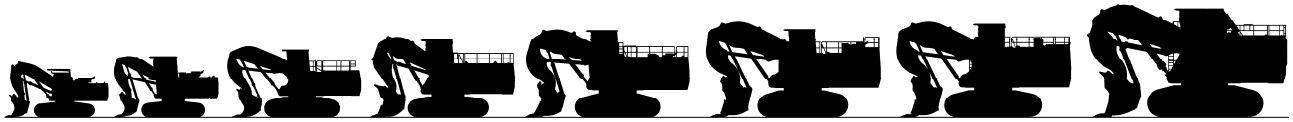
Operating Instructions

CE

Hydraulic Excavator

RH 40E 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

11 – Engine
12 - Fuel tank
13 – Reservoir (cooling liquid)
14 – Radiator (engine cooling liquid)
15 – Air-intake system with vacuum-meter
16 – Exhaust system
17 – Pump transfer gearbox
18 – Hydraulic pumps (main pumps)
19 – Hydraulic pump (fan drive)
20 – Slewing pump
21 – Pilot control pump
22 – Cooling oil pump
23 – Hydraulic oil cooler
24 – Hydraulic oil reservoir
25 – Slewing gear
26 – Batteries
27 – Driver`s cab
28 – Control panel
29 – Travel control block and rotor
30 – Grease container
31 – Counterweight
32 – Air conditioner
33 – Switch cabinet with PMS and SPC
34 – Ladder
35 – Ladder

Loading bucket

41 – Boom
42 - TriPower linkage
43 – Stick
44 - Bottom-dump bucket
45 - Boom cylinder
46 - Stick cylinder
47 - Tipping cylinder
48 - Bottom-dump cylinder
54 - Control valves
55 - Bottom-dump control valve
56 - Quick-action valve

Backhoe bucket

43 - Stick
45 - Boom cylinder
46 - Stick cylinder
49 - Monoblock boom
50 - Backhoe bucket
51 - Backhoe cylinder
52 - Toggle link
53 - Toggle lever
54 - Control valves

Fire-extinguisher

(optional equipment)

The excavator cmay be equipped with a fire-extinguisher (arrow, Fig. 2-17: and Fig. 2-18:).

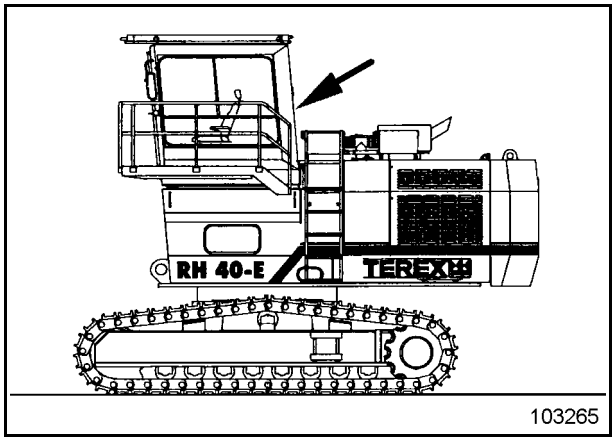

Fig. 2-17:

The excavator driver and the maintenance personnel must inform themselves about how to handle the fire-extinguisher in order to be able to act fast and efficiently in case of beginning fires. Such instruction should be given by a qualified instructor.

Extinguishing agent

Each filre-extinguisher is filled with 12 kg of Glutex. This extinguishing agent is used for fighting fires of classes A, B and C. Fires are extinguished fast, perfectly and without residues.

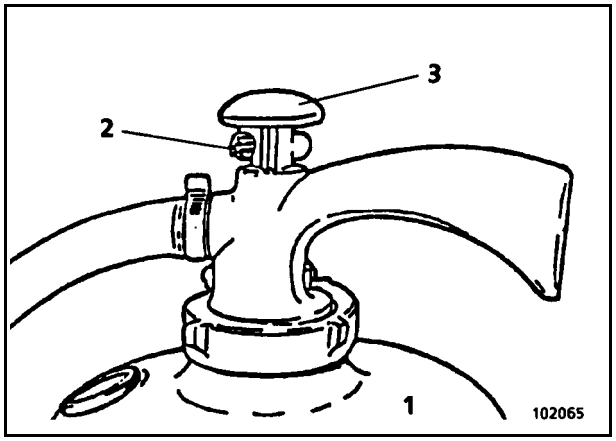

Fig. 2-18:

Handling

- ➲ Pull out safety pin (2, Fig. 2-18:).
- ➲ Press down button (3) firmly and release.
- ➲ Operate the extinguishing gun.

After fire-fighting, the extinguisher must be refilled Immediately and prepared ready for use.

Inspection

Have fire-extinguishers inspected regulary by an expert. This is required by the authorities and the insurance companies, but also for your own safety.

Have the fire-extinguisher checked at the prescribed intervals by authorized testing institutes.

Fire extinguishing system (optional)

The automatic fire extinguishing system prevents fire from spreading. It is, however, assumed that that the machine be thoroughly cleaned of combustible and easily flammable substances.

Inspection

Have the extinguishing system inspected regularly by an expert. This is required by authorities and insurance companies and is in the interests of your own safety.

Have the extinguishing system check at the prescribed intervals by authorized testing institutes.

Fig. 2-23:

No.	Element		Function	Symbol
81	**Button**	**Counting dumper**	RESET	
82	**Switch**	**Lighting**	Switches the cab lighting on and off.	
83	**Switch**	**Windscreen wiper rear window (optional)**	Activates permanent wiping	
84	**Switch**	**Beacon (optional)**	Switches the beacon on and off.	
85	**Switch**	**Floodlamps**	Switches on the floodlamps on the driver´s cab	
86	**Switch**	**Floodlamps**	Switches on the floodlamps on the platform	
87	**Switch**	**Floodlamps**	Switches on the floodlamps on the counter-weight	
98	**Switch**	**Floodlamps**	Switches on the floodlamps on the boom	

Fig. 2-28:

No.	Element		Function	Symbol
151	**Warning lamp**	**Slewing pump contaminated**	Lits up when the slewing pump is contaminated with metal particles.	
152	**Warning lamp**	**Slewing pump temperature**	Lits up when the temperature in the slewing pump is too high	
153	**Warning lamp**	**Hydraulic reservoir**	Lits up when the shut-off valves in the hydraulic reservoir are closed.  **The engine cannot be started when one of the shut-off valves is closed.** **Closing one of the valves while the engine is running stops the engine.**	
154	**Warning lamp**	**Idle-Auto**	Lits up when the automatic speed reduction function is activated (speed reduced to idling when the pilot control valves remain inactivated for abt. 10 seconds).	
155	**Warning lamp**	**Hydraulic oil level**	Lits up when the the hydraulic oil lecel is too low	
156	**Warning lamp**	**Min. fuel**	Lits up when the fuel has been used up, so that there is only the fuel reserve (abt. 120 l) left	
157	**Indicator lamp**	**Track parking brake**	Lits up 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.	

Air conditioner (optional)

Control panel (Greentop)

(Fig. 2-43:)

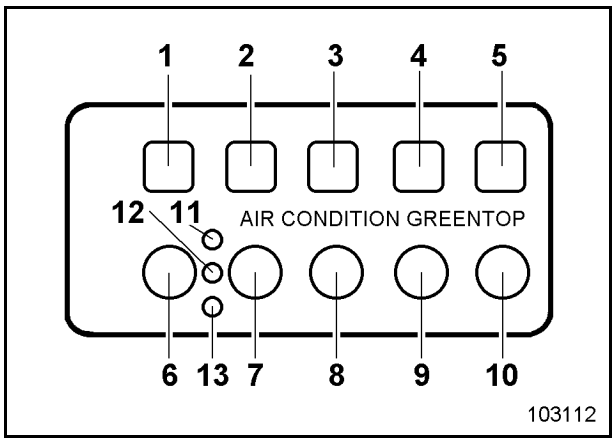

Fig. 2-43:

1	Indicator lamp	lights up when the air conditioner is on
2	Indicator lamp	lights up when the blower is running
3	Indicator lamp	Leuchtet, wenn die Klimaanlage heizt.
4	Indicator lamp	lights up when the air conditioner is set to cooling
5	Indicator lamp	lights up when the air conditioner is in the automatic temperature control mode
6	Switch	switches the air condtioner on and off
7	Switch	selects the intensity level of the blower (3 levels)
8	Switch	air conditioner in cab-heating mode.
9	Switch	air conditioner in cab-cooling mode.
10	Switch	air conditioner in automatic cab temperature control mode.
11	Indicator lamp	lights up when the first blower level is selected
12	Indicator lamp	lights up when the second blower level is selected.
13	Indicator lamp	lights up when the third blower level is selected

The ball valves (1, Fig. 2-44:) in the feeding- and the return pipeline to the air conditioner unit must be opened (levers are in longitudinal direction).

The ball valves (1) are accessible from the bottom.

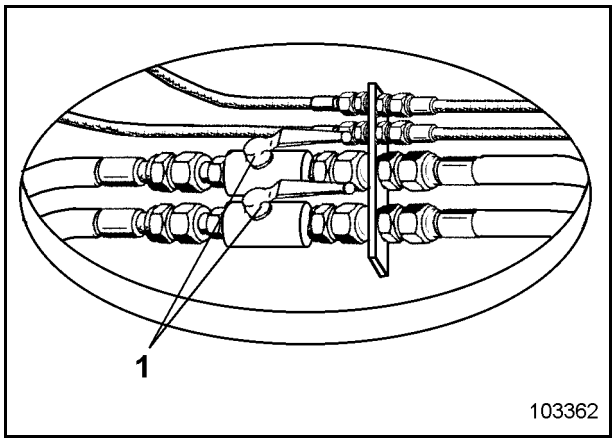

Fig. 2-44:

At low temperatures, bring the engines down to moderate speed, then activate all hydraulic functions for about 10 minutes (bring to service temperature). For further instructions, see section "Lubricants".

If the warning lamps for engine temperature, engine oilpressure, coolant level, alternator or hydraulic oil filter control (with hydraulic oil at service temperature) light up: Lower the working equipment and shut off engine.

Parts of the attachment may damage the machine if they are moved into extreme positions (see illustration Fig. 2-62: and Fig. 2-63:).

Work carefully, avoiding extreme positions of this kind.

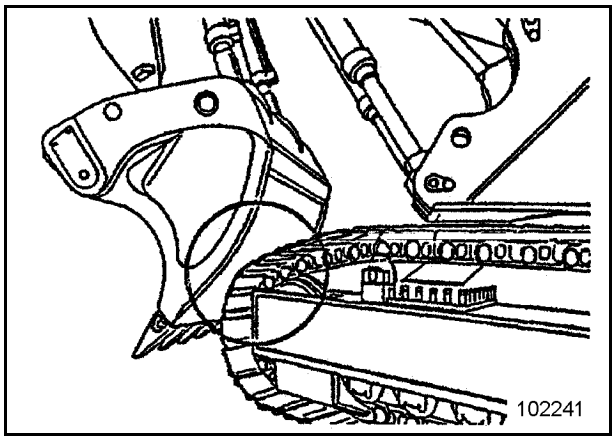

Fig. 2-62:

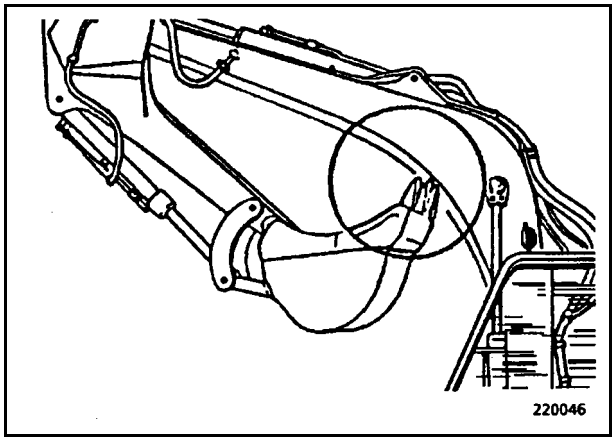

Fig. 2-63:

Overload warning system

Hydraulic excavators that are used as lifting gear or for the transport of loads must be equipped with an overload warning system.

The overload warning system consists mainly of an electro-hydraulic switching unit which gives an optical and an acoustic warning signal before the maximum admissible load moment is reached.

Do not switch off the overload warning system when the warning signal sounds.

The overload warning system must be on during lifting-gear operation.

The overload warning system only gives warning signals.

It cannot avert the danger of overturning.

- **When the warning signal sounds:**
- **let the load down immediately**
- **reduce the working radius or the load.**

In spite of the overload warning system, the operator must assure himself beforehand that the load to be lifted does not exceed the excavator's lifting capacity.

The admissible load moment is exceeded if too big a load is being lifted with a large working radius of the equipment (lifting capacity cf. the "Lifting capacity of the excavator" section).

Checking the overload warning system

Check the overload warning system for safe operation before beginning to work with the loadhook.

In case of malfunctions have the overload warning system immediately checked and repaired by Terex Germany.

Do not make re-adjustments or repairs of the overload warning system.
Re-adjustments or repairs might lead to incorrect operation or failure of the system.

Putting the overload warning system out of operation

Shut off the overload warning system if the machine is to be used exclusively for digging.

Relieving residual pressure in the hydraulic system

Only unpressurized hydraulic systems may be opened. Even when a machine is parked on a horizontal surface with ist attachments supported on the ground and its driving motor switched off, there may still be substantial residual pressure in parts of the hydraulic system, e.g. primary pressure from the last hydraulic movements prior to stopping the machine.

Residual pressure is reduced only gradually. If an intervention into the hydraulic system is to be undertaken

immediately after stopping, the system must be depressurzized:

(do not leave the driver's seat)

- Stand working equipment on the ground
- Shut off the engine
- Move all control levers and pedals repeatedly into all ndirections.

Screwed connections, piping, hydraulic hoses

Repair any leakage in the piping and hose system immediately.

A fine, highly pressurized jet of hydraulic oil can penetrate the skin.

Never search for leakages with the fingers, but use a piece of cardboard and always wear goggles.

If oil has penetrated into the skin, consult a doctor immediately.

Never repair damaged piping; always replace them.

Replace hydraulic hoses immediately on detecting any damage or moist areas.

Tighten leaking screw plugs only when the system is depressurized.

Escaping oil is an environmental hazard.

Plan V

Plan V - Once prior to initial commissioning

Location	Servicing work	Quantity/ No.
Engine	Check oil level	1
Cooling system		
Cooling liquid	Check	1
Electrical system		
Battery	Check liquid level	2
Lighting	Check operation	
Monitoring, warning and control elements	Check function of monitoring, warning and control elements	
Button EMERGENCY OFF	Check function	3
Fuel system		
Refuelling station (option)		
- Earthing strap (equipotential bonding)	Check tightness	1
Hydraulic system	Check function of working and travelling movement	
	Check pressure (cf. Technical handbook)	
Hydraulic oil reservoir	Check oil level	1
Hydraulic cylinders	Vent (cf. chapter “venting hydraulic system“)	
Pump tranfer gearbox	Check oil level	1
- Pre-chamber		
- Expansion reservoir	Check oil level	1
Slewing gearbox		
Expansion reservoir	Check oil level	1
Travel gearbox	Check oil level	2
Slewing ring		
Internal gearing	Check grease filling	1
Undercarriage		
Track roller	Check for leaks and free movement	2 x 8
Support roller	Check for leaks and free movement	2 x 1
Track	Check pressure	2 x 1
Idler	Check oil level	2 x 1

III. Oils for gearboxes (selection)

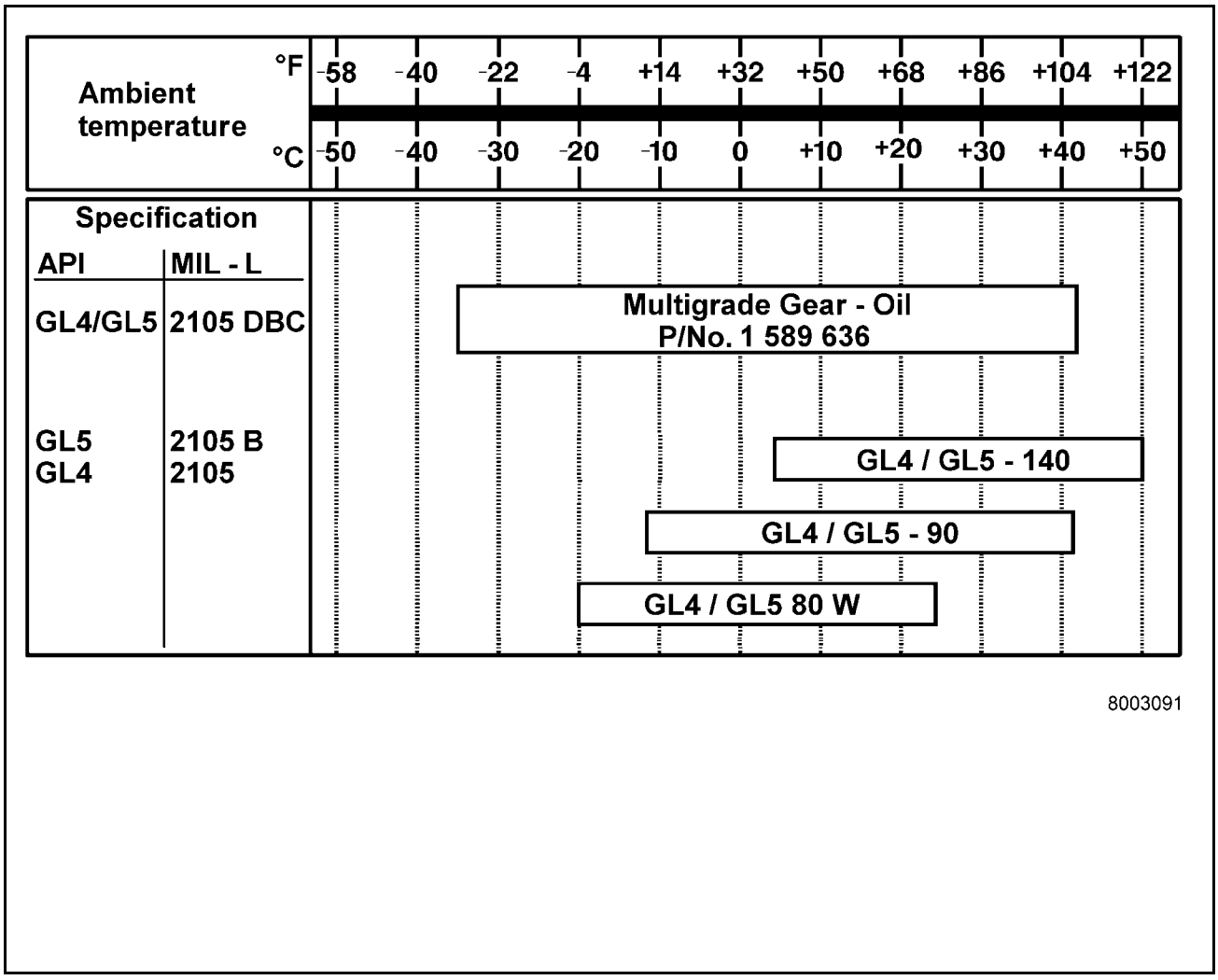

Fig. 3-7:

AIR-INTAKE SYSTEM

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

Wear a fall arresters

Risk of injury caused by rotating or hot parts of the engine.

Shut off the engine before working on the air-intake system.

Secure the machine as described in the "Securing the machine" section.

Do not start the engine when parts of the air-intake system have been detached.

Engine damage may occur if the engine is allowed to draw in unfiltered air.

The air-intake system is equipped with two dry-air filter (Fig. 3-23:) consisting of main and safety filter element.

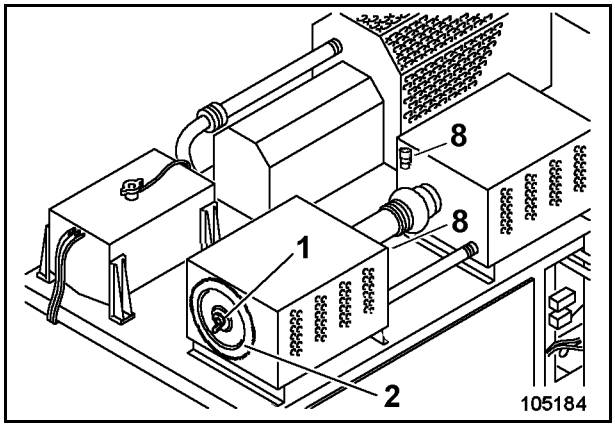

Fig. 3-23:

Main filter elements

An insufficient air-intake performance, caused by a contaminated main filter element, is indicated by the vacuum-meter (8, Fig. 3-23:).

Clean or renew main filter element only if the vacuum-meter nindication changes to "RED" with the engine running at high speed.

Removal and installation

- Unscrew nut (1, Fig. 3-23:) and remove cover (2).
- Unscrew nut (3, Fig. 3-24:) and withdraw main filter element (4). Do not loose the washer under nut (3).
- Clean or renew main filter element only if the vacuummeter (8, Fig. 3-23:) indication changes to "RED" with the engine running at high speed.

New or cleaned main filter elements should always be at hand to shorten excavator downtimes.

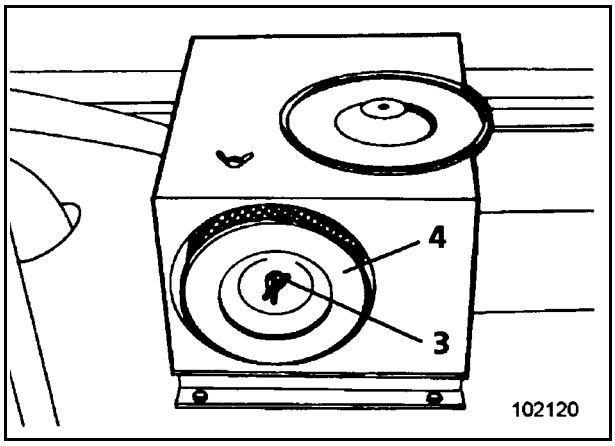

Fig. 3-24:

Removing and installing the battery

Read and observe the "Inspection and servicing – Safety instructi-ons" chapter.

Wear protective gloves and firm working clothing.

Shut off the engines before removing the batteries to avoid damaging the alternator and the regulator.

Turn key in key-switch to position "0" and withdraw.

Disconnect and reconnect the terminal clamping lugs in the prescribed order.

Disconnecting and connecting in the wrong order may cause short-circuits.

The batteries (1, Fig. 3-42:) are located under the hatch.

The 12-volt batteries are connected in series and in parallel, so that the system voltage is 24 volts.

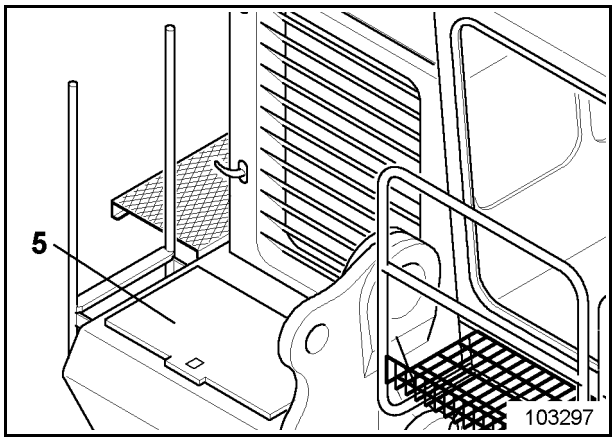

Fig. 3-42:

- Open hatch (8)
- Unscrew battery holder (3, Fig. 3-43:).
- Disconnect the cable lug from the negative terminal of the battery.
- Disconnect the cable lug from the positive terminal of the battery.
- Insulate the cable lugs.

Take out the batteries

Before installing the new battery, the contact faces of the battery terminal posts and the cable lugs must be cleaned down to the bright metal.

Install the new batteries.

- Connect the cable lug to the positive terminal of the battery.
- Tighten the clamping screw of the cable lug. Do not use too much force to avoid deforma-tions.
- Connect the cable lug to the negative terminal of the battery.
- Apply special terminal grease or acid-free vaseline on the battery terminal posts and clamping lugs.
  Loose or corroded clamping lugs will lead to alternator or regulator overloading.
- Fix battery holder (3).

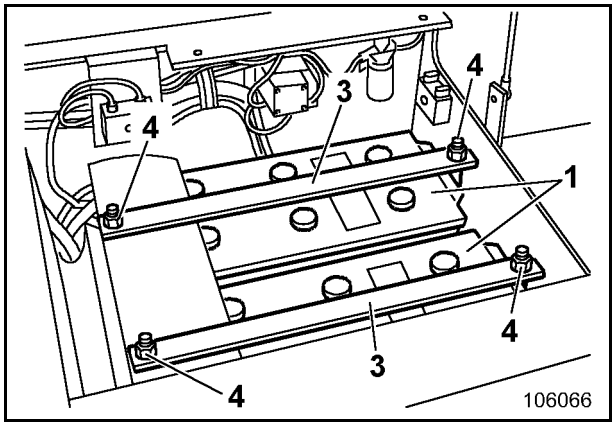

Fig. 3-43:

High-pressure filter for working hydraulics

To filter the hydraulic oil on the high-pressure side of the working hydraulic system, the machine is equipped with two high-pressure filters (30, Fig. 3-62:).

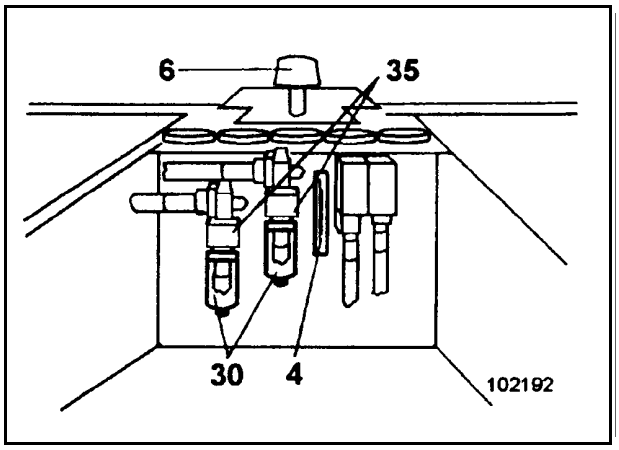

Fig. 3-62:

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

Checking/changing the filter elements

Shut off the engine.

Risk of scalding caused by hot hydraulic oil.

The filter housings themselves may also be hot.

Avoid skin contact.

Skin contact with hydraulic oil may cause skin injury.

Wear protective gloves and firm working clothing.

Collect escaping hydraulic oil and discard without polluting the environment.

Checking/cleaning the filter elements

- Unscrew filter housing (31, Fig. 3-62:) and pour out the oil.
- Withdraw filter element (32) from housing (31).

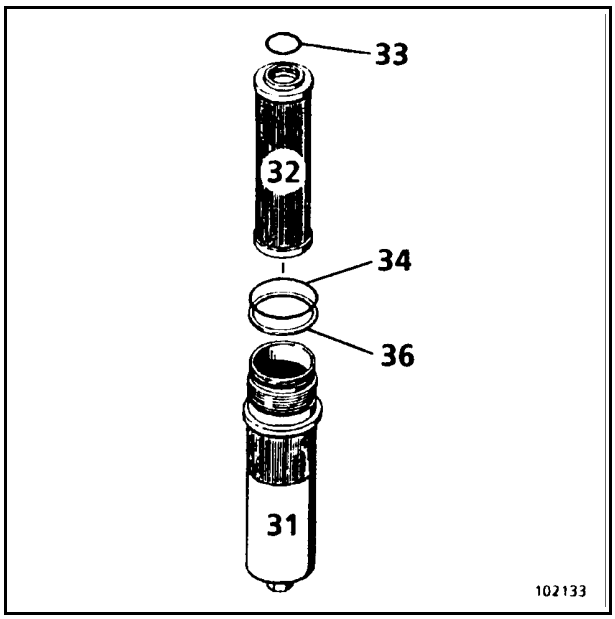

Fig. 3-63:

- Clean filter housing and contact faces at the filter head (35, Fig. 3-63:) with white spirit or paraffin oil and replace, if required.
- Insert filter element into housing (31, Fig. 11) and attach to the filter head (35) with new, slightly oiled sealing rings (33 and 34) and a new retaining ring (36).

Check high-pressure filter for leaks after the system has been put into operation.

Replacing the filter elements

- Detach the filter element as described under "Checking the filter elements".
- Clean filter housing (9, Fig. 3-63:) and the sealing faces at the filter head with white spirit or paraffin oil.
- Insert new filter element into filter housing (9) and refit to the filter head with new, lightly oiled sealing rings (10 and 14) and a new retaining ring (13).

Check high-pressure filter for leaks after putting it into operation.

SLEWING GEARBOX

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

Shut off the engine

The gearbox housings may be hot, too.

Secure the machine as described in the "Securing the machine" section.

Protect the skin from contact with gearbox oil.

Skin contact with cooling liquid is a potential health hazard.

Wear protective gloves and firm working clothing.

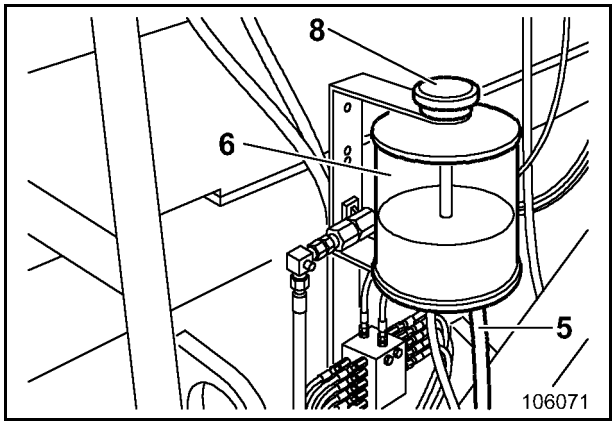

Fig. 3-79:

Gearbox - Checking the oil level / Topping up with oil

➲ Park the machine as described under "Securing the machine".

➲ Check the oil level visually at expansion tanks (6, Fig. 3-79:).
The expansion tanks must be filled with gearbox oil up to abt. 1/3.

The oil level is visible from outside (light/dark area).

Hose (5, Fig. 3-79:and Fig. 3-80:) connects the gearbox (3, Fig. 3-80:) with the expansion tank (6, Fig. 3-79:).

Changing the gearbox oil

➲ Prepare a collecting recipient for used oil. Choose the required capacity in accordance with the "Refilling quantities - Oil" table.

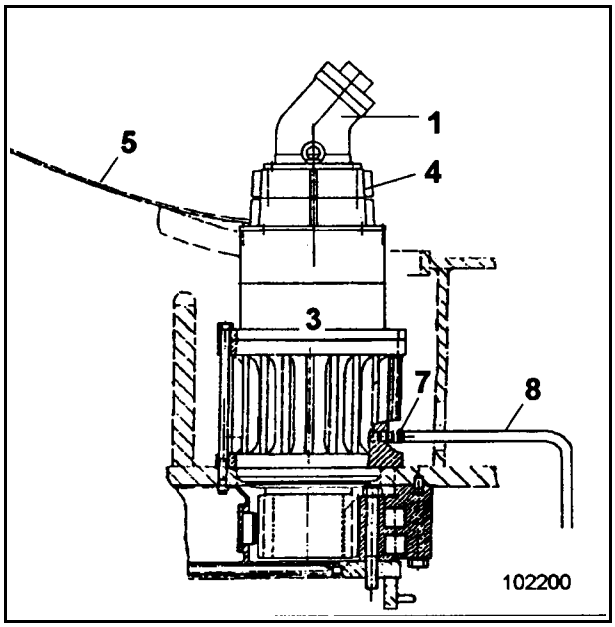

Fig. 3-80:

➲ Attach hose (8, Fig. 3-80:) to drain valve (7) and drain off oil completely.

Unscrewing cover (8, Fig. 3-79:) facilitates draining off the used oil.

The use of the oil draining hose is described in the "Draining hose for oil changes" chapter.

The drain valve (7, Fig. 3-80:) is accessible from the undercarriage.

➲ Remove hose. The oil drain valve closes automatically.for oil and cooling liquid change" section.

After switching on the electrical system with key-switch (32, Fig. 3-96) the monitoring and warning lamps (165, 166, 167 and 168 Fig. 3-97) light up. After starting of the engine, the central greasing system is activated.

During normal operation, the warning lamps (166 and 167) are off.

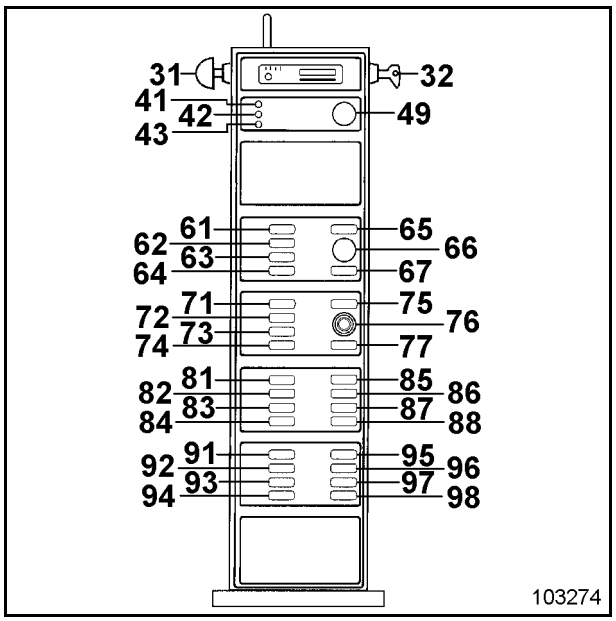

Fig. 3-96

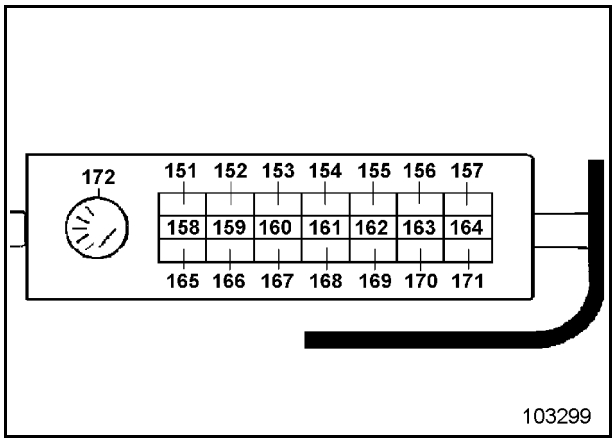

Fig. 3-97

The greasing points connected are greased in regular intervals. During greasing time, monitoring lamp (165, Fig. 3-97) is lit up.

Greasing is effected by grease pump (5, Fig. 3-98) with attached grease drum. The grease is pumped to a main distributor through greasing lines.

The main distributor is monitored by a sensor. An LED in the sensor lights up at the beginning of a greasing cycle and then goes out again.

The LED does not light up during a greasing pause.

In the event of malfunctions, warning lamp (166, Fig. 3-97) flashes for 15 minutes. Thereafter, warning lamp (166) remains permanently on. The backhoe and the bucket tipping cylinder are then shut off.

In the event of malfunction, shut off the engine and rectify the fault.

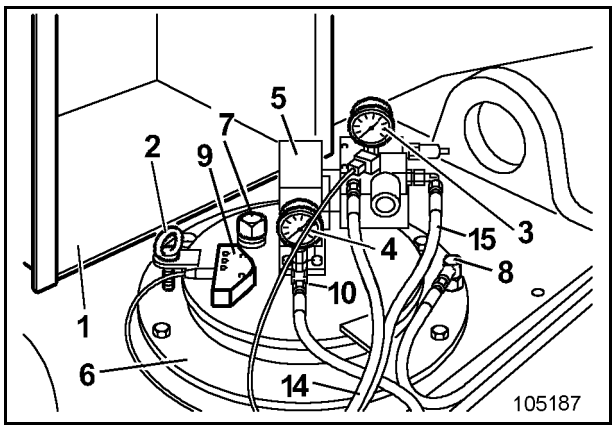

Fig. 3-98

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								1) Contact the Terex-Germany Service	
Uncontrolled working movements									
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		

TECHNICAL DATA

2462197