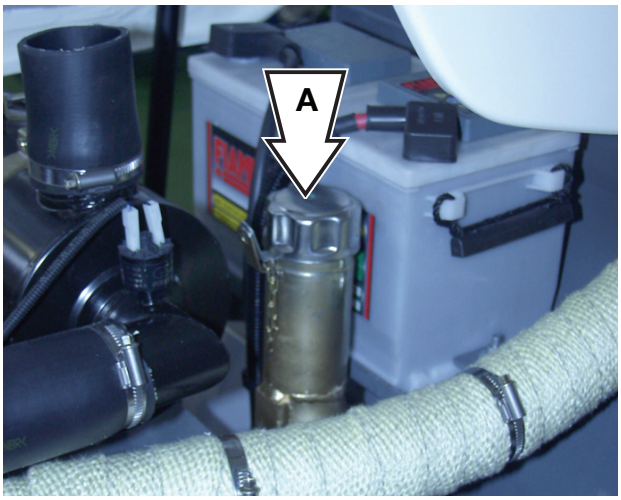
A-11 CHECK THE HYDRAULIC OIL LEVEL IN THE TANK

DANGER

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

Check the hydraulic oil level (visually) through the special level **B** fitted into the tank.

When necessary, add new oil through filler **A**.

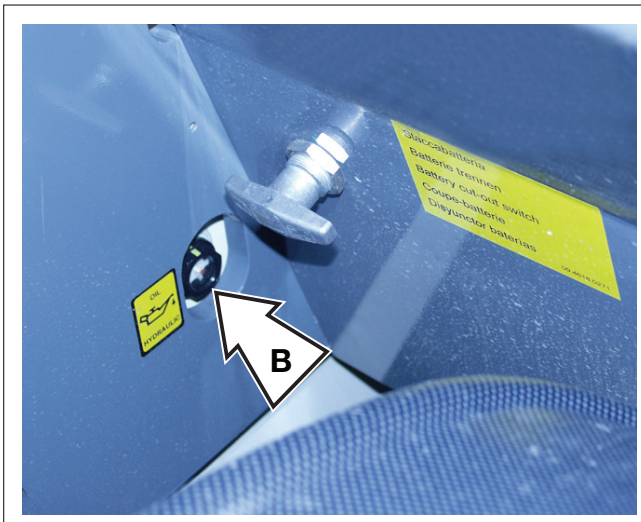


WARNING

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

NOTICE

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



A-12 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.

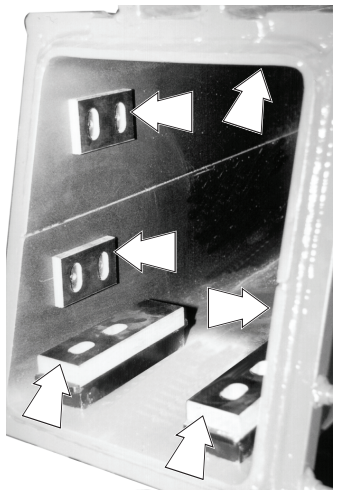
At regular intervals, check that the telescopes are well greased in correspondence of the sliding pads.

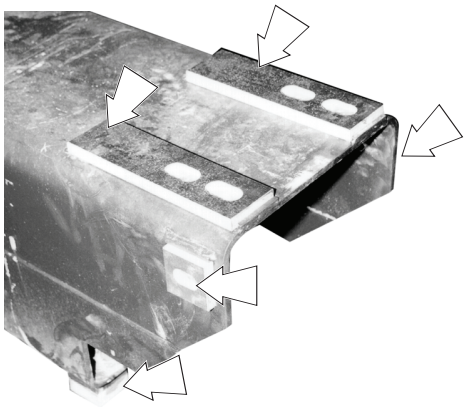
If necessary, scrape off the old grease and brush new grease. We recommend using:

- **INTERFLON grease FIN GREASE LS 2**

CAUTION

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





A-13 GREASE THE ATTACHMENT HOLDING FRAME

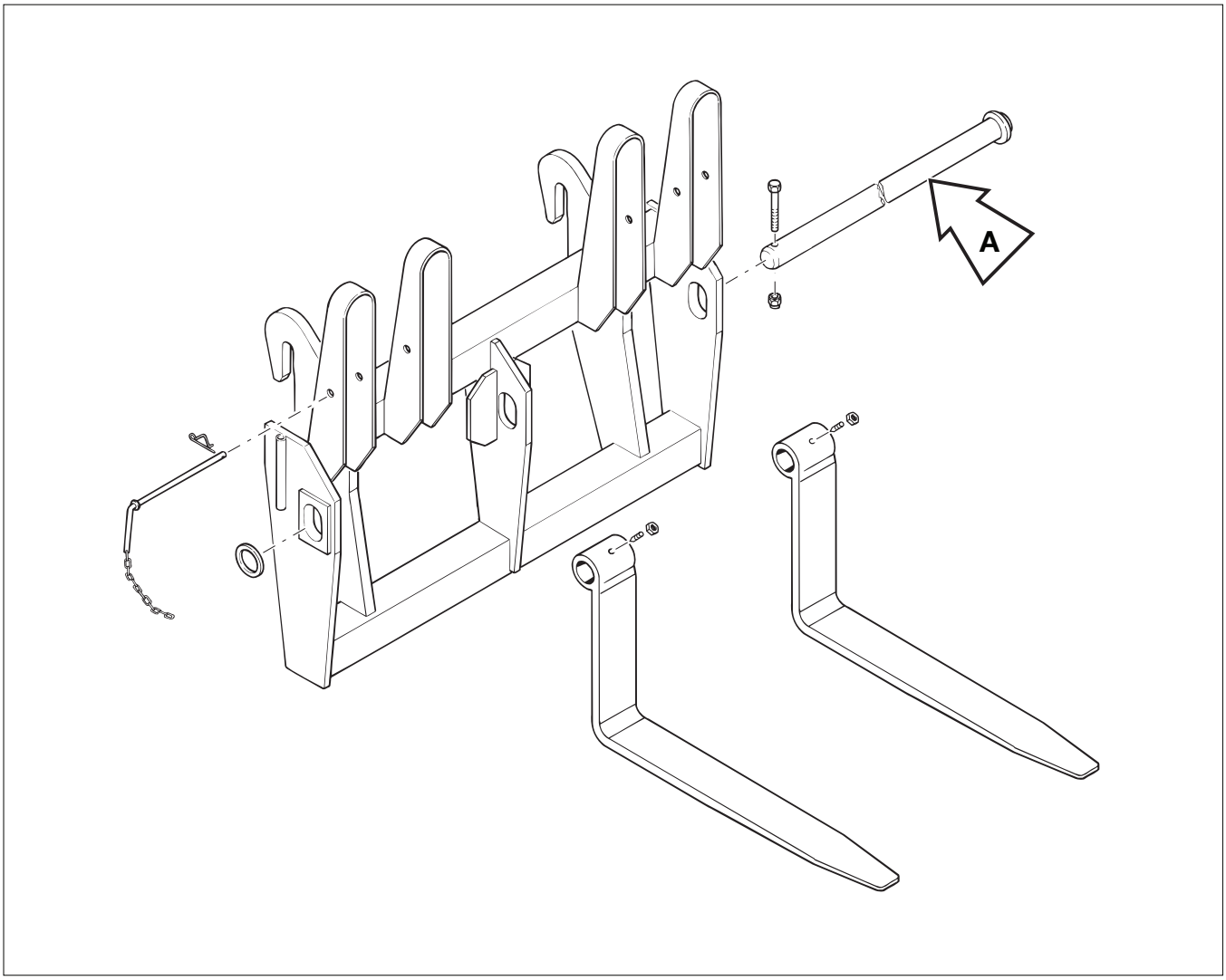
CAUTION

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.

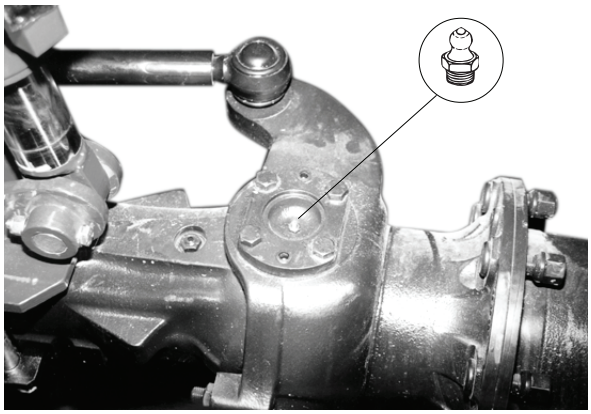
Smear pin **A** with grease to help the forks slide on it.

Recommended grease:

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



A-14 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.

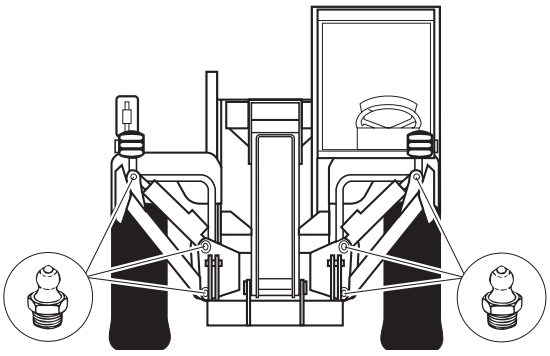
Regularly grease the machine to grant it efficient conditions and a long life.

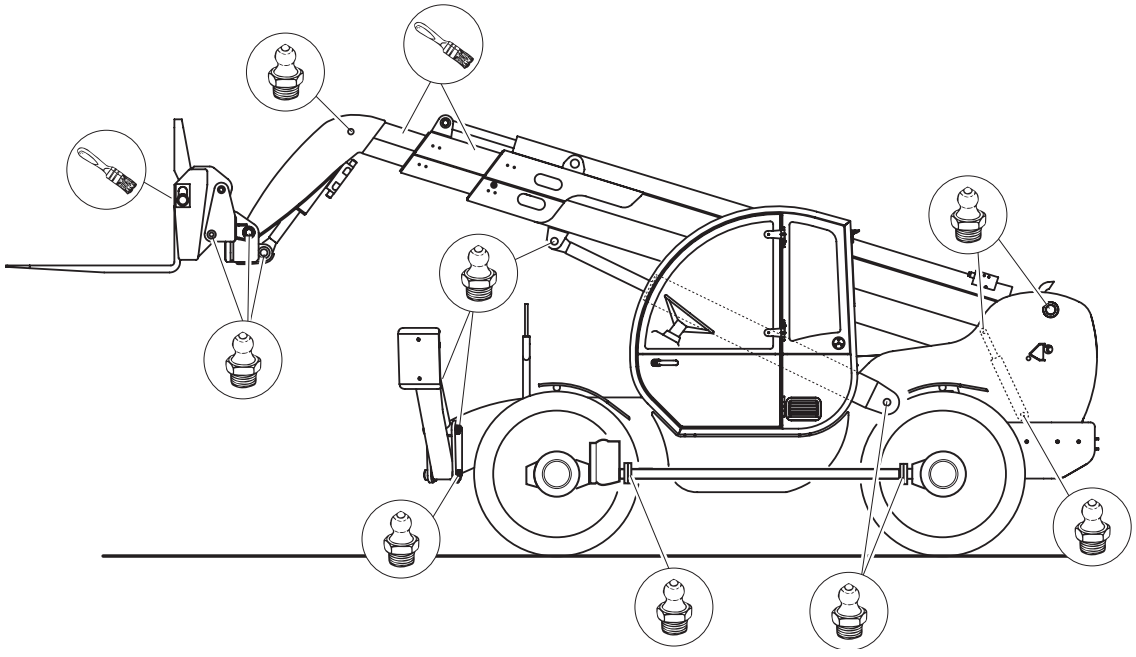
By means of a pump, inject grease into the special greasers.

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



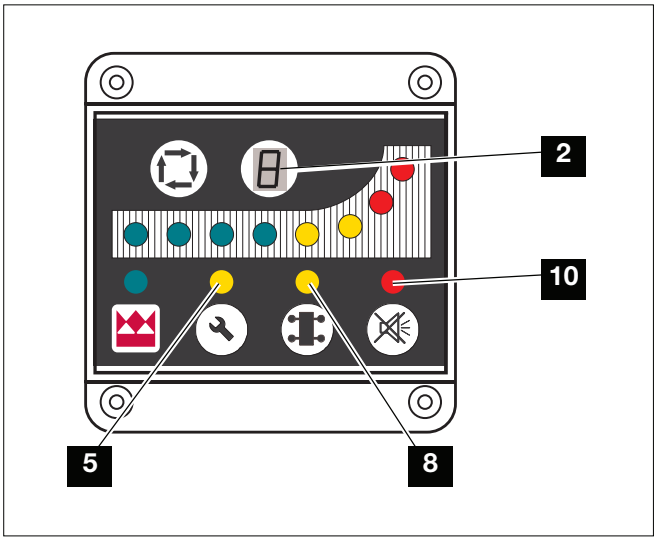


A-15 CHECK THE EFFICIENCY OF THE OVERLOAD WARNING SYSTEM

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 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.



CAUTION

If the system does not warn of the alarm, please contact the TEREXLIFT Service Centre.

A-16 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 **A** (position lights, low and high beams and turn signals) and the rear lights **B** (position lights, stop/tail lights and turn signals) are in excellent state of repair.

Also check beacon **C** located on the cab roof.

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

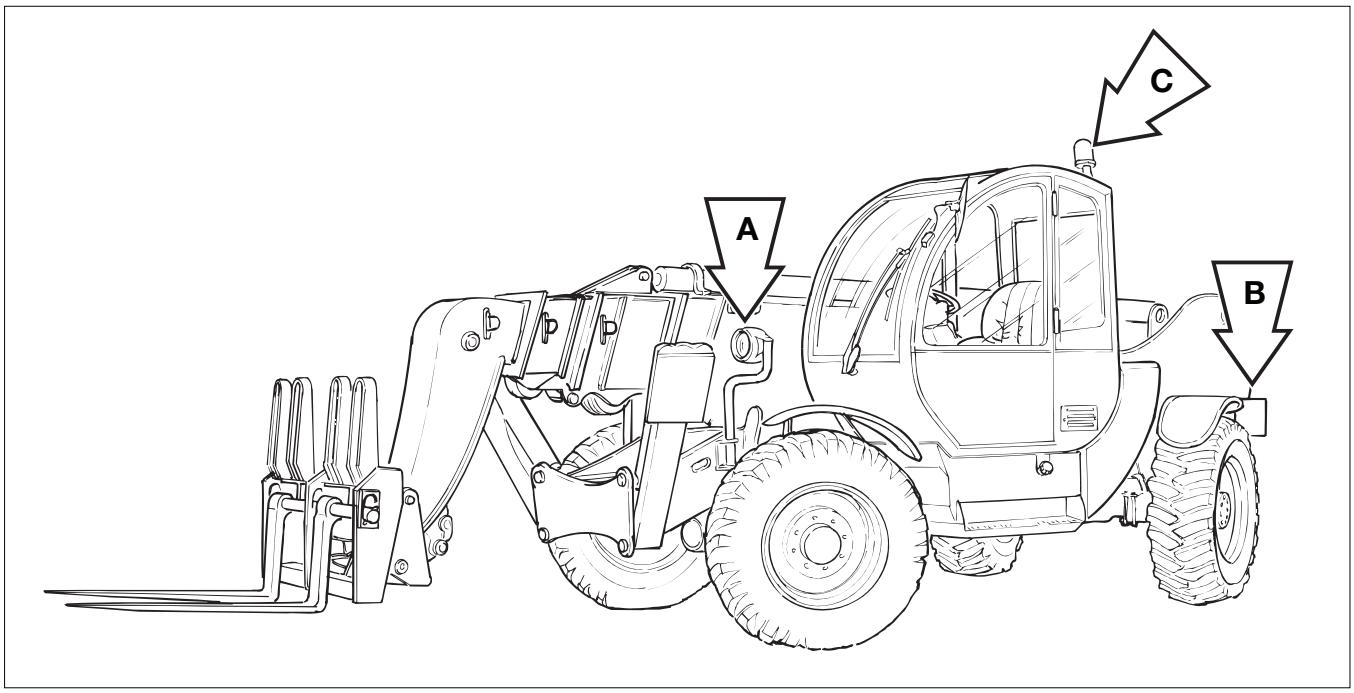
WARNING

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-17 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 Customer Service Centre or the nearest TEREXLIFT authorised workshop.

A-18 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**).

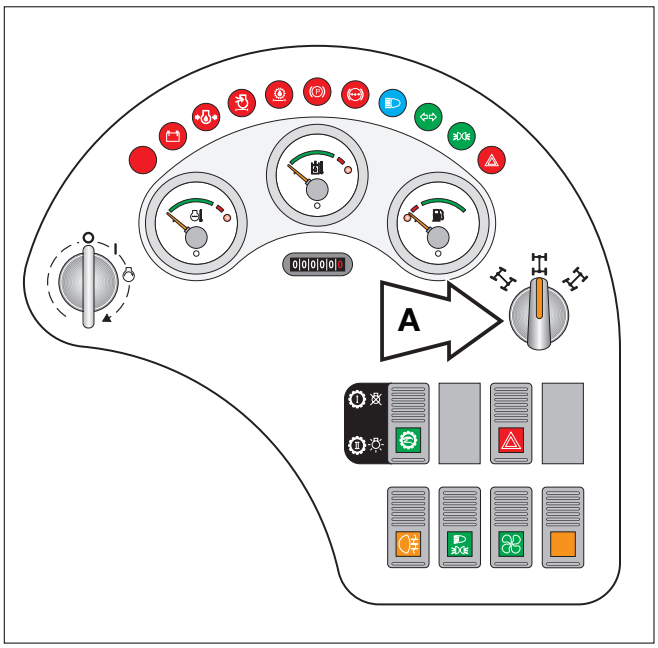
7 Rotate the steering (to the side opposite to point **3**) so that the rear axle reaches its stop

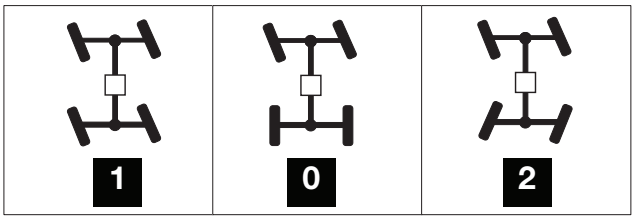
8 Reset the steering selection switch to “two-wheel steer” (pos. **0**)

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-19 CHECK THE EFFICIENCY OF THE FORK BALANCING SYSTEM

WARNING

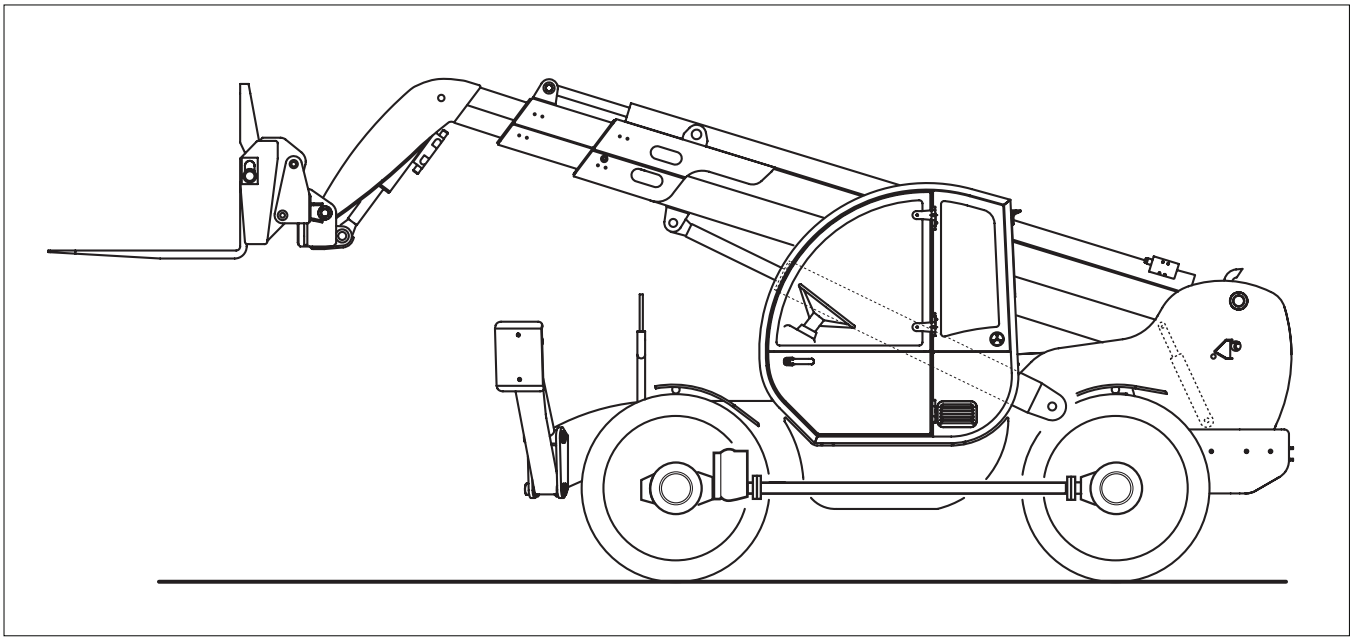
Test the system without any load on the machine's forks.

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

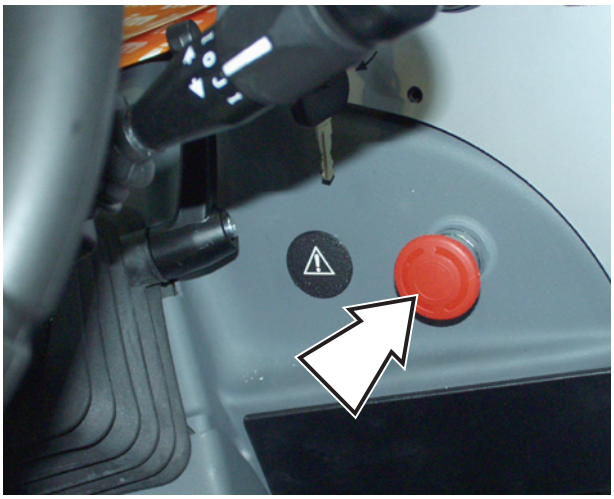
If the forks do not remain parallel to the ground, consult section 5 "Problems - Causes - Solutions".



A-20 MAKE SURE THE SAFETY DEVICES INSTALLED ARE IN EFFICIENT WORKING ORDER

■ Checking the emergency stop pushbutton
(at every use)

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



■ Checking the joystick pushbutton (at every use)

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



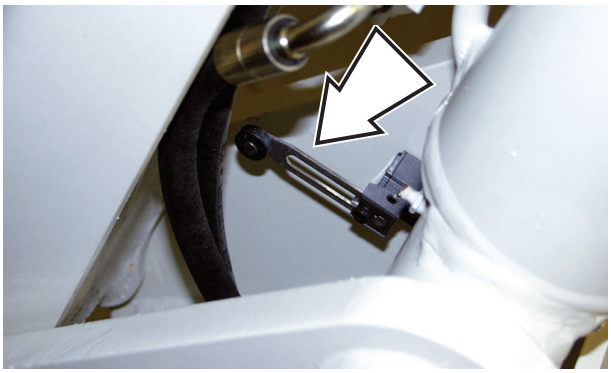
■ Checking the limit switches of the outriggers
(at every use)

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 Customer Service.

Check one outrigger at a time.

- With the outriggers up, the relevant indicator light on the moment limiter panel in the cab, must be off; with the outriggers down to the ground, this light must be on. Should that not be the case, contact the TEREXLIFT Customer Service.

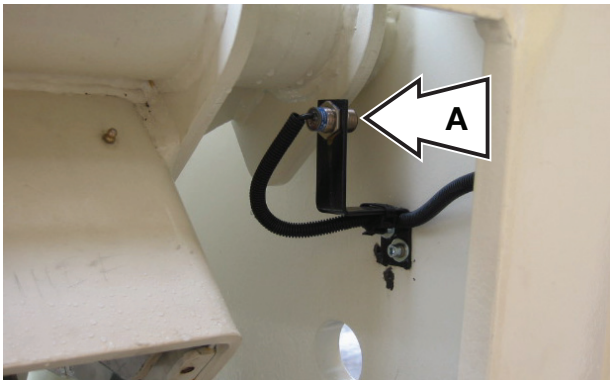


■ **Checking the proximity switches** (before any use)

Sensor A on the boom

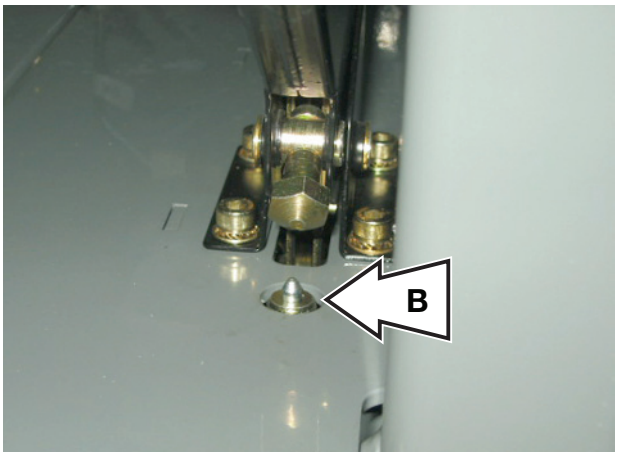
- Raise the boom beyond the horizontal and ensure the sway control and the outrigger control are blocked.
  Should that not be the case, contact the TEREXLIFT Customer Service.

If the trouble does not depend on the sensor adjustment, contact the TEREXLIFT Customer Service.



■ **Micro-switch B on the parking brake**
(before any use)

- To check the efficiency of the parking brake micro-switch, simply sit in the driving place, start the engine and attempt to move the machine with the parking brake engaged. The machine should not move. Should that not be the case, adjust or replace the proximity sensor on the parking brake.



■ **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 Customer Service.
Repeat the operation putting first one gear, then the other.

4.4 TABLE B PROCEDURES

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

B-2 CHECK THE TENSION OF THE ALTERNATOR BELT

CAUTION

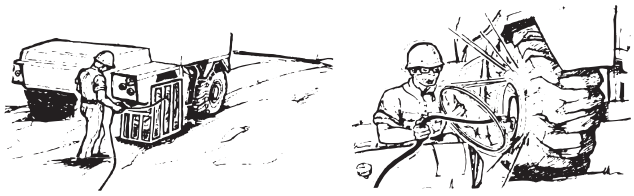
For the engine maintenance, please refer to the specific Operator handbook supplied with the machine.

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 3512-4010	OPTIONAL Telelift 3512-4010
Dimensions (front and rear)	405/70 R20	405/70 R24
P.R. (or load index)	14 pr	14 pr
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

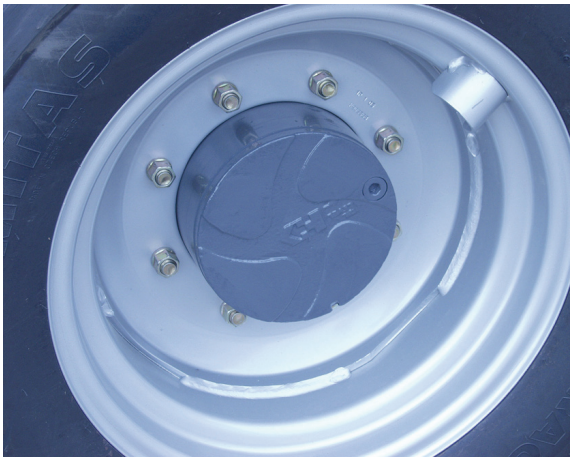
Always use tyres having the dimensions indicated in the vehicle registration card.

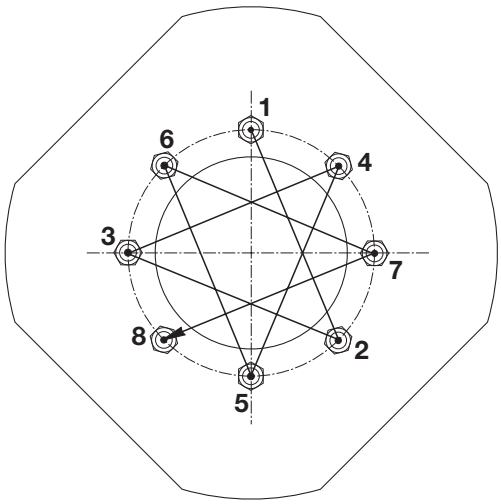
B-4 CHECK THE TIGHTENING OF THE WHEEL NUTS

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

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

Re-tighten all nuts to a torque 440 Nm.





⚠WARNING

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

⚠WARNING

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

⚠WARNING

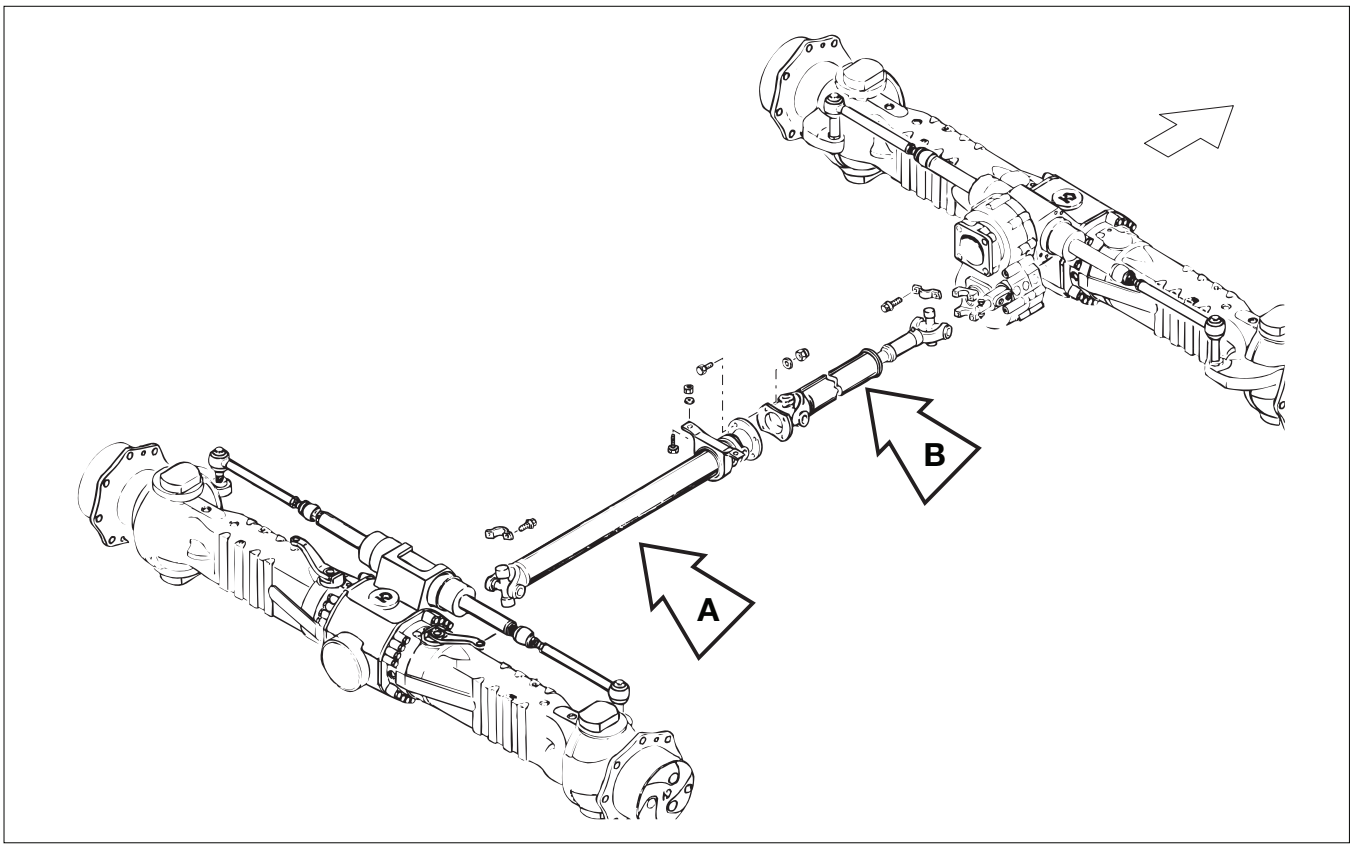
Always use tyres having the dimensions indicated in the vehicle registration card.

	STANDARD Telelift 3512-4010	OPTIONAL Telelift 3512-4010
Dimensions (front and rear)	405/70 R20	405/70 R24
P.R. (or load index)	14 pr	14 pr
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.

B-7 CHECK THE RESTRICTION OF THE DRIVE HYDRAULIC OIL FILTER

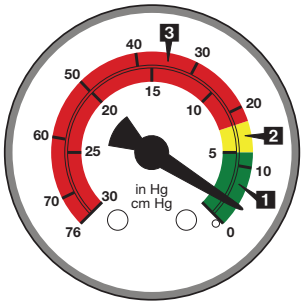
Every 50 hours, check the clogging degree of the filtering element using the vacuometer **A**.

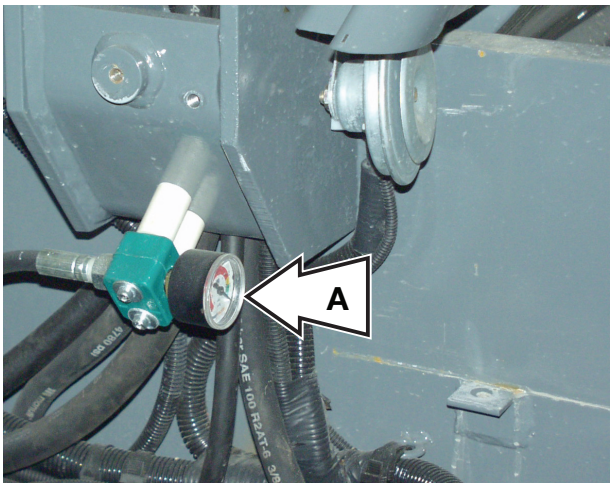
The indexed scale of the vacuometer is divided into 3 areas:

1 - Green area: Normal condition

2 - Yellow area: Replace the filter as soon as possible

3 - Red area: Shut the engine down to prevent damage to the hydraulic system. Change the filter and/or check for the fault reasons.





4.5 TABLE C PROCEDURES

C-1 CHANGE THE OIL IN REDUCTION GEARS, DIFFERENTIAL GEARS AND POWER DIVIDER

To change 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.

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:

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

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

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

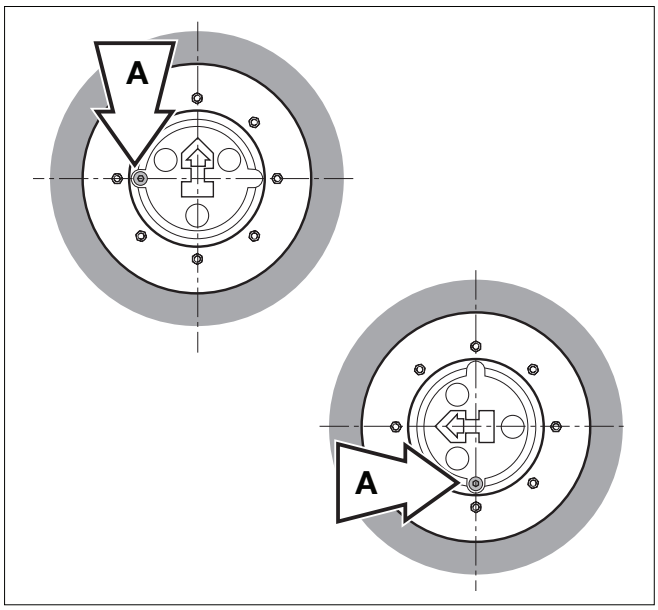
NOTICE

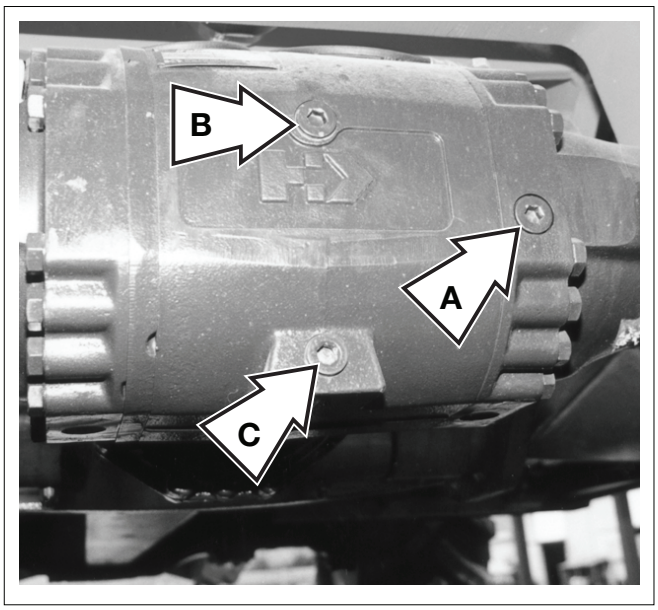
Place a container of suitable size under the plug.

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

Recommended oil:

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





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

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

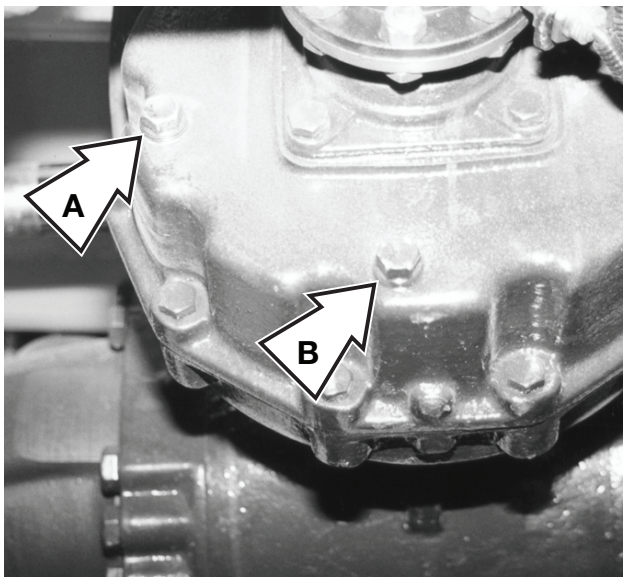
NOTICE

Place a container of suitable size under the plug.

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

Recommended oil:

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



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.

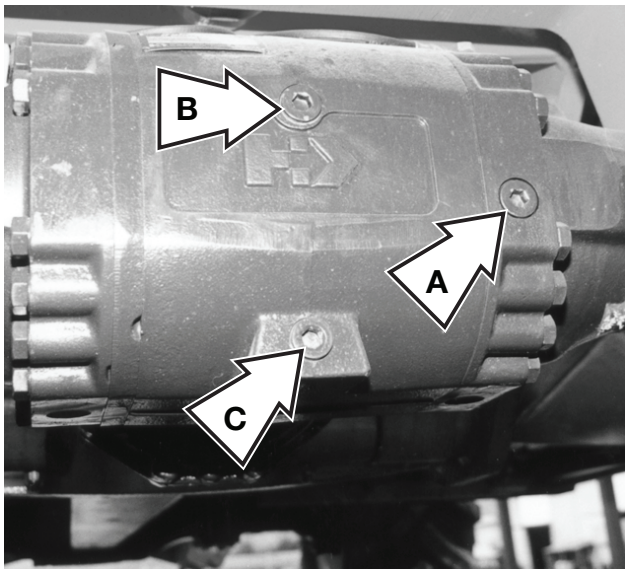
C-4 CHECK THE OIL LEVEL IN THE FOUR WHEEL REDUCTION GEARS

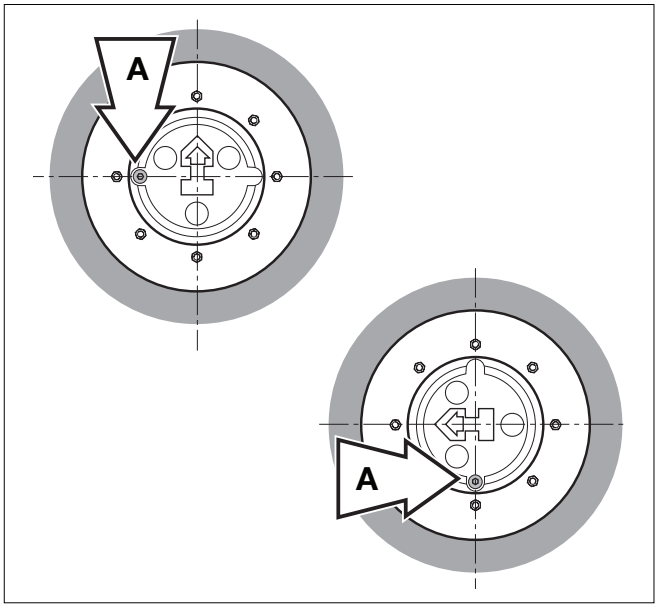
To check the oil level within the **wheel reduction gears**:

- 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.

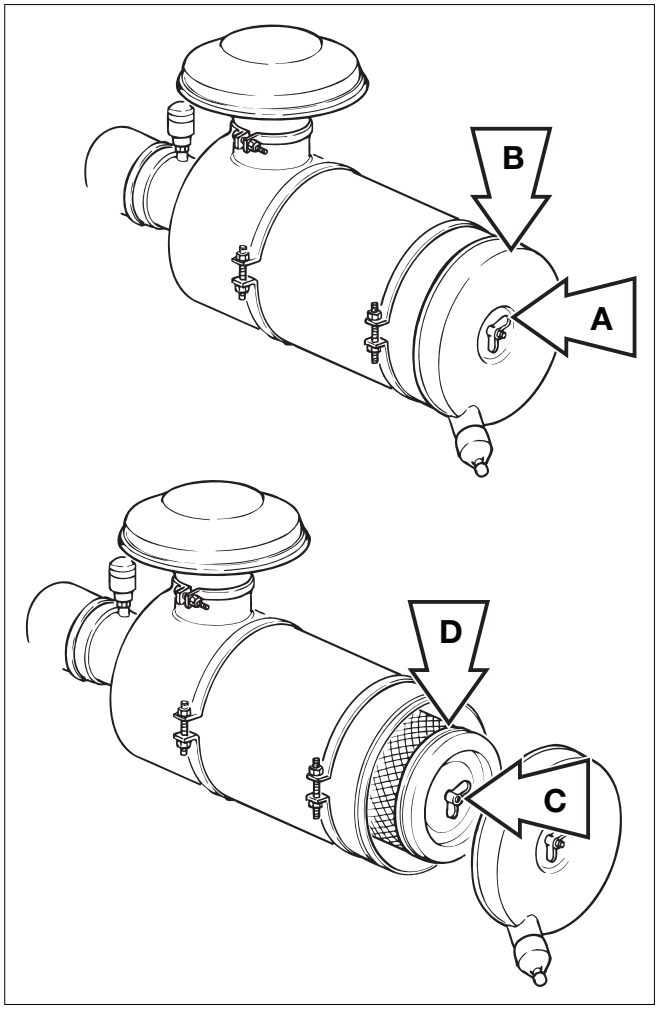




C-5 CHECK AND CLEAN THE AIR INTAKE FILTER

Clean the engine air filter following the instructions below:

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



WARNING

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

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

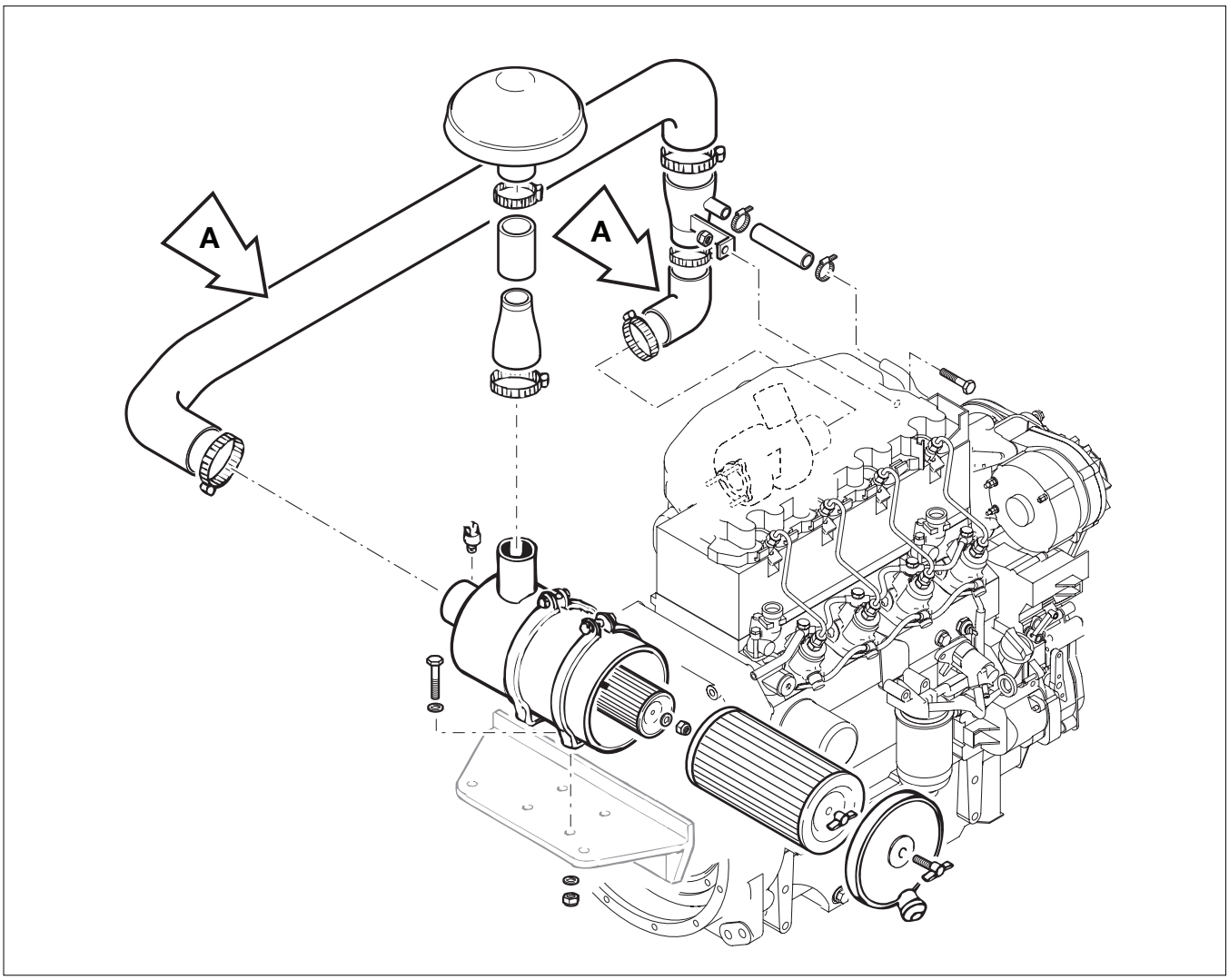
- ***Keep out of items which can produce sparks, of naked flames or lit cigarettes.***
- ***Do not rest metal objects onto the battery. This can result in a dangerous short especially during a recharge.***

C-7 CHECK THE AIR SUCTION HOSE BETWEEN ENGINE AND FILTER

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

CAUTION

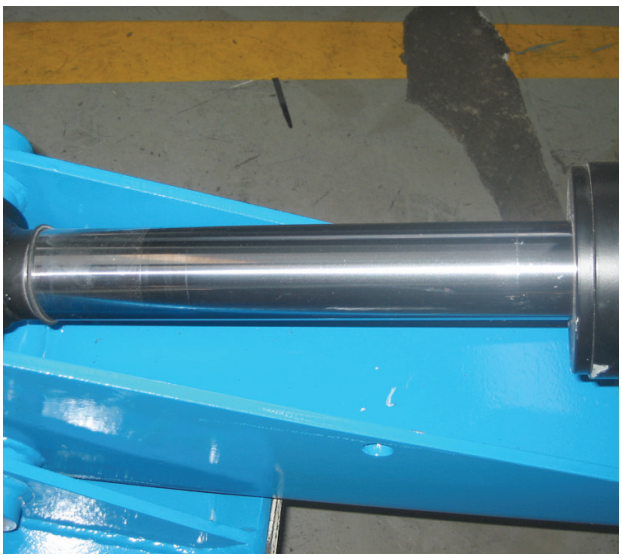
If you use the machine continuously for several days, check these sleeves, as well as the hose clamps more frequently.



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.

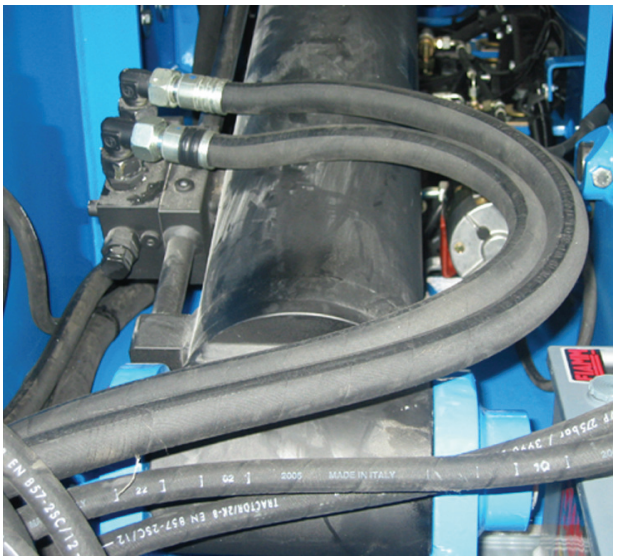


C-9 CHECK THE HYDRAULIC LINES

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.

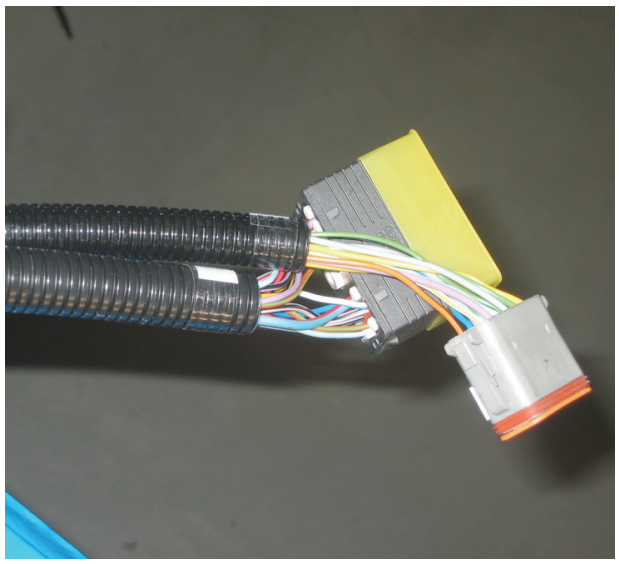


C-10 CHECK THE ELECTRIC CABLES

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.



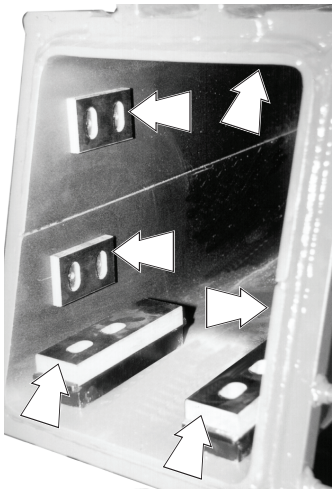
C-11 CHECK THE WEAR OF THE SLIDING PADS OF THE BOOM SECTIONS

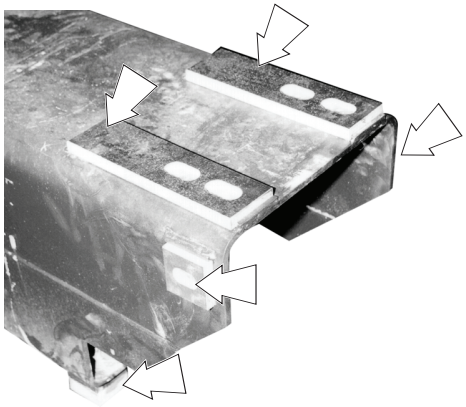
Any boom section is fitted with adjustable pads located on the four sides of the profile. These pads are secured to both fixed and mobile part of every section.

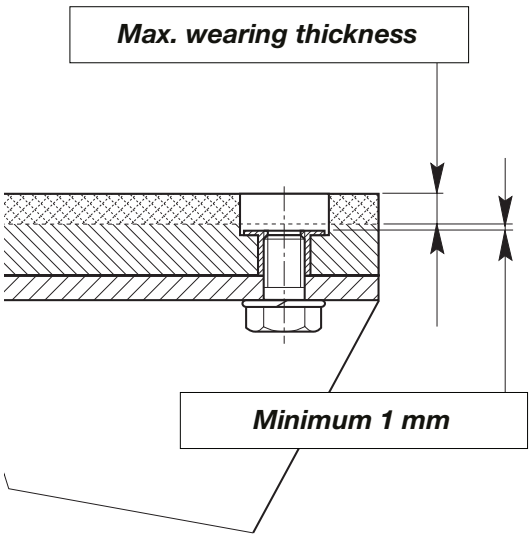
All pads can be adjusted by the special shims not supplied by TEREXLIFT.

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.







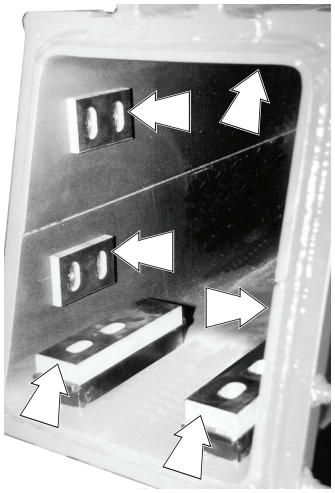
C-12 ADJUST THE PLAY OF THE SLIDING PADS OF THE BOOM SECTIONS

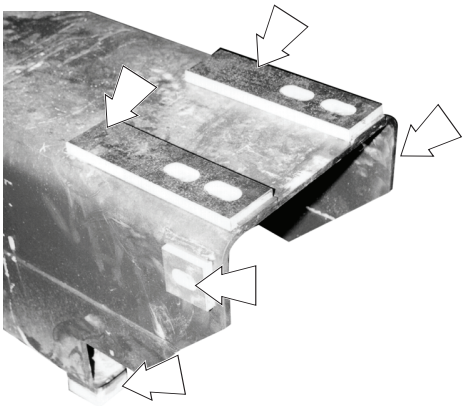
Any boom section is fitted with adjustable pads located on the four sides of the profile. These pads are secured to both fixed and mobile part of every section.

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.





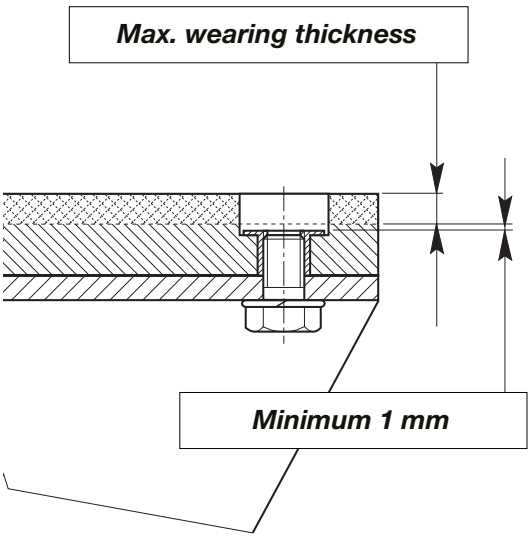
Tightening torques of the pad screws in relation to the screw diameter

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 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 block valves allow to held the load in position in case of burst of a flexible hose.

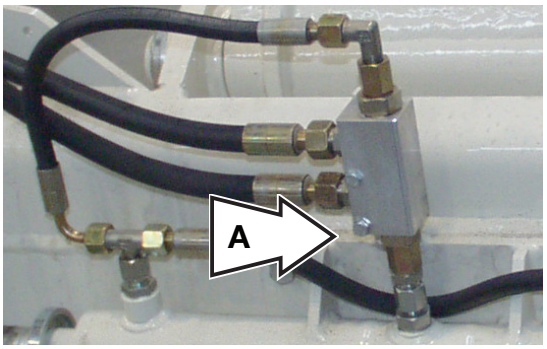
To check the efficiency of a valve, proceed as follows:

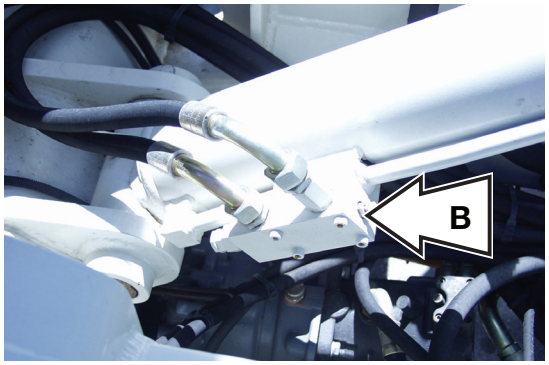
- Load a weight near the maximum payload (3500 kg roughly) onto the boom.
- Raise the load some centimetres above the ground (max 10 cm). To check the valve on the telescope extension cylinder move the boom to maximum height and extend it some centimetres.
- Loosen the oil hoses to the cylinder of which 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 on the tyres. Loosen the cylinder hoses to check the efficiency of the valve.

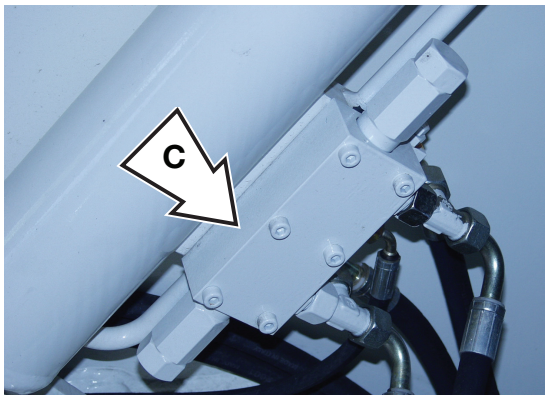
During the check, the load shall remain blocked in position.
Should that not be the case, the valve must be replaced. Contact TEREXLIFT Customer Service.

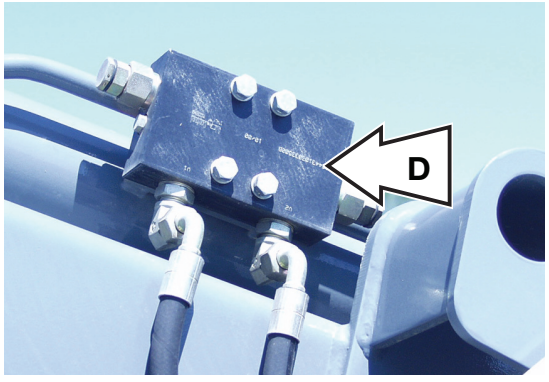
NOTICE

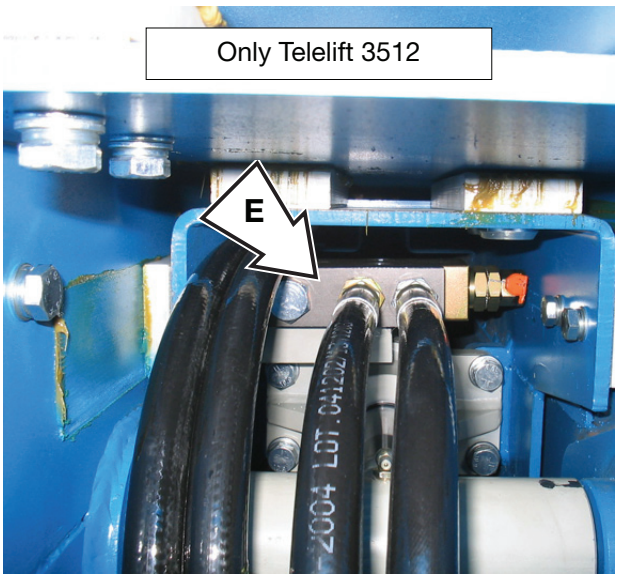
Place a container of suitable size under the plug.











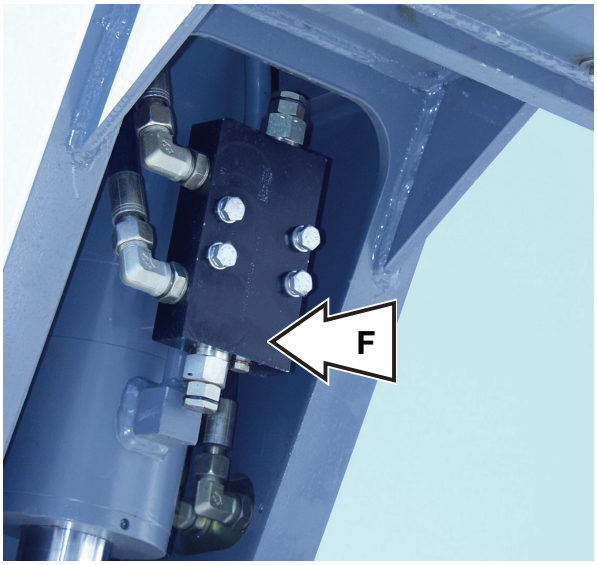
⚠ DANGER

Take any necessary safety measure when checking the valves:

- ***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.***





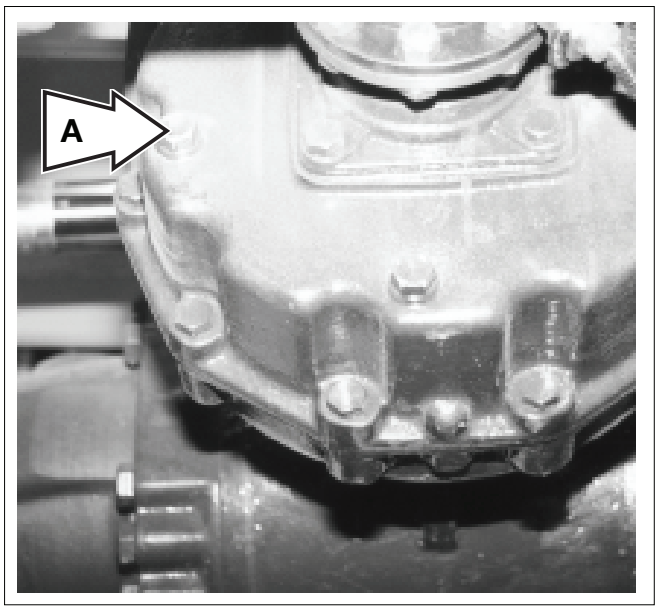
C-16 CHECK THE OIL LEVEL OF THE POWER DIVIDER

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

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

NOTICE

Place a container of suitable size under the plug.



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 **218 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.

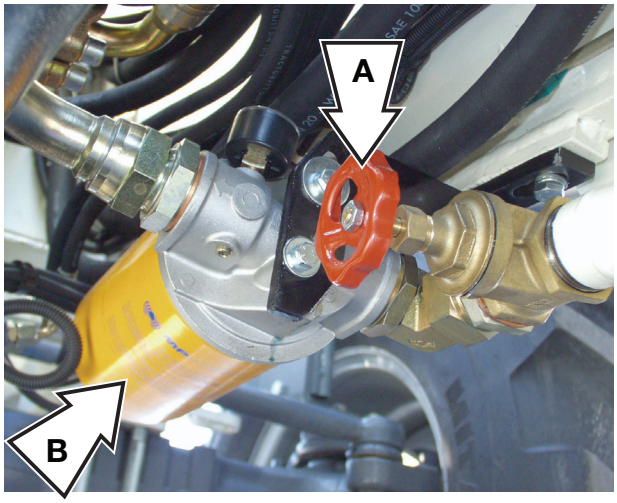
CAUTION

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

D-5 CHANGE THE HYDRAULIC OIL FILTER OF THE DRIVE

To change the oil filter cartridge of the drive, follow the instructions below:

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



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' = MPS 150
Filtering = 10 μ
code = 09.4604.0001

NOTICE

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

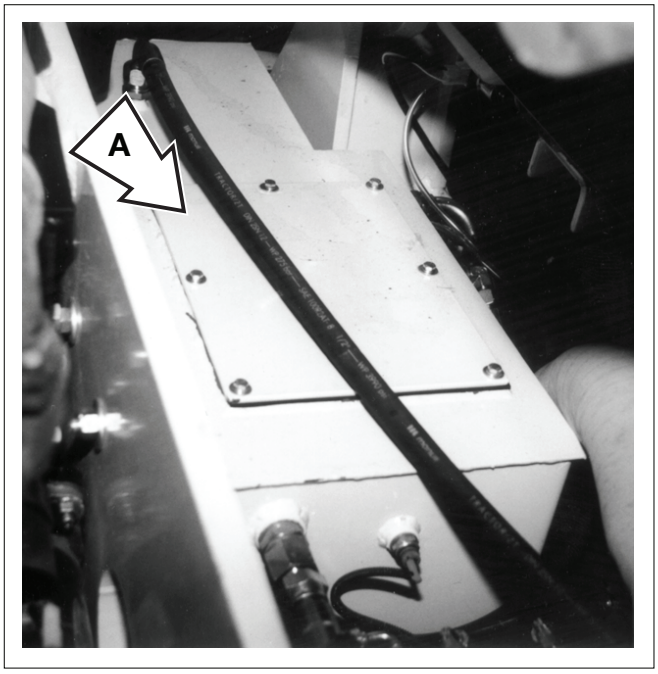
CAUTION

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

D-6 CHANGE THE HYDRAULIC OIL FILTER CARTRIDGE IN THE TANK

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

- Stop the machine on a level ground and engage the parking brake.
- Remove the inspection hatch **A** and unscrew the oil filter fitted inside the tank.
- Check the tank is clean, then fit a new filtering element and refit the inspection hatch.
- Check the oil level within the tank. Add new oil, if necessary.



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' = STR 100/1
Filtering = 60 μ
code = 09.4604.0004

NOTICE

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

CAUTION

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

D-7 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.

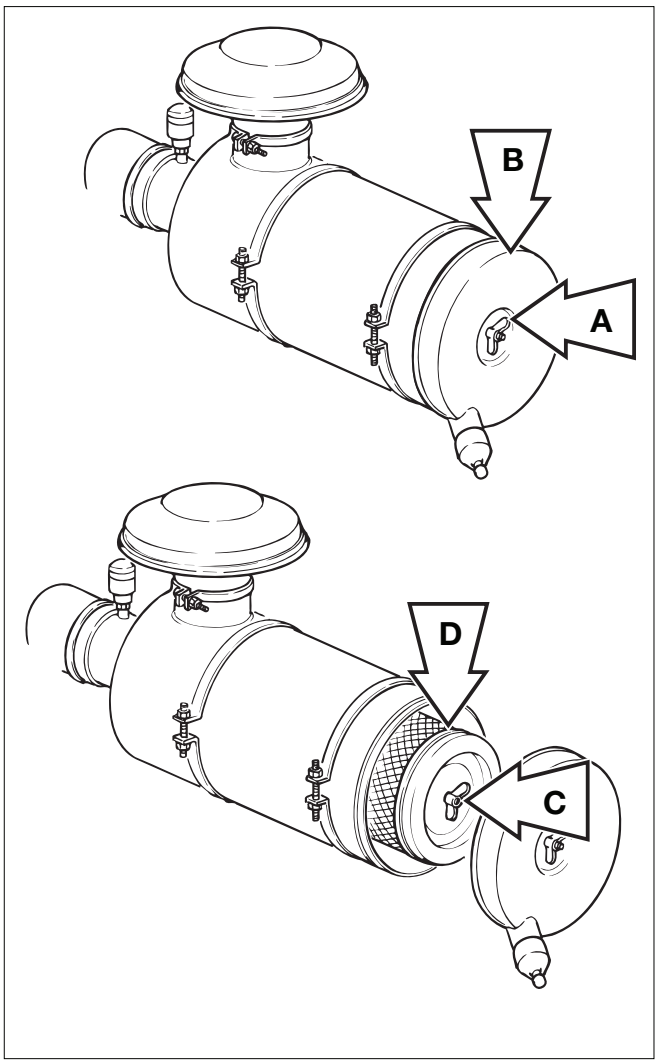
CAUTION

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

D-8 CHANGE THE PRIMARY CARTRIDGE OF THE AIR FILTER

Replacement of the primary cartridge of the air filter:

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



⚠WARNING

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

D-9 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.

4.7 TABLE E PROCEDURES

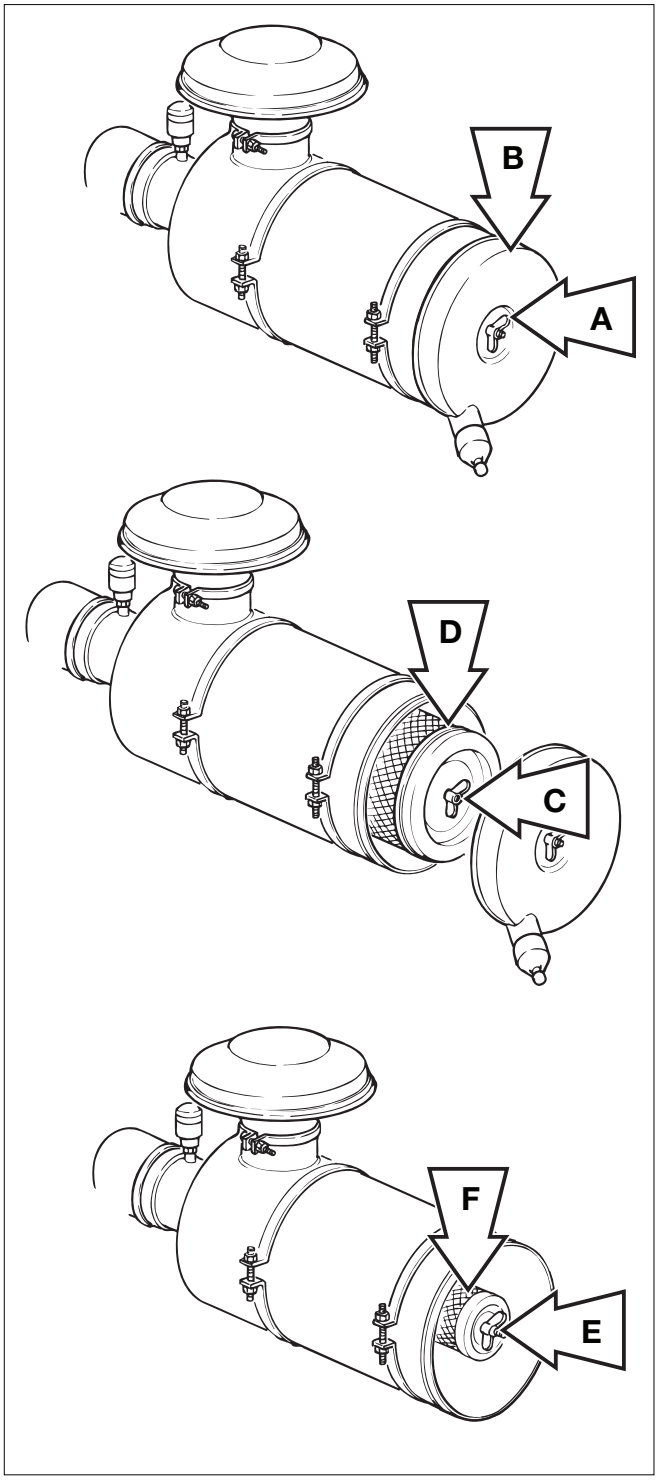
E-1 CHANGE THE SAFETY ELEMENT OF ENGINE AIR FILTER

Replacement of the safety cartridge of the air filter:

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

⚠WARNING

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



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

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

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

NOTICE

Place a container of suitable size under the plug.

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

Recommended oil:

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

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

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

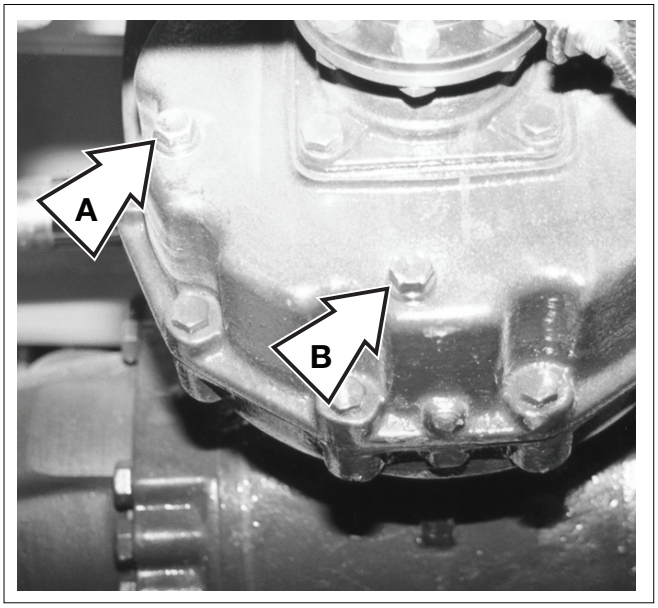
NOTICE

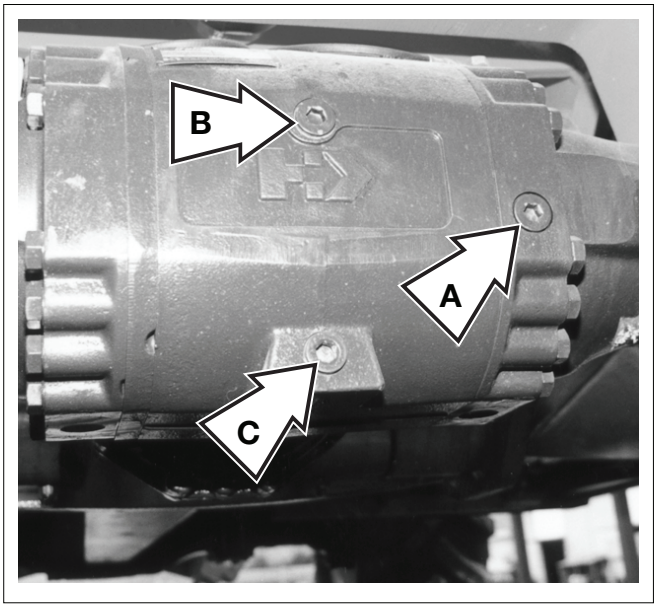
Place a container of suitable size under the plug.

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

Recommended oil:

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





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.

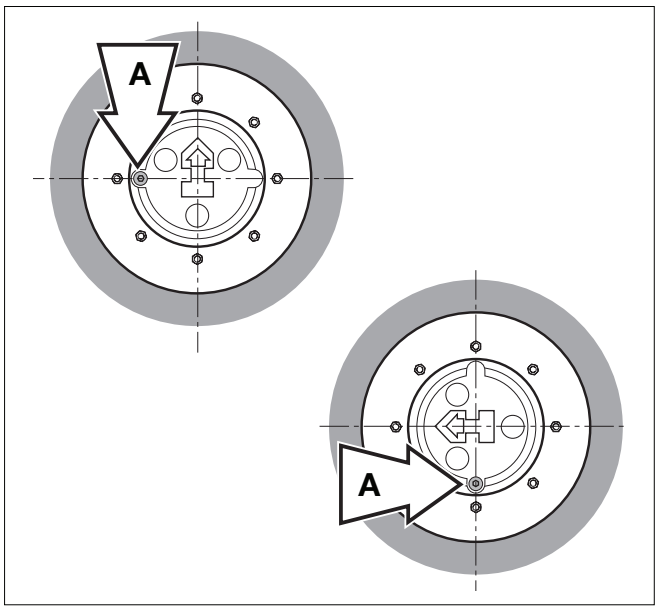
NOTICE

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:

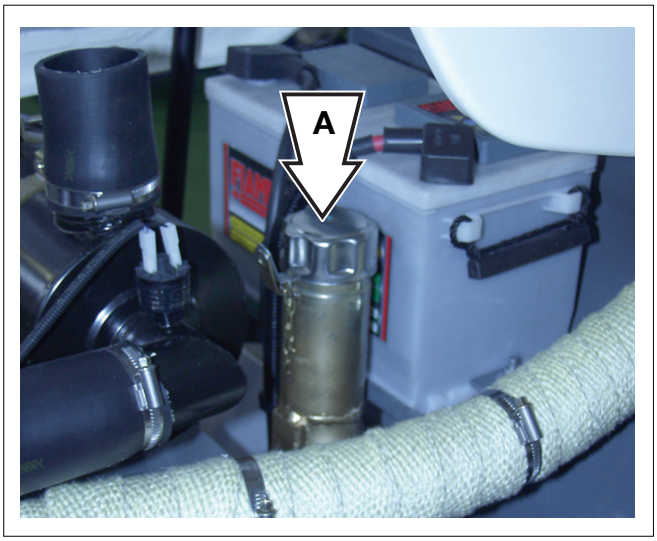
- **FUCHS TITAN GEAR LS 85 W-90 API GL-5 LS / GL-5**

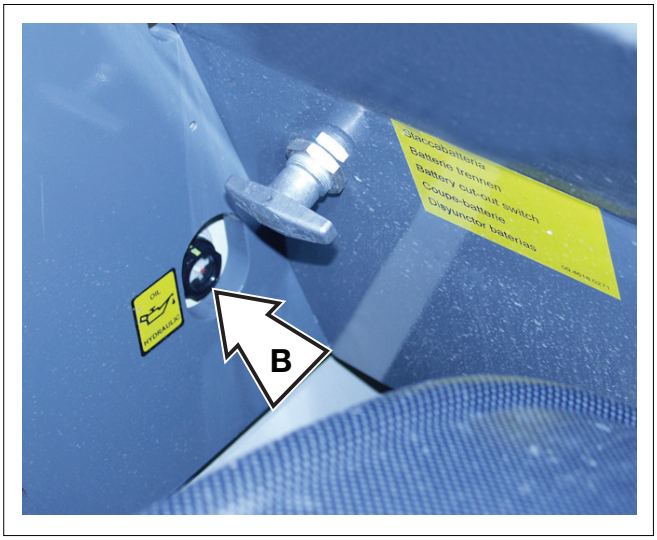


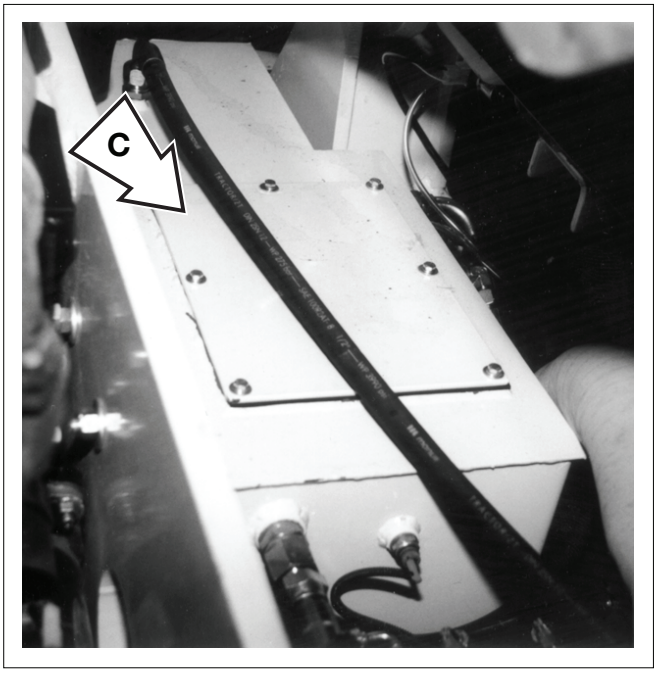
E-4 CHANGE THE HYDRAULIC OIL

To change the hydraulic oil:

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

Section 5
TROUBLESHOOTING

SECTION INDEX

5.1 Introduction ..... page 2
5.2 About this section 3
5.3 Problems-Causes-Solutions 4
5.3.1 Hydraulic problems 4
5.3.2 Electrical problems 9

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 PROBLEMS-CAUSES-SOLUTIONS

5.3.1 Hydraulic problems

Problem	Cause	Solution
The machine does not move forward/back	Low pressure from the transmission pump	Re-calibrate the pump according to the instructions of the manual enclosed.
	DA valve damaged	Check and replace if necessary
	Hydraulic oil filter clogged	Check and replace if necessary
Low boost supply	Pump damaged	Change the pump.
	Hydraulic motor damaged	Change the motor.
Machine traction is low	Hydraulic oil filter clogged	Change the filter.
	Low hydraulic oil level	Top up
	Oil in the tank soiled	Clean tank and pipes, empty the pumps and add new oil.
No shifting between first and second gear	Low boost pressure	Check the boost pressure of the transmission pump.
	Gearbox solenoid valve **6** damaged	Check the mechanical movement of the pin of solenoid valve **6**.
	Mechanical gearbox piston **5** damaged	Check piston **5**.
	Gearbox gears damaged	Check the gears and replace those damaged.
The steering mode cannot be selected	Solenoid valve **13** defective	Check the mechanical movement of the pin of solenoid valve **13**.
Poor parking brake action	Loose cables	Tension the cables and check the relevant clamps.
	Brake control lever in the cab damaged	Check the control lever and replace if necessary.

Problem	Cause	Solution
The stabilisers do not work	Problems to cylinders **23** and **24**	Check cylinders **23** and **24** and their internal seals.
	Problems to the cylinder block valves	Check the valves are in efficient working order and the internal pistons slide correctly.
	Main valve defective	Check the elements of the Walvoil main valve **16**.
The machine does not steer	Pump **3** damaged	Check the operation of gear pump **3**.
	The priority valves doesn't select the oil delivery	Check the priority valve and replace if necessary.
	Power steering damaged	Check power steering **12** is in efficient working order and verify the pilot activates the priority valve of pump **3**.
	Problems to cylinders **14** and **15**	Check cylinders **14** and **15** and their internal seals.
The boom does not move	Pump **3** damaged	The pump doesn't deliver oil. Check and replace if necessary.
	Priority valve defective	The pump priority valve is clogged or damaged; remove, check its seals and refit or change the valve.
	Main valve**16** damaged	Check the solenoid valve of main valve **16** is in efficient working order.
	Pressure relief valve of main valve **16** damaged	Check the pressure relief valve is in efficient working order, eliminate any foreign matters which may hinder a proper operation.
Stepping down on the brake pedal, the machine does not brake	Pump **27** damaged	Carefully check the pump and replace if necessary.
	Brake pump damaged	Carefully check the pump (refer to section "brake pump")

Problem	Cause	Solution
	Problems to the axle brakes	Check the brake disks (see Dana manual supplied with the machine)
The attachment locking cylinder dosn't work	Seals of cylinder **25** damaged	Check the cylinder's internal seals and replace if necessary.
	Quick-fit connectors **26** damaged	Check and replace if necessary.
	Problems to the hydraulic line from main valve to quick-fit connectors	Check and repair any damaged or clogged hoses.
The fork pitching system doesn't work properly	Seals of cylinder **19** damaged	Check the cylinder's internal seals and replace if necessary.
	Block valve of cylinder **19** damaged	Check the valve; clean or replace.
	Problems to the hydraulic line from main valve to block valve	Check and repair any damaged or clogged hoses.
	Safety valves of electric valve **18** maladjusted or damaged	Check that valves fitted to ports **A1** and **B1** of the electric valve **18** are in efficient working order; or re-calibrate or replace
The boom extension system doesn't work properly	Boom internal extension cylinder **22** damaged (only for Telelift 3512).	Check the cylinder's internal seals and rod and the re-sequencing valve at the top of the rod; repair any damaged components or change the cylinder.
	Boom external extension cylinder **21** damaged	Check the cylinder's internal seals and rod and the re-sequencing valve at the top of the rod; repair any damaged components or change the cylinder.
	Block valve of the boom internal extension cylinder damaged	Remove and clean the valve and check its seals; replace if necessary.
	Block valve of the boom external extension cylinder damaged	Remove and clean the valve and check its seals; replace if necessary.
	Valve **18** on port **A2** damaged	Check the valve is in efficient working order or replace.

Problem	Cause	Solution
	Boom extension line hose damaged	Check and replace the hoses if damaged or clogged.
	Main valve damaged	Check the main valve and replace if necessary
The boom lifting system doesn't work properly	Boom lifting cylinder **17** damaged	Check the cylinder's internal seals, rod and liner; repair any damaged components or change the cylinder.
	Block valve of the boom lifting cylinder damaged	Remove and clean the valve and check its seals; replace if necessary.
The boom lowers jerkily	Block valve damaged	Check the valve calibration and replace the valve if necessary.
The boom sections are frequently out of sequence when the boom is extended/retracted (only for Telelift 3512)	Cylinder seals worn	Change the seals.
	Seals of the cylinder re-sequencing valves **21** and **22**.	Check the re-sequencing valves, clean or replace if worn out.
	Air in the circuit	Bleed as indicated in the operator manual.
When the boom is moved up or down, the forks cannot be levelled	Levelling cylinder **20** damaged	Check the cylinder's internal seals and rod; repair any damaged components or change the cylinder.
	Safety valve of the electric valve **18** damaged	Check that the safety valves fitted to ports **A1** and **B1** of the main valve are in efficient working order. Remove and clean, or re-calibrate or replace the valves if necessary.
	One-way valves **32** fitted to the valve holding plate of the levelling cylinder **20** damaged	Remove the valves and check for foreign matters. Change the valves if broken.
	Block valves of the fork levelling and control cylinders **19** and **20** damaged	Remove and clean the valves and check their seals; replace if necessary.

Problem	Cause	Solution
	Fork levelling line hoses damaged	Check and replace the hoses if damaged or clogged.
The booms swings when moved out	Sliding pads worn out	Check the pads for wear and replace if worn.
	Boom not greased	Smear a thin coat of grease of the type recommended by TEREXLIFT on the sliding area of the boom pads.
	Paint or abrasion on the pad sliding rail	Grind and polish the pad's sliding zone on the boom, then grease.
The boom moves hardly in when fully extended and horizontal	Sliding pads worn out	Carefully check all the pads fitted to the front bottom part and the rear high part of the boom; carefully clean the sliding zone of the boom sections and lubricate with the special grease “INTERFLON FIN GREASE LS 2.

5.3.2 Electric problems

Problem	Cause	Solution
Turning the ignition key no power is supplied to the dashboard	Battery discharged	Check the battery charge and replace the battery if necessary.
	Battery disconnect switch turned to wrong position or damaged	Turn to correct position or repair if damaged.
	Ground clamp defective	Check the ground clamp connected to the frame.
	50A maxi-fuse **F2G** interrupted	Check the fuse and replace if necessary.
	Ignition key block damaged	Check input **30** of the key and output **15/54**; replace the ignition key if necessary.
	Electric line defective	Check the line continuity up to the fuse-relay board input.
Turning the ignition key the machine doesn't start	Ignition key block damaged	Check the block and verify you have 12V on output **50** of the key when the machine is started.
	Emergency stop button **S13** damaged	Check the button and change the contacts or the button if necessary.
	Relay **K11** and 70A relay **K01** (inside the box near the engine) interrupted	Check the relays and replace if necessary.
	Electrical line between dashboard and 70A relay **K01** defective	Check the line continuity and repair if necessary.
	Speed selector damaged	Check the selector and verify it is in the neutral position.
	10A fuse **F24** feeding the emergency stop button interrupted	Check the fuse and replace if necessary.
	10A fuse **F14** interrupted	Check the fuse and replace if necessary.
	Electric line between relay **K11** and relay **K01** defective	Check the line continuity and repair if necessary.
	Starting motor protection relay **M1** interrupted	Check the relay and replace if necessary.

Problem	Cause	Solution
	Starting motor **M1** damaged	Check the starting motor and replace if necessary.
	Ground clamp defective	Check the ground clamp connected to the frame.
	Battery disconnect switch turned to wrong position or damaged	Turn to correct position or repair the battery disconnect switch.
The engine runs but doesn't start	No fuel	Refuel
	Injection pump of the Deutz engine damaged	Check the pump and, if the machine is still under warranty, contact the nearest Deutz customer service
	Air in the tank suction system	Bleed the system
	Engine stop solenoid damaged	Check the solenoid and replace if necessary.
The battery gets discharged rapidly	Internal cells broken	Replace with a new equivalent battery.
	The alternator charge is not sufficient	Check the alternator and replace if necessary.
	Wrong absorption of the system	Check and rectify
The machine does not move forward/back	Speed selector **SX12** damaged	Check and replace if necessary.
	10A fuse **F14** interrupted	Check the fuse and replace if necessary.
	Relays **K7** - **K8** - **K9** - **K10** interrupted	Check all the relays and replace those damaged.
	Parking brake micro-switch damaged	Check the micro-switch and replace if necessary.
	Stopped machine relay **K24** interrupted	Check the relay and replace if necessary.
	Rexroth pump solenoid valves damaged	Check the solenoid valves and replace if necessary

Problem	Cause	Solution
	Electric connecting lines	Check the line continuity and repair if necessary
	Outrigger micro-switches damaged	Check the micro-switches and replace if necessary.
	Engaged gear micro-switch	Check the micro-switch and replace if necessary.
	10A fuse **F18** interrupted	Check the fuse and replace if necessary.
No shifting between first and second mechanical gear and vice versa	10A fuse **F14** interrupted	Check the fuse and replace if necessary.
	Mechanical gearbox button **S14** damaged	Check the button and replace if necessary.
	Gearbox sensor **S53** damaged	Check the sensor and replace if necessary.
	Relay **K5** interrupted	Check the relay and replace if necessary.
	Stopped machine relay **K24** interrupted	Check the relay and replace if necessary.
	Gearbox valve solenoids damaged	Check and replace if necessary.
	Electric connecting lines	Check the line continuity and repair if necessary
The boom doesn't move	Road-jobsite-platform selector on road or damaged	Check the position; change the selector if damaged.
	Electric connecting lines	Check the line continuity and repair if necessary
The 3B6 system doesn't change scale when the machine is on wheels or stabilised	10A fuse **F18** interrupted	Check the fuse and replace if necessary.
	Outrigger micro-switches damaged	Check the micro-switches and replace if necessary.
	Electric line connecting the micro-switches to the DLE.	Check the line continuity and repair if necessary.

Problem	Cause	Solution
	Socket **X25** on DLE defective	Check the pins of the signal inputs; if damaged, replace the socket.
	DLE display damaged	Change the DLE
No steering mode selction (two-wheels, four-wheels, crab)	10A fuse **F5** interrupted	Check the fuse and replace if necessary.
	Road-jobsite-platform selector **S2** damaged	Check the selector and replace if necessary.
	Steer mode selector **S22** damaged	Check the selector and replace if necessary.
	Spools **Y20-Y21** of the crab or four-wheel steering selection solenoid damaged	Check the spools and replace if necessary..
	Electric connecting lines	Check the line continuity and repair if necessary
The horn doesn't work	10A fuses **F10** or 15A **F21** interrupted	Check the fuses and replace if necessary.
	Horn button **SX11** on speed selector damaged	Check the button and replace if necessary.
	Horn **H20** damaged	Check the horn and replace if necessary.
	Electric connecting lines	Check the line continuity and repair if necessary
The beacon doesn't work	7.5A fuse **F11** interrupted	Check the fuse and replace if necessary.
	Beacon **X101** damaged.	Check the beacon and replace if necessary.
	Electric connecting lines	Check the line continuity and repair if necessary
The heating fan doesn't work	15A fuse **F2** interrupted	Check the fuse and replace if necessary.
	Fan control switch **S20** damaged	Check the switch and replace if necessary.

Problem	Cause	Solution
	Heating fan motor **M5** damaged	Check the fan motor and replace if necessary.
	Electric connecting lines	Check the line continuity and repair if necessary
The sensor checking the low boom position doesn't work	10A fuse **F18** interrupted	Check the fuse and replace if necessary.
	Sensor **B38** damaged	Check the sensor and replace if necessary.
	Electric connecting lines	Check the line continuity and repair if necessary
The air filter restriction indicator light doesn't work	Dashboard indicator light **X1** defective	Check the indicator light and replace if necessary
	Filter restriction sensor **B15** damaged	Check the sensor and replace if necessary.
	Electric connecting lines	Check the line continuity and repair if necessary
The engine cooling oil temperature indicator light doesn't work	Temperature sensing bulb **B13** damaged	Check the bulb and replace if necessary.
	Dashboard indicator light **X1** defective	Check the indicator light and replace if necessary
	Electric connecting lines	Check the line continuity and repair if necessary
The Deutz engine oil pressure light indicator doesn't work	Pressure switch **B11** for low engine oil pressure damaged	Check the pressure switch on the engine and replace if necessary.
	Dashboard indicator light **X1** defective	Check the indicator light and replace if necessary
	Electric connecting lines	Check the line continuity and repair if necessary
The Deutz engine oil thermometer doesn't work	Dashboard thermometer **P1** damaged	Check the thermometer and replace if necessary.

Problem	Cause	Solution
	Deutz engine oil temperature transducer **B14** damaged	Check the transducer and replace if necessary.
	Electric connecting lines	Check the line continuity and repair if necessary.
The hydraulic oil thermometer doesn't work	Dashboard thermometer **P2** damaged	Check the thermometer and replace if necessary.
	Hydraulic oil temperature transducer **B16** damaged	Check the transducer and replace if necessary.
	Electric connecting lines	Check the line continuity and repair if necessary.
The fuel gauge doesn't work	7.5A fuse **F9** interrupted	Check the fuse and replace if necessary.
	Dashboard fuel gauge **P3** damaged	Check the fuel gauge and replace if necessary.
	Fuel detector **B12** fitted to a damaged tank	Check the fuel detector and replace if necessary.
	Electric connecting lines	Check the line continuity and repair if necessary.
The hour-meter doesn't work	Hour-meter damaged	Check the hour-meter and replace if necessary.
	Alternator **A1** damaged	Check the alternator and replace if necessary.
	Electric connecting lines	Check the line continuity and repair if necessary.

Section 6
SCHEMES

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6.1 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

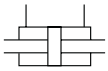

Variable displacement pump with flow regulator

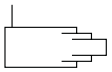
CYLINDERS


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

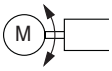

Hand-operated control with pedal


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

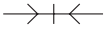

Connecting point

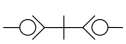

Pipe cross without connection


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

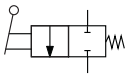
Thermometer

Flowmeter

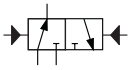
Pressure switch

Drain to tank indication

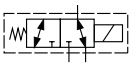
DISTRIBUTION - SETTING ELEMENTS



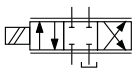
Two-position and two-way distributor, with manual lever control and spring return



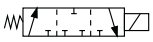
Three-way and two-position distributor, with hydraulic control



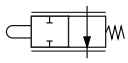
Two-position, three-way distributor, with electro-magnetic control and spring return



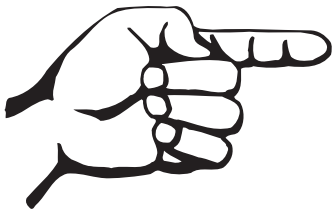
Distributor with mechanical control and span proportional to the action of the same control



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



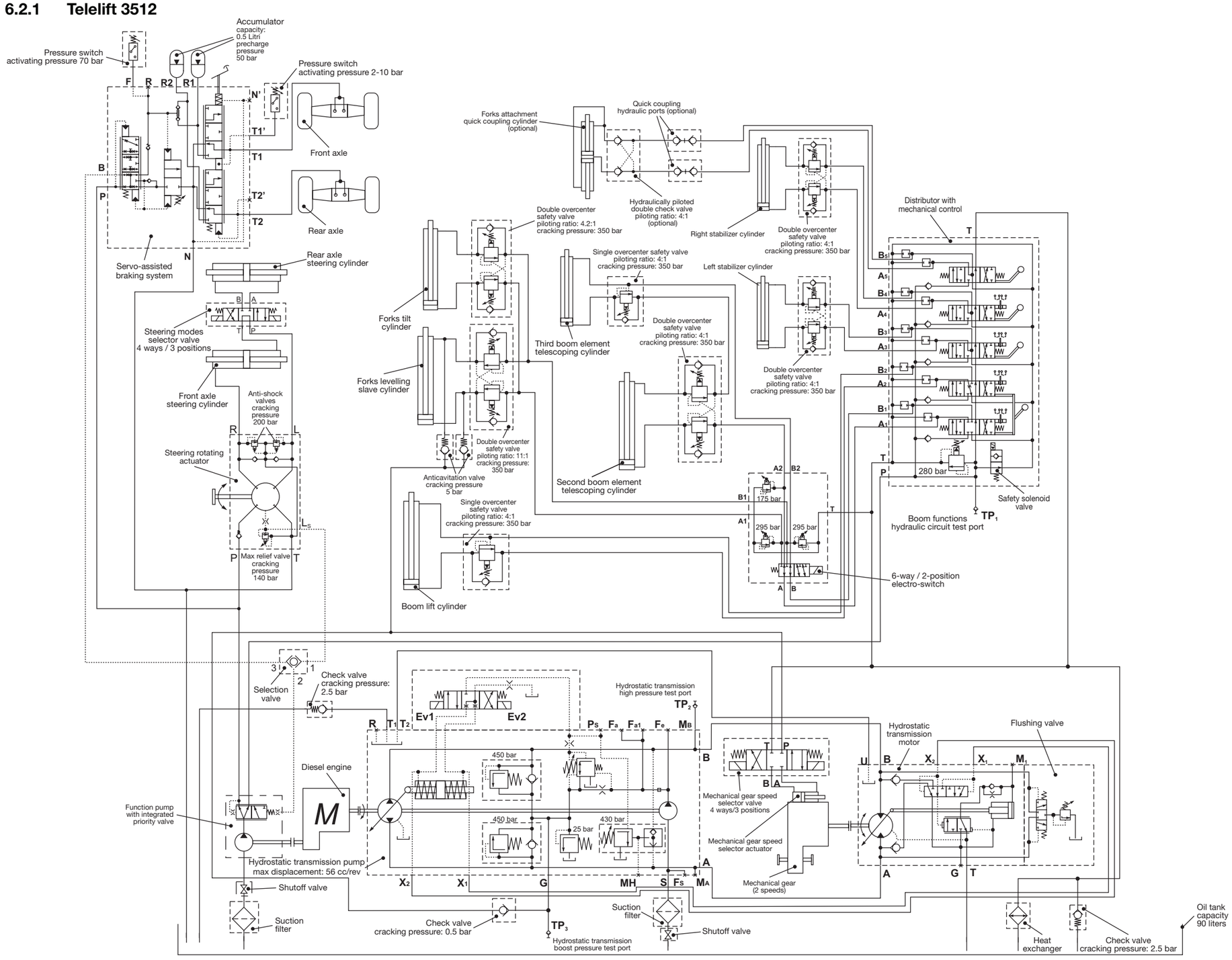
Electro-hydraulic single-acting servo valve



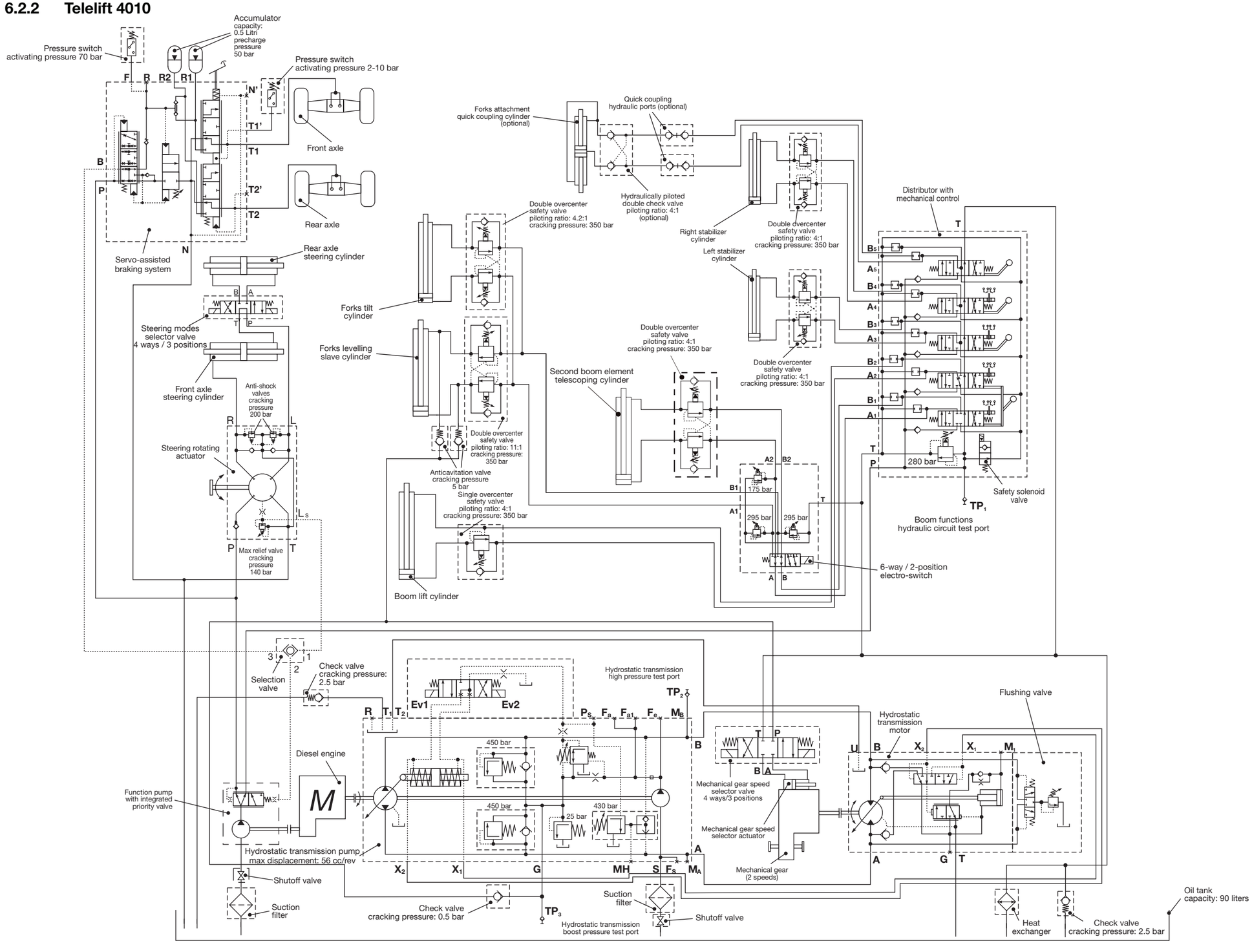
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6.2 HYDRAULIC SCHEMATICS

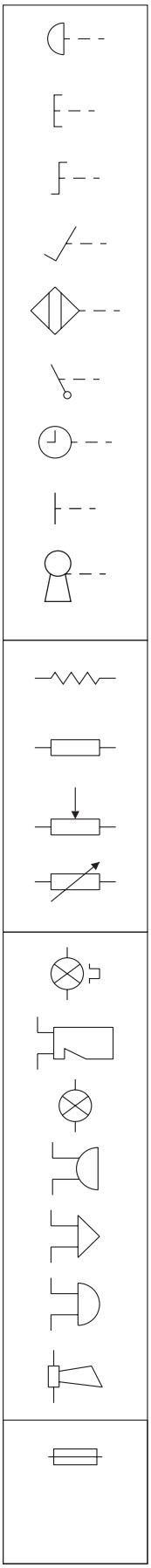
6.2.1 Telelift 3512



6.2.2 Telelift 4010



6.3 ELECTRICAL SYMBOLS

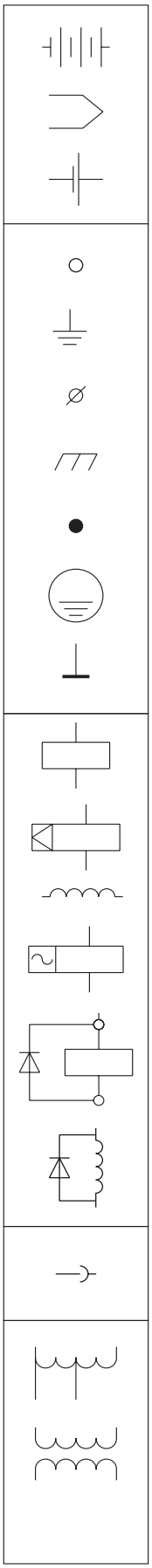


ACTUATORS
Emergency controls
Pushbutton control
Rotary control
Pedal control
Proximity control
Lever control
Timed control
Mechanical/manual control
Key control

RESISTANCES
Resistance
Resistor
Potentiometer
Variable resistance

SIGNALS
Intermittent lamp
Whistle
Lamp
Buzzer
Siren
Bell
Horn

FUSES AND RELAYS
Horizontal fuse
Relay



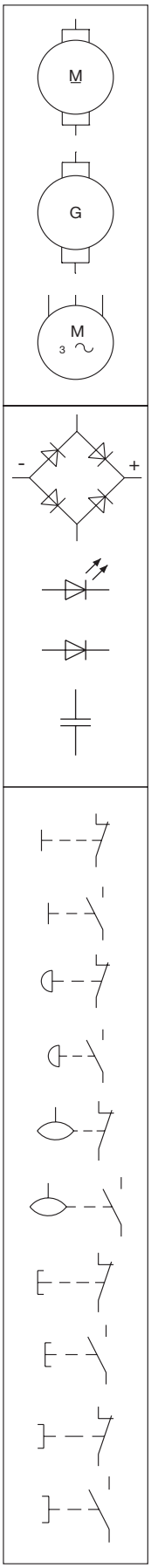
ACCUMULATORS
Battery
Thermocouple
Element

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

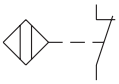

Magneto-thermal closure


Magneto-thermal opening


Thermal closure

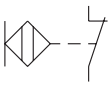

Thermal opening


Exchange


NC proximity


NO proximity


NO mechanical

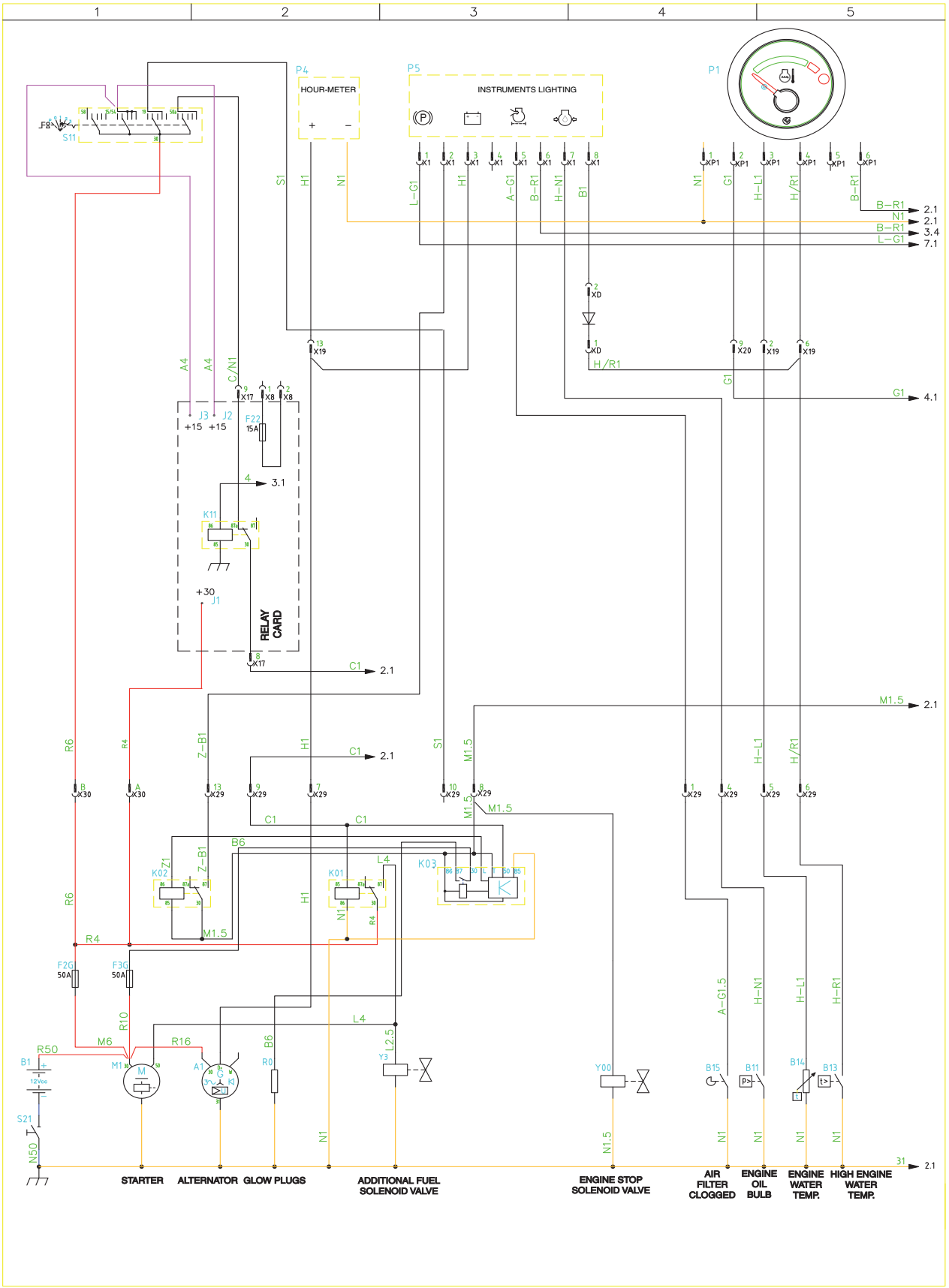

NC mechanical


Selector

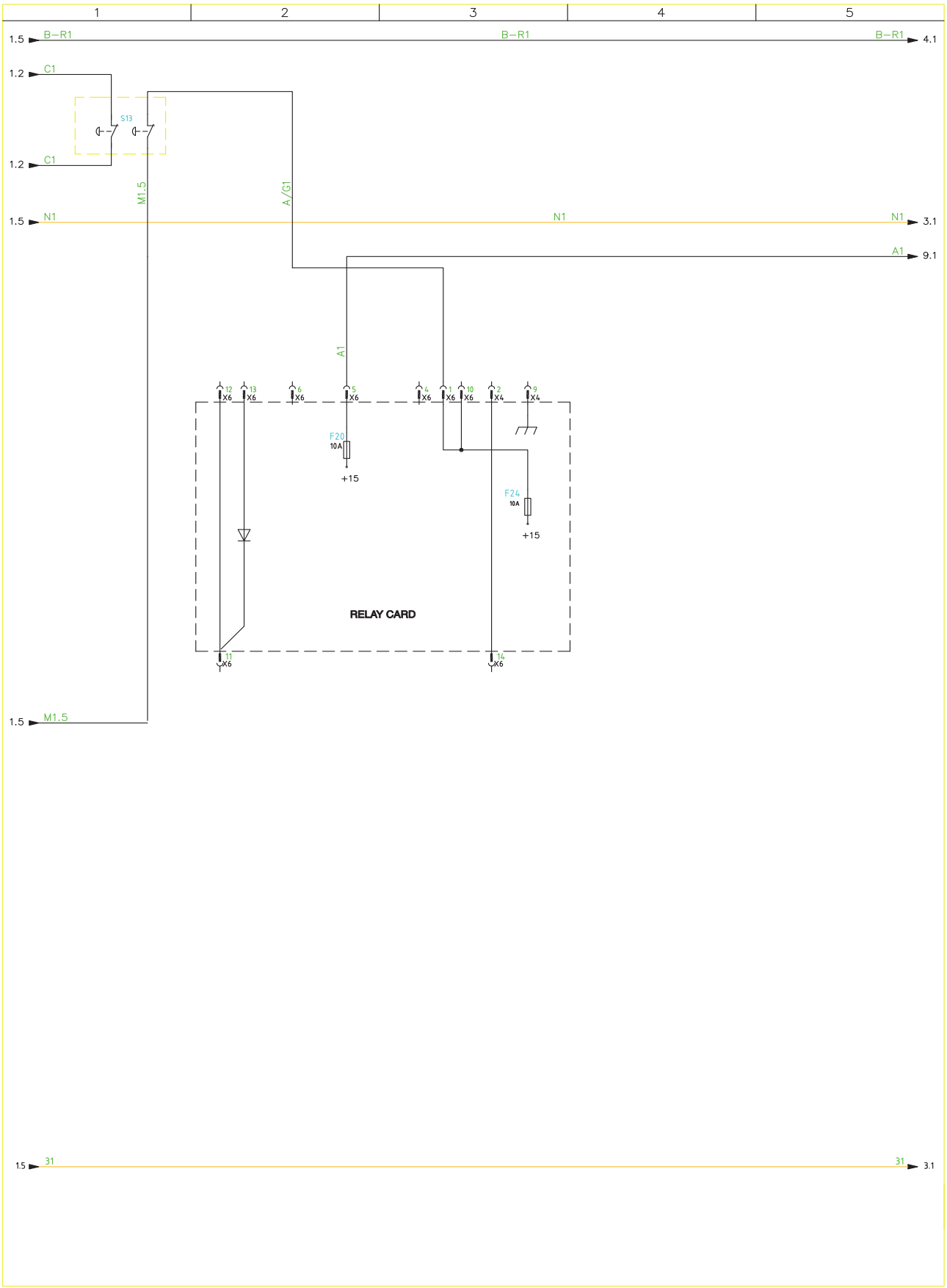

Selector2

6.4 WIRING DIAGRAMS

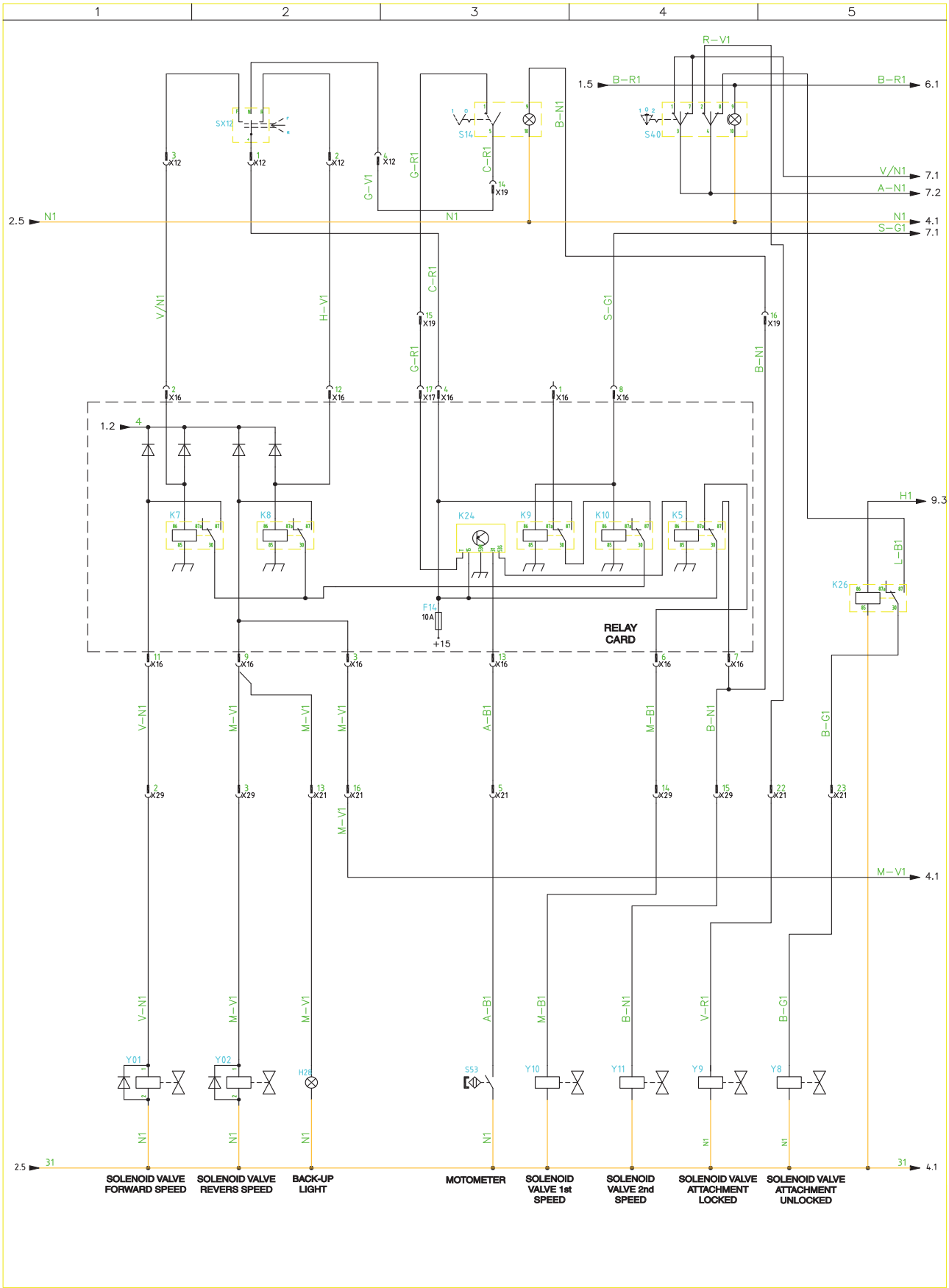
6.4.1 Sheet 1 of 9



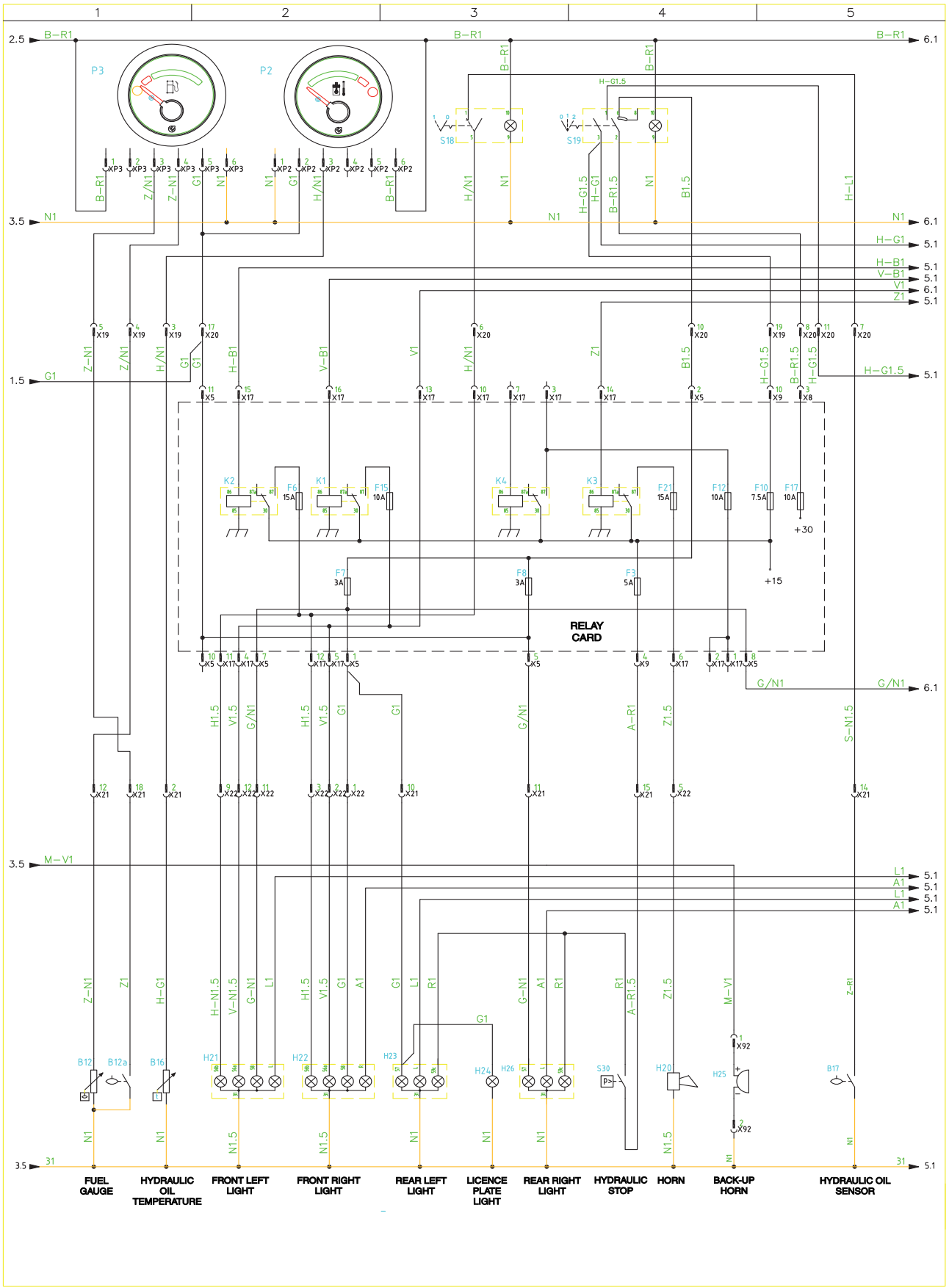
6.4.2 Sheet 2 of 9



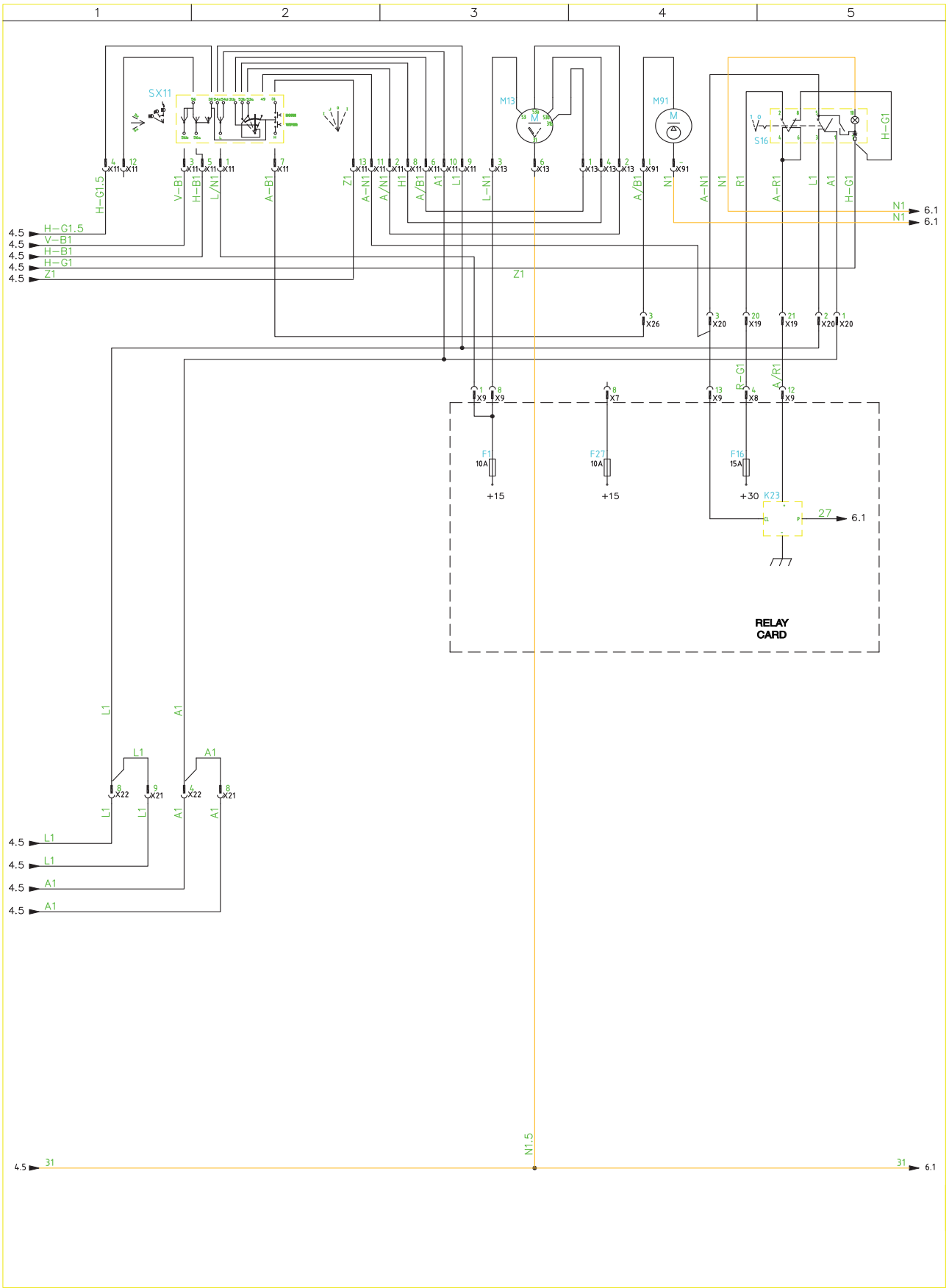
6.4.3 Sheet 3 of 9



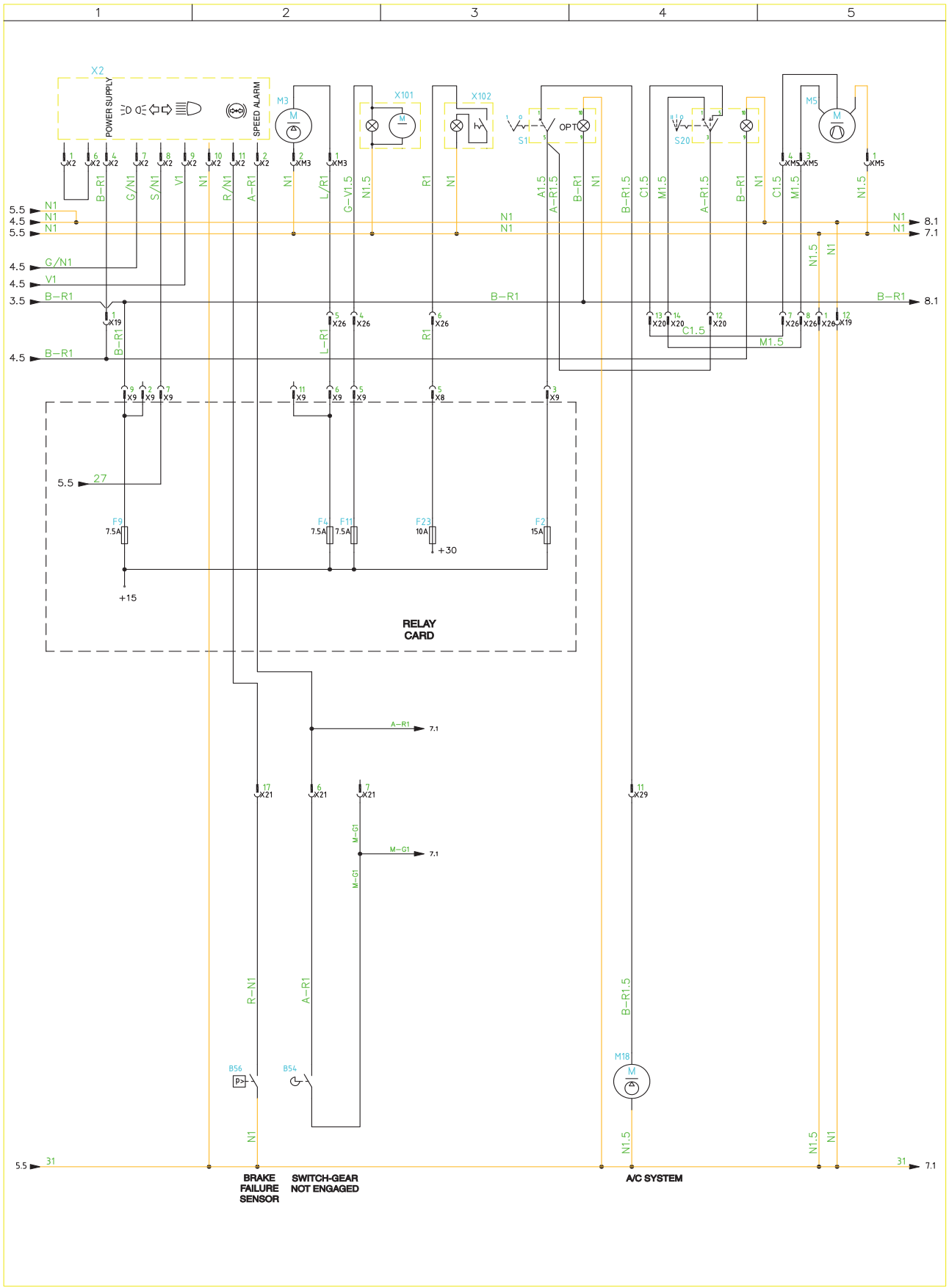
6.4.4 Sheet 4 of 9



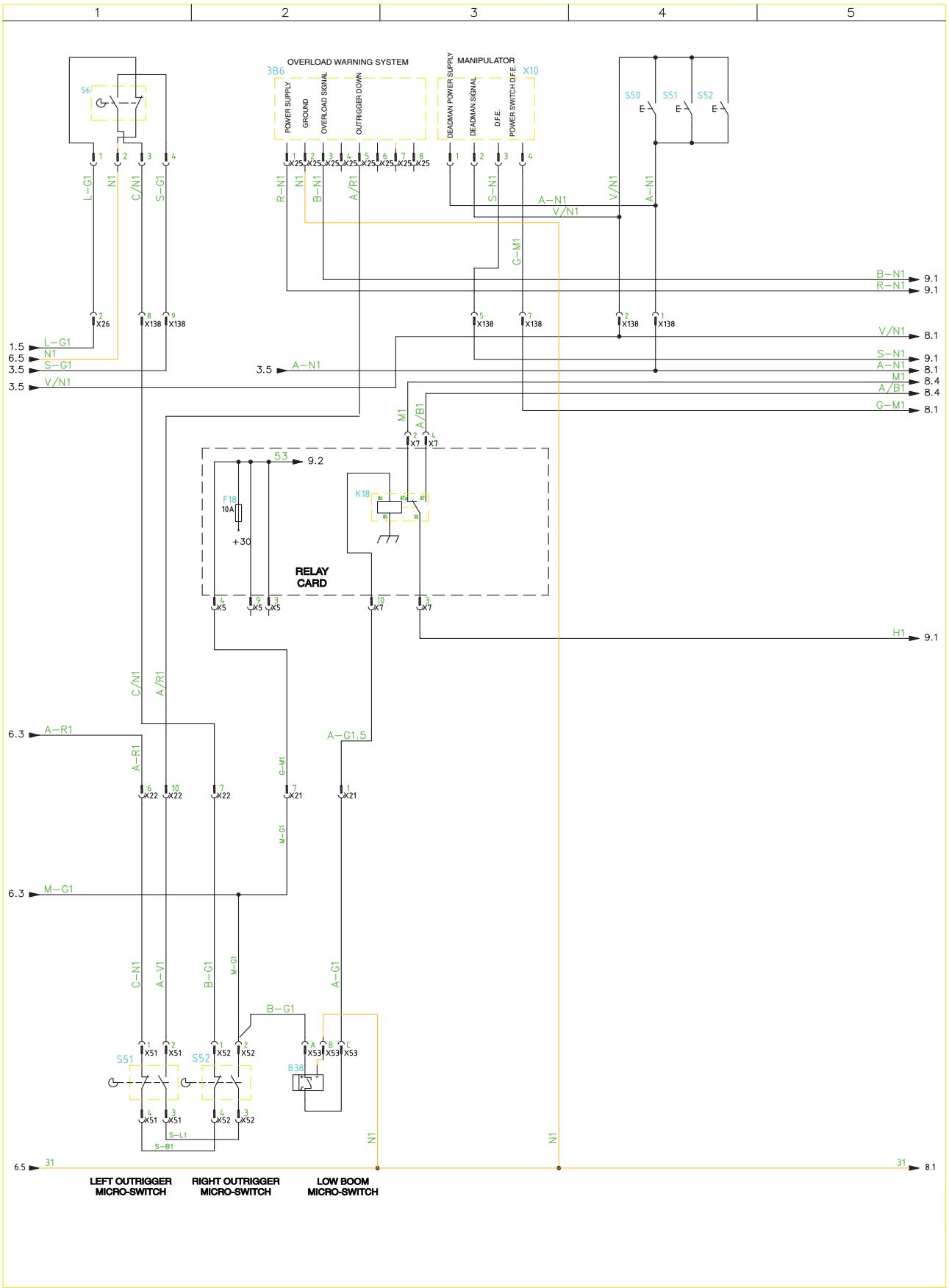
6.4.5 Sheet 5 of 9



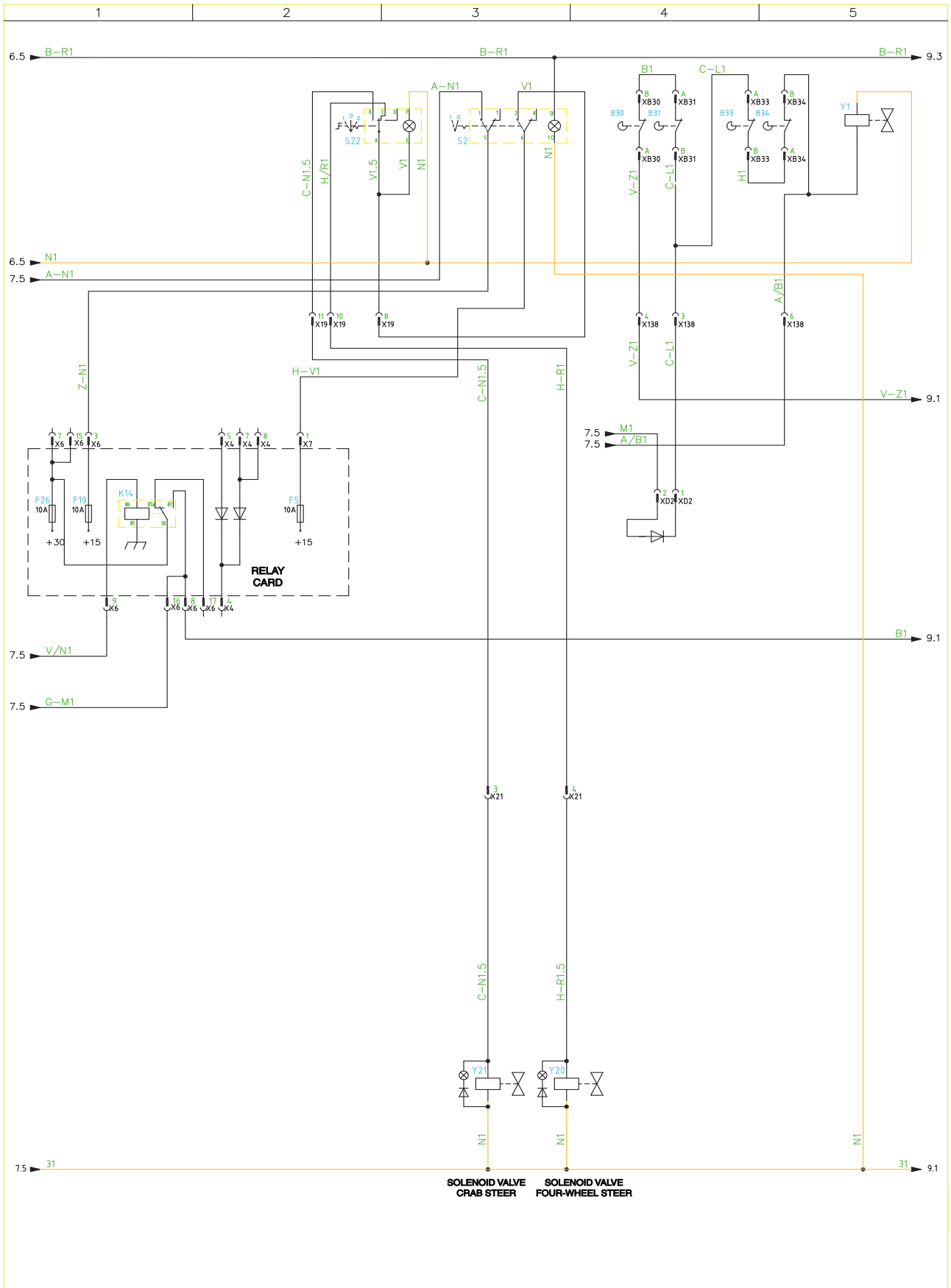
6.4.6 Sheet 6 of 9



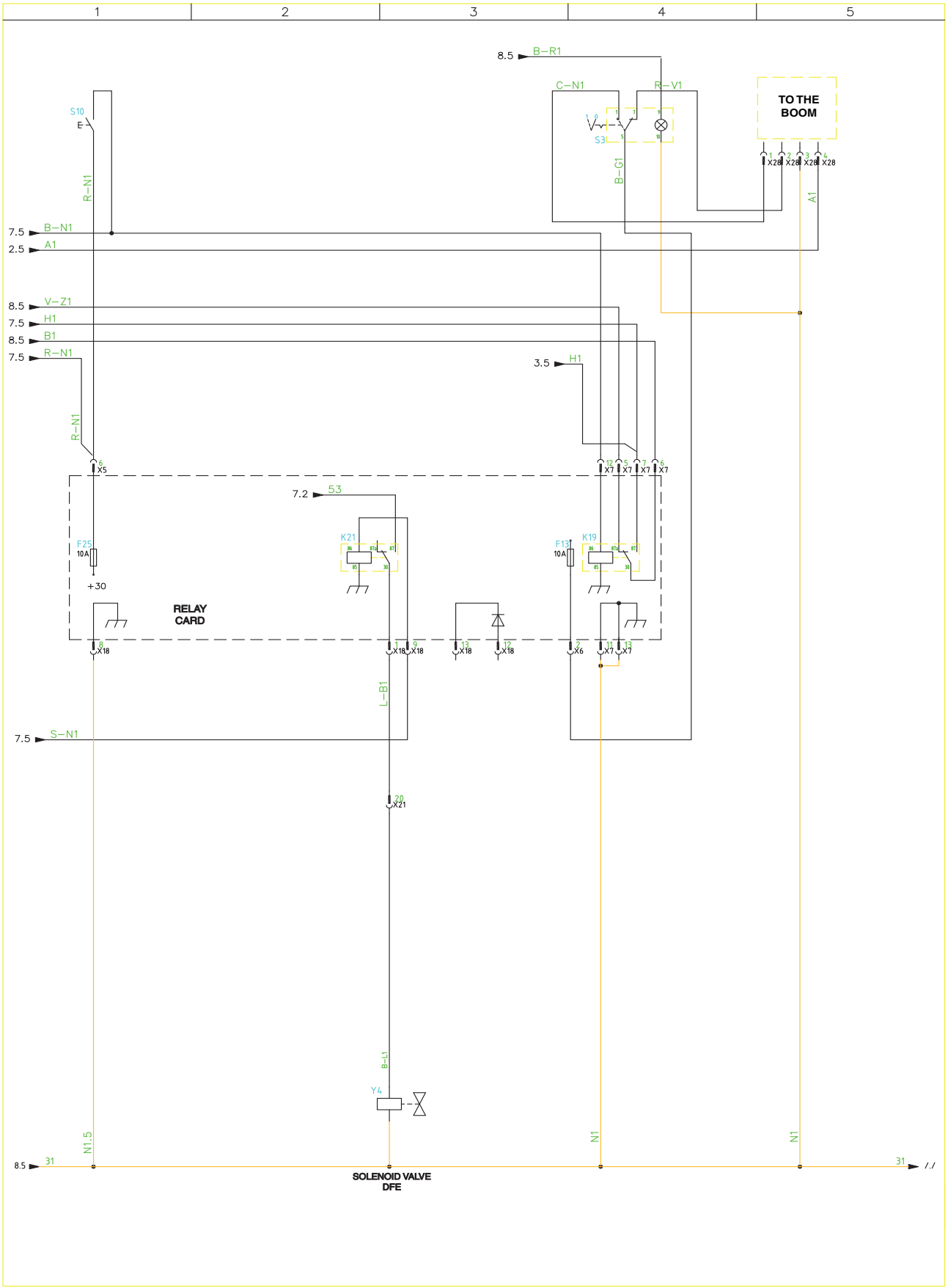
6.4.7 Sheet 7 of 9



6.4.8 Sheet 8 of 9



6.4.9 Sheet 9 of 9



6.4.10 Wiring diagram - Component description

Ref	Description	Sheet
3B6	OVERLOAD WARN.SYSTEM CONTROL UNIT	7
A1	ALTERNATOR	1
B1	BATTERY	1
B11	PRESSURE SWITCH - ENGINE OIL FILTER	1
B12	FUEL GAUGE	4
B12a	FUEL RESERVE	4
B13	THERMOSTAT - HIGH ENGINE WATER TEMPERATURE	1
B14	THERMOMETER - HIGH ENGINE WATER TEMPERATURE	1
B15	MICRO-SWITCH - AIR FILTER CLOGGED	1
B16	THERMOMETER - HIGH HYDRAULIC OIL TEMPERATURE	4
B17	HYDRAULIC OIL SENSOR	4
B54	SWITCH - GEAR NOT ENGAGED	6
B56	BRAKE FAILURE SENSOR	6
F1	FUSE - HAZARD WARNING LIGHTS 10 A	5
F2	FUSE - HEATING 15 A	6
F3	FUSE - STOP LIGHT MICRO-SWITCH 5 A	4
F4	FUSE - REAR WIPER 7.5 A	6
F5	FUSE - WORK MODE SELECTOR 10 A	8
F6	FUSE - LOW BEAM 15 A	4
F7	FUSE - RIGHT POSITION LIGHTS 3 A	4
F8	FUSE - INSTRUMENT LIGHTING 3 A	4
F9	FUSE - INDICATOR LIGHTS POWER SUPPLY 7.5 A	6
F10	FUSE - LIGHTS SWITCH 7.5 A	4
F11	FUSE - BEACON 7.5 A	6
F12	FUSE - WORK LIGHTS 10 A	4
F13	FUSE - JIB SWITCH 10 A	9
F14	FUSE - SPEED SWITCH 10 A	3
F15	FUSE - HIGH BEAM 10 A	4
F16	FUSE - EMERGENCY 15 A	5
F17	FUSE - LIGHTS AND FLASHING 10 A	4
F18	FUSE - OUTRIGGERS 10 A	7
F19	FUSE - WORK MODE SELECTOR 10 A	8
F20	FUSE - PLATFORM EMERGENCY BUTTON 10 A	2
F21	FUSE - HORN 15 A	4
F22	FUSE - PLATFORM OPTIONAL 15 A	1
F23	FUSE - CAB LIGHTS 10 A	6
F24	FUSE - EMERGENCY STOP	2
F25	FUSE - 3B6 CONTROL UNIT 10 A	9
F26	FUSE - STABILIZERS 10 A	8
F27	FUSE - OPTIONAL	5
F2G	MAIN FUSE 50 A	1
F3G	MAIN FUSE 50 A	1
H20	HORN	4
H21	FRONT LEFT LIGHT	4
H22	FRONT RIGHT LIGHT	4
H23	REAR LEFT LIGHT	4
H24	LICENCE PLATE LIGHT	4
H25	BACK-UP BUZZER	4
H26	REAR RIGHT LIGHT	4
H28	BACK-UP LIGHT	3
K01	RELAY - START-UP	1
K02	RELAY - PRE-HEATING	1
K03	RELAY - ENGINE STOP	1
K1	RELAY - HIGH BEAM	4
K2	RELAY - LOW BEAM	4
K3	RELAY - HORN	4
K4	RELAY - WORK LIGHTS	4
K5	RELAY - 1st and 2nd MECHANICAL SPEED	3
K7	RELAY - FORWARD SPEED	3
K8	RELAY - REVERSE SPEED	3
K9	RELAY - TRANSMISSION DISCONNECTED	3
K10	RELAY - TRANSMISSION DISCONNECTED	3
K11	RELAY - ENGINE START-UP ENABLING COMMAND	1
K14	RELAY - OUTRIGGERS	8
K18	RELAY - ENABLING OUTRIGGER	7
K19	RELAY - BLOCKED FORKS	9
K21	RELAY - POWER SUPPLY DFE SOLENOID VALVE	9
K23	FLASHING FUNCTION	5
K24	MODULE - SHAFT STOPPED	3
M1	STARTING MOTOR	1
M3	REAR WINDSCREEN WIPER/WASHER	6
M5	HEATING FAN	6
M13	WINDSCREEN WIPER/WASHER MOTOR	5
M18	A/C SYSTEM	6
M91	PUMP MOTOR	5
R0	GLOW PLUGS	1
S1	SWITCH - AIR CONDITIONER	6
S2	SWITCH - HYDRAULIC ACTIVATION	8
S3	SWITCH - JIB	9
S6	PARKING BRAKE MICRO-SWITCH	7
S10	MOMENT LIMITING SYSTEM CUTOUT	9
S11	ENGINE IGNITION KEY	1
S14	SWITCH - 1st and 2nd MECHANICAL GEAR	3
S16	SWITCH - HAZARD WARNING LIGHT	5
S18	SWITCH - BACK-UP LAMP	4
S19	SWITCH - LIGHTS	4
S20	SWITCH - HEATER	6
S21	BATTERY CUTOUT	1
S22	SWITCH - STEERING SELECTOR	8
S30	HYDROSTOP	4
S50	DEADMAN BUTTON JOYSTICK	7
S51	DEADMAN BUTTON JOYSTICK	7
S52	DEADMAN BUTTON JOYSTICK	7
S53	RPM SENSOR GEAR BOX	3
S13	EMERGENCY MUSHROOM-HEAD PUSHBUTTON	2
Y00	SOLENOID VALVE - ENGINE STOP	1
Y01	SOLENOID VALVE - FORWARD SPEED	3

Ref	Description	Sheet
Y02	SOLENOID VALVE - REVERSE SPEED	3
Y1	SOLENOID VALVE - DEADMAN	8
Y20	SOLENOID VALVE - FOUR-WHEEL STEER	8
Y21	SOLENOID VALVE - CRAB STEER	8
P5	INDICATOR LIGHT INSTRUMENT	1
X2	INDICATOR LIGHT INSTRUMENT	6
X4	9-WAY MARK CONNECTOR	
X5	11-WAY MARK CONNECTOR	
X6	17-WAY MARK CONNECTOR	
X7	13-WAY MARK CONNECTOR	
X8	5-WAY MARK CONNECTOR	
X9	13-WAY MARK CONNECTOR	
X10	JOYSTICK	7
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 - REAR LINE	
X22	12-WAY DEUTSCH CONNECTOR - REAR LINE	
X25	12-WAY DEUTSCH CONNECTOR	
X26	17-WAY MARK CONNECTOR	
X28	9-WAY MARK CONNECTOR	
X29	24-WAY DEUTSCH CONNECTOR - ENGINE LINE	
X30	2-WAY CONNECTOR	
X91	2-WAY 90° CONNECTOR	
X101	BEACON	6
X102	CAB LIGHTS	6
XD	5-WAY MARK CONNECTOR	
XM3	2-WAY CONNECTOR	
XM5	4-WAY CONNECTOR	
XP1	6-WAY MIC 70 CONNECTOR	
XP2	6-WAY CONNECTOR	
XP3	6-WAY CONNECTOR	
Y3	ADDITIONAL FUEL SOLENOID VALVE	1
Y4	DFE SOLENOID VALVE	9
K26	RELAY - SAFETY ATTACHMENT UNLOCK SOLENOID VALVE	3
S40	SWITCH - SAFETY ATTACHMENT UNLOCK SOLENOID VALVE	3
Y8	SOLENOID VALVE ATTACHMENT UNLOCKED	3
Y9	SOLENOID VALVE ATTACHMENT LOCKED	3
Y10	SOLENOID VALVE 1st SPEED	3
Y11	SOLENOID VALVE 2nd SPEED	3
B30	MICRO-SWITCH BOOM IN/UOT	8
B31	MICRO-SWITCH BOOM UP/DOWN	8
B33	MICRO-SWITCH LEFT OUTRIGGER	8
B34	MICRO-SWITCH RIGHT OUTRIGGER	8
B38	LOW BOOM MICRO-SWITCH	7
P1	ENGINE WATER GAUGE	1
P2	HYDRAULIC OIL TEMPERATURE GAUGE	4
P3	FUEL GAUGE	4
P4	HOUR-METER	1
SX11	LIGHT SWITCH	5
SX12	FORWARD-REVERS LEVER	3

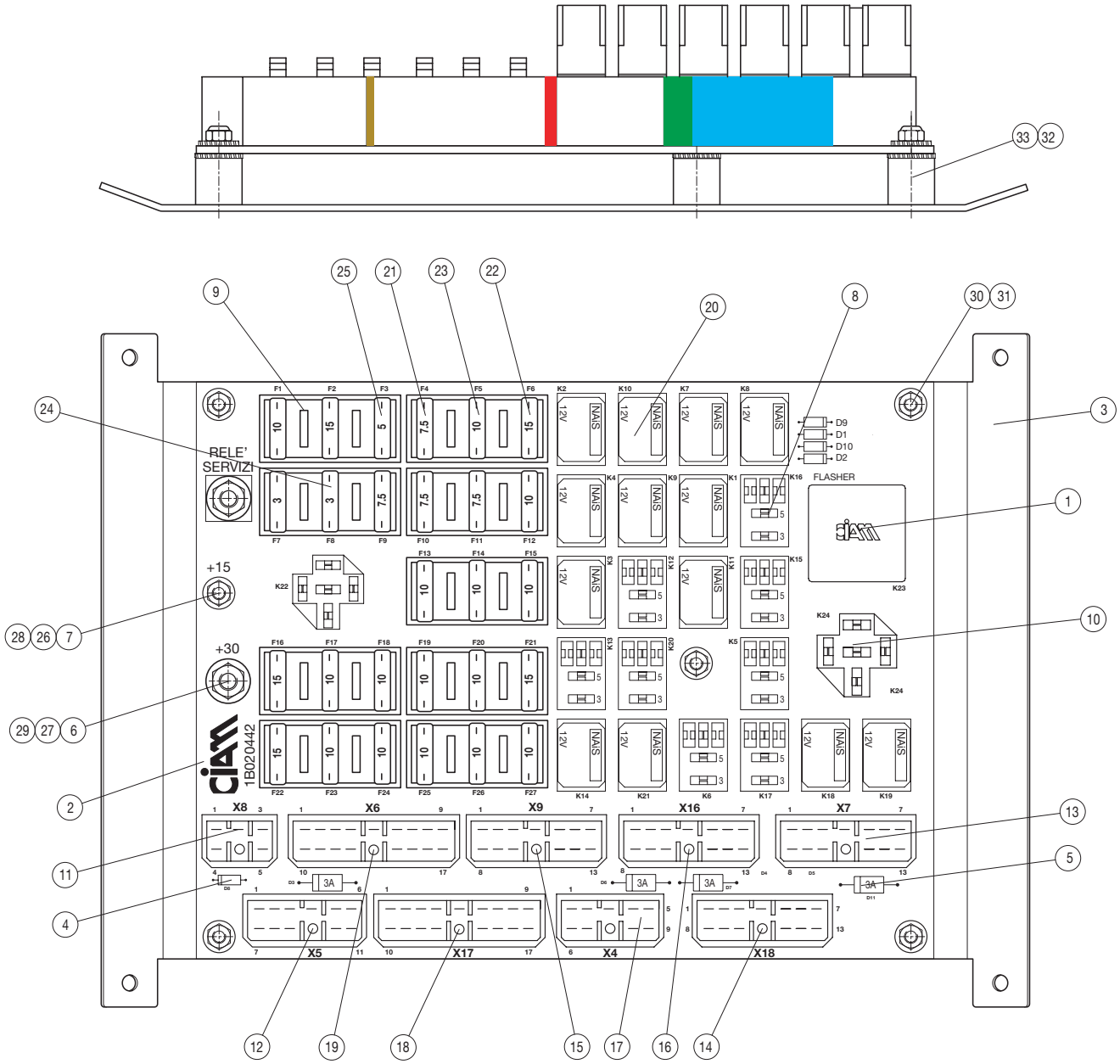
WIRE COLOURS

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

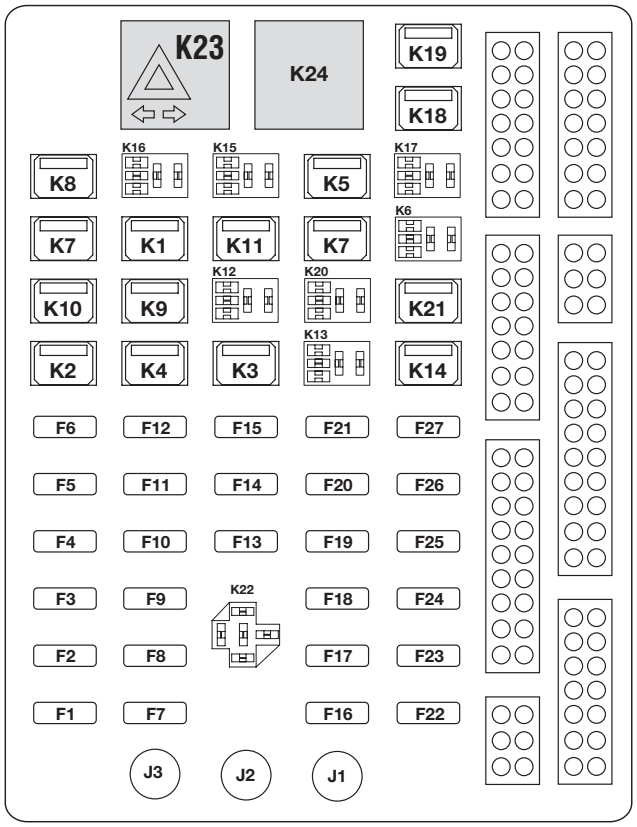
REMARK: Two-colour wires are indicated through a combination of the aforesaid initials as follows:

G/V = YELLOW/GREEN (crosswise colouring)
G-V = YELLOW-GREEN (lengthswise colouring)

6.4.11 Fuses and relays board



Pos.	Description	Amp.
1	12V FLASHING	
2	PRINTED CIRCUIT	
3	RELAY CARD SUPPORT	
4	1N 4007 DIODES, BLACK	
5	3 A 1N5408 DIODES	
6	POWER TERMINAL M6	
7	POWER TERMINAL M5	
8	BOARD RELAY MICRO-SWITCH CONNECTOR	
9	BOARD FUSE-BOX CONNECTOR	
10	BOARD FUSE-BOX CONNECTOR	
11	5-WAY MARK II CONNECTOR - BOARDS	
12	11-WAY MARK II CONNECTOR - BOARDS	
13	13-WAY MARK.II CONNECTOR - BOARDS	
14	13-WAY MARK.II CONNECTOR - LIGHT BLUE	
15	13-WAY MARK.II CONNECTOR - RED	
16	13-WAY MARK.II CONNECTOR - GREEN	
17	9-WAY MARK II CONNECTOR - BOARDS	
18	17-WAY MARK II CONNECTOR - BOARDS	
19	17-WAY MARK II CONNECTOR - YELLOW	
20	MICRO-SWITCH RELAY WITH 12V DIODE	
21	KNIFE-BLADE FUSE	7,5
22	KNIFE-BLADE FUSE	15
23	KNIFE-BLADE FUSE	10
24	KNIFE-BLADE FUSE	3
25	257005 KNIFE-BLADE FUSE	5
26	WASHER ø .3x8.9x1.2 UNI1751, STAINLESS STEEL	
27	WASHER ø 6.4x11.3x1.6 UNI1751, STAINLESS STEEL	
28	NUT M5 UNI 5588-65, STAINLESS STEEL	
29	NUT M6 UNI 5588, STAINLESS STEEL	
30	NUT M4 UNI 7473, STAINLESS STEEL	
31	WASHER 3.5x13.6x2, CERTENE	
32	WASHER 4.4x10x1.1, NYLON	
33	VIBRATION-PROOF PAD M4x10, STAINLESS STEEL	



FUSES

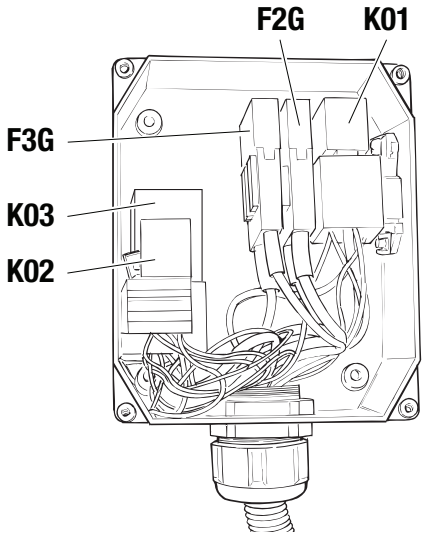
Pos.	Description	Amp.
F1	FUSE - HAZARD WARNING LIGHTS	10
F2	FUSE - HEATING	15
F3	FUSE - STOP LIGHT MICRO-SWITCH	5
F4	FUSE - REAR WIPER	7,5
F5	FUSE - WORK MODE SELECTOR	10
F6	FUSE - LOW BEAM	15
F7	FUSE - RIGHT POSITION LIGHTS	3
F8	FUSE - INSTRUMENT LIGHTING	3
F9	FUSE - INDICTAOR LIGHTS POWER SUPPLY	7,5
F10	FUSE - LIGHTS SWITCH	7,5
F11	FUSE - BEACON	7,5
F12	FUSE - WORK LIGHTS	10
F13	FUSE - WALVOIL CONTROL UNIT	10
F14	FUSE - FORWARD/REVERSE SELECTOR	10
F15	FUSE - HIGH BEAM	10
F16	FUSE - EMERGENCY	15
F17	FUSE - LIGHTS AND FLASHING	10
F18	FUSE - OUTRIGGERS	10
F19	FUSE - WORK MODE SELECTOR	10
F20	FUSE - PLATFORM EMERGENCY BUTTON	10
F21	FUSE - HORN	15
F22	FUSE - PLATFORM FUNCTION	15
F23	FUSE - CAB LIGHTS	10
F24	FUSE - EMERGENCY STOP	10
F25	FUSE - 3B6 CONTROL UNIT	10
F26	FUSE - OUTRIGGERS	10
F27	FUSE - OPTIONAL	10

RELAYS

Pos.	Circuit
K1	RELAY - HIGH BEAM
K2	RELAY - LOW BEAM
K3	RELAY - HORN
K4	RELAY - WORK LIGHTS
K5	RELAY - 1st and 2nd MECHANICAL SPEED
K6	RELAY - NOT USED
K7	RELAY - FORWARD SPEED
K8	RELAY - REVERSE SPEED
K9	RELAY - TRANSMISSION DISCONNECTED
K10	RELAY - TRANSMISSION DISCONNECTED
K11	RELAY - START-UP ENABLING COMMAND
K12	RELAY - NOT USED
K13	RELAY - NOT USED
K14	RELAY - OUTRIGGERS
K15	RELAY - NOT USED
K16	RELAY - NOT USED
K17	RELAY - NOT USED
K18	RELAY - OPTIONAL
K19	RELAY - BLOCKED FORKS
K20	RELAY - NOT USED
K21	RELAY - POWER SUPPLY ACTIVATION FROM PLATFORM (only with man-platform)
K22	RELAY - NOT USED
K23	INTERMITTENCE
K24	MODULE - STOPPED SHAFT
K26	SAFETY RELAY - ATTACHMENT COUPLING

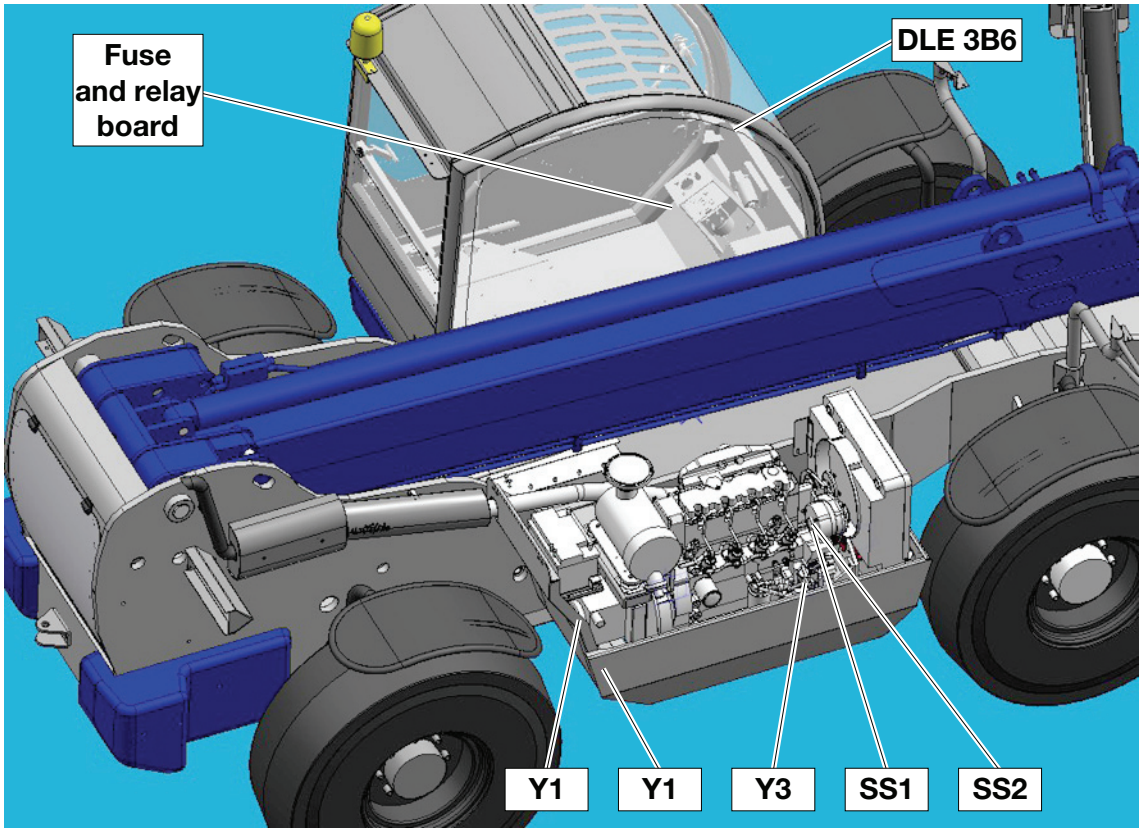
6.4.12 Engine compartment fuses and relays

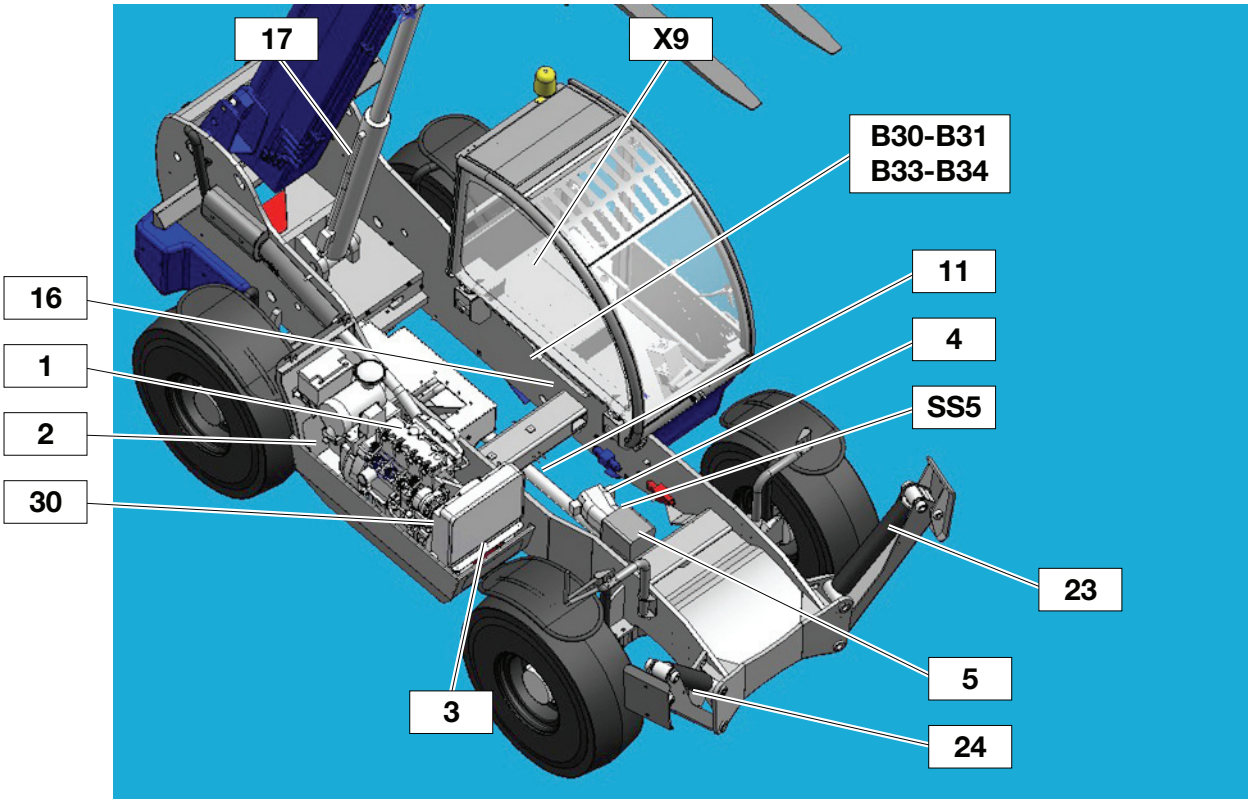
Ref.	Circuit	Amp.
F2G	Main fuse	50
F3G	Fuse - glow plugs	50
K01	Relay - start-up	50
K02	Relay - glow plug led	
K03	Relay - pre-heating	

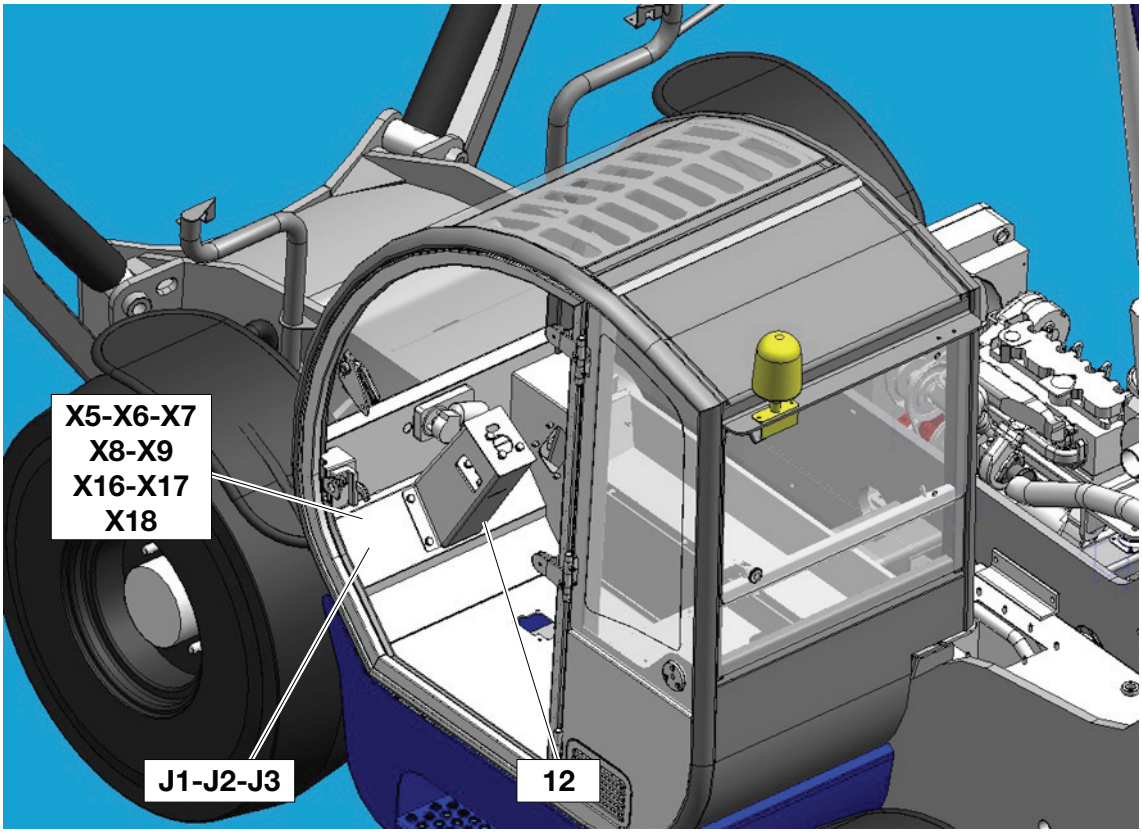


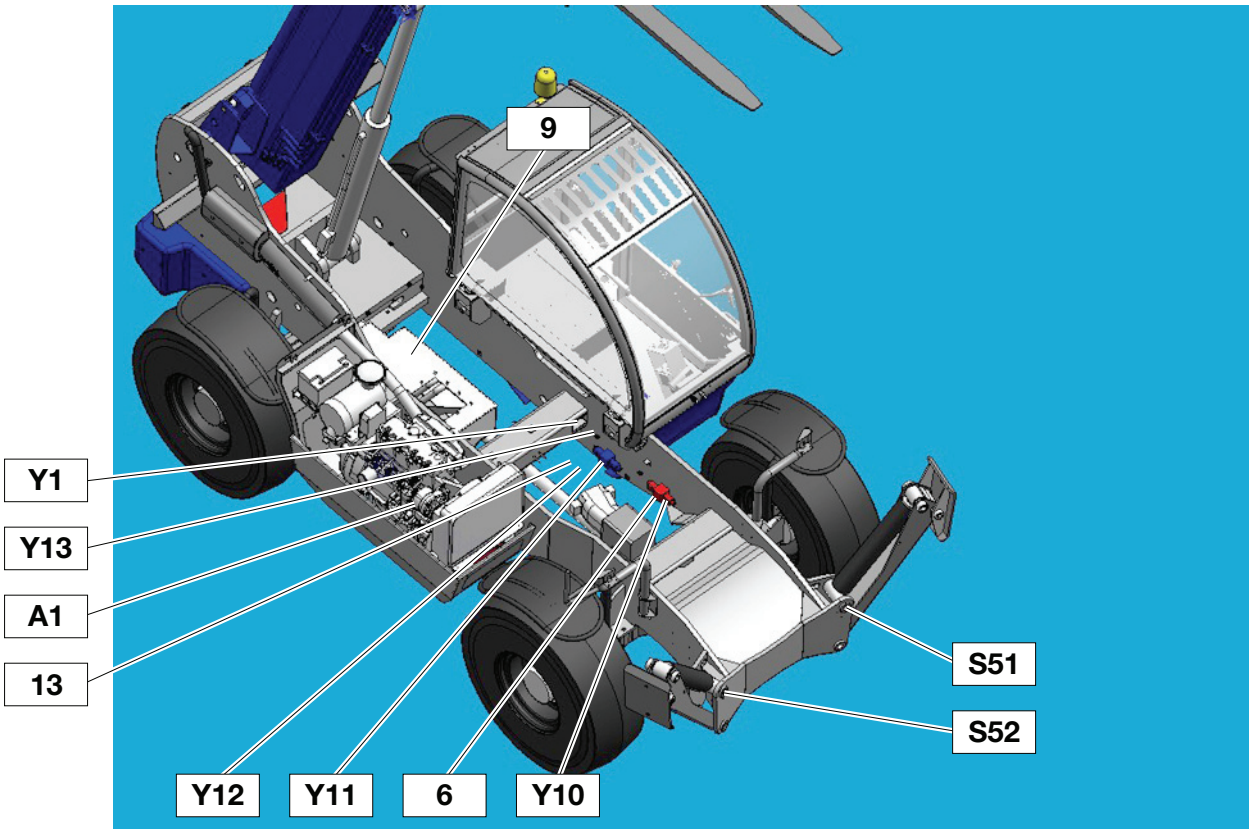
6.5 POSITION OF THE ELECTRICAL AND HYDRAULICAL COMPONENTS ON THE MACHINE

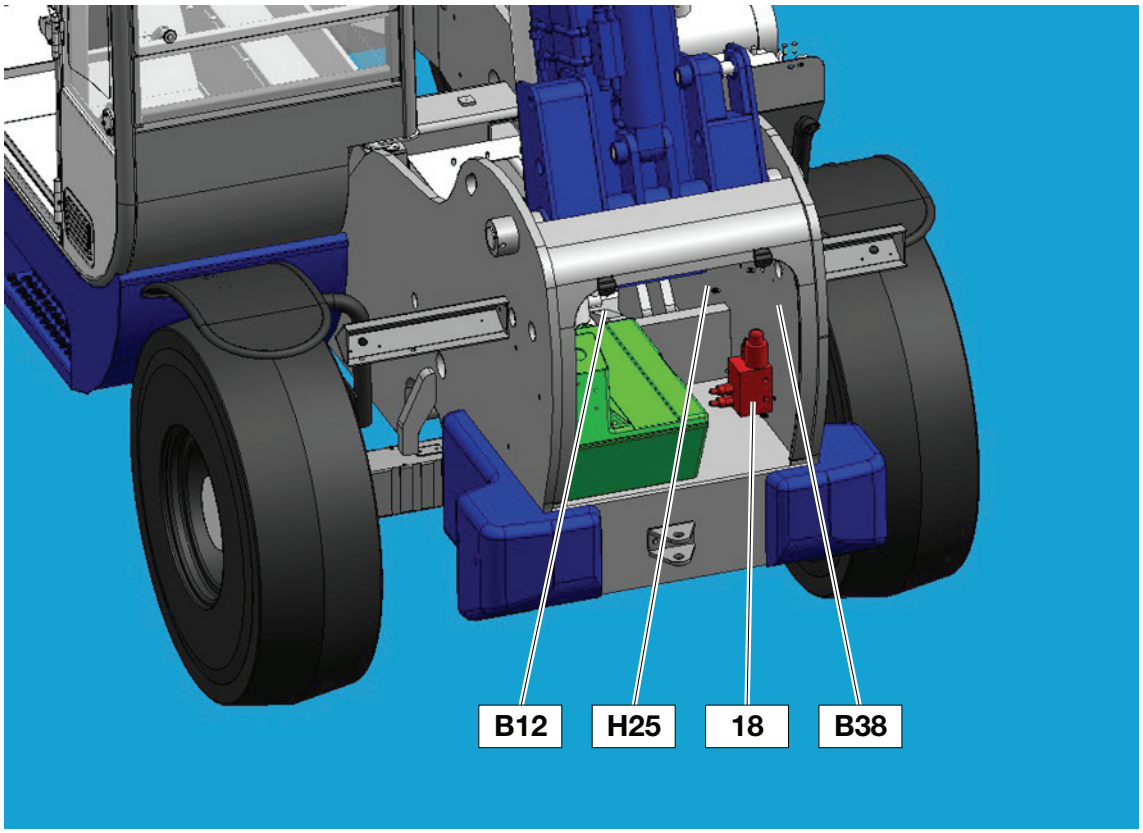
Telelift 3512-4010

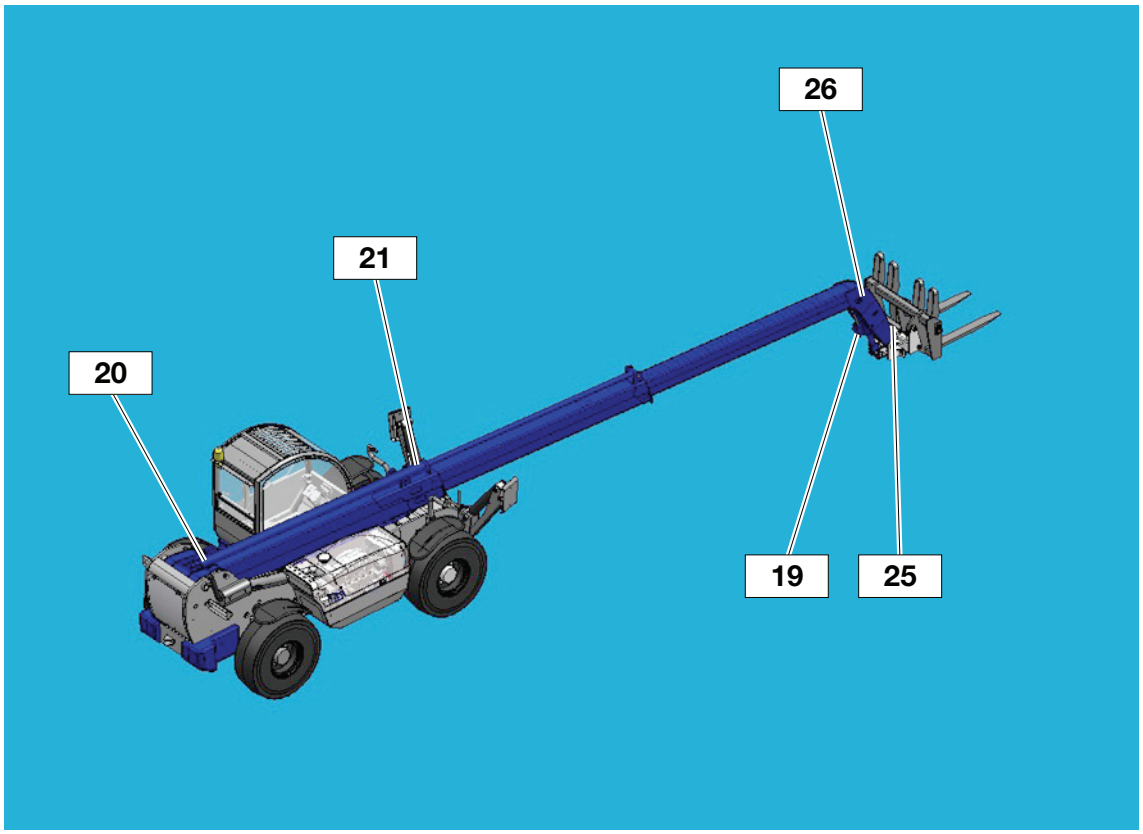


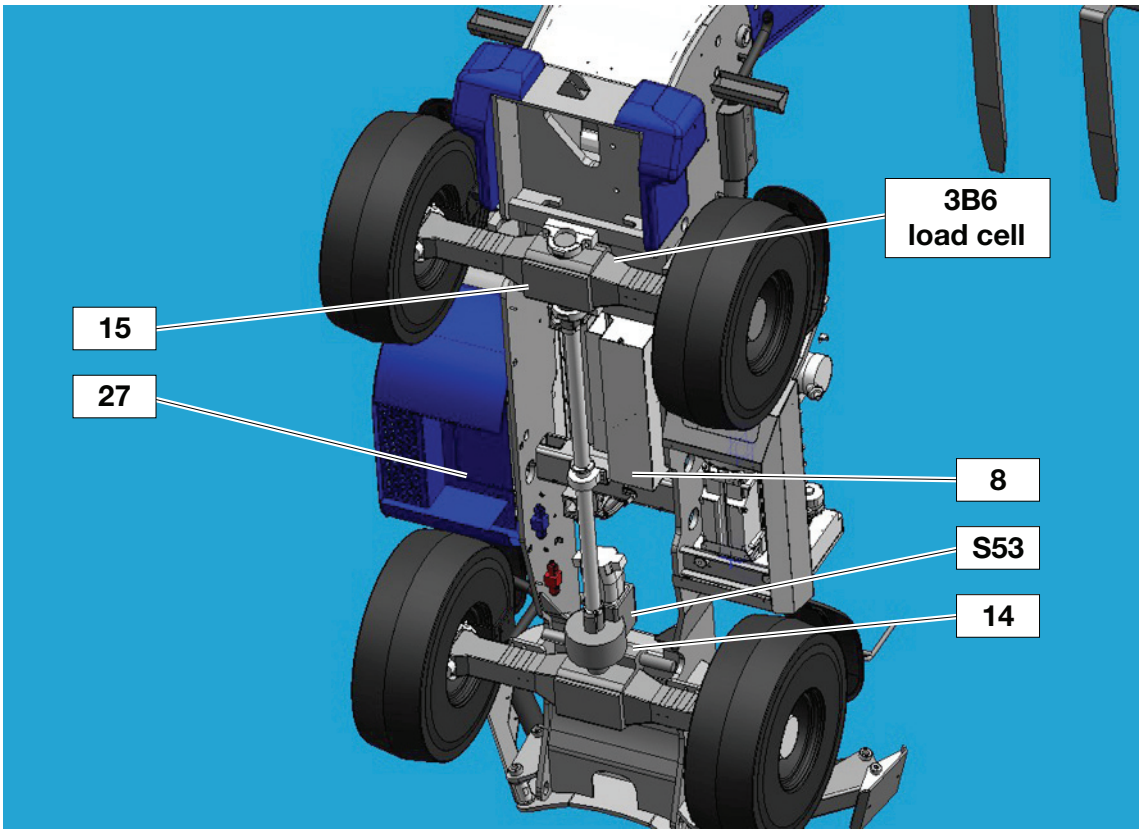


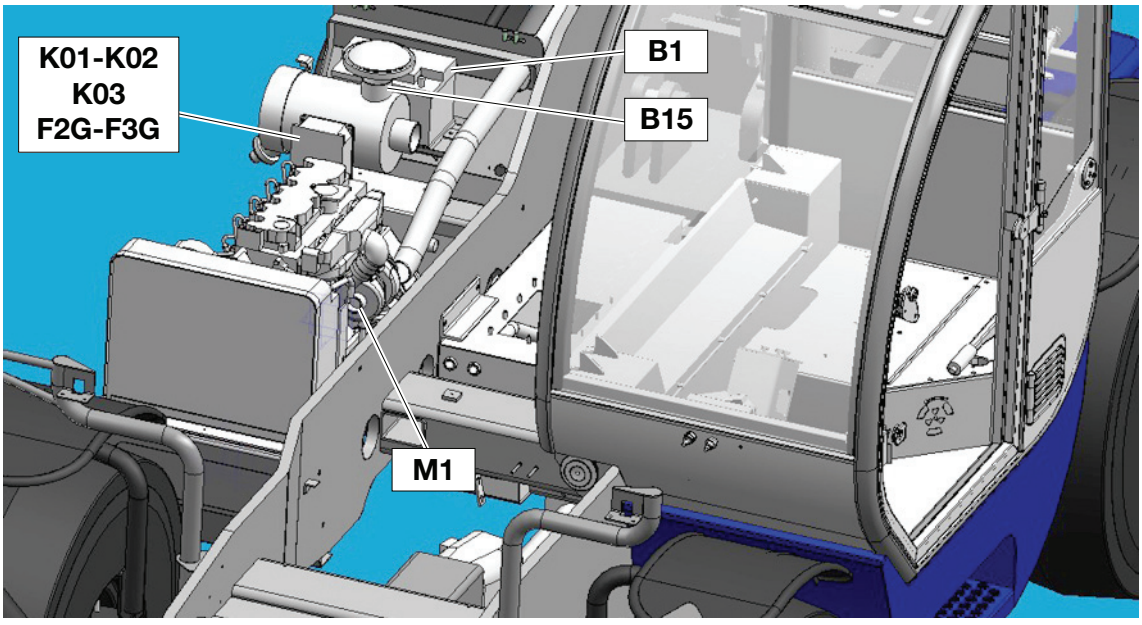

X5-X6-X7
X8-X9
X16-X17
X18
J1-J2-J3
12


9
Y1
Y13
A1
13
S51
S52
Y12
Y11
6
Y10


B12
H25
18
B38


26
21
20
19
25



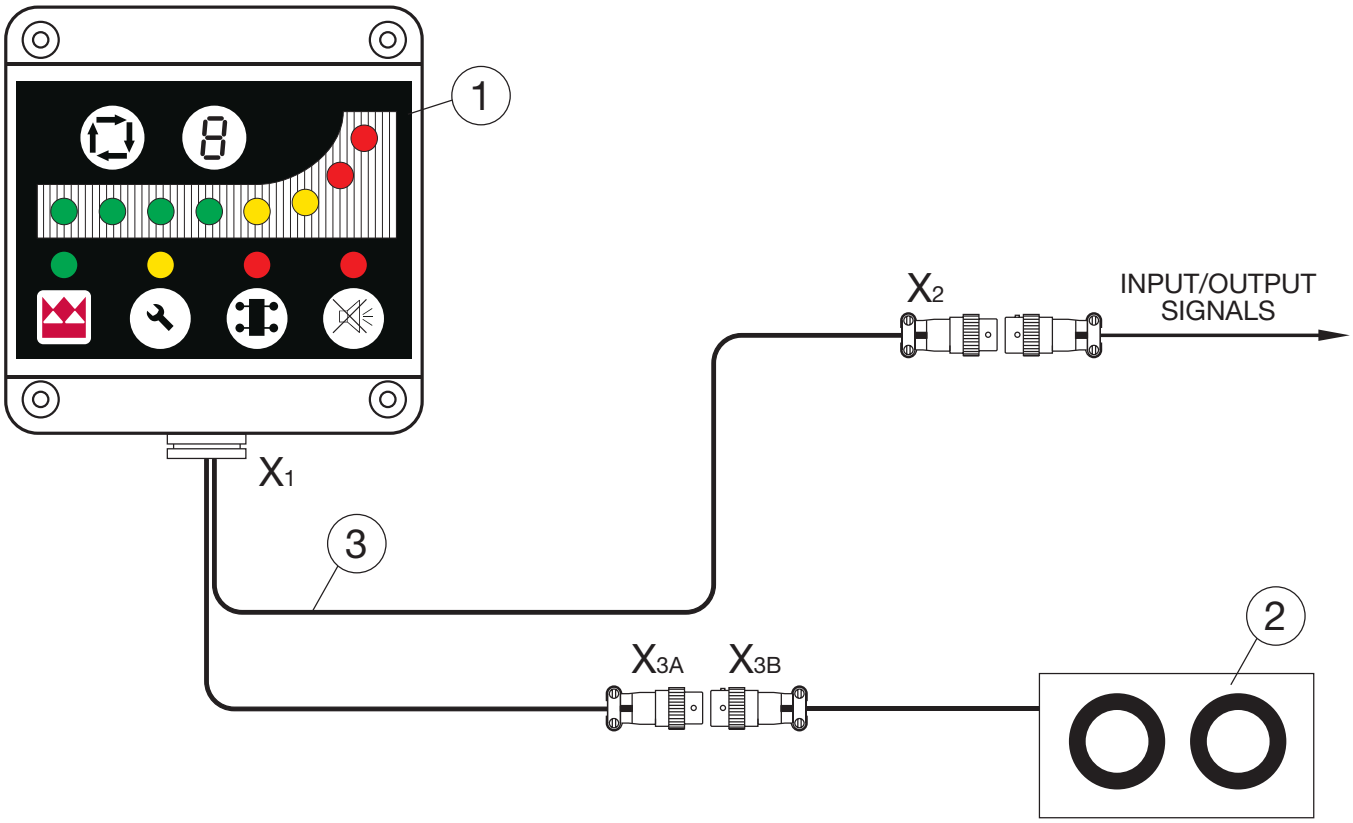


CAUTION

The references having a number as sole indication refer to hydraulic components; the remaining references are initials which can be found on the wiring diagram supplied with the machine.

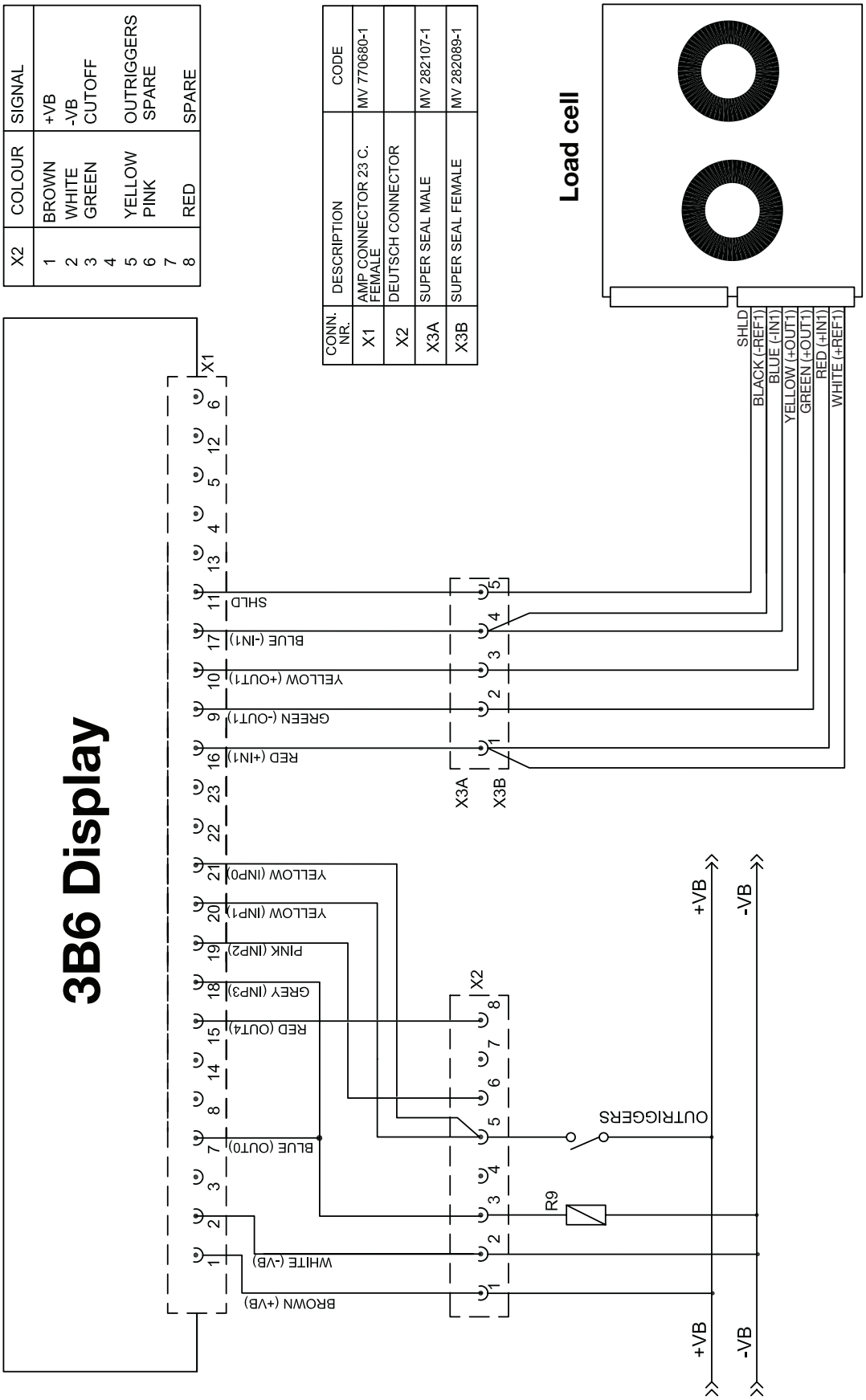
6.6 LOAD LIMITING SYSTEM WIRING DIAGRAM

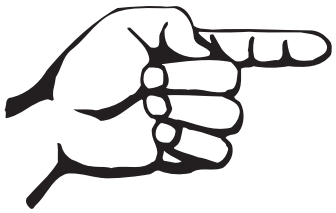
6.6.1 Lay-out



1 = main unit
2 = strain load cell double bridge
3 = connecting cable

6.6.2 Internal connections





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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 DLE overload warning system display	1	0.15
re-calibrate the 3B6 system	1	1.00
change the load cell (extensimeter)	1	0.30
change the transmission control box	1	0.10
change the joystick (mechanical bar)	1	0.20
change the deadman button	1	0.30
change the joystick movement switch pushbutton	1	0.30
change the brake pump	1	1.30
change speed sensor	1	0.30
change the low boom sensor	1	0.20
change the boom lifting cylinder	1	3
change the boom lifting cylinder kit (complete overhaul)	1	2
change the block valve of the boom lifting cylinder	1	0.30
change the cylinder inside the boom (Telelift 3512)	1	2.50
change the extension cylinder kit inside the boom (Telelift 3512)	1	1.30
change the block valve of the extension cylinder inside the boom (Telelift 3512)	1	1.00
change the extension cylinder on the boom	1	1.30
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 cylinder re-sequencing valve inside boom (Telelift 3512)	1	2.00
change the fork pitching cylinder	1	2.00
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 stabiliser cylinder	1	1.30
change the stabiliser cylinder kit	1	1.30
change the block valve of the stabiliser cylinder	1	0.30
change the fork compensation cylinder	1	2.00

Job	Operators needed	Expected time (h)
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 boom internal line for the boom extension	1	2.00
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 (Telelift 3512)	1	3.00
change the boom slide pads (Telelift 4010)	1	2.00
check the pressure of the drive pump	2	0.30
check the pressure of the main actuator operating the boom movements	2	0.30
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 drive motor, pump and pipes, and test	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 relays and fuses	1	0.10
change the windscreen wiper motor	1	1.30
change a solenoid valve	1	0.20
change the gas pedal complete with cord	1	1.00
change the manual throttle complete with cord	1	0.30
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
change the boom anchoring pin	2	1.00 each
change the attachment locking cylinder pins	1	0.30
change the pin of the stabilising cylinder	1	0.20
change a cab pushbutton	1	0.30
change and test the actuator pressure relief valve or the sliders	1	1.30
change and test the actuator safety valve	1	0.30
change the one-way valve	1	0.30

Job	Operators needed	Expected time (h)
change the maxi-fuses and search for troubles	1	1.00
bleed the braking system	2	0.15 each
change the hydraulic oil filter of the drive pump injection line	1	0.30
change the hydrostatic steering unit	1	2.00
change the beacon	1	0.20
change the battery	1	0.20
change the exhaust pipe	1	1.00
change the mud-guard supports	1	0.30
change the mud-guards	1	0.20
change the parking brake cord	1	1
change the steering wheel	1	0.20
dismantle the hydraulic oil tank	1	3.00
dismantle the fuel tank	1	1.00
change a wheel (n° 1)	1	0.20
change the parking brake lever	1	0.30