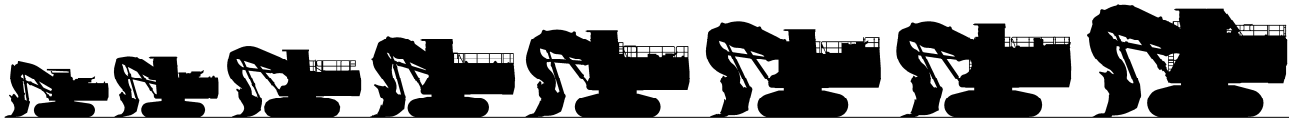
Operating Instructions

CE

Hydraulic Excavator

RH 30F No.

Bucyrus HEX GmbH



1 INTRODUCTION

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	Operating instructions	Target group
Part 1	**INTRODUCTION** **FUNDAMENTAL** **SAFETY INSTRUCTIONS**	**Operating personnel** **+** **Inspection and servicing personnel** **+** **Repair personnel**
Part 2	**OPERATION**	**Operating personnel** The operating personnel must have know-how relevant to the operation and the application of this or comparable machines.
Part 3	**INSPECTION AND SERVICING**	**Inspection and servicing personnel** The inspection and servicing personnel must have know-how relevant to the inspection and servicing of this or comparable machines.
Part 4	**REPAIR WORK**	**Repair personnel** The repair personnel must have know-how and experience relevant to the repair of this or comparable machines.
Part 5	**ANNEX**	**Operating personnel** **+** **Inspection and servicing personnel** **+** **Repair personnel**
Part 6	**INDEX**	**Operating personnel** **+** **Inspection and servicing personnel** **+** **Repair personnel**

Gas, dust, steam and smoke

Always start and operate the engine in a well-vented area;

If in an enclosed area, vent the exhaust to the outside;

Do not modify or tamper with the exhaust system

Diesel engine exhaust and some of its constituents are known to cause cancer, birth defects, and other reproductive harm

Operate fuel-operated heating systems only on adequately ventilated premises. Before starting the machine on enclosed premises, make sure that there is sufficient ventilation.

Observe the regulations in force at the respective site.

Carry out welding, flame-cutting and grinding work on the machine only if this has been expressly authorized, as there may be a risk of explosion and fire.

Before carrying out welding, flame-cutting and grinding operations, clean the machine and its surroundings from dust and other inflammable substances and make sure that the premises are adequately ventilated (risk of explosion).

Hydraulic equipment

Check all lines, hoses and screwed connections regularly for leaks and obvious damage. Repair damage immediately. Splashed oil may cause injury and fire.

Depressurize all system sections and pressure pipes (hydraulic system) to be removed in accordance with the specific instructions for the unit concerned before carrying out any repair work.

Hydraulic lines must be laid and fitted properly. Ensure that no connections are interchanged. The fittings, lengths and quality of the hoses must comply with the technical requirements.

Noise

During operation, all sound baffles of the machine must be closed.

Always wear the prescribed ear protectors.

Oil, grease and other chemical substances

When handling oil, grease or other chemical substances, observe the product-related safety regulations (see safety specifications).

Be careful when handling hot consumables (risk of burning or scalding).

Transporting and recommissioning

The machine must be loaded and transported only in accordance with the operating instructions.

Use only appropriate means of transport and lifting gear of adequate capacity.

The recommisioning procedure must be strictly in accordance with the operating instructions.

Excavator layout

Fig. 2-1:

Undercarriage

1 - Track drive
2 – Idler
3 - Track roller
4 - support roller
5 - Crawler track
6 - Track tensioner
7 - Slewing ring
8 - Ladder

Superstructure

9 – Radiator (engine cooling liquid)
10 - Fuel tank
11 - Engine
12 - Pump transfer gearbox
13 – Hydraulic pumps (main pumps)
14 - Hydraulic oil reservoir
15 - Slewing pump
16 – Pilot control pump
17 - Cooling oil pump
18 – Hydraulic oil cooler
19 – Slewing gear
20 – Batteries and battery main switch
21 – Driver`s cab with air conditioner
22 – Control panel
23 – Counterweight
24 – Grease container for central lubricating system
25 – Travel control block and rotor
26 – Air-intake system with vacuum-meter
27 – Exhaust system
28 - Ladder

Loading bucket

29 – Boom
30 - TriPower linkage
31 – Stick
32 - Bottom-dump bucket
33 - Boom cylinder
34 - Stick cylinder
35 - Tipping cylinder
36 - Bottom-dump cylinder
42 - Control valves
43 - Bottom-dump control valve
44 - Quick-action valve

Backhoe bucket

31 - Stick
33 - Boom cylinder
34 - Stick cylinder
37 - Monoblock boom
38 - Backhoe bucket
39 - Backhoe cylinder
40 - Toggle link
41 - Toggle lever
42 - Control valves

Cab interior lighting

The cab lighting is switched on and off with switch (1, Fig. 2-17:).

The power supply to the lamp is not interrupted even after the electrical system has been shut off.

The batteries may be discharged if the interior lighting remains on for prolonged periods.

Therefore, shut off the interior lighting when leaving the machine.

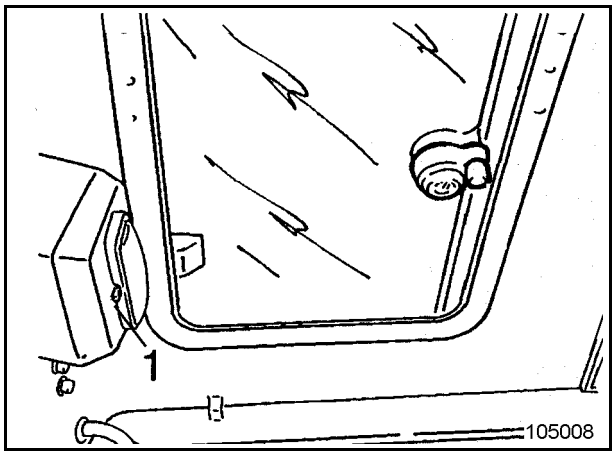

Fig. 2-17:

Screen-washer

The reservoir (1, Fig. 2-18:) for the screen-washer is located under the driver's seat.

- ➲ Open flap (2).
- ➲ Depending on the season, fill reservoir (1) either with water or with water and an antifreeze compound.

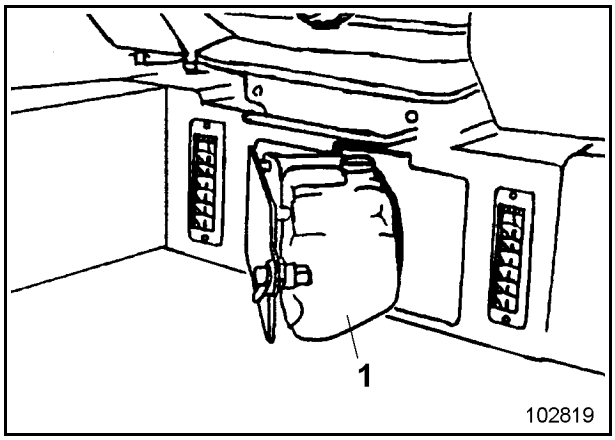

Fig. 2-18:

Fig. 2-23:

No.	Element	Function	Symbol
36	**Buzzer**	Sounds an acoustic warning when a malfunctionis reported continuous tone together with warning lamps 9,10,11,19 Intermittent tone with warning lamps 15,16,22,23 **Shut off the engine immediately and lower the working equipment to the ground when buzzer (36) sounds continuously and when one of the warning lamps indicates a fault. The buzzer continues to sound until the fault has been rectified.** **In the event of pump contamination or excessive slewing pump temperature, buzzer (36) sounds intermittently. The corresponding warning lamp lights up. The buzzer continues to sound until the fault has been rectified.**	

The refuelling system consists of an electrical pump,filling hose, switch box (2, Fig. 2-30:) and key-switch (3).

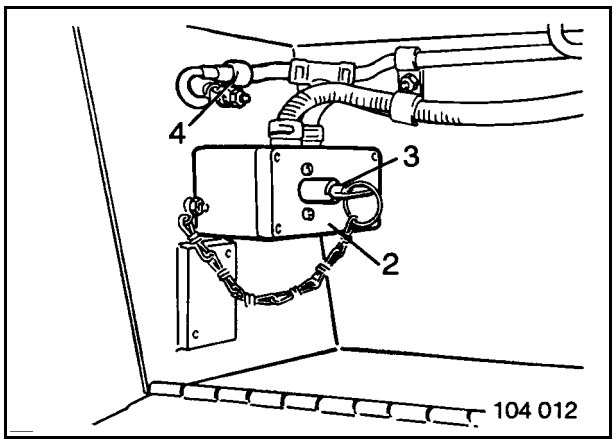

Fig. 2-30:

Check before refuelling that the earthing strap (4, Fig. 2-30:) is attached to the chassis. Sparking caused by static or electric charges may set fuel on fire.

Using the refuelling system

➲ Unscrew cap (16, Fig. 2-31:) from express coupling (17).

➲ Attach filling hose (18) to express coupling (17) and introduce into the fuel barrel. The electrical pump of the refuelling system is switched on with key-switch (14).

Switch on electrical pump only after the filling hose with the micro-filter has been immersed into the fuel barrel.

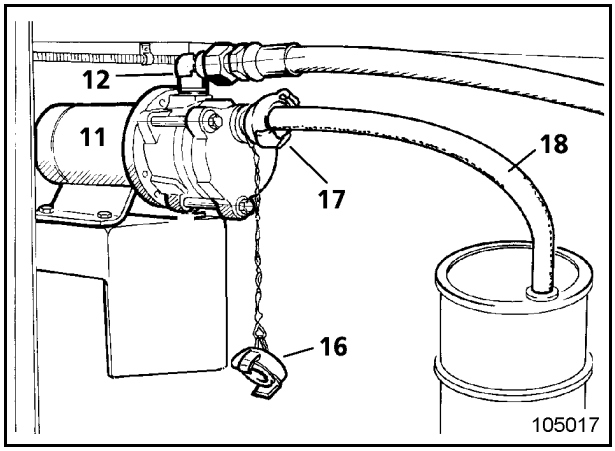

Fig. 2-31:

It is recommended to use a micro-filter in the filling line.Fuel should always be filled in through a screen.

Regulating the travelling speed

Travelling on level ground

Regulate the travelling speed with

➲ pedals (81 and 82, Fig. 2-52:) and

Turn speed regulator (71) fully clockvice (full-throttled position)

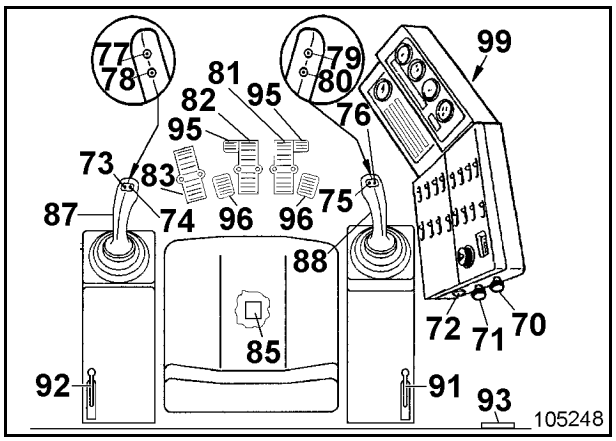

Fig. 2-52:

Travelling under special working conditions

➲ Turn potentiometer (71) clockwise until the desired maximum travelling speed has been adjusted.

➲ Turn potentiometer (70) completely clockwise for maximum travelling speed.

Regulate the travel speed with

➲ pedals (81 and 82)

Travelling uphill and downhill

Read and observe the "Travelling - Safety instructions" chapter.

Potentiometer (71) must be in fully clockwise for maximum travelling speed.

➲ Depress padals (81 and 82,) fully to the limit stop.

➲ Regulate the travel speed only with the engines speed control.

When travelling downhill, the travel retarder valve acts as a speed limiter.

The travel retarder valve works correctly if pedals (81 and 82) are fully depressed down to the limit stop.

Should the travelling speed become too high when travelling downhill release pedals (81 and 82) to stop the excavator.

Cornering

To take a right-hand corner forwards

➲ depress only peda l (82,) forwards

To take a lefthand corner forwards -

➲ depress only pedal (81) forwards -

Turning

To turn to the right

➲ depress pedal (82) forwards and pedal (81) backwards

To turn to the left

➲ depress pedal (81) forwards and pedal (82) backwards.

After daily operation

Parking the machine

- Park the machine on level and stable ground. This is particularly important in winter to avoid freezing of the tracks.
- Stand the working equipment on the ground.
- Shut off the engine.
- Shift both control levers into all directions to-depressurize the hydraulic cylinders.
- Withdraw the key from the electrical system key-switch.
- Close the cab window.
- Lock the cab door and all lockable hatches and covers on the machine.
- Clean the machine of coarse dirt as well as of combustible and easily flammable substances, if possible with a stream jet (rubber parts and electric components with compressed air - refer to information label) Otherwise, the fire and explosion hazard will exist.
- Fill up the fuel tank.
- Inspect the engine, the hydraulic system, the track rollers, support rollers, idlers and gearboxes visually for leaks.

Escaping oil pollutes the environment.

Repair leaks immediately (or have them repaired). Report oil accidents to the user of the machine.

- Check the superstructure, undercarriage and the working equipment for damage and all steel components for cracks or fractures.
- Report detected damage immediately to the user.
- Clean off gross dirt, ice and snow from the fins and the fan wheel of the hydraulic oil cooler.

NOTES

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FIRE AND EXPLOSION HAZARD

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Safety Instructions

Avoid smoking and open fire on, next to and below the machine.

Combustible and easily flammable substances or liquids increase the fire and explosion hazard.

Do not store such substances on the excavator.

Clean the excavator thoroughly, if possible, with a steam jet (rubber parts and electric components with compressed air - refer to information label), when, for example, oil, grease, fuel or cleaner was spilled.

Such substances may spontaneously ignite if they get into the vicinity of hot units or objects such as turbo superchargers.

Even battery gases can ignite in open flames or fire.

Avoid parking the excavator in places where

- combustible substances such as coal dust or tar are present.
- open or smouldering fire may occur.

Remove the excavator from such an area where combustible or easily flammable liquids have spilled from the excavator onto the ground.

Flying sparks may cause fire on the ground that can spread to the excavator.

Plan T

(Every 10 OH or every working shift

(whichever comes first)

Every 60 OH or every working shift

(whichever comes first)

Location	Servicing work	Quantity/ No.	Plan T	Plan W
Engine	Check oil level	1	●	●
Cooling system				
Cooling fluid level	Check	1	●	●
Radiator	Check / clean	1	●	●
Fuel system				
Fuel filter	Drain off water	2	●	●
Air-intake system				
Vacuum-meter	Check indication	1	●	●
Intake and clean-air lines	Check for tightness and leaks			●
Electrical system				
Lighting	Check operation		●	●
Monitoring, warning and control elements	Check function of monitoring, warning and control elements		●	●
Hydraulic system	Check function of working and travelling movement		●	●
	Inspect visually for leaks			●
Hydraulic oil reservoir	Check oil level	1	●	●
Oil cooler	Check / clean	1		●
Fan wheel	Check condition	1	●	●
Pump transfer gearbox	Check oil level	1		●
Slewing gearbox	Check oil level	1		●
	Inspect visually		●	●
	Inspect for unusual noise		●	●
Travel gearbox	Check for leaks	2	●	●
Undercarriage				
Tracks	Inspect track tension visually	2	●	●
Track roller	Check for leaks and free movement	2 x 8		●
Support roller	Check for leaks and free movement	2 x 2		●
Idler	Check for leaks	2		●
Working equipment				
Backhoe bucket	Grease	11	●	●

Lubricating chart – Grease / Backhoe bucket (legend)

No.	Greasing point	Number	Lubricant properties	Grease every .... operating hours
1	Central lubricating system – grease container	1	V [12]	10
2	Cylinder/toggle link bearing	1		10
3	Toggle link/toggle lever bearing	2		10
4	Stick/toggle lever bearing	2		10
5	Stick/backhoe bucket bearing	2x 2		10
6	Toggle link/toggle lever bearing	2		10
7	Slewing gearbox output pinion	1		10000

All other greasing points are supplied with grease by the central lubricating system.

Filling quantities - Grease

Greasing point	Lubricant properties	Filling quant. in kg
Central lubricating system – grease container	V [11]	5
Internal gearing – Roller-bearing slewing ring		20
Idler (permanent grease filling)	**Tribol** Terex Germany P/No. 2764564	2 x 1.3

[12] cf. "LUBRICANTS" section

Changing the engine oil

Read and observe: "Inspection and servicing – Safety instructions".

Risk of scalding from hot engine oil.

The engine may also be hot.

Wear protective gloves and firm working clothing.

Collect escaping oil and discard without polluting the environment.

- Bring engine oil to operating temperature.
- Park the machine on a horizontal surface and secure.
- Shut off the engine.
- Drain off engine oil using the oil draining hose. The use of the oil draining hose is described in the "Draining hose for oil changes" chapter.

After the engine oil has drained away:

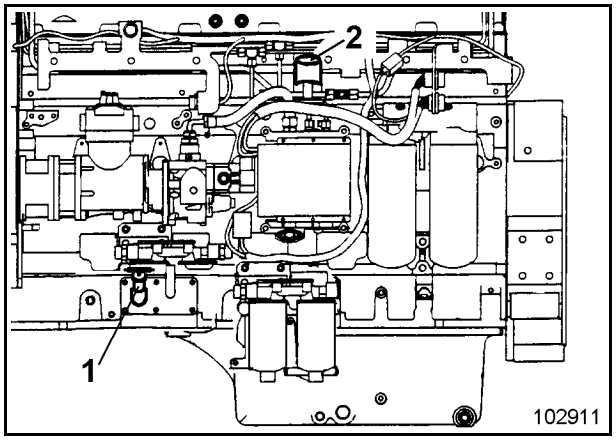

Fig. 3-12:

After draining of the oil:

- Replace the engine oil filter.
- Remove the hose line.
  The automatic drain coupling closes automatically.
- Screw on protective cap.
- Fill in engine oil through the filler tube (2, Fig. 3-12:) until the oil level reaches the "max" mark (Fig. 3-13:).
- Start the engine and allow to run for abt. 2 minutes at idling.
- Check oil level and top up with oil up to the "max" mark, if required.

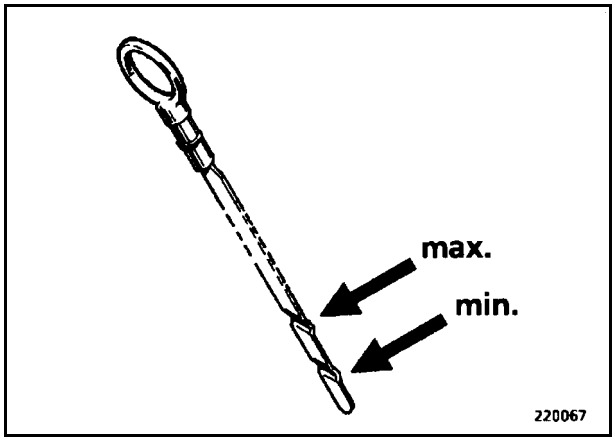

Fig. 3-13:

Replacing the fuel filter

Read and observe the "Inspection and servicing – Safety instructions" chapter.

Collect escaping fuel and discard without polluting the environment.

Avoid skin contact with diesel fuel.

Diesel fuel may cause skin injury.

Wear firm working clothing.

Wear protective gloves or use a barrier cream.

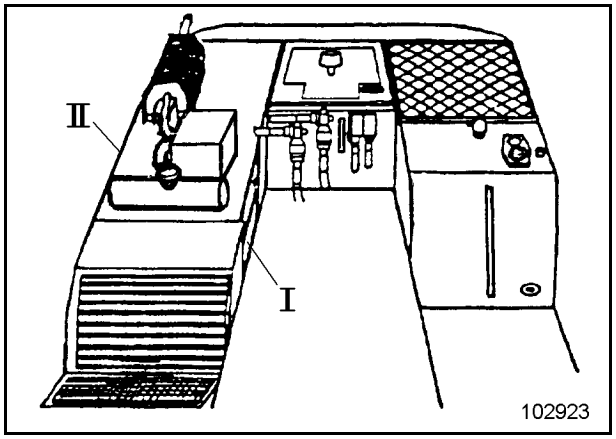

Fig. 3-34:

- Open hatch I (Fig. 3-34:) to gain access to the filters.
- Unscrew filters (3, Fig. 3-35:).
- Fill new filter with clean fuel and screw it onto the filter head by hand.
- Continue to tighten filter by a further 1/2 to 3/4 turn.

Tightening the filter element with a tool may damage or deform the filter head.

The fuel filters (3) serve at the same time as water

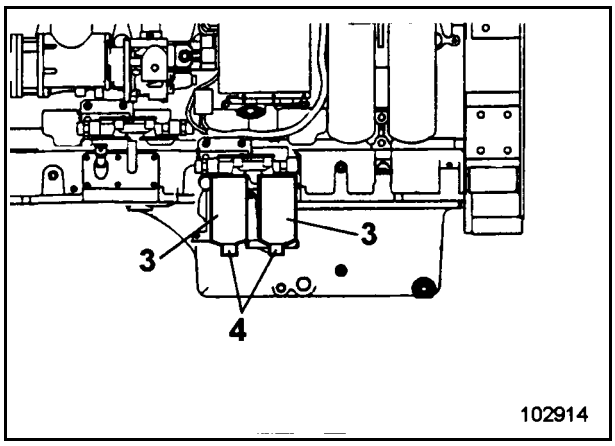

Fig. 3-35:

- Open valve (4) and drain off water until fuel emerges.
- Close valve (4).

Venting the fuel system

The fuel tanks are vented with breather valves (4, Fig. 3-36:).

Clean breather valves regularly.

- Remove breather valve, flush with paraffin oil and blow clean with compressed air.

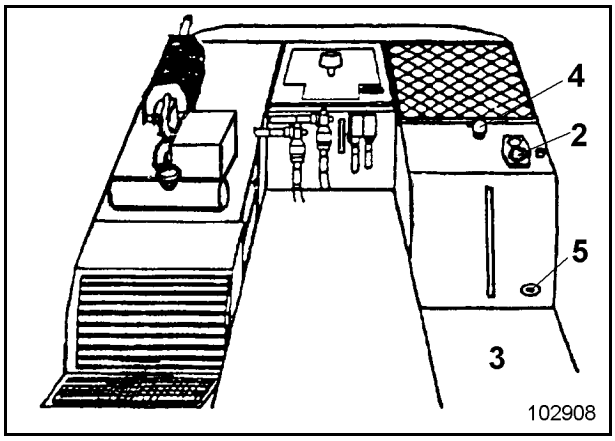

Fig. 3-36:

Breather filter

Read and observe the "Inspection and servicing - Safety instructions" chapter.

Shut off the engine.

Risk of scalding caused by hot hydraulic oil.

The hydraulic oil reservoir itself may also be hot.

Avoid skin contact.

Skin contact with hydraulic oil may cause skin injury.

Wear protective gloves and firm working clothing.

Replacing the filter elements

The breather filters (20, Fig. 3-53:) ensure venting of the hydraulic oil reservoir at varying hydraulic oil levels.

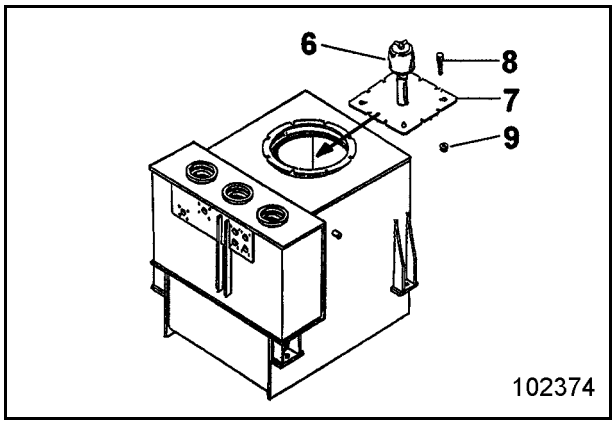

Fig. 3-53:

➲ Unscrew butterfly nut (50, Fig. 3-54:). Withdraw hood (51) and withdraw filter element (52) from the holding rod.

➲ Insert new sealing ring (53) and new filter element and secure hood (51) with nut (50).

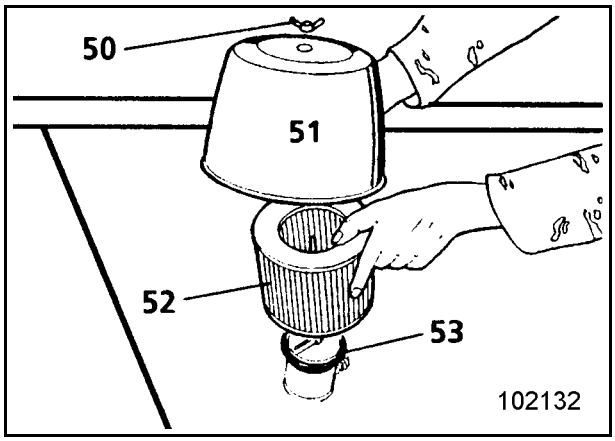

Fig. 3-54:

Gearbox venting

The gearbox is vented through breather filter (2, Fig. 3-69:).
Clean breather filter in accordance with the servicing plan.

- ➲ Unscrew breather filter, clean in white spirit or paraffin oil and blow dry with compressed air.
- ➲ Screw breather filter back in place.

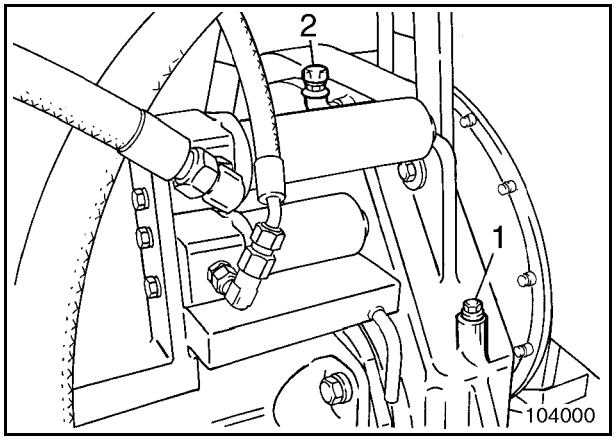

Fig. 3-69:

Slewing ring - Checking the grease filling

Read and observe: "Inspection and servicing - Safety instructions.

Shut off the engines

Wear protective gloves and firm protective clothing.

At regular intervals

- ➲ check internal gearing and teeth of slewing mechanism pinion for condition
- ➲ check that the grease filling is sufficient.

The housing must always contain enough grease for the gearing - measured from its lower edge - to run in **at least 20 mm** of grease over its whole circumference (Fig. 3-86:).

In the event of greater grease losses, eliminate cause immediately and add grease to prevent the internal gearing and the pinion from being damaged by continued slewing movements.

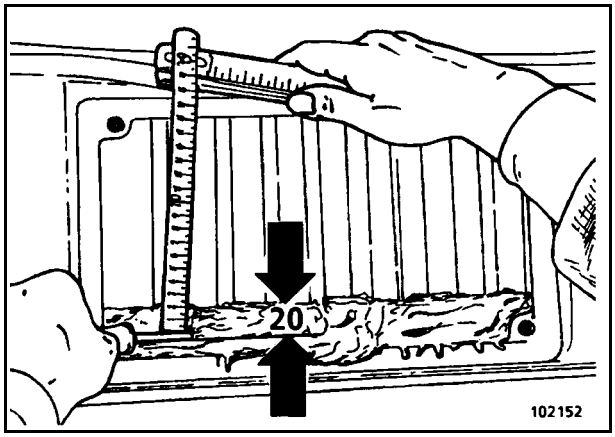

Fig. 3-86:

Slewing ring - Filling in grease

Prior to initial commissioning, the grease trough of the internal gearing must be filled with grease.

Add grease when

- the housing has been replaced
- old grease has been removed in the course of other work.

Always fill in fresh grease by hand.

Risk of accidents. Never slew the superstructure when refilling grease.

Slewing ring - Checking the screws for tightness

The fastening screws of the slewing ring in the superstructure and the undercarriage are tightened with their respective check torque (cf. "Tightening torques" table).

When these values are reached, the fastening screws are perfectly tight.

Loosen slack screws before tightening them with a torque wrench to the prescribed torque (cf. table "Tightening torques and angles).

NOTES

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HYDRAULIC SYSTEM

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Repair

Always depressurize the hydraulic system before disconnecting any hydraulic hoses.

Replace damaged or leaking hydraulic hoses by new ones. Use original Terex-Germany spare parts. These parts are specially suitable for the respective function. Do not re-use used hoses.

Dispose of spilt oil and oily wastes without polluting the environment. These wastes must not be allowed to penetrate into the soil.

Hydraulic hoses should be replaced after a service life of 6 years.

Read and observe also the "Inspection and servicing - Safety instructions" chapter.

Working hydraulics – Fault table

Fault								Remedial action	
Working and slewing functions not operational								Check	**P**
	No boom function							Adjust	**E**
		No bucket function						Replace	**W**
			No backhoe function					Top up	**A**
				No stick function				Reduce	**S**
					Working movements too slow			Clean	**R**
						Power loss in working hydraulics			
							Uncontrolled working movements	1) Contact the Terex-Germany Service	
							Cause	**Abschnitt**	
•							Servo control not activated/defective	Working	**P**
•	•	•	•	•		•	Malfunction of pressure-relief valve		**1)**
•						•	Servo system pump defective		**1)**
	•	•	•	•	•		• Malfunction of primary / sencondary pressure-relief valves		**1)**
					•		Engine speed too low		**P**
					•		ECO-power switch in 80%-position		**P**
					•		Fuel filter contaminated	Fuel filter	**P/W**
					•		Insufficient engine power	Engine malfunction	**1)**
					•		Hydraulic oil temperatur too high (warning lamp lit, PMS fault indicator lamp lit) oil cooler contaminated	Hydraulic oil cooler clea-ning	**P/R**
					•		Engine coolant temperature too high (warning lamp lit and PMS fault indicator lamp flashing)		**1)**
						•	Malfunction of solenoid valves		**1)**
					•	•	Malfunction of control spool		**1)**
•							Engine coupling defective		

ABBREVIATIONS

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A	Four-wheel drive
A	Ampere (SI base unit of electric current)
A2	2-point bracing (claws)
A4	4-point bracing (claws)
abt.	about
ABE	General Operating Permit [Germany]
acc.	according to
Ah	Ampere hours (SI base unit of quantity of electricity)
AOT	Upper part of boom
API	American Petroleum Institute
approx.	approximately
AUT	Lower part of boom
BA	= OI = Operating instructions
Bh	= OH = Operating hour
CE	Communauté Européenne = European community
CECE	Committee for european Construction Equipment (Defines a measure for bucket, grab or scoop filling)
CEN	European Standardization Committee
cm	centimeter (= $^{1}/_{100}$ m)
cm^3/rev	Cubic centimeters per revolution
dB(A)	Decibel (sound intensity according to measuring method A)
dia.	Diameter
DIN	German Industrial Standard
EDS	Electronic diagnostic system
eff.	effective
e.g.	for example
etc.	etcetera
Fig.	Figure, serial number of illustration
FOPS	Falling objects protective structures
FS	Rock shovel (working equipment)
GLR	Full-load controller (electronic module for PMS)
HD	Heavy duty
HDS	Heavy duty small
Hydr.	Hydraulic, Hydraulics
i	Transmission ratio
i.e.	id est = that is
IFN	ISO service rating, blocked

incl.	including, inclusive of
ISO	International Standardization Organization
kg	Kilogram (unit of weight)
kg/dm^3	Kilograms per cubic decimeter (= unit of specific density)
km/h	Kilometers per hour
kNm	KiloNewtons per meter (1 kNm = 1000 Nm) = unit of torque
kW	Kilowatt (1 kW = 1.36 hp)
l	Liter
Lb/in^2	Pounds per square inch (= psi)
LC	Long crawler
LDA	Charge pressure-dependent full-load limiter
LED	Light-emitting diode
l/min	Liters per minute
LpA	Sound pressure at workplace
LPS	Load-sensing Power System
LS	Limited slip
LS	Load sensing
LwA	Sound power level of the machine in stationary operation
m	Meters
M_A	Tightening torque
MA	Milliampere (=$^{1}/_{1000}$**A**)
max.	maximal, maximum
MH	Mobile hydraulics (excavator)
MHS	Mobile hydraulic excavator for road and rail operation
min.	minimal, minimum
min^{-1}	Revolutions per minute
mm	Millimeter (=1/1000 m)
MONO	Monoblock boom
N	Normal, standard version
N, kN	Newton, kiloNewton (unit of force)
NLGI	National Lubricating Grease Institute (USA)
NLGI--Klasse	Consistency - lubricant classification acc. to DIN 51 818
Nm	Newtonmeter (unit of torque)
No.	Number
OH	Operating hour
OLS	Terex load stabilization
op.inst.	Operating instructions
OW	Superstructure