

Service Manual

Track excavator

1404



Machine model	1404
Edition	1.1
Language	English
Item no.	1000166693

Documentation

Description	Order no.
Operator's Manual	1000164553
Service manual	1000166693
Spare parts list	1000163718

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The cover features the machine with possible optional equipment.



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Neuson Baumaschinen GmbH

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Operation

1 Operation

1.1 Important information on this service manual

This service manual contains important information on how to work safely, correctly and economically with the machine. Therefore, it aims not only at new operators, but it also serves as a reference for experienced ones. It helps to avoid dangerous situations and reduce repair costs and downtimes. Furthermore, the reliability and the service life of the machine will be increased by following the instructions in the service manual.

Careful and prudent working is the best way to avoid accidents!

Operational safety and readiness of the machine do not only depend on your skill, but also on maintenance and servicing of the machine.

Insist on using original spare parts when carrying out maintenance and repair work. This ensures operational safety and readiness of your machine, and maintains its value.

Your Neuson After-Sales Service will be pleased to answer any further questions regarding the machine or the service manual.

Abbreviations/symbols

- This symbol stands for a list
 - Subdivision within lists or an activity. Follow the steps in the recommended sequence

 *This symbol requires you to carry out the activity described*

 Description of the effects or results of an activity

n. s. = not shown

“Option” = optional equipment

Stated whenever controls or other components of the machine are installed as an option.

A combination of digits, or a combination of digits and letters, e.g. 40/18 or 40/A used for identifying the control elements, means:

Figure no. 40/control element no. 18 or position A in figure no. 40

Figures carry no numbers if they are placed to the left of the text.



1.2 Identification of warnings and dangers

Important indications regarding the safety of the staff and the machine are identified in this service manual with the following terms and symbols:



Danger!

Failure to observe the instructions identified by this symbol may result in personal injury or death for the operator or other persons.

 *Measures for avoiding danger*



Caution!

Failure to observe the instructions identified by this symbol may result in damage to the machine.

 *Measures for avoiding danger for the machine*



Important!

This symbol identifies instructions for a more efficient and economical use of the machine.



Environment!

Failure to observe the instructions identified by this symbol may result in damage to the environment. The environment is in danger if environmentally hazardous material (e.g. waste oil) is not subject to proper use or disposal.



1.3 Designated use and exemption from liability

- The machine is intended for:
 - moving earth, gravel, coarse gravel or ballast and rubble as well as for
 - working with the attachments mentioned in chapter *Specifications*.
 - Every other application is regarded as not designated for the use of the machine. Neuson Baumashinen GmbH will not be liable for damage resulting from use other than mentioned above. The user alone will bear the risk.
Designated use also includes observing the instructions set forth in the Operator's Manual and observing the maintenance and service conditions.
- The safety of the machine can be negatively affected by carrying out machine modifications without proper authority and by using spare parts, equipment, attachments and optional equipment which have not been checked and released by Neuson Baumaschinen GmbH. Neuson Baumaschinen GmbH will not be liable for damage resulting from this.
- Neuson Baumaschinen GmbH shall not be liable for personal injury and/or damage to property caused by failure to observe the safety instructions and the Operator's Manual, and by the negligence of the duty to exercise due care when:
 - handling
 - operating
 - servicing and carrying out maintenance work and
 - repairing the machine. This is also applicable in those cases in which special attention has not been drawn to the duty to exercise due care, in the safety instructions as well as in the operation and maintenance manuals (machine/engine).
 - Read and understand the Operator's Manual before starting up, servicing or repairing the machine. Observe the safety instructions!
- The machine may not be used for transport jobs on public roads



1.4 Type labels and component numbers



Fig. 1: Type label: location

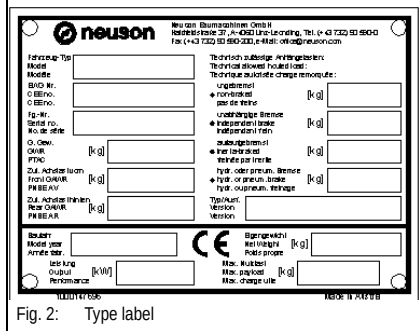


Fig. 2: Type label

Serial number

The serial number is stamped on the machine chassis. It is also located on the type label.

The type label is located at the front left on the machine chassis (at cab level)

Type label information

Example: 1404 RD

Machine model: 1404 RD

Serial no.: e.g. AF01272

Model year: 2006

Output: 13.2 kW (17.7 hp)

Dead weight: 1550 kg (3417 lbs)

Other information – see [chapter 2 Specifications](#) on page 2-1

Cab number

The type label (arrow) is located on the chassis of the cab, at the upper left beside the door.

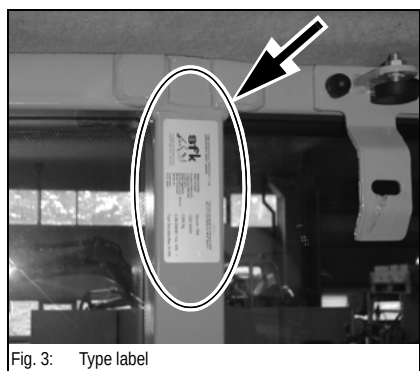


Fig. 3: Type label

Engine number

The type label (arrow) is located on the cylinder-head cover (engine).

Example: Yanmar 10120

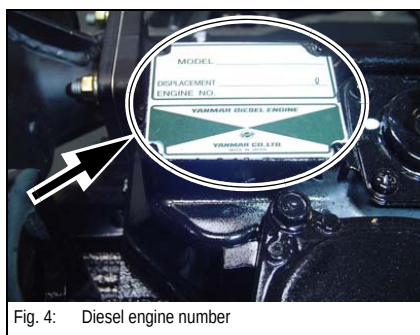


Fig. 4: Diesel engine number



Fig. 5: Main valve block type label

Main valve block number

The type label is located on the lower side of the main valve block.



Fig. 6: Travelling drive type label

Travelling drive number

The type label (arrow) is located on the travelling drive.



Fig. 7: Swivel unit type label

Swivel unit number

The type label (arrow) is located on the swivel unit.

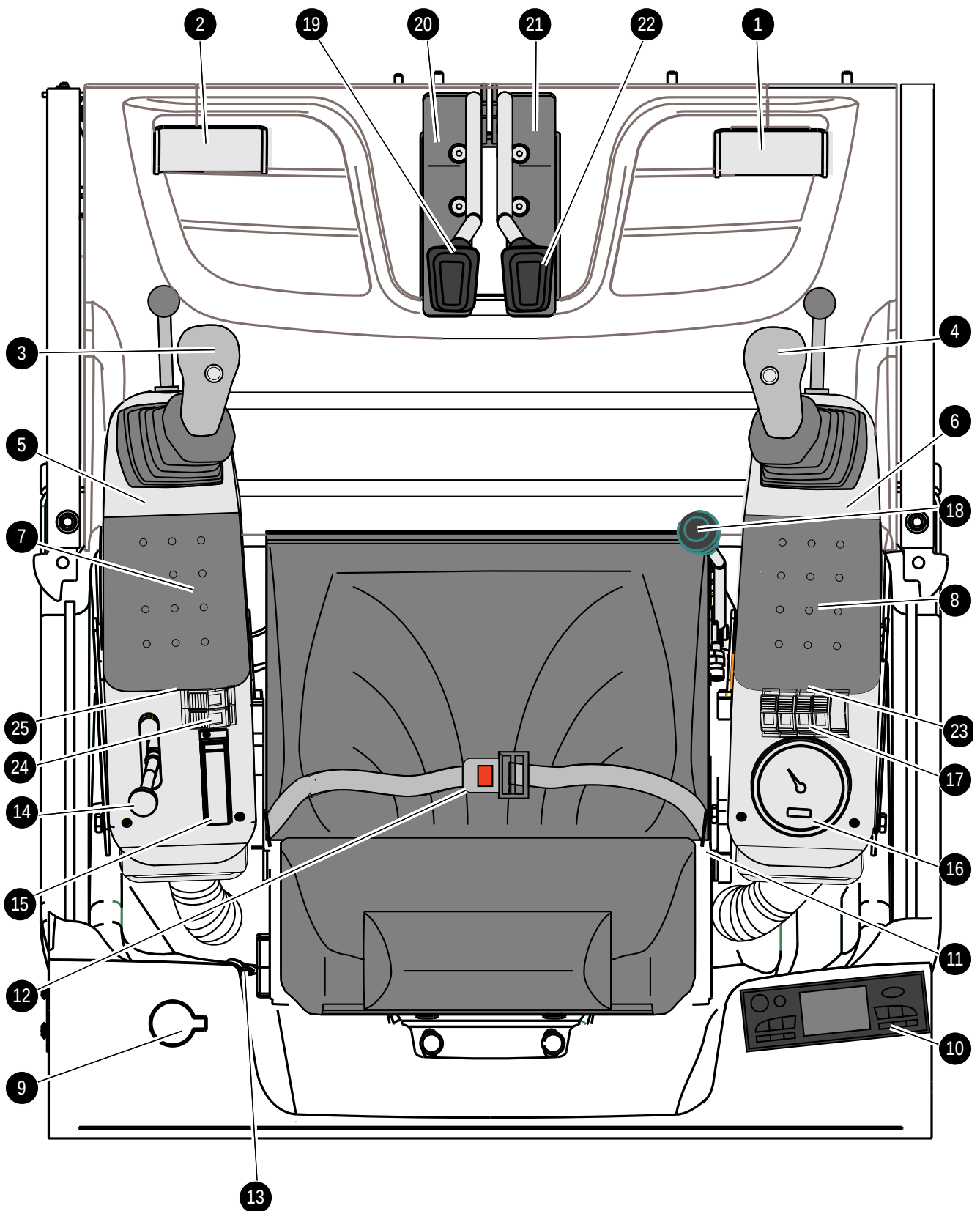


1.5 Machine overview





1.6 Cab overview





1.7 Cab overview: legend

Pos.	Description
1	Hammer pedal (auxiliary hydraulics)
2	Hammer pedal for boom slewing
3	Control lever (left)
4	Control lever (right)
5	Control lever base (left)
6	Control lever base (right)
7	Armrest (left)
8	Armrest (right)
9	Tank for washer system
10	Radio (option)
11	Seat (backrest adjustment)
12	Seat belt (lock)
13	Heating controls (option)
14	Throttle
15	Fuse box
16	Round display element
17	Switch panel (right-hand side console)
18	Stabiliser blade/lever for telescopic undercarriage (option)
19	Drive lever (left)
20	Drive pedal (left)
21	Drive pedal (right)
22	Drive lever (right)
23	Preheating start switch
24	Switch panel (left-hand side console)
25	Cigarette lighter



1.8 Instrument panel overview



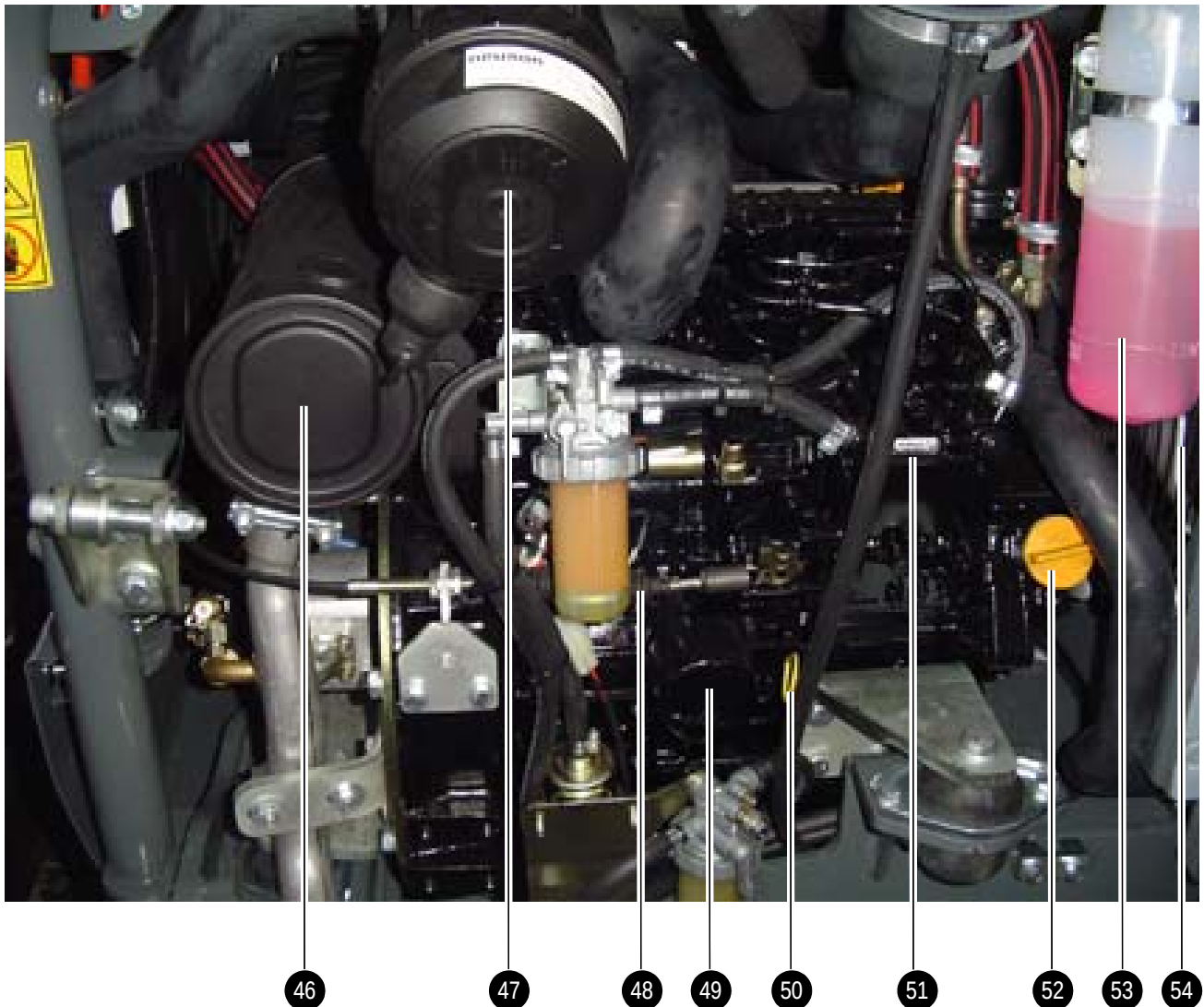


1.9 Instrument panel overview: legend

Pos.	Description	For more information see page
26	Not assigned	
27	Not assigned	
28	Telltale (yellow) – cold starter	
29	Not assigned	
30	Not assigned	
31	Telltale (red) – alternator charge function	3-43
32	Not assigned	
33	Telltale (red) – engine oil pressure	3-13
34	Telltale (red) – coolant temperature	3-18
35	Not assigned	
36	Not assigned	
37	Fuel level indicator	
38	Hour meter	
39	Not assigned	
40	Ventilation (option)	
41	Washer system (option)	
42	Working light (option)	
43	Rotating beacon (option)	
44	Roof lights (option)	
45	Not assigned	



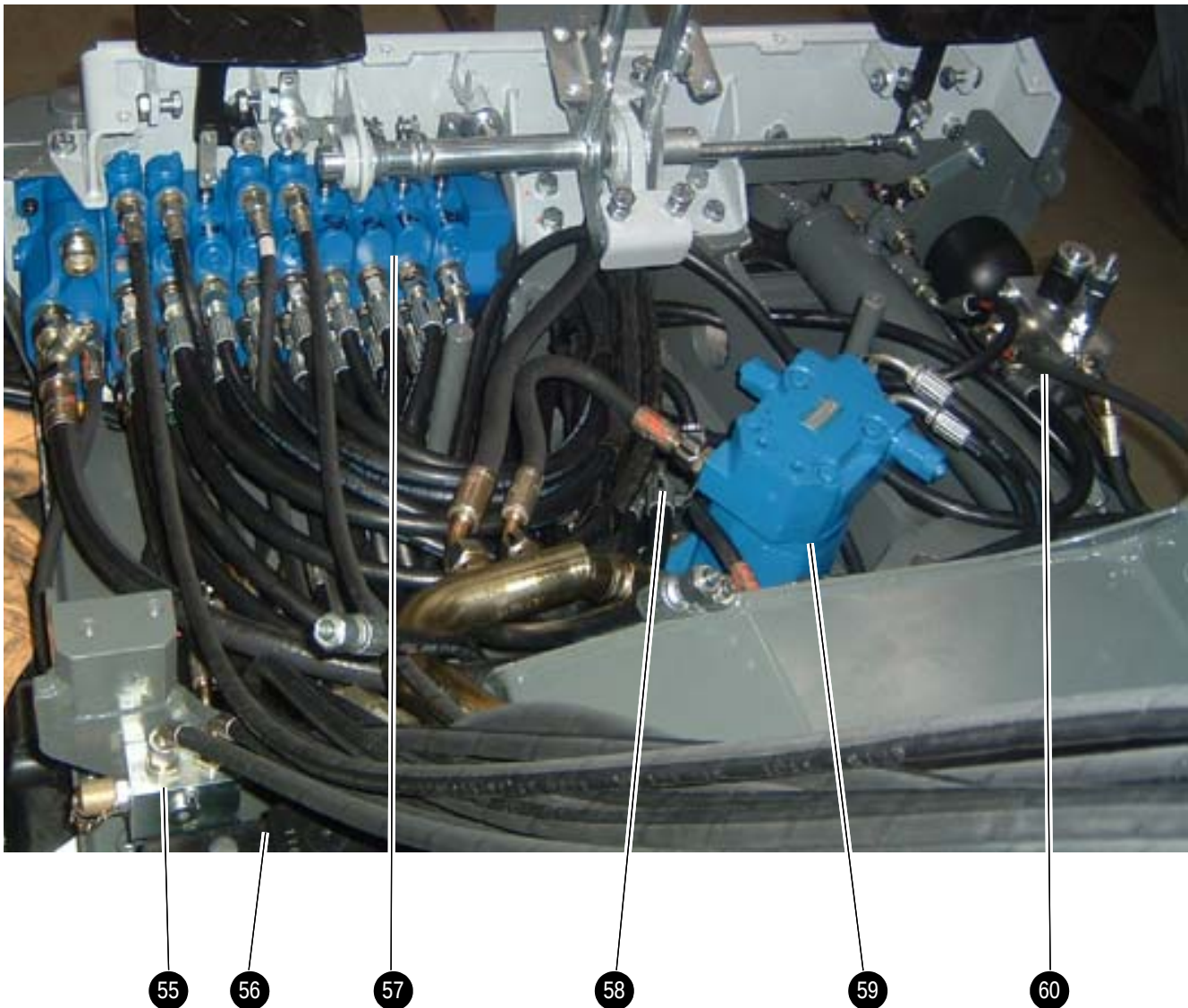
1.10 Engine compartment: overview



Pos.	Description	For more information see page
46	Exhaust silencer	
47	Air filter	3-20
48	Throttle cable	
49	Engine oil filter	3-13
50	Oil dipstick	3-13
51	Fuel injection pump	4-7
52	Oil filler neck	3-31
53	Expansion tank	3-18
54	Fan wheel	



1.11 Chassis overview



Pos.	Description	For more information see page
55	Distributing block	3-25
56	Battery	3-43
57	Main valve block	5-4
58	Swivel joint	5-19
59	Swivel unit	5-14
60	Pilot oil supply unit	5-3



1.12 Removing the cab

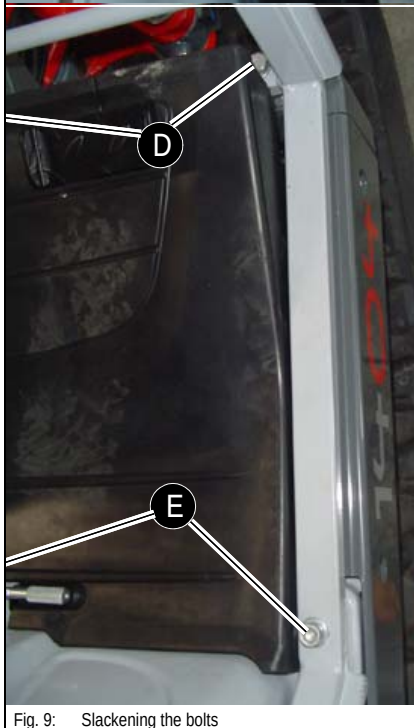
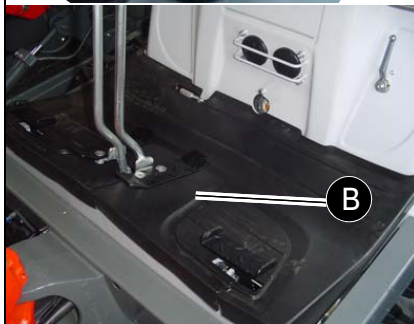


Fig. 9: Slackening the bolts



Danger!

Careful when removing the cab –

Danger of accidents!

- ☞ Always tighten screws C, D and E firmly when driving and working with the machine.
- ☞ Stay clear from underneath the cab as you remove it
 - Switch off the engine
 - Remove the ignition key
 - Fold the control lever base (left) up



Caution!

Hitch the crane cables in the eye hooks on the cab roof before removing the cab – see [chapter Removing the cab](#) on page 1-14.

Remove the cab as follows:

- ☞ Switch off the engine
- ☞ Remove the ignition key
- ☞ Fold the control lever base (left) up
- ☞ Hitch the crane cables in the eye hooks of the cab
- ☞ Disconnect wiring harness A to the right of the seat
- ☞ Remove floor mat B

Slackening the bolts

Slacken bolts C as follows:

- ☞ Slide the seat to the front
- ☞ Unscrew bolts A with a suitable tool
 - ➞ Bolts C are located in the cab directly behind the seat
- ☞ Slacken bolts D and E with a suitable tool
 - ➞ Bolts D are located at the front left and right in the cab
 - ➞ Bolts E are located at the rear left and right in the cab

Removing the cab



Fig. 10: Eye hooks



Danger!

Always close the door. Even if the door is secured in the open position with the door arrester –

Danger of accidents!

- ☞ Always close the door before raising the cab
- ☞ Should the door be open as you raise the cab, do not actuate the door opener unintentionally

Carefully raise the cab from the excavator and set it down on a level surface.

Removing the floor panel

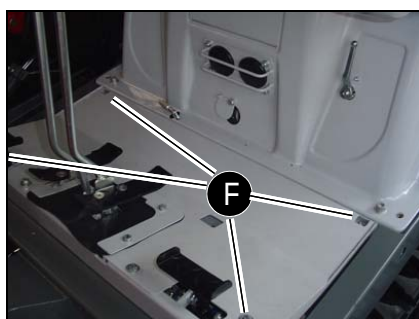


Fig. 11: Removing the floor panel

Remove the floor panel as follows:

- ☞ Switch off the engine
- ☞ Remove the ignition key
- ☞ Fold the control lever base (left) up
- ☞ Remove floor mat B – see chapter 1.12 Removing the cab on page 1-13
- ☞ Slacken bolts F with a suitable tool

Install the cab and the floor panel again in the reverse order.

Battery master switch (model 1404)

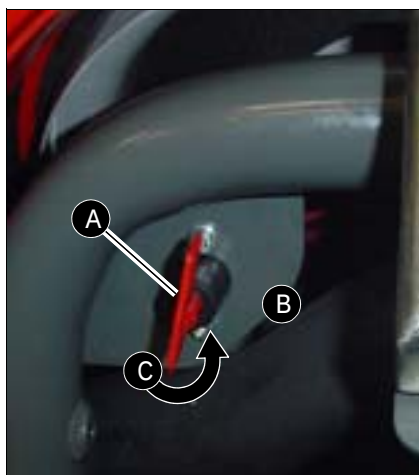


Fig. 12: Battery master switch model 1404



Important!

Do not disconnect the battery while the engine is running.



Important!

Power supply is interrupted directly after the battery, by means of a key

- Before working on the electric system
- As an antitheft precaution

Interrupting power supply:

- ☞ Turn key A of the battery master switch to position B and remove it

Switching on power supply:

- ☞ Insert key A in the battery master switch
- ☞ Turn the key down to the notched position C

Specifications

2 Specifications

2.1 Chassis

Sturdy steel sheet chassis, rubber-mounted engine

2.2 Engine

Engine	Model 1404
Product	Yanmar diesel engine
Model	3TNV76-SNS2
Design	Water-cooled 4 stroke diesel engine
No. of cylinders	3
Fuel injection system	Indirect injection
Aspiration	Natural aspiration
Cooling system	Water-cooled/blowing fan
Lubrication system	Force-feed lubrication with trochoidal pump
Displacement	1116 cm ³ (68 in ³)
Nominal bore and stroke	76 x 82 mm (3.0 x 3.3")
Output	13.2 kW (17.7 hp) at 2200 rpm
Max. torque	65.8 Nm (48.5 lbf ft) at 1600 rpm
Max. engine speed without load	2375 +/- 25 rpm
Idling speed	1300 +/- 25 rpm
Valve tip clearance (intake = outlet)	0.15 – 0.25 mm / 0.0059 - 0.0098" (cold)
Compression	34.3 ± 1 bar (497 ± 14.5 psi) at 250 rpm
Engine oil pressure	2.9 – 4.4 bar (42.1 - 63.8 psi)
Pressure switch for engine oil pump	0.5 ± 0.1 bar (7.25 ± 1.45 psi)
Thermostat opening temperature	69.5 – 72.5 °C (157.1 - 162.5°F)
Thermal switch	107 – 113 °C (224.6 - 235.4°F)
Firing order	1 – 3 – 2
Direction of rotation	Counterclockwise (as seen from the flywheel)
Starting aid	Intake manifold preheating (preheating time 4 sec)
Max. inclined position (engine no longer supplied with oil)	25° / 46% in all directions (30° / 58%) no longer than 3 minutes!
Specific fuel consumption	< 272 g/kWh (< 0.447 lb/kpm) at rated output
Exhaust values according to	EPA Tier II
Average engine droop	about 150 rpm less than the max. engine speed without load measured before (about 2225 rpm)

Specifications


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Fuel injection pump

Type	YPES-3ML
Design	In-line pump
Injection pressure	118 – 128 bar (1711 - 1856 psi)
Revs control	Mechanical
Lubrication system	Engine oil lubrication

Engine capacities

Capacities	Model 1404 RD
Fuel tank	24 l (6.3 gal)
Engine oil	3.4 l / 0.9 gal (up to max. mark)
Coolant (without radiator)	0.9 l / 0.24 gal (engine only)
Radiator	4 l (1 gal)
Expansion tank	0.5 l (0.13 gal)

Engine tightening torques

Tightening torques	Nm / lbf ft
Cylinder-head bolt	53.9 – 57.9 / 39.8 - 42.7 (M9x1.25)
Connecting rod bearing screw	22.6 – 27.5 / 16.7 - 20.3 (M7x1)
Main bearing screw	75.5 – 81.5 / 55.7 - 60.1 (M10x1.25)
Flywheel screw	80.4 – 86.4 / 59.3 - 63.7 (M10x1.25)

2.3 Hydraulic system

Hydraulics	Model 1404
Gear pump	14 cm ³ (0.85 in ³)
Flow rate	33.3 l/min (8.8 gpm) at 2376 rpm
Service pressure for work and drive hydraulics	200 bar (2901 psi)
Swivel unit service pressure	130 bar (1885 psi)
Hydraulic tank capacity	20 l (5.3 gal)

Auxiliary hydraulics oil flow

Pressure bar (psi)	P1 l/min (gpm)
10 (145)	34 (9.0)
20 (290)	33.5 (8.8)
40 (580)	33 (8.7)
60 (870)	32 (8.5)
90 (1305)	31.5 (8.3)
120 (1740)	30.5 (8.1)
150 (2176)	29 (7.7)
180 (2611)	16.5 (4.4)
190 (2756)	11.5 (3.0)
195 (28289)	7 (1.8)



Important!

Output indications for auxiliary hydraulics with unpressurised reflux line.

Work hydraulics

Work hydraulics	Model 1404
Hydraulic pump displacement	1 x 33.3 l/min (1 x 8.8 gpm) at 2376 rpm
Control valve	9 sections
Max. service pressure	200 ^{+6/-0} bar (2901 ^{+87/-0} psi)
Primary pressure limiting valve for boom/bucket/stick	200 ^{+6/-0} bar (2901 ^{+87/-0} psi)
Primary pressure limiting valve for stabiliser blade	200 ^{+6/-0} bar (2901 ^{+87/-0} psi)
Motor pressure limitation	180 ^{+6/-0} bar / 2611 ^{+87/-0} psi (MA1) (PA: 150 bar / 2176 psi) ¹
Filter	Reflux filter
Hydraulic oil tank	20 l (5.3 gal)

1. PA = Pswivel unit = 150 bar/2176 psi

2.4 Undercarriage and swivel unit

Undercarriage/swivel unit	Model 1404
Drive speed	2.25 km/h (1.40 mph)
Climbing ability	30° / 58%
Chain width	230 mm (9.1")
No. of track rollers on either side	3
Ground clearance	180 mm (7.1")
Ground pressure	0.26 kg/cm ² (3.7 psi)
Upper carriage swivel speed	9 rpm

2.5 Stabiliser blade

Stabiliser blade	Model 1404
Width (folded in/out, option)	990 / 1296 mm (39.0" / 51.0")
Height	215 mm (8.5")
Max. lift over/under subgrade	211 / 265 mm (8.3" / 10.4")

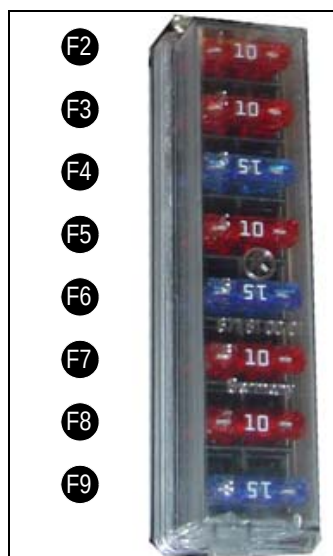
2.6 Electric system

Electric system	Model 1404
Dynamo	12 V 20 A
Starter	12 V 1.1 kW (1.5 hp)
Battery	12 V 45 Ah
Socket	E.g. for cigarette lighter; 15 A max.

Specifications


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Fuses on left-hand side control lever base



Fuse no.	Rated current (A)	Protected circuit
F2	10 A	Fuse: relay, display, cutoff solenoid
F3		Boom working light fuse
F4	15 A	Cab working light fuse
F5	10 A	Valves and horn fuse
F6	15 A	Heating fuse
F7	10 A	Wiper and interior light fuse
F8		Rotating beacon, radio and drive interlock fuse
F9	15 A	Socket and cigarette lighter fuse

Main fuse box with relays



Fig. 1: Relays

The main fuse box is located at the rear left in the engine compartment.

Fuse no.	Rated current (A)	Protected circuit
F1	50 A	Main fuse

Relay no.	Protected circuit
K 6	Preheating time lag relay
K 7	Start switching relay
K 8	Cutoff solenoid time lag relay
K 9	Cutoff solenoid switching relay

2.7 Noise levels

Sound power level	Model 1404
Sound power level (L_{WA})	92.7 dB (A)
Sound pressure level (L_{PA}) at the driver's ear	80 dB (A)



Important!

Measurement of sound power level according to EC Directive 2000/14 EC.
Noise level at the driver's ear measured according to EC Directives 89/514/EEC and 95/27/EEC. Measurements carried out on asphalted surface.

2.8 Vibration

Vibration	
Effective acceleration value for the upper extremities of the body *	< Trigger value
Effective acceleration value for the body *	< Trigger value

* Measurements as per 2002/44/EC (excavating, driving and hammering with a Neuson hammer). Machine and attachment operation and maintenance as per Operator's Manual.

2.9 Coolant compound table

Outside temperature	Coolant			
	Water	Anticorrosion agent		Antifreeze agent
Up to °C (°F)	% by volume	cm ³ /l (in ³ /gal)	% by volume	% by volume
4 (39)	99	10 2.6	1	–
-10 (14)	78			21
-20 (-4)	65			34
-25 (-13)	60			39
-30 (-22)	55			44



Important!

Anticorrosion protection no longer ensured if coolant diluted below 33 % by volume (corresponds to freezing point below - 20 °C/ -4 °F).

2.10 Model-specific tightening torques

1404		Nm (lbf ft)
Live ring	M14 10.9	180 (133) *
Track roller	M16 10.9	275 (203) *
Drive pinion	M14 10.9	180 (133) *
Travelling drive	M14 10.9	180 (133) *
Gear motor	M16 10.9	275 (203) *
Angled engine bracket	M10 8.8	45 (33)
Engine mounting	M10 8.8	45 (33)
Pump mounting	M10 10.9	70 (52)
Pump	M12 10.9	110 (81)
Swivel joint	M10 10.9	64 (47) *
Counterweight/additional counterweight	M20 8.8	290 (214) *

*) All connections with an * must be glued with Loctite S2420 or VaryBond 12-43.



2.11 General tightening torques

Tightening torques for hydraulic screw connections (dry assembly)

Metric hose fittings for hydraulic applications (light execution, DKOL)				
Nominal ø	Outer ø	Thread	Wrench size	Torque Nm (lbf ft)
05	6L	M12X1.5	WS 14	15 (11)
06	8L	M14X1.5	WS 17	20 (15)
08	10L	M16X1.5	WS 19	40 (30)
10	12L	M18X1.5	WS 22	50 (37)
12	15L	M22X1.5	WS 27	75 (55)
16	18L	M26X1.5	WS 32	85 (63)
20	22L	M30X2	WS 36	100 (74)
25	28L	M36X2	WS 41	180 (133)
32	35L	M45X2	WS 55	220 (162)

Galvanised and dry surface (O-ring slightly oiled). Torque tolerance: -10 %
Values determined empirically and to be applied as approximate figures.

Metric hose fittings for hydraulic applications (heavy execution, DKOL)				
Nominal ø	Outer ø	Thread	Wrench size	Torque Nm (lbf ft)
05	8S	M16X1.5	WS 19	40 (30)
06	10S	M18X1.5	WS 22	50 (37)
08	12S	M20X1.5	WS 24	60 (44)
10	14S	M22X1.5	WS 27	75 (55)
12	16S	M24X1.5	WS 30	90 (66)
16	20S	M30X2	WS 36	100 (74)
20	25S	M36X2	WS 41	180 (133)
25	30S	M42X2	WS 50	270 (199)
32	38S	M52X2	WS 60	400 (295)

Galvanised and dry surface (O-ring slightly oiled). Torque tolerance: -10 %
Values determined empirically and to be applied as approximate figures.

Screw connections with various seals for hydraulic applications (light execution)					
Thread	Straight pipe fitting with thread and screwed plug			Non-return valve with elastic seal Nm (lbf ft)	Identification aid, outside Ø mm (")
	Sealing washer Nm (lbf ft)	Elastic seal Nm (lbf ft)	O-ring Nm (lbf ft)		
M10X1.0	9 (7)	18 (13)	15 (11)	18 (13)	10 (0.4)
M12X1.5	20 (15)	25 (18)	25 (18)	25 (18)	12 (0.5)
M14X1.5	35 (26)	45 (33)	35 (26)	35 (26)	14 (0.6)
M16X1.5	45 (33)	55 (41)	40 (30)	50 (37)	16 (0.6)
M18X1.5	55 (41)	70 (52)	45 (33)	70 (52)	18 (0.7)
M22X1.5	65 (48)	125 (92)	60 (44)	125 (92)	22 (0.9)
M27X2.0	90 (66)	180 (133)	100 (74)	145 (107)	27 (1.0)
M33X2.0	150 (111)	310 (229)	160 (118)	210 (155)	33 (1.3)



Screw connections with various seals for hydraulic applications (light execution)

M42X2.0	240 (177)	450 (332)	210 (155)	360 (266)	42 (1.7)
M48X2.0	290 (214)	540 (398)	260 (192)	540 (398)	48 (1.9)
G1/8A	9 (7)	18 (13)	15 (11)	18 (13)	9.73 (0.4)
G1/4A	35 (26)	35 (26)	30 (22)	35 (26)	13.16 (0.5)
G3/8A	45 (33)	70 (52)	45 (33)	50 (37)	16.66 (0.7)
G1/2A	65 (48)	90 (66)	55 (41)	65 (48)	20.96 (0.8)
G3/4A	90 (66)	180 (133)	100 (74)	140 (103)	26.44 (1.0)
G1A	150 (111)	310 (229)	160 (118)	190 (140)	33.25 (1.3)
G1 1/4A	240 (177)	450 (332)	210 (155)	360 (266)	41.91 (1.6)
G1 1/2A	290 (214)	540 (398)	360 (266)	540 (398)	47.80 (1.9)

Torque tolerance: – 10 %; countermaterial: steel/aluminium

Screw connections with various seals for hydraulic applications (heavy execution)

Thread	Straight pipe fitting with thread and screwed plug			Non-return valve with elastic seal Nm (lbf ft)	Identification aid, outside Ø mm (")
	Sealing washer Nm (lbf ft)	Elastic seal Nm (lbf ft)	O-ring Nm (lbf ft)		
M12X1.5	20 (15)	35 (26)	35 (26)	35 (26)	12 (0.5)
M14X1.5	35 (26)	55 (41)	45 (33)	45 (33)	14 (0.6)
M16X1.5	45 (33)	70 (52)	55 (41)	55 (41)	16 (0.6)
M18X1.5	55 (41)	90 (66)	70 (52)	70 (52)	18 (0.7)
M20X1.5	55 (41)	125 (92)	80 (59)	100 (74)	22 (0.8)
M22X1.5	65 (48)	135 (100)	100 (74)	125 (92)	27 (1.0)
M27X2.0	90 (66)	180 (133)	170 (125)	135 (100)	12 (0.5)
M33X2.0	150 (111)	310 (229)	310 (229)	210 (155)	33 (1.3)
M42X2.0	240 (177)	450 (332)	330 (243)	360 (266)	42 (1.7)
M48X2.0	290 (214)	540 (398)	420 (310)	540 (398)	48 (1.9)
G1/8A	35 (26)	55 (41)	45 (33)	45 (33)	13.16 (0.5)
G1/4A	45 (33)	80 (59)	60 (44)	60 (44)	16.66 (0.7)
G3/8A	65 (48)	115 (85)	75 (55)	100 (74)	20.96 (0.8)
G1/2A	90 (66)	180 (133)	170 (125)	145 (107)	26.44 (1.0)
G3/4A	150 (111)	310 (229)	310 (229)	260 (192)	33.25 (1.3)
G1A	240 (177)	450 (332)	330 (243)	360 (266)	41.91 (1.6)
G1 1/4A	290 (214)	540 (398)	420 (310)	540 (398)	47.80 (1.9)

Torque tolerance: – 10 %; countermaterial: steel/aluminium

Tightening torques for high-resistance screw connections

With coarse-pitch thread					
Thread	Screws according to DIN 912, DIN 931, DIN 933 etc.			Screws according to DIN 7984	
	8.8	10.9	12.9	8.8	10.9
	Nm (lbf ft)	Nm (lbf ft)	Nm (lbf ft)	Nm (lbf ft)	Nm (lbf ft)
M5	5.5 (4)	8 (6)	10 (7)	5 (4)	7 (5)
M6	10 (7)	14 (10)	17 (13)	8.5 (6)	12 (9)
M8	25 (18)	35 (26)	42 (31)	20 (15)	30 (22)
M10	45 (33)	65 (48)	80 (59)	40 (30)	59 (44)
M12	87 (64)	110 (81)	147 (108)	69 (51)	100 (74)
M14	135 (100)	180 (133)	230 (170)	110 (81)	160 (118)
M16	210 (155)	275 (203)	350 (258)	170 (125)	250 (184)
M18	280 (207)	410 (302)	480 (354)	245 (181)	345 (254)
M20	410 (302)	570 (420)	690 (509)	340 (251)	490 (361)
M22	550 (406)	780 (575)	930 (686)	460 (339)	660 (487)
M24	710 (524)	1000 (738)	1190 (878)	590 (435)	840 (620)
M27	1040 (767)	1480 (1092)	1770 (1305)	870 (642)	1250 (922)

DIN 912 – hexagon socket head cap screw; DIN 931/DIN 933 – hexagon head screw with/without shaft;
DIN 7984 – hexagon socket head cap screw with short head
All values subject to a friction coefficient of $\mu = 0.12$ and are to be used as approximate figures.

With fine-pitch thread					
Thread	Screws according to DIN 912, DIN 931, DIN 933 etc.			Screws according to DIN 7984	
	8.8	10.9	12.9	8.8	10.9
	Nm (lbf ft)	Nm (lbf ft)	Nm (lbf ft)	Nm (lbf ft)	Nm (lbf ft)
M8X1.0	25 (18)	37 (28)	43 (32)	22 (16)	32 (24)
M10X1.0	50 (37)	75 (55)	88 (65)	43 (32)	65 (48)
M10X1.25	49 (36)	71 (52)	83 (61)	42 (31)	62 (46)
M12X1.25	87 (64)	130 (96)	150 (111)	75 (55)	110 (81)
M12X1.5	83 (61)	125 (92)	145 (107)	72 (53)	105 (77)
M14X1.5	135 (100)	200 (148)	235 (173)	120 (89)	175 (129)
M16X1.5	210 (155)	310 (229)	360 (266)	180 (133)	265 (195)
M18X1.5	315 (232)	450 (332)	530 (391)	270 (199)	385 (284)
M20X1.5	440 (325)	630 (465)	730 (538)	375 (277)	530 (391)
M22X1.5	590 (435)	840 (620)	980 (723)	500 (369)	710 (524)
M24X2.0	740 (546)	1070 (789)	1250 (922)	630 (465)	900 (664)
M27X2.0	1100 (811)	1550 (1143)	1800 (1328)	920 (679)	1300 (959)

DIN 912 – hexagon socket head cap screw; DIN 931/DIN 933 – hexagon head screw with/without shaft;
DIN 7984 – hexagon socket head cap screw with short head
All values subject to a friction coefficient of $\mu = 0.12$ and are to be used as approximate figures.

2.12 Dimensions model 1404

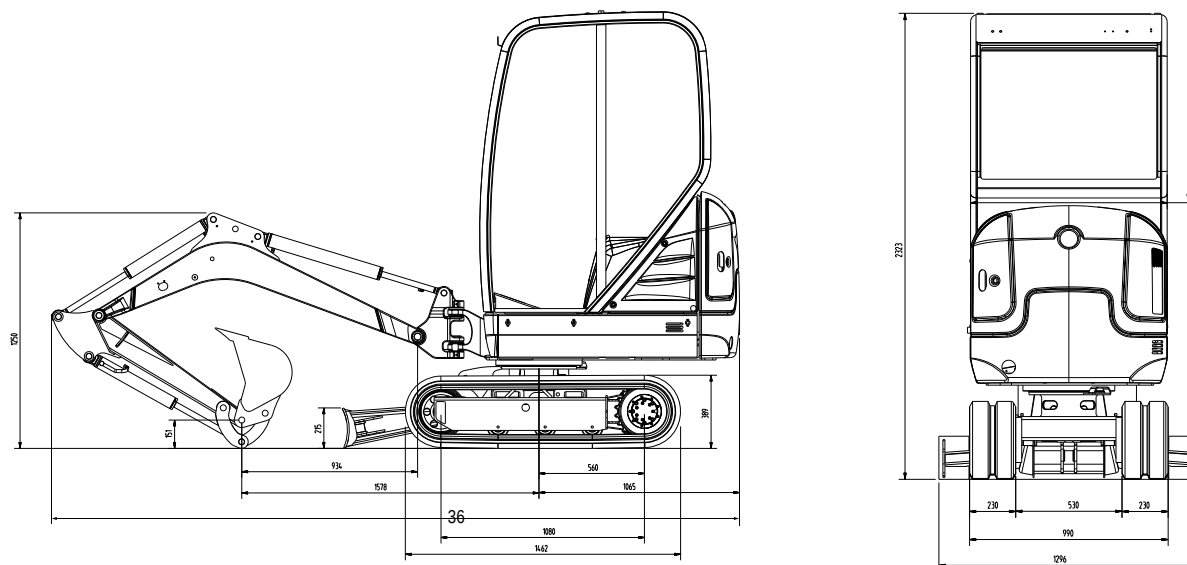
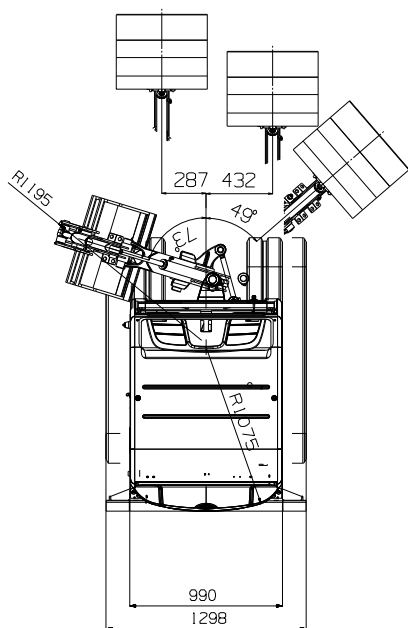


Fig. 2: Machine dimensions (model 1404)

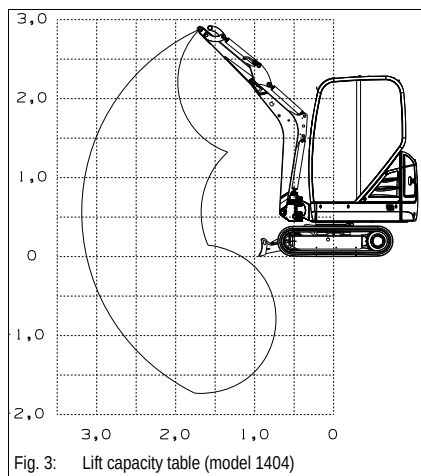


Main data	Model 1404
Transport weight canopy/cab (option)	1325 / 1450 kg (2921 / 3197 lbs)
Transport weight with telescopic undercarriage canopy/cab (option)	1390 / 1515 kg (3064 / 3340 lbs)
Height (transport position) for standard/telescopic undercarriage	2285 / 2317 mm (7'6" / 7'7")
Width for standard undercarriage/extended telescopic undercarriage	990 / 1298 mm (3'3" / 4'3")
Transport length for short stick and standard/telescopic undercarriage	3644 / 3648 mm (11'11" / 11'11")
Transport length for long stick and standard/telescopic undercarriage (option)	3607 / 3606 mm (11'10" / 11'10")
Max. digging depth with standard/telescopic undercarriage	2413 / 2372 mm (7'11" / 7'9")
Stick length (standard)	940 mm (3'1")
Long stick length (option)	1100 mm (3'7")
Max. vertical digging depth with standard/telescopic undercarriage	1802 / 1764 mm (5'11" / 5'9")
Max. digging height with standard/telescopic undercarriage	3508 / 3529 mm (11'6" / 11'7")
Max. dump height with standard/telescopic undercarriage	2371 / 2396 mm (7'9" / 7'10")
Max. digging radius with standard/telescopic undercarriage	3861 / 3860 mm (12'8" / 12'8")
Max. reach at ground level with standard/telescopic undercarriage	3648 / 3642 mm (11'11" / 11'11")
Max. breakout force at bucket tooth	14.2 kN (3192 lbf)
Max. tearout force	7.1 kN (1596 lbf)
Min. tail end slewing radius	1075 mm (3'6")
Max. tail end lateral projection (90° rotation of upper carriage)	580 mm (1'11")
Max. boom displacement to bucket centre (right-hand side)	432 mm (1'5")
Max. boom displacement to bucket centre (left-hand side)	287 mm (0'11")



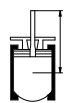
2.13 Lift capacity table 1404 RD

All table indications in kg (lb) and horizontal position on firm ground without bucket.



A	 max			3,0 m (9'10")			2,0 m (6' 7")		
B			About side 360°			About side 360°			About side 360°
1,5 m (4'11")	395* (871*)	180 (397)	170 (375)	400 (882)	180 (397)	175 (386)	430 (948)	330 (728)	315 (694)
1,0 m (3'3")	380* (838*)	165 (364)	155 (342)	405* (893*)	180 (397)	170 (375)	615 (1356)	315 (694)	300 (661)
0,5 m (1'8")	365* (805*)	160 (353)	155 (342)	410* (904*)	175 (386)	165 (364)	725* (1598*)	295 (650)	280 (617)
0,0 m (0'0")	350* (772*)	165 (364)	155 (342)	385* (849*)	170 (375)	165 (364)	715* (1576*)	285 (628)	270 (595)

max	Admissible load on extended stick
A	Reach from live ring centre
B	Load hook height
*	Lift capacity limited by hydraulics

	With the stabiliser blade in driving direction
	Without the stabiliser blade, 90° to driving direction

If equipped with a bucket or other attachments, lift capacity or tilt load is reduced by bucket or attachment dead weight.

Calculation basis: according to ISO 10567

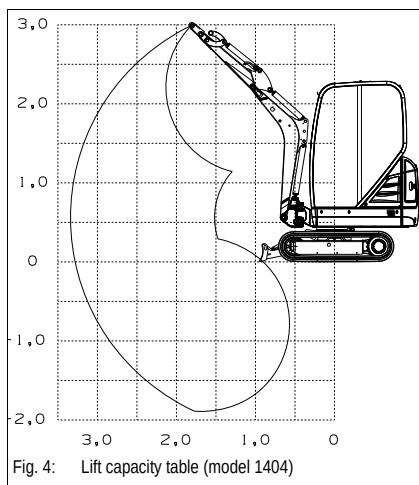
The track excavator's lift capacity is restricted by the settings of the pressure limiting valves and the hydraulic system's stabilising features.

Neither 75 % of the static tilt load nor 87 % of the hydraulic lift capacity is exceeded.



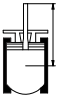
2.14 Lift capacity table 1404 RD with long stick (option)

All table indications in kg (lb) and horizontal position on firm ground without bucket.



A				3,0 m (9' 10")			2,0 m (6' 7")		
B			About side 360°			About side 360°			About side 360°
1,5 m (4'11")	390* (860*)	170 (375)	160 (353)	415* (915)	185 (408)	175 (386)	375* (827*)	355 (783)	335 (739)
1,0 m (3'3")	375* (827*)	155 (342)	150 (331)	425* (937*)	175 (386)	170 (375)	575* (1268*)	325 (717)	305 (672)
0,5 m (1'8")	360* (794*)	150 (331)	145 (320)	410* (904*)	170 (375)	165 (364)	695* (1532*)	290 (639)	275 (606)
0,0 m (0'0")	345* (761*)	155 (342)	145 (320)	400* (882*)	190 (419)	180 (397)	695* (1532*)	270 (595)	255 (562)

max	Admissible load on extended stick
A	Reach from live ring centre
B	Load hook height
*	Lift capacity limited by hydraulics

	With the stabiliser blade in driving direction
	Without the stabiliser blade, 90° to driving direction

If equipped with a bucket or other attachments, lift capacity or tilt load is reduced by bucket or attachment dead weight.

Calculation basis: according to ISO 10567

The track excavator's lift capacity is restricted by the settings of the pressure limiting valves and the hydraulic system's stabilising features.

Neither 75 % of the static tilt load nor 87 % of the hydraulic lift capacity is exceeded.

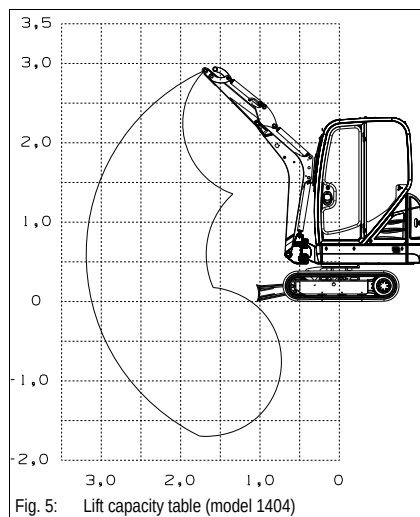


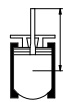
2.15 Lift capacity table 1404 RD with cab (option) and telescopic undercarriage (option)

All table indications in kg (lb) and horizontal position on firm ground without bucket.

A					3,0 m (9'10")				2,0 m (6' 7")			
B			About side 360°				About side 360°				About side 360°	
			TELE on	TELE off			TELE on	TELE off			TELE on	TELE off
1,5 m (4'11")	395* (871*)	215 (474)	205 (452)	295 (650)	400* (882)	220 (485)	210 (463)	300 (661)	430* (948*)	390 (860)	375 (827)	545 (1202)
1,0 m (3'3")	380* (838*)	200 (441)	195 (430)	275 (606)	405* (893*)	215 (474)	210 (463)	295 (650)	615* (1356*)	370 (816)	360 (794)	525 (1157)
0,5 m (1'8")	365* (805*)	195 (430)	190 (419)	270 (595)	410* (904*)	210 (463)	205 (452)	290 (639)	725* (1598*)	355 (783)	345 (761)	505 (1113)
0,0 m (0'0")	350* (772*)	195 (430)	190 (419)	275 (606)	385* (849*)	205 (452)	200 (441)	300 (661)	715* (1576*)	345 (761)	335 (739)	495 (1091)

max	Admissible load on extended stick
A	Reach from live ring centre
B	Load hook height
*	Lift capacity limited by hydraulics



	With the stabiliser blade in driving direction
	Without the stabiliser blade, 90° to driving direction

If equipped with a bucket or other attachments, lift capacity or tilt load is reduced by bucket or attachment dead weight.

Calculation basis: according to ISO 10567

The track excavator's lift capacity is restricted by the settings of the pressure limiting valves and the hydraulic system's stabilising features.

Neither 75 % of the static tilt load nor 87 % of the hydraulic lift capacity is exceeded.

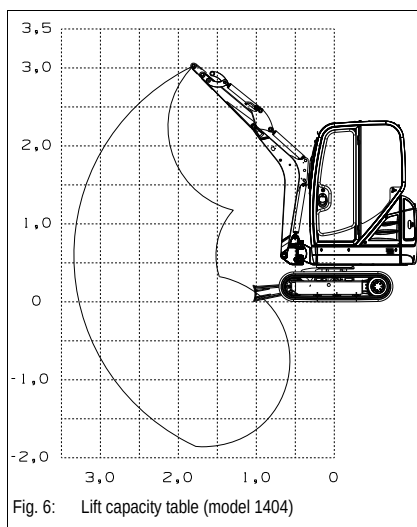


2.16 Lift capacity table 1404 RD with cab (option), long stick (option) and telescopic undercarriage (option)

All table indications in kg (lb) and horizontal position on firm ground without bucket.

A					3,0 m (9'10")				2,0 m (6'7")			
B			About side 360°				About side 360°				About side 360°	
			TELE on	TELE off			TELE on	TELE off			TELE on	TELE off
1,5 m (4'11")	390* (860*)	205 (452)	200 (441)	280 (618)	415* (915)	220 (485)	215 (474)	305 (672)	375* (827*)	375* (827*)	375* (827*)	375* (827*)
1,0 m (3'3")	375* (827*)	190 (419)	185 (408)	265 (584)	425* (937*)	215 (474)	210 (463)	300 (661)	575* (1268*)	385 (849)	370 (816)	540 (1190)
0,5 m (1'8")	360* (794*)	185 (408)	180 (297)	255 (562)	410* (904*)	210 (463)	200 (441)	290 (639)	695* (1532*)	345 (761)	335 (739)	495 (1091)
0,0 m (0'0")	345* (761*)	185 (408)	180 (297)	260 (573)	400* (882*)	225 (496)	220 (485)	315 (694)	695* (1532*)	325 (717)	315 (694)	470 (1036)

max	Admissible load on extended stick
A	Reach from live ring centre
B	Load hook height
*	Lift capacity limited by hydraulics



	With the stabiliser blade in driving direction
	Without the stabiliser blade, 90° to driving direction

If equipped with a bucket or other attachments, lift capacity or tilt load is reduced by bucket or attachment dead weight.

Calculation basis: according to ISO 10567

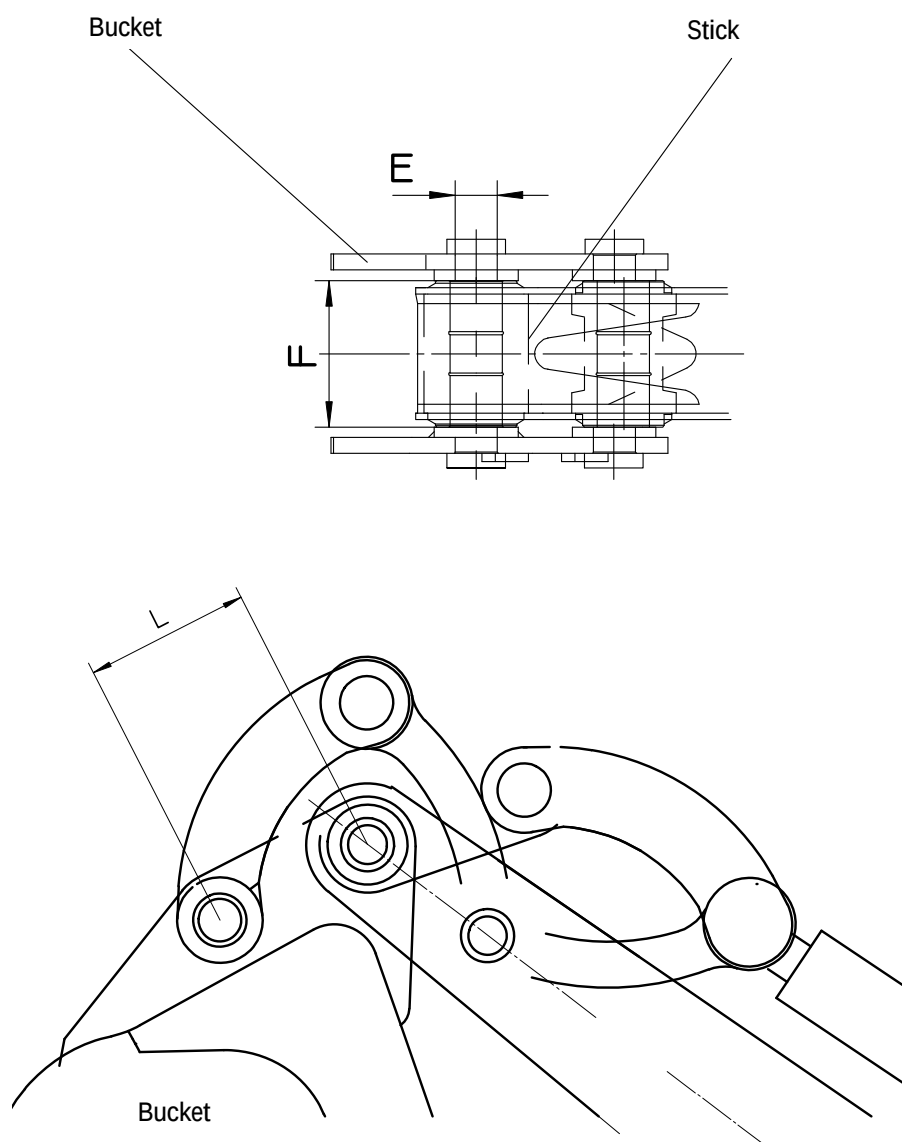
The track excavator's lift capacity is restricted by the settings of the pressure limiting valves and the hydraulic system's stabilising features.

Neither 75 % of the static tilt load nor 87 % of the hydraulic lift capacity is exceeded.



2.17 Kinematics

E	Pin diameter	32 mm (1.26")
F	Stick width	118 mm (4.65")
L	Pin distance to bucket mount	129.5 mm (5.10")



2.18 Attachments

Description of attachment	Capacity l (gal)	Item no.	Remarks
Complete quickhitch facility		1000004049	Required for operation of Neuson quickhitch systems
Bucket B = 250 mm (9.8")	23 (6.1)	1000093251	
		1000017084	For quickhitch facility
Bucket B = 300 mm (11.8")	27 (7.1)	1000093249	
		1000017085	For quickhitch facility
Bucket B = 400 mm (15.7")	35 (9.2)	1000093252	
		1000017087	For quickhitch facility
Bucket B = 500 mm (19.7")	44 (11.6)	1000093253	
		1000017088	For quickhitch facility
Bucket B = 600 mm (23.6")	53 (14.0)	1000093254	
		1000017089	For quickhitch facility
Offset bucket B = 850 mm (33.5")	50 (13.2)	1000093255	
		1000017090	For quickhitch facility
Offset bucket B = 1000 mm (39.4")	56 (14.8)	1000096515	
		1000017091	For quickhitch facility
Ditch cleaning bucket B = 850 mm (33.5")	69 (18.2)	1000093460	
	68 (18.09)	1000093335	For quickhitch facility
Ditch cleaning bucket B = 1000 mm (39.4")	82 (21.7)	1000096528	
	80 (21.1)	1000096518	For quickhitch facility
Hammer mount console		1000020344	Universal mount
Hammer mounting kit		1000157326	Mount for Neuson hammers



Maintenance



3 Maintenance

3.1 Fluids and lubricants

Component/ application	Engine/machine fluid	Specification	Season/ temperature	Capacities ¹
Diesel engine	Engine oil	API CD, CF, CF-4, CI-4	-20°C (-4°F) +40°C (104°F)	3.4 l (0.9 gal)
		ACEA: E3, E4, E5 (SAE 10W40) ²		
Travelling drive	Gearbox oil ³	Q8 T 55, SAE 85W-90 ⁴	Year-round	About 0.4 l (0.1 gal) each
		Q8 T 55, SAE 80W-90 ⁵		
		FINA PONTONIC GLS, SAE85W-90		
Hydraulic oil tank	Hydraulic oil	HVLP46 ⁶	Year-round	20 l (5.3 gal)
	Biodegradable oil ⁷	PANOLIN HLP Synth 46		
		FINA BIOHYDRAN SE 46		
		BP BIOHYD SE-46		
Grease	Roller and friction bearings ⁸	FINA Energrease L21M	Year-round	As required
	Open gear ⁹ (live ring gears)	BP Energrease MP-MG2	Year-round	As required
Grease nipples	Multipurpose grease ¹⁰	FINA Energrease L21 M	Year-round	As required
Battery terminals	Acid-proof grease ¹¹	FINA Marson L2	Year-round	As required
Fuel tank	Diesel fuel	2-D ASTM D975 – 94 (USA)		24 l (6.3 gal)
		1-D ASTM D975 – 94 (USA)		
		EN 590 : 96 (EU)		
		ISO 8217 DMX (International)		
		BS 2869 – A1 (GB)	Depending on outside tempera- ture Summer or winter diesel fuel	
		BS 2869 – A2 (GB)		
Radiator	Coolant	Soft water + antifreeze ASTM D4985	Year-round	4 l (1.1 gal)
		Distilled water + antifreeze ASTM D4985		
Washer system	Cleaning agent		Year-round	1.5 l (0.4 gal)

1. The capacities indicated are approximative values; the oil level check alone is relevant for the correct oil level
Capacities indicated are no system fills

2. According to DIN 51511

3. Hypoid gearbox oil based on basic mineral oil (SAE85W-90 according to DIN 51502), (API GL-4, GL5)

4. The Q8 T55 SAE 85W-90 gearbox oil is no longer produced

5. The Q8 T55 SAE 80W-90 gearbox oil is used from 10/2006 onwards. Do not mix both gearbox oils!

6. According to DIN 51524 section 3

7. Hydraulic ester oils (HEES)

8. KF2K-25 according to DIN 51502 multipurpose lithium grease with MoS² additive

9. KP2N-20 according to DIN 51502 EP multipurpose calcium sulphonate complex grease

10. KF2K-25 according to DIN 51502 multipurpose lithium grease with MoS² additive

11. Standard acid-proof grease



Oil grades for the diesel engine, depending on temperature

Engine oil grade	Ambient temperature (C°)														
	°C	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	
		SAE 10W													
		SAE 20W													
		SAE 10W-30													
		SAE 10W-40													
		SAE 15W-40													
		SAE 20													
		SAE 30													
		SAE 40													
API CD, CF, CF-4, CI-4 ACEA: E3, E4, E5															

Additional oil change and filter replacement (hydraulics)



Caution!

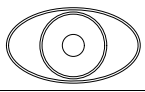
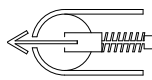
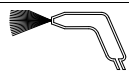
An additional oil change and filter replacement may be required depending on how the machine is used. Failure to observe these replacement intervals can cause damage to hydraulic components.

🔧 *Observe the following intervals*

Application		Hydraulic oil	Hydraulic oil filter insert
Normal work (excavation work)		Every 1000 s/h	Replace the first time after 50 s/h, then every 500 s/h
Percentage of hammer work	20 %	Every 800 s/h	300 s/h
	40 %	Every 400 s/h	
	60 %	Every 300 s/h	100 s/h
	Over 80 %	Every 200 s/h	

3.2 Maintenance label

Explanation of symbols on the maintenance label

Symbol	Assembly	Explanation
	General	Visual check
	General	Grease instructions
	Fuel system	Drain condensation water
	Fuel system	Replace the fuel filter, clean the fuel prefilter
	Radiator	Check the coolant level
	Radiator	Drain and fill in new coolant
	Engine	Check valve tip clearance. Adjust if necessary
	Engine	Check the engine oil level
	Engine	Replace the oil filter
	Engine	Check V-belt tension
	Travelling drive	Change oil
	Travelling drive	Check oil
	Undercarriage	Check chain tension
	Hydraulic system	Check oil level
	Hydraulic system	Change hydraulic oil
	Hydraulic system	Replace the hydraulic oil filter, replace the breather filter
	Radiator fins	Clean
	Heating	Replace the recirculated air filter

Please refer to the maintenance plan on page 3-5 for additional maintenance work.





3.3 Maintenance plan (overview)	
Work description	Authorised workshop
For service and maintenance work on the attachment, please refer to the operation and maintenance manual of the attachment manufacturer as well.	Customer
	Every 1000 s/h once a year
	Every 500 s/h
	Every 50 s/h
	Maintenance work (once a day)
Fluid and filter changes ():	
Carry out the following oil and filter changes (check oil levels after test run):	
• Engine oil ¹	●
• Engine oil filter ²	●
• Fuel filter ³	●
• Air filter element if fouling indicator is at "Service"	●
• Coolant	●
• Hydraulic oil filter insert ⁴	●
• Hydraulic oil ⁵	●
• Hydraulic oil tank breather filter	●
• Gearbox oil ^{6,7}	●
Inspection work ():	
Check the following material. Refill if necessary:	
• Engine oil	●
• Engine coolant	●
• Hydraulic oil	●
• Gearbox oil	●
Clean water ducts ⁸	●
Check engine cooler and hydraulic oil for contamination. Clean if necessary	●
Check cooling systems, heating and hoses for leaks and pressure (visual check)	●
Check the pilot control filter on the main valve block for dirt, clean it if necessary ⁹	●
Replacing the cab filter	●
Air filter (damage)	●
Prefilter with water separator: drain water	●
• Clean	●
Check V-belt condition and tension	●



3.3 Maintenance plan (overview)	Work description For service and maintenance work on the attachment, please refer to the operation and maintenance manual of the attachment manufacturer as well.	Maintenance plan/service hours (s/h)					Authorised workshop
		Maintenance work (once a day)	Every 50 s/h	Every 500 s/h	Every 1000 s/h once a year	Customer	
		Check exhaust system for damage and condition	●			●	
		Check valve tip clearance. Adjust if necessary			●		
		Clean and adjust the fuel injection pump ¹⁰			●		
		Check and adjust the injection pressure of the injection nozzles, clean the injection needles/nozzles			●		
		Check and adjust injection time ¹¹			●		●
		Empty diesel fuel tank ¹²		●			●
		Check battery electrolyte. Fill up with distilled water if necessary	●	●		●	
		Check alternator, starter and electric connections, bearing play and function		●			●
		Check preheating system and electric connections		●			●
		Pressure check of primary pressure limiting valves ¹³	●	●			●
		Check chains for cracks and cuts	●			●	
		Check chain tension. Retighten if necessary	●			●	
		Check bearing play of tread rollers, track carrier rollers, front idlers		●			●
		Check piston rods for damage	●			●	
		Check screws for tightness ⁸		●			●
		Check pin lock	●			●	
		Check line fixtures	●			●	
		Check telltales for correct function		●			●
		Couplings, dirt pile-up on hydraulic system dust caps if necessary	●			●	
		Check insulating mats in the engine compartment for damage/condition		●		●	
		Check labels and Operator's Manual for completeness and condition		●		●	



3.3 Maintenance plan (overview)		Work description	For service and maintenance work on the attachment, please refer to the operation and maintenance manual of the attachment manufacturer as well.	Maintenance plan/service hours (s/h)					Customer	Authorised workshop	
				Maintenance work (once a day)	Every 50 s/h	Every 500 s/h	Every 1000 s/h once a year				
Lubrication service ():											
Lubricate the following assemblies/components: – see Maintenance label on page 3-3											
		• Stabiliser blade		●					●		
		• Swivelling console		●					●		
		• Boom		●					●		
		• Stick		●					●		
		• Attachments		●					●		
		• Grease strip on chassis – see Maintenance label on page 3-3		●					●		
Functional check ():											
Check the function of the following assemblies/components. Rectify if necessary:											
		• Lights, signalling system, acoustic warning system ¹⁴		●		●				●	
		• Heating function				●				●	
Leakage check ():											
Check for tightness, leaks and chafing: pipes, flexible lines and screw connections of the following assemblies and components. Rectify if necessary:											
		• Visual check		●					●		
		 Engine, hydraulic system and hydraulic components		●					●		
		 Cooling circuit		●					●		
		 Travelling drive		●					●		
1. Drain engine oil the first time after 50 s/h, then every 250 s/h 2. Replace the engine oil filter the first time after 50 s/h, then every 250 s/h 3. Replace the fuel filter the first time after 50 s/h, then every 500 s/h 4. Replace the hydraulic oil filter insert the first time after 50 s/h, then every 500 s/h 5. Replace the hydraulic oil the first time after 500 s/h, then every 1000 s/h 6. Drain the gearbox oil the first time after 50 s/h, then every 1000 s/h 7. The Q8 T55 SAE 85W-90 gearbox oil is no longer produced. The Q8 T55 SAE 80W-90 gearbox oil is used from 10/2006 onwards. Do not mix both gearbox oils! 8. Clean the water ducts every other 1000 s/h servicing 9. Coarse dirt causes malfunctions and can even destroy the filter screen! 10. Clean and adjust the fuel injection pump every other 1000 s/h servicing 11. Check and adjust the fuel injection time every other 1000 s/h servicing 12. Empty the fuel tank every 250 s/h 13. First check after 50 s/h, then every 500 s/h 14. Check the first time at 50 s/h, then every 500 s/h											



3.4 Service package

1000148555	1	Service package 1404
1000003052	1	➡ Engine oil filter
1000147873	1	➡ Fuel filter insert
1000005134	1	➡ Water separator element
1000019708	2	➡ O-ring for fuel filter/water separator
1000004556	1	➡ Hydraulic reflux filter insert
1000141558	1	➡ Air filter element (outside)
1000141559	1	➡ Air filter element (inside)
1000071058	1	➡ Sealing ring for engine oil drain plug
1000148554	1	➡ Cylinder-head cover gasket

3.5 Introduction

Operational readiness and the service life of machines are heavily dependent on maintenance.

It is therefore in the interest of the machine owner to carry out the prescribed maintenance work.

Before carrying out service and maintenance work, always read, understand and follow the instructions given in:

- Chapter 2 "SAFETY INSTRUCTIONS" in the Operator's Manual
- The Operator's Manuals of the attachments.

Carry out the prescribed inspections and rectify any disorders before taking the machine into service.

Secure open (engine) covers appropriately. Do not open (engine) covers on slopes or in strong wind.

Dirt may be blown away and cause severe injuries when using compressed air. Always wear protective goggles, masks and clothing.

Daily service and maintenance work, and maintenance according to maintenance plan "A" must be carried out by a specifically trained driver. All other maintenance work must be carried out by trained and qualified staff only.

The maintenance plans indicate when the maintenance work mentioned below must be carried out – [see Maintenance plan \(overview\)](#) on page 3-5.

3.6 Fuel system

Specific safety instructions

- Extreme caution is essential when handling fuel – high risk of fire!
- Never carry out work on the fuel system in the vicinity of naked flames or sparks!
- Do not smoke when working on the fuel system or when refuelling!
- Before refuelling, switch off the engine and remove the ignition key!
- Do not refuel in closed rooms!
- Wipe away fuel spills immediately!
- Keep the machine clean to reduce the risk of fire!

Refuelling



Fig. 1: Fuel filler inlet

Filler inlet A for the fuel tank is located in the engine compartment, on the right in driving direction.



Danger!

All work involving fuel carries an increased

Danger of fire and poisoning!

- ⚠ *Do not refuel in closed rooms*
- ⚠ *Never carry out work on the fuel system in the vicinity of naked flames or sparks*
- ⚠ *No smoking, no fire!*



Environment!

Use a suitable container to collect the fuel as it drains and dispose of it in an environmentally friendly manner!



Important!

Do not run the fuel tank completely dry. Otherwise, air is drawn into the fuel system. This requires bleeding the fuel system
– see *Bleeding the fuel system* on page 3-10.



Important!

Fill up the tank with the correct fuel type at the end of each working day. This prevents condensation water from forming in the fuel tank over night. Do not fill the tank completely but leave some space for the fuel to expand.



Stationary fuel pumps

General

Only refuel from stationary fuel pumps. Fuel from barrels or cans is usually contaminated. Even the smallest particles of dirt can cause:

- Increased engine wear
- Malfunctions in the fuel system and
- Reduced effectiveness of the fuel filters

Refuelling from barrels

If refuelling from barrels cannot be avoided, note the following points (see fig. 2):

- Barrels must neither be rolled nor tilted before refuelling
- Protect the suction pipe opening of the barrel pump with a fine-mesh strainer
- Immerse it down to a max. 15 cm above the floor of the barrel
- Only fill the tank using refuelling aids (funnels or filler pipes) with integral microfilter
- Keep all refuelling containers clean at all times

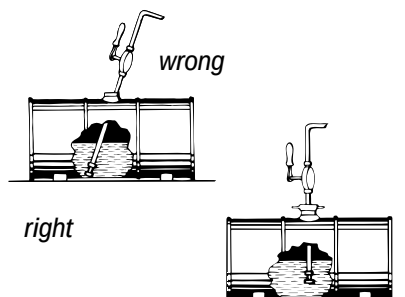


Fig. 2: Refuelling from a barrel

Diesel fuel specification

Use only high-grade fuels

Grade	Use
• 2-D ASTM D975 – 94	USA
• 1-D ASTM D975 – 94	
• EN 590 : 96	EU
• ISO 8217 DMX	International
• BS 2869 – A1	Great Britain
• BS 2869 – A2	

Bleeding the fuel system

**Danger!**

If the fuel, as it drains, comes into contact with hot engine parts or the exhaust system, there is an increased

Danger of burns!

⚠ *Never bleed the fuel system if the engine is hot!*



Bleed the fuel system in the following cases:

- After removing and fitting the fuel filter, prefilter or the fuel lines back on again
- After running the fuel tank empty
- After running the engine again, after it has been out of service for a longer period of time

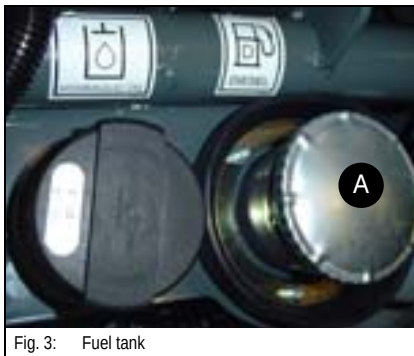
🔧 *Bleed the fuel system as follows:*

- Fill the fuel tank
- Turn the ignition key to the first position
- Wait about 5 minutes while the fuel system bleeds itself automatically
- Start the engine

If the engine runs smoothly for a while, and then stops; or if it does not run smoothly:

- Switch off the engine
- Bleed the fuel system again as described above
- Have it check by authorised staff if necessary

Emptying the fuel tank



Danger!

All work involving fuel carries an increased

Danger of fire and poisoning!

- 🔧 *Do not work in closed rooms*
- 🔧 *Never carry out work on the fuel system in the vicinity of naked flames or sparks*
- 🔧 *No smoking, no fire!*



Environment!

Use a suitable container to collect the fuel as it drains and dispose of it in an environmentally friendly manner!

Filler inlet A for the fuel tank is located in the engine compartment, on the right in driving direction.

Proceed as follows:

- 🔧 *Unscrew filler cap A*
- 🔧 *Remove the microfilter*
- 🔧 *Pump out the fuel with a suitable pump*
 - ➡ Collect the fuel in a suitable container



Fuel prefilter with water separator

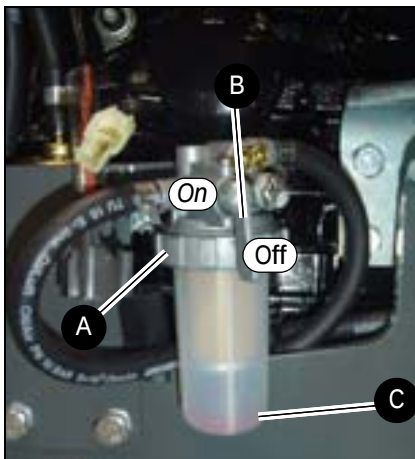


Fig. 4: Fuel prefilter with water separator

Check the fuel prefilter as follows:

- ☞ If the red indicator ring rises to position C
- ☞ Turn ball-type cock B to OFF
- ☞ Unscrew thread A
 - ➔ Remove and empty the container
- ☞ Fit the receptacle back on again
- ☞ Screw thread A back on again
- ☞ Open ball-type cock B again

Interrupt fuel supply as follows:

- ☞ Turn ball-type cock B to the OFF mark
 - ➔ Fuel supply is interrupted
- ☞ Turn ball-type cock B to the ON mark
 - ➔ Fuel supply is open again

Replacing the fuel filter



Fig. 5: Fuel filter position

**Danger!**

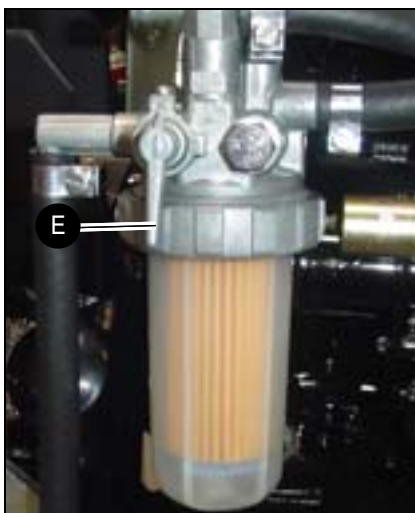
If the fuel, as it drains, comes into contact with hot engine parts or the exhaust system, there is an increased

Danger of burns!

- ☞ Never change the fuel filter if the engine is hot!

**Environment!**

Use a suitable container to collect the fuel as it drains from the container and dispose of it in an environmentally friendly manner!



- ☞ Open the engine cover
- ☞ Close stop cock E (horizontal)
- ☞ Unscrew the union nut
- ☞ Remove the transparent housing
- ☞ Extract the old filter insert
- ☞ Put the new filter insert in place
- ☞ Fit the housing back on again (apply a thin coat of oil or diesel fuel to the sealing surface)
- ☞ Open stop cock E (vertical)
- ☞ Bleed the fuel system
 - see chapter Bleeding the fuel system on page 3-10
- ☞ Check the filter for tightness after a short test run.
- ☞ Dispose of the old filter insert in an environmentally friendly manner

3.7 Engine lubrication system



Caution!

If the engine oil level is too low or if an oil change is overdue, this may cause

Engine damage or loss of output!

☞ Have the oil changed by an authorised workshop
– see Maintenance plan (overview) on page 3-5



Important!

Check the oil level once a day.

We recommend checking it before starting the engine. After switching off a warm engine, wait at least 5 minutes before checking.

Checking the oil level

☞ Proceed as follows:

- Park the machine on level ground
- Switch off the engine!
- Fold up the control lever base and remove the ignition key
- Let the engine cool down
- Open the engine cover
- Clean the area around the oil dipstick with a lint-free cloth
- Oil dipstick A:

☞ Pull it out

☞ Wipe it with a lint-free cloth

☞ Push it back in as far as possible

☞ Withdraw it and read off the oil level

☞ However if necessary, fill up oil at the latest when the oil reaches the MIN mark on the oil dipstick A – see on page 3-14

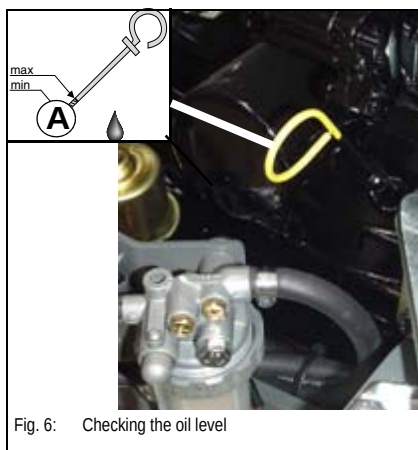


Fig. 6: Checking the oil level



Draining engine oil

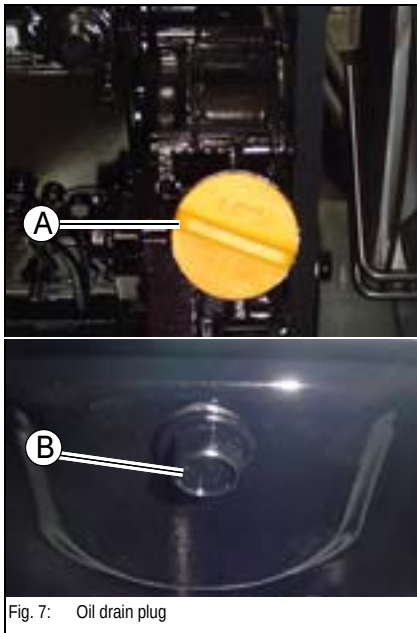


Fig. 7: Oil drain plug

Filling up engine oil

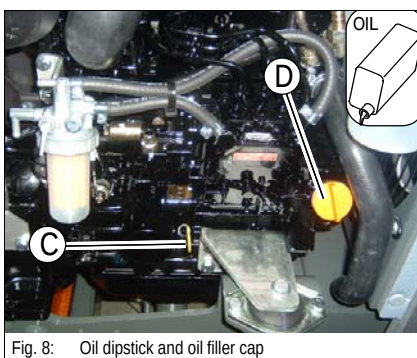


Fig. 8: Oil dipstick and oil filler cap



Environment!

Use a suitable container to collect the engine oil as it drains and dispose of it in an environmentally friendly manner!

The oil drain plug is located at the lower right in the engine compartment and is unscrewed through a recess in the chassis at the lower rear of the machine.

Draining engine oil

➤ Proceed as follows:

- Clean the area around oil filler cap A with a lint-free cloth
- Open filler cap A
- Place a suitable container under oil drain plug B to collect the oil as it drains
- Unscrew oil drain plug B
- ➡ Let the oil drain
- Then dispose of the oil by an ecologically safe method
- Screw the oil drain plug back on again
- Screw filler cap A back on again



Caution!

Too much or incorrect engine oil may result in engine damage! For this reason:

- Do not add engine oil above the MAX mark of oil dipstick 8/C
- Use only the specified engine oil
- – see Fluids and lubricants on page 3-1



Environment!

Use a suitable container to collect the engine oil as it drains and dispose of it in an environmentally friendly manner!

➤ Proceed as follows:

- Clean the area around oil filler cap D with a lint-free cloth
- Open filler cap D
- Raise oil dipstick C slightly to allow any trapped air to escape
- Fill in engine oil
- Wait about 3 minutes until all the oil has run into the oil sump
- Check the oil level
– see Checking the oil level on page 3-13
- Fill up if necessary and check the oil level again
- Close filler cap D
- Push oil dipstick C back in as far as possible
- Completely remove all oil spills from the engine

Changing engine oil

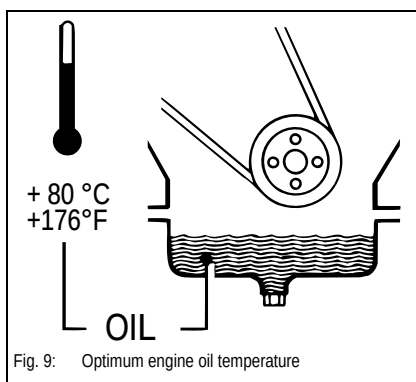


Fig. 9: Optimum engine oil temperature



Danger!

Caution when draining hot engine oil –

Danger of burns!

☞ Wear protective gloves

☞ Use suitable tools



Environment!

Use a suitable container to collect the engine oil as it drains and dispose of it in an environmentally friendly manner!

☞ *Change the engine oil as follows:*

- Park the machine on level ground
- Let the engine run until reaching service temperature (oil temperature about 80 °C / 176°F)
- Switch off the engine
- Place a container under the opening to collect the oil as it drains
- Unscrew the oil drain plug
- Completely drain the oil
- Screw the oil drain plug back in again
- Fill in engine oil
- Start the engine and let it run briefly at low revs
- Switch off the engine
- Wait a moment until all the oil has run into the oil sump
- Check the oil level again
- Fill up if necessary and check again
- Completely remove all oil spills from the engine

Replacing the engine oil filter cartridge



Fig. 10: Engine oil filter position



Danger!

Caution when draining hot engine oil –

Danger of burns!

☞ *Wear protective gloves*



Environment!

Collect the drained engine oil in a suitable container. Dispose of used oil and filters in an environmentally friendly manner!

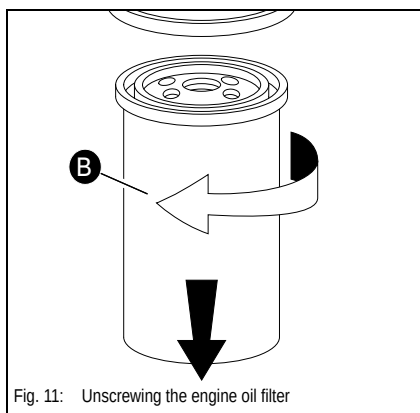


Fig. 11: Unscrewing the engine oil filter

☞ *Change the filter as follows:*

- Switch off the engine
- Place a suitable container underneath the oil filter to collect the oil as it drains
- Slowly slacken oil filter cartridge B using a commercially available tool
- Let the oil drain into the container
- Remove the filter cartridge once the oil is completely drained
- Make sure the thread adapter is correctly placed in the filter head

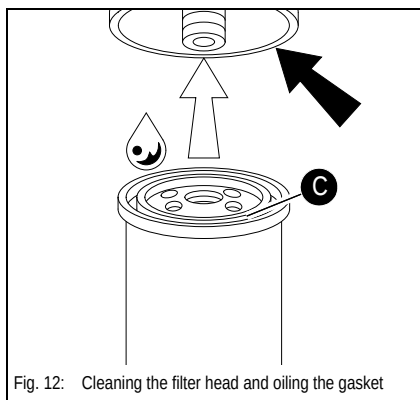


Fig. 12: Cleaning the filter head and oiling the gasket

- Clean the inside of the filter head
- Apply a thin coat of fresh engine oil to rubber seal C of the new oil filter cartridge
- Tighten the new filter cartridge by hand until the gasket makes contact

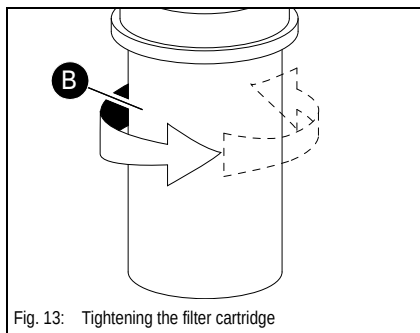


Fig. 13: Tightening the filter cartridge

- Tighten oil filter cartridge B by hand by about a further half revolution
- Make sure the oil level is correct!
- Let the engine run briefly
- Switch off the engine
- Check the seal of oil filter cartridge B and retighten by hand
- Check the oil level and fill in engine oil if necessary
- Completely remove all oil spills from the engine
- Dispose of the used oil filter in an environmentally friendly manner



3.8 Engine cooling system

The radiator is located in the engine compartment, on the right-hand side of the engine, and cools the diesel engine.

The expansion tank for the coolant is also located on the right in the engine compartment, behind the engine.

Specific safety instructions

- Dirt on the radiator fins reduces the cooler's heat dissipation capacity!
To avoid this:
 - ☞ Clean the outside of the radiator at regular intervals. Use oil-free compressed air (2 bar max. / 29 psi) to clean. Maintain a certain distance to the radiator to avoid damage to the radiator fins. Refer to the maintenance plans in the appendix for the cleaning intervals
 - ☞ In dusty or dirty work conditions, clean more frequently than indicated in the maintenance plans.
- An insufficient coolant level reduces the heat dissipation capacity as well and can lead to engine damage! Therefore:
 - ☞ Check the coolant level at regular intervals. Refer to the maintenance plans in the appendix for the intervals.
 - ☞ If coolant must be added frequently, check the cooling system for leaks and/or contact your dealer!
 - ☞ Never fill in cold water/coolant if the engine is warm!
 - ☞ After filling the expansion tank, make a test run with the engine and check the coolant level again after switching off the engine!
- The use of the wrong coolant can destroy the engine and the cooler. Therefore:
 - ☞ Add enough antifreeze compound to the coolant – but never more than 50 %. If possible use brand-name antifreeze compounds with anticorrosion additives!
 - ☞ Observe the coolant compound table
– see *Coolant compound table* on page 2-5
 - ☞ Do not use cooler cleaning compounds if an antifreeze compound has been added to the coolant – otherwise this causes sludge to form, which can damage the engine!
- Once you have filled the expansion tank:
 - ☞ Test run the engine
 - ☞ Switch off the engine
 - ☞ Let the engine cool down
 - ☞ Check the coolant level again



Environment!

Use a suitable container to collect the coolant as it drains and dispose of it in an environmentally friendly manner!



Checking/filling up coolant

**Danger!**

Never open the coolant tank and never drain coolant if the engine is warm since the cooling system is under high pressure –

Danger of burns!

- ☞ Wait at least 15 minutes after switching off the engine!
- ☞ Wear protective gloves and clothing
- ☞ Open filler cap B to the first notch and release the pressure
- ☞ Make sure the coolant temperature is sufficiently low so you can touch the radiator plug with your hands

**Danger!**

Antifreeze is flammable and poisonous –

Danger of accidents!

- ☞ Keep away from flames!
- ☞ Avoid eye contact with antifreeze
 - If antifreeze comes into contact with the eyes
 - ➔ Immediately rinse with clean water and seek medical assistance

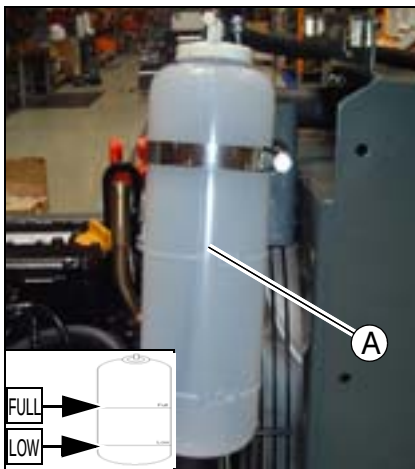


Fig. 14: Expansion tank for coolant

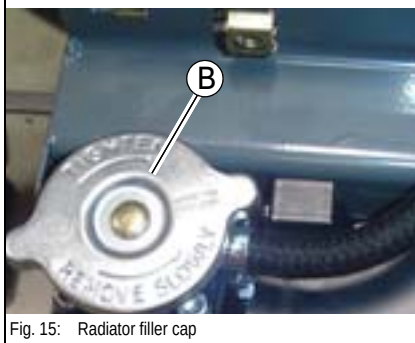


Fig. 15: Radiator filler cap

Checking the coolant level

- ☞ Proceed as follows:
 - Park the machine on level ground
 - Switch off the engine!
 - Fold up the control lever base
 - Remove the key and carry it with you
 - Let the engine and the coolant cool down
 - Open the engine cover
 - Check the coolant level on the transparent coolant tank A and on the radiator B
- ☞ If the coolant level is below the LOW seam or if there is no coolant at the radiator's filler inlet:
 - ➔ Fill up coolant
- ☞ Check the coolant grade (antifreeze) with suitable test equipment (antifreeze tester)
 - ➔ – see Coolant compound table on page 2-5

**Important!**

Check the coolant level *once a day*.
We recommend checking it before starting the engine.



Filling up coolant

After the engine has cooled down:

- ☞ Release overpressure in the radiator
- ☞ Carefully open cap B to the first notch and fully release the pressure
- ☞ Open filler cap B
- ☞ Fill up coolant up to the lower edge of the filler inlet (radiator) and into the expansion tank
- ☞ Close filler cap B
- ☞ Start the engine and let it warm up for about 5 – 10 minutes
- ☞ Switch off the engine
- ☞ Remove the key and carry it with you
- ☞ Let the engine cool down
- ☞ Check the coolant level again
 - ➡ The coolant level must be between the LOW and FULL tank seams
- ☞ If necessary, fill up coolant and repeat the procedure until the coolant level remains constant



Important!

Check the antifreeze every year before the cold season sets in!

Draining coolant



Danger!

Never open the coolant tank and never drain coolant if the engine is warm since the cooling system is under high pressure –

Danger of burns!

- ☞ Wait at least 10 minutes after switching off the engine!
- ☞ Wear protective gloves and clothing
- ☞ Open filler cap 16/A to the first notch and release the pressure

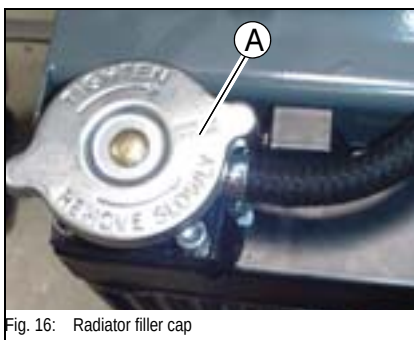


Fig. 16: Radiator filler cap

After the engine has cooled down:

- ☞ Release overpressure in the radiator
- ☞ Open the cap to the first notch and fully release the pressure
- ☞ Open filler cap A
- ☞ Remove the drain hose of the radiator and drain the coolant
- ☞ Fit the drain hose back on again
- ☞ Fill up the radiator and the expansion tank with coolant
 - see [Fluids and lubricants](#) on page 3-1
- ☞ Check the coolant level
 - see [chapter Checking/filling up coolant](#) on page 3-18



3.9 Air filter



Caution!

The filter cartridge will be damaged if it is washed or brushed out! Bear in mind the following to avoid premature engine wear!

- ❗ *Do not clean the filter cartridge*
- ❗ *Replace the filter cartridge when the telltale comes on*
- ❗ *Never reuse a damaged filter cartridge*
- ❗ *Ensure cleanliness when replacing the filter cartridge!*



Fig. 17: Indicator for air filter contamination



Important!

For applications in especially dusty environment, the air filter is fitted with an extra inside filter. Do not clean the inside filter.



Caution!

Filter cartridges degrade prematurely when in service in acidic air for longer periods of time. This risk is present for example in acid production facilities, steel and aluminium mills, chemical plants and other nonferrous-metal plants.

- ❗ *Replace the air filter after 50 service hours at the latest!*

General instructions for air filter maintenance:

- Store filters in their original packaging and in a dry place!
- Do not knock the filter against other objects as you install it!
- Check air filter attachments, air intake hoses and air filters for damage, and immediately repair or replace if necessary!
- Check the screws at the induction manifold and the clamps for tightness!
- Check the function of the dust valve, replace if necessary!

Air intake



Fig. 18: Engine air intake



Danger!

When crossing water fords or similar, make sure that the engine air intake slits are always above water level, otherwise the engine is damaged!

Danger of engine damage!

- ❗ – see chapter Air intake on page 3-20
Check once a day for cleanliness before taking the machine into service!



Filter replacement

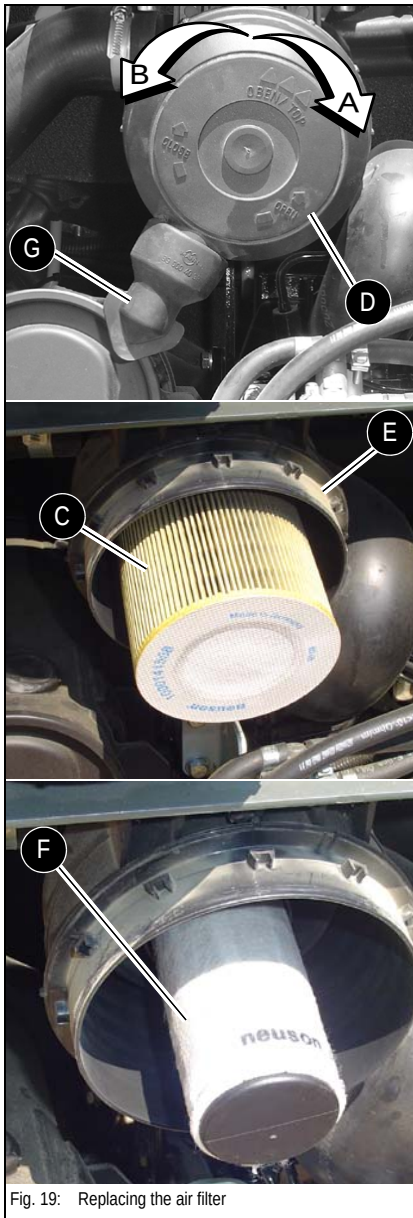


Fig. 19: Replacing the air filter

Replace air filter C as follows:

- ✎ Switch off the engine
- ✎ Remove the key and carry it with you
- ✎ Let the engine cool down
- ✎ Open the engine cover
- ✎ Remove dirt and dust from the air filter and the area around the air filter
- ✎ Turn the lower housing section D to the right A
- ✎ Remove the lower housing section D
- ✎ Carefully remove air filter C with slightly turning movements
- ✎ Make sure all dirt (dust) inside the upper and lower housing sections (E and D), including dust valve G, has been removed
 - ✎ Clean the parts with a clean lint-free cloth, do not use compressed air
- ✎ Check the air filter cartridges for damage, only install intact filters
- ✎ Carefully insert the new air filter C in the upper housing section E
- ✎ Position lower housing section D (make sure it is properly seated)
- ✎ Turn the lower housing section D to the left B

Replace air filter F as follows:

- ✎ Switch off the engine
- ✎ Remove the key and carry it with you
- ✎ Let the engine cool down
- ✎ Open the engine cover
- ✎ Remove dirt and dust from the air filter and the area around the air filter
- ✎ Turn the lower housing section D to the right A
- ✎ Remove the lower housing section D
- ✎ Carefully remove outside air filter C with slightly turning movements
- ✎ Carefully extract inside air filter F
 - ✎ Cover the air supply at the end of the filter with a clean lint-free cloth to prevent dust from entering the engine
- ✎ Make sure all dirt (dust) inside the upper and lower housing sections (E and D), including dust valve G, has been removed
 - ✎ Clean the parts with a clean lint-free cloth, do not use compressed air
 - ✎ Remove the cloth from the air supply
- ✎ Check the air filter cartridges for damage, only install intact filters
- ✎ Carefully insert the new air filter F in the upper housing section E
- ✎ Carefully insert the outside air filter C in the upper housing section E
- ✎ Position lower housing section D (make sure it is properly seated)
- ✎ Turn the lower housing section D to the left B



Important!

Make sure dust valve G shows downwards once it is installed!



3.10 V-belt



Danger!

Only check or retighten/replace the V-belt when the engine is switched off –

Danger of personal injury!

- ☞ Switch off the engine before carrying out inspection work in the engine compartment!
- ☞ Disconnect the battery or the battery master switch
- ☞ Let the engine cool down



Caution!

Cracked and stretched V-belts cause engine damage

- ☞ Have the V-belt replaced by an authorised workshop

Check the V-belt once a day or every 10 service hours, and retighten if necessary!

Retighten new V-belts after about 15 minutes of running time.

Checking V-belt tension

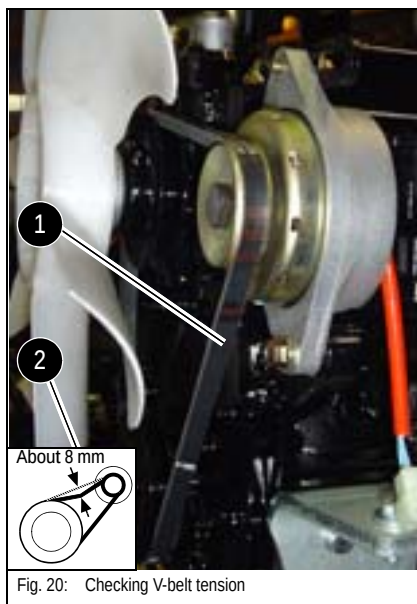


Fig. 20: Checking V-belt tension

- Check as follows:
 - ☞ Switch off the engine
 - ☞ Fold up the control lever base
 - ☞ Remove the key and carry it with you
 - ☞ Open the engine cover
 - ☞ Disconnect the battery or the battery master switch
 - ☞ Let the engine cool down
 - ☞ Carefully check V-belt 1 for damage, cracks or cuts.
 - ☞ Replace the V-belt if it touches the base of the V-belt groove or the discs of the pulley
- If the V-belt is damaged:
 - ☞ Have the V-belt replaced by authorised staff.
 - ☞ Press with your thumb to check the deflection of the V-belt between the crankshaft disc and the fan wheel (2). A new V-belt should have a deflection of 6 to 8 mm (0.2" - 0.3"), a used V-belt (after about 5 minutes running time) should have a deflection of 7 to 9 mm (0.3" - 0.35") (fig. 20).
 - ☞ Retighten the V-belt if necessary.

Tightening the V-belt (dynamo)

**Caution!**

Overtightening the V-belt can damage the V-belt, the V-belt guide and the water pump bearing.

Avoid contact of oil, grease or similar substances with the V-belt.

☞ *Checking V-belt tension* [3-22](#)

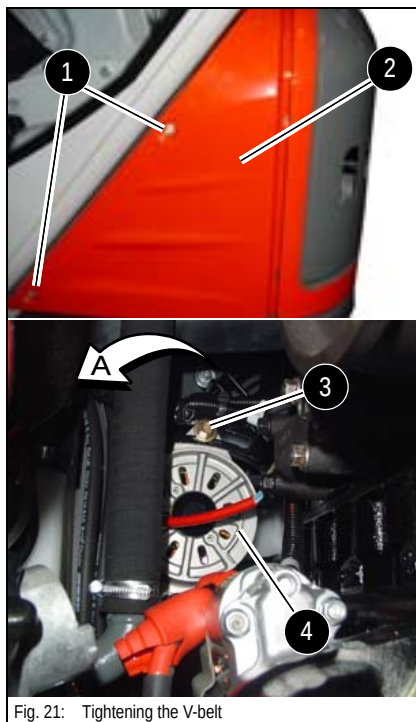


Fig. 21: Tightening the V-belt

- Retighten as follows:
 - ☞ Switch off the engine
 - ☞ Fold up the control lever base
 - ☞ Remove the key and carry it with you
 - ☞ Open the engine cover
 - ☞ Disconnect the battery or the battery master switch
 - ☞ Let the engine cool down
 - ☞ Slacken fastening screws 1 of cover 2
 - ➡ Remove cover 2
 - ☞ Slacken fastening screw 3 of dynamo 4
 - ☞ Use a suitable tool to push the dynamo in the direction of arrow A until reaching the correct V-belt tension
 - *see chapter* [Checking V-belt tension](#) on page 3-22
 - ☞ Keep the dynamo in this position, and at the same time retighten fastening screw 3
 - ☞ Check V-belt tension again and adjust it if necessary
 - ☞ Tighten fastening screws 1 of cover 2
 - ☞ Connect the battery or the battery master switch
 - ☞ Close the engine cover



Tightening the V-belt (alternator)

Dynamo output is not sufficient for switching on the working lights if the machine is fitted with the "Front and rear working lights" option. This is why an alternator is installed. The following explains how to tighten the V-belt in this case.

**Caution!**

Overtightening the V-belt can damage the V-belt, the V-belt guide and the water pump bearing.

Avoid contact of oil, grease or similar substances with the V-belt.

☞ *Checking V-belt tension* [3-22](#)

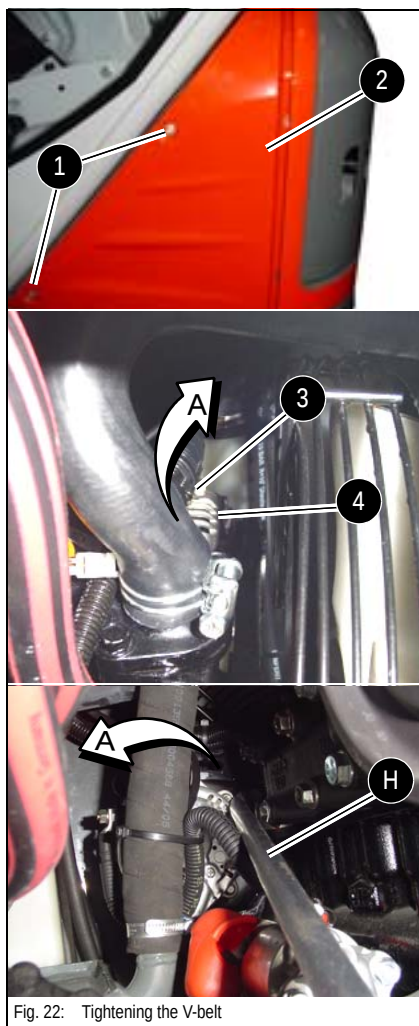


Fig. 22: Tightening the V-belt

- Retighten as follows:
 - ☞ Switch off the engine
 - ☞ Fold up the control lever base
 - ☞ Remove the key and carry it with you
 - ☞ Open the engine cover
 - ☞ Disconnect the battery or the battery master switch
 - ☞ Let the engine cool down
 - ☞ Slacken fastening screws 1 of cover 2
 - ➔ Remove cover 2
 - ☞ Slacken fastening screw 3 of alternator 4
 - ☞ Use a suitable tool H to push the alternator in the direction of arrow A until reaching the correct V-belt tension
 - see [chapter](#) *Checking V-belt tension* on page 3-22
 - ☞ Keep the alternator in this position, and at the same time retighten fastening screw 3
 - ☞ Check V-belt tension again and adjust it if necessary
 - ☞ Tighten fastening screws 1 of cover 2
 - ☞ Connect the battery or the battery master switch
 - ☞ Close the engine cover

3.11 Pressure check

General

- Run the machine warm before checking the pressure! Hydraulic oil temperature: 50 °C min./ 122°F (operating temperature)
- Pressure drop is checked by reducing revs from maximum to idling speed at constant load
- Set the primary pressure limiting valves (PPLV) at maximum engine revs.
- See chapter "Specifications" (– [see Hydrauliksystem](#) on page 2-3) for the pressure settings
- Ensure utmost cleanliness of all measuring points and ports, micro measuring lines and pressure gauges that are connected for checking pressure => even the slightest traces of dirt, e.g. a grain of sand, can impair tightness and cause leaks!

Checking pilot control pressure

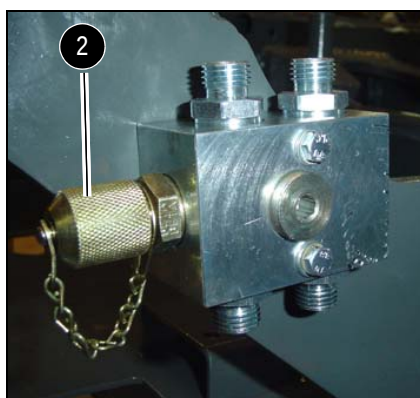


Fig. 23: Pilot control pressure measuring port

Checking pilot control pressure

- ☞ Connect a pressure gauge to measuring port MP 2
- ☞ Move the control lever base (safety switch) to work position
- ☞ Carry out any function (e.g. bucket) to the limit
- ☞ Check and make a note of the pressure value.



Fig. 24: Pressure reducing valve

Setting the pressure reducing valve (PRV)

- ☞ Set the pressure at the pressure reducing valve PRV 1 on the pilot oil supply unit
- ☞ Check the pilot control pressure again once adjustment is over

Pressure check of gear pump P

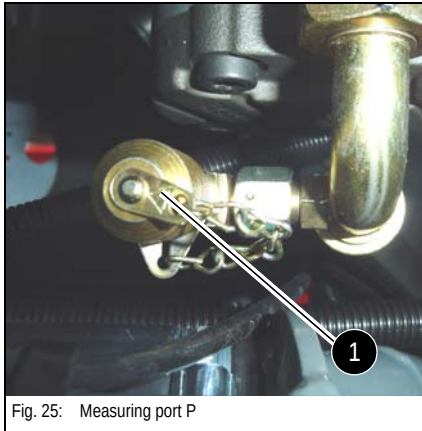


Fig. 25: Measuring port P

Hydraulic supply for boom, bucket, stick, driving, stabiliser blade, auxiliary hydraulics, slewing and rotation (all)

Checking the primary pressure limiting valve (PPLV)

- ☞ Connect a pressure gauge to measuring port MP 1



☞ e.g. extend or retract the bucket ram as far as it will go at max. engine revs

- ☞ Check and make a note of the pressure value.

Checking pressure drop

- ☞ e.g. extend or retract the bucket ram as far as it will go at max. engine revs
- ☞ Swiftly reduce engine revs from maximum to minimum -> pressure drop
- ☞ Check and make a note of the pressure value.

➔ Pressure drop should not exceed the specified value by more than 10 %

Setting the primary pressure limiting valve

- ☞ Set the pressure at the primary pressure limiting valve A on the main valve block
- ☞ Remove the yellow protective cap
- ☞ Slacken the locknut of the pressure limiting valve
- ☞ Unscrew the pressure limiting valve until you can read off a pressure drop on the pressure gauge
- ➔ The valve seat may be stuck and must be slackened first
- ☞ Adjust the pressure limiting valve and tighten the locknut
- ☞ Fit the yellow protective cap back on again
- ☞ Check the primary pressure limiting valve and the pressure drop again once adjustment is over

The secondary pressure limiting valve cannot be set.



Fig. 26: Primary pressure limiting valve

Secondary pressure limiting valve of the gear motor

Check (at idling speed)

- ☞ Connect a pressure gauge to measuring port MP 1
- ☞ Rotating the upper carriage
- ☞ Check and make a note of the pressure value

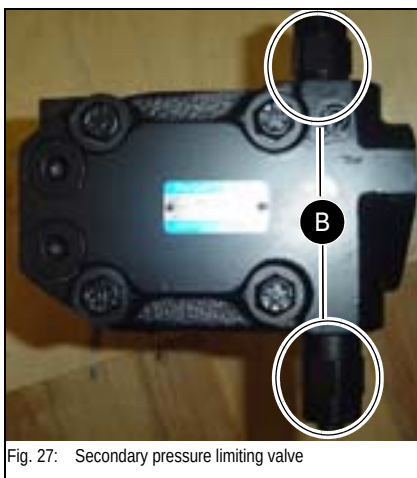
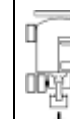


Fig. 27: Secondary pressure limiting valve

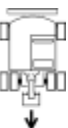
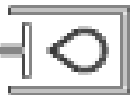


3.12 Test report

Pilot control

Function	Movement	Symbol	Pressure limiting valve PRV 1 (pilot oil supply unit)	Measuring port	Specified values		1st measure- ment	2nd measure- ment
					Engine speed	Pressure in bar (psi)		
Joystick	ANY		Pressure reducing valve PRV 1 (pilot oil supply unit)	Measuring port MP 2 (P distributing block in the chassis)	Rated value	35 ^{±2} (508 ^{±29})		
Boom	UP		Primary pressure limiting valve PPLV 1 (main valve block)	Measuring port MP 1 (pump) special fitting	Max.	200 ^{+6/-0} (2901 ^{+87/-0})		
	DOWN				Min.	180 (2611)		
Bucket	EXTEND				Max.	200 ^{+6/-0} (2901 ^{+87/-0})		
	RETRACT				Min.	180 (2611)		
Left-hand side drive	FORWARDS				Max.	200 ^{+6/-0} (2901 ^{+87/-0})		
	REVERSE				Min.	180 (2611)		
Stick	EXTEND				Max.	200 ^{+6/-0} (2901 ^{+87/-0})		
	RETRACT				Min.	180 (2611)		

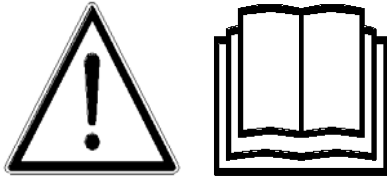


3.12 Test report									
Right-hand side drive	FORWARDS		Measuring port MP 1 (pump) special fitting	Primary pressure limiting valve PPLV 1 (main valve block)	Secondary pressure limiting valve SPLV (gear motor)	Max.	200 ^{+6/-0} (2901 ^{+87/-0})		
	REVERSE					Min.	180 (2611)		
Stabiliser blade	UP					Max.	200 ^{+6/-0} (2901 ^{+87/-0})		
	DOWN					Min.	180 (2611)		
Auxiliary hydraulics	LEFT					Max.	200 ^{+6/-0} (2901 ^{+87/-0})		
	RIGHT					Min.	180 (2611)		
Boom swivel	LEFT					Max.	200 ^{+6/-0} (2901 ^{+87/-0})		
	RIGHT					Min.	180 (2611)		
Rotate	LEFT					Max.	180 ^{+6/-0} (2611 ^{+87/-0})		
	RIGHT					Min.	162 (2350)		
						Max.	180 ^{+6/-0} (2611 ^{+87/-0})		
						Min.	162 (2350)		



3.13 Hydraulic system

Specific safety instructions



- Release the pressure in all lines carrying hydraulic oil prior to any maintenance and repair work. To do this:
 - Lower all hydraulically controlled attachments to the ground
 - Move all control levers of the hydraulic control valves several times
- Fold up the control lever base
- Hydraulic oil escaping under high pressure can penetrate the skin and cause serious injuries. Always consult a doctor immediately even if the wound seems insignificant – otherwise serious infections could set in!
- If the hydraulic oil in the sight glass is cloudy, this indicates that water or air has penetrated the hydraulic system. This may cause damage to the hydraulic pump!
- Oil or fuel flowing out of high pressure lines can cause fire or malfunctions, and severe injuries or damage to property. Interrupt work immediately if slack nuts or damaged hoses and lines are detected.
 - ☞ Contact your Neuson dealer immediately
- Replace the hose or line if one of the problems mentioned below is detected.
 - ☞ Damaged or leaky hydraulic seals
 - ☞ Worn or torn shells or uncovered reinforcement branches
 - ☞ Expanded shells in several positions
 - ☞ Entangled or crushed movable parts
 - ☞ Foreign bodies jammed or stuck in protective layers



Caution!

Contaminated hydraulic oil, lack of oil or wrong hydraulic oil –

Danger of severe damage to the hydraulic system!

- ☞ Take care to avoid contamination when working!
- ☞ Always fill in hydraulic oil using the filling screen!
- ☞ Only use authorised oils of the same type
 - see [chapter 3.1 Fluids and lubricants](#) on page 3-1
- ☞ Always fill up hydraulic oil before the level gets too low
 - see [Filling up hydraulic oil](#) on page 3-31
- ☞ If the hydraulic system is filled with biodegradable oil, then only use biodegradable oil of the same type for filling up – observe the sticker on the hydraulic oil tank!
- ☞ Contact customer service if the hydraulic system filter is contaminated with metal chippings. Otherwise, follow-on damage may result!



Environment!

Collect drained hydraulic oil and biodegradable oil in a suitable container!

Dispose of drained oil and used filters by an ecologically safe method. Always contact the relevant authorities or commercial establishments in charge of oil disposal before disposing of biodegradable oil.



Checking the hydraulic oil level

**Caution!**

Do not fill up oil if the oil level is above the MAX mark, otherwise the hydraulic system may be damaged and escaping oil may cause serious injuries.

☞ Check the hydraulic oil level each time the machine is put into operation or once a day

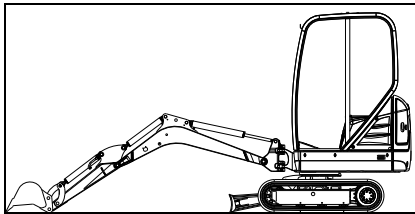


Fig. 28: Parking the excavator

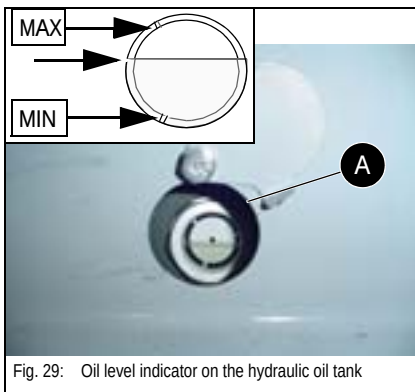


Fig. 29: Oil level indicator on the hydraulic oil tank

- If the attachment is not positioned as shown:
 - ☞ Start the engine and let it run at idling speed
 - ☞ Retract the bucket and boom rams, lower the boom and the bucket teeth to the ground
 - ☞ Extend the stabiliser blade ram, lower the stabiliser blade to the ground.
 - ☞ Switch off the engine again.

☞ Proceed as follows:

- Park the machine on level ground
- Retract the bucket and boom rams, lower the boom and the bucket teeth to the ground
- Extend the stabiliser blade ram, lower the stabiliser blade to the ground.
- Set the boom straight
- Switch off the engine
- Fold up the control lever base
- Sight glass A is located in the seat console under the heating air flaps in the trim.
- Check the oil level on sight glass A
- The oil level must be about 1 cm over the centre, between positions MIN and MAX, as shown by the arrows in fig. 29.
 - ➡ The MIN level is marked by the lower joint
 - ➡ The MAX level is marked by the upper joint

If the oil level is lower

- Fill up hydraulic oil

The oil level varies according to the machine's operating temperature:

Machine condition	Temperature	Oil level
• Before taking into service	Between 10 and 30 °C (50°F und 86°F)	LOW mark
• Normal operation	Between 50 and 90 °C (122°F und 194°F)	FULL mark

**Important!**

Measure the oil level of the hydraulic system only after the machine reaches its operating temperature.



Filling up hydraulic oil



Danger!

Removing the breather filter may cause oil to escape suddenly and at high pressure –

Danger of accidents!

☞ *Carefully unscrew the breather filter to slowly reduce the pressure inside the tank.*



Fig. 30: Hydraulic oil tank

Do not fill up the hydraulic oil unless the engine is switched off. Otherwise, hydraulic oil will run out of the filler opening on the hydraulic tank.

☞ *Fill up as follows:*

- Park the machine on level ground
- Retract the bucket and boom rams, lower the boom and the bucket teeth to the ground
- Lower the stabiliser blade to the ground
- Set the boom straight
- Switch off the engine
- Fold up the control lever base
- Let the engine cool down
- Slowly open breather filter B

With the filter insert in place:

- Fill up hydraulic oil
- Check the hydraulic oil level on sight glass 29/A
- Fill up if necessary and check again
- Tighten breather filter B again by hand

Changing hydraulic oil



Important!

Change the hydraulic oil when the machine is warm.
Retract all hydraulic rams before changing the oil.

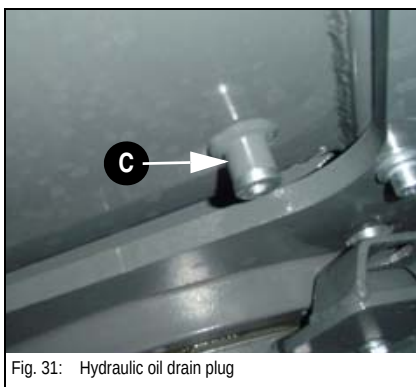


Fig. 31: Hydraulic oil drain plug

- ☞ *Open the breather filter to release pressure*
- ☞ *Open drain plug C and drain the oil into a container*
- ☞ *Check the hydraulic oil tank for contamination and clean if necessary*
- ☞ *Replace the filter according to the maintenance specifications*
- ☞ *Screw the drain plug back in correctly*
- ☞ *Fill in clean hydraulic oil through the strainer*
– see [Filling up hydraulic oil on page 3-31](#)
- ☞ *Close the hydraulic oil tank correctly*
- ☞ *Let the machine run at idling speed without load for some minutes*



Important information for the use of biodegradable oil

- Use only the biodegradable hydraulic fluids which have been tested and approved by Neuson Baumaschinen GmbH. Always contact Neuson Baumaschinen GmbH for the use of other products which have not been recommended. In addition, ask the oil supplier for a written declaration of guarantee. This guarantee is applicable to damage occurring on the hydraulic components, which can be proved to be due to the hydraulic fluid.
- Use only biodegradable oil of the same type for filling up. In order to avoid misunderstandings, a label providing clear information is located on the hydraulic oil tank (next to the filler inlet) regarding the type of oil currently used! Replace missing labels! The joint use of two different biodegradable oils can affect the quality of one of the oil types. Therefore, make sure the remaining amount of initial hydraulic fluid in the hydraulic system does not exceed 8 % when changing biodegradable oil (manufacturer indications).
- Do not fill up with mineral oil – the content of mineral oil should not exceed 2 % in order to avoid foaming problems and to ensure biological degradability.
- When running the machine with biodegradable oil, the same oil and filter replacement intervals are valid as for mineral oil
– see [chapter 3.3 Maintenance plan \(overview\)](#) on page 3-5
- Always have the condensation water in the hydraulic oil tank drained by an authorised workshop before the cold season. The water content may not exceed 0.1 % by weight.
- The instructions in this Operator's Manual concerning environmental protection are also valid for the use of biodegradable oil.
- If additional hydraulic attachments are mounted or operated, use the same type of biodegradable oil for these attachments to avoid mixtures in the hydraulic system.

Subsequent change from mineral oil to biodegradable oil must be carried out by an authorised workshop or by your Neuson partner.



Checking hydraulic pressure lines

Specific safety instructions



Danger!

Caution when checking hydraulic lines, especially when searching for leaks. Hydraulic oil escaping under high pressure can penetrate the skin and cause serious injuries.

Danger of personal injury!

☞ *Always consult a doctor immediately, even if the wound seems insignificant – otherwise serious infections could set in!*

☞ *Always observe the following instructions:*

- Retighten leaking screwed fittings and hose connections only when the system is not under pressure; i.e. release the pressure before working on pressurised lines!
- Never weld or solder damaged or leaking pressure lines and screw connections. Replace damaged parts with new ones!
- Never search for leaks with your bare hands, but wear protective gloves!
- Use paper or wood to check for minor leaks. Never use an unprotected light or naked flame!
- Have damaged flexible lines replaced by authorised workshops only!



- Leaks and damaged pressure lines must be immediately repaired or replaced by an authorised workshop or after-sales staff.
This not only increases the operating safety of your machine but also helps to protect the environment
- Replace hydraulic hoses every 6 years from the date of manufacture, even if they do not seem to be damaged

In this respect, we recommend that you observe all the relevant safety regulations for hydraulic lines, as well as the safety regulations regarding accident prevention and occupational health and safety in your country. Also observe DIN 20066, part 5.

The article number is marked on the clamping section, and the date of manufacture is indicated on the hose of each hose connection.

Example:

The indication "1 Q/06" means manufactured in the 1st quarter of 2006.



3.14 Pilot control filter (from serial number AF01441)



Caution!

Check the pilot control filter every 1000 s/h and clean it if necessary to protect the piston valves in the control valve from dirt in the oil!

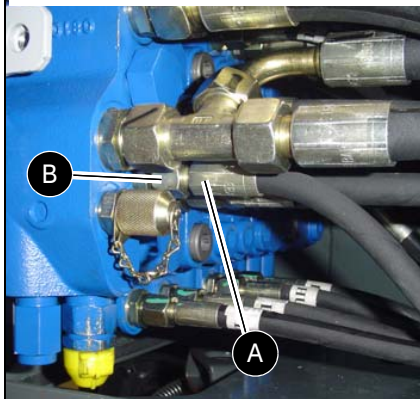


Fig. 32: Pilot control filter

Check the pilot control filter as follows:

- ☞ Park the machine on level ground
- ☞ Retract the bucket and boom rams, lower the boom and the bucket teeth to the ground
- ☞ Lower the stabiliser blade to the ground
- ☞ Set the boom straight
- ☞ Switch off the engine
- ☞ Move the control levers in all directions repeatedly
- ☞ Switch off the ignition and remove the ignition key
- ☞ Fold up the control lever base
- ☞ Let the engine cool down
- ☞ Slowly open the breather filter
 - ➡ Release the pressure
- ☞ Install the vacuum pump
- ☞ Switch on the pump before routing hoses
- ☞ Remove the side panel on the left-hand side of the excavator
 - ☞ To this effect, slacken the 6 fastening screws S and remove the trim.
- ☞ Remove pilot control hose A from the control valve
- ☞ Remove pilot control filter B from the control valve
- ☞ Check pilot control filter screen C for dirt and clean it if necessary. Replace it by a new filter if it is damaged!
- ☞ Assemble in the reverse order.



3.15 Travelling drive



Danger!

Immediately after switching off the engine, the engine's components and the oil are very hot. This may cause burns. If the inside of the drive gear is under pressure, the oil or the plug may be squeezed out.

Danger of injury and scalding!

- ☞ Wait until the engine has cooled down before taking up work.
- ☞ Slowly open the plug to reduce the pressure inside.



Caution!

The Q8 T55 SAE 85W-90 gearbox oil is no longer produced!

- ☞ Therefore the Q8 T55 80W-90 gearbox oil is used from 10/2006 onwards!
- ☞ Do not mix both oils under no circumstances!

Checking the oil level and filling up oil

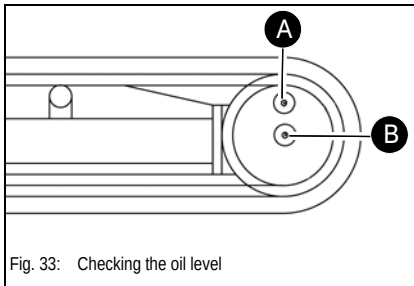


Fig. 33: Checking the oil level

- ☞ Park the machine on firm and horizontal ground
- ☞ Place the machine so that filler plug A is at the top
- ☞ Switch off the engine
- ☞ Let the engine cool down
- ☞ Fold the control lever base up
- ☞ Unscrew screws A and B with a suitable tool
- ☞ A small quantity of oil must flow out of opening B
- ☞ If the oil does not flow out of opening B, fill up oil:
 - ☞ Fill in oil through opening A,
 - ☞ until a small quantity of oil flows out of opening B
- ☞ Screw screws A and B back in again
- ☞ Move the machine a few metres
- ☞ Check the oil level again
 - ☞ If the oil level is not correct:
 - ☞ Repeat the procedure

Draining oil

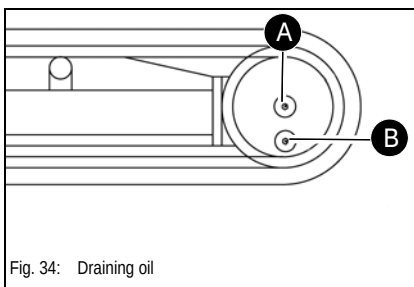


Fig. 34: Draining oil

- ☞ Park the machine on firm and horizontal ground
- ☞ Place the machine so that filler plug B is at the bottom
- ☞ Switch off the engine
- ☞ Let the engine cool down
- ☞ Fold the control lever base up
- ☞ Unscrew screws A and B with a suitable tool
 - ☞ The oil now flows out of opening B
- ☞ Use a suitable container to collect the oil as it drains



Environment!

Collect the oil with a suitable container and dispose of it in an environmentally friendly manner.

3.16 Chains

- Chain wear may vary according to work and ground conditions.
 - ☞ We recommend checking chain wear and tension once a day.
 - ☞ Park the machine on firm and level ground to check and carry out maintenance.

Checking chain tension



Danger!

Working under the machine with the chains off the ground and only supported by the attachment is extremely dangerous.

Caution, danger!

- ☞ Firmly support the machine with chocks or suitable brackets

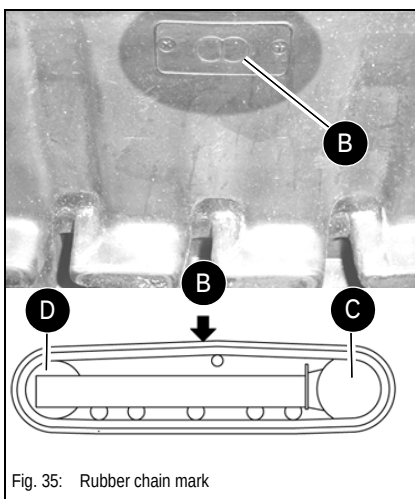


Fig. 35: Rubber chain mark

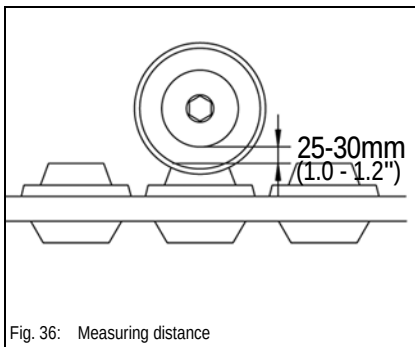


Fig. 36: Measuring distance

Check chain tension as follows:

- Mark B is affixed on the rubber chain
 - ☞ Place the excavator so that mark B of the rubber chain is between the drive pinion C and the chain tension roller D
 - ☞ Park the machine on firm and level ground
 - ☞ Raise the excavator with the boom and the stick
 - ☞ Slowly and carefully actuate the control levers
 - ☞ Switch off the engine
 - ☞ Remove the key and carry it with you
 - ☞ Fold up the control lever base
 - ☞ Use suitable auxiliary means to support the machine
- Standard play between the sliding block's shoulder and the contact area of the second support roller of the drive pinion is 25-30 mm (1.0 - 1.2").
 - ☞ Set the tension as follows if it is not in accordance with the rated value.



Setting the chains



Danger!

The lubricating valve may be squeezed out due to the high grease pressure in the hydraulic ram.

Danger of personal injury!

- ☞ Do not slacken and unscrew the lubricating valve by more than one turn.
- ☞ Slacken no other component except the lubricating valve.
- ☞ Keep your face away from the lubricating valve connection.
 - ➔ Contact your Neuson dealer if this does not reduce the tension of the rubber sliding block.



Caution!

Excessive tension of the chains causes severe damage to the ram and the chain.

- ☞ Tighten the chains only up to the prescribed measuring distance

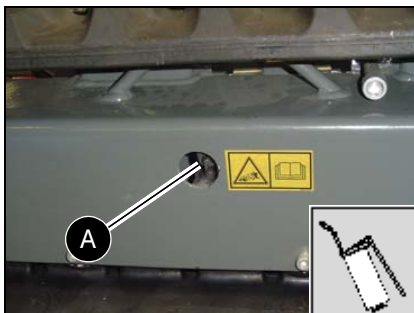


Fig. 37: Tightening the chains

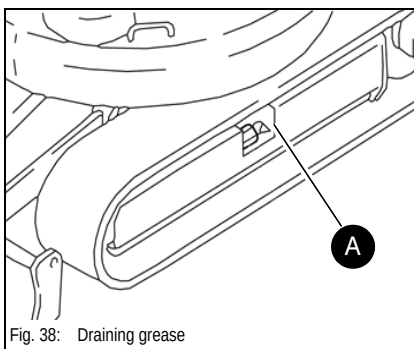


Fig. 38: Draining grease

Tightening the chains

- ☞ Inject grease with the pump through lubricating valve A
- ☞ Check the tension is correct by starting the engine, letting it run at idling speed and slowly moving the machine forwards and reverse and switching it off again
- ☞ Check the tension of the track chains again.
 - ➔ If it is not correct:
 - ☞ Adjust again
- ☞ Should the track chain still be slack after injecting more grease, replace the chain or the seal in the ram. Contact a Neuson dealer in this case

Reducing tension

- Draining grease in a way different from the one described below is very dangerous. Also bear in mind the safety instructions on this page
- ☞ Slowly open the lubricating valve A by 1 turn to allow the grease to flow out.
 - ☞ Place a suitable container underneath to collect the grease
 - ➔ The grease flows out of the groove of the lubricating valve
- ☞ Retighten the lubricating valve A
- ☞ Check the tension is correct by starting the engine, letting it run at idling speed and slowly moving the machine forwards and reverse and switching it off again
- ☞ Check the tension of the track chains again
 - ➔ If it is not correct:
 - ☞ Adjust again



Environment!

Use a suitable container to collect the grease as it flows out and dispose of it in an environmentally friendly manner.



3.17 Lubrication work

Apply multipurpose lithium grease with an MoS₂ additive to all lubrication points indicated – see *Fluids and lubricants* on page 3-1

Lubrication points on the stabiliser blade

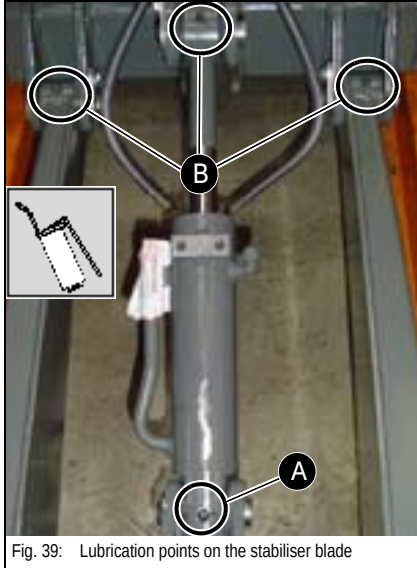
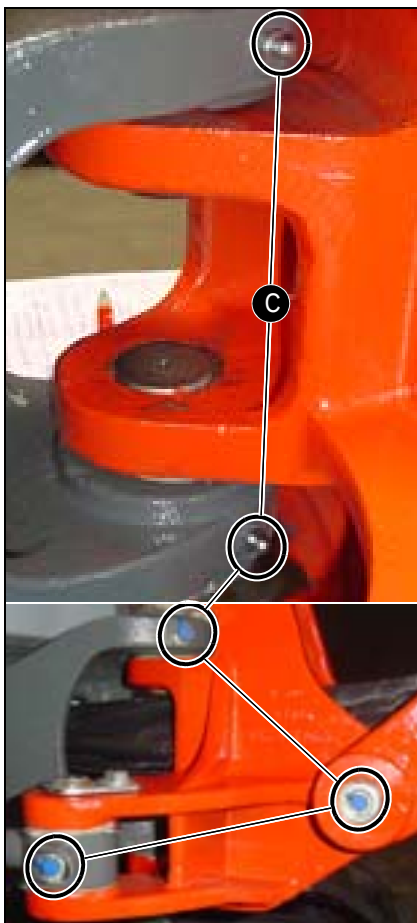


Fig. 39: Lubrication points on the stabiliser blade

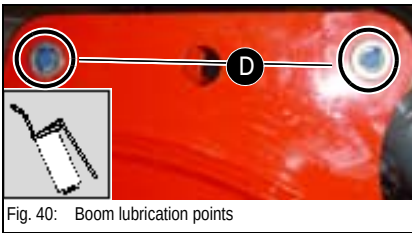
- ☞ Apply grease to lubrication points A on the stabiliser blade ram
- ☞ Apply grease to lubrication points B on the stabiliser blade

Lubrication points on the swivelling console



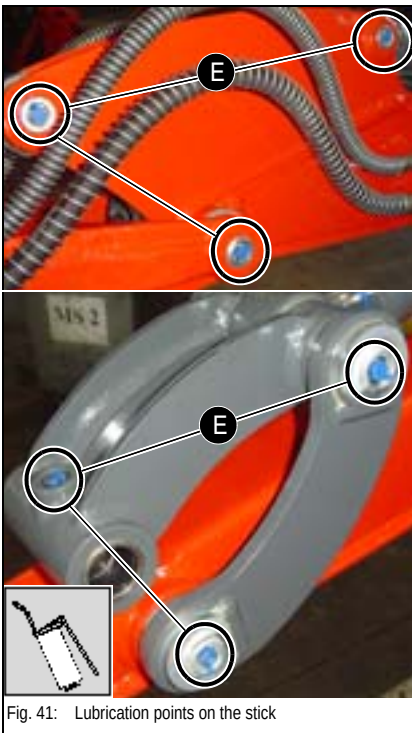
- ☞ Apply grease to lubrication points C of the swivelling console

Boom lubrication points



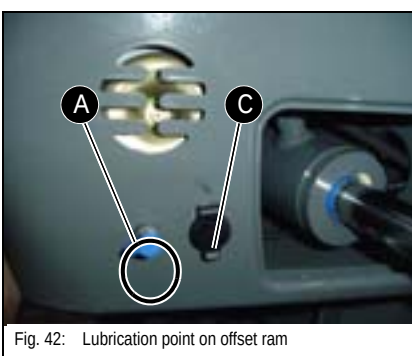
➡ Apply grease to lubrication points D on the boom

Lubrication points on the stick



➡ Apply grease to lubrication points E on the stick

Lubrication point for offset ram



Apply grease to lubrication point A for the offset ram

A 12 V port C for a portable lamp is located next to grease nipple A



Lubrication point on the live ring

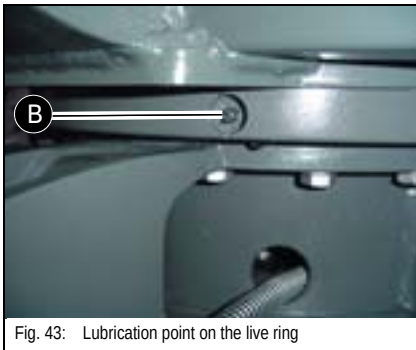


Fig. 43: Lubrication point on the live ring

- 🔧 Apply grease to lubrication point *B* for the ball bearing of the live ring
 - ➡ Grease: BP Energrease MP-MG2



Important!

Apply grease to lubrication points 42/A and 43/B once a day.

Maintenance of attachments



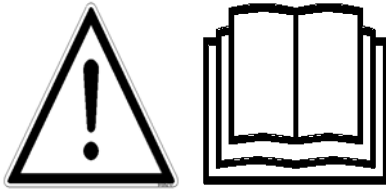
Important!

Correct maintenance and service is absolutely necessary for smooth and continuous operation, and for an increased service life of the attachments. Please observe the lubrication and maintenance instructions in the attachments' Operator's Manuals



3.18 Electric system

Specific safety instructions



- The battery contains sulphuric acid! This acid must not be allowed to come into contact with the skin, the eyes, clothing or the machine.

Therefore when recharging or working near the battery:

- ☞ Always wear goggles and protective clothing with long sleeves

If acid is spilt:

- ☞ Thoroughly rinse all affected surfaces immediately with plenty of water
- ☞ Thoroughly wash any part of the body touched by the acid immediately with plenty of water and seek medical attention at once!

- Especially when charging batteries, as well as during normal operation of batteries, an oxyhydrogen mixture is formed in the battery cells – danger of explosion!
- Do not attempt to jump-start the machine if the battery is frozen or if the acid level is low. The battery may rupture or explode!
- ☞ Replace the battery immediately
- Avoid naked flames and sparks and do not smoke in the vicinity of open battery cells – otherwise the gas produced during normal battery operation may ignite!
- Use only 12 V power sources. Higher voltages will damage the electric components
- When connecting the battery leads, make sure the poles +/– are not inverted, otherwise sensitive electric components will be damaged
- Do not interrupt voltage-carrying circuits at the battery terminals because of the danger of sparking!
- Never place tools or other conductive articles on the battery – danger of short circuit!
- Disconnect the negative (–) battery terminal from the battery before starting repair work on the electric system
- Dispose of used batteries properly

Service and maintenance work at regular intervals



Before driving the machine

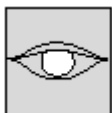
☞ Check every time before driving the machine:

- Is the light system OK?
- Is the signalling and warning system OK?

Every week

☞ Check once a week:

- Electric fuses
– see *Electric system* on page 2-3
- Cable and earth connections
- Battery charge condition
– see *Battery* on page 3-43
- Condition of battery terminals





Instructions concerning specific components

Cables, bulbs and fuses

Always observe the following instructions:

- Defective components of the electric system must always be replaced by an authorised expert. Bulbs and fuses may be changed by unqualified persons
- When carrying out maintenance work on the electric system, pay particular attention to ensuring good contact in leads and fuses
- Blown fuses indicate overloading or short circuits. The electric system must therefore be checked before installing the new fuse
- Only use fuses with the specified load capacity (amperage)
– [see Electric system](#) on page 2-3

Alternator

Always observe the following instructions:

- Only test run the engine with the battery connected
- When connecting the battery, make sure the poles (+/–) are not inverted
- Always disconnect the battery before carrying out welding work or connecting a quick battery charger
- Replace defective charge telltales immediately



Battery



Danger!

Battery acid is highly caustic!

Danger of caustic injury!

Therefore when recharging and/or working near the battery:

☞ *Always wear goggles and protective clothing with long sleeves*

If acid is spilt:

☞ *Thoroughly rinse all affected surfaces immediately with plenty of water*

☞ *Thoroughly wash any part of the body touched by the acid immediately with plenty of water and seek medical attention at once!*

Especially when charging batteries, as well as during normal operation of batteries, an oxyhydrogen mixture is formed in the battery cells –

Danger of explosion!

☞ *Avoid naked lights and sparks in the vicinity of the battery and do not smoke!*

☞ *Do not attempt to jump-start the machine if the battery is frozen or if the acid level is low. The battery may rupture or explode!*

- Replace the battery immediately

☞ *Always disconnect the negative terminal (–) from the battery before starting repair work on the electric system!*

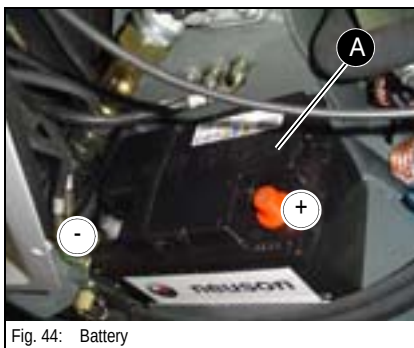


Fig. 44: Battery

Battery A is located behind the rear left side trim. The battery is “maintenance-free”. However have the battery checked at regular intervals to make sure the electrolyte level is between the MIN and MAX marks.

Checking the battery requires it to be removed and must be carried out by an authorised workshop.

Always follow the specific battery safety instructions!



Important!

Do not disconnect the battery while the engine is running.



3.19 General maintenance work

Cleaning

Cleaning the machine is divided into 3 separate areas:

- Inside the cab
- Exterior of the machine
- Engine compartment

The wrong choice of cleaning equipment and agents may impair the operating safety of the machine on the one hand, and on the other undermine the health of the persons in charge of cleaning the machine. It is therefore essential to observe the following instructions.

General instructions for all areas of the machine

When using washing solvents

- Ensure adequate room ventilation
- Wear suitable protective clothing
- Do not use flammable liquids, such as petrol or diesel

When using compressed air

- Work carefully
- Wear goggles and protective clothing
- Do not aim the compressed air at the skin or at other people
- Do not use compressed air for cleaning your clothing

When using a high-pressure cleaner or steam jet

- Electric components and damping material must be covered and not directly exposed to the jet
- Cover the vent filter on the hydraulic oil tank and the filler caps for fuel, hydraulic oil etc.
- Protect the following components from moisture:
 - Engine
 - Electric components such as the alternator etc.
 - Control devices and seals
 - Air intake filters etc.

When using volatile and easily flammable anticorrosion agents and sprays:

- Ensure adequate room ventilation
- Do not use unprotected lights or naked flames
- Do not smoke!

Inside the cab



Caution!

Never use high-pressure cleaners, steam jets or high-pressure water to clean inside the cab. Water under high pressure may

- penetrate into the electric system and cause short circuits and
- damage seals and disable the controls!

We recommend using the following aids to clean the cab:

- Broom
- Vacuum cleaner
- Damp cloth
- Bristle brush
- Water with mild soap solution

Cleaning the seat belt

- Clean the seat belt (which remains fitted in the machine) only with a mild soap solution; do not use chemical agents as they may destroy the fabric!

Exterior of the machine

The following articles are generally suitable:

- High-pressure cleaner
- Steam jet

Engine compartment



Danger!

Clean the engine at engine standstill only –

Danger of personal injury!

 *Switch off the engine before cleaning*



Caution!

When cleaning the engine with a water or steam jet

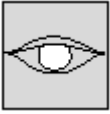
 *The engine must be cold*

 *and do not point the jet directly at electric sensors such as the oil pressure switch.*

The humidity penetrating any such sensors causes them to fail and leads to engine damage!



Screw connections and attachments



All screw connections must be checked regularly for tightness, even if they are not listed in the maintenance schedules.

☞ *Engine fastening screws*

☞ *Fastening screws on the hydraulic system*

☞ *Line, bucket teeth and pin fastenings on the attachment*

Retighten loose connections immediately. Contact an authorised workshop if necessary. Refer to chapter "Specifications" for the tightening torques.

Pivots and hinges

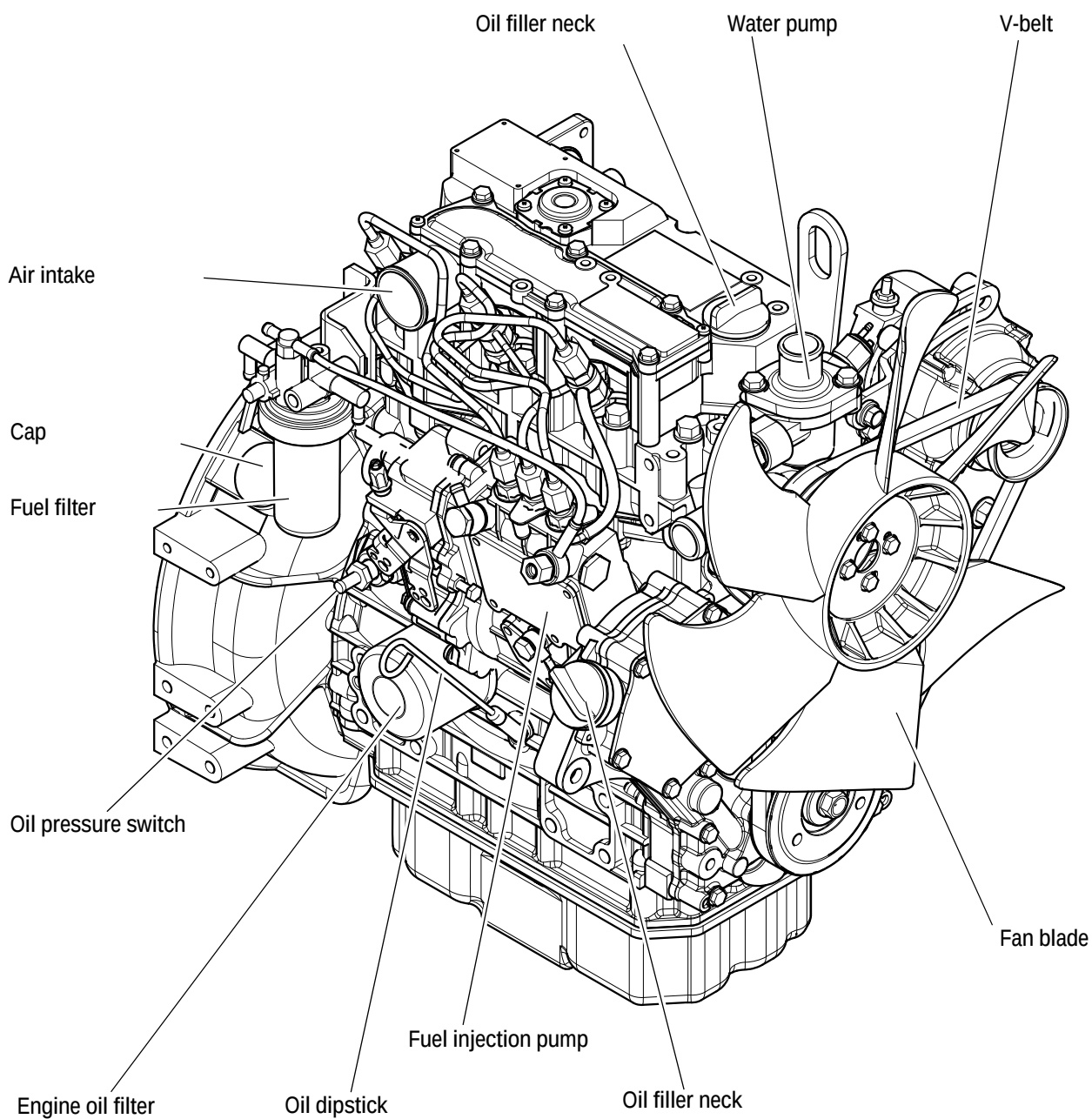


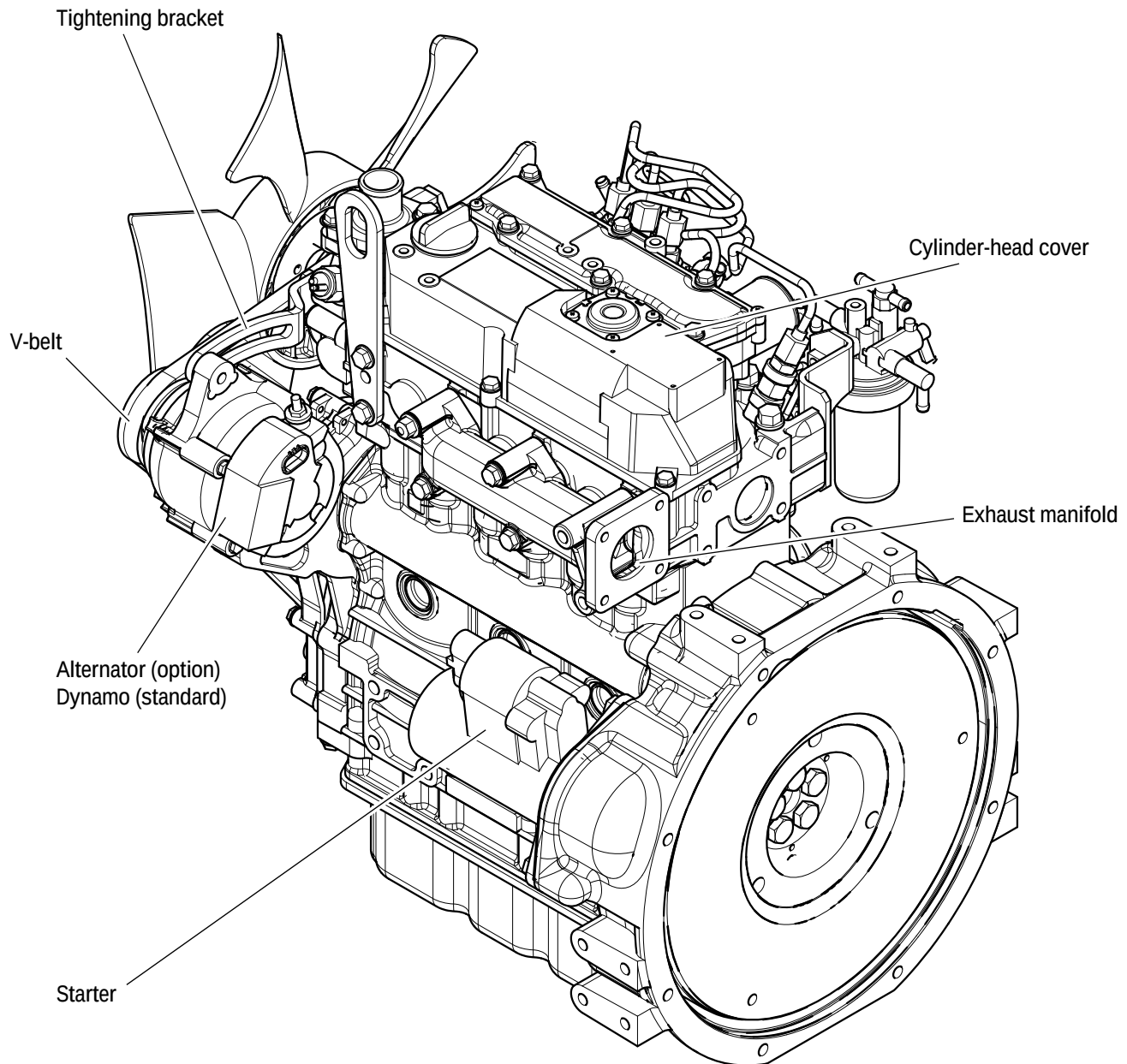
All mechanical pivot points on the machine (e.g. door hinges, joints) and fittings (e.g. door arresters) must be lubricated regularly, even if they are not listed in the lubrication plan.

Engine

4 Engine

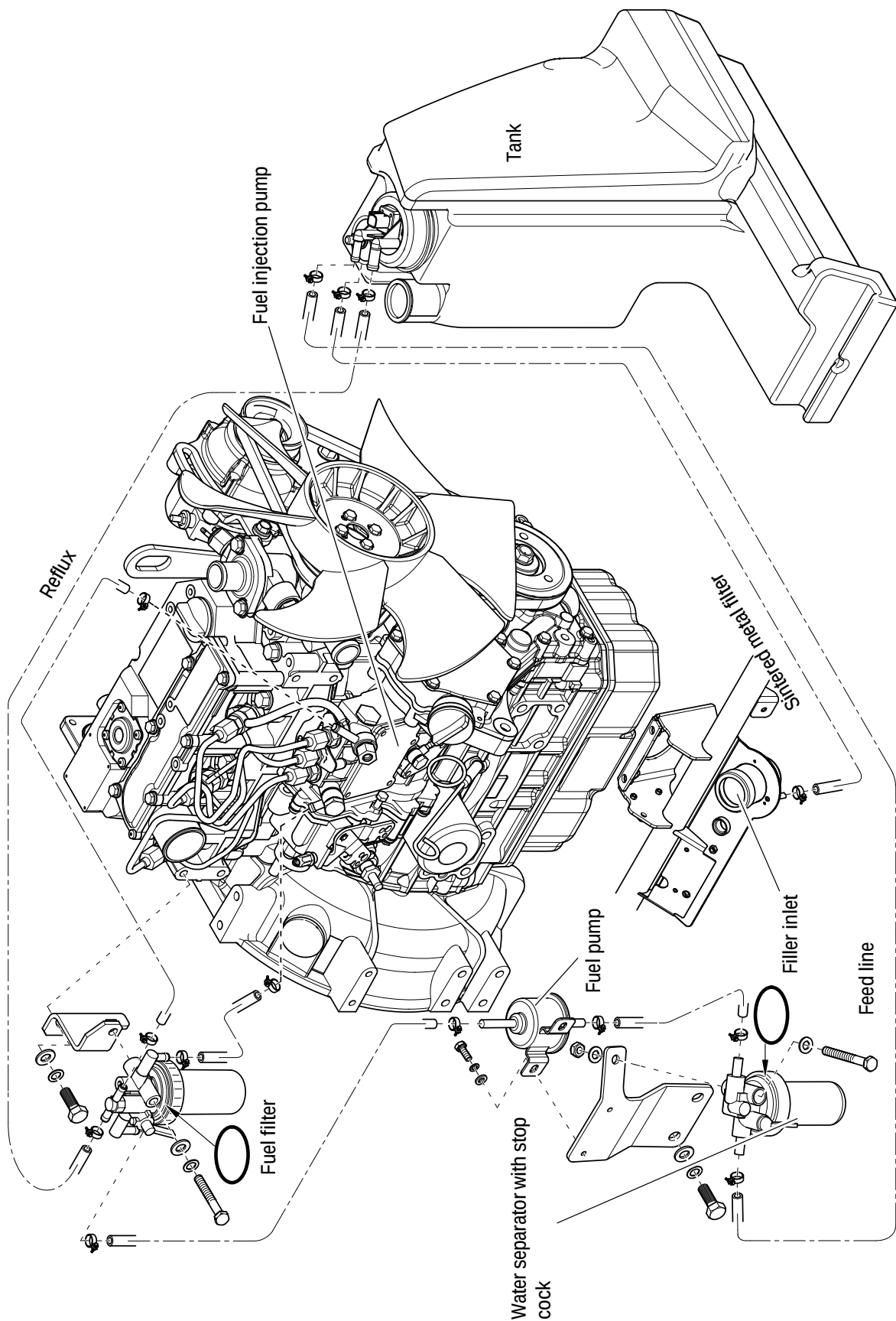
4.1 3TNV76-SNS2 engine overview







4.2 Fuel system





4.3 Checking and adjusting valve tip clearance

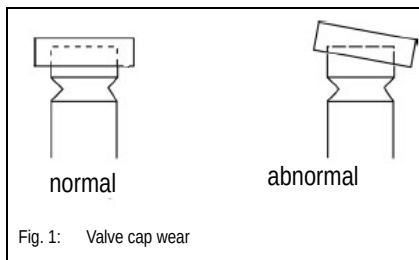


Fig. 1: Valve cap wear

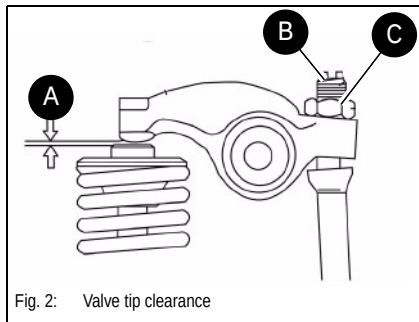


Fig. 2: Valve tip clearance

☞ Standard setting of valve tip clearance is possible:

➡ On a cold engine

☞ Remove the cylinder-head cover

☞ Turn the engine with a screwdriver (as in 4.7) until the cylinder reaches the top dead centre of the compression cycle.

➡ Valve overlapping

☞ Check valve tip clearance 2/A with a feeler gauge

➡ Valve tip clearance: 0.15 – 0.25 mm (0.0059 - 0.0098")

☞ Set the valve tip clearance on the cylinder by turning set screw 2/B.

➡ Valve tip clearance: 0.15 – 0.25 mm (0.0059 - 0.0098")

☞ Tighten locknut 2/C

– see [chapter 2.11](#) General tightening torques on page 2-6.

➡ Check the setting again with the feeler gauge.

☞ Repeat the procedure for each cylinder

4.4 Tightening order for cylinder head bolts

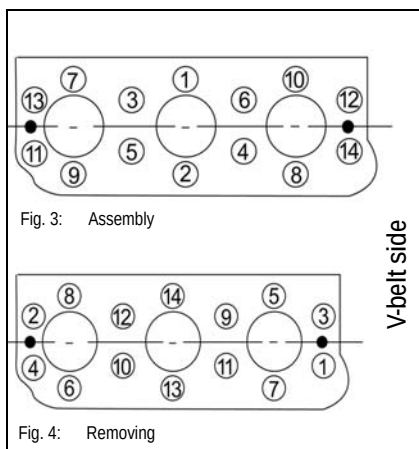


Fig. 3: Assembly

Fig. 4: Removing

Assembly

☞ Mount the cylinder-head bolts

➡ Tightening torques:

- 1st pass 26.9 – 28.9 Nm (19.8 - 21.3 lbf ft)
- 2nd pass 53.9 – 57.9 Nm (39.8 - 42.7 lbf ft)



Caution!

Bear in mind the order for tightening the cylinder-head bolts!

☞ See [fig. 3](#)



Important!

Apply a thin coat of oil to the threads and contact surfaces before mounting.

Removing



Caution!

Order for removing the cylinder-head bolts

☞ See [fig. 4](#)



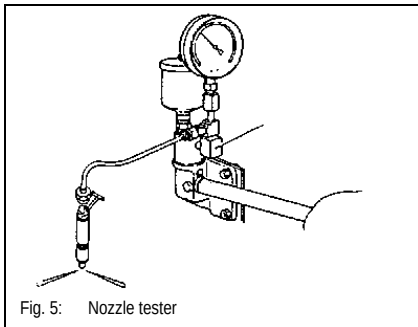
Important!

Always carry out work on the cylinder head on a cold engine!

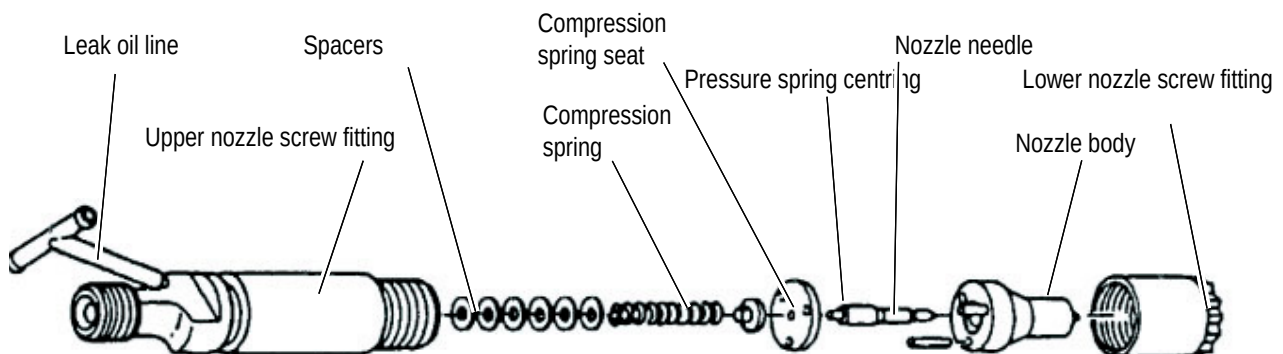


4.5 Checking the injection nozzles

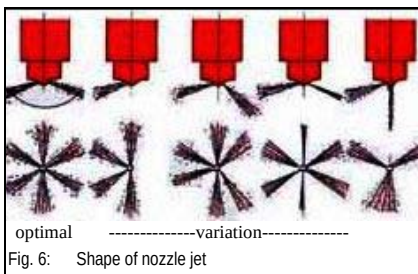
Pressure check



- ☞ Ball-type cock on fuel filter in the "OFF" position
- ☞ Clean the area around the nozzles
- ☞ Remove the injection line and the injection nozzle
- ☞ Connect the injection nozzle with the high pressure line of the nozzle tester
- ☞ Slowly increase pressure until the nozzle ejects fuel and read the pressure off the pressure gauge
- ☞ If the injection pressure is too low, replace the spacer in the nozzle by a thicker one. If the pressure is too high, replace the spacer by a thinner one.
 - ➡ Injection pressure: 123 – 133 bar (1784 - 1929 psi)
- Spacer thickness of 0.1 mm (0.004") corresponds to modification by 6.9 – 9.8 bar (100 - 142 psi)
- Check the pressure again
- Check the injection nozzle for drips after it has ejected fuel
 - ☞ Create a pressure of about 20 bar (290 psi) below injection pressure and check whether fuel escapes from the nozzle
- Install the nozzle
- Open the ball-type cock on the fuel filter again



4.6 Checking the nozzle jet



- ☞ Remove the injection lines and the injection nozzles
- ☞ Connect the injection nozzle with the high pressure line of the nozzle tester
- ☞ Quickly create pressure until the nozzle ejects fuel (ejection 3 – 4 times)
- ☞ Hold a white sheet of paper about 30 cm (12") away from the nozzle and let the nozzle eject fuel
- ☞ The nozzle jet must create a shape on the paper as shown in fig. 6

4.7 Injection time

Checking and adjusting injection time



Fig. 7: Measuring equipment



Fig. 8: Mark on housing



Fig. 9: Opening on fuel pump

- Preparatory work:

- ☞ Close the ball-type cock on the fuel filter

- ☞ Clean the engine

- ☞ Mark the actual position of the fuel injection pump on the engine block

- Trace the mark with a touch-up applicator

- ☞ Move the throttle to work position, apply current to the cutoff solenoid

- ☞ Unscrew only the injection line on the pump side and bend it a little to the side so that you can see the opening to the fuel injection pump.

- ☞ In order to be able to see better, you can use a section of an injection line or a transparent tube instead of the injection line (as required).

- Measurement:

- ☞ Remove the cap

- see [chapter 4.1](#) 3TNV76-SNS2 engine overview on page 4-1

- ☞ Slowly turn the engine clockwise, as seen from the radiator side.

- ☞ As you do so, carefully watch the opening where the injection line was.

- ☞ Stop turning as soon as fuel starts coming out.

- ☞ Wipe away the fuel and turn back to about 20° before top dead centre.

- ☞ Repeat the measurement.

- ☞ Read the mark on the crankshaft (16°). Injection time is set correctly if it corresponds to this value.

- ☞ If it does not correspond to this value, slacken the fuel injection pump (do not unscrew it completely) and rotate it a little.

- ➡ Rotated towards the engine: later injection time

- ➡ Rotated away from the engine: earlier injection time

- ☞ Screw the fuel injection pump firmly and check.

- ☞ Repeat the procedure as required.

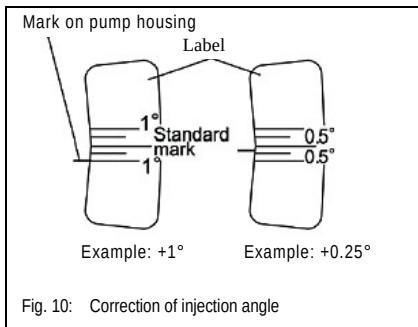


Important!

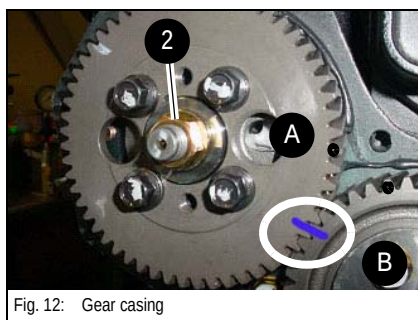
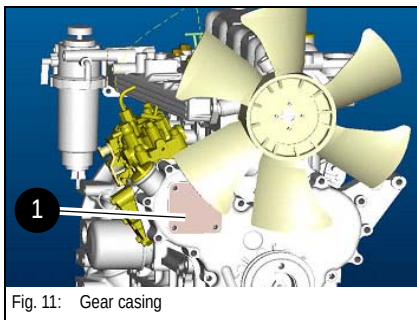
Bend the injection lines as you mount them so they are not subject to tension once they are mounted. Bleed the injection lines once they are installed.



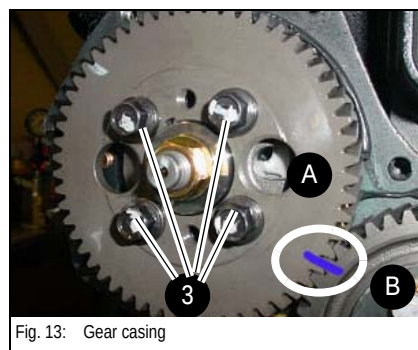
Replacement of fuel injection pump



- 🔧 Clean the engine
- 🔧 Close the ball-type cock on the fuel filter
- 🔧 Unscrew the injection lines
- 🔧 Mark the initial position on the pump and wheel case housing before removing the fuel injection pump – see [Fig. 10](#)
- 🔧 Remove gear casing cover 11/1 of the fuel injection pump
 - 🔧 Turn the engine until the marks on the gears coincide
- 🔧 Completely slacken lock nut 12/2 of the drive pinion
- 🔧 Slacken und unscrew the 3 bolts on the flange
- 🔧 Remove the fuel injection pump



- 🔧 Install the new fuel injection pump
 - 🔧 Check the marked position of the drive pinion of the fuel injection pump (fig. 12)
- 🔧 Screw on and tighten nut 12/2
- 🔧 Check injection time
 - see [chapter 4.7](#) Injection time on page 4-6
- 🔧 Mount gear casing cover 11/1 of the fuel injection pump
- 🔧 Install the injection lines
- 🔧 Open the ball-type cock on the fuel filter



i Important!

Do not slacken screws 13/3 of the drive pinion of the fuel injection pump. These screws specify the precision setting of the fuel injection pump set by the manufacturer!

4.8 Adjusting engine revs



Important!

The maximum engine revs are set and sealed by the manufacturer without the pump and may not be modified!

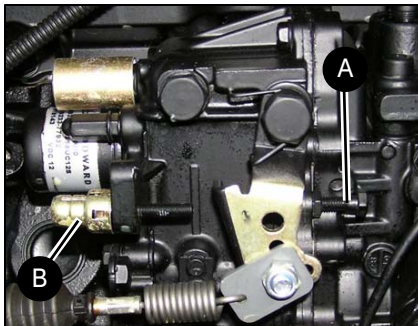


Fig. 14: Adjusting engine revs

Adjust engine revs without load!

- ☞ Run the diesel engine until it reaches operating temperature
- ☞ Check idling speed *A* and maximum revs *B* with all attachment functions in neutral
 - ➔ Idling speed: 1300 ± 25 rpm
 - ➔ Max. revs: 2375 ± 25 rpm

4.9 Compression

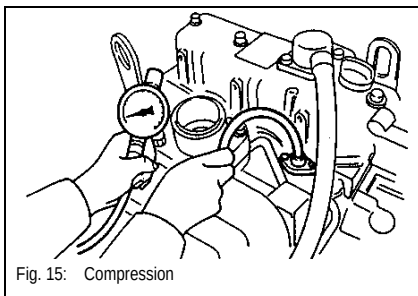


Fig. 15: Compression

- ☞ Clean the engine
- ☞ Close the cock on the fuel filter
- ☞ Remove the injection lines and the injection nozzles
- ☞ Set the fuel injection pump to zero delivery (remove the plug for the cutoff solenoid)
- ☞ Turn the engine
- ☞ Mount the compression gauge on the cylinder you want to measure
- ☞ Turn the engine with the starter and read the pressure off the pressure gauge
 - ➔ Specified value: 34.3 ± 1 bar (497 ± 14.5 psi) at 250 rpm
 - ➔ Limit value: 27.5 ± 1 bar (399 ± 14.5 psi) at 250 rpm

4.10 Checking the coolant thermostat

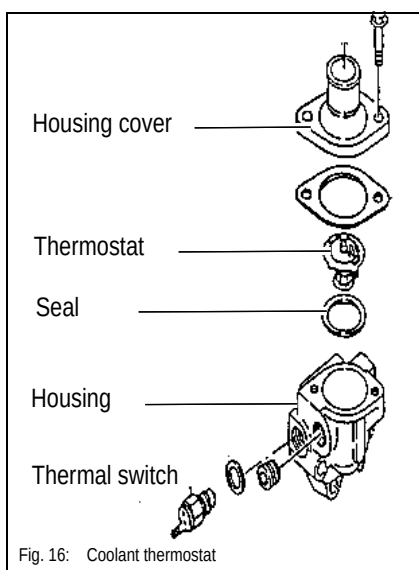
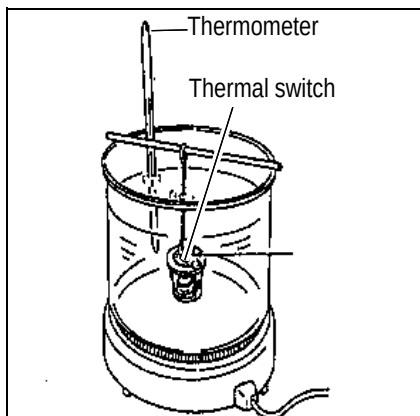


Fig. 16: Coolant thermostat

- ☞ Drain the coolant
- ☞ Remove the thermostat
 - ➔ The thermostat is located on the water pump
 - see 3TNV76-SNS2 engine overview on page 4-1



- ☞ Warm up the thermostat in a container with water
- ☞ Check whether the thermostat opens at the specified temperature (check with a temperature gauge)
- ☞ Thermostat opening temperature: 69.5 – 72.5 °C (157.1 - 162.5°F)

4.11 Checking the thermal switch

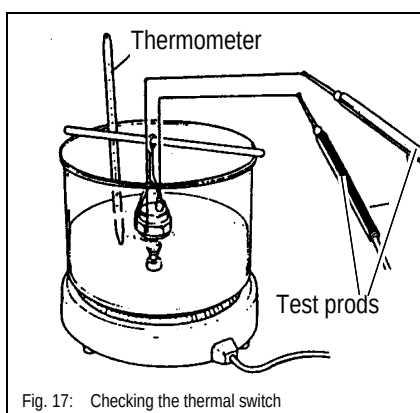


Fig. 17: Checking the thermal switch

- ☞ Drain the coolant
- ☞ Remove the thermal switch
- ☞ Warm up the thermal switch in a container with antifreeze or oil
- ☞ Measure the resistance of the thermal switch as shown by means of an ohmmeter.
- ☞ The switch must allow the coolant to pass at a temperature of 107 – 113 °C (224.6 - 235.4°F).

4.12 Oil pressure switch

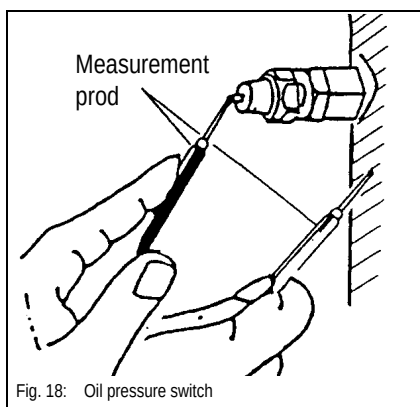


Fig. 18: Oil pressure switch

- ☞ Remove the cable connection from the oil pressure switch (in the area of the cutoff solenoid)
- ☞ Start the engine, check for correct idling speed
- ☞ Measure the resistance of the oil pressure switch as shown by means of an ohmmeter.
- ☞ Oil pressure switch OK: infinite resistance
- ☞ The oil pressure switch is defective if the oil can pass



4.13 Checking the coolant circuit

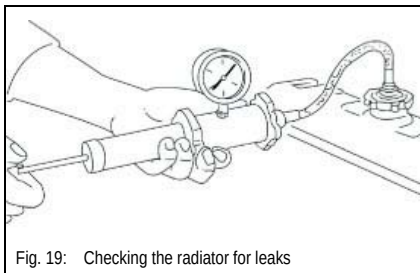


Fig. 19: Checking the radiator for leaks

Leakage check

- ☞ Fill up the radiator completely
- ☞ Mount an adapter on the radiator as shown
- ☞ Increase the pressure in the cooling system by means of a hand pump to about 1 bar (14.5 psi)
 - ➡ Check the lines and the connections for leaks if the pressure drops at the pressure gauge

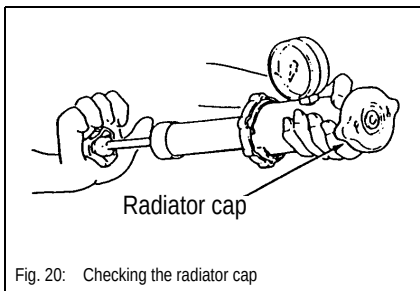


Fig. 20: Checking the radiator cap

Checking the radiator cap

- ☞ Remove the radiator cap and mount it onto the adapter as shown
- ☞ Increase the pressure to about 1 bar / 14.5 psi (stamped onto the radiator cap) with the hand pump
 - ➡ The radiator cap must open

4.14 Engine trouble

Problem	Possible causes
Engine does not start or is not easy to start	Wrong SAE grade of engine lubrication oil
	Fuel grade does not comply with specifications
	Defective or flat battery
	Loose or oxidised cable connections in starter circuit
	Defective starter, or pinion does not engage
	Wrong valve tip clearance
	Defective fuel injector
	Defective starting relay
	Defective glow plug
	Defective solenoid switch
	Cutoff solenoid does not attract
	Cutoff solenoid without current
	High pressure created immediately in the hydraulic system
Engine starts, but does not run smoothly or faultless	Air in fuel system
	Fuel grade does not comply with specifications
	Wrong valve tip clearance
	Injection line leaks
	Defective fuel injector
	Air in fuel system



Problem	Possible causes
Engine overheats. Temperature warning system responds	Oil level too low
	Oil level too high
	Dirty air filter
	Dirty cooler fins
	Defective fan, torn or loose V-belt
	Resistance in cooling system too high, flow capacity too low
	Defective fuel injector
	Not enough coolant
	Defective water pump
Insufficient engine output	Oil level too high
	Fuel grade does not comply with specifications
	Dirty air filter
	Defective air filter maintenance switch or gauge
	Wrong valve tip clearance
	Injection line leaks
	Defective fuel injector
	Air in fuel system
Engine does not run on all cylinders	Injection line leaks
	Defective fuel injector
Insufficient or no engine oil pressure	Oil level too low
	Machine inclination too high (admissible permanent inclination of the engine is 25°)
	Wrong SAE grade of engine lubrication oil
Engine oil consumption too high	Oil level too high
	Machine inclination too high (admissible permanent inclination of the engine is 25°)
	Wrong oil
	Worn oil scraper rings



Problem		Possible causes
Engine smoke	Blue	Oil level too high
		Machine inclination too high (admissible permanent inclination of the engine is 25°)
		Engine oil combustion (defective cylinder-head gasket)
		Worn oil scraper rings
	White	Engine starting temperature too low
		Fuel grade does not comply with specifications
		Defective fuel injector
		Coolant combustion (defective cylinder-head gasket)
		Extreme misalignment of injection time
	Black	Dirty air filter
		Defective air filter maintenance switch or gauge
		Wrong valve tip clearance
		Defective fuel injector (drips)
		Wrong fuel injection pump setting
		Dirty injection nozzle

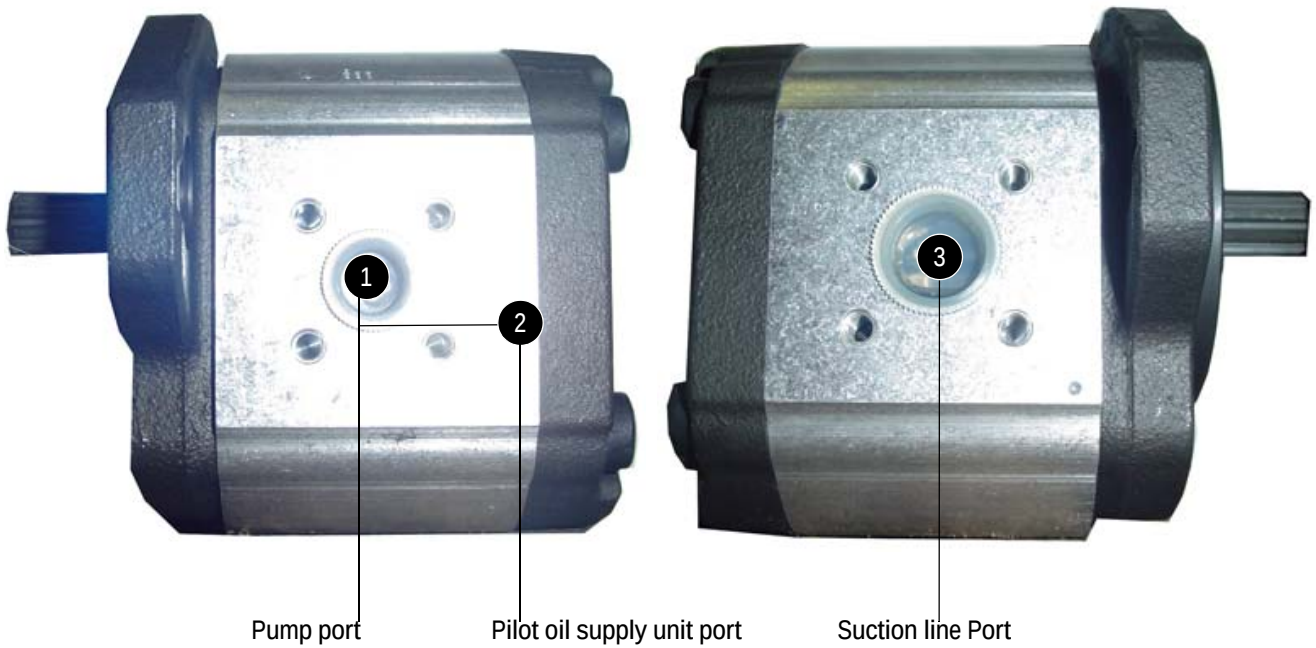
Hydraulic system



5 Hydraulic system

The hydraulic system has load sensing (LS) control.

5.1 Gear pump AZPS-11-014RRR20MB



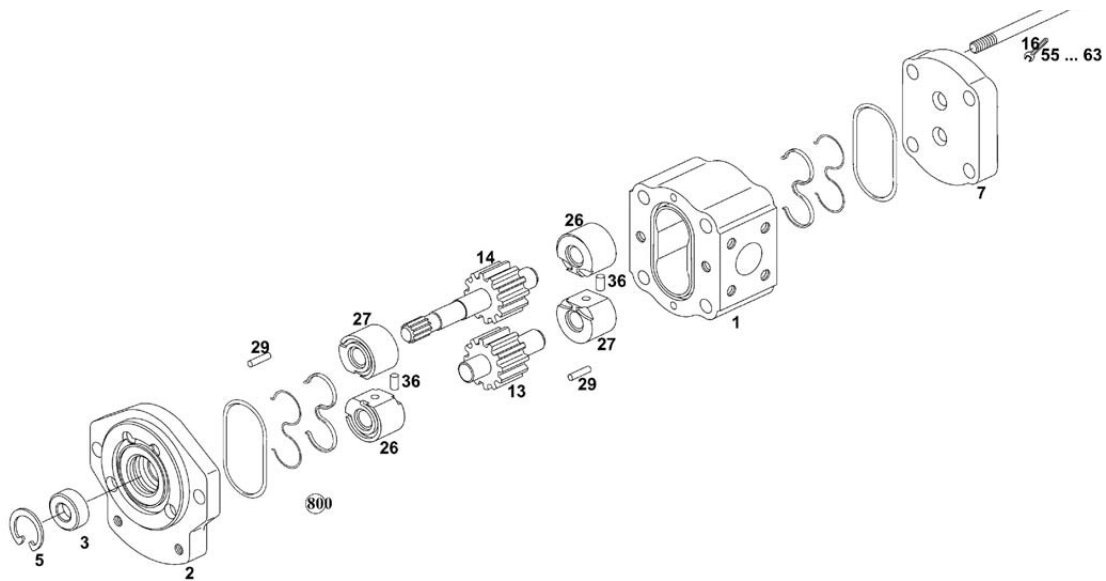
Pos.	Description
1	Pump pressure line port
2	Pilot oil supply unit port
3	Suction line Port

Hydraulic system

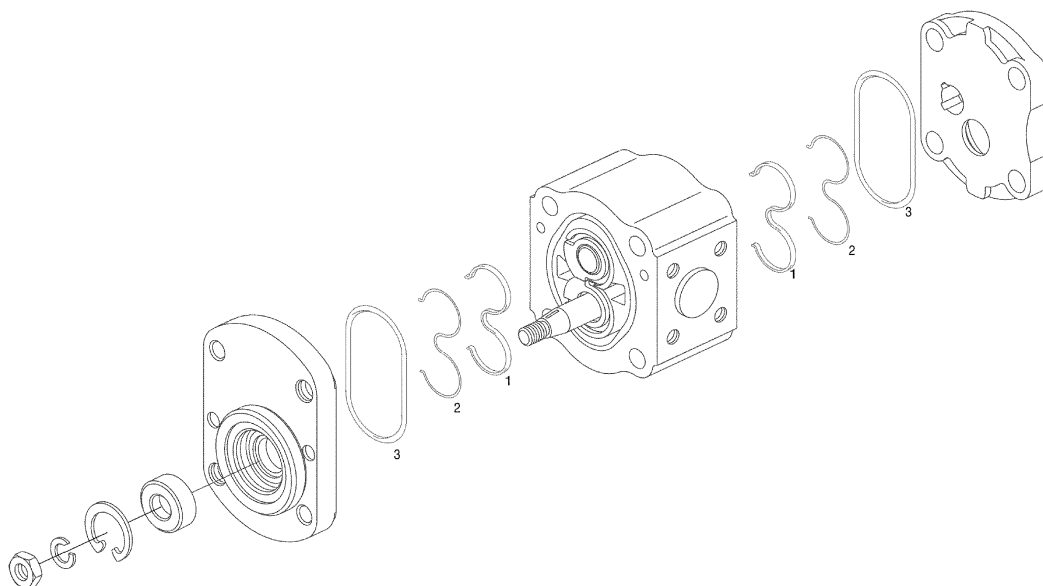


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Pump unit: exploded view



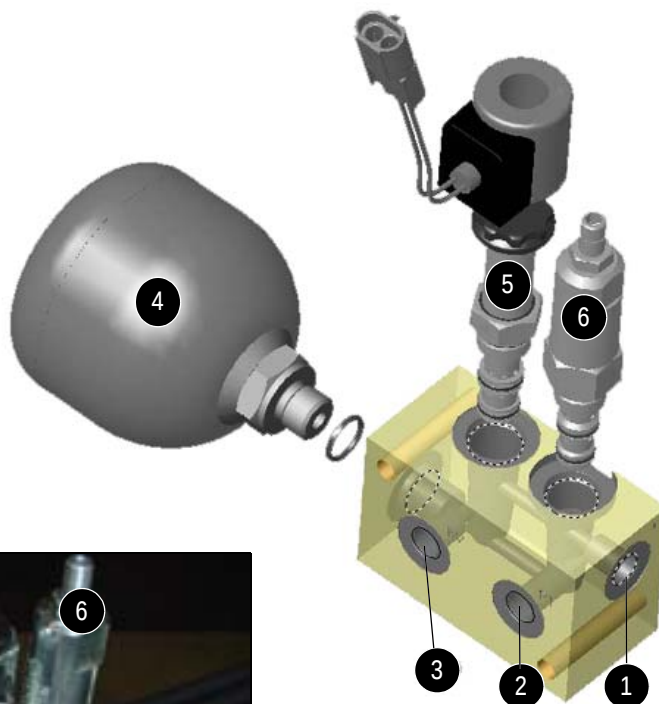
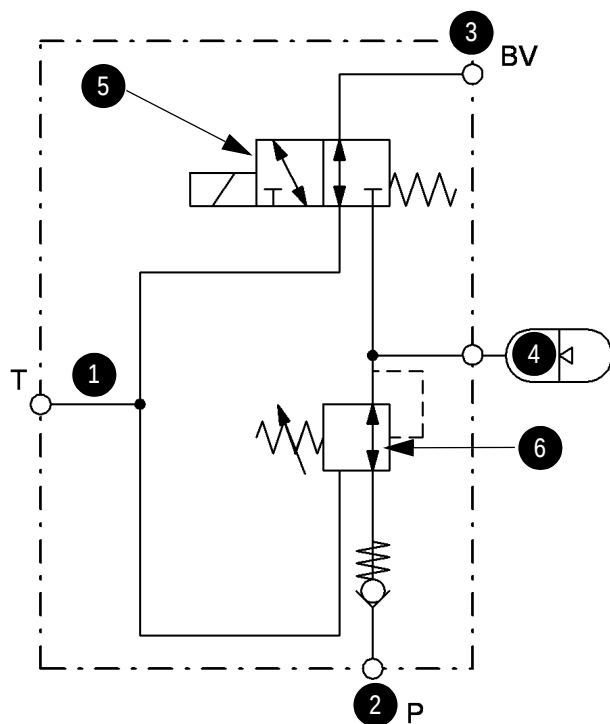
Pos.	Description	Pos.	Description
1	Pump housing	14	Gear
2	Bearing cover	16	Torx cheese-head screw 55-63 Nm (41-46 lbf ft)
3	Rotary shaft lip seal (radial)	26	Bearing bushing
5	Circlip 30x1.2 DIN 472	27	Bearing bushing
7	Filler cap	29	Parallel pin
13	Gear	36	Parallel pin



800 sealing kit

Pos.	Description
1	Pump pressure line port
2	Pilot oil supply unit port
3	Suction line Port

Pilot oil supply unit

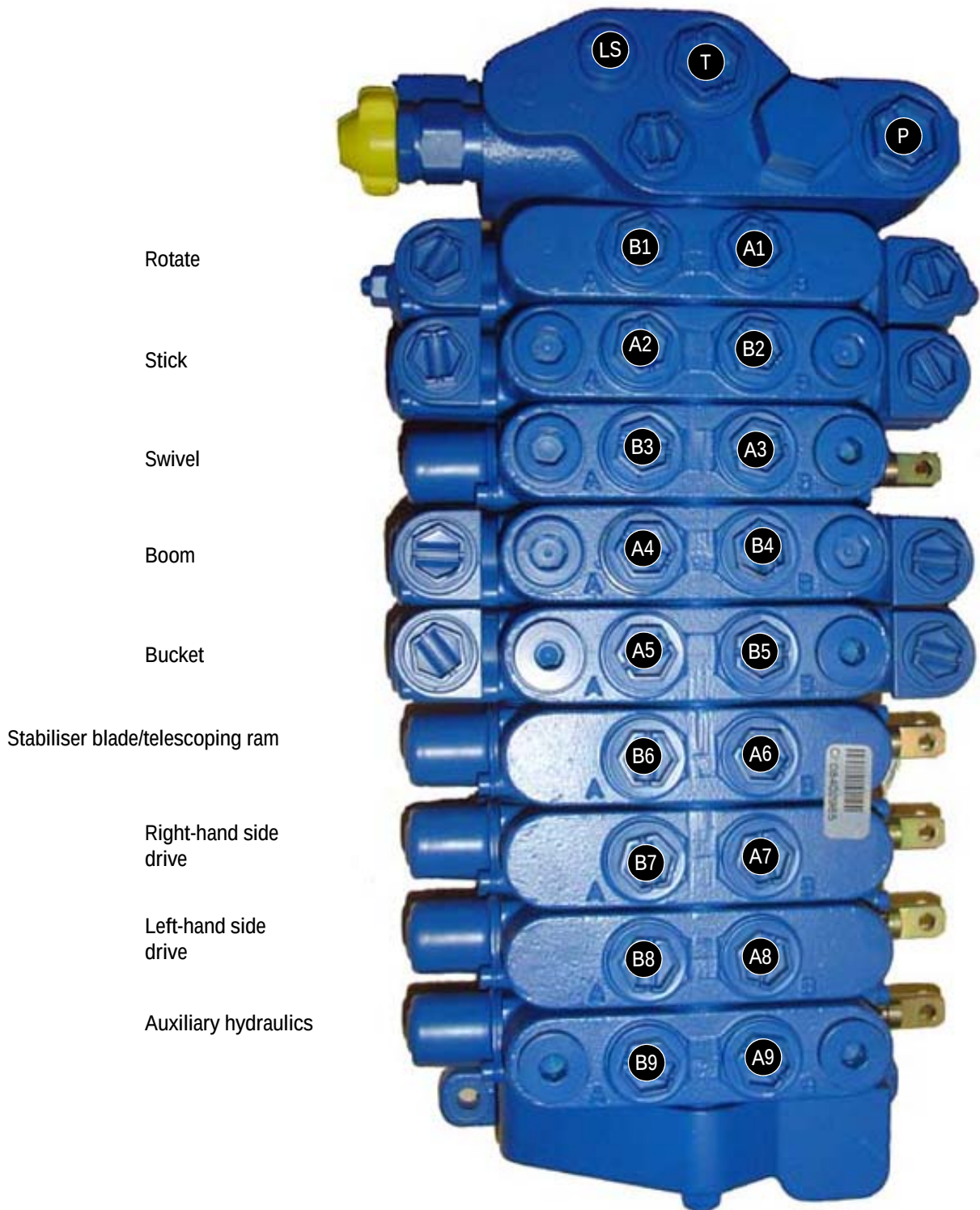


Pos.	Description	Port
1	Tank line	T
2	Pump supply	P
3	Pilot valve supply	BV
4	Accumulator	
5	Solenoid valve for safety valve	
6	Pressure reducing valve	



5.2 Main valve block SX 10

Ports



Legend

Main control lines

Port	Legend
A1, B1	Rotate
A2, B2	Stick
A3, B3	Swivel
A4, B4	Boom
A5, B5	Bucket
A6, B6	Stabiliser blade/telescoping ram
A7, B7	Travelling drive (right)
A8, B8	Travelling drive (left)
A9, B9	Auxiliary hydraulics

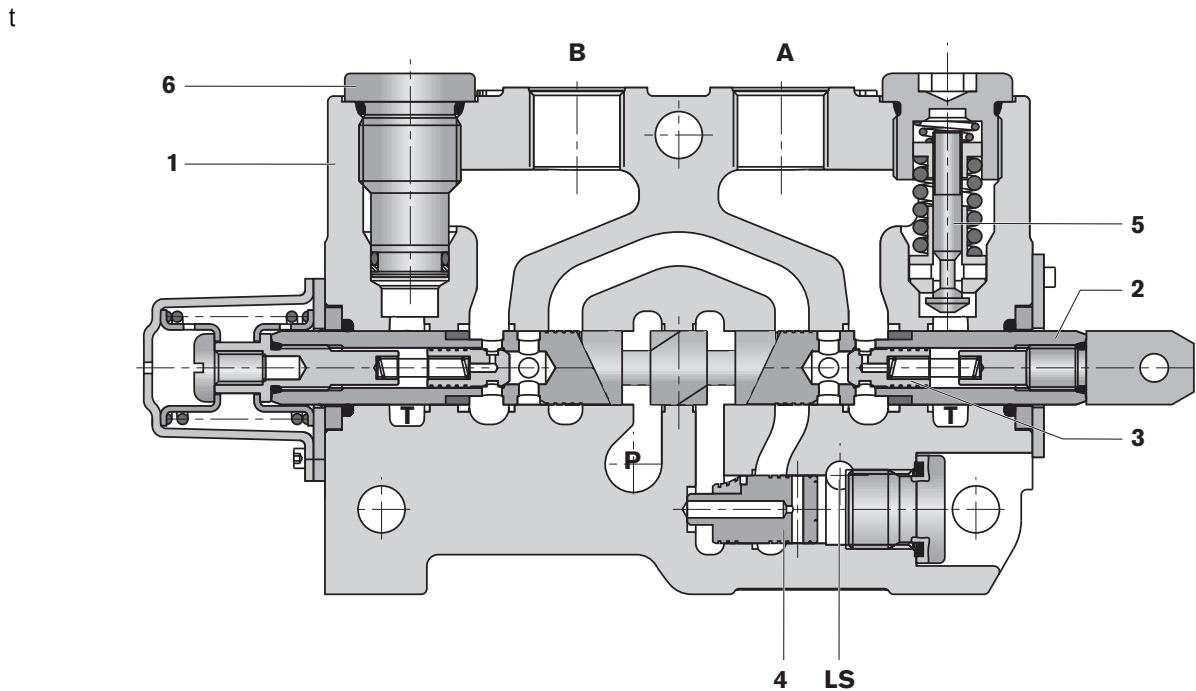
Pump/tank lines

Port	Legend
P	Pump port
T	Tank line
LS	Load Sensing

SX 10 features

- Distributes the volumetric flow as required among the control axes regardless of pressure and available volumetric flow
- No shuttle valve required
- Maximum system pressure is limited by the LS pressure limiting valve
- System secured by LS pressure limiting valve and pressure limiting valves on secondary side

Sectional view



Pos.	Description	Pos.	Description
1	Housing	6	Screw plug
2	Main piston	P	Pump
3	Non-return valve	A,B	Consumer
4	Pressure compensator	T	Tank
5	Directly actuated pressure limiting valve with feed function	LS	Load Sensing

Functional description

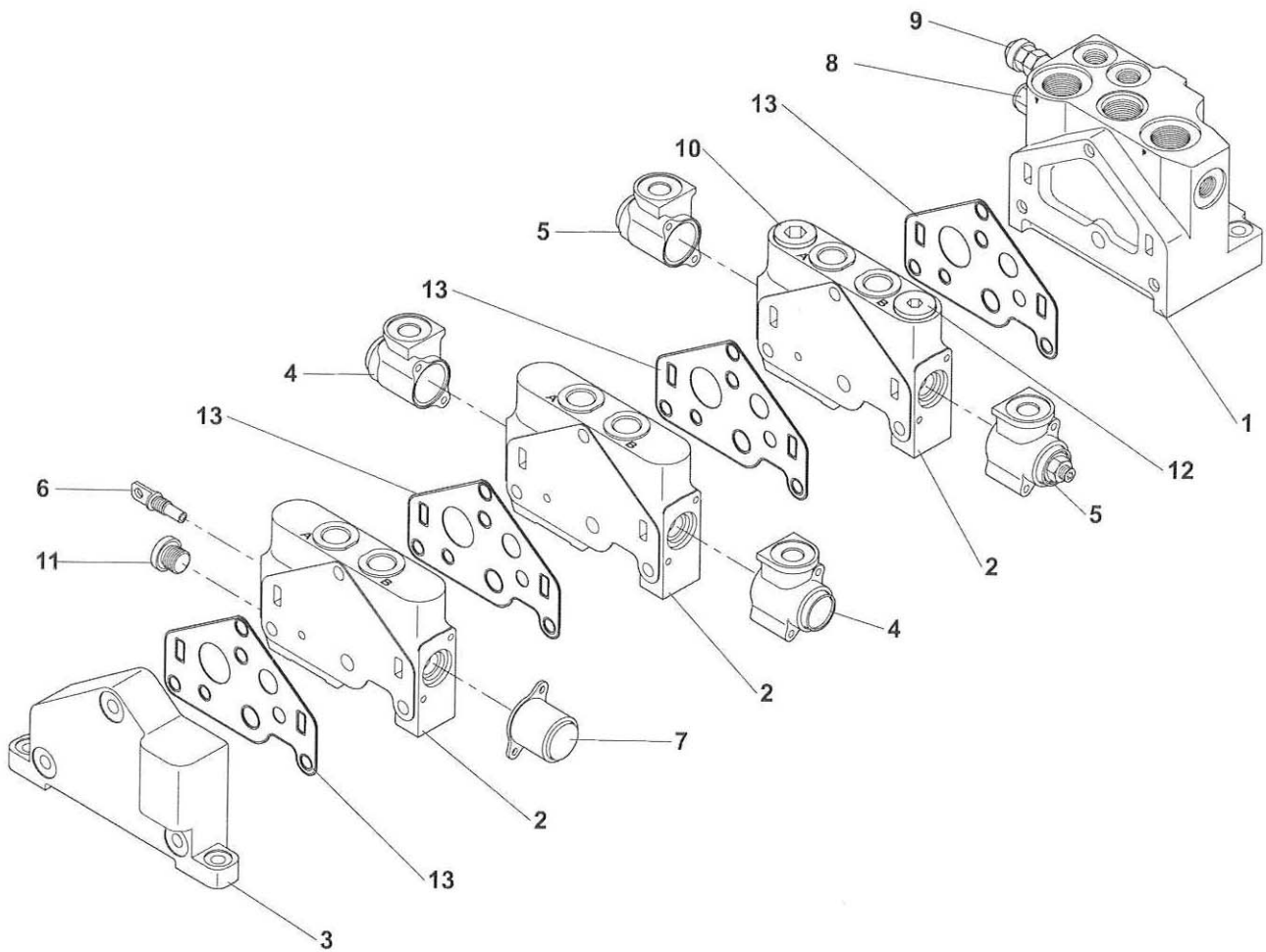
The SX 10 control valve consists of an input element, directional control valve elements and a final element.

The input element has a fastening and the line ports P, T, LS, M.

The input element consists of all the components required for the system function: a volumetric flow control valve for reducing the load on the LS line in a controlled manner, an LS pressure limiting valve for limiting the maximum pressure on the system and a pressure compensator.

Each directional control element of the SX control valve consists of a housing (1), a piston (2), two load retaining valves (3) integrated in the piston valve, a pressure compensator (4), bores for directly controlled pressure limiting valves with feed function (5) and feed valves or screw plugs (6).

The final element has two fastenings.



Possible configurations

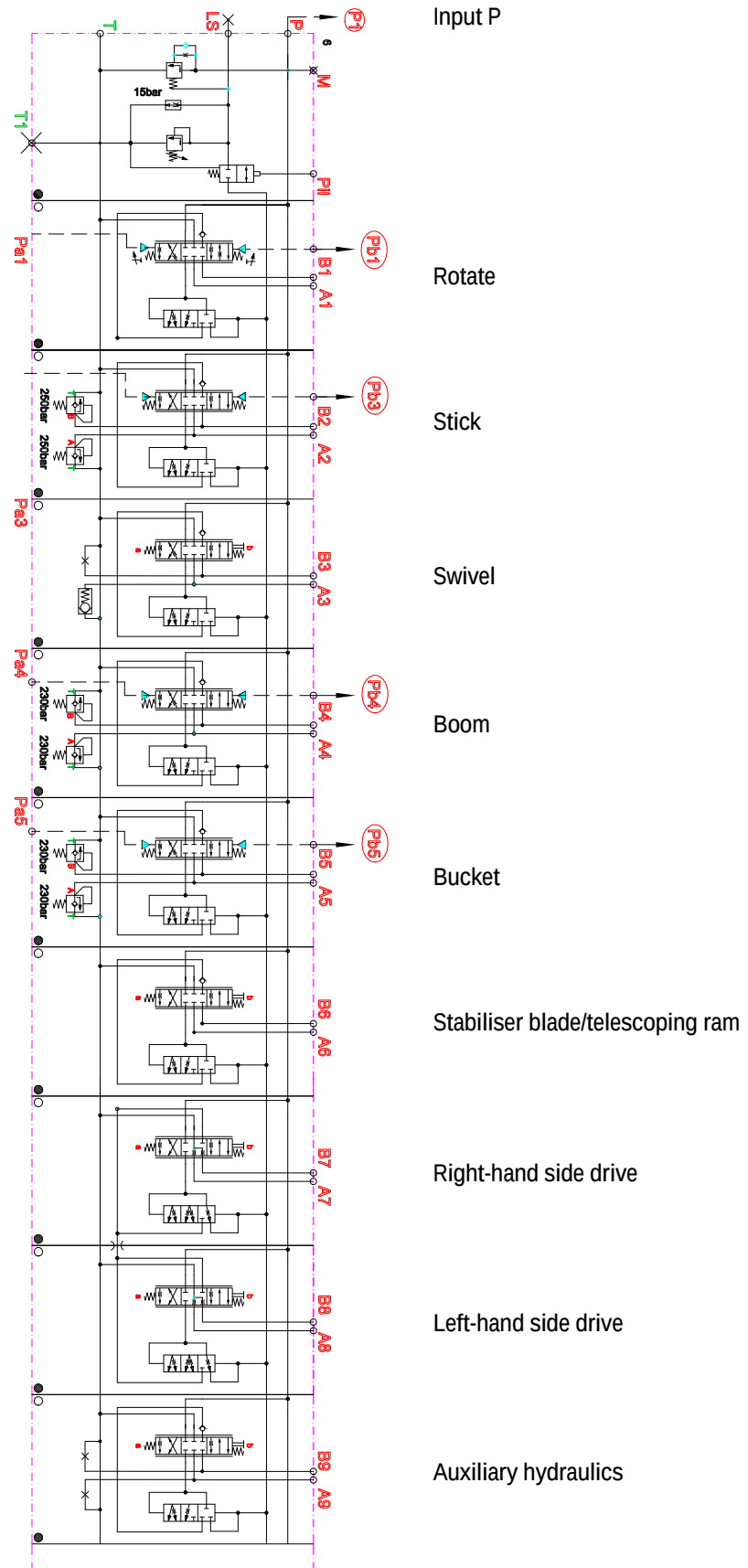
Pos.	Description	Pos.	Description
1	Input element	8	LS volumetric flow control valve
2	Directional control valve element	9	LS pressure limiting valve
3	End plate	10	Secondary-side pressure limiting valve
4	Cover for hydraulic control H200	11	Screw plug for section pressure compensator
5	Cover for hydraulic control H230	12	Screw plug
6	Mechanical actuation with latch type Z1	13	Sealing plate
7	Spring reset device type A2		

Hydraulic system



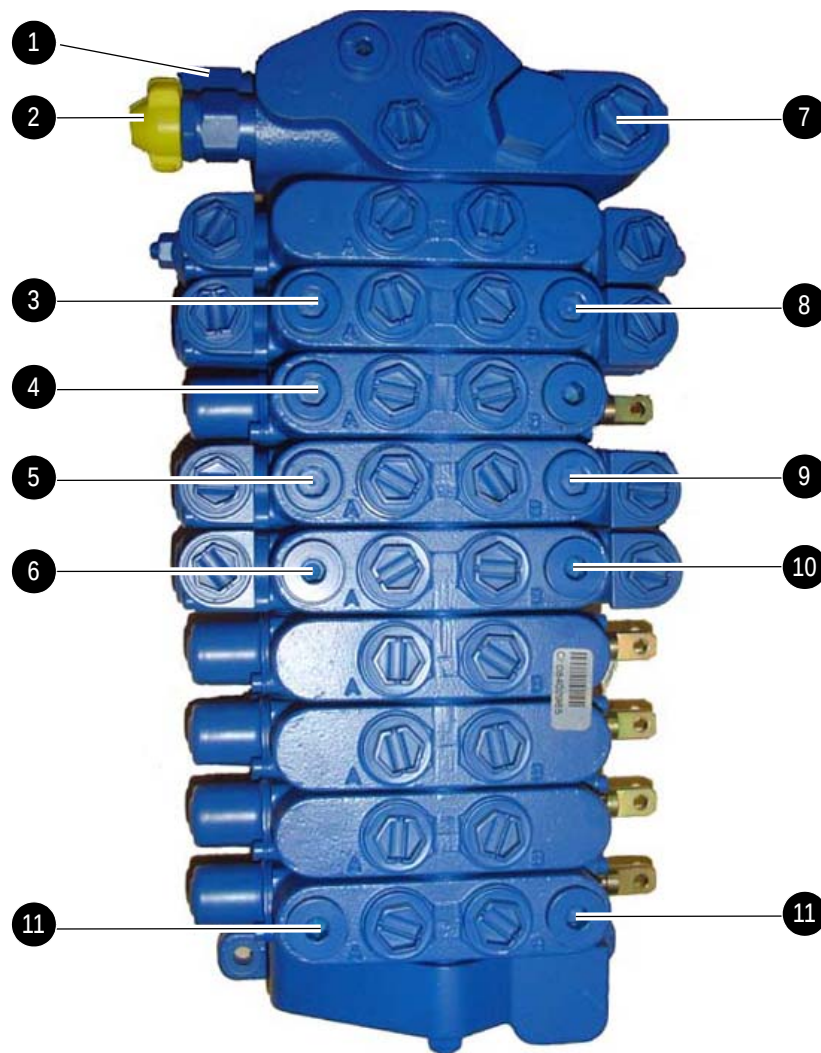
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Main valve block diagram





Pressure limiting valves



Pos.	Description
1	Load sensing volumetric flow control valve
2	Load sensing pressure limiting valve
3	Secondary pressure limiting valve (stick base side)
4	Secondary pressure limiting valve for rod side slewing
5	Secondary pressure limiting valve (boom base side)
6	Secondary pressure limiting valve (bucket base side)
7	Input pump P
8	Secondary pressure limiting valve (stick rod side)
9	Secondary pressure limiting valve (boom rod side)
10	Secondary pressure limiting valve (bucket rod side)
11	Plug



Load sensing

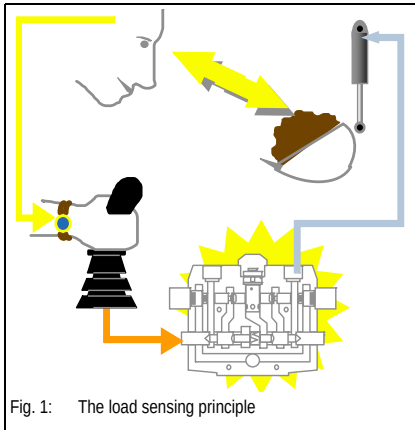


Fig. 1: The load sensing principle

How it works

Load sensing involves a load-pressure independent flow distribution or, in other words, a hydraulic control system with pressure and volumetric flow adaptation to the current requirements of one or more consumers. The LS system with the fixed displacement pump is designed as an Open Centre system (OC system) where the proportional directional valve connects the pump pressure port with the tank when it is in the centre position. Given the fact that the fixed displacement pump cannot be controlled, the input pressure compensator is in charge of controlling the oil flow (valve control). It maintains a specified differential pressure at a constant level via a measurement orifice. In doing so, the control and measurement orifices are connected in parallel.

5.3 Auxiliary hydraulics connections

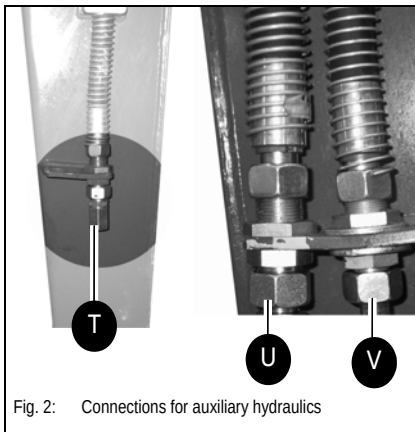


Fig. 2: Connections for auxiliary hydraulics

**Important!**

Follow the instructions in the attachment manufacturer's Operator's Manual for connecting the auxiliary hydraulics to attachments.

Standard connections:

Port	Stick (left)	Stick (right)
T	Pressure line bulkhead coupling 1/2"	
V		Pressure line bulkhead coupling 1/2"
U		Unpressurised reflux line (hammer) bulkhead coupling 1/2"

Quick coupler options:

Port	Stick (left)	Stick (right)
T	Pressure line quick coupler 12.5 1/2"	
V		Pressure line quick coupler ISO De 12.5 1/2"
U		Unpressurised reflux line (hammer) quick coupler 1/2"

Couplings according to ISO 16028

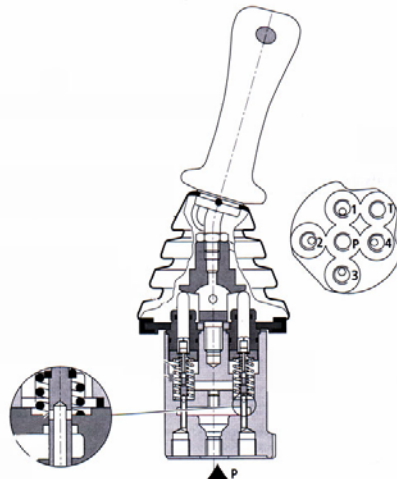
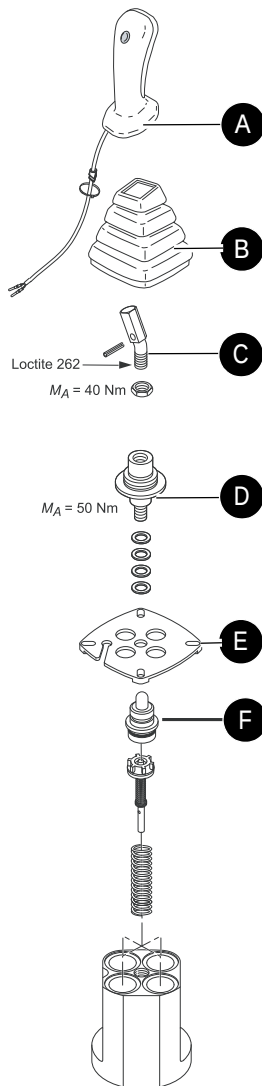
Couplings cannot be coupled under pressure!



5.4 Pilot valves

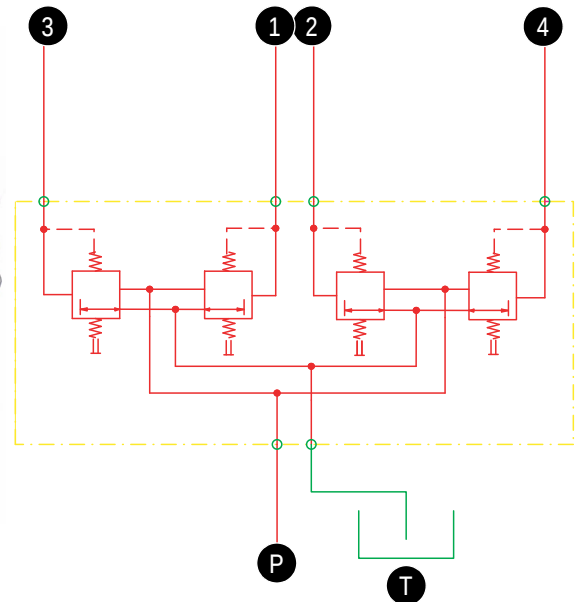
Joystick

- Pilot valve for bucket, boom, stick and rotation
- Consists of a lever and four pressure reducing valves



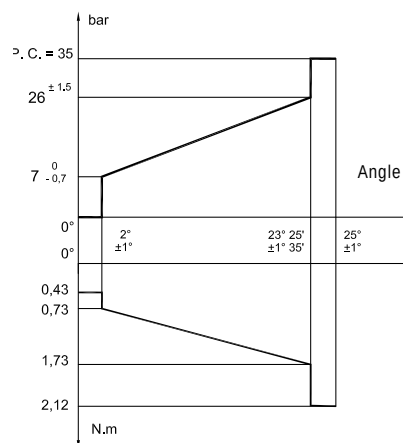
Set of tappets = sealing kit
Article no.: 1000021259

Numbering for right-hand side joystick.
Left-hand side joystick 2 – 4 – 3 – 1

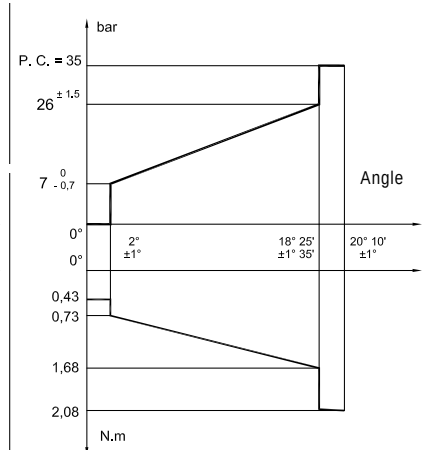


Joystick characteristics

Pressure Ports 1 – 3



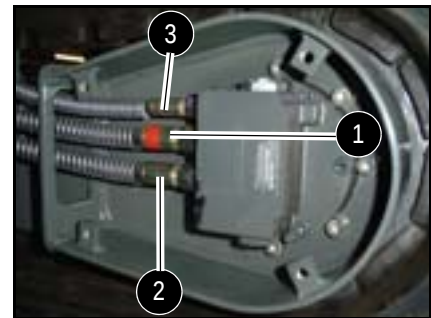
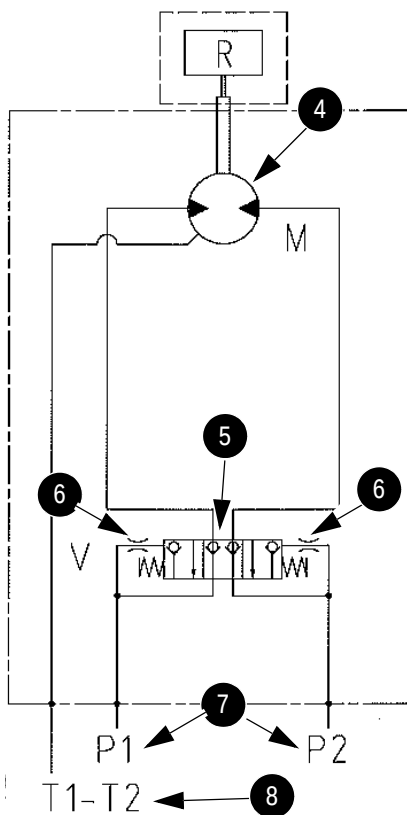
Ports 2 – 4



Pos.	Description
A	Control lever
B	Rubber collar
C	Linkage
D	Universal joint
E	Guide plate
F	Tappet

Pos.	Description (left-hand side joystick)	Description (right-hand side joystick)
1	Stick extension control	Boom ram extension control
2	Left-hand side rotation control	Bucket ram extension control
3	Stick retraction control	Boom ram retraction control
4	Right-hand side rotation control	Bucket ram retraction control
P	Pump line	Pump line
T	Tank line	Tank line

5.5 Travelling drive



Pos.	Description
1	Drive port (-> swivel joint 3/4)
2	Drive port (-> swivel joint 2/5)
3	Leak oil port (-> swivel joint 8)
4	Engine
5	Brake valve
6	Throttle orifice
7	Pump input/output
8	Tank/leak oil line

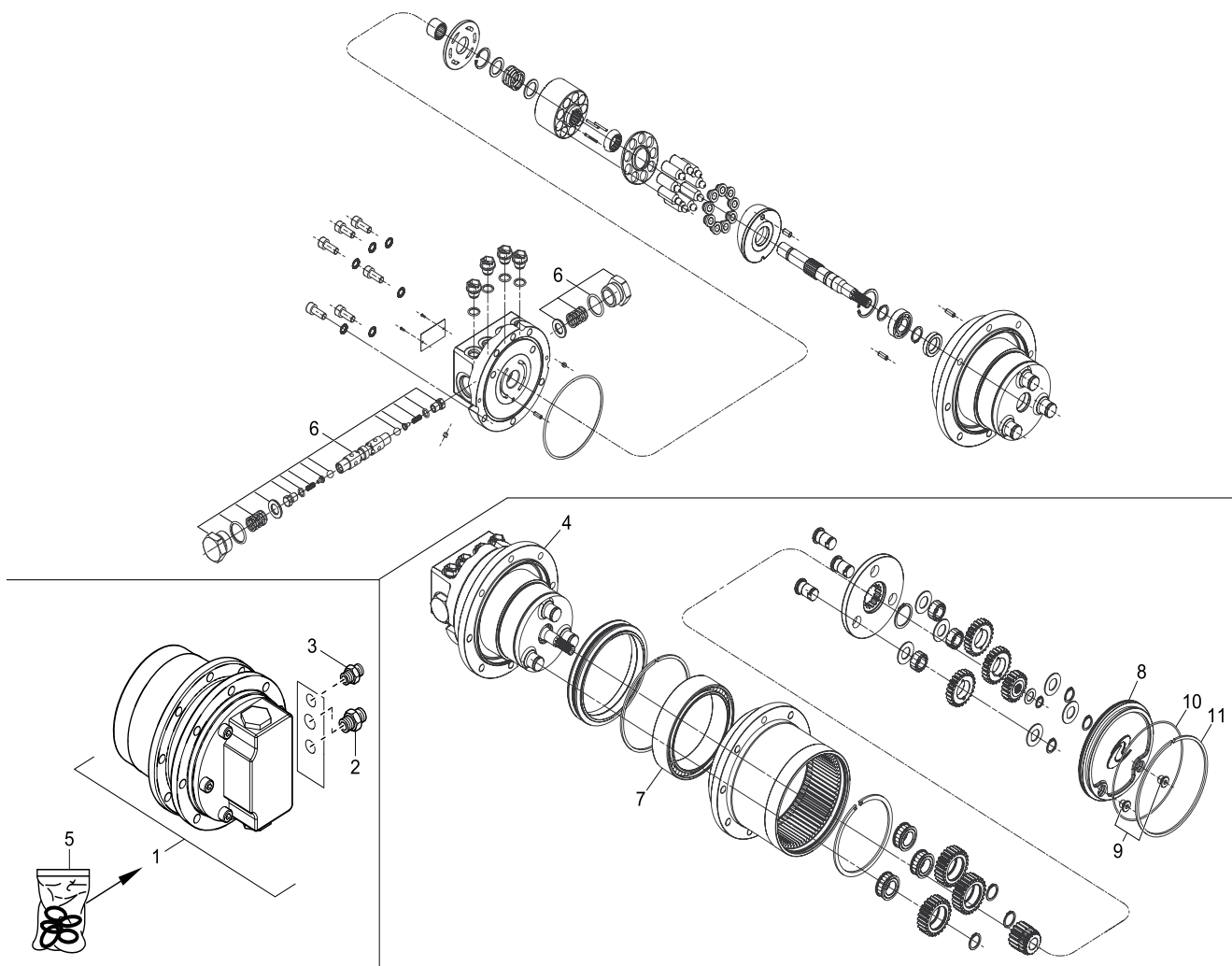
Function

Moving off

If high pressure is applied to a drive, brake valve (5) is slowly actuated via throttle orifice (6) and the oil flows to motor (4) which starts turning.

Stopping

Releasing the drive pedal reduces the load on both ports. The brake valve (5) is throttled (6) and returns to its home position, and prevents the hydraulic motor (4) from stopping abruptly by closing slowly. With the brake valve in neutral position, the circuit is interrupted to the motor, which can no longer turn. The excavator stops.

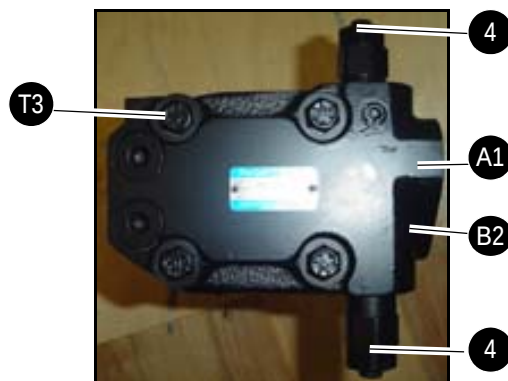
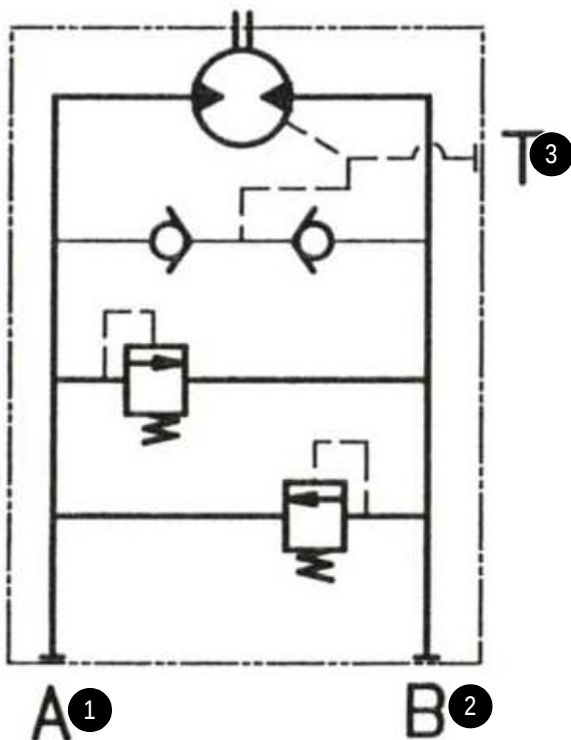


Pos.	Description
1	Travelling drive
2	Screw connection
3	Screw connection
4	Hydraulic motor
5	Hydraulic motor sealing kit
6	Brake valve
7	Bearing
8	Cover
9	Screw connection
10	O-ring
11	Snap ring



5.6 Swivel unit

The swivel unit is a low-speed gerotor motor.



Pos.	Description
1	Right-hand side rotation port (-> main valve block)
2	Left-hand side rotation port (-> main valve block)
3	Tank line (-> manifold)
4	Secondary pressure limiting valves

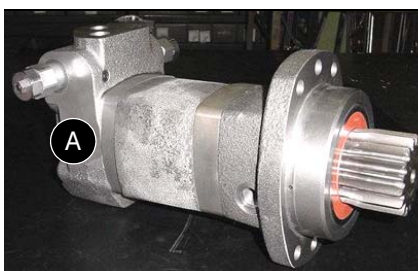


Fig. 3: Gerotor

Replacing the seals



Important!

Remove or dismantle only the components of the gear motor that are required under all circumstances!

- ➔ Apply utmost care to springs (16) and pins (18) as you remove the valve housing – see [chapter Swivel unit overview](#) on page 5-18!
- ➔ Stop the motor so that valve housing (A) shows upwards



Fig. 4: Component parts

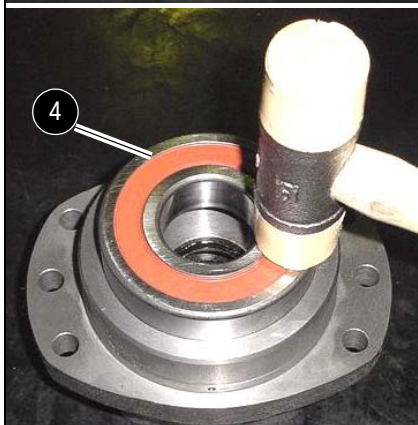
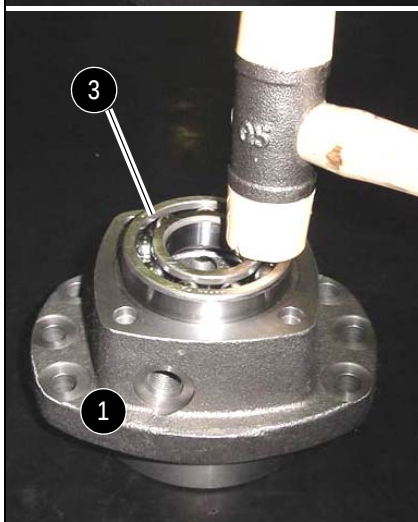


Fig. 5: Ball bearing

- ☞ Check all contact surfaces
- ☞ Replace all parts with traces of scratches, burrs or damage, otherwise this may result in leaks
- ☞ Clean all metal parts with solvent and dry them with compressed air
- ☞ Clean only with a lint-free cloth
- ☞ Do not grind any parts



Important!

Replace old seals by new ones and apply petroleum or vaseline to them before assembly.

Insert X-ring (6) in bearing housing (1).

Install both ball bearings (3) and (4) in bearing housing (1)

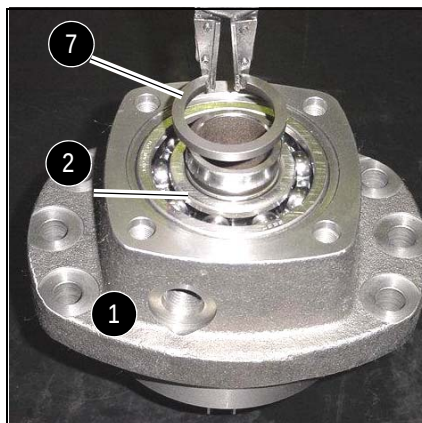
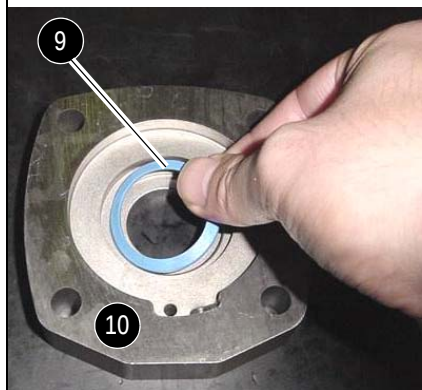


Fig. 6: Circlip

Once pinion (2) is installed in bearing housing (1), insert snap ring (7)



Install shaft face seal (9) in wear plate (10)

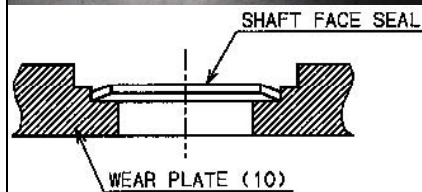


Fig. 7: Drive

Place O-ring (8) in bearing housing (1). Mount cardan shaft (20).
Insert both O-rings (8) and (23) in wear plate (10).

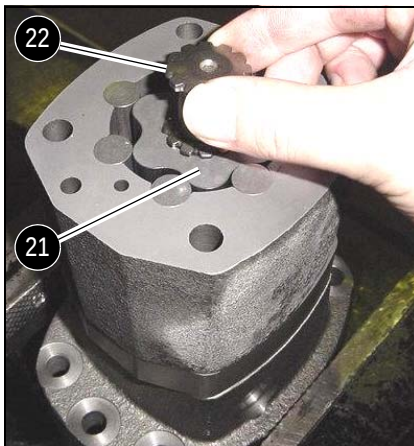
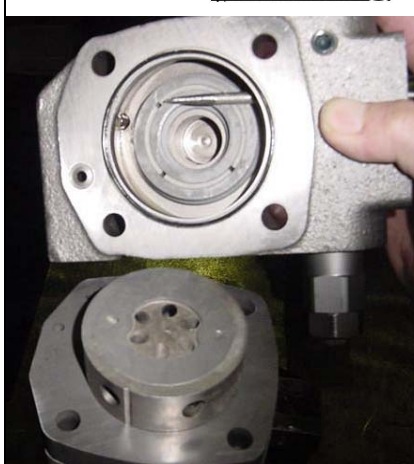
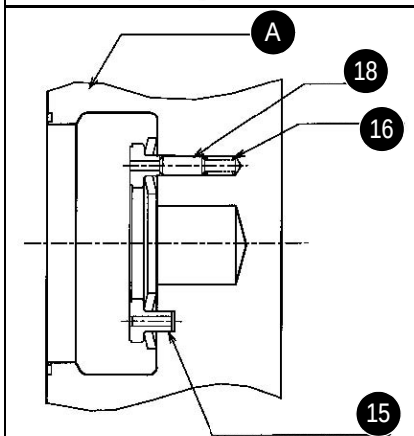
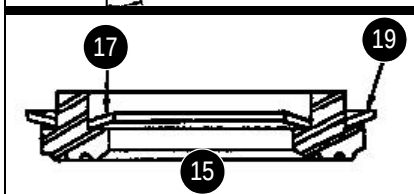
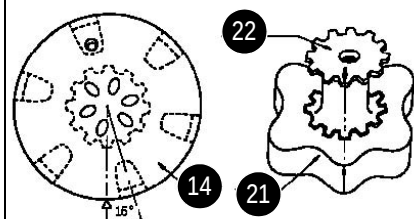


Fig. 8: Drive



Important!

Make sure the parts are in their exact positions when assembling the Gerotor.

- Mount the Geroler (21).
- Fit valve shaft (22).
- Insert O-ring (8) in valve plate (12), put the valve plate in place.



Important!

Mount valve shaft (22) and distributor valve (14) as shown!

- Align the tooth of valve shaft (22) with the outer tooth of the Geroler (21), mark the tooth on the distributor valve.
- Put the valve in place, align it 15° to the right with respect to the valve bore and mark the tooth of the distributor valve.



Caution!

The motor will turn in the other direction if the valve is not installed correctly.

Insert the inside sealing ring (17) and the outside sealing ring (19) in compensating ring (15).

Place both springs (16) and both pins (18) in the bores of valve housing (A).



Caution!

Make sure pins (18) are actually inserted in the bores of housing (A).

Insert compensating ring (15) in valve housing (A). Place O-rings (13) in the bores of the housing.

Insert a screwdriver through the housing head to apply pressure to the side of the compensating ring (15) for purposes of installation. Hold the ring in its position when connecting with the housing.

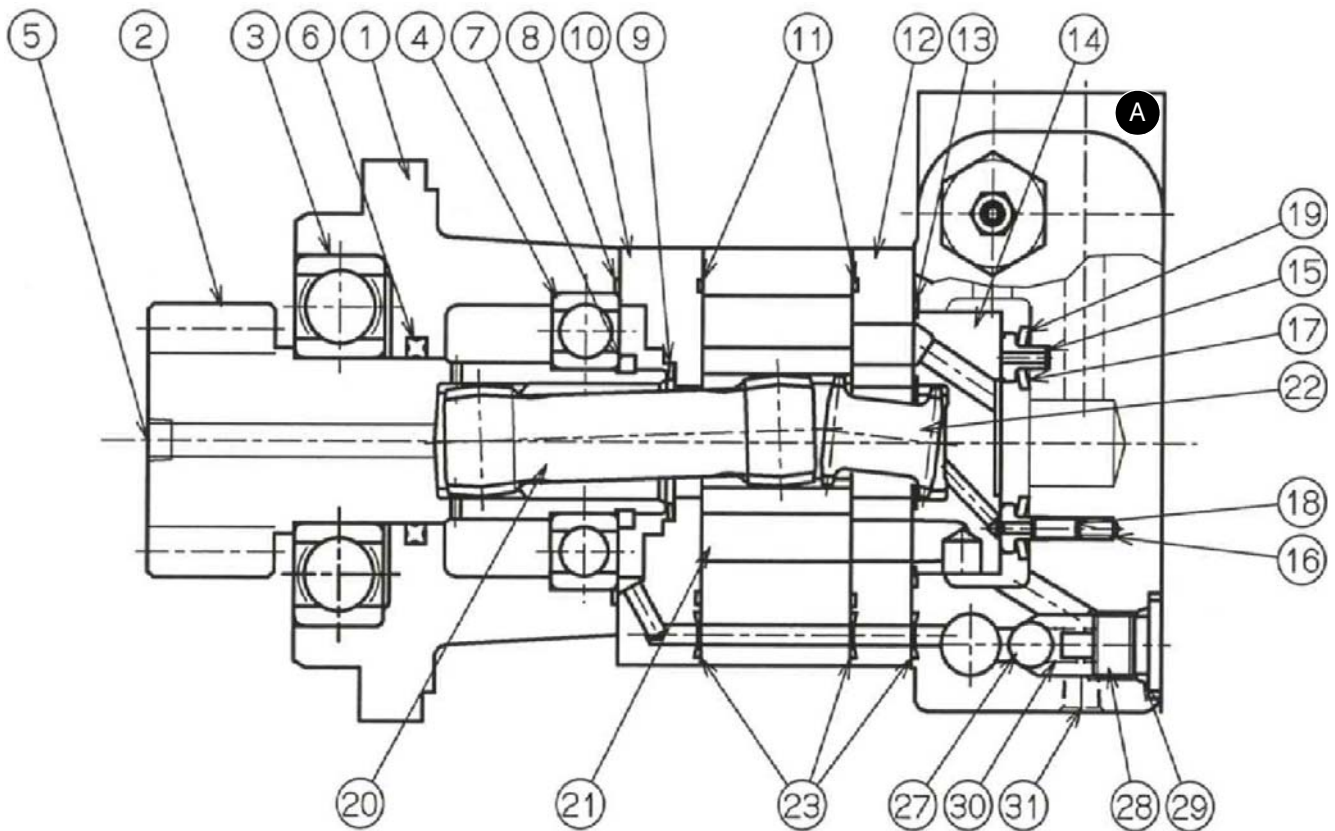
Finally, install the four hexagon bolts again alternately with a tightening torque of 53 Nm (39 lbf ft).

Hydraulic system



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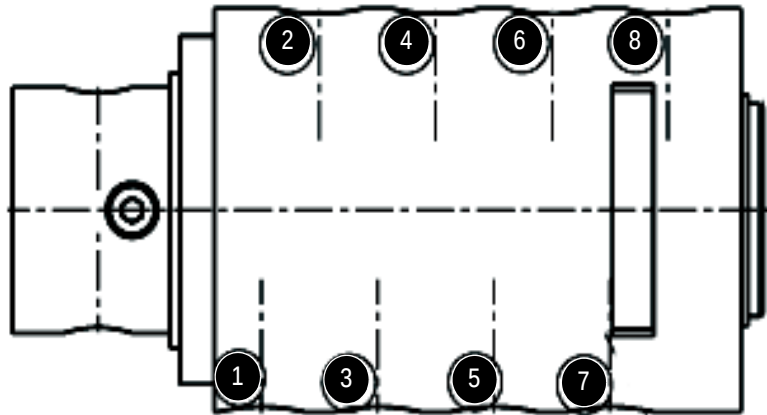
Swivel unit overview



Pos.	Description	Pos.	Description
1	Bearing housing	15	Compensating ring
2	Pinion	16	Spring
3	Ball bearing	17	Inside face seal
4	Ball bearing	18	Pin
5	Plug	19	Outside face seal
6	X ring	20	Cardan shaft
7	Snap ring	21	Geroler
8	O-ring	22	Valve shaft
9	Shaft face seal	23	O-ring
10	Wear plate	27	Steel ball
11	O-ring	28	Plug
12	Valve plate	29	O-ring
13	O-ring	30	Spring
14	Distributor valve	31	Plug
A	Valve housing		

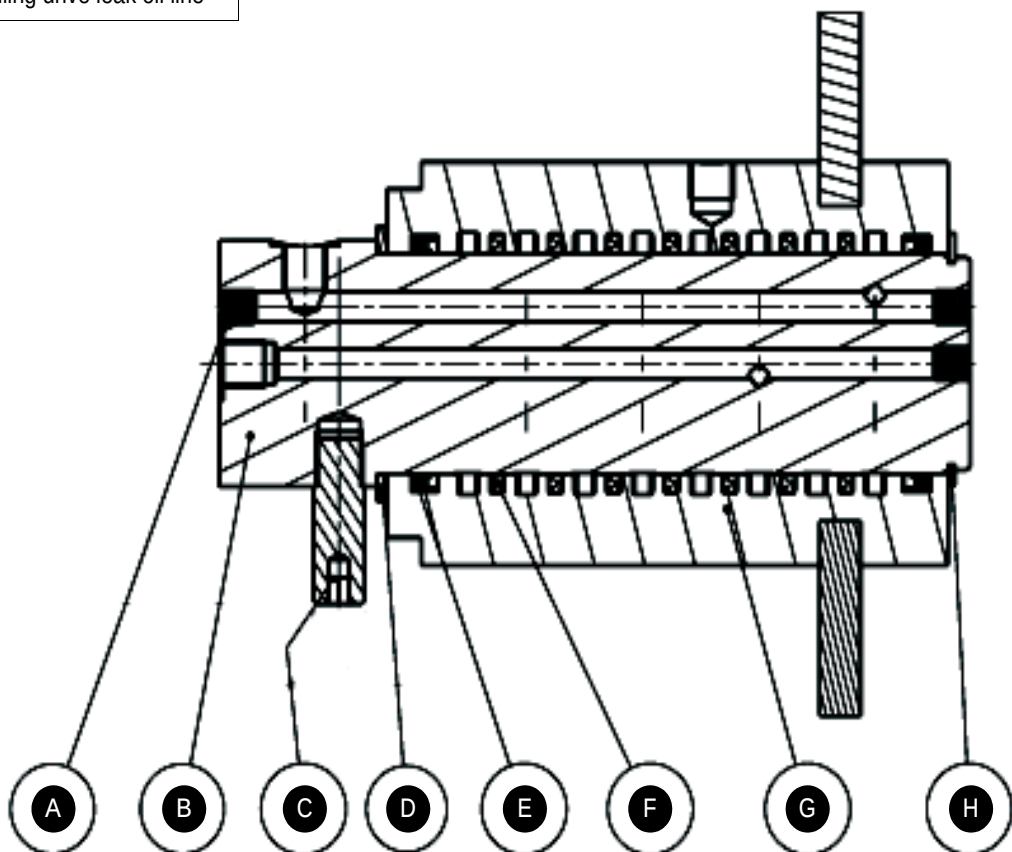


5.7 Swivel joint



Pos.	Port
1 and 7	Telescopic undercarriage ram
2 and 4	Right-hand side drive
3 and 5	Left-hand side drive
6 and 7	Stabiliser blade
8	Travelling drive leak oil line

Pos.	Description	Pos.	Description
A	Plug	E	Rotor seal
B	Rotor	F	Rotor seals
C	Driver	G	Housing
D	Ring	H	Circlip





Sealing

- ☞ Slacken circlip H on the lower side
- ☞ Pull the swivel joint apart
- ☞ Replace the sealing rings
- ☞ Push together again
- ☞ Insert the circlip back in again

5.8 Mechanical controls

The hammer pedals for slewing and the auxiliary hydraulics, the control pedals/levers and the levers for the stabiliser blade/telescoping are controlled mechanically.

Checking the auxiliary hydraulics controls

- ☞ Remove the insulating mat and the floor panel
– see chapter Removing the floor panel on page 1-14

Make sure the auxiliary hydraulics piston (actuated mechanically via steering rod B) can be fully moved in both directions. If this is not the case, this may cause the hydraulic system to overheat!

Correct setting of hammer pedal

- ☞ Actuate the pedal with your hand and in doing so, actuate the piston in the main valve block as far as it will go. If the pedal stop is limited by set screws A, screw in or unscrew the set screws.

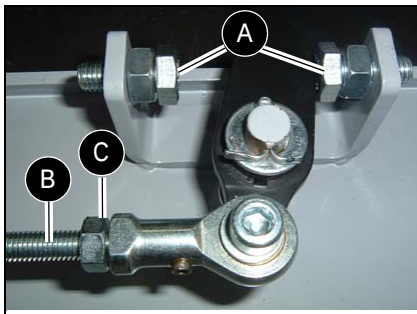


Fig. 9: Hammer pedal (auxiliary hydraulics)

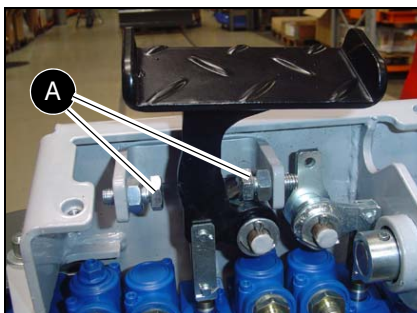


Fig. 10: Hammer pedal for slewing

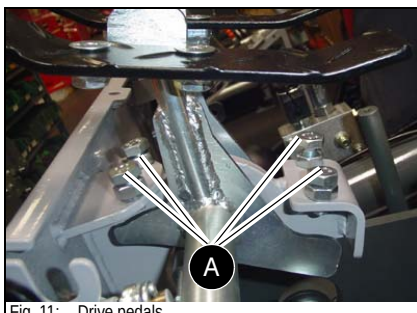


Fig. 11: Drive pedals



Caution!

Actuate the pedal only with your hand!

- ☞ Screw in set screw A as far as it will go with the pedal pressed.
- ☞ Then unscrew set screw A again by half a revolution (stop tolerance).
- ☞ Fasten set screw A with a locknut.
- ☞ Check the controls respond correctly.

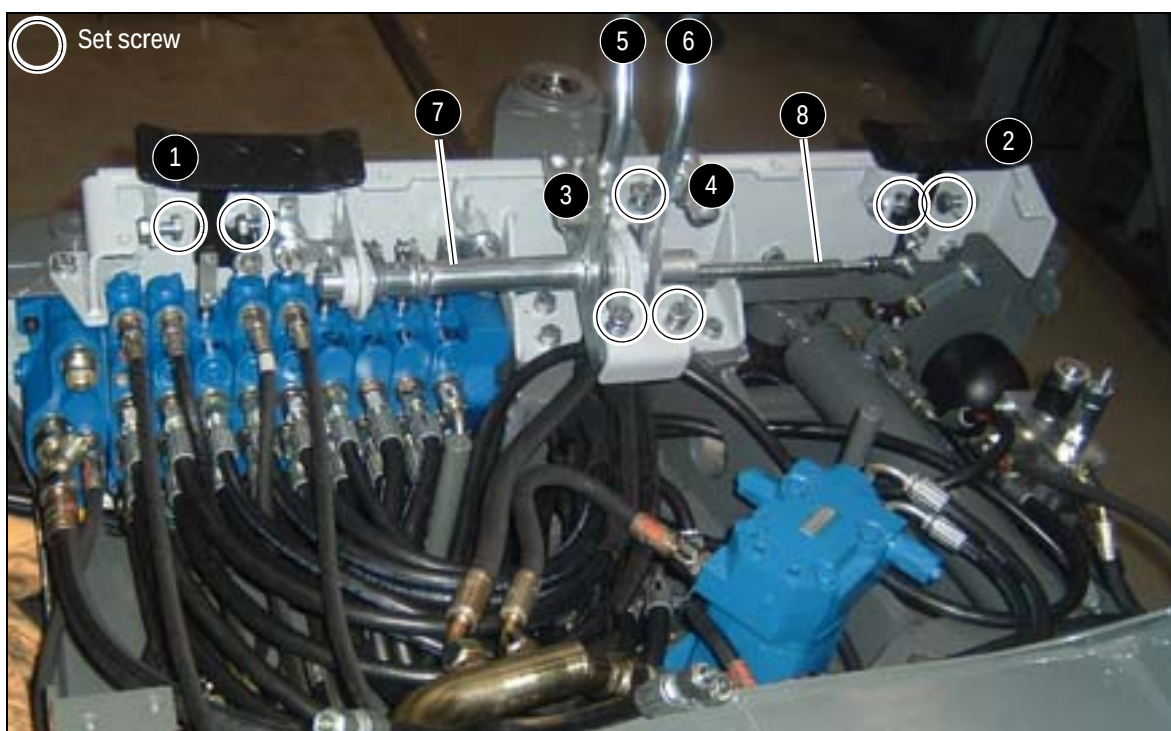
Carry out this setting for both set screws A.

Angle of auxiliary hydraulics hammer pedal

- ☞ Slacken locknut C on steering rod B until you can counter the pedal in horizontal position.

- The pedal must have no contact with the insulating mat!

The slewing and drive pedals are set in the same manner as the auxiliary hydraulics pedal. The angle of the slewing pedal and of both drive pedals cannot be adjusted in inclination.



Pos.	Description	Pos.	Description
1	Hammer pedal for slewing	2	Hammer pedal (auxiliary hydraulics)
3	Drive pedal (left)	4	Drive pedal (right)
5	Drive lever (left)	6	Drive lever (right)
7	Control shaft	8	Steering rod

A set screw (see drive pedal) 4 is located underneath drive pedal 3

Adjusting the stabiliser blade/telescopic undercarriage lever

- Push or pull the lever as far as it will go in order to actuate the piston in the main valve block to the limit. Unscrew set screw A if it limits the lever stop.
- Screw in set screw A as far as it will go with the lever pushed.
- Then unscrew screw A again by half a revolution (stop tolerance).
- Fasten set screw A with a locknut
- Check the controls respond correctly



Caution!

Make sure under all circumstances that the fork head of the Bowden cable in the tool case does not touch the seat console.

- The angle of the stabiliser blade/telescopic undercarriage lever can be set by means of the set screw on the Bowden cable.

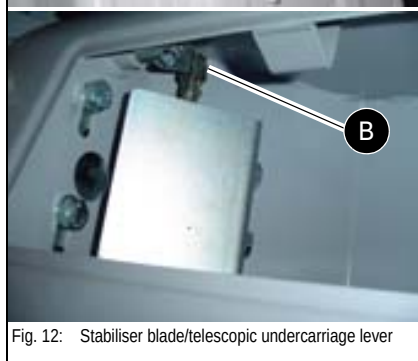


Fig. 12: Stabiliser blade/telescopic undercarriage lever



5.9 Breather filter

The breather filter is in charge of:

- Air intake and outlet for pressure compensation in the hydraulic oil tank (varying oil level) – prevents the oil tank from inflating.
- Pre-tension of the oil tank to the specified overpressure -> supports the pump's suction
- Filtering the intake air
- Opens at 0.4 bar (5.8 psi)

The breather filter is located at the rear of the machine next to the fuel filler neck.

Replace the breather filter according to the instructions in the maintenance plan!

– see *Maintenance plan (overview)* on page 3-5



Important!

The breather filter must be replaced at 1000 s/h under all circumstances!



Fig. 13: Breather filter position

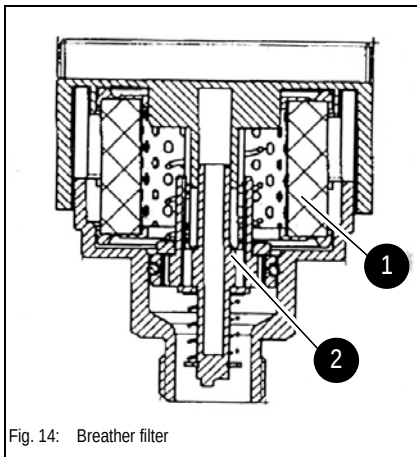


Fig. 14: Breather filter

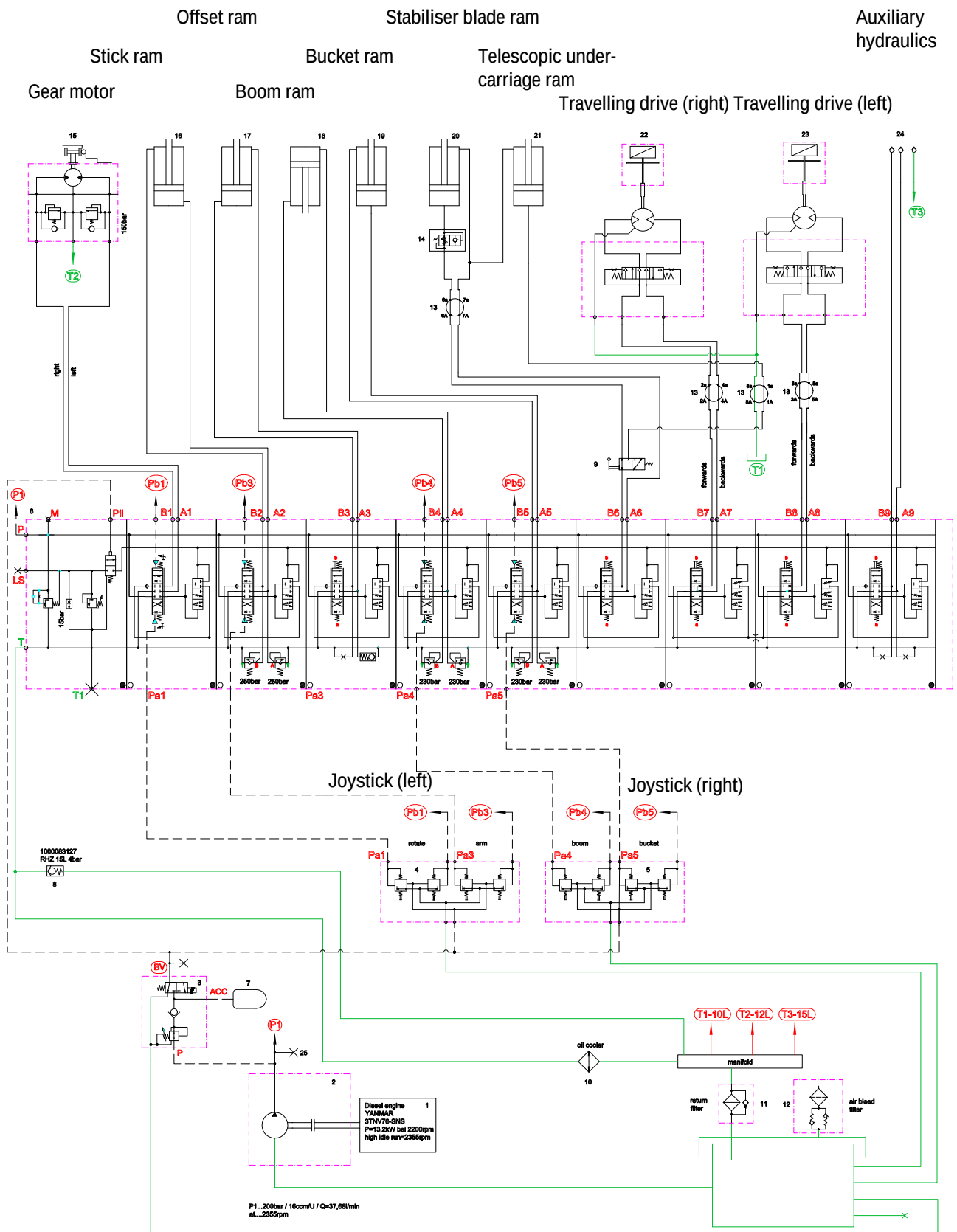
Pos.	Description
1	Filter fabric
2	Bleeder valve



5.10 Troubleshooting in the hydraulic system

Problem	Possible causes
Hydraulic system without function	Defective safety switch on control lever base
	Wrong setting of safety switch on control lever base
	Defective solenoid valve on pilot oil supply unit
	Contaminated solenoid valve on pilot oil supply unit
	Hydraulic oil level too low
	Defective valve fuses
	Defective/interrupted plug and socket connection towards solenoid valve
Hydraulic hammer does not work correctly	Quickhitch couplings not connected correctly
	Hydraulic oil quantity too high/too low
	Hydraulic oil pressure too high/too low

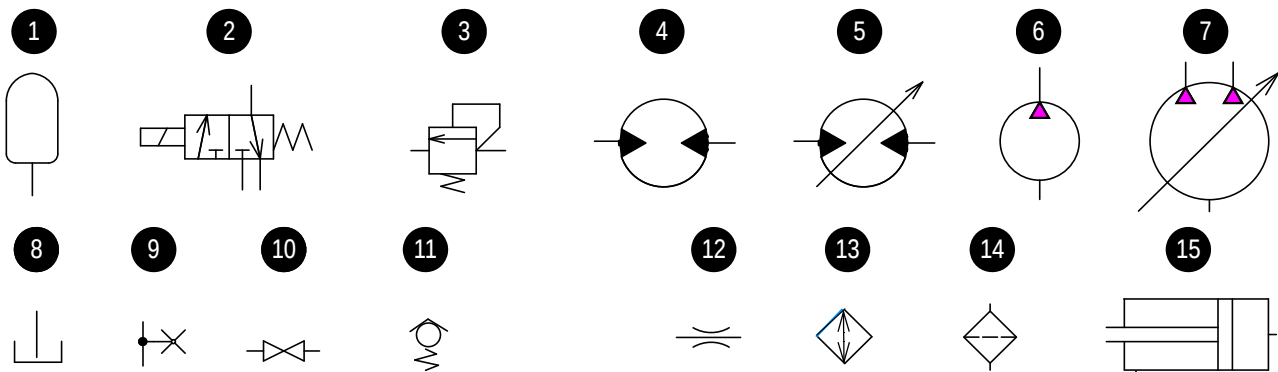
5.11 Hydraulics diagram A4





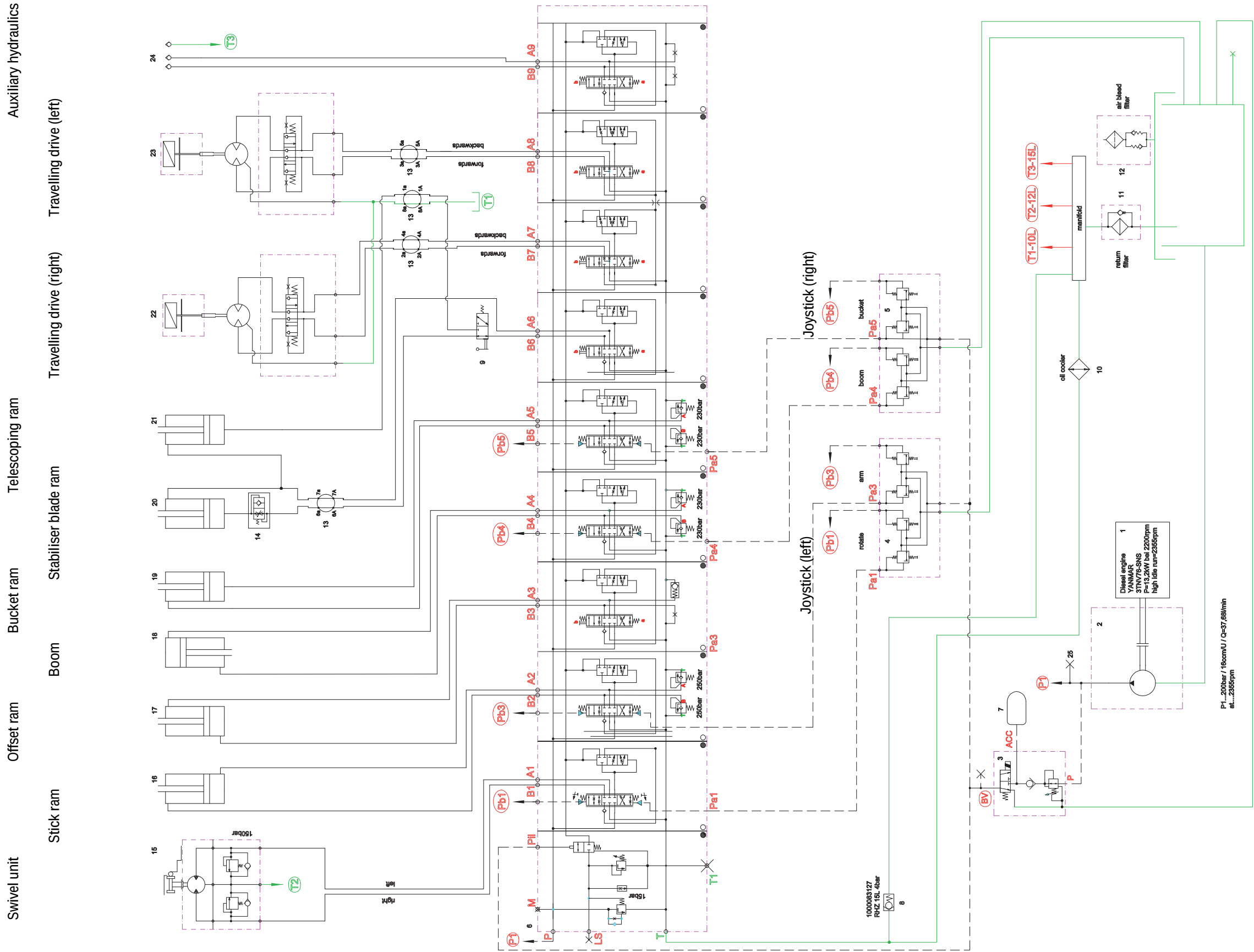
5.12 Hydraulics diagram: legend

Pos.	Description	Pos.	Description
1	Diesel engine	14	Hose burst valve
2	Gear pump	15	Swivel unit
3	Pilot oil supply unit	16	Stick ram
4	Left-hand side joystick pilot valve	17	Offset ram
5	Right-hand side joystick pilot valve	18	Boom ram
6	Main valve block	19	Bucket ram
7	Pressure accumulator	20	Stabiliser blade ram
8	Non-return valve	21	Telescopic undercarriage ram
9	Changeover valve: stabiliser blade/telescoping ram	22	Travelling drive (right)
10	Oil cooler	23	Travelling drive (left)
11	Oil filter	24	Auxiliary hydraulics
12	Breather filter	25	Measurement ports
13	Swivel joint		

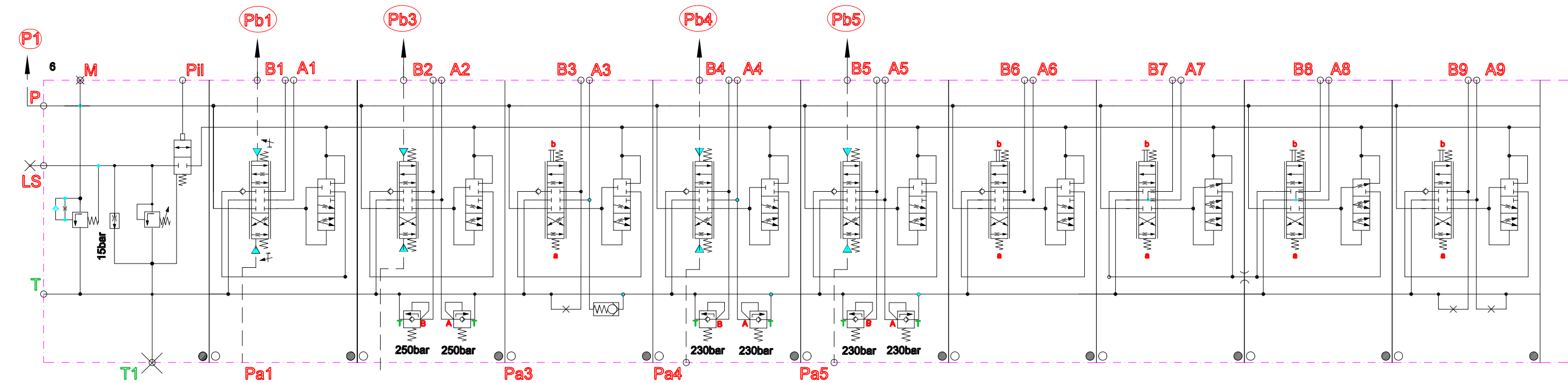


1	Pressure accumulator
2	Spring-loaded solenoid valve
3	Pressure limiting valve
4	Fixed displacement motor
5	Variable displacement motor
6	Fixed displacement pump
7	Double variable displacement pump
8	Tank line
9	Measuring port
10	Stop cock
11	Non-return valve
12	Throttle orifice
13	Oil cooler
14	Filter
15	Double-acting ram

5.13 Hydraulics diagram 1404 RD



5.14 Main valve block diagram 1404 RD



Pilot control lines

Port	Legend	Controlled via
Pa1, Pb1	Rotation control	Joystick (left)
Pa3, Pb3	Stick control	Joystick (left)
Pa4, Pb4	Boom control	Joystick (right)
Pa5, Pb5	Bucket control	Joystick (right)

Main control lines

Port	Legend
A1, B1	Swivel unit
A2, B2	Stick ram
A3, B3	Offset ram
A4, B4	Boom ram
A5, B5	Bucket ram
A6, B6	Stabiliser blade/telescoping ram
A7, B7	Travelling drive (right)
A8, B8	Travelling drive (left)
A9, B9	Auxiliary hydraulics

Pump/tank lines

Port	Legend
P	Gear pump port
T	Tank line
LS	Load Sensing

Electric system

6 Electric system

6.1 Ohm's Law (current, voltage, resistance); power

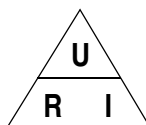
It describes the interrelation between current, voltage and resistance.

Current "I" – Ampere (A)

Voltage "U" – Volt (V)

Resistance "R" – Ohm (Ω)

Mnemonic:



Output

Power "P" – Watt (W)

$$P = U \times I = R \times I^2 = U^2/R$$

6.2 Measuring equipment, measuring methods

Multifunction measuring device

- Measurements of values (U, R, I, f)
- Continuity test
- Diode test

Calculate the measuring range using known data (P, U, R, I) and set before measuring!

Observe AC/DC basic setting.

➡ AC = alternating current/voltage;

➡ DC = direct current/voltage

Test device with acoustic and optical signal output

- Continuity test in de-energised machine electric system and of wiring harnesses



Measuring methods – multifunction measuring device

- Measuring current (ignition switched on):
 - Black cable in COM socket (earth),
 - red cable in A socket or mA socket; connect in series to consumer.
- Measuring voltage (ignition switched on):
 - Black cable in COM socket (earth),
 - red cable in V socket;
 - connect in parallel to consumer.
- Measuring resistance (ignition switched off):
 - Black cable in COM socket (earth),
 - red cable in Ω socket;
 - connect in parallel to consumer (see measuring voltage).

Test lamp

The test lamp is used to test lines and functions with the ignition switched on.

- Line test (testing voltage):

Connect test lamp between test point (live cable) and machine earth or between test point (earth line) and a live cable.

- Functional check (testing current):

Connect test lamp between a connection on the consumer to be tested and the connection line.

6.3 Cable colour coding

Colour	Code
Black	blk
Brown	brn
Red	red
Orange	org
Yellow	yel
Green	grn
Blue	blu
Violet	vio
Grey	gry
White	wht
Pink	pnk

6.4 Relays

Use, mode of function

Relays are used for switching electric loads (high currents) whereby the control power of the relay coil is relatively low. Relays can therefore be controlled by microelectronics or microswitches (e.g. touchpad keyboards, sensors). The switch contacts can be make-contact, break-contact or changeover switches. They are in charge of the actual switching function.

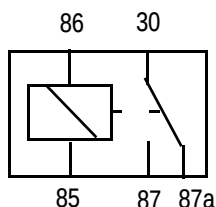


Fig. 1: Terminal description on relay

Zero-centre relay

- 86 = Start of coil (control line)
- 85 = End of coil (earth)
- 30 = Input (load line)
- 87 = Make-contact switch output (load line)
- 87 a= Break-contact switch output (load line)

6.5 Electric system

Electric system	
Dynamo	12 V 20 A
Starter	12 V 1.1 kW (1.5 hp)
Battery	12 V 45 Ah

Fuses on left-hand side control lever base

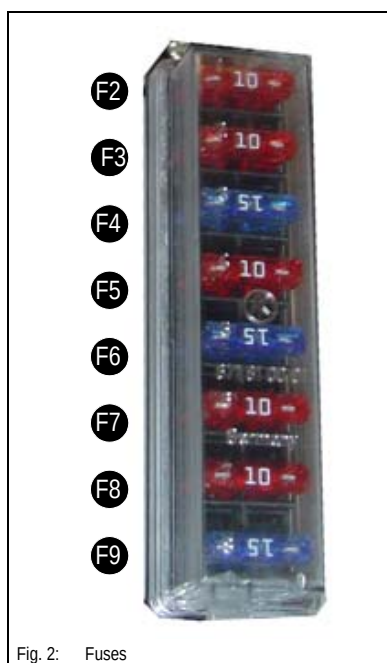


Fig. 2: Fuses

Fuse no.	Rated current (A)	Protected circuit
F2	10 A	Fuse: relay, display, cutoff solenoid
F3	10 A	Boom working light fuse
F4	15 A	Cab working light fuse
F5	10 A	Valves and horn fuse
F6	15 A	Heating fuse
F7	10 A	Wiper and interior light fuse
F8	10 A	Rotating beacon, radio and drive interlock fuse
F9	15 A	Socket and cigarette lighter fuse



Main fuse box with relays

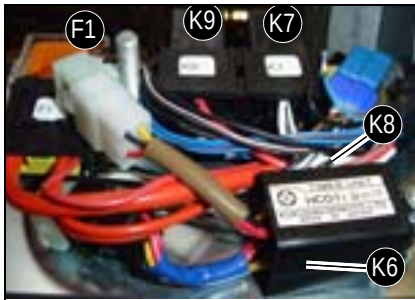


Fig. 3: Relays

Fuse no.	Rated current (A)	Protected circuit
F1	50 A	Main fuse
Relay no.	Protected circuit	
K 6	Preheating time lag relay	
K 7	Start switching relay	
K 8	Cutoff solenoid time lag relay 1s	
K 9	Cutoff solenoid switching relay	

6.6 Instrument panel overview



Pos.	Description
1	Wiper
2	Working light
3	Rotating beacon
4	Roof lights
5	Radio ON button (option)
6	Volume
7	Radio station memory
8	Frequency selection
9	Ventilation/heating



6.7 Dynamo and governor

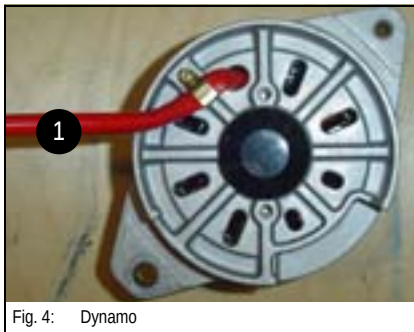


Fig. 4: Dynamo

The dynamo supplies the alternating current which in turn is rectified by the governor.

Pos.	Description
1	Alternating voltage to rectifier

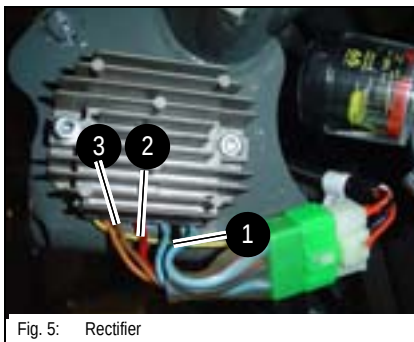


Fig. 5: Rectifier

Pos.	Description
1	Alternating voltage from dynamo
2	Connection B (battery)
3	Start interlock

6.8 Starter

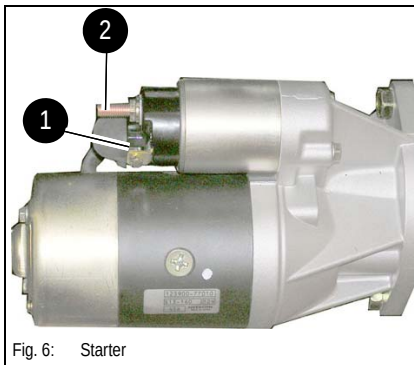


Fig. 6: Starter

Pos.	Description
1	Connection S starting relay
2	Connection B battery



Wiring harnesses designed to allow easy retrofitting of components.



6.9 Wiring diagram A4 1404 RD: legend

No.	Description	Section	Loc.
A1	Radio	E11	Option
A3	Regulator	D2	
B1	Fuel level indicator	E/F9	
B2	Horn	D7	
B11	Loudspeaker	E12	
B12	Loudspeaker	F12	
B14	Warning buzzer	C1/2	
E7	Rear working light	F12/13	Option
E9	Front working light	F13	Option
E11	Boom light	E/F9	
E14	Interior light	E14	
E15	Cigarette lighter	C11	
F1	Main fuse: starter, preheating	E0	
F2	Relay, indicator, cutoff solenoid fuse	A4	
F3	Boom light fuse	A9	
F4	Cab working light fuse	A13	
F5	Valves and horn fuse	A6	
F6	Heating fuse	A10	
F7	Wiper and interior light fuse	A14	
F8	Rotating beacon, radio and drive interlock fuse	A11	
F9	Socket and cigarette lighter fuse	A11	
G1	Alternator	D/E1	
G2	Battery	F0	
H2	Preheating telltale	C1	
H3	Engine temperature telltale	B1	
H4	Engine oil pressure telltale	B/C1	
H5	Charge telltale	B1	
H6	Air filter clogging telltale	B1	
H7	Hydraulic oil filter clogging telltale	B1	
H9	Not assigned		
H28	Rotating beacon	F13	Option
K6	Preheating time lag relay	E3	
K7	Starting relay	E2	
K8	Cutoff solenoid time lag relay	E2	
K9	Pick-up contact cutoff solenoid relay	F3	
K15	Charge telltale relay	C2/3	
M1	Starter	F2	
M2	Wiper	F14	Option
M4	Heater fan	C10	Option
M5	Washer pump	F14	Option
M9	Fuel pump	F3	
P1	Hour meter	B1	
P2	Fuel gauge	B1	
R1	Preheating system	F1	
S1	Preheating start switch	A1	
S2	Engine oil pressure	F4	
S3	Engine temperature switch	E4	
S8	Battery master switch	F0	
S16	Boom light switch	B9	
S17	Cab working light switch	B13	Option
S18	Rotating beacon switch	B12	Option
S15	Heating switch	B10	
S20	Wiper/washer switch	B14	Option
S21	High speed switch	B6	
S21.1	High speed tip switch	E7	Option
S27	Boom slew tip switch	C7	
S28	Safety switch	B5	
S29	Safety switch	C5	Option
S41	Not assigned		
S42	Not assigned		
S55	Horn tip switch	D7	
V1	Diode	F4	
Y1	Cutoff solenoid	F3	
Y3	High-speed valve	F6	
Y13	Safety valve	F5	
Y15	Boom slew valve	F7	

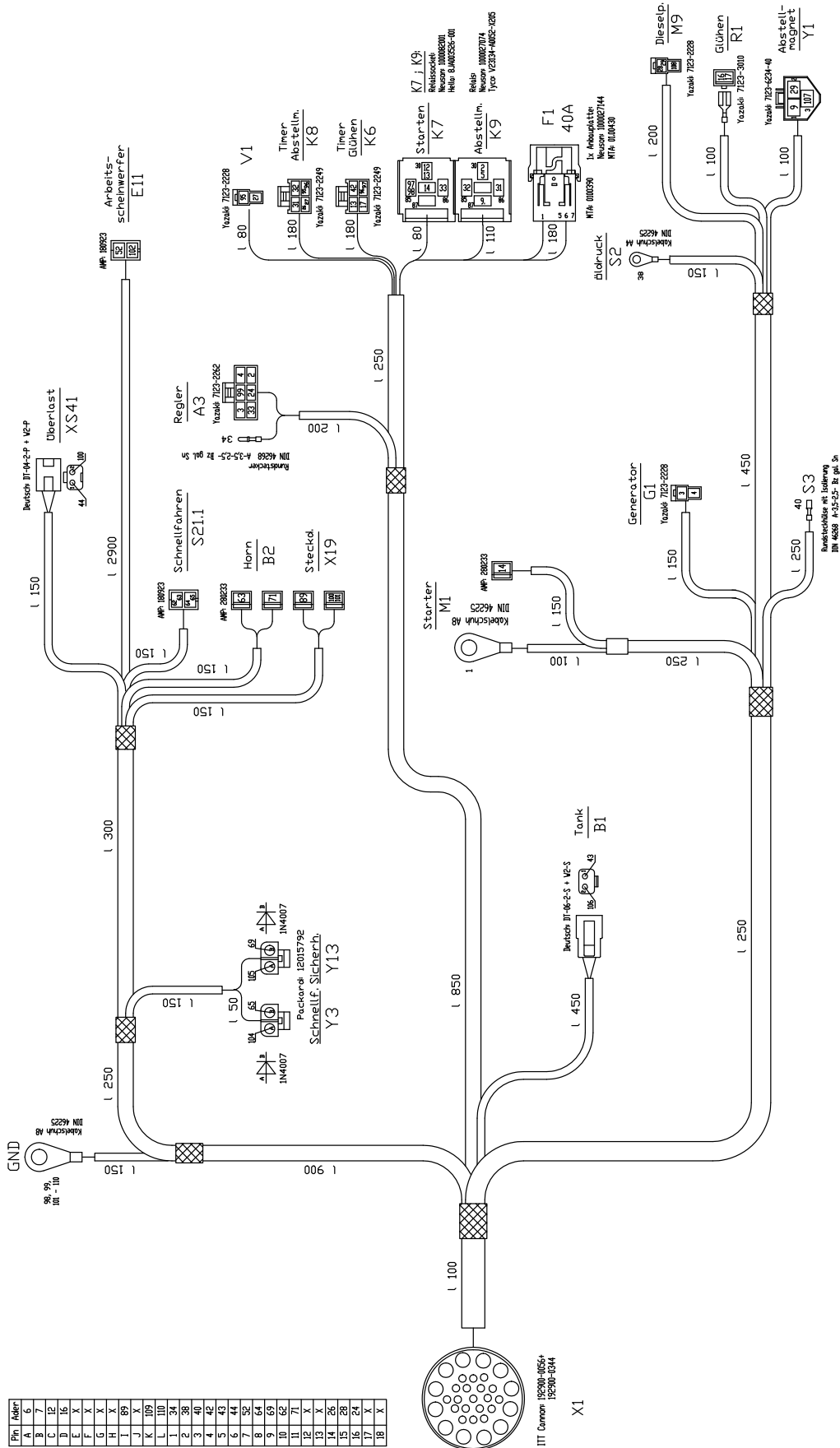


6.11 Engine wiring harness 1404 RD: legend

No.	Up to	To	Colour	mm ²
1	M1 starter	F1/1 main fuse	red	10
2	K9/30 cutoff solenoid relay	A3 regulator	red	4
3	G1 alternator	A3 regulator	red/blk	2.5
4	G1 alternator	A3 regulator	red/blk	2.5
5	F1/2 main fuse	K9/30 cutoff solenoid relay	red	4
6	F1/2 main fuse	X1/A engine/chassis connection	red	4
7	F1/2 main fuse	X1/B engine/chassis connection	red	4
9	K9/87 cutoff solenoid relay	Y1/1 cutoff solenoid	wht	2.5
12	K7/30 starting relay	X1/C engine/chassis connection	wht/blk	2.5
13	K7/30 starting relay	K6 preheating time lag relay	wht/blk	1
14	M1 starter	K7/87a starting relay	wht/blk	2.5
16	R1 preheating system	X1/D engine/chassis connection	brn	4
17	R1 preheating system	K6 preheating time lag relay	brn	1
24	A3 regulator	X1/16 engine/chassis connection	blu	1
26	K8 cutoff solenoid time lag relay	X1/14 engine/chassis connection	blu/red	1
27	K8 cutoff solenoid time lag relay	V1 diode	blu/red	1
28	M9 fuel pump	X1/15 engine/chassis connection	blu/red	1
29	M9 fuel pump	Y1/2 cutoff solenoid	blu/red	1
31	K8 cutoff solenoid time lag relay	K9/86 cutoff solenoid relay	blu/blk	1
32	K8 cutoff solenoid time lag relay	K9/85 cutoff solenoid relay	pnk/blk	1
33	A3 regulator	K7/86 starting relay	brn/blk	1
34	A3 regulator	X1/1 engine/chassis connection	pnk	1
38	S2 engine oil pressure	X1/2 engine/chassis connection	wht/grn	1
40	S3 engine temperature switch	X1/3 engine/chassis connection	blk/grn	1
42	K6 preheating time lag relay	X1/4 engine/chassis connection	gry/red	1
43	B1/1 fuel tank sensor	X1/5 engine/chassis connection	vio/blk	1
52	E11/1 boom light	X1/7 engine/chassis connection	grn/yel	1
62	S21.1/1 high speed tip switch	X1/10 engine/chassis connection	gry	2.5

No.	Up to	To	Colour	mm ²
63	S21.1/1 high speed tip switch	B2 horn	gry	1
64	S21.1/2 high speed tip switch	X1/8 engine/chassis connection	brn/blk	1
65	S21.1/2 high speed tip switch	Y3/B high speed valve	brn/blk	1
69	Y13/B safety valve	X1/9 engine/chassis connection	brn/wht	1
71	B2 horn	X1/11 engine/chassis connection	org	1
89	X19 socket connection	X1/I engine/chassis connection	red/blk	2.5
95	V1 diode	K8 cutoff solenoid time lag relay	blk	1
96	K6 preheating time lag relay	K8 cutoff solenoid time lag relay	blk	1
97	K6 preheating time lag relay	K7/85 starting relay	blk	1
98	GND	K7/85 starting relay	blk	1
99	GND	A3 regulator	blk	1.5
101	GND	X19 socket connection	blk	1.5
102	GND	E11 boom light	blk	1
104	GND	Y3/A high speed valve	blk	1
105	GND	Y13/A safety valve	blk	1
106	GND	B1/2 fuel tank sensor	blk	1
107	GND	Y1/3 cutoff solenoid	blk	1
108	GND	M9 fuel pump	blk	1
109	GND	X1/K engine/chassis connection	blk	2.5
110	GND	X1/I engine/chassis connection	blk	2.5

6.12 Engine wiring harness A4 1404 RD





6.13 Seat console wiring harness A4 1404 RD: legend

No.	Up to	To	Colour
6	X1/A engine/chassis connection	S1/1 preheating start switch	red
7	X1/B engine/chassis connection	S1/2 preheating start switch	red
8	F9/H socket, cigarette lighter	S1/2 preheating start switch	red
10	X4/4 drive interlock connection	S1/7 preheating start switch	wht/blk
11	X5/4 starter	X5/8 starter	wht/blk
12	X1/C engine/chassis connection	X4/8 drive interlock connection	wht/blk
15	S1/8 preheating start switch	S1/3 preheating start switch	brn
16	X1/D engine/chassis connection	S1/4 preheating start switch	brn
18	S1/5 ignition lock	F3/B boom working light	blu
19	S1/6 ignition lock	F6/E heating	blu
20	F2/1 indicators fuse	X4/5 drive interlock	blu
21	X4/7 drive interlock	X4/5 drive interlock	blu
22	F2/1 indicators fuse	K15/87a charge telltale relay	blu
23	X10/1 indicator connector	K15/87a charge telltale relay	blu
24	X1/16 armrest connector	F2/1 indicators fuse	blu
25	X1/17 armrest connector	F2/1 indicators fuse	blu
26	X1/14 armrest connector	X4/9 drive interlock	blu/red
28	X1/15 armrest connector	X4/9 drive interlock	blu/red
30	X5/5	X5/9	blu/red
34	X1/1 engine/chassis connection	K15/86 charge telltale relay	pnk
35	X1/18 engine/chassis connection	K15/30 charge telltale relay	pnk/blk
36	B14/5 warning buzzer	K15/30 charge telltale relay	pnk/blk
37	B14/5 warning buzzer	X10/8 indicator connector	pnk/blk
38	X1/2 engine/chassis connection	B14/9 warning buzzer	wht/grn
39	X10/10 indicator connector	B14/4 warning buzzer	wht/grn
40	X1/3 engine/chassis connection	B14/6 warning buzzer	blk/grn

No.	Up to	To	Colour
41	X10/14 indicator connector	B14/1 warning buzzer	blk/grn
42	X1/4 engine/chassis connection	X10/12 indicator connector	gry/red
43	X1/5 engine/chassis connection	X10/4 indicator connector	vio/blk
47	F3/2 boom light fuse	S16/1 boom light	grn
48	S16/10 boom light	S16/1 boom light	grn
49	S16/10 boom light	S18/10 rotating beacon	grn
51	X10/2 indicator connector	S16/5 boom light	grn/yel
52	X1/7 engine/chassis connection	S16/5 boom light	grn/yel
53	F4/3 cab working light	S17/1 cab working light	grn
54	S17/2 cab working light	S17/1 cab working light	grn
55	S17/2 cab working light	S17/10 cab working light	grn
56	X12/5	S17/6 cab working light	grn/red
57	X12/7	S17/3 cab working light	grn/blu
58	S21/1 high speed	F5/4 valve, horn fuse	gry
59	S21/1 high speed	S21/10 high speed	gry
61	X3/1	S28 safety switch	gry
62	X1/10 engine/chassis connection	F5/4 valve, horn fuse	gry
64	X1/8 engine/chassis connection	S21/5 high speed	brn/blk
66	S28 safety switch	S29 safety switch	brn/wht
67	X4/1 drive interlock	S29 safety switch	brn/wht
68	X5/1	X5/6	brn/wht
69	X1/9 engine/chassis connection	X4/6 drive interlock	brn/wht
71	X1/11 engine/chassis connection	S55/1 horn switch	org
72	F6/5 heating fuse	S15/3 heater switch	yel
73	S15/10 heater switch	S15/3 heater switch	yel

Electric system



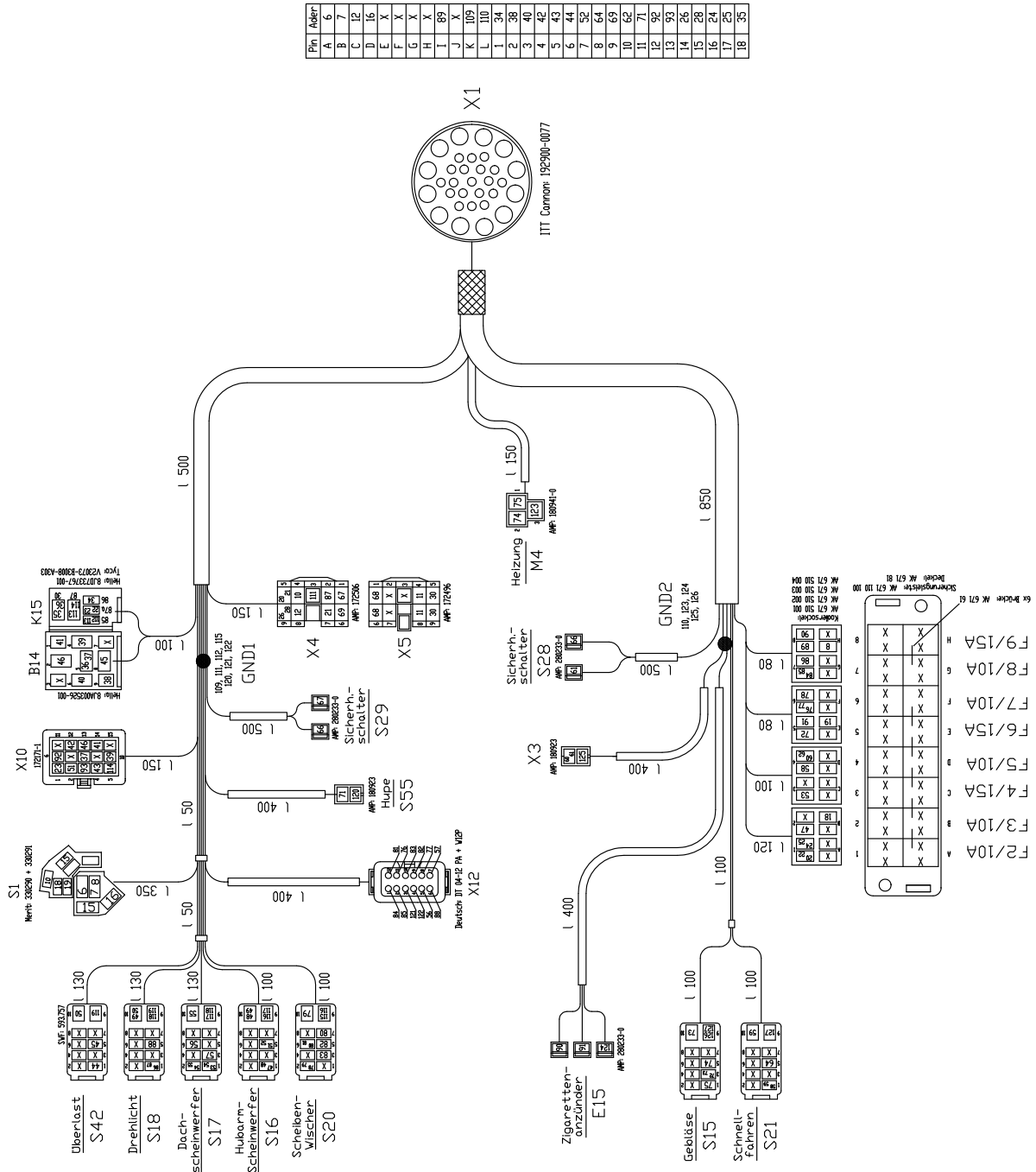
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No.	Up to	To	Colour	mm ²
112	K15/85 charge telltale relay	GND1	blk	1
113	K15/85 charge telltale relay	K15/87 charge telltale relay	blk	1
114	X10/5	K15/87 charge telltale relay	blk	1
115	S20/9 wiper/washer switch	GND1	blk	1
116	S20/9 wiper/washer switch	S16/9 boom light switch	blk	1
117	S17/9 cab working light switch	S16/9 boom light switch	blk	1
118	S17/9 cab working light switch	S18/9 rotating beacon switch	blk	1
120	S55/2 horn	GND1	blk	1
121	X12/3	GND1	blk	1
122	X12/4	GND1	blk	1
123	M4/3 heater fan	GND2	blk	1
124	E15 cigarette lighter	GND2	blk	1.5
125	X3/2	GND2	blk	1
126	S15/9 heater switch	GND2	blk	1
127	S15/9 heater switch	S21/9 high speed	blk	1

No.	Up to	To	Colour	mm ²
74	S15/5 heater switch	M4/2 heater fan	yel/blk	1
75	S15/1 heater switch	M4/1 heater fan	yel/blu	1
76	F7/6 wiper, interior light fuse	X12/11 cab connection	blu	1
77	F7/6 wiper, interior light fuse	X12/8 cab connection	blu	1
78	F7/6 wiper, interior light fuse	S20/2 wiper/washer switch	blu	1
79	S20/10 wiper/washer switch	S20/2 wiper/washer switch	blu	1
80	S20/7 wiper/washer switch	S20/6 wiper/washer switch	blu/wht	1
81	X12/12	S20/6 wiper/washer switch	blu/wht	1
82	S20/5 wiper/washer switch	X12/9	blu/red	1
83	S20/3 wiper/washer switch	X12/10	blk/wht	1
84	F8/7 rotating beacon, radio, drive interlock fuse	X12/1	red	1
85	F8/7 rotating beacon, radio, drive interlock fuse	X12/2	red	1
86	F8/7 rotating beacon, radio, drive interlock fuse	S18/1 rotating beacon switch	red	1
87	X4/2	S18/1 rotating beacon switch	red	1
88	S18/5 rotating beacon switch	X12/6	vio	1
89	X1/1 engine/chassis connection	F9/8 socket, cigarette lighter fuse	red/blk	2.5
90	E15 cigarette lighter	F9/8 socket, cigarette lighter fuse	red/blk	1.5
91	E15 cigarette lighter	F6/5 heating fuse	yel	1
92	X1/12 engine/chassis connection	X10/6	org/wht	1
93	X1/13 engine/chassis connection	X10/3	gry/blu	1
109	X1/K engine/chassis connection	GND1	blk	2.5
110	X1/I engine/chassis connection	GND2	blk	2.5
111	X4/3	GND1	blk	1



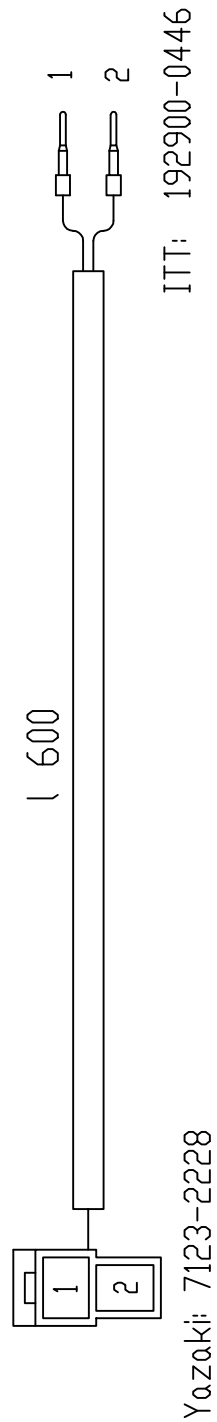
6.14 Seat console wiring harness A4 1404 RD





6.15 Alternator wiring harness (option) A4 1404 RD

Cable-side indication of connector assignment (unless stated otherwise)



Wiring harnesses designed to allow easy retrofitting of components.

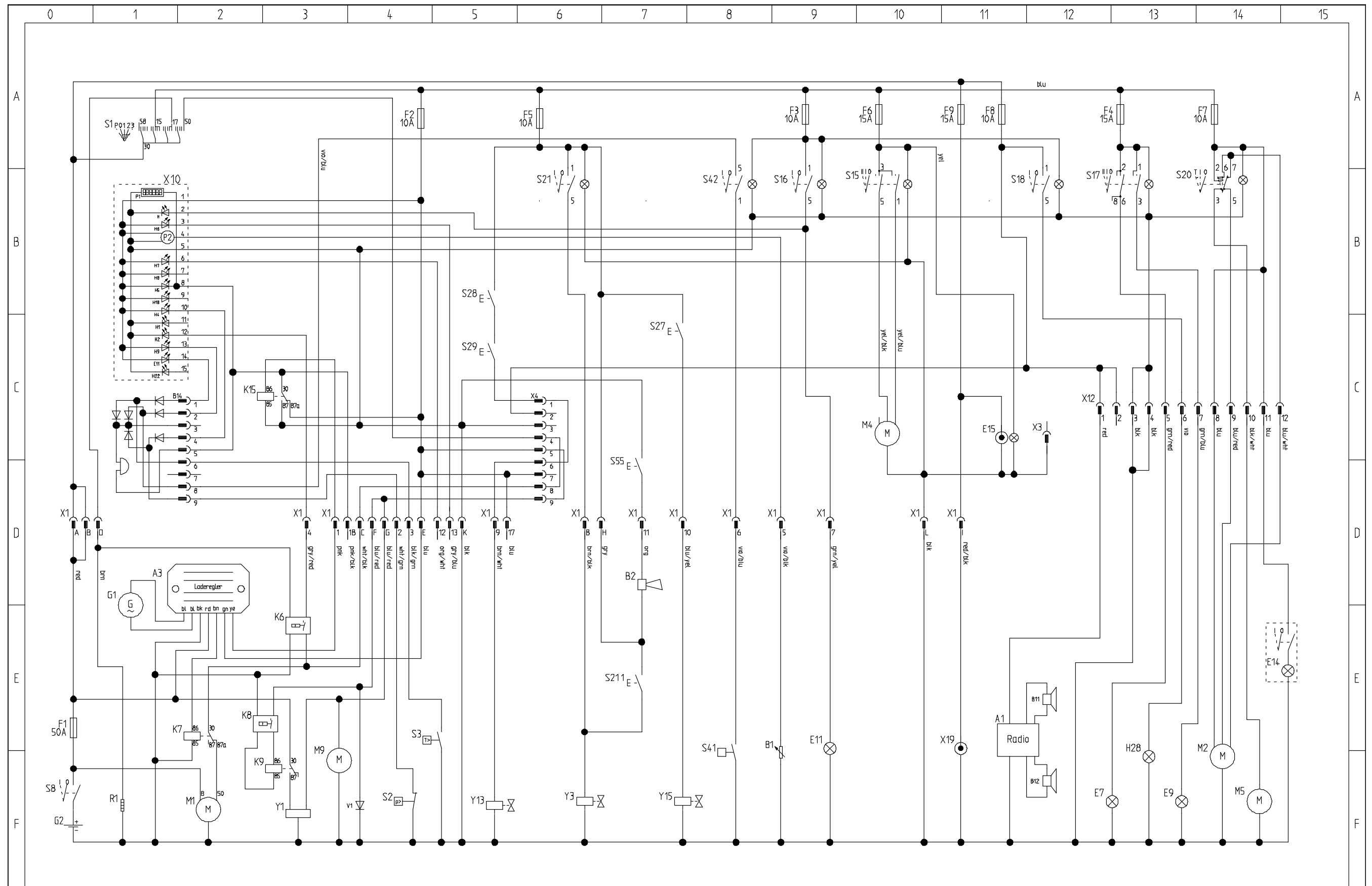
Electric system

6.16 Wiring diagram A3 1404 RD: legend

No.	Description	Section	Loc.
A1	Radio	E11	Option
A3	Regulator	D2	
B1	Fuel level indicator	E/F9	
B2	Horn	D7	
B11	Loudspeaker	E12	
B12	Loudspeaker	F12	
B14	Warning buzzer	C1/2	
E7	Rear working light	F12/13	Option
E9	Front working light	F13	Option
E11	Boom light	E/F9	
E14	Interior light	E14	
E15	Cigarette lighter	C11	
F1	Main fuse: starter, preheating	E0	
F2	Relay, indicator, cutoff solenoid fuse	A4	
F3	Boom light fuse	A9	
F4	Cab working light fuse	A13	
F5	Valves and horn fuse	A6	
F6	Heating fuse	A10	
F7	Wiper, interior light fuse	A14	
F8	Rotating beacon, radio, drive interlock fuse	A11	
F9	Socket and cigarette lighter fuse	A11	
G1	Alternator	D/E1	
G2	Battery	F0	
H2	Preheating telltale	C1	
H3	Engine temperature telltale	B1	
H4	Engine oil pressure telltale	B/C1	
H5	Charge telltale	B1	
H6	Air filter clogging telltale	B1	
H7	Hydraulic oil filter clogging telltale	B1	
H9	Not assigned		
H28	Rotating beacon	F13	Option
K6	Preheating time lag relay	E3	
K7	Starting relay	E2	
K8	Cutoff solenoid time lag relay	E2	
K9	Pick-up contact cutoff solenoid relay	F3	
K15	Charge telltale relay	C2/3	
M1	Starter	F2	
M2	Wiper	F14	Option
M4	Heater fan	C10	Option
M5	Washer pump	F14	Option

No.	Description	Section	Loc.
M9	Fuel pump	F3	
P1	Hour meter	B1	
P2	Fuel gauge	B1	
R1	Preheating system	F1	
S1	Preheating start switch	A1	
S2	Engine oil pressure	F4	
S3	Engine temperature switch	E4	
S8	Battery master switch	F0	
S16	Boom light switch	B9	
S17	Cab working light switch	B13	Option
S18	Rotating beacon switch	B12	Option
S15	Heating switch	B10	
S20	Wiper/washer switch	B14	Option
S21	High speed switch	B6	
S21.1	High speed tip switch	E7	Option
S27	Boom slew tip switch	C7	
S28	Safety switch	B5	
S29	Safety switch	C5	Option
S41	Not assigned		
S42	Not assigned		
S55	Horn tip switch	D7	
V1	Diode	F4	
Y1	Cutoff solenoid	F3	
Y3	High-speed valve	F6	
Y13	Safety valve	F5	
Y15	Boom slew valve	F7	

6.17 Wiring diagram A3 1404 RD

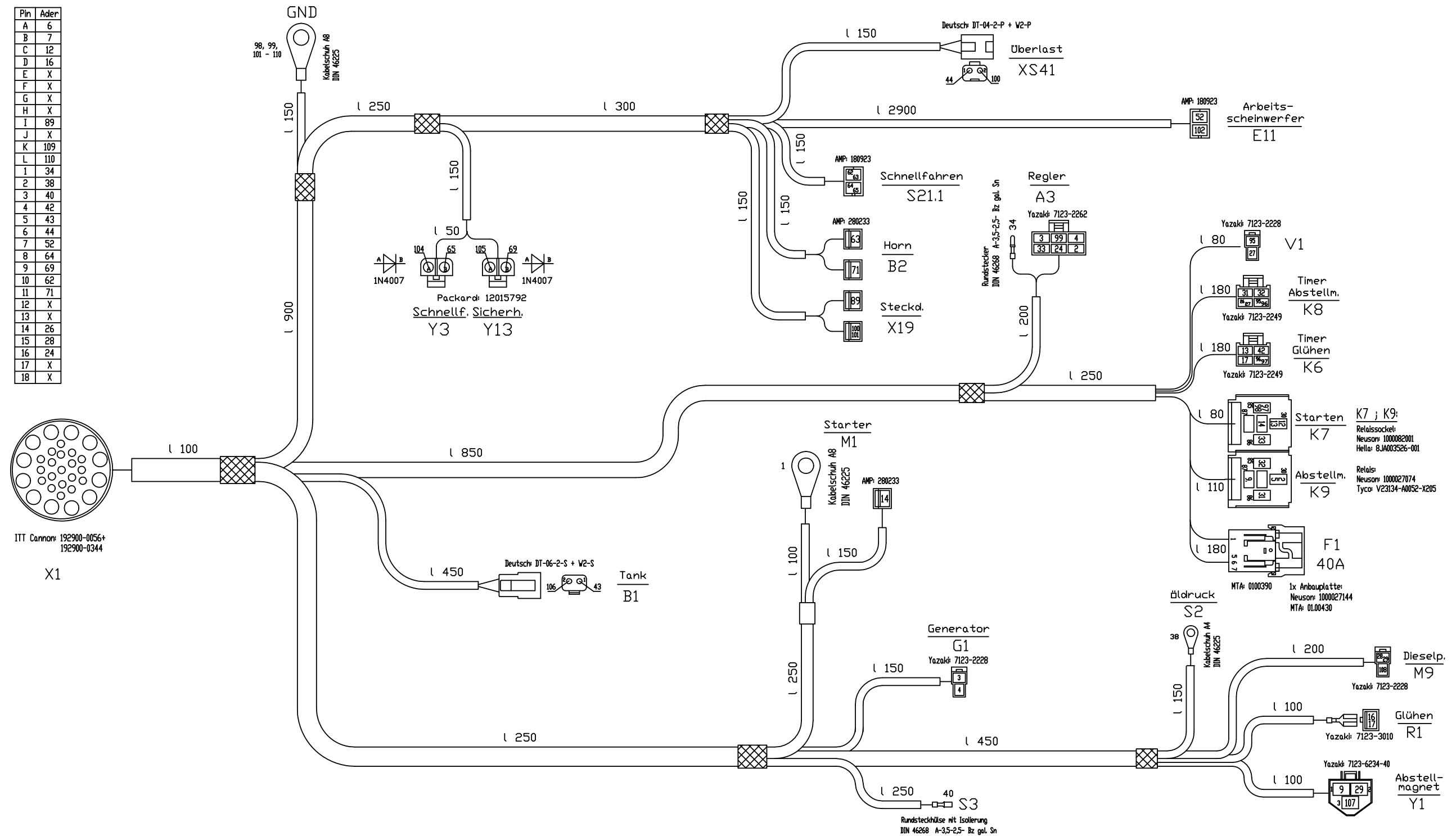


6.18 Engine wiring harness A3 1404 RD: legend

No.	Up to	To	Colour	mm ²
1	M1 starter	F1/1 main fuse	red	10
2	K9/30 cutoff solenoid relay	A3 regulator	red	4
3	G1 alternator	A3 regulator	red/blk	2.5
4	G1 alternator	A3 regulator	red/blk	2.5
5	F1/2 main fuse	K9/30 cutoff solenoid relay	red	4
6	F1/2 main fuse	X1/A engine/chassis connection	red	4
7	F1/2 main fuse	X1/B engine/chassis connection	red	4
9	K9/87 cutoff solenoid relay	Y1/1 cutoff solenoid	wht	2.5
12	K7/30 starting relay	X1/C engine/chassis connection	wht/blk	2.5
13	K7/30 starting relay	K6 preheating time lag relay	wht/blk	1
14	M1 starter	K7/87a starting relay	wht/blk	2.5
16	R1 preheating system	X1/D engine/chassis connection	brn	4
17	R1 preheating system	K6 preheating time lag relay	brn	1
24	A3 regulator	X1/16 engine/chassis connection	blu	1
26	K8 cutoff solenoid time lag relay	X1/14 engine/chassis connection	blu/red	1
27	K8 cutoff solenoid time lag relay	V1 diode	blu/red	1
28	M9 fuel pump	X1/15 engine/chassis connection	blu/red	1
29	M9 fuel pump	Y1/2 cutoff solenoid	blu/red	1
31	K8 cutoff solenoid time lag relay	K9/86 cutoff solenoid relay	blu/blk	1
32	K8 cutoff solenoid time lag relay	K9/85 cutoff solenoid relay	pnk/blk	1
33	A3 regulator	K7/86 starting relay	brn/blk	1
34	A3 regulator	X1/1 engine/chassis connection	pnk	1
38	S2 engine oil pressure	X1/2 engine/chassis connection	wht/grn	1
40	S3 engine temperature switch	X1/3 engine/chassis connection	blk/grn	1
42	K6 preheating time lag relay	X1/4 engine/chassis connection	gry/red	1
43	B1/1 fuel tank sensor	X1/5 engine/chassis connection	vio/blk	1
52	E11/1 boom light	X1/7 engine/chassis connection	grn/yel	1
62	S21.1/1 high speed tip switch	X1/10 engine/chassis connection	gry	2.5
63	S21.1/1 high speed tip switch	B2 horn	gry	1
64	S21.1/2 high speed tip switch	X1/8 engine/chassis connection	brn/blk	1
65	S21.1/2 high speed tip switch	Y3/B high speed valve	brn/blk	1
69	Y13/B safety valve	X1/9 engine/chassis connection	brn/wht	1
71	B2 horn	X1/11 engine/chassis connection	org	1
89	X19 socket connection	X1/I engine/chassis connection	red/blk	2.5
95	V1 diode	K8 cutoff solenoid time lag relay	blk	1

No.	Up to	To	Colour	mm ²
96	K6 preheating time lag relay	K8 cutoff solenoid time lag relay	blk	1
97	K6 preheating time lag relay	K7/85 starting relay	blk	1
98	GND	K7/85 starting relay	blk	1
99	GND	A3 regulator	blk	1.5
101	GND	X19 socket connection	blk	1.5
102	GND	E11 boom light	blk	1
104	GND	Y3/A high speed valve	blk	1
105	GND	Y13/A safety valve	blk	1
106	GND	B1/2 fuel tank sensor	blk	1
107	GND	Y1/3 cutoff solenoid	blk	1
108	GND	M9 fuel pump	blk	1
109	GND	X1/K engine/chassis connection	blk	2.5
110	GND	X1/L engine/chassis connection	blk	2.5

6.19 Engine wiring harness A3 1404 RD



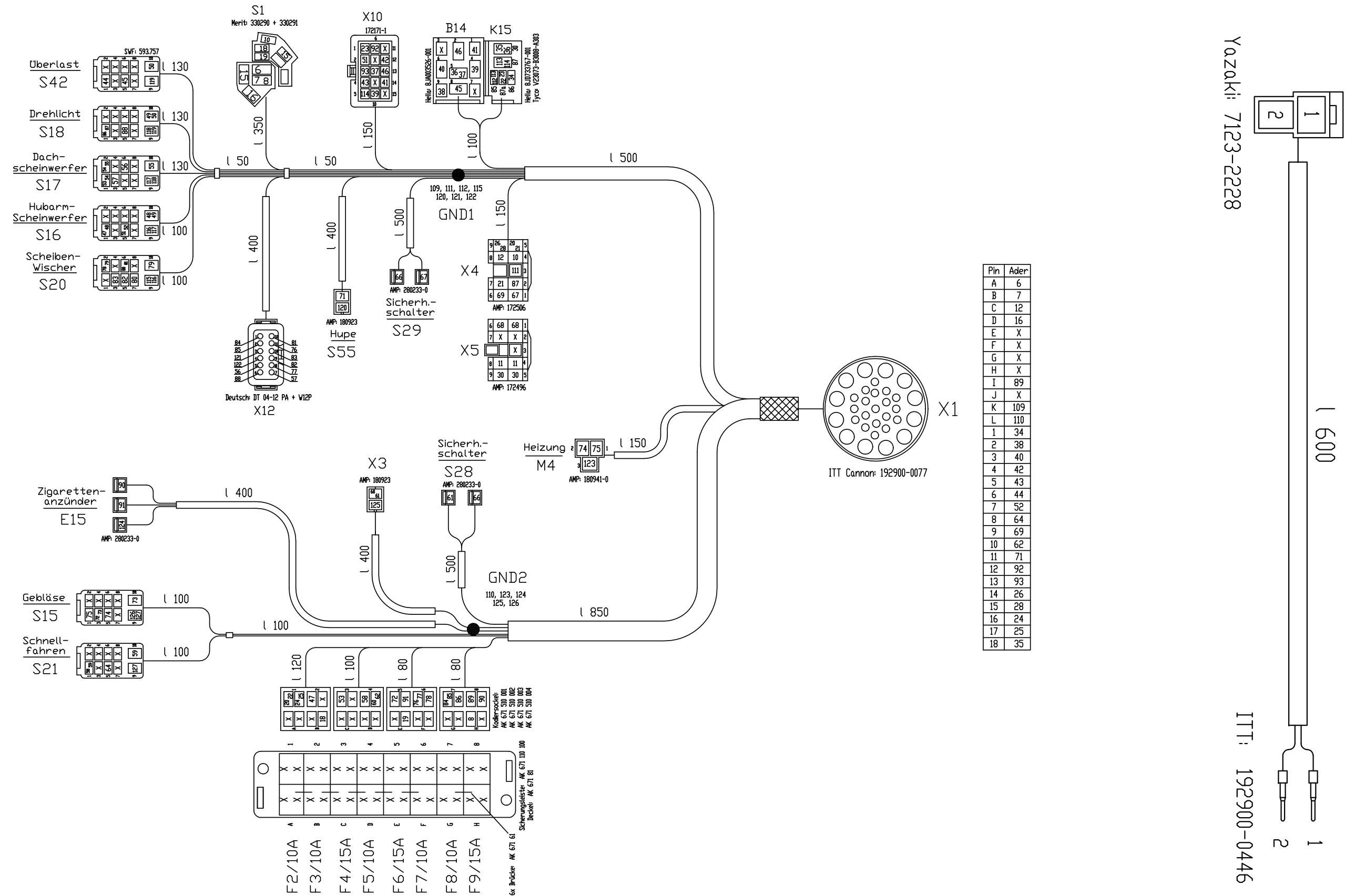
Electric system

6.20 Seat console wiring harness A3 1404 RD: legend

No.	Up to	To	Colour	mm ²
6	X1/A engine/chassis connection	S1/1 preheating start switch	red	4
7	X1/B engine/chassis connection	S1/2 preheating start switch	red	4
8	F9/H socket, cigarette lighter	S1/2 preheating start switch	red	2.5
10	X4/4 drive interlock connection	S1/7 preheating start switch	wht/blk	2.5
11	X5/4 starter	X5/8 starter	wht/blk	2.5
12	X1/C engine/chassis connection	X4/8 drive interlock connection	wht/blk	2.5
15	S1/8 preheating start switch	S1/3 preheating start switch	brn	4
16	X1/D engine/chassis connection	S1/4 preheating start switch	brn	4
18	S1/5 ignition lock	F3/B boom working light	blu	4
19	S1/6 ignition lock	F6/E heating	blu	4
20	F2/1 indicators fuse	X4/5 drive interlock	blu	1
21	X4/7 drive interlock	X4/5 drive interlock	blu	1
22	F2/1 indicators fuse	K15/87a charge telltale relay	blu	1
23	X10/1 indicator connector	K15/87a charge telltale relay	blu	1
24	X1/16 armrest connector	F2/1 indicators fuse	blu	1
25	X1/17 armrest connector	F2/1 indicators fuse	blu	1
26	X1/14 armrest connector	X4/9 drive interlock	blu/red	1
28	X1/15 armrest connector	X4/9 drive interlock	blu/red	1
30	X5/5	X5/9	blu/red	1
34	X1/1 engine/chassis connection	K15/86 charge telltale relay	pnk	1
35	X1/18 engine/chassis connection	K15/30 charge telltale relay	pnk/blk	1
36	B14/5 warning buzzer	K15/30 charge telltale relay	pnk/blk	1
37	B14/5 warning buzzer	X10/8 indicator connector	pnk/blk	1
38	X1/2 engine/chassis connection	B14/9 warning buzzer	wht/grn	1
39	X10/10 indicator connector	B14/4 warning buzzer	wht/grn	1
40	X1/3 engine/chassis connection	B14/6 warning buzzer	blk/grn	1
41	X10/14 indicator connector	B14/1 warning buzzer	blk/grn	1
42	X1/4 engine/chassis connection	X10/12 indicator connector	gry/red	1
43	X1/5 engine/chassis connection	X10/4 indicator connector	vio/blk	1
47	F3/2 boom light fuse	S16/1 boom light	grn	1
48	S16/10 boom light	S16/1 boom light	grn	1
49	S16/10 boom light	S18/10 rotating beacon	grn	1
51	X10/2 indicator connector	S16/5 boom light	grn/yel	1
52	X1/7 engine/chassis connection	S16/5 boom light	grn/yel	1
53	F4/3 cab working light	S17/1 cab working light	grn	1
54	S17/2 cab working light	S17/1 cab working light	grn	1
55	S17/2 cab working light	S17/10 cab working light	grn	1
56	X12/5	S17/6 cab working light	grn/red	1
57	X12/7	S17/3 cab working light	grn/blu	1
58	S21/1 high speed	F5/4 valve, horn fuse	gry	1
59	S21/1 high speed	S21/10 high speed	gry	1
60	X3/1	F5/4 valve, horn fuse	gry	1
61	X3/1	S28 safety switch	gry	1
62	X1/10 engine/chassis connection	F5/4 valve, horn fuse	gry	2.5
64	X1/8 engine/chassis connection	S21/5 high speed	brn/blk	1
66	S28 safety switch	S29 safety switch	brn/wht	1
67	X4/1 drive interlock	S29 safety switch	brn/wht	1
68	X5/1	X5/6	brn/wht	1
69	X1/9 engine/chassis connection	X4/6 drive interlock	brn/wht	1
71	X1/11 engine/chassis connection	S55/1 horn switch	org	1
72	F6/5 heating fuse	S15/3 heater switch	yel	1
73	S15/10 heater switch	S15/3 heater switch	yel	1
74	S15/5 heater switch	M4/2 heater fan	yel/blk	1

No.	Up to	To	Colour	mm ²
75	S15/1 heater switch	M4/1 heater fan	yel/blu	1
76	F7/6 wiper, interior light fuse	X12/11 cab connection	blu	1
77	F7/6 wiper, interior light fuse	X12/8 cab connection	blu	1
78	F7/6 wiper, interior light fuse	S20/2 wiper/washer switch	blu	1
79	S20/10 wiper/washer switch	S20/2 wiper/washer switch	blu	1
80	S20/7 wiper/washer switch	S20/6 wiper/washer switch	blu/wht	1
81	X12/12	S20/6 wiper/washer switch	blu/wht	1
82	S20/5 wiper/washer switch	X12/9	blu/red	1
83	S20/3 wiper/washer switch	X12/10	blk/wht	1
84	F8/7 rotating beacon, radio, drive interlock fuse	X12/1	red	1
85	F8/7 rotating beacon, radio, drive interlock fuse	X12/2	red	1
86	F8/7 rotating beacon, radio, drive interlock fuse	S18/1 rotating beacon switch	red	1
87	X4/2	S18/1 rotating beacon switch	red	1
88	S18/5 rotating beacon switch	X12/6	vio	1
89	X1/I engine/chassis connection	F9/8 socket, cigarette lighter fuse	red/blk	2.5
90	E15 cigarette lighter	F9/8 socket, cigarette lighter fuse	red/blk	1.5
91	E15 cigarette lighter	F6/5 heating fuse	yel	1
92	X1/12 engine/chassis connection	X10/6	org/wht	1
93	X1/13 engine/chassis connection	X10/3	gry/blu	1
109	X1/K engine/chassis connection	GND1	blk	2.5
110	X1/L engine/chassis connection	GND2	blk	2.5
111	X4/3	GND1	blk	1
112	K15/85 charge telltale relay	GND1	blk	1
113	K15/85 charge telltale relay	K15/87 charge telltale relay	blk	1
114	X10/5	K15/87 charge telltale relay	blk	1
115	S20/9 wiper/washer switch	GND1	blk	1
116	S20/9 wiper/washer switch	S16/9 boom light switch	blk	1
117	S17/9 cab working light switch	S16/9 boom light switch	blk	1
118	S17/9 cab working light switch	S18/9 rotating beacon switch	blk	1
120	S55/2 horn	GND1	blk	1
121	X12/3	GND1	blk	1
122	X12/4	GND1	blk	1
123	M4/3 heater fan	GND2	blk	1
124	E15 cigarette lighter	GND2	blk	1.5
125	X3/2	GND2	blk	1
126	S15/9 heater switch	GND2	blk	1
127	S15/9 heater switch	S21/9 high-speed switch	blk	1

6.21 Seat console and alternator wiring harness (option) A3 1404 RD



Options