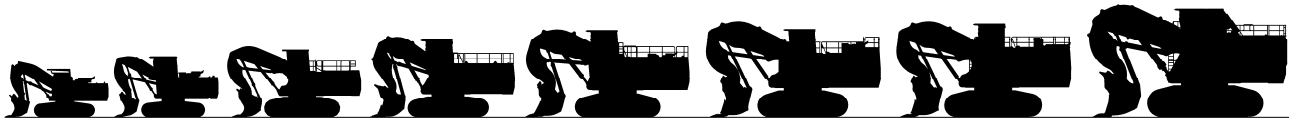
Operating Instructions

CE

Hydraulic Excavator

RH 40E No.

Bucyrus HEX GmbH



FUEL SYSTEM

ELECTRICAL SYSTEM

HYDRAULIC SYSTEM

2804199

Preface

These operating instructions are designed to familiarize the operator with the machine and its designated use.

The instruction manual contains important information on how to operate the machine safely, properly and with maximum efficiency. Observing these instructions helps to prevent hazardous situations, to reduce repair costs and downtimes and to increase the reliability and service life of the machine.

The instruction manual must be supplemented by the respective national rules and regulations for accident prevention and environmental protection.

The operating instructions must always be available in the operator's cab of the machine.

The operating instructions must be read and put into practice by any person in charge of carrying out work with or on the machine, such as

- **operation,** including setting-up, troubleshooting in the course of work, care, evacuation of production waste and disposal of fuels and consumables.
- **maintenance** (inspection, servicing, repair) and / or
- **transport.**

In addition to the operating instructions and the mandatory rules and regulations for accident prevention and environmental protection in the user's country and at the place where the machine is to be used, the generally recognized technical rules for safe and proper working must be observed. [1]

The operating instructions are directed to the construction-machine specialist. They cannot provide basic know-how. This can be acquired, for example, in several days' instruction by a qualified O&K-Mining mechanic or by attending an O&K-Mining training course for operators or maintenance personnel.

The **O&K-Mining after-sales service** will be pleased to deal with any queries you may have after reading through the operating instructions.

All O&K-Mining operating manuals are issued in German and then translated. Even a good translation may give rise to questions which O&K-Mining will be pleased to answer.

The operating instructions are not working instructions for carrying out major **repairs**. Such work is willingly done for you by the **O&K-Mining after-sales service**.

The documentation relating to the machine is listed according to scope, quantity and language in the shipping note of the machine or in the covering letter if supplied separately. The operating instructions and spare-parts list are marked with the serial number of the machine.

On taking receipt of the consignment, please check that the documentation is complete and in the language requested by you. □

Warranty

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O&K-Mining's warrenty is subject among other things to the maintenance works described in the Owner's Manual having been performed by the O&K-Mining Service or by a workshop authorized in writing by O&K-Mining to perform such work.

□

[1] Complies with VDMA recommendation "Operating instructions"

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PART 2 - OPERATION

Operating manual		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**

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Signs

Warning and instructions signs

Observe the warning and instruction signs attached to the machine.

Keep the signs legible and clean.

Replace the signs immediately if they have become illegible.

New warning and instruction signs can be ordered from the O&K-Mining pare-Parts Service. The part order numbers are set out in the spare-parts list of the machine.

Fig. 2 shows the location of warning and instruction signs on the machine.

Machine number

The identification plate with the machine number is attached to the front side of the A-frame (arrow, Fig. 3 and Fig. 4).

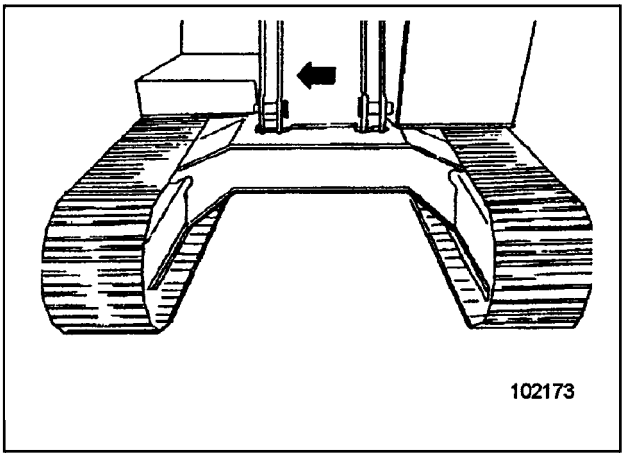


Fig. 3

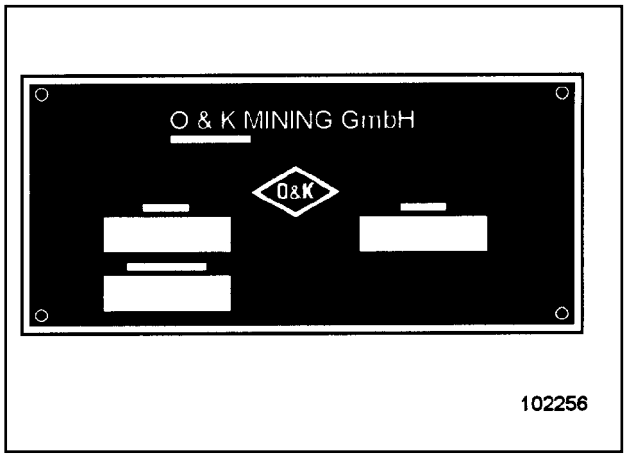


Fig. 4

Engine number

The identification plate (Fig. 5) with the engine number is attached to the engine.

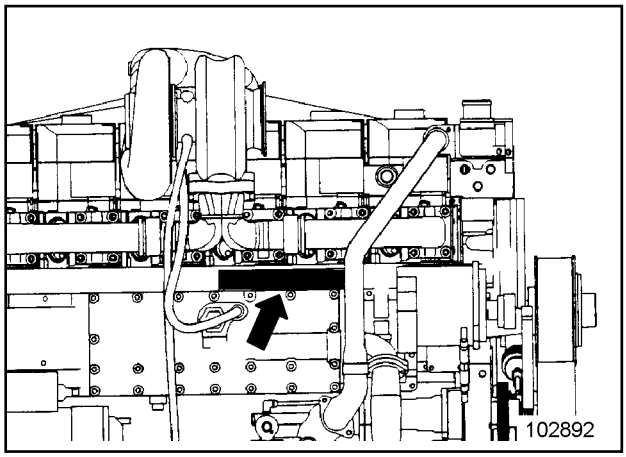


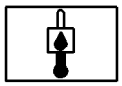
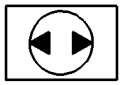
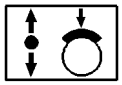
Fig. 5

Component numbers

Also the other larger units have identification lates indicating, among other things, their serial number.

On steel components, the O&K-Mining part number or the serial number may be stamped into the metal at a clearly visible place.

(Fig. 3)

No.	Designation		Function	Symbol
14	**Thermometer**	**Hydraulic oil temperature**	Indicates the temperature of the oil in the hydraulic reservoir.	
15	**Warning lamp**	**Slewing pump contamination**	Lit when the slewing pump is contaminated with metallic particles.	
16	**Warning lamp**	**Slewing pump temperature**	Lit when the temperature of the slewing pump is too high.	
17			Free for optional equipment	
18			Free for optional equipment	
19	**Warning lamp**	**Min. hydraulic oil level**	Lit when the hydraulic oil level is below limit value. **Shut off engine**	
20	**Warning lamp**	**Min. fuel**	Lit when the fuel has been used up, so that there is only the fuel reserve (abt. 115 l) left	
21	**Indicator lamp**	**Track parking brake**	Lit when the parking brake is applied. - The parking brake is automatically applied when the machine is stationary. - The parking brake is automatically released when the "Travel" function is active.	
22	**Warning lamp**	**Main pump I contamination**	Lit when the hydraulic pump I is contaminated with metallic particles	
23	**Warning lamp**	**Main pump II contamination**	Lit when the hydraulic pump II is contaminated with metallic particles	
24			Free for optional equipment	
25			Free for optional equipment	

(Fig. 8)

No.	Element		Function	Symbol
70	**Speed control**	**(Potentiometer)**	Controls the engine speed - turn counter-clockwise to the limit stop: idling speed - turn clockwise to the limit stop: full speed	
71			not in use	
72	**Key-switch**		Activation /De-activation of electrical system Position 1: function check of indicator and warning lamps in satellites I and II and of buzzer Position 3: starting of engine	
73			Free for optional equipment	
74			Free for optional equipment	
75			Free for optional equipment	
76			Free for optional equipment	
77			Free for optional equipment	
78			Free for optional equipment	
79	**Pushbutton**	**Boom-floating position (with shovel equip-ment)**	When actuated: boom cylinders are pressurized when when retracted. (only for loading shovel equipment) **Depress button (79) only when control lever (88) is in position "0"**	
80	**Pushbutton**	**Horn**	Sounding of the horn	
81	**Pedal**	**Travelling, right track**	forwards / backwards	
82	**Pedal**	**Travelling, left track**	forwards / backwards	
82	**Pedal**	**Bottom dump**	Opens/closes the bucket bottom	

Driving - Safety instructions

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Have the attachment raised only so far as to permit the machine to be driven under overhead power lines without any risk.

Close the cab door.

If the machine is fitted with a safety belt for the operator, fasten the belt.

If the superstructure is turned by more than 90° from the BASIC POSITION, the excavator travels in the opposite direction to that selected.

If the position of the superstructure in relation to the undercarriage is not exactly known, touch the accelerator lightly to see which direction the machine takes, before initiating the full travelling movement.

Warn persons in the immediate vicinity by sounding the horn before setting off.

Never drive across slopes.

Take the utmost care on slippery, greasy ground.

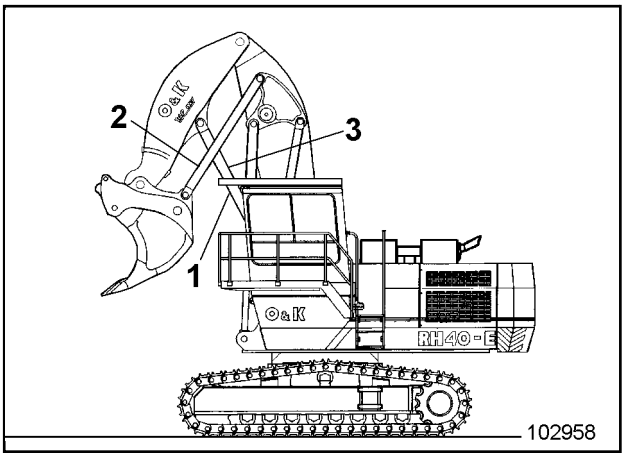

Fig. 1

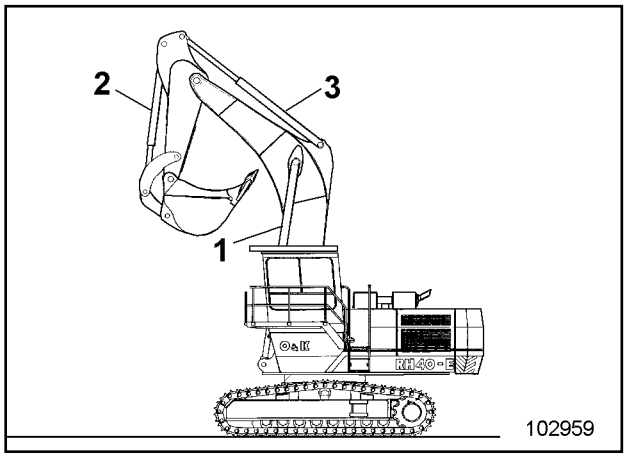

Fig. 2

Running-in specifications for components of the crawler tracks

Prior to initial commissioning and/or after repair work, run in the idlers, track rollers and support rollers as follow:

- **Raise the equipment (Fig. 1 and 2)**
- **Drive the excavator in reverse approx. 50 m.**
- **Drive the excavator in forwards approx. 50 m.**
- **Stop the excavator.**
- **Measure the temperature at each idler, track roller and support roller with an infrared thermometer. (at a temperature of approx. 100° C wait for idlers, track rollers and support rollers to cool down).**
- **Repeat this running-in procedure up to 10x.**
- **Check all idlers, track rollers and support rollers for leaks.**

The engine must be at operating temperature before being subjected to full load.

If the machine is to be driven a longer distance, the superstructure must be secured against turning by means of the locking bolts and the holding brake. The machine is then in its basic position.

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WORKING OPERATION

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Before starting work

Prior to initial commissioning and after repairs on the central lubricating system or the hydraulic cylinders, move the unloaded equipment for abt. 5 minutes.
This is required to ensure an adequate supply of grease to the cylinder bearing when the works starts.

Warming up

At low outside temperatures it is necessary to run the hydraulic system up to operating temperature. The temperatures at which warming up is necessary depend on the type of hydraulic oil used (cf. also "Oils for hydraulic systems").

To warm up the system, run the engine at approximately 2/3 of full speed before performing for abt. 10 minutes working movements with the unloaded excavator.

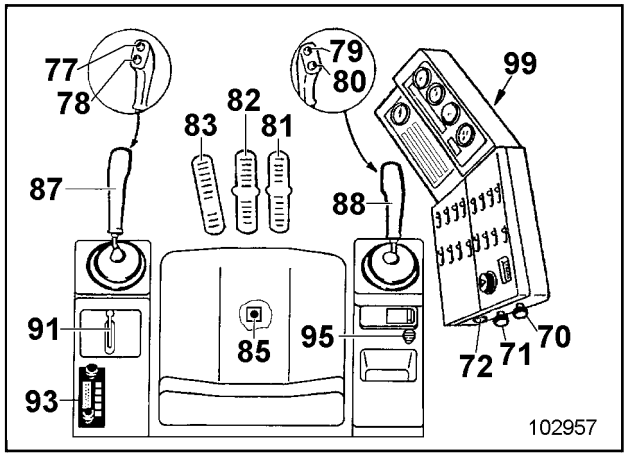

Fig. 1

Switching on the pump servo system

Activating and de-activating the pump servo control

The hydraulic pump servo control is activated by means of button switch (85, Fig. 1).

Servo control activated -
The driver is sitting in his seat.

Servo control de-activated -
The driver's seat is empty.

Slewing and braking the superstructure

To slew the superstructure to the right - shift control lever (87, Fig. 1) to the right.

To slew the superstructure to the left - shift control lever (87) to the left.

The control lever returns automatically to neutral position when released and the superstructure is braked in accordance with the braking valve setting.

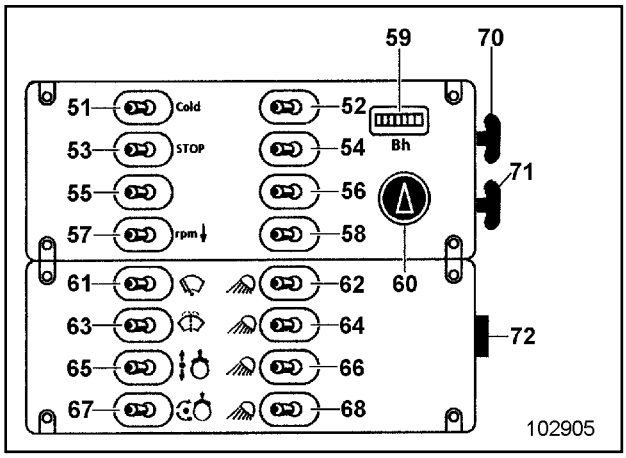

Fig. 2

Switch on the "hold" function of the superstructure slewing brake with push-button (65, Fig. 2)

The slewing brake is released automatically when the "superstructure slewing" function is activated.

Depress button (67) only when the superstructure is stationary.

Hydraulic hammer

Working with the hydraulic hammer - Safety instructions

Nobody must stand in the hazard range of the hammer:
risk of injury by splintering stones.

Stop the work immediately if persons enter the hazard range of the hammer or the machine.

Close the front window of the machine before putting the hammer into operation.
Mount a protective grid as a splinter protection.

Wear ear protectors.

Operate the hammer only when sitting in the driver's seat.

The power of the machine and that of the hydraulic hammer must be adapted to each other. In case of doubt, contact the O&K Mining Service.

Do not change the setting of the pressure-relief valves without approval and do not remove lead seals.

Observe the operating instructions of the hammer manufacturer.

Stop the work immediately when oil losses are detected. Collect escaping oil and dispose of it without polluting the environment.

Report oil accidents immediately to the user or his representative.

Repair leaks and damage immediately.

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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.

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Plan T - Every 10 OH or every working shift (whichever comes first)

Plan W - Every 60 OH or weekly (whichever comes first)

Location	Servicing work	Quantity / No.	Plan T	Plan W
Engine	Check oil level	1	•	•
Cooling system				
Cooling liquid	Check level	1	•	•
Radiator	Check contamination/clean		•	•
Fuel system				
Fuel filter	Drain off water	2	•	•
Refuelling station (option)				
- Earthing strap (equipotential bonding)	Check tightness	1	•	•
Water trap (optional)	Drain off water	1	•	•
Air-intake system				
Vacuum-meter	Check indication	1	•	•
Intake and clean airlines	Check for tightness and leaks			•
Electrical system				
Lighting	Check operation		•	•
Monitoring, warning and control elements	Check operation		•	•
BCS	Check operation		•	•
Hydraulic system	Inspect visually for leaks			•
Hydraulic oil reservoir	Check oil level	1	•	•
Oil cooler	Check / clean	1		•
Fins /fan wheel	Remove contamination, ice and snow		•	•
Pump transfer gearbox	Check oil level	1	•	•
Slewing gearbox				
Expansion reservoir	Check oil level	1	•	•
Venting bore	Check / clean	1		•
Travel gearbox	Check for leaks	2	•	•
Working equipment				
Backhoe bucket	Grease	11	•	•
Undercarriage				
Tracks	Inspect track tension visually	2	•	•
Track roller	Check for leaks and free movement	16	•	•
Support roller	Check for leaks and free movement	4	•	•
Idler	Check for leaks	2	•	•

Lubricating chart - Grease / Backhoe Bucket (legend)

Pos.	Greasing point	Number	Lubricant properties	Grease every .... operating hours
1	Central lubricating system - grease container	1	V 1)	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	2 x 2		10
6	Toggle link/toggle lever bearing	2		10
7	Hinge (cab door)	3		1000

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

Refilling quantities - Grease

Greasing point, component	Lubricant properties	Filling quantities in kg
Central lubricating system - grease container	V 1)	5
Internal gearing - roller bearing slewing ring		28

1) Cf. section "Lubricants"

Bh = OH = Operating hours

Changing the engine oil

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

Risk of scalding caused by hot engine oil.

The engine itself may be hot, too.

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:

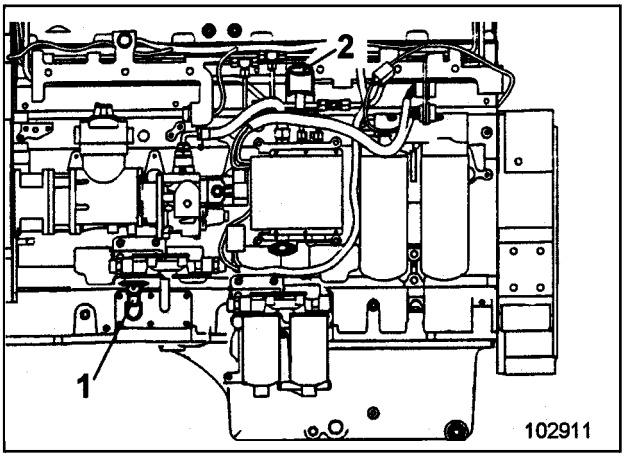

Fig. 3

- Replace engine oil filter.
- Unscrew draining hose to allow oil drain plug to close automatically.
- Screw protective cap back in place.
- Fill in engine oil through the filler tube (2, Fig. 3) until the oil level reaches the "max" mark (Fig. 4).
- 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.

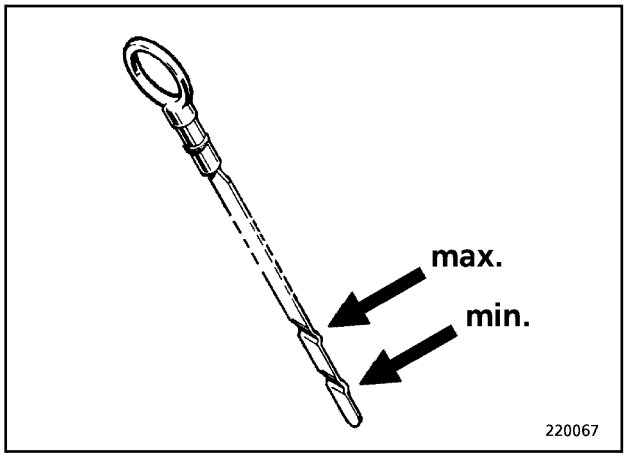

Fig. 4

Changing 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.

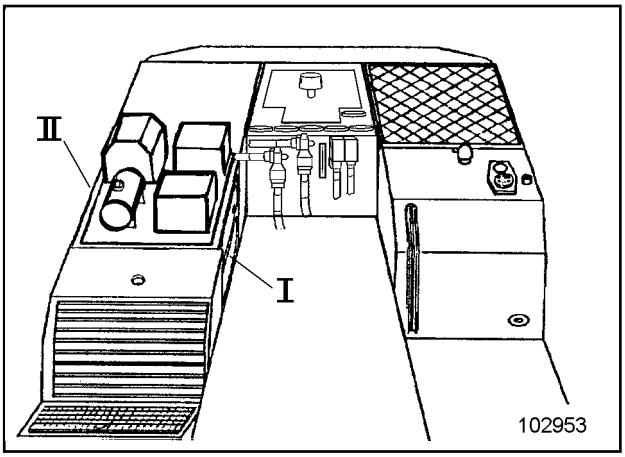

Fig. 2

- Open hatch I (Fig. 2) to gain access to the filters.
- Unscrew filters (3, Fig. 3).
- 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 can damage or deform the filter head.

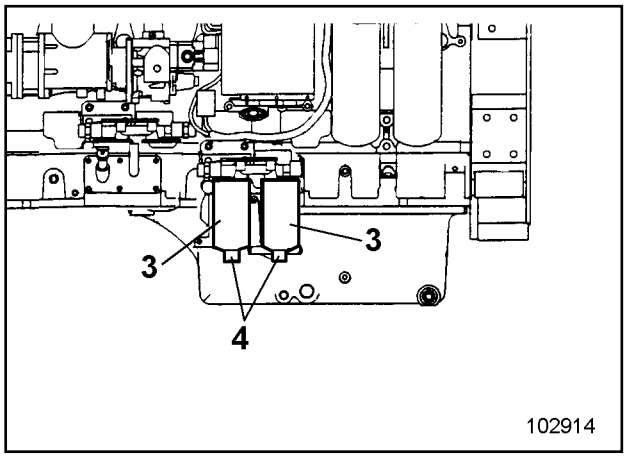

Fig. 3

The fuel filter (3) serves at the same time as a water separator.

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

Venting the fuel system

If the fuel tank is completely emptied in operation, the fuel system must ebe vented. Cf. engine operating instructions.

The fuel tank is vented with breather valve (4, Fig. 4).

Clean breather valve regularly.

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

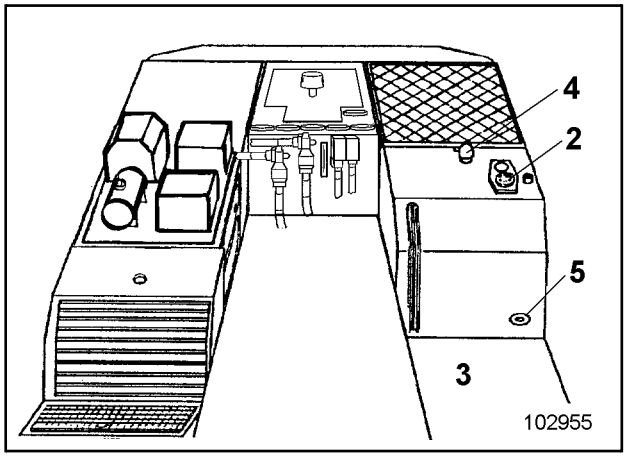

Fig. 4

Bypass valves (working circuit)

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

Shut off the engine.

Risk of scalding caused by hot hydraulic oil.

The hydraulic reservoir itself may also be hot.

Avoid skin contact.

Contact with hydraulic oil can cause skin injury.

Wear protective gloves and firm working clothing.

Collect escaping hydraulic oil and discard without polluting the environment.

Cleaning the sieve

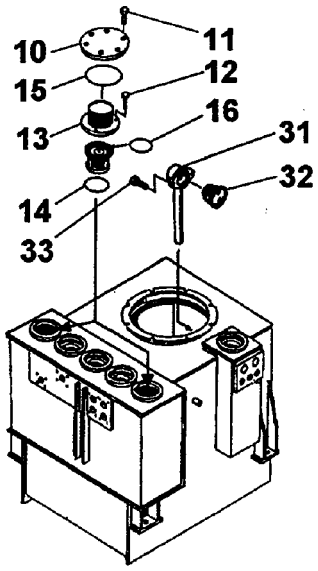

Fig. 7

- Remove cover (10, Fig. 7). Remove screws (12) and take out the bypass valve. Withdraw sieve (13) and clean in white spirit or paraffin oil. Replace, if required.
- Check sealing ring (16) for damage and replace, if required.
- Re-assemble the bypass valve.
- Check sealing rings (14 and 15) for damage and replace, if required.
- Insert the bypass valve. Make sure the valve fits properly.
- Refit cover (10) with sealing ring (15).

Replacing the bypass valves and the sealing rings

- Remove the bypass valve as described under "Cleaning the sieve".
- Re-assemble new bypass valve with sieve (13) and new sealing ring (16).
- Insert bypass valve with new sealing ring (14).
- Refit cover (10) with new sealing ring (15).

Group	Inspections prior to commissioning		Regular
	at the factory	at the place of use	inspections
II p ≥ l bar und p˙l ≤ 200	Pressure testing Manufacturer s certificate of satisfactory manufacturer and pressure testing	Inspection certificate (check of correctness and correct installation) issued by authorities	Test programme to be drawn up by end user based upon experience with the type of operation and fluid.

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CENTRAL LUBRICATING SYSTEM

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Design and function

The excavator is equipped with an automatic central lubricating system ensuring regular the regular supply of grease to all greasing points except those mentioned in the "Lubricating chart - Grease" for the backhoe bucket.

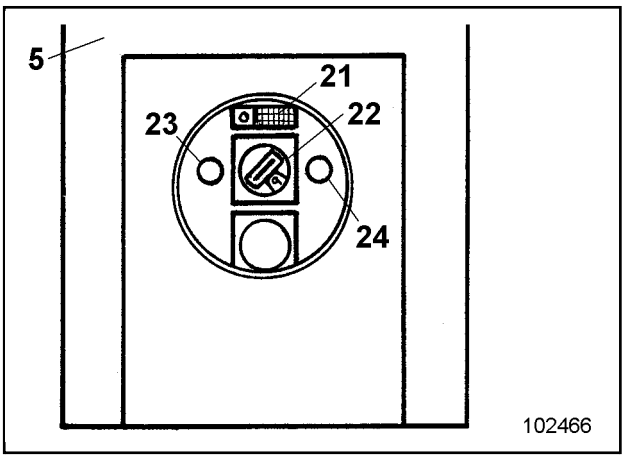

Fig. 1

When the electrical system is switched on with the key- switch, the indicator lamp (23, Fig. 1) lights up and the lubricating system is activated.
The indicator lamp (23) is visible after removing cover (20, Fig. 2).
All lubricating points connected to the system are greased at regular intervals. During the greasing cycle, indicator lamp (24, Fig. 1) is lit up.

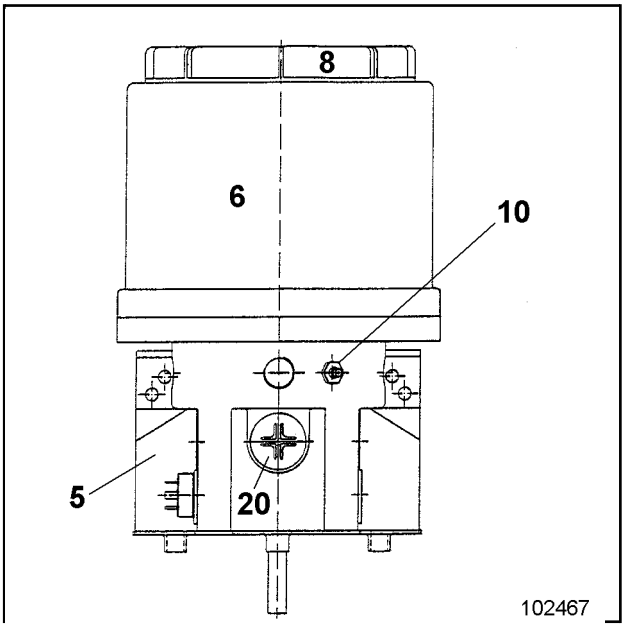

Fig. 2

A grease pump (5, Fig. 3) with attached grease container (6) pumps the grease through lines (7) to the main distributors (17 and 18, Fig. 3 and Fig. 4).
There is no main distributor (18) if the excavator is equipped with a backhoe bucket.

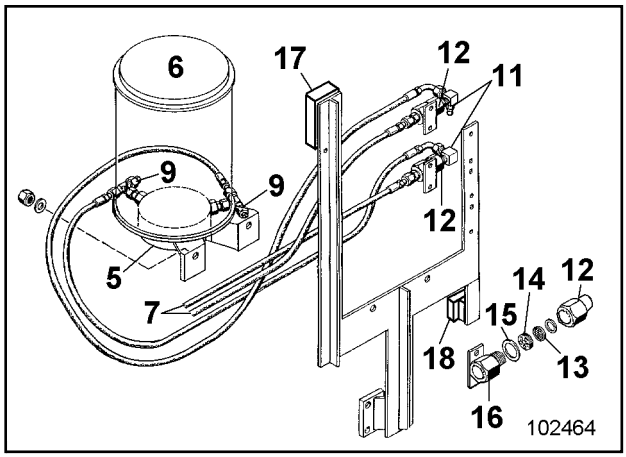

Fig. 3

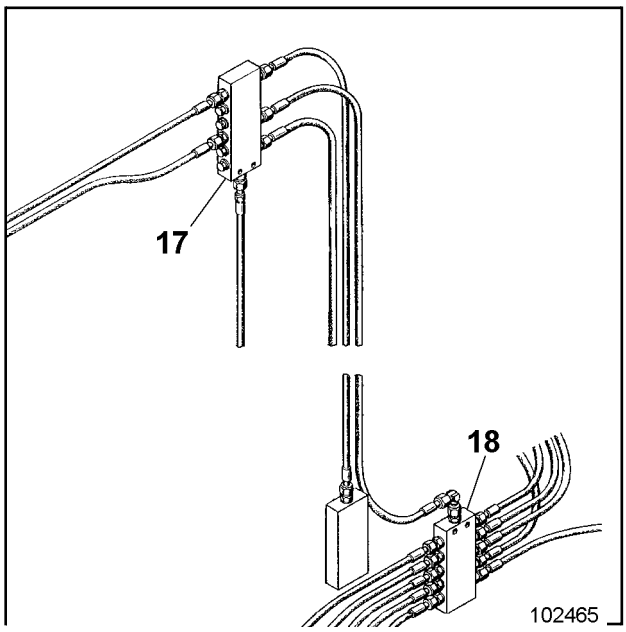

Fig. 4

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Repair work - Safety instructions

Operating instructions

Never carry out repair work without having read and understood the operating instructions.

Pay special attention to:

"Fundamental Safety Instructions",

"Inspection and servicing - safety instructions"

and all warnings and safety instructions attached to the machine.

The descriptions of job sequences provide only experienced personnel with the necessary instructions.

The operating manual must be kept with the machine at all times.

Repair personnel

Repair personnel must have know-how and experience relevant to repairing this or comparable machines.

In the absence of such know-how, meticulous training must be given by experienced repair personnel, e.g. from O&K-Mining.

Working in greater heights

Always wear safety harnesses when working at greater heights.

Wear an approved safety harness; it must be equipped with fall arresters and safety cables.

Prestressed units

Never open defective prestressed units but replace them as an entirety.

In exceptional cases, open only when the system and the operating sequence are precisely known and any special tools required are available.

The operating manual contains no information on this point.

Dismantling components

Never do dismantling while the machine is at operating temperature.

Oils, greases, brake fluid or coolants may have a high temperature and result in burning or scalding.

Leave time for the machine to cool down.

Before starting work, depressurize piping and hoses, cylinders, radiator, hydraulic tank and other systems or units.

Replace defective components in good time to prevent major damage.

Clean the defective component carefully before dismantling it.

Mark the dismantled parts in the correct sequence to faciliate re-assembly.

When dismantling the component, close off exposed hose and piping connections, exposed drill holes and housings carefully to prevent any dirt from penetrating.

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PART 5 - ANNEX

Operating manual		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**

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PART 6 - INDEX

Operating manual		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**

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