7 Service and maintenance

All required service and maintenance work is to be taken from the maintenance plan. We point out that damage due to failure of complying with maintenance plan are not repaired within the scope of guarantee.

CAUTION
- Observe accident prevention regulation.
- Insert shovel arm support (Fig. 40/arrow).
- The diesel engine has to be at standstill prior to service and maintenance work.
- Secure swing shovel loader against rolling away.

Oil check/oil change/ filter change
Collect leaking oil during oil checks and changes. Do not use it again.

Oil checks
Remove the plug (Fig. 41/1) from the center axle gear by means of an Allan key. The oil level has to come up to the bore of the inspection plug (Fig. 41/1).

Turn plug (Fig. 42/1) out of the planetary gear by means of an Allan key. The oil level has to come up to the bore of the inspection plug (Fig. 42/1).

NOTE
The oil inspection plug is to be in horizontal position (Fig. 42/1).

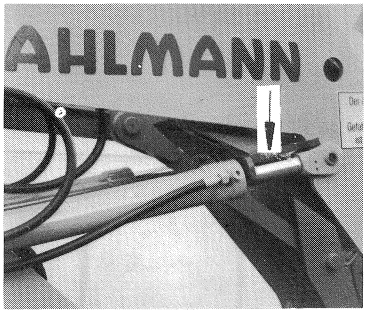


Fig. 40

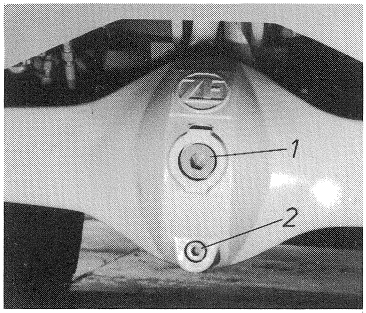


Fig. 41

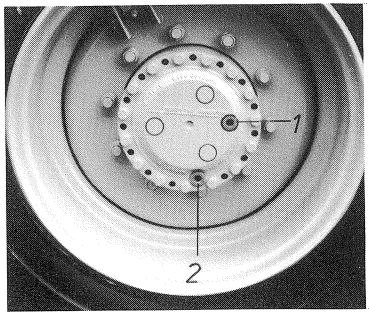
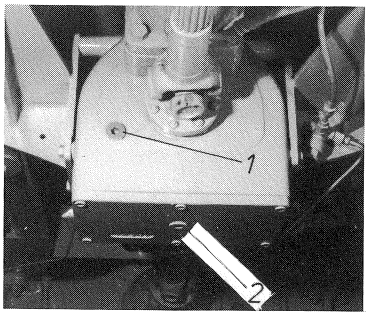


Fig. 42



Power divider

Screw plug out of gear-box by means of an Allan key. The oil level is to come up to the bore of the inspection plug (Fig. 43/1).

Fig. 43

Oil change

Center axle gear

Remove plug (Fig. 41/1 and Fig. 41/2) and drain the oil. Screw in the plug (Fig. 41(2) with new seal. Fill in the oil and screw in plug with new seal (Fig. 41/1).

Planetary gear

Remove plug (Fig. 42/1 and Fig. 42/2) and drain the oil. Screw in plug (Fig. 42/2) with new seal. Fill in the oil and screw in plug with new seal (Fig. 42/7).

Power divider

Remove the plug (Fig. 43/2) in the bottom of the gear box, remove the plug (Fig. 43/1) and drain the oil. Screw in plug (Fig. 43/2) with new seal. Fill in the oil and screw in plug (Fig. 43/1) with new seal.

NOTE

After oil change the oil lever has to come up to the bore of the inspection plug.

Combustion engine

A "Bochumer-plug" is screwed into the engine oil sump. Unscrew sealing cap from the plug for changing the oil. Screw transition piece with extension hose (tool kit) onto the "Bochumer-plug" and hold hose clamp in a tank. The "Bochumer-plug" opens and closes automatically when the transition piece with hose is screwed on or unscrewed.

Hydraulic oil tank 110 l

The oil level is checked at the oil level gauges.

Fig. 44/1 = max. indication
Fig. 44/2 = min. indication

NOTE

The oil is checked with the shovel arm completely lowered.

ATTENTION

Hydraulic oil free of foreign matter of prescribed quality is to be used only. Filter cap (Fig. 44/3).

A return filter is installed in the hydraulic oil tank (Fig. 44/5).

Changing of filter cartridges:

- Screw off filter cover.
- Pull up filter cartridges complete with casing bottom (Fig. 45/arrow) and carry out other operation outside the swing shovel loader.
- Remove filter cartridges (2 pieces) from the casing bottom (Fig. 46) and replace them by new ones.

NOTE

- Wet O-rings with oil.

- Install casing bottom complete with filter cartridges and close with filter cover.

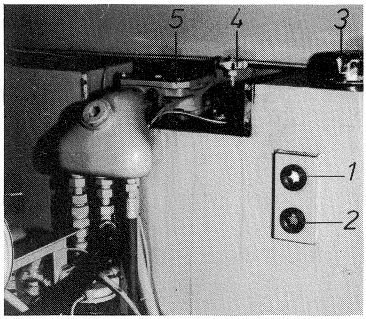


Fig. 44

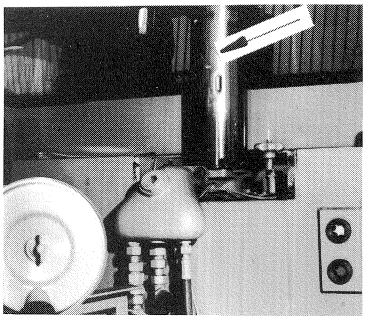


Fig. 45

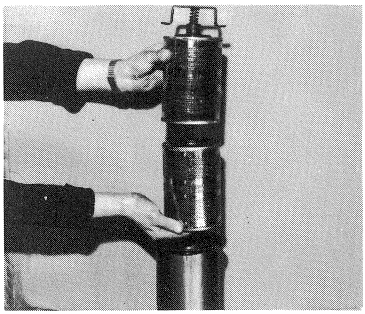


Fig. 46

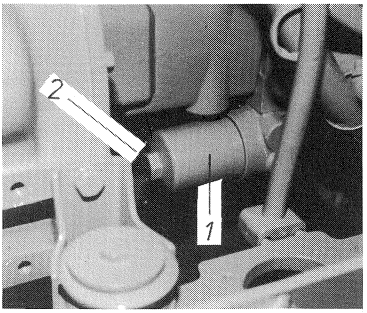


Fig. 47

A pressure filter is located between hydraulic oil tank and axial piston pump (Fig. 47/1).

Changing of filter cartridge:

- Place collecting vessel under the filter.
- Unscrew the filter cartridge by means of a spanner (Fig. 47/2).
- Replace filter element and screw on filter cartridge.

NOTE

The complete suction cage may be closed by a shut-off valve arranged on the hydraulic oil tank (Fig. 44/4).

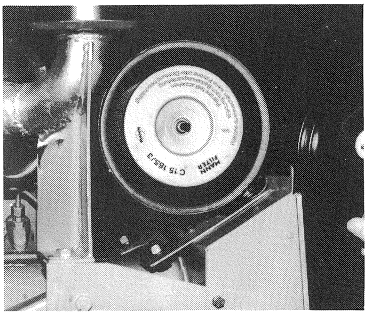


Fig. 48

Maintenance of air filter

Unscrew cover with discharge valve (KHD-engine, Fig. 48).

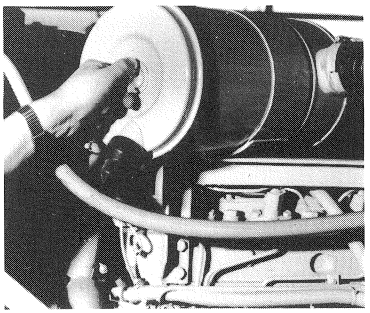


Fig. 49

Unscrew cover with discharge valve (Perkins-engine, Fig. 49)

Unscrew hexagon nut and pull out filter element (Fig. 50/1). Blow with compressed air from the inside to outside, not exceeding 6 bars. Replace the filter element in case it is very dirty.

If necessary, the safety cartridge is to be replaced, too (Fig. 50/2).

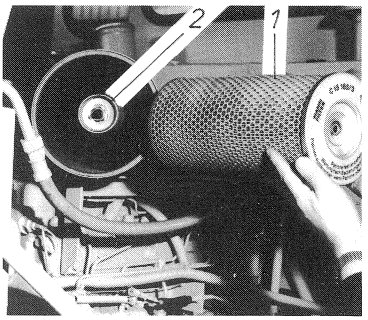


Fig. 50

ATTENTION

- Prior to removal of the safety cartridge the filter casing is to be free of impurities.

- Before the filter cartridge is mounted, check the seals for damage and press in the releasing button of the vacuum indicator (Fig. 51/arrow); the red "service field" becomes transparent.

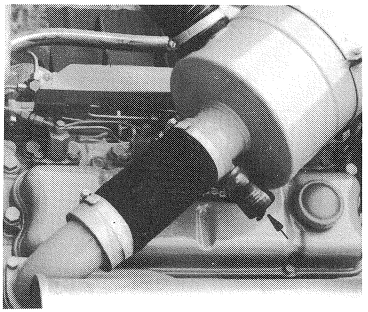


Fig. 51

NOTE

Mount the cover with discharge valve in such a manner that the discharge valve is directed downwards.

Check the water of the Perkins-engine

Check the cooling water level with cold engine only (Fig. 52). Water level is to be visible in the compensating space. Every time after refilling check the anti-freezing limit. Quantity of cooling water abt. 15 l.

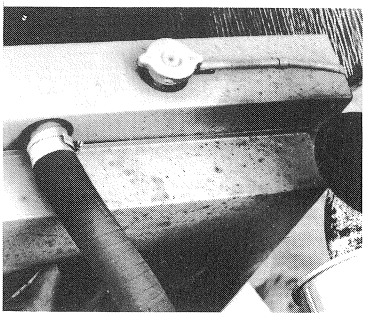


Fig. 52

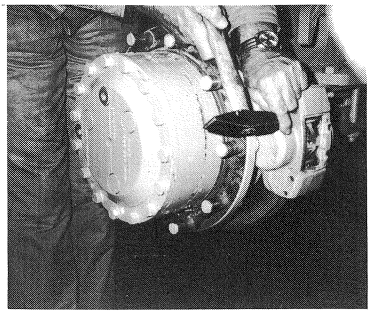


Fig. 53

Changing of brake pads

Service brake

(1) Dismount the wheel.

(2) Remove cover plate from caliper.

(3) Expel upper locking pin by means of a drift (Fig. 53).

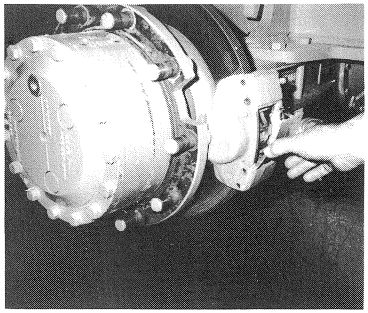


Fig. 54

(4) Remove locking spring (Fig. 54) and expel lower locking pin by means of the drift.

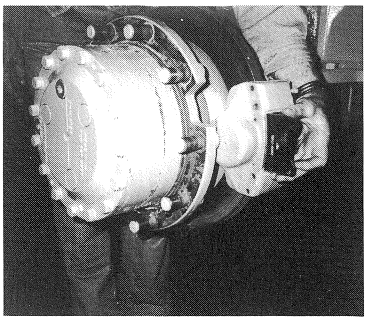


Fig. 55

(5) Draw out brake pads laterally (Fig. 55).

NOTE

The caliper is to be completely unscrewed to change the brake pads at the power divider.

Parking brake

- Replace the brake pads,
- Adjustment

(1) Release parking brake.
(2) Remove the locking springs from the brake pad by means of mounting spoon (Fig. 56/arrow).
(3) Draw out brake pad to the top (Fig. 57/arrow).

The parking brake is adjusted at the rotary handle of the hand lever (Fig. 8/arrow).

Adjustment:

- Put the hand lever in its relieving position (Fig. 8/) (horizontal position).
- Adjust the initial tension by means of the rotary handle.
- Adjustment of the initial tension is correct when it is possible to bring the lever out of the horizontal position without great expenditure of force beyond the point of its self-locking (vertical position).
- Carry out a brake test. The braking effect is to be so high that the unit is held fast at road speed and with the throttle fully open.
- In case adjustment at the rotary handle is not possible because the setting distance is too high, the brake tongs is to be roughly adjusted first of all. Loosen counternut (Fig. 58/1) and screw in shaft (Fig. 58/2) of the lever. Lock the shaft with counternut.

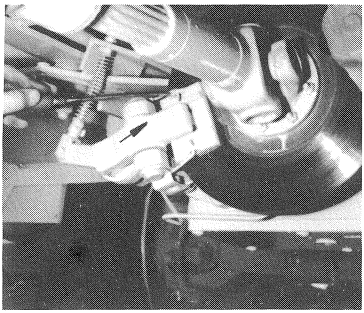


Fig. 56

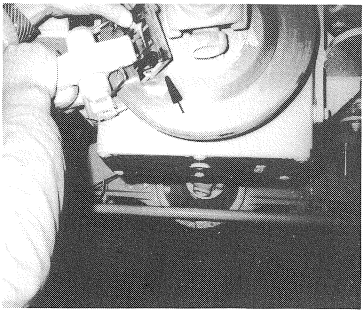


Fig. 57

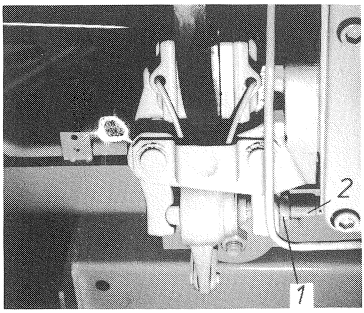


Fig. 58

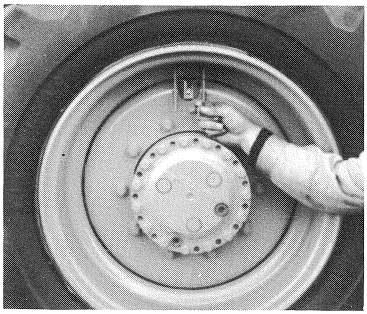


Fig. 59

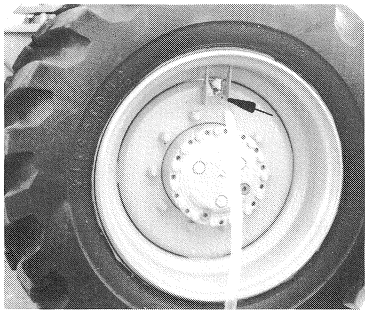


Fig. 60

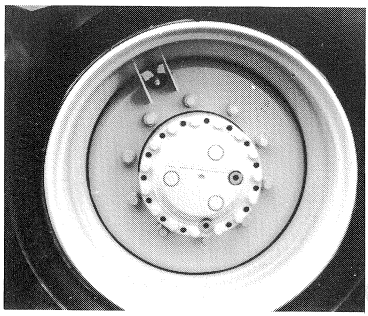


Fig. 61

Tyre filling

The tyres are filled with prepared solution as follows:

1. Turn the tyre until valve is in uppermost position.
2. Screw out valve insert and screw in connecting nut (Fig. 59)
3. Screw tyre filling valve onto connecting nut.
4. Let the solution flow from higher vessel into the tyre.
5. Operate vent knob at the tyre filling valve from time to time (Fig. 60/arrow).
6. Unscrew tyre filling valve. Screw in valve insert and inflate the tyre at a pressure of 2 bars.
7. Check the filling:
   Turn the tyre until the valve is in position shown in Fig. 61).
   In this position, liquid is to flow out when the valve is operated.

   Mixture:
   130 l water
   100 kg magnesium chloride frost-proof up to -25 °C.

CAUTION

- Add magnesium chloride to the water, never reversely. Avoid contact of the solution with eyes, skin or clothing.
- An injury of the eyes might be caused by penetrating liquid. Take head out of spraying direction.

Lubrication and Maintenance

The **first relubrication** of the raceway and the gear has to take place immediately after installation. For every subsequent lubrication, acidfree, non-resinous, water-repellant and non-ageing greases with adequate heat resistance properties must be used exclusively, see Table 3.

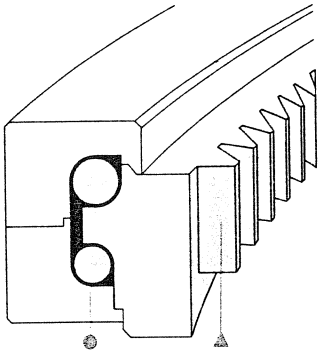
The order in which the lubricants are listed is not in order of recommendation.

The filling is to reduce friction, to seal and to protect against corrosion. Always grease liberally until a collar of fresh grease forms at the bearing gaps and seals around the entire circumference. The bearing should be rotated during relubrication.

Lubricant

Questions relating to lubricants should be clarified with the lubricant manufacturer. When automatic lubricating devices are used, pumpability must be confirmed by the lubricant manufacturer.

Applications at sub-zero temperatures will require special lubricants, for instance Molykote TTF 52



Raceway Gear

Table 3

ARAL	●	Aralub HLP 2	248 K to 403 K (-25°C to +130°C)
	▲	Aralub LFZ 1	253 K to 523 K (-25°C to +250°C)
BP	●	Energrease LS-EP 2	248 K to 403 K (-25°C to +130°C)
	▲	Energol WRL	273 K to 353 K (-0°C to +80°C)
Castrol	●	Spheerol EPL 2	253 K to 393 K (-20°C to +120°C)
	▲	Grippa 33 S	253 K to 353 K (-20°C to +80°C)
elf	●	EPEXA 2	243 K to 393 K (-30°C to +120°C)
	▲	CARDREXA DC 1	253 K to 393 K (-20°C to +120°C)
Esso	●	BEACON EP 2	248 K to 403 K (-25°C to +130°C)
	▲	SURETT FLUID 4 k	253 K to 373 K (-20°C to +100°C)
	●	CENTOPLEX 2 EP	238 K to 393 K (-35°C to +120°C)
	▲	GRAFLOSCON CA 901	253 K to 423 K (-20°C to +150°C)
Mobil	●	Mobilux EP 2	253 K to 393 K (-20°C to +120°C)
	▲	Mobiltac 81	243 K to 393 K (-30°C to +120°C)
	●	Stabyl LEP 2	253 K to 393 K (-20°C to +120°C)
	▲	Ceplattyn KG 10	243 K to 523 K (-30°C to +250°C)
SHELL	●	Calithia EP Fett T 2	248 K to 403 K (-25°C to +130°C)
	▲	Cardium Fluid C	243 K to 333 K (-30°C to +60°C)
TEXACO	●	Multifak EP 2	243 K to 403 K (-30°C to +130°C)
	▲	Crater 2 X Fluid	253 K to 393 K (-20°C to +120°C)
Fritz Manke Inh. A. Pfalz Worringer Str. 78 4000 Dusseldorf	●	—	—
	▲	Voler Compound 2000 E	243 K to 343 K (-30°C to +70°C)

Lubrication intervals are to be selected according to the operating conditions; generally every 100 operating hours, roller bearings every 50 operating hours. Shorter greasing intervals in tropical regions must be used in the presence of high humidity, dust or dirt, strong temperature fluctuations, and for continuous rotation.

Bogie bearings for rail and road vehicles are treated in a different manner (ask for special details).

Before and after prolonged stoppage of the equipment, relubrication is absolutely necessary. This is especially important after a winter shutdown. When cleaning the equipment, care must be taken to prevent cleaning agents from damaging the seals, penetrating into the raceways.

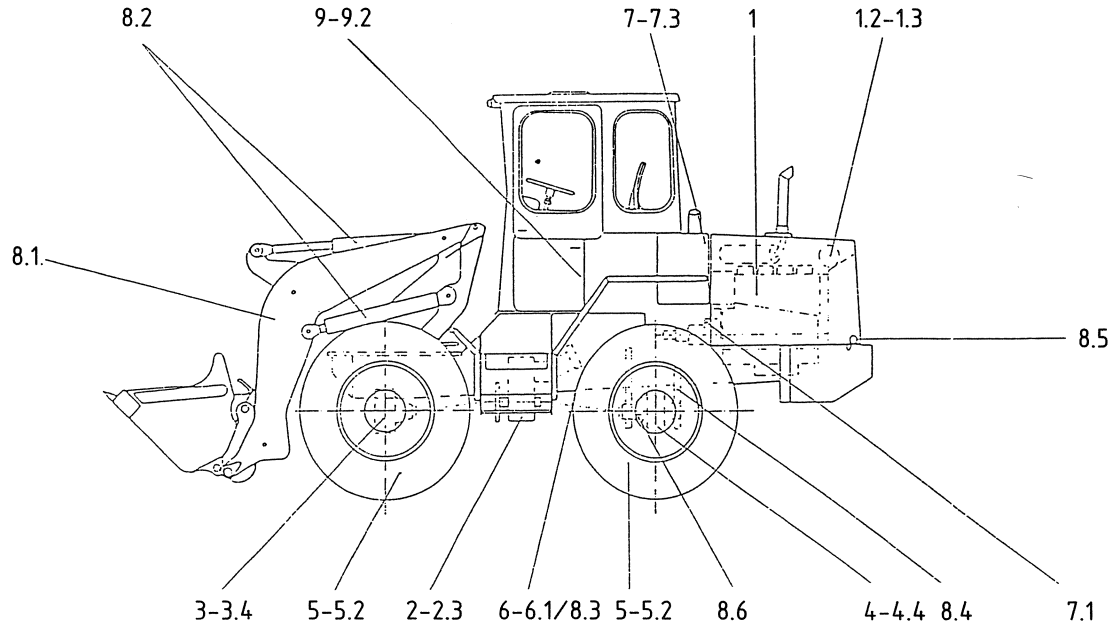
Checking of bolts

To compensate for settling phenomena, it is necessary to retighten the bolts with the specified tightening torque. During this operation the bolted connection must be relieved of all tensile stresses coming from external loads. This should be checked after approximately 100 operating hours at the latest. Thereafter, checking should be repeated about every 600 operating hours or every 3 months.

Under special operating conditions, or if specific test instructions so require, the interval between checks should be changed correspondingly.

Checking of the raceway systems

In their delivered condition large-diameter antifriction bearings have clearances which guarantee good operating conditions and functional safety. After a prolonged operating time bearing clearances will increase. It is, therefore, necessary to check the clearance at certain intervals. See page 43 Roth Erde main catalogue.



Item	Designation	Specification	Quantity of filling
1	Engine oil viscosity acc. to manufacturer's specification	MIL-L-2104C	First filling abt. 11 l. Oil change abt. 9,5l.
2.3	Gear oil SAE 90	MIL-L-2105B	abt. 5 l.
3.2	Gear oil SAE 90	MIL-L-2105B	abt. 6,5 l.
3.4	Gear oil SAE 90	MIL-L-2105B	abt. 1,7 l. for each planetary gear
4.2	Gear oil SAE 90	MIL-L-2105B	abt. 7 l.
4.4	Gear oil SAE 90	MIL-L-2105B	abt. 2 l. for each planetary gear
7.3	Hydraulic oil	HLP-oil acc. to ISO-VG 46 with VI exceeding 180	abt. 120 l.
8	Multi-purose lubricating grease	DIN 51502 K2K	as required
9	Distilled water		as required
10.2	Brake fluid		as required

Legend

△ - First oil change or first filter change or first check

○ - Check or lubrication

◆ - Change at 1000 working hours or yearly

CAUTION

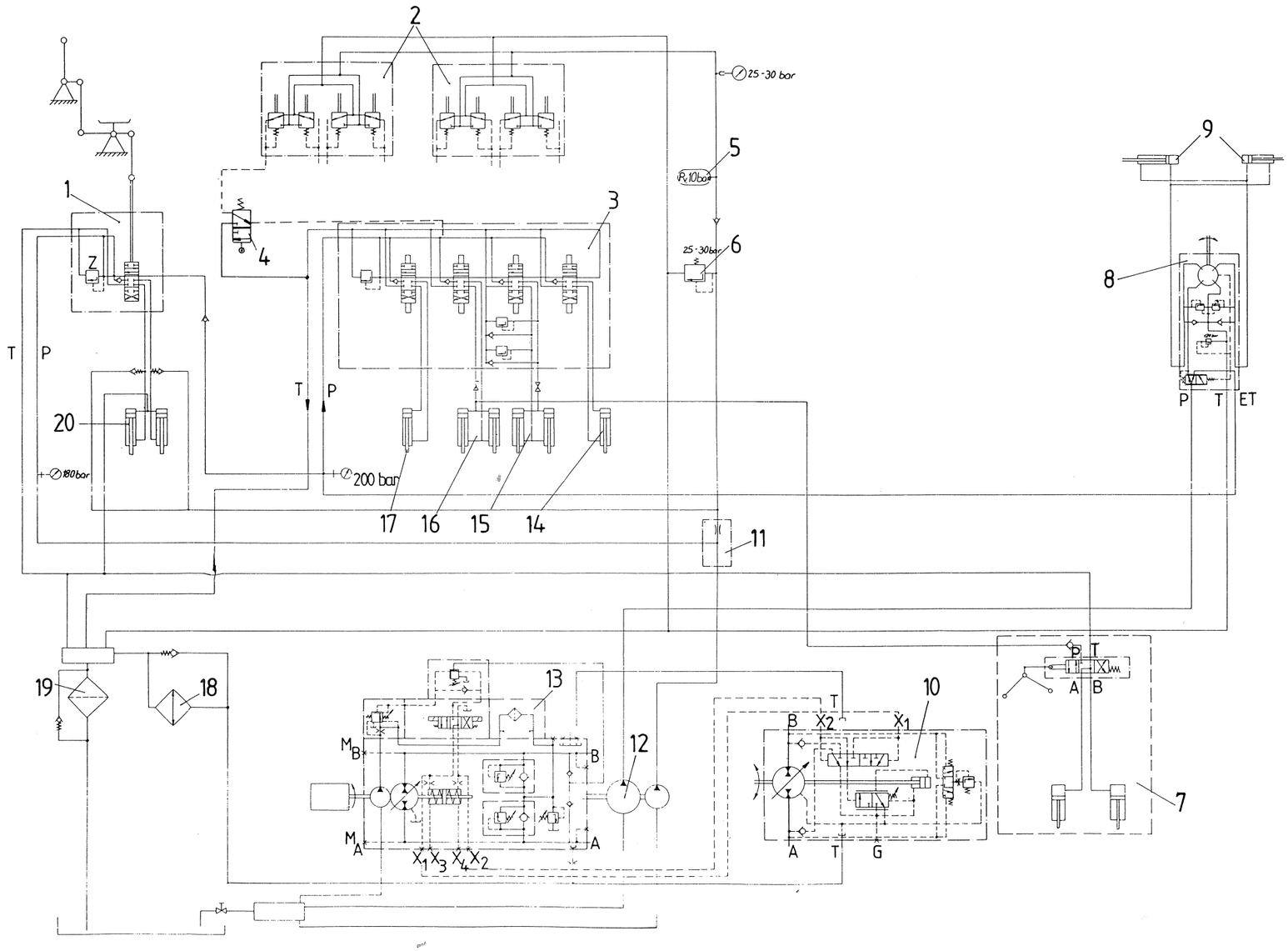
Observe the accident prevention regulations when maintenance work is carried out.

as from chassis no. 12551010

Time interval hours

10	50	100	200	1000	item	MAINTENANCE POINTS
					1	Engine
					1.1	Maintenance acc. to manufacturer's specification
					1.2	Dry air filter Observe clogging indicator during operation. Replace filter element when clogging indicator shows red.
	○				1.3	Clean dust box.
					2	Power divider
	○				2.1	Check parking brake (readjust)
			○		2.2	Oil check (check screw)
	△			◆	2.3	Oil change
					3	Front axle
			○		3.1	Axle gear, oil check (check screw)
	△			◆	3.2	Axle gear, oil change
			○		3.3	Planetary gear, oil check (check screw)
	△			◆	3.4	Planetary gear, oil change
					4	Steering axle
			○		4.1	Axle gear, oil check (check screw)
	△		*	◆	4.2	Axle gear, oil change
			○		4.3	Planetary gear, oil check (check screw)
	△			◆	4.4	Planetary gear, oil change
					5	Wheels and tyres
	○				5.1	Check air pressure
△			○		5.2	Check wheel nuts
					6	Cardan shafts
			○		6.1	Check fastening
					7	Hydraulic systems
	△			◆	7.1	Replace filter elements — observe
○					7.2	Oil check — clogging
				◆	7.3	Oil change — indicator
					8	Lubrication points
○					8.1	Shovel unit/outfit
	○				8.2	Hydraulic cylinder
	○				8.3	Cardan shafts
○					8.4	Pendulum bridge
	○				8.5	Articulated flange/engine hood
	○				8.6	Tie rod ends
					9	Brake system
○					9.1	Visual check/functioal check
		○			9.2	Check/refill liquid level

1 Swivelling valve
2 Pilot valves
3 Main control valve
4 Limit of lift (no standard equipment)
5 Accumulator for pilot valves
6 Accumulator for pilot valves
7 Supporting system
8 Power steering with priority valve
9 Steering cylinder
10 Hydraulic engine - travelling mechanism
11 Flow divider
12 Tandem working hydraulic pump
13 Axial piston pump - travelling mechanism
14 Possible connections for accessories
15 Tilt cylinder
16 Lift cylinder
17 Possible connections for accessories
18 Oil cooler
19 Reversing filter
20 Slewing cylinder



1 Combi-instrument
2 Fuel indicator
3 Light-igntion switch
4 Flasher switch
5 Pressure switch
6 Universal switch
7 Frame, 6-fold
8 Warning signal flasher switch
9 Symbol, warning signal flasher switch
10 Toggle switch
11 Symbol, working headlights, front
12 Symbol, working headlights, rear
13 Symbol, windscreen wiper, front
14 Symbol, windscreen wiper, rear
15 Screen
16 Socket
17 Cover for socket
18 Drain plug
19 Coupling plug housing
20 Fuse box, 2-pole
21 Fuse box, 8-pole
22 Relay change-over contact
23 Remote switching relay
24 Warning signal flasher
25 Steering column switch
26 Tension ring half
27 H4 mounted headlights
28 Tail-brake flashlight
29 Rear reflector
30 Bulb 24V 3W
31 Holder - magnetic switch
32 Soffitten bulb 24V 15W
33 Ball lamp 24V 18W
34 Ball lamp 24V 5W
35 Halogen bulb
36 Socket for lamp base
37 Ball lamp 24V 4W
38 Signal horn
39 Rubber feed-through 8 mm
40 Mounting socket, 7-pole
41 Magnetic switch
42 Switching magnet
43 Countersunk screw M 4x20 DIN 963, galvanized
44 Coupling
45 Reversing light switch
46 Accumulators 12V 88Ah
47 Accumulator terminal +
48 Accumulator terminal -
49 Distance bush
50 Pad
51 Earthing strap
52 Connection bar
53 Protective cap 10 mm²
54 Protective cap 70 mm²
55 Fuse 16A, 6x25
56 Round plug
57 Round plug bushing
58 Halogen bulb
59 Halogen bulb
60 Internal light
61 Soffitten bulb
62 Wiper motor
63 Wiper arm
64 Wiper blade
65 Tab
66 Distance bush
67
68 Cable connector 6 mm²
69 Cable connector 10 mm²
70 Receptacle housing, 4-pole
71 Receptacle housing, 2-pole
72 Receptacle housing, 8-pole
73 Flat plug housing, 4-pole
74 Flat plug housing, 3-pole
75 Flat plug housing, 8-pole
76 Wedge base bulb 5W/1.2W
77 Flashlight, yellow
78 Carbon holder
79 Number plate lamp
80 Soffitten bulb 24V 5W
81 Toggle switch for flashing alarm lamp
82 Position flashlight