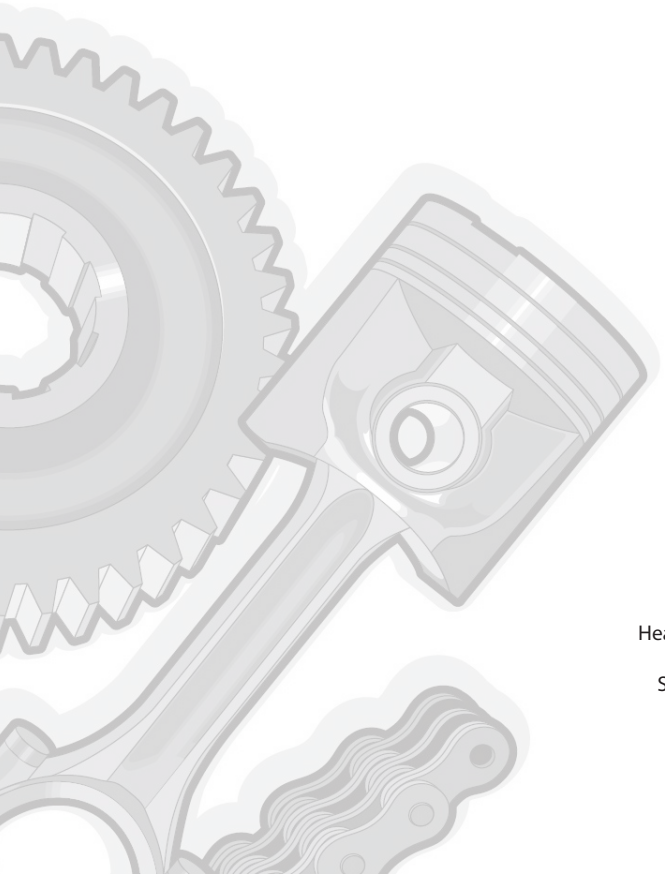
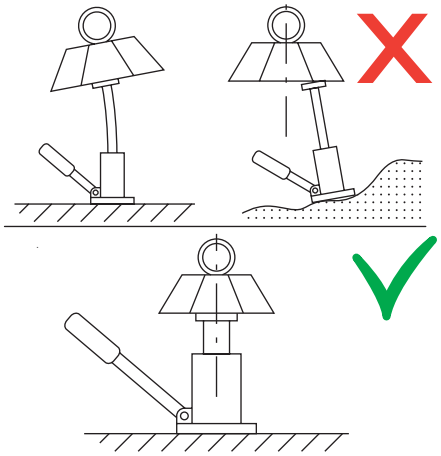
MANITOU

HANDLING YOUR WORLD

REPAIR MANUAL
MANUEL DE RÉPARATION
REPARATURANLEITUNG
MANUAL DE REPARACIÓN
MANUALE RIPARAZIONE

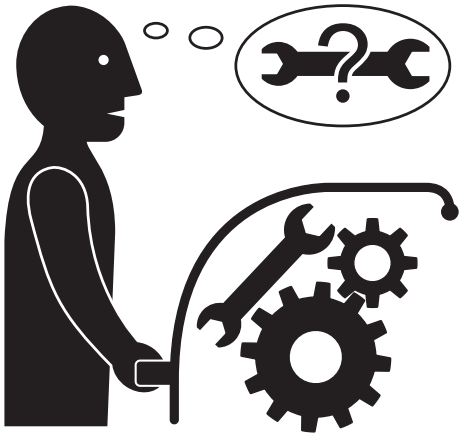


MANITOU BF
Head office: 430, Rue de l'Aubinière
44150 Ancenis - FRANCE
Share capital: 39,548,949 euros
857 802 508 RCS Nantes
Tel: +33 (0)2 40 09 10 11
www.manitou.com



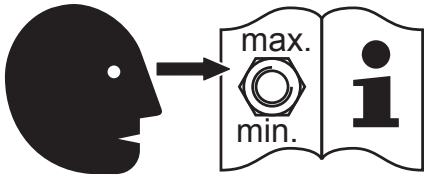
When lifting or shoring a component of the machine, make sure the equipment used is suitable for at least the load for which it is subjected by the component and that it meets the national standards for lifting devices.

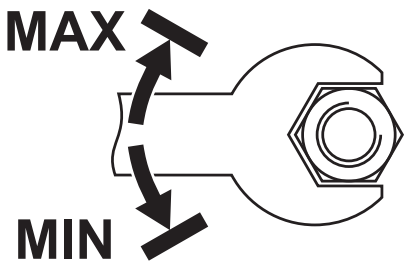
When using a jack, make sure it is used on a flat, uniform surface, is sturdy enough to support the load, that its lifting capacity is sufficient and that it is correctly placed and positioned under the machine.



Make sure no object or tool which could cause an accident is left in the machine.

Never control any leaks using a hand.



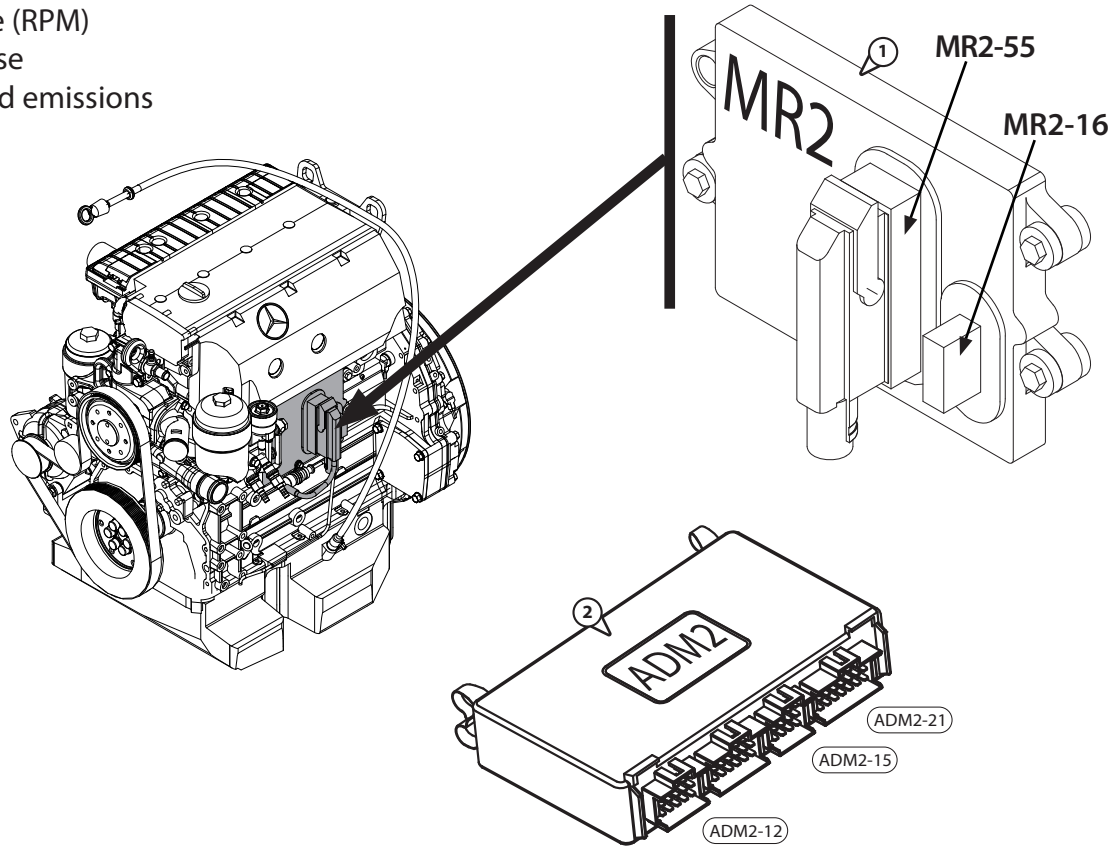


Never adjust a component to over the maximum capacity indicated by the manufacturer.

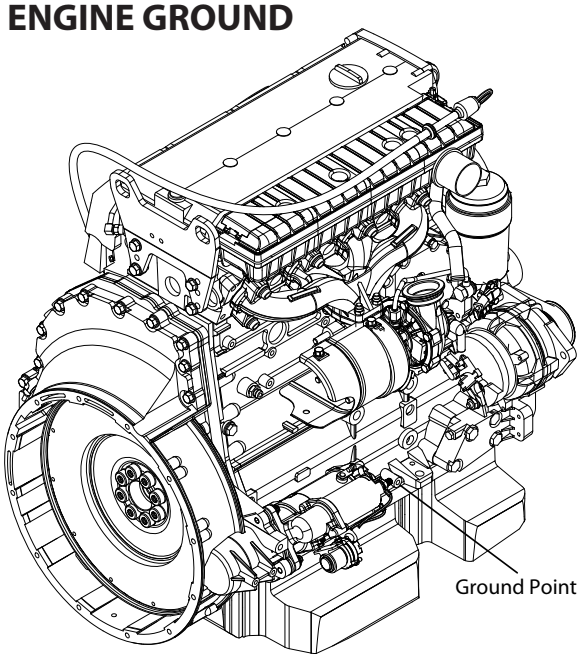
ELECTRONIC CONTROL MODULE

The MR2-PLD electronic control module (1) is the regulator and computer for the fuel circuit. The MR2-PLD receives signals from the sensors to control the engine's tuning and speed.
The electronic circuit is made up of the MR2-PLD, sensors on the engine and inputs from the whole of the machine by the ADM2 (2) located in the cab. The MR2-PLD is the computer. The personalization module is the computer software. The personalization module contains the performance curves.
The performance curves define the following characteristics of the engine:

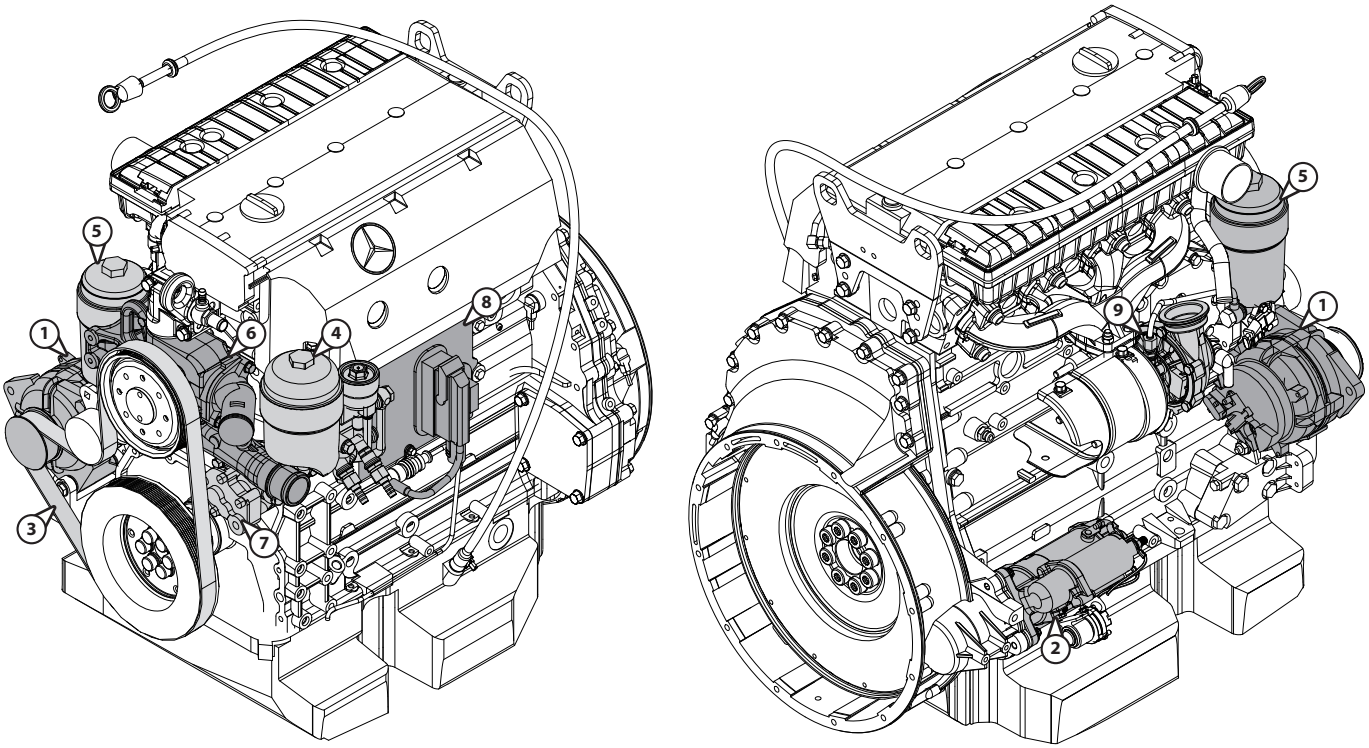
- Engine power
- Torque curves
- Engine rate (RPM)
- Engine noise
- Exhaust and emissions



ENGINE GROUND



ENGINE COMPONENTS REMOVAL AND REFIT



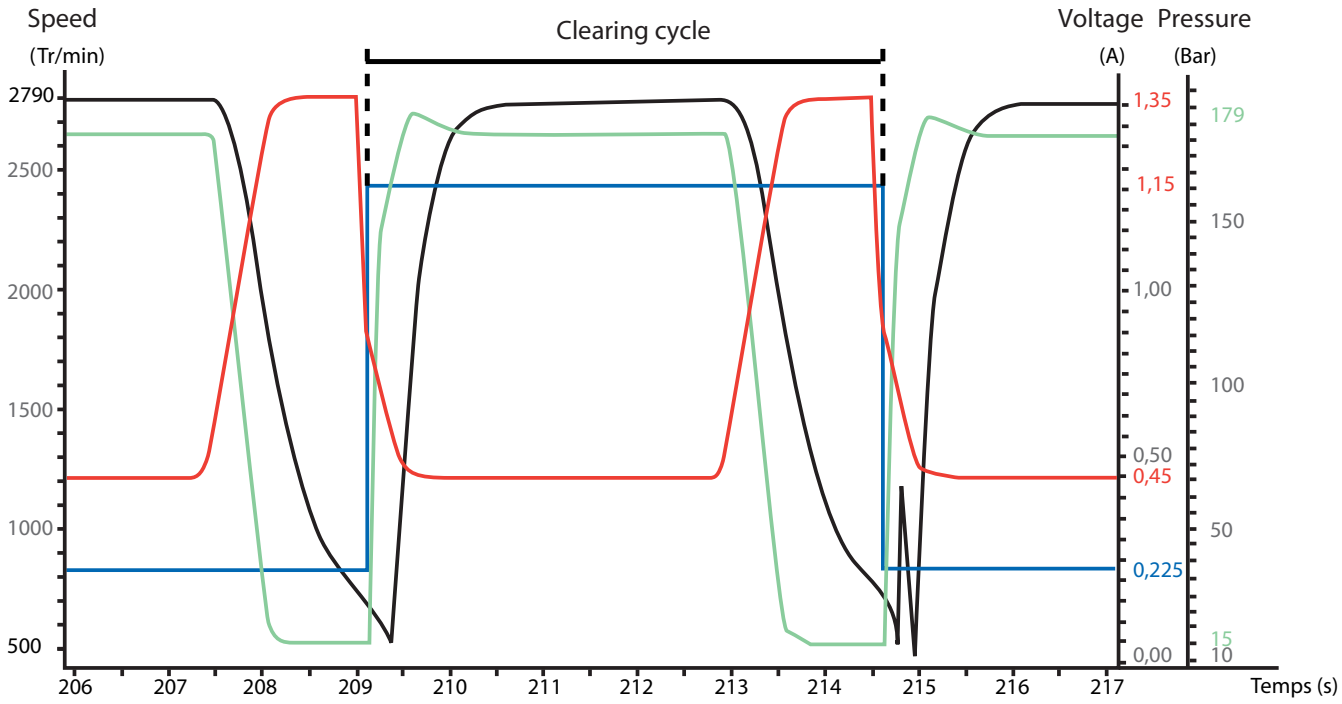
Key :

1 - Alternator
2 - Starter
3 - Belt
4 - Fuel fi lter
5 - Oil fi lter
6 - Water pump
7 - Fuel pump
8 - PLD
9 - Turbocompressor

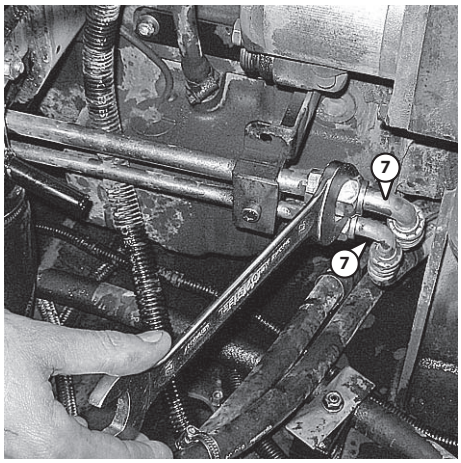
PREPARATION AND SAFETY INSTRUCTIONS

– Activate battery cut-out.
– Open I.C. engine cover.
– Use battery cut-out to deactivate power supply.

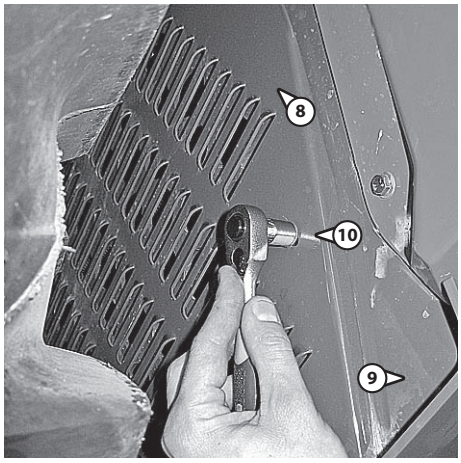
Graph showing Fan Drive operating cycle



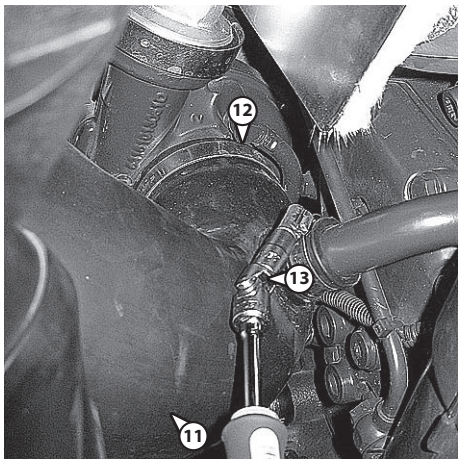
Key :
- Control voltage
- Changeover voltage
- Fan circuit pressure
- Fan speed



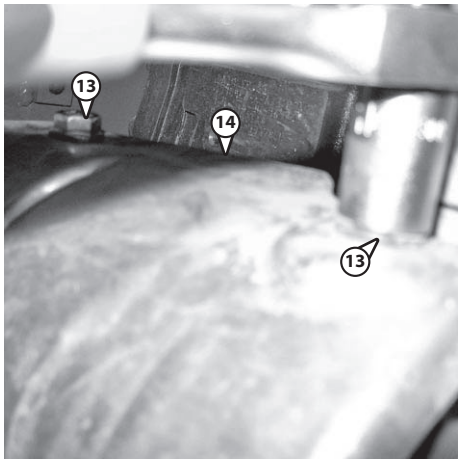
Empty the air conditioning circuit, then remove its hoses (Item 7) using a 27 mm spanner.



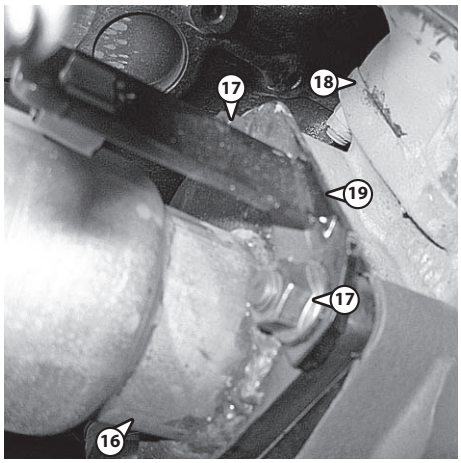
Remove the protective cover (Item 8) from the back of the engine bay (Item 9), unscrewing the bolts (Item 10) with a 10 mm spanner.



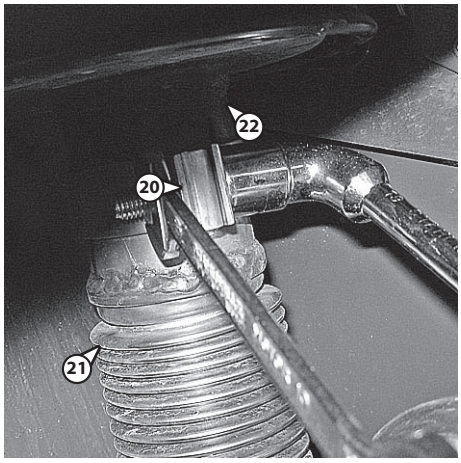
Remove the air inlet hose (Item 11), unscrewing the three hose clips (Item 12) with a 7 mm spanner.



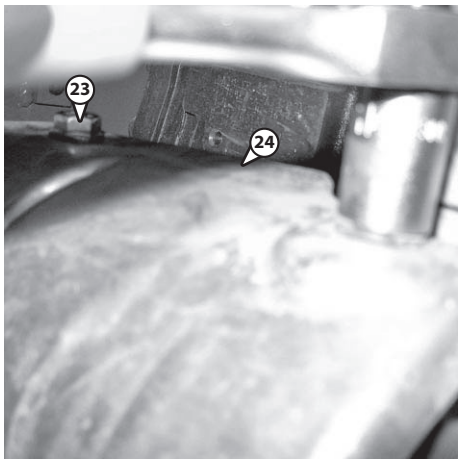
Remove the four fixing bolts (Item 13) from the protective grille (Item 14) between the compensator and the turbo, using a 13 mm spanner.
Remove the protective grille.



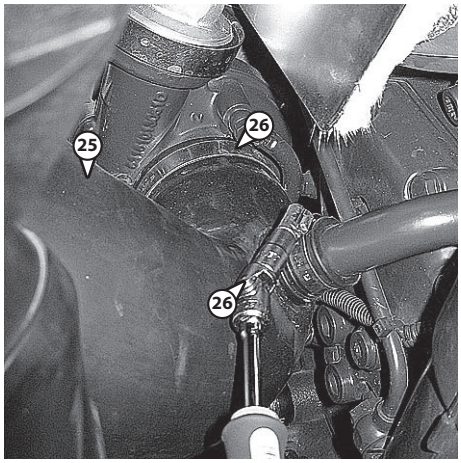
Fit the compensator (Item 16). Fix the four fixing bolts (Item 17) behind the turbo (Item 18), without forgetting the protective grille's fitting lug (Item 19).



Fit the clamp (Item 20) between the compensator (Item 21) and the exhaust system (Item 22).



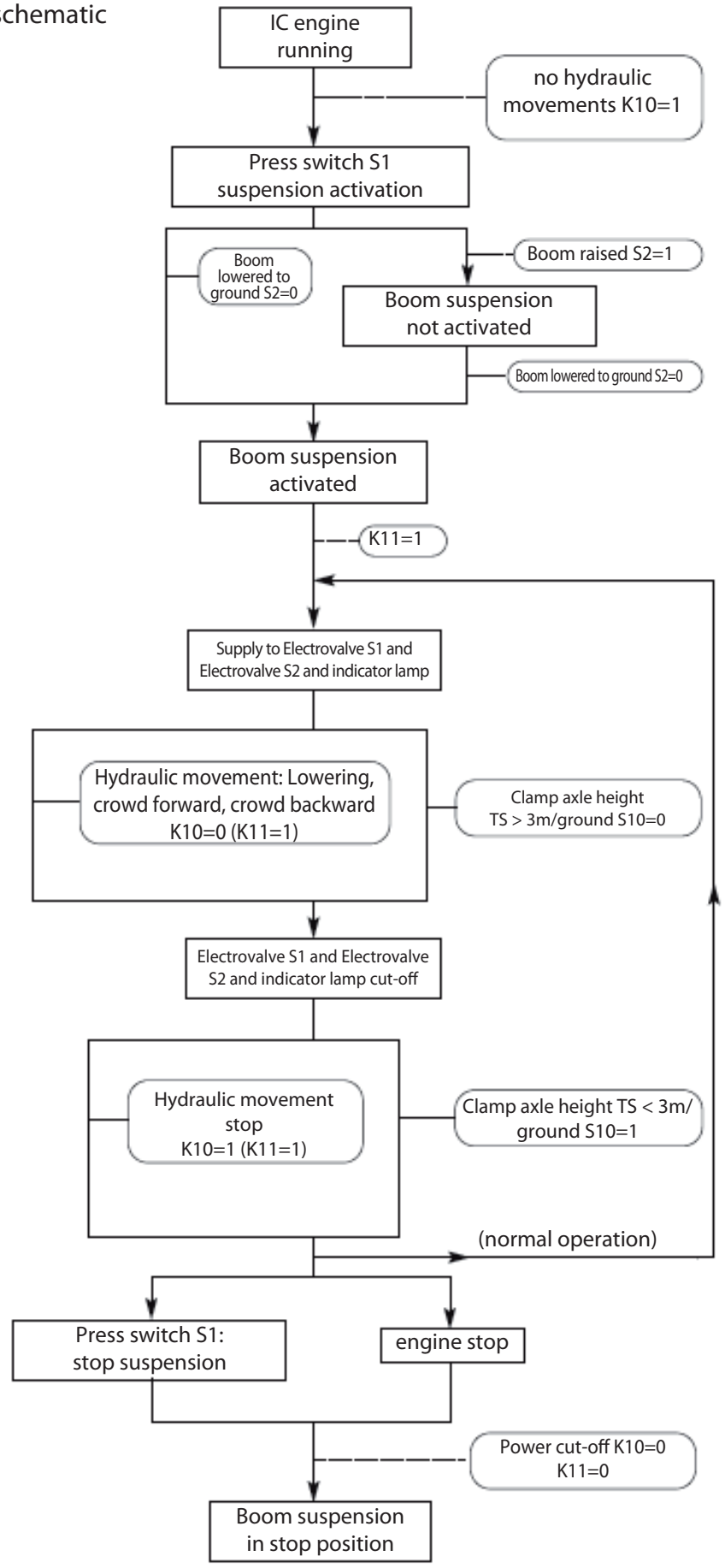
Fit the compensator protective grille (Item 23); Tighten the four bolts (Item 24) with a 13 mm spanner.



Re-fit the air intake hose (Item 25) between the filter and the turbo; secure it with the three hose clips (Item 26) and tighten with a 7 mm spanner.

OPERATING LOGIC

Boom suspension schematic



PRE START-UP OR POST SERVICING CHECKS

- Check reservoir oil level.
- Check sealing of all connections and hosing pieces.
- Check solenoid valve electrical connections.
- Check circuit is topped up, and in some cases fill oil filter cartridge before fitting for full priming.
- Check control hosing piece connections.
- Connect up booster - control – HP - casing manometers.

Start-up

- Put all wheels on chocks for safety reasons.
- Turn over engine on starter without starting up so as to purge circuit.
- Check that booster pressure goes up to around 14 bars by turning over starter.

"Never start without booster pressure as it will risk damaging transmission".

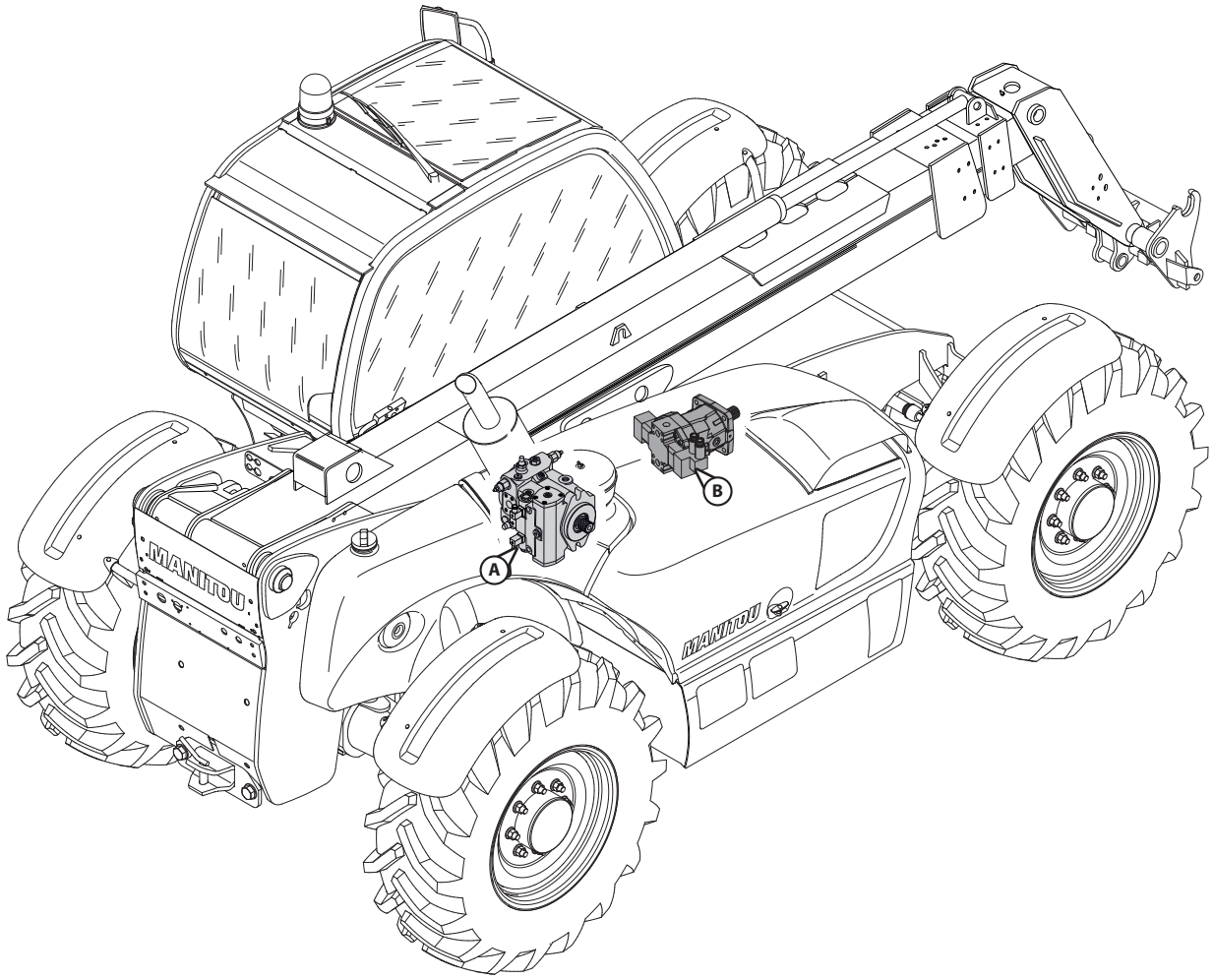
- Reconnect injection pump solenoid valve.
- Start engine and let it idle for some minutes.
- 30 bar booster pressure with 2 bar casing pressure.

Needle instability indicates air intake at suction (oil surface emulsion in reservoir and transmission cavitation noise).

"Lever in neutral" in two HP circuit loops. Pressure is equal to booster pressure.

- Gradually accelerate to heat up circuit oil.
- When oil is at -50° à 60° - check engine speed.
  - Idling speed,
  - Max no-load engine speed,

HYDROSTATIC TRANSMISSION REMOVAL



Key :

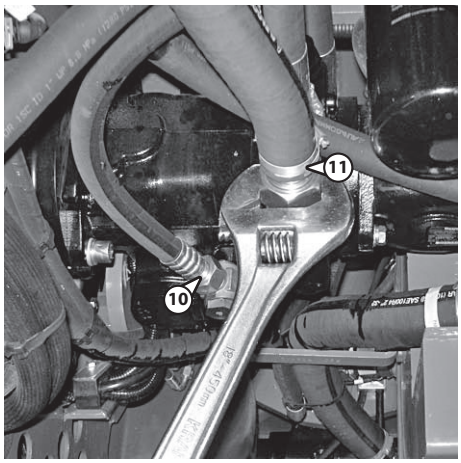
A - Hydrostatic pump
B - Hydrostatic motor

PREPARATION AND SAFETY INSTRUCTIONS

- Stabilise the machine on level ground over a pit.
- Raise the boom approx. 40°, so as to position the sling above the hydrostatic pump.
- Deactivate battery power supply by means of the battery cut-off.

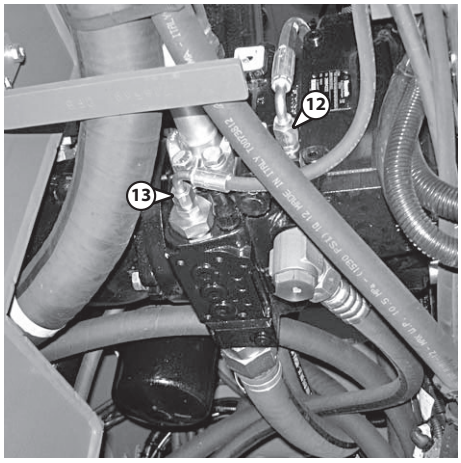
Specific tools:

- Lifting crane (1 000 kg min.).
- Hoist

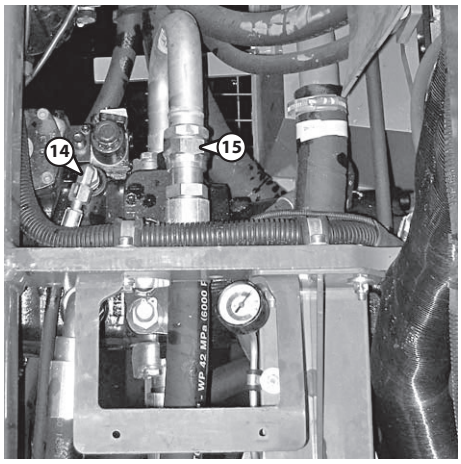


Attach the hose (10).

Attach the hose (11).

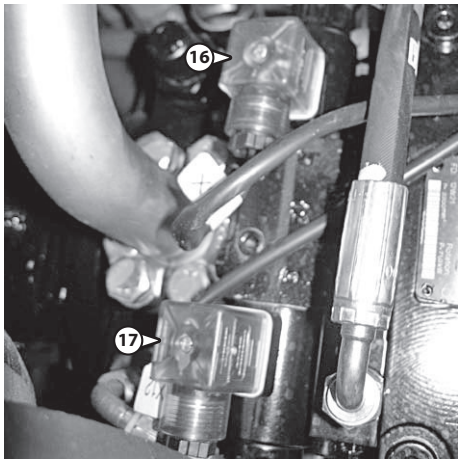


Attach the hoses (12 and 13) according to their markings, using a 17 mm wrench.



Attach the hose (14) using a 17 mm wrench.

Attach the tube (15), using a 41 mm wrench.



Attach the two connectors X9 (16) and X12 (17).

KEY: HYDRAULIC BRAKE CIRCUIT DIAGRAM		
Rep.	**Désignation**	
MC	Master Cylinder	
	P	Pressure
	R	Brake fluid return
RLF	Brake fluid tank	

SERVICE BRAKE

SETTING BRAKE PEDAL HEIGHT

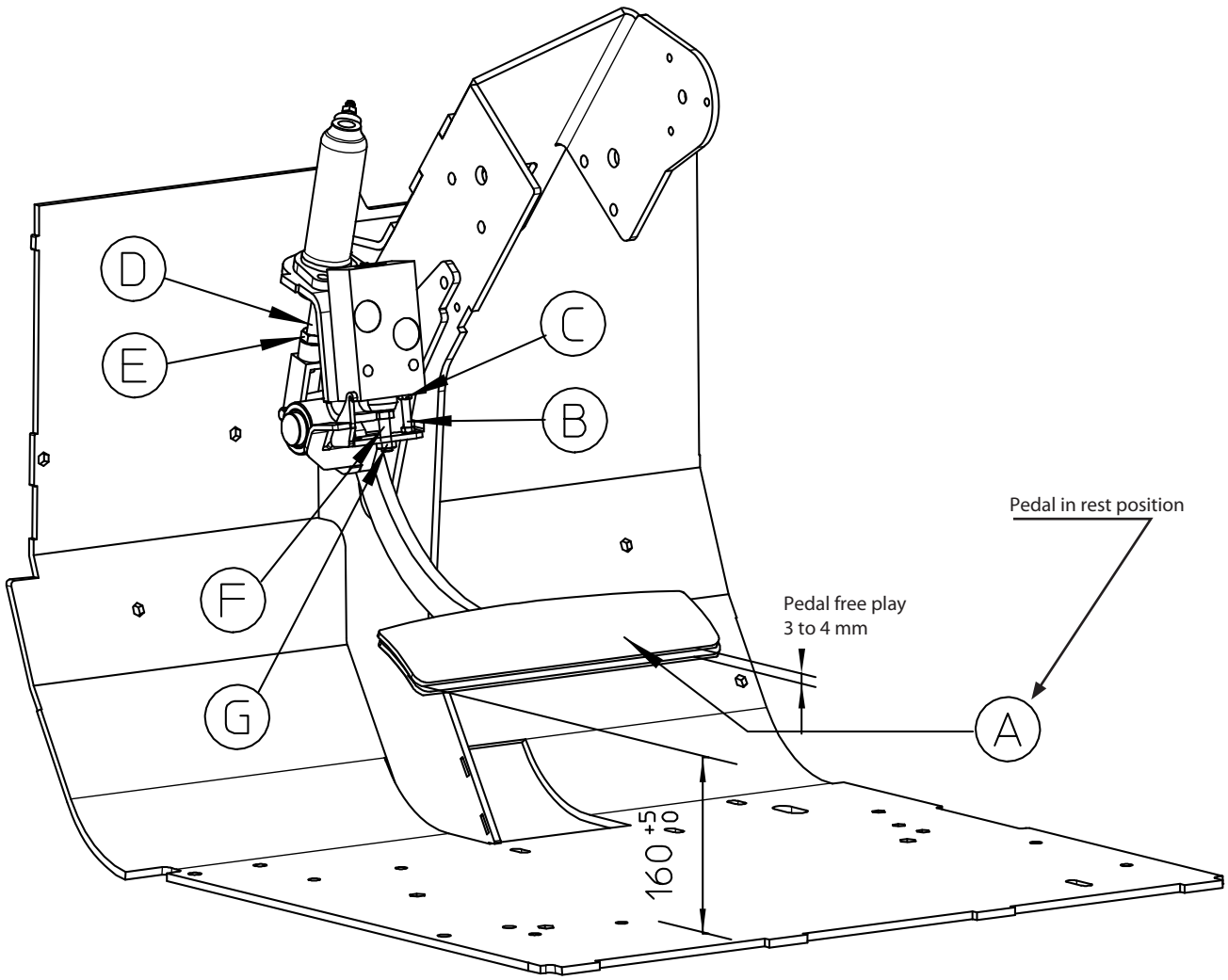
1) BRAKE PEDAL

- Adjust the height of the brake pedal (Item A) to 160 mm above the cab fl oor (without mats) using the stop (Item B).).
- Tighten the locknut (Item C).
- Adjust the brake pedal free play (Item A) (3 to 4 mm) by turning the pushrod (Item D).
- Tighten the locknut (Item E).

2) TH7 VALVE ADJUSTMENT

- Pedal in its rest position, resting on the stop (Item B).
- Place a 0,5 mm to 1 mm shim; between the screw head (Item F) and the TH7 pushrod.
- Adjust the stop position (Item F).
- Tighten the locknut (Item G).

NOTE: The pedal switch must change state (passnt) as soon as the TH7 pushrod is free to move, that is at the very start of braking.

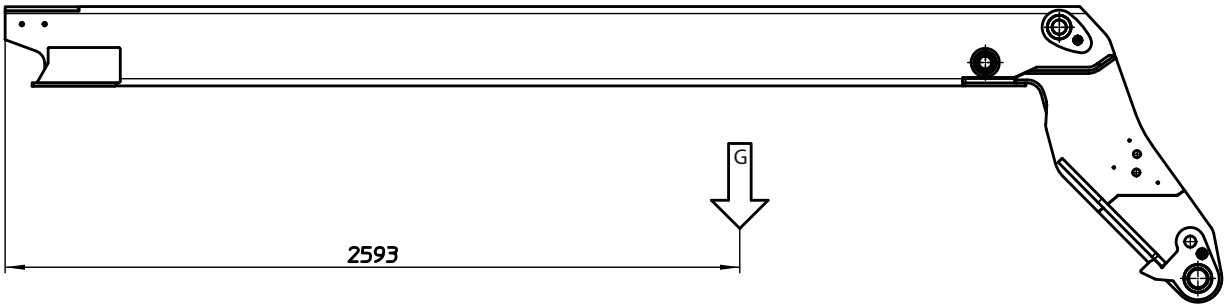


MOBILE COMPONENTS

DUPLEX (7 METRE MLT):

Mobile component (T1):

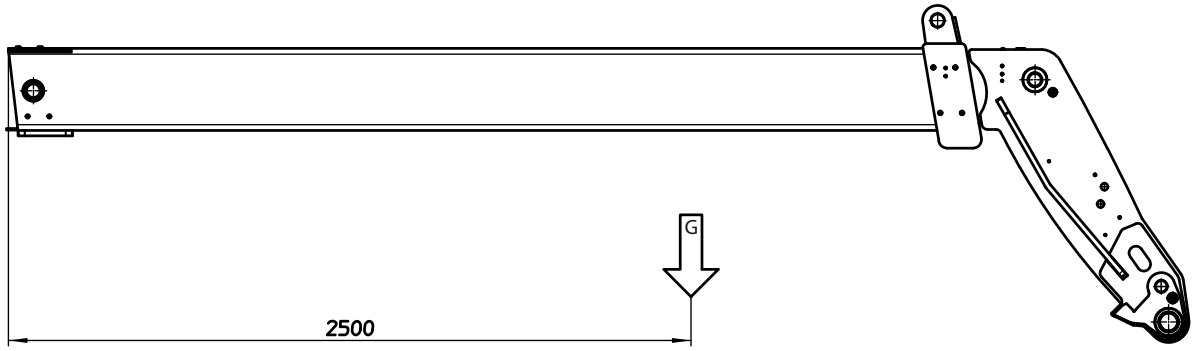
- Weight: Approx. 470 kg
- Centre of gravity: G



TRIPLEX (9 METRE MLT):

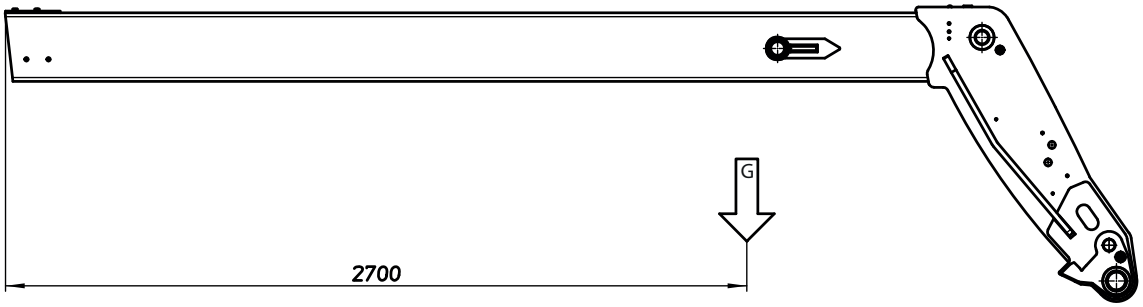
Mobile components (T1+T2):

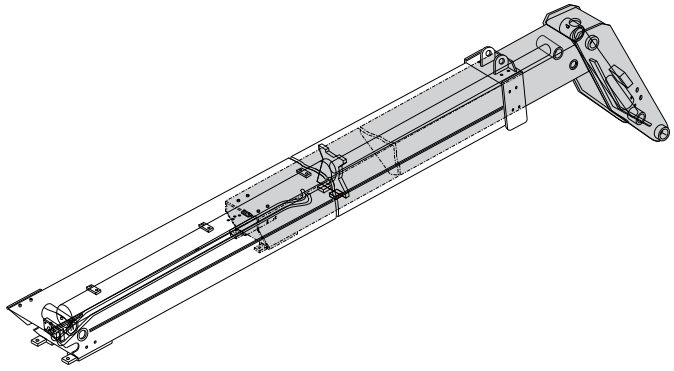
- Weight: Approx. 680 kg
- Centre of gravity: G

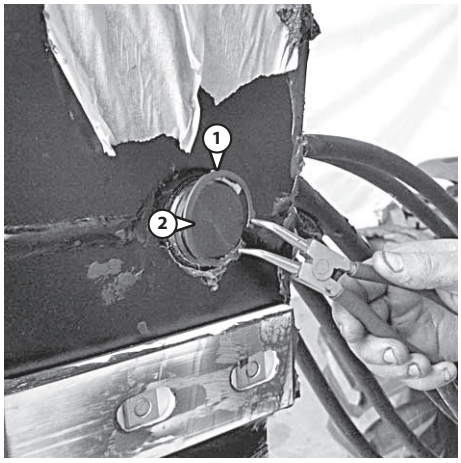


Mobile component (T2):

- Weight: Approx. 416 kg
- Centre of gravity: G





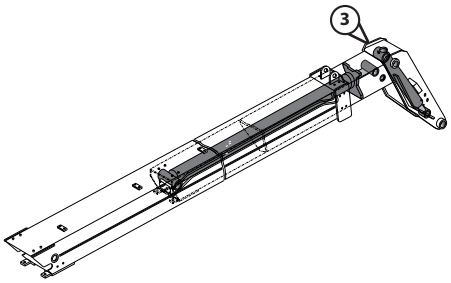


REMOVING TELESCOPE T2

Perform ◅ ''REMOVING TELESCOPES T1+T2''

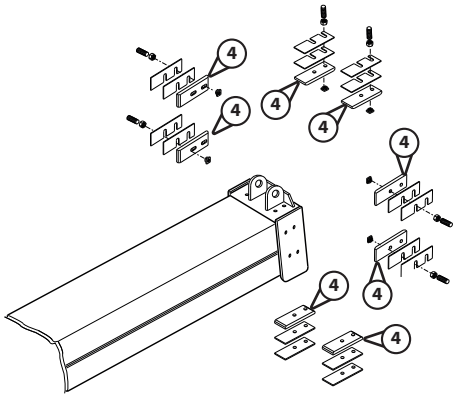
Remove the telescope cylinder circlip (1)

Remove the telescope cylinder pivot pin (2).



Place a strap around the boom and pull the boom head out halfway (3).

Hold/Secure the boom (3) at its centre of gravity with a strap and a lifting system (hoist) ◅ ''***BOOM CHARACTERISTICS AND SPECIFICATIONS***''.

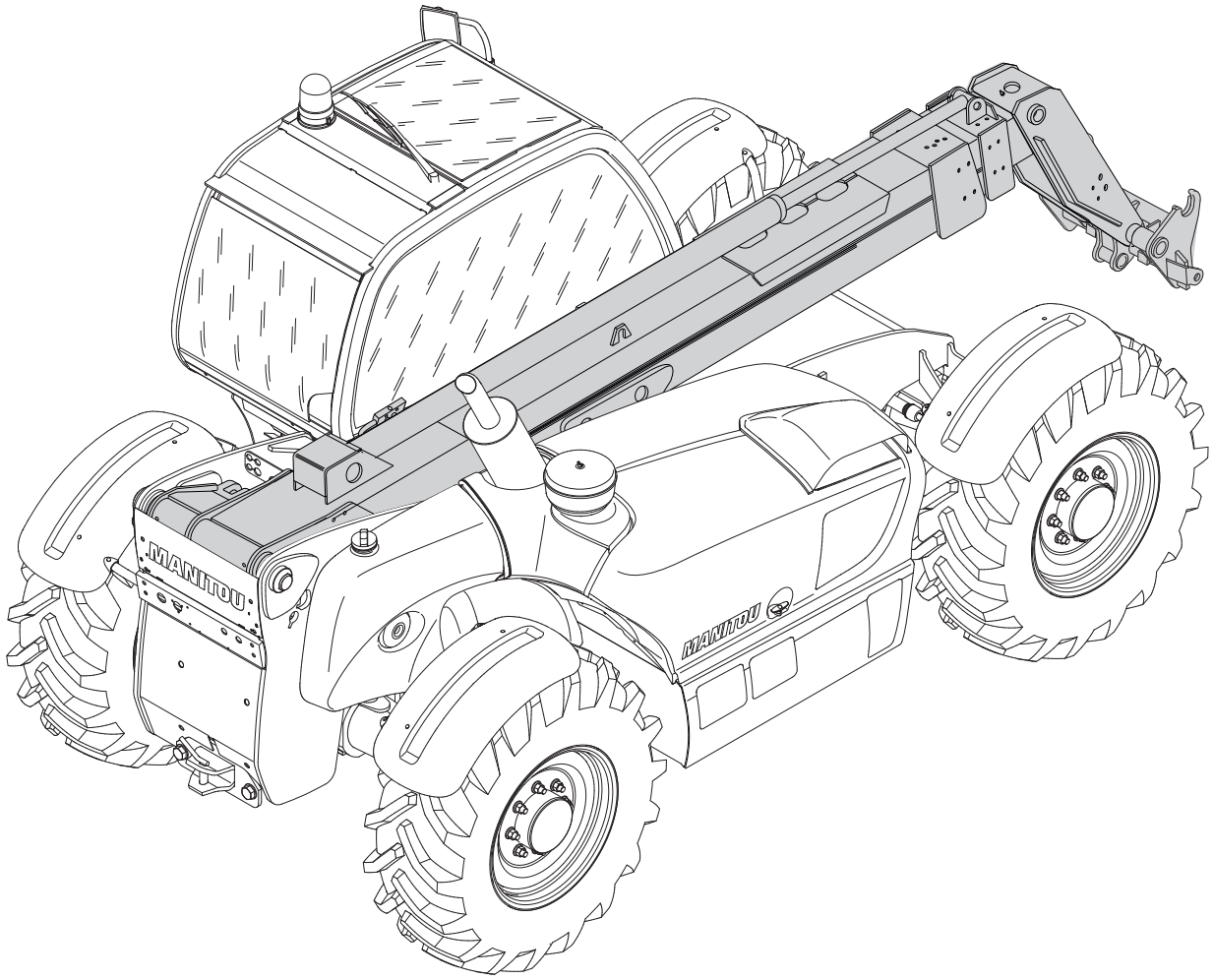


Dismantle then remove the six slide pads (4).

Fully remove the boom head.

Set the boom head don on trestles.

TRIPLEX BOOM



PREPARATION AND SAFETY INSTRUCTIONS

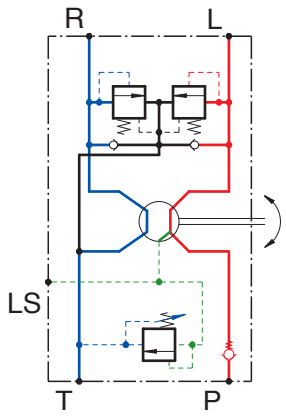
- Stabilise the machine on horizontal ground.
- Deactivate battery power supply by means of the battery cut-off.

Weight of complete boom ≈ 1 875 kg

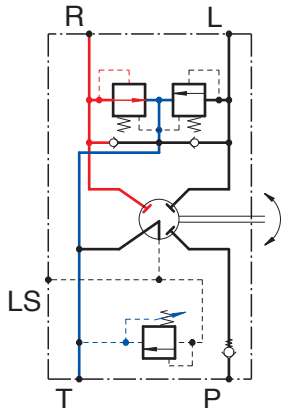
Specific tools:

– Floor crane or hoist + slings (2 000 kg min.).
– Mallet.
– Trestles.

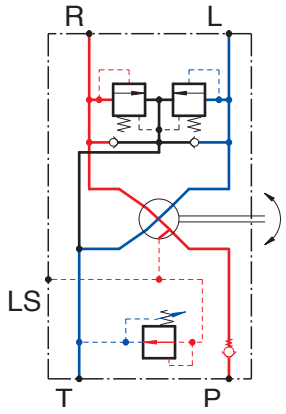
Values for information purposes only.



When the driver turns the steering wheel towards the right, he passes the flowrate from P to R and sends pilot pressure towards the divisor to get priority.



When there is an impact on a wheel, the pressure increases in the line. This pressure opens the valve which enables the resulting pressure to be evacuated and therefore protects the hydraulic and mechanical steering components.



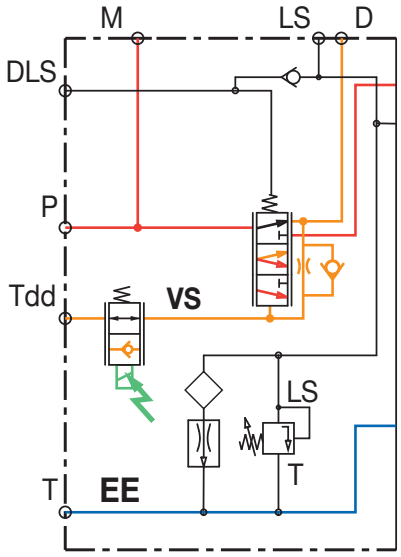
When the wheels are locked to a maximum, the steering circuit increases in pressure, the LS line activates the relief valve and enables flow to the tank.

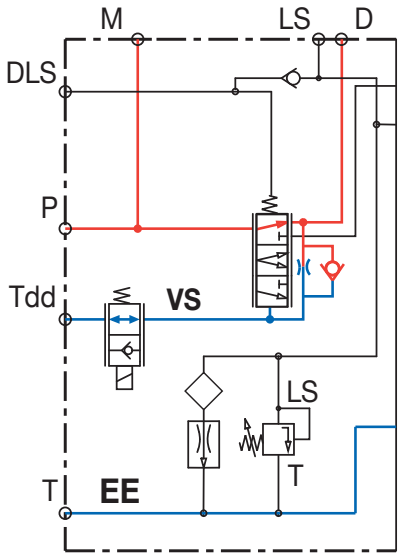
What use do the two valves that are located opposite each other on the top part of the diagram have?

What is the maximum pressure permitted in the steering circuit?

What is the LS line, without actions, connected to on the steering wheel?

Values for information purposes only.





Hydraulic pressure arrives at P.

- The flow divider valve enables priority to be given to the steering system when there is stand-by pressure equal to the spring. When the orbitrol is not called for the pressure moves the slide and applies the stand-by pressure from the pump to the valveblock modules.

- The LS limiter enables the maximum circuit pressure to be limited by limiting the pump pilot pressure. It pre-empts the action of the pump DR slide and reduces rippling.

- The regulator allows the LS pressure to fall to 0 when the control stick returns to neutral.

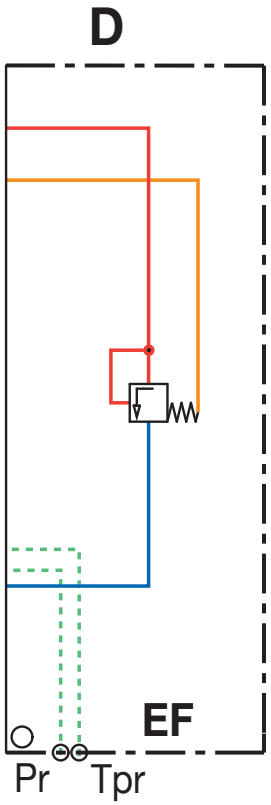
- The VS enables all hydraulic movements to be cut off, directing the divider pilot flow to the tank.

What is the function of the non-return valve?

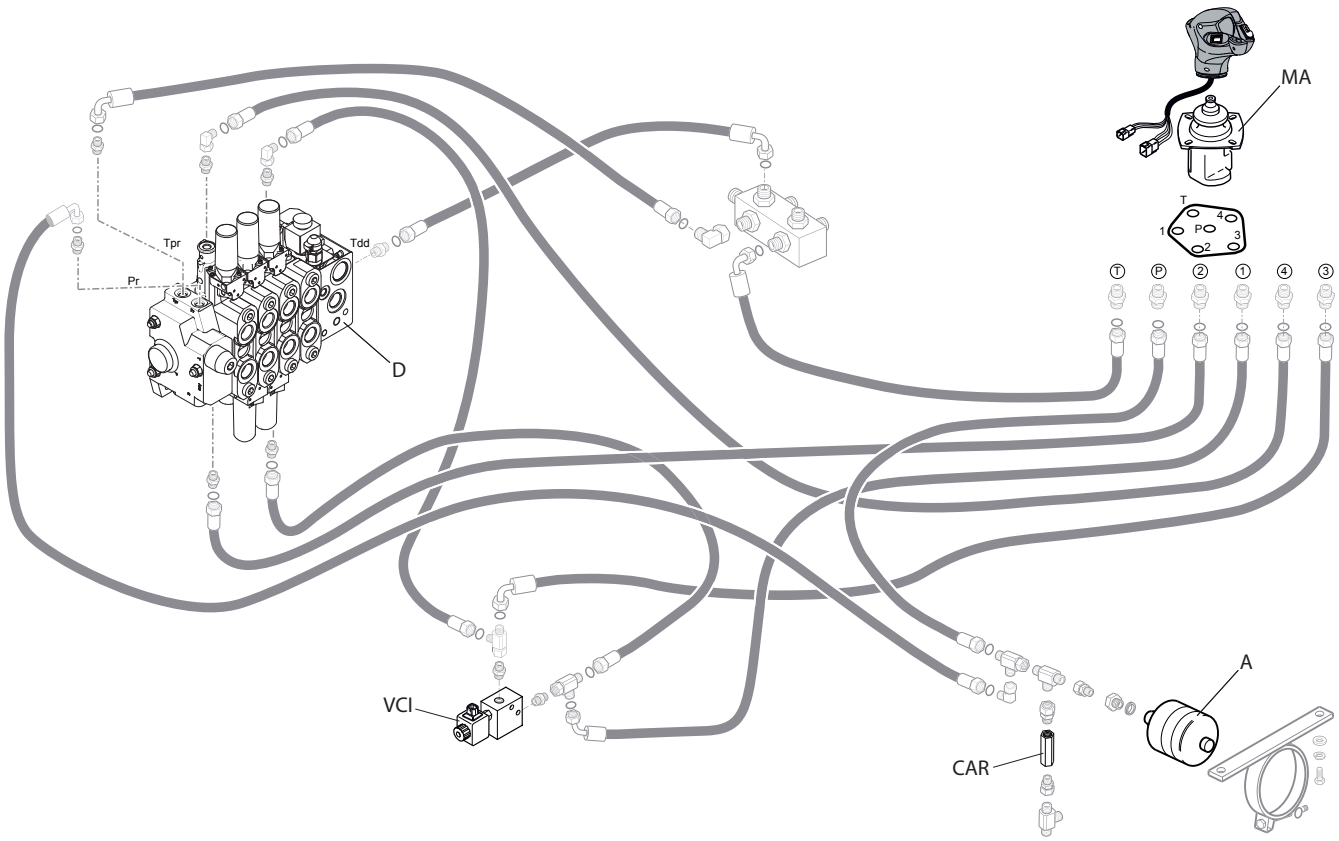
How is the main pressure limited?

What is the exact calibration of the maximum pressure relief valve?

Values for information purposes only.



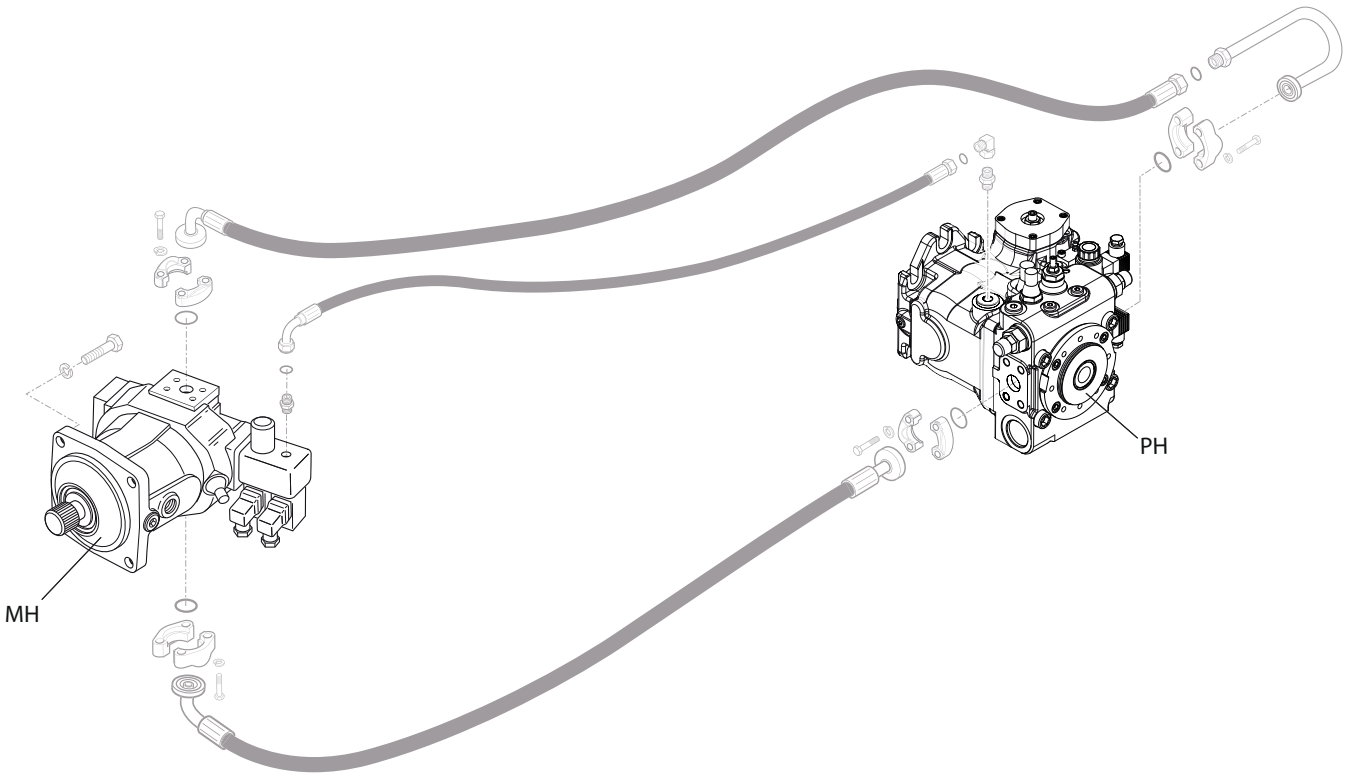
– The hydraulic pressure arrives at the entry module with pump stand-by pressure.



2 – HYDROSTATIC TRANSMISSION CIRCUIT

70

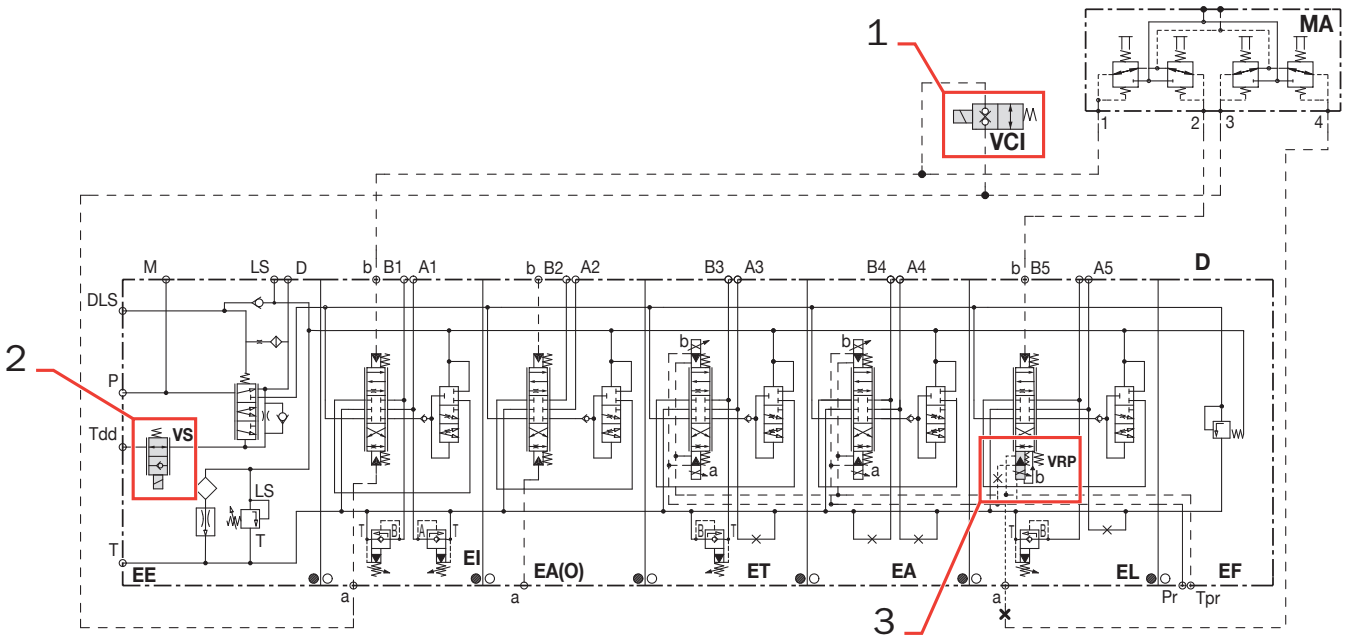
MLT 741 - 120 H Series 3 - E3
MLT 940 - 120 H Series 3 - E3



OPERATING PRINCIPLES OF AGGRAVATING MOVEMENTS CUT-OFF

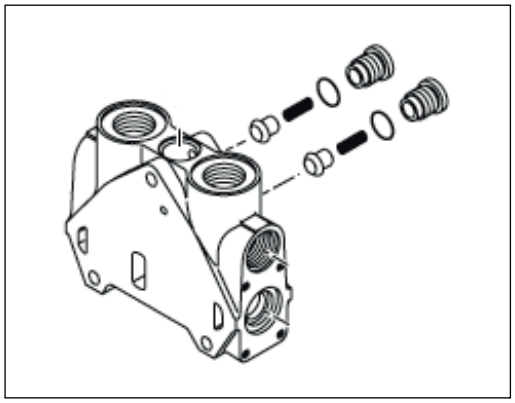
Movement cut-off is activated by the VRP/SPU or VCI at 105% gauge signal.
If the gauge signal indicates 112% the VS is also cut off.
(These values change according to the boom angle)

The VS cut-off occurs 7% after proportional cut-off to account for the possibility of the SPU taking longer to cut off the proportionals. The VS, therefore cuts off all movements at 112%.



1 - Tilt cut-off valve (VCI).
2 - Movement cut-off valve (VS).
3 - Control Regulation Valve (VRP).

Load hold check valve disassembly



- Unscrew the plug (5 mm Allen key).

- Remove the spring and the poppet.

- Visually inspect the parts for condition.

- If necessary, replace any defective parts.

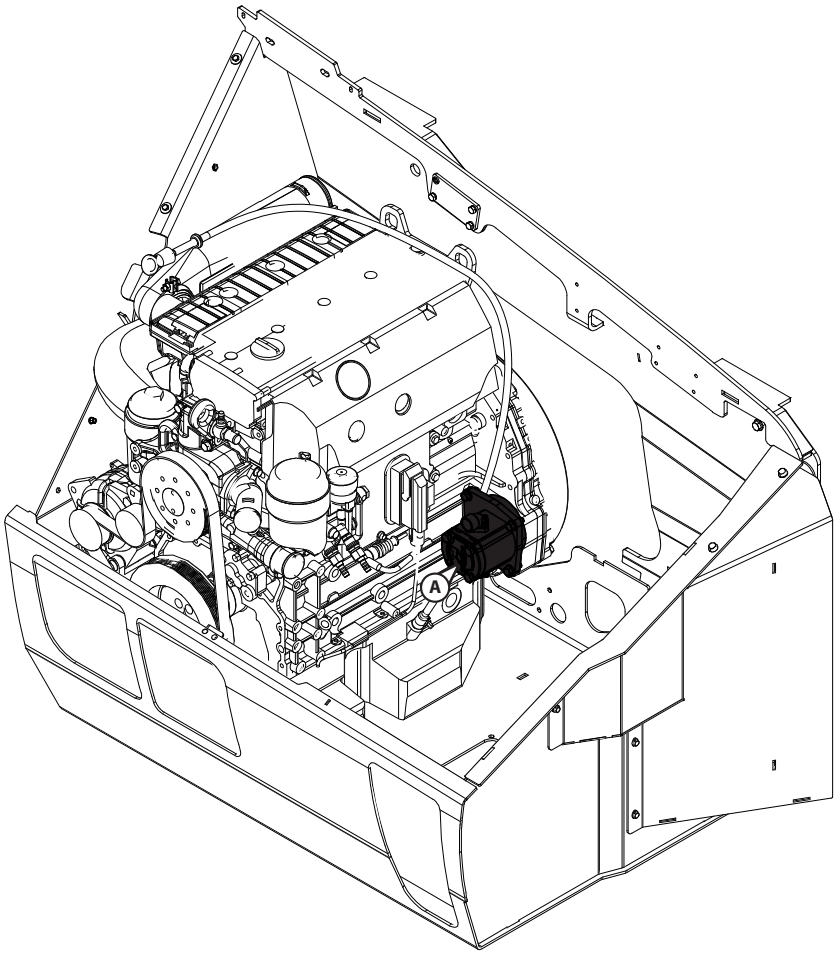
Re-fitting:
- Replace the plug O-ring.
- Tightening torque: cf. § 6.

6 - SPECIFIC TIGHTENING TORQUE

Tightening torques given in Nm ±10%.

Ref.	torque	N.m
	Inlet component:	
1	LS pressure relief valve:	45
2	LS Flow regulator:	3,5
3	DLS/LS selector:	20
4	Priority valve seat:	10
5	Priority valve plug:	100
	Distribution module	
6	Non-Return Valve:	30 to 35
7	Balance plug:	60
8	Hydraulic Control Housing:	10
9	Return housing:	10
10	EMS module control piston:	10
11	EMS module:	15
	Output module	
12	Flushing valve plug:	100
13	Tie-bolt nuts:	42

HYDRAULIC COOLING PUMP



Key :

A - Hydraulic pump

PREPARATION AND SAFETY INSTRUCTIONS

- Stabilize the machine on a horizontal floor.
- ull boom up and make sure it is positioned correctly.
- Decompress all hydraulic components before dismantling.
- Deactivate battery power supply using a battery cut-off.

Specifi c tools:

- Lifting crane (minimum 1000 Kg)

OPERATION

Telescope retraction control: VRP installed as part of the distributor raising/lowering system. Flow limiting nozzle fitted to pressure distributor inlet descent control.

Boom extension control: SPU computer (signal is monitored).

Accessory line +/- cut-off: SPU calculator (signal is controlled).

Tilt +/- cut-off: VCI (Tilt cut-off valve) fitted externally.

Dangerous movements cut-out: Activated by VRP/SPU or VCI at 105% gauge signal, and if gauge signal exceeds 120%, additional VS cut-out. (Percentages can change, depending on telescopic boom angle).

Control and change of rotational direction of the FAN DRIVE fan: SPU computer (the signal is checked).

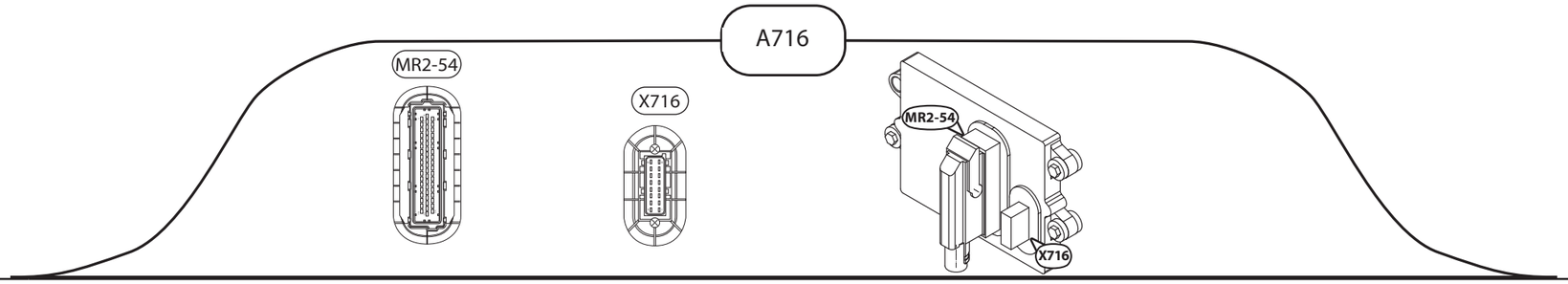
Operation is identical to the MLT T = 2 cut-out thresholds, depending on strain gauge signal.

PLD INPUTS/OUTPUTS

Key:

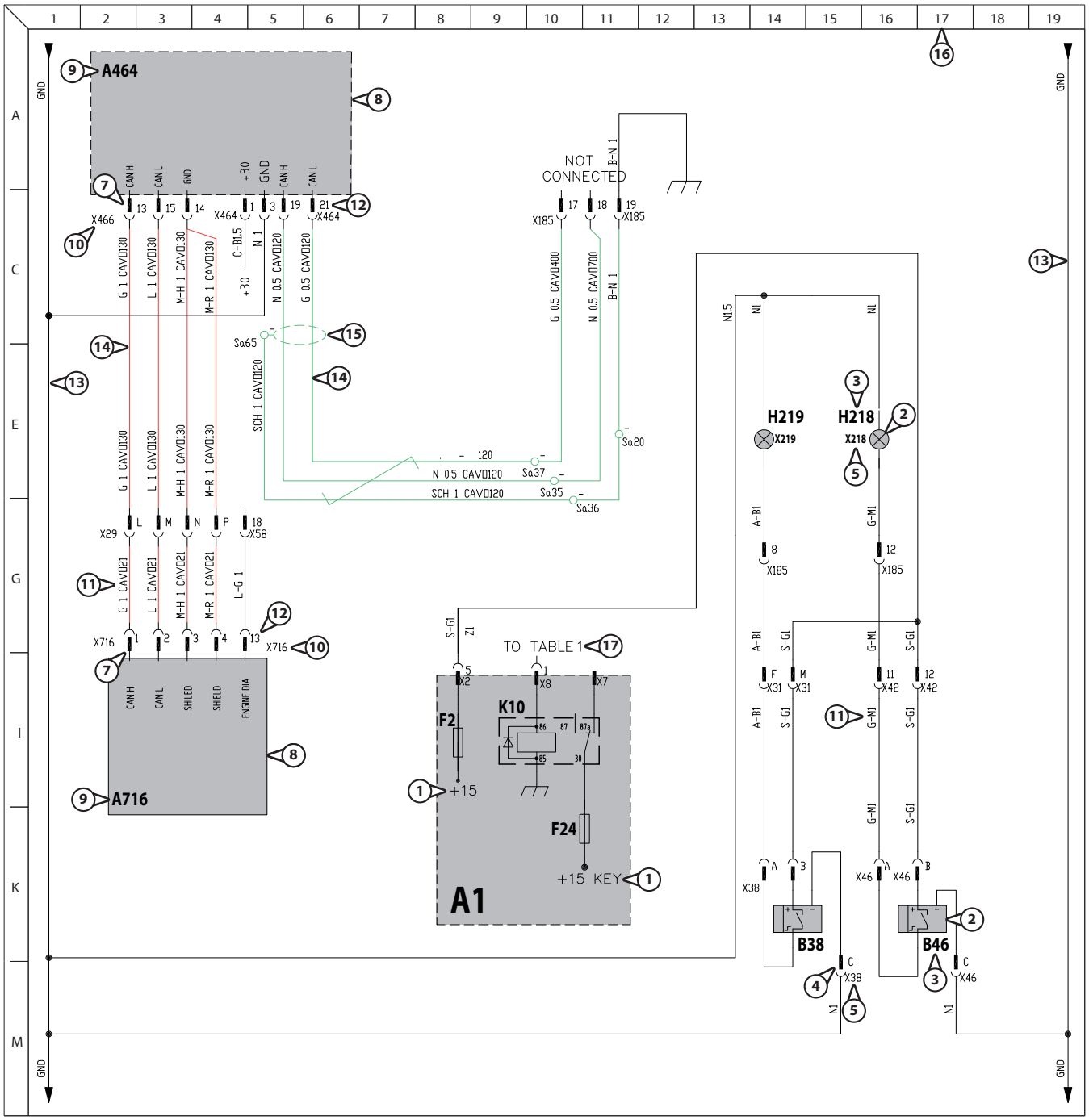
SPU: Signal Processing Unit
NC: Not connected

PLD



PLD						
Designation 18	***ECU TYPE***	***CONNECTOR***	***PIN No.***	***WIRE***	***Function on truck***	***Comments***
INPUT	OAB_S	MR2-54	00		OIL SEPARATOR	
INPUT	NW_B	MR2-54	01		CAMSHAFT SENSOR	
INPUT	KW_B	MR2-54	02		CRANKSHAFT ANGLE POSITION SENSOR	
INPUT	TMOT_B	MR2-54	03		COOLANT LIQUID TEMPERATURE SENSOR	
INPUT	TFUEL_B	MR2-54	04		FUEL TEMPERATURE SENSOR	
INPUT	POEL_M	MR2-54	05		FAN SPEED SENSOR	
FINISH	POELAKT_P	MR2-54	06		ENGINE PRESSURE SENSOR	
FINISH	P2_P	MR2-54	07		AIR SUPPLY PRESSURE SENSOR	
INPUT	NTL2_S	MR2-54	08		SPEED SENSOR	
FINISH	MVB 2	MR2-54	09		INJECTOR VALVES 2	
INPUT	POELAKT_M	MR2-54	10		ACTIVE OIL PRESSURE SENSOR	
FINISH	PV_M	MR2-54	11		PROPORTIONAL VALVE GROUND	
FINISH	PVB_P	MR2-54	12		PROPORTIONAL VALVE	
	PDK_P	MR2-54	13		OPTIONAL FUEL PRESSURE	
FINISH	P23_P	MR2-54	14		REFUSE REMOVAL SLOPE SENSOR/FAN SPEED SENSOR	
INPUT	TOEL_P	MR2-54	15		OIL TEMPERATURE SENSOR	
FINISH	MVB 1	MR2-54	16		INJECTOR VALVES 1	
INPUT	NLUE_S	MR2-54	17		SPEED SENSOR	
FINISH	ANLA	MR2-54	18		STARTER	
INPUT	KW_A	MR2-54	19		CRANKSHAFT ANGLE POSITION SENSOR	
INPUT	NW_A	MR2-54	20		CAMSHAFT SENSOR	
INPUT	T2_B	MR2-54	21		TURBO AIR TEMPERATURE SENSOR	
	PDK_M	MR2-54	22		OPTIONAL FUEL PRESSURE	
INPUT	P2_M	MR2-54	23		AIR SUPPLY PRESSURE SENSOR	
INPUT	NTL_S	MR2-54	24		SPEED SENSOR	
INPUT	MSST_S	MR2-54	25		ENGINE START SWITCH	
INPUT	POEL_S	MR2-54	26		PASSIVE ENGINE OIL PRESSURE SENSOR	
FINISH	PV5	MR2-54	27		PROPORTIONAL VALVE 5	
	PDK_S	MR2-54	28		OPTIONAL FUEL PRESSURE	
INPUT	P2_S	MR2-54	29		PRESSURE INCREASE SENSOR	
FINISH	MSS_P	MR2-54	30		ENGINE ON / OFF SWITCH	
INPUT	P23_S	MR2-54	31		OPTIONAL WASTE REMOVAL SLOPE	
INPUT	POELAKT_S	MR2-54	32		ENGINE OIL PRESSURE SENSOR	
INPUT	HDEL_S	MR2-54	33		OIL LEVEL SENSOR	
INPUT	TMOT_A	MR2-54	34		COOLANT LIQUID TEMPERATURE SENSOR	
INPUT	MSSP_S	MR2-54	35		ENGINE BUTTON STOP SIGNAL	

CODES ON THE ELECTRICAL DIAGRAMS



Example of marking on cables and components on an electrical diagram

Key:

1 - Power supply
2 - Electrical component
3 - Electrical component designation
4 - Electrical connector
5 - Electrical connector designation
6 - Splice
7 - Computer connector
8 - Computer
9 - Computer designation
10 - Computer connector designation
11 - Wire designation
12 - Electrical connector PIN N° designation
13 - Grounds
14 - CAN
15 - CAN Shielding
16 - Marking grid
17 - Diagram reference

Electrical connectors					
Wiring harness type	**Item**	**Name component**	**Designation**	**Position on diagram**	**Hydraulic code equivalence**
Main	Xm	S167	JSM (JOYSTICK SWITCH AND MOVE)	G33	
Main	Xrs	KRS	RESET RELAY	E32	
Main/Electric plate	X1	A1	PLATE	I20	
Main/Electric plate	X2	A1	PLATE	M23	
Main/Electric plate	X4	A1	PLATE	I6 - M5 - I16 - I22	
Main/Electric plate	X5	A1	PLATE	I25 - I27 M25 - M27	
Electric plate	X6	A1	PLATE (SHUNT)	M17 - M24	
Main/Electric plate	X7	A1	PLATE	M12 - M15 - I12 I17 - I24	
Main/Electric plate	X8	A1	PLATE	I29 - I32 M33 - M36	
Engine	X9	Y9	FORWARD GEAR ELECTROVALVE	O12	
Main/Electric plate	X11	A1	PLATE	M8 - M28	
Engine	X12	Y12	REVERSE GEAR ELECTROVALVE	O14	
Main/Engine	X29		MAIN/ENGINE INTERFACE	M12 - M14	
Front/Main	X31		FRONT/MAIN INTERFACE	E36 - M4 - O16 O33 - O36	
Front	X33	Y33	TIME-DELAY SUPPLY ELECTROVALVE 2	G36	
Front	X34	Y34	SLOW SPED ELECTROVALVE	O33	
Front	X35	Y35	HIGH SPEED ELECTROVALVE	O36	
Front	X39	B39	ANGLE GEAR BOX SENSOR	O16	
Rear/Main	X42		REAR/MAIN INTERFACE	Q7 - O9 - O18	
Rear	X43	B43	HAND BRAKE SENSOR	Q18	
Rear	X53		TRAILER BRAKE KIT (OPTION)	O9	
Main	X63	B63	STOP SWITCH PRESSURE SWITCH	M27	
Main	X167.1	S167	JSM (JOYSTICK SWITCH AND MOVE)	G15	
Dashboard	X168	S168	EMERGENCY STOP BUTTON	E26	
Dashboard/Main	X185		DASHBOARD/MAIN INTERFACE	E36 - E17 G10 - O22	
Dashboard/Main	X186		DASHBOARD/MAIN INTERFACE	G24 - G27 - E29 E38 - E18	
Front	X193	Y193	TIME-DELAYED TRANSMISSION ELECTROVALVE	O4	
Main	X201	R201	ACCELERATOR POTENTIOMETER	O31	
Dashboard/Main	X206		DASHBOARD/MAIN INTERFACE	C38 - E20	
Dashboard	X213	H213	MAX POWER WARNING INDICATOR LAMP	E30	
Dashboard	X214	H214	LOW SPEED INDICATOR LAMP	A36	
Dashboard	X215	H215	HIGH SPEED INDICATOR LAMP	A35	
Dashboard	X216	S216	HIGH/LOW SPEED SELECTOR	A31	
Dashboard	X217	S217	TRANSMISSION RESET	A18	
Dashboard	X225	H225	BRAKE INDICATOR LAMP (OPTION)	E10	
Dashboard	X228	A228	CONTROL INDICATOR LAMP	Q20	
Dashboard	X232.1	H232	DASHBOARD MODULE INDICATOR LAMP	Q23	
Main	X300	Diode	SPEED CONTROL DIODE	G12	
Main	X301	Diode	SPEED CONTROL DIODE	G13	
Main	X464	A464	ADM2 MODULE	Q27	
Main	X466	A464	ADM2 MODULE	Q28	
Main	X526		PLATFORM (OPTION)	Q6	
Main	X606	A606	SPU MODULE	C8	
Main	X607	A606	SPU MODULE	C7	

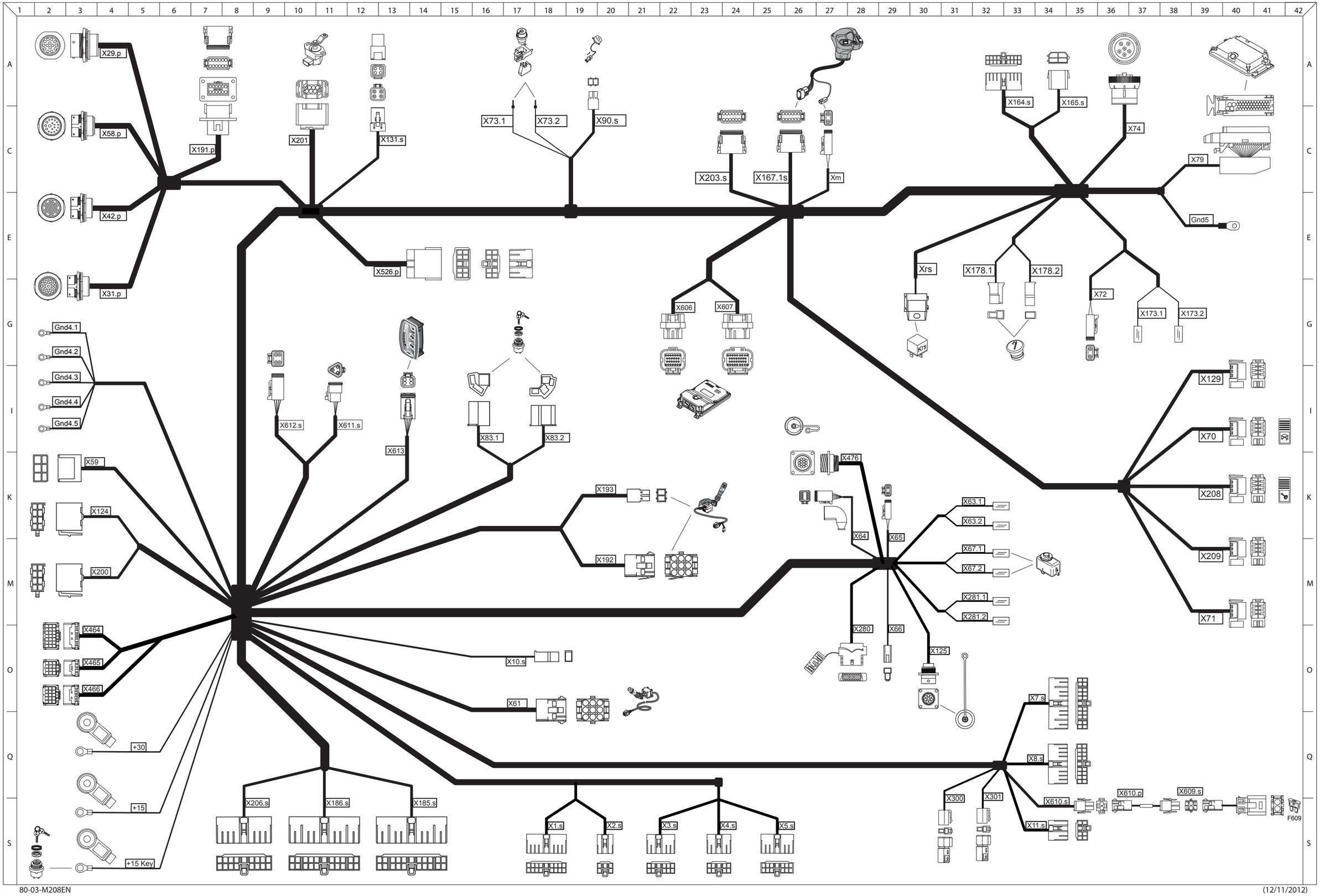
Electrical components			
Item	**Designation**	**Position on diagram**	**Hydraulic code equivalence**
A1	PLATE	K6	
A17	HYDROSTATIC MODULE	I35	
A228	CONTROL INDICATOR LAMP	Q20	
A464	ADM2 MODULE	Q27	
A606	SPU MODULE	A10	
B39	ANGLE GEAR BOX SENSOR	O16	
B43	HAND BRAKE SENSOR	Q17	
B63	STOP SWITCH PRESSURE SWITCH	M27	
H213	MAX POWER WARNING INDICATOR LAMP	E30	
H214	LOW SPEED INDICATOR LAMP	A36	
H215	HIGH SPEED INDICATOR LAMP	A35	
H225	BRAKE INDICATOR LAMP (OPTION)	E10	
H232	DASHBOARD MODULE INDICATOR LAMP	Q23	
R201	ACCELERATOR POTENTIOMETER	M29	
S167	JSM (JOYSTICK SWITCH AND MOVE)	E15	
S168	EMERGENCY STOP BUTTON	E27	
S216	HIGH/LOW SPEED SELECTOR	A31	
S217	TRANSMISSION RESET	A18	
Y9	FORWARD GEAR ELECTROVALVE	O11	
Y12	REVERSE GEAR ELECTROVALVE	O14	
Y33	SUPPLY ELECTROVALVE 2	G35	
Y34	SLOW SPED ELECTROVALVE	O33	
Y35	HIGH SPEED ELECTROVALVE	O35	
Y193	TRANSMISSION ELECTROVALVE	O4	

Fuses and relays			
Item	**Current**	**Designation**	**Position on diagram**
F14	5A	INDICATOR LAMPS+INSTRUMENTS+CAN	K20
F23	7,5A	LOW/HIGH SPEED	K33
F25	15A	TRANSMISSION CONTROL UNIT	I21
F27	10A	TRANSMISSION ELECTROVALVE	K6
K1		NEUTRAL RELAY	K25
K2		TRANSMISSION ELECTROVALVE	I5
K4		TRANSMISSION CUT-OFF RELAY	I22
K6		REVERSE GEAR RELAY	I15
K7		FORWARD GEAR RELAY	I12
K15		GEAR CHANGE RELAY	I30
K16		TRANSMISSION CUT-OFF RELAY	K8
KRS		RESET RELAY	E32

Electrical connectors					
Wiring harness type	**Item**	**Name component**	**Designation**	**Position on diagram**	**Hydraulic code equivalence**
Air-conditioning	FUSE 1	FUSE 1	FAN FUSE	C15	
Air-conditioning	FUSE 2	FUSE 2	AIR CONDITIONING PANEL FUSE	C16	
Air-conditioning	FUSE 3	FUSE 3	FAN 1 FUSE	C17	
Air-conditioning	FUSE 4	FUSE 4	FAN 2 FUSE	C18	
Air-conditioning	RL1	RL1	AIR CONDITIONING COMPRESSOR RELAY	C21	
Main/Engine	X58		MAIN/ENGINE INTERFACE	M5	
Main	X74		MAIN/AIR CONDITIONING INTERFACE	O9	
Air-conditioning	X100	P100	AIR CONDITIONING PANEL	O29	
Air-conditioning	X101		AIR CONDITIONING/ MAIN INTERFACE	O9	
Air-conditioning	X102	A102	AIR CONDITIONING MODULE	C25	
Air-conditioning	X103	K103	THIRD GEAR RELAY	G15	
Air-conditioning	X104.1	M104.1	AIR CONDITIONING MOTOR 1	O15	
Air-conditioning	X104.2	M104.2	AIR CONDITIONING MOTOR 2	O13	
Air-conditioning	X104.3	B104.3	AIR CONDITIONING HIGH PRESSURE SENSOR	O15	
Air-conditioning	X105	A105	RECYCLING	O18	
Air-conditioning	X106	M106	AIR-CONDITIONING COMPRESSOR	O18	
Air-conditioning	X107		AIR CONDITIONING/ MAIN INTERFACE	Q7	
Air-conditioning	X108	B108	OUTSIDE TEMPERATURE SENSOR	O37	
Air-conditioning	X109	B109	THREE SPEED FAN MOTOR	O24	
Air-conditioning	X110	B110	EVAPORATOR PRESSURE SWITCH	O22	
Air-conditioning	X111	M111	HEATING CIRCUIT MOTOR	O25	
Air-conditioning	X112	B112	HEATING TEMPERATURE SENSOR	O26	
Main	X131		MAIN/AIR CONDITIONING INTERFACE	O7	
Engine	X711	F1	POWER SUPPLY FUSE	O5	

Electrical components			
Item	**Designation**	**Position on diagram**	**Hydraulic code equivalence**
A102	AIR CONDITIONING MODULE	A29	
A105	RECYCLING	O19	
B104.3	AIR CONDITIONING HIGH PRESSURE SENSOR	O14	
B108	OUTSIDE TEMPERATURE SENSOR	O36	
B110	EVAPORATOR PRESSURE SWITCH	O22	
B112	HEATING TEMPERATURE SENSOR	O26	
G1	BATTERY	Q4	
M104.1	AIR CONDITIONING MOTOR 1	O15	
M104.2	AIR CONDITIONING MOTOR 2	O12	
M106	AIR-CONDITIONING COMPRESSOR	O17	
M109	THREE SPEED FAN MOTOR	Q23	
M111	HEATING CIRCUIT MOTOR	O25	
P100	AIR CONDITIONING PANEL	O29	

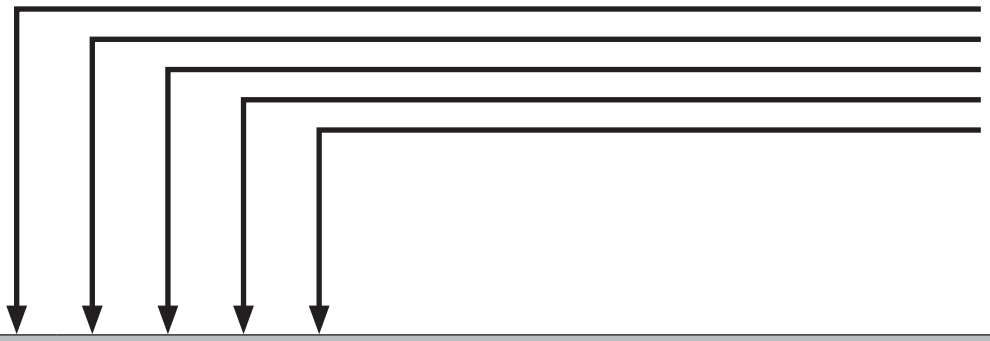
Fuses and relays			
Item	**Current**	**Designation**	**Position on diagram**
F1	30A	POWER SUPPLY +30	O6
F20	25A	AIR CONDITIONING PANEL +30	O10
FUSE 1	5A	FAN	C15
FUSE 2	5A	AIR CONDITIONING PANEL +15	C16
FUSE 3	15A	FAN 1	C17
FUSE 4	15A	FAN 2	C18
K103		THREE-SPEED FAN RELAY	G14
RL1		AIR CONDITIONING COMPRESSOR RELAY	C21

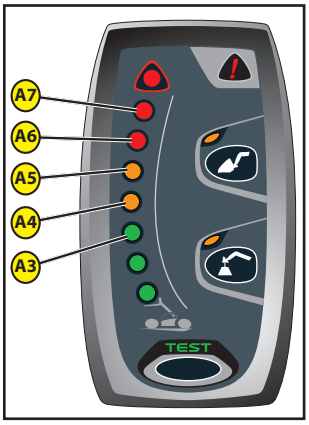

X29.p
X58.p
X42.p
X31.p
X191.p
X201
X131.s
X73.1
X73.2
X90.s
X203.s
X167.1s
Xm
X164.s
X165.s
X74
X79
Gnd5
X526.p
X606
X607
Xrs
X178.1
X178.2
X72
X173.1
X173.2
Gnd4.1
Gnd4.2
Gnd4.3
Gnd4.4
Gnd4.5
X612.s
X611.s
X613
X83.1
X83.2
X129
X70
X208
X209
X71
X59
X124
X200
X193
X192
X476
X64
X65
X63.1
X63.2
X67.1
X67.2
X281.1
X281.2
X280
X66
X125
X464
X465
X466
X10.s
X61
+30
+15
+15 Key
X206.s
X186.s
X185.s
X1.s
X2.s
X3.s
X4.s
X5.s
X7.s
X8.s
X610.s
X11.s
X300
X301
X610.p
X609.s
F609

LONGITUDINAL STABILITY INDICATOR (LLMI)

ERROR CODES

The error codes are indicated by LEDs A3 to A7 on the warning device and longitudinal stability limiter.





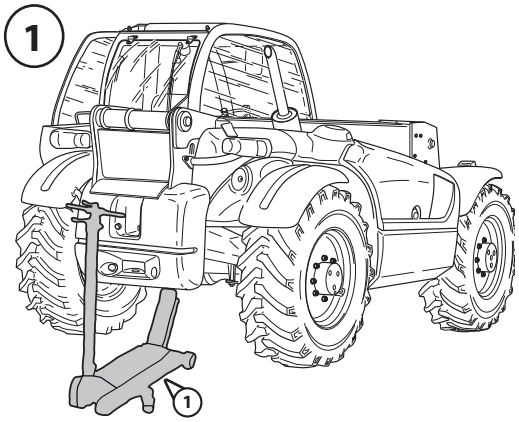
ERROR CODES					
LEDS					DESCRIPTIONS
A7	A6	A5	A4	A3	
☀	☀	☀	☀	☀	Regulating fault (fault detected during the test).
☀	☀	☀	☀	○	Lowering regulating valve fault.
☀	☀	☀	○	☀	Safety valve cut-off fault (fault detected during the test).
☀	☀	☀	○	○	Safety valve fault.
☀	☀	○	☀	☀	Gauge calibration fault (fault detected during the test). **Resetting the longitudinal stability limiter and warning device may resolve the problem. (◁ : 3 - MAINTENANCE: G - OCCASIONAL MAINTENANCE)**
☀	☀	○	☀	○	Angle calibration fault (fault detected during the test).
☀	☀	○	○	☀	Inclination cut-off valve fault.
☀	○	☀	☀	☀	Strain gauge fault.
☀	○	☀	☀	○	Jib angle sensor fault.
☀	○	☀	○	☀	Telescope or attachment control fault.
☀	○	☀	○	○	Telescope retracted senor fault.
☀	○	○	☀	☀	Computer earth output fault.
☀	○	○	☀	○	Aggravating hydraulic movement cut-off disable fault.
☀	○	○	○	○	Fan drive valve fault.
○	☀	☀	☀	○	Stability indicator fault.
○	☀	☀	○	☀	Electronic handling controller fault.
○	☀	☀	○	○	Hydraulic control lever control setting fault.
○	☀	○	☀	☀	Transmission cut-off output fault.
○	☀	○	○	☀	Electronic handling controller supply fault.
○	☀	○	○	○	Telescope retracted sensor fault (fault detected during the test).
○	○	☀	☀	☀	Tilt cut-off valve fault (according to model)
○	○	☀	☀	○	Boom head solenoid valve fault. (OPTION)
○	○	☀	○	☀	Button fault, accessory hydraulic easy attachment (OPTION)
○	○	☀	○	○	Electrovalve attachment hydraulic control and electrical jib provision fault button. (OPTION)
○	○	○	☀	☀	Forced operation indicator fault (OPTION)
○	○	○	☀	○	Electric handling controller 10 V output fault.
○	○	○	○	☀	Forced operation button fault (OPTION)

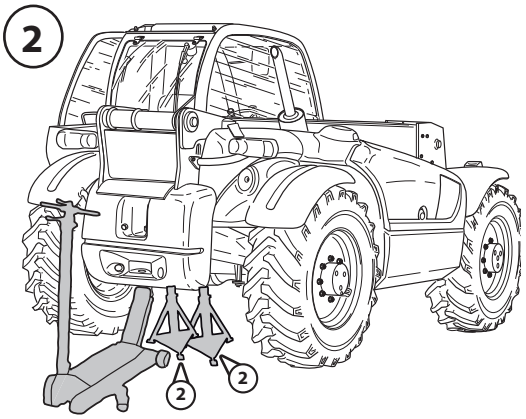
CHARACTERISTICS OF THE ATTACHMENT SCREWS

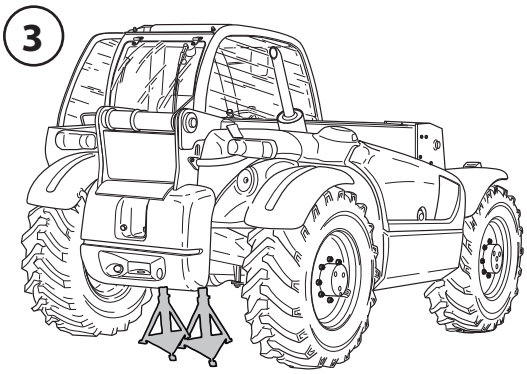
The bolts used are delivered with the strain gauge.

– Bolt H, M10x30 pitch 1.5 Class 10.9.

PRECAUTIONS FOR ASSEMBLY AND TIGHTENING TORQUE







The two components (strain gauge and axle) must be kept at the same temperature for at least 4 hours before commencing assembly.

The strain gauge should be assembled with a completely unloaded axle.

To ensure this:

1 - Lift the rear axle from the floor using a hydraulic jack (Item 1) (Part No Manitou 505507).
2 - Make the machine safe by placing 2 stands (Item 2) (Part No Manitou 554772) on each side of the chassis.
3 - Remove the jack to completely unload the rear axle.

PLD MERCEDES (A716)		
Fault N°	**Fault**	**Repair instructions**
0 25 09	oil level sensor open circuit fault	- check oil level sensor B14, replace if necessary. - check wire N3/33 - B14/1 for open circuit fault, repair or replace if necessary. - check wire N3/49 - B14/2 for open circuit fault, repair or replace if necessary - perform functional check
0 25 15	oil level sensor measuring range exceeded	- check oil level, correct if necessary. - check wire N3/33 - B14/1 if shortened to battery voltage, repair of replace if necessary. - check oil level sensor B14 resistance, replace if necessary - nominal value: 20-25 Ohm - perform functional check.
0 25 16	oil level sensor remains under measuring range	- check oil level, correct if necessary. - check wire N3/33 - B14/1 for ground short, repair or replace if necessary. - check oil level sensor B14 resistance, replace if necessary. nominal value: 20-25 Ohm - perform functional check.
0 25 17	oil level sensor measured value not plausible	- check oil level during engine standstill, correct if necessary. - check calibration of oil pan type, correct if necessary. - calibration of oil level sensor, correct if necessary. - check cable, plug, plug connections and electrical components for damage, correct connection, loose contact and corrosion, repair if necessary. - check oil level sensor B14 resistance, replace if necessary. nominal resistance: 22 Ohm when oil pan filled. - perform functional check.
0 40 24	internal fault: auxiliary controller defective	- check all affected connectors, plug connections and electrical components for damage, loose contact, corrosion etc. and repair if necessary. - if fault code is still present, renew and program control unit - perform functional check.
0 40 37	internal fault: cylinder number implausible	- check all affected connectors, plug connections and electrical components for damage, loose contact, corrosion etc. and repair if necessary. - if fault code is still present, renew and program control unit. - perform functional check.
0 40 38	internal fault: high resistance starter driver (redundant-/auxiliary path)	- if fault code 07543 is present, remove this fault code first. - check all affected connectors, plug connections and electrical components for damage, loose contact, corrosion etc. and repair if necessary. - if fault code is still present, renew and program control unit. - perform functional check.
0 40 40	internal fault: level detection starter defective	- check all affected connectors, plug connections and electrical components for damage, loose contact, corrosion etc. and repair if necessary. - if fault code is still present, renew and program control unit. - perform functional check.

PLD MERCEDES (A716)		
Fault N°	**Fault**	**Repair instructions**
1 57 26	contact recognition injector-/solenoid valve: no contact cylinder 8	refer to example of fault code 15026...
1 57 27	control failure injector-/solenoid valve: control cylinder 8 disturbed	refer to example of fault code 15027...
1 64 09	heater flange: open circuit fault (heater flange defective)	Condition: The heating flange becomes after Kl. 15 uniquely briefly switched on. Here if no break-down of the battery voltage is recognized, the heating flange is classified as defective. Error threshold and cyclic duration are deposited in the data record.
1 70 06	proportional valve 1: short circuit to ground (-lead)	note: ECU engine control (e.g. MR-PLD) wrong calibration. - check parametrization. - parameter 06 has to be set to NOT ACTIVE - if not, then the data set of ECU engine control (e.g. MR-PLD) is wrong - replace and program ECU engine control (e.g. MR-PLD). - perform functional check.
1 70 07	proportional valve 1: shortened to battery voltage (-lead)	
1 70 09	proportional valve 1: open circuit fault	note: ECU engine control (e.g. MR-PLD) wrong calibration. - check parametrization. - parameter 06 has to be set to NOT ACTIVE - if not, then the data set of ECU engine control (e.g. MR-PLD) is wrong - replace and program ECU engine control (e.g. MR-PLD). - perform functional check.
1 71 06	proportional valve 3: short circuit to ground (-lead)	note: ECU engine control (e.g. MR-PLD) wrong calibration / short circuit to ground - check calibration, correct if necessary. Parameter 008 has to be set to NOT ACTIVE. - if the calibration is OK, check wire N3/41 - Y70/1 for short circuit to ground, repair or replace if necessary. - if still no fault can be detected, replace and program ECU engine control (e.g. MR-PLD). - perform functional check.
1 71 07	proportional valve 3: shortened to battery voltage (-lead)	

DIAGNOSTIC TOOLKIT

Phase 4: evaporation

The fluid goes through the evaporator (Item 5) to absorb the cab interior heat and vaporizes while keeping a low temperature and pressure.

As such, the cab interior air propelled by the fan motor cools down and looses its humidity when in contact with the evaporator. The condensation of the air is then drained and evacuated to the outside of the vehicle.

High and low pressure checks of the circuit are carried out by a HP and LB pressure switch attached directly on the dehydrator filter (Item 3).

Its security operations are as follows:

- Complete stop of the air conditioning if the pressure is lower than 2 bars or greater than 27 bars.

DESCRIPTION OF COMPONENTS

The compressor

The compressor is the component that allows to:

- pass the fluid in the circuit by sucking it in gas state from the evaporator in low pressure and low temperature,
- to compress it to send it in high pressure and high temperature to the condenser.

The condenser

The condenser is a thermal exchanger that transmits the heat recuperated from the evaporator to the outside air using the fan and causes the condensation of the fluid at high pressure.

The drier filter

The filter is the main element protecting the installation. Its functions are as follows:

- Filtering any solid particles passing in the fluid that may damage the compressor or obstruct the reduce valve, for example.
- To dehumidify fluid and oil to preserve circuit elements against:
  - ⇒ corrosive agents
  - ⇒ the freezing of the humidity at outlet of the reducing valve so as to prevent the equipment from blocking.
- Storing the fluid in liquid state and as such constituting a reserve tank to make up for pressure variations. It therefore contributes to the absorption of pressure differences generated by the compressor.

The « binary » pressure switch

Attached on the drier filter, the pressure switch is the equipment security component that is sensitive to pressure variations.

It secures the equipment from both too low or too high pressure values by acting directly on the compressor clutch:

- Action to prevent low pressures (< 2 bars) due for example to insufficient refrigerant fluid, a leak or a plug forming upstream of the circuit.
- Action to prevent low pressures (> 27 bars) due to poor condenser cooling, an excess of refrigerant fluid or a plug forming upstream of the circuit.