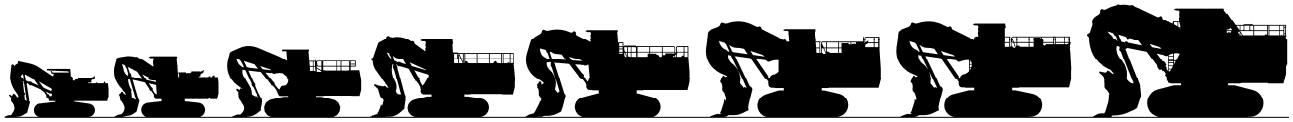
Operating Instructions

CE

Hydraulic Excavator

RH 340 No.

Bucyrus HEX GmbH



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1 INTRODUCTION

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	Operating instructions	Target group
Part 1	**INTRODUCTION** **FUNDAMENTAL** **SAFETY INSTRUCTIONS**	**Operating personnel** **+** **Inspection and servicing personnel** **+** **Repair personnel**
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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.
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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 - Radiator (engine cooling liquid)
13 - Air-intake system
14 - Exhaust system
15 - Fuel Tank
16 - Engine oil reservoir (optional)
17 - Hydraulic oil reservoir
18 – Hydraulic oil cooler
19 – Reservoir (engine cooling liquid)
20 – Pump transfer gearbox
21 - Working pump
22 – Slewing pump
23 - Servo system pump
24 - Gearbox circulating pump
25 - Filling pump (slewing circuit)
26 - Fan drive pump (engine radiator)
27 – Pump for fan drive and hydraulic oil cooling
28 – Air conditioner
29 - Slewing gear
30 - Travel block and rotor
31 - Driver's cab
32 - Control stand with BCS
33 - Control-cabinet with CMS
34 - Control-cabinet with PMS
35 - Fire-extinguisher
36 - Control-cabinet with battery main switch
37 – Batteries
38 - Service-station (tank lift)
39 – On-board crane (optional)
40 – Crane engine (optional)
41 – Fuel tank (crane engine, optional)
42 – Battery (crane engine, optional)
43 – Hydraulic oil reservoir (crane engine, optional)
44 – Grease container of central lubricating system
45 – Tool cabinet (optional)
46 – Ramp-type ladder
47 – Ladder
48 – Ladder
49 – Emergency ladder
50 – Counterweight
52 – Ladder
53 – Ladder

Loading bucket

61 – Boom
62 - TriPower linkage
63 – Stick
64 - Bottom-dump bucket
65 - Boom cylinder
66 - Stick cylinder
67 - Tipping cylinder
68 - Bottom-dump cylinder
74 - Control valves
75 - Quick-action valve

Backhoe bucket

63 - Stick
65 - Boom cylinder
66 - Stick cylinder
69 - Monoblock boom
70 - Backhoe bucket
71 - Backhoe cylinder
72 - Toggle link
73 - Toggle lever
74 - Control valves
75 - Quick-action valve

Fire extinguisher

The excavator is equipped with two fire extinguishers (arrow Fig. 2-21:)

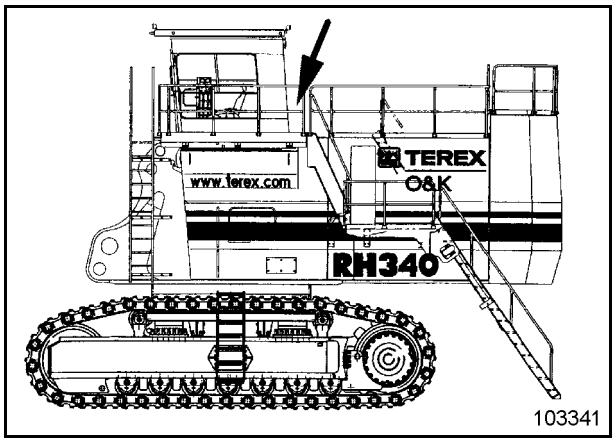

Fig. 2-21:

The excavator driver and the maintenance personnel must informthemselves 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 fire-extinguisher is filled with 12 kg Glutex. This extinguishing agent is used for fighting fires of classes A, B and C. Fires are extinguished fast, perfectly and without residues.

Handling

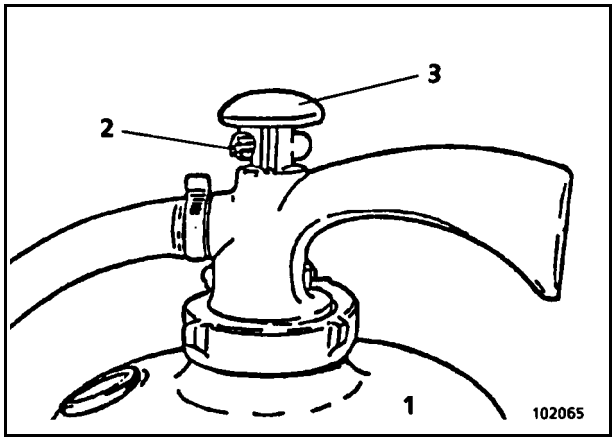

Fig. 2-22:

- ➲ Pull out securing pin (2, Fig. 2-22:).
- ➲ Strike knob (3) hard, then release again.
- ➲ Operate the extinguishing gun.

Inspection

Have the extinguisher inspected at regular intervals by an expert. This is required by local authorities and insurance companies and is in the interest of your own safety.

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

Fig. 2-26:

No.	Element		Function	Symbol
41	**Warning lamp**		Not connected	
42	**Warning lamp**		Not connected	
43	**Warning lamp**	**CENTRY warning (left engine 1)**	Lamp is lit up (e.g.): ▪ when the engine oil pressure is too low ▪ when the cooling water temperature is too high **Shut off the engine**	Centry
44	**Warning lamp**		Not connected	
45	**Warning lamp**		Not connected	
46	**Warning lamp**	**CENTRY warning (right engine 2)**	Lamp is lit up (e.g.): ▪ when the engine oil pressure is too low ▪ when the cooling water temperature is too high **Shut off the engine**	Centry
47	**Indicator lamp**	**Boom/stick angle (optional)**	Lamp is lit up when the boom/stick angle is in normal working range.	
48	**Indicator lamp**	**Boom/stick angle (optional)**	Lamp is lit up when the boom/stick angle is in hazard range. (the tracks may be demaged by the working equipment) **Increase the angle.** The buzzer (34) sounds until the angle has resumed the normal working range.	

Fig. 2-31:

No.	Element		Function	Symbol
91	**Switch**	**Emergency Operation Boom/Stick**	Lowers the boom and stick when actuated in an emergency.	
92	**Button**	**Counting dumper**	RESET	
93	**Switch**	**Stick cylinder switch-off bypass (optional)**		
94	**Switch**		Not connected	
95	**Switch**	**Lighting**	Switches on the lighting for servicing work.	
96	**Switch**	**Lighting**	Switches the cab lighting on and off.	
97	**Switch**	**Windscreen wiper rear window (optional)**	Activates permanent wiping	
98	**Switch**	**Beacon (optional)**	Switches the beacon on and off.	

Fig. 2-36: (optional)

No.	Element		Function	Symbol
165	**Warning lamp**	**Slewing motor 1 contaminated**	Lights up when the slewing motor is contaminated with metal particles.	
166	**Warning lamp**	**Slewing motor 2 contaminated**	Lights up when the slewing motor is contaminated with metal particles.	
167	**Warning lamp**		free for optional	
168	**Warning lamp**	**Hydraulic oil filter contaminated**	Lights up when the flow resistance in the filter is too high. Replace filter elements if the warning lamp fails to go out when the oil is at operating temperature.	
169	**Warning lamp**	**Min. hydraulic oil level**	Lights up when the hydraulic oil level in the hydraulic tank is too low.	
170	**Warning lamp**	**Electronic excavator control ON**	Lights up when the electronic excavator control is switched on.	
171	**Indicator light**	**Hydraulic oil tank**	Lights up when one of the shut-off valves of the hydraulic oil tank is closed  **When the left valve is closed, the LH engine cannot be started.** **When the right valve is closed, the RH engine cannot be started.** **When a shutoff valve is closed with the engines running, both engines are stopped.**	
172	**Thermometer**	**Hydraulic oil**	Indicates hydraulic oil temperature in hydraulic tank	
181	**Control unit**	**Air conditioner (optional)**		
182	**Control unit**	**Heating (optional)**		

Assemblies resp. reservoirs	Measuring device	Remarks
Cooling system reservoir	Level indicator (4, Fig. 2-50:)	Stop filling when the level indicator indicates maximum filling level. (cf. chapter "Cooling system - Cooling liquid").
Grease container – cental lubricating system	BCS display (Fig. 2-51:)	Stop filling when the BCS indicates „“grease container is full“. Switch on the display system (optional) with the toggle switch (33, Fig. 2-52:). Stop filling when the grease container is full. The indicator lamp (34) lights up. On completion of filling, switch the display system off again with the toggle switch (33).

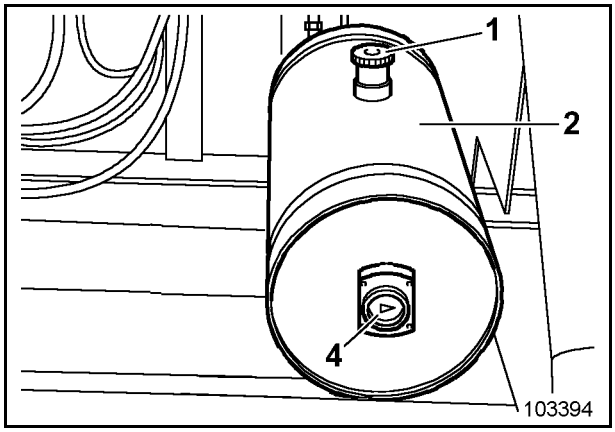

Fig. 2-50:

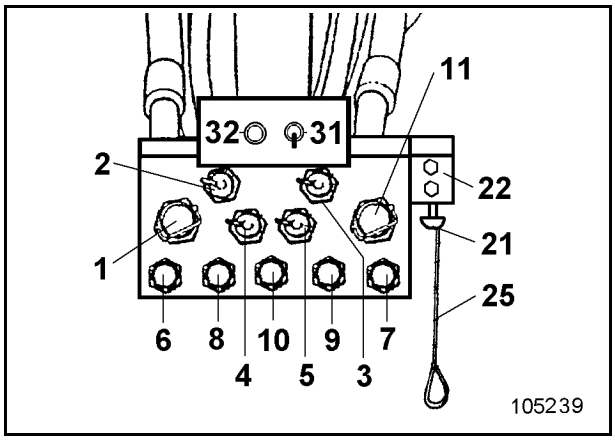

Fig. 2-52:

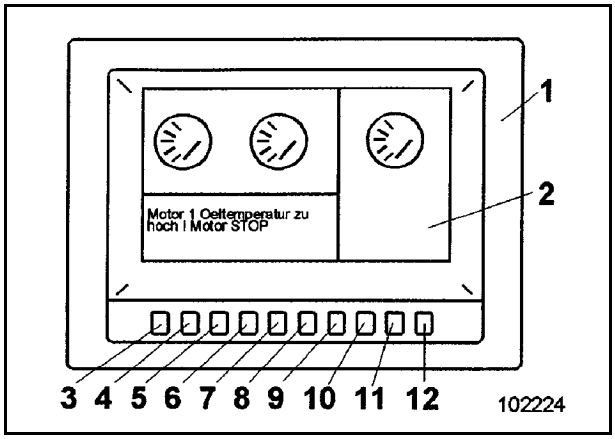

Fig. 2-51:

Superstructure basic position

Travel direction and sense of actuation of pedals (112 and 113, Fig. 2-69:) are identical only when the excavator is in its BASIC POSITION (Fig. 2-68:).

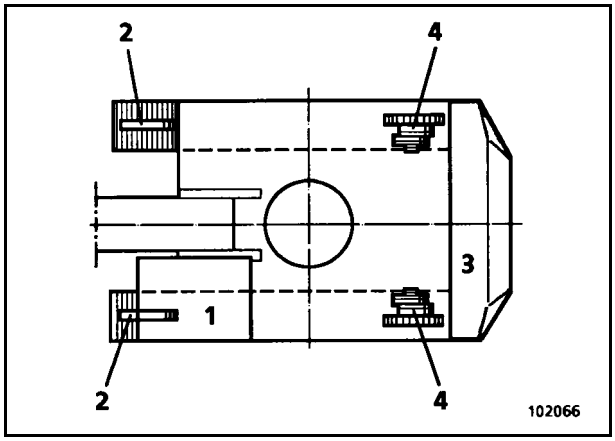

Fig. 2-68:

If the superstructure is slewed out of its basic position by more than 90° (Fig. 2-70:), the excavator moves in a direction opposite to that expected when pedals (112 and 113, Fig. 2-69:) are depressed.

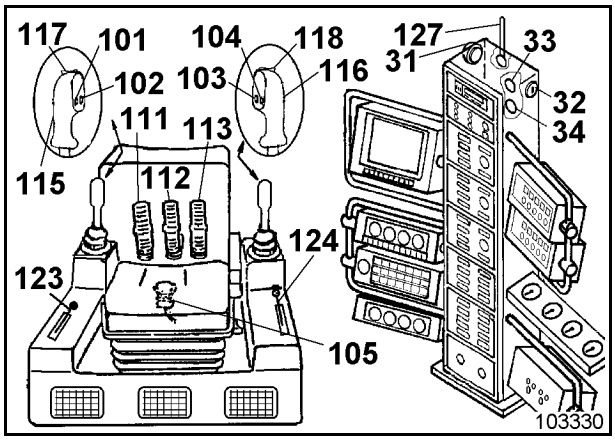

Fig. 2-69:

If the operator is not completely sure of the position of the superstructure with regard to the undercarriage, pedals (112 and 113) should be depressed slightly in order to find out which way the excavator moves before initiating the full travelling movement.

Travelling forwards/backwards

Travelling forwards:

depress pedals (112 and 113) forwards.

The excavator travels in the direction of the idler (2, Fig. 2-68:).

Travelling backwards:

depress pedals (112 and 113, Fig. 2-69:) backwards.

The excavator travels in the direction of the drive sprocket (4,Fig. 2-68:).

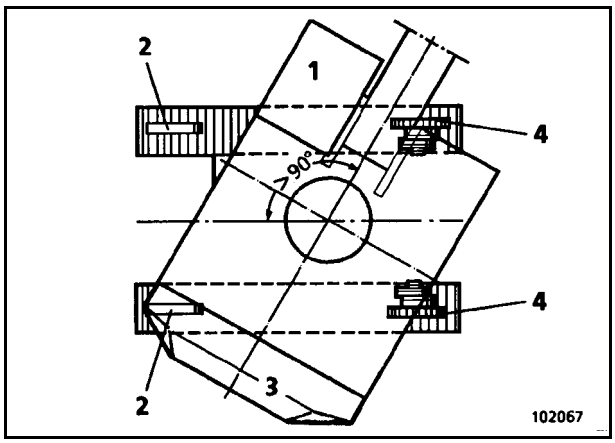

Fig. 2-70:

The pedals return automatically to their "0" positions when released.

Reverse the excavator only over short distances and with the assistance of marshallers because of restricted rear-view conditions.

Do not travel across slopes.

When travelling uphill or downhill, the travel drive must always be at the rear. Travel only in the basic position of the excavator and only forwards.
Be extremely careful on slippery and greasy ground.

All instructions with regard to travelling speed regulation and travel direction control are applicable only as long as the crawler tracks have sufficient grip and do not slip.

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 bearings when the work 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 diesel engines at ca. 2/3 full speed and start to perform no-load working movements for abt. 10 minutes with the excavator.

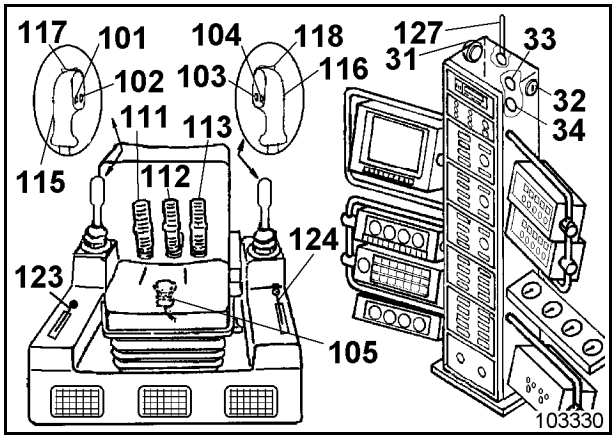

Fig. 2-87:

Switching on the electronic excavator control

The electronic excavator control is switched on and off with switch (105, Fig. 2-87:).

Electronic excavator control activated - operator is sitting on his seat.

Electronic excavator control deactivated - driver's seat is empty.

Slewing and braking the superstructure

The superstructure can only be slewed if the superstructure holding brake is released.

To slew the superstructure to the right:
shift control lever (115) to the right.

To slew the superstructure to the left:
shift control lever (115) to the left.

After releasing, the control lever returns automatically to position "0".

Braking the superstructure

The superstructure is braked only by setting control lever (115) into the opposite direction (countering).

In an emergency apply parking brake with switch (82, Fig. 2-88:)

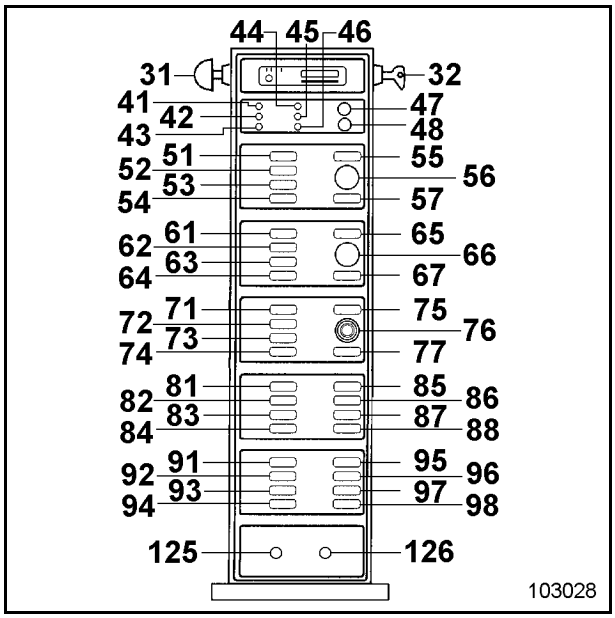

Fig. 2-88:

3 INSPECTION AND SERVICING

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INSPECTION AND SERVICING PLANS - INSTRUCTIONS

Intervals

The inspection and Servicing plan lists all jobs which have to be done on the machine at regular intervals.

The individual inspection and Servicing plans are marked with letters providing a link between the operating hours (OH) recorded by the hours-run meter of the machine and the inspection and sServicing plans.

Plan	Do all jobs ....
V	...once prior to initial commissioning.
N	...after initial commissioning and during the running-in period.
T	...every 10 OH or every working shift [1)]
W	...every 60 OH or weekly .[2]
A	...after every 250 OH.
B	...after every 500 OH.
C	...after every 1000 OH.
D	...after every 5000 OH.
E	...after every 10000 OH.
OH = Bh = Operating hours	

Change of engine oil

The intervals stated for **changing the engine oil** apply to fuels with a sulphur content of ≤ 0.5% and a permanent ambient temperature down to –10° C.

In case of higher sulphur content and/or a permanent ambient temperature of below –10° C, shorter intervals are required.

If the engine oil change intervals are not reached within **6 months**, the oil must be changed at least **after 6 months**.

Air-intake system

The air filter must be serviced only if the BCS so

indicates. Replace the filter elements after one year at the latest.

Oils / Greases

For the specification of oils and greases to be used refer to the "Lubricants" section.

The numerals mentioned in the "Oil / Grease" column in the inspection and sServicing plans have the following meaning:

I	Oils for combustion engines and compressors
II	Oils for hydraulic systems
III	Oils for gearboxes
V	Greases for bearings and slewing rings

Cleaning jobs

Cleaning jobs, especially on cooling systems, must be done at shorter intervals if the machine is exposed to severe dust build-up.

Components

The maintenance intervals for components, e.g. engine and gearbox, are listed in the following **Terex Germany** maintenance schedules.

It is possible that the manufacturer's documentation for these components states intervals deviating from the above-mentioned intervals.

In such case, only the maintenance intervals specified by Terex Germany shall apply.

[2] Whichever comes first.

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Plan A - after every 250 OH
(at 250, 750, 1250 ... OH)

Plan B - after every 500 OH
(at 500, 1500, 2500 ... OH)

Plan C - after every 1000 OH
(at 1000, 2000, 3000, 4000 ... OH)

Plan D - after every 5000 OH
(at 5000, 15000, 25000 ... OH)

Plan E - after every 10000 OH
(at 10000, 20000, 30000, ... OH)

Location	**Servicing work**	**Menge / No.**	**Plan A**	**Plan B**	**Plan C**	**Plan D**	**Plan E**
Engine with engine oil reservoir and CENTINEL	Carry out oil analysis	2	●	●	●	●	●
	Change oil	2 [7]				●	●
	Clean				●	●	●
- Bearing							
- Fastening screws	Check tightness				●	●	●
- Rubber bearing	Check condition				●	●	●
Engine oil reservoir	Change oil	2 [7]				●	●
	Clean				●	●	●
- Oil filter	Replace	2 x 2			●	●	●
V-belt	Check tension		●	●	●	●	●
	Check condition		●	●	●	●	●
Centrifuge	Clean	2 x 1			●	●	●
- Rotor seal	Replace	2 x 1			●	●	●
- Casing seal	Check /replace	2 x 1			●	●	●
Inspection and servicing	(cf. Operating and maintenance manual for engine)	2	●	●	●	●	●

[7] cf. “Refilling quantities – Oil“ table

Inspection plan – Oil (legend))

No.	Location	Number	Lubricant properties [18]	Check oil level every ... OH	Change oil every ... OH
1	Engine	2	**I**	10	250
1	Engine with engine oil reservoir (optional)	2	**I**	10	1000
1	Engine with engine oil reservoir and CENTINEL (optional)	2	**I**	10	5000
2	Engine oil reservoir (optional)	2	**I**	10	1000
2	Engine with engine oil reservoir and CENTINEL (optional)	2	**I**	10	5000
3	Hydraulic system	1	**II**	10	10000 [19]
4	Pump transfer gearbox	2	**III** **API SAE 80** **(synthic oils for gearboxes)**	60	1000
	- Pre-chambers	2 x 5		10	1000
5	Slewing gearbox	4	**API GL5** **SAE 85W-90** **SAE 80W-90**	10	1000
	- Brake chambers	4	**API GL4** **SAE 10W-30**	10	1000
6	Travel gearbox	2	**III**	500	5000
	- Pre-chambers	2 x 1		500	5000
	- Brake chambers	2 x 2		500	5000
7	On-board crane (optional)				
	- Crane drive engine	1	**I**	10	250 [20]
	- Hydraulic oil reservoir	1	**II**	10	1000 [21]

[18] cf. "LUBRICANTS" section

[19] Change hydraulic oil every 5000 OH unless the oil is analyzed at regular intervals, but not later than every 3 years.

[20] Change oil at least once a year.

[21] Change hydraulic oil at least once a year.

Changing the engine oil

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

Risk of scalding from hot engine oil.

The engines may also be hot.

Wear protective gloves and firm working clothing.

Collect escaping oil and discard without polluting the environment.

Drawing off engine oil with the service station.

- ➲ Bring engine oil to operating temperature.
- ➲ Park the machine on a horizontal surface and secure.
- ➲ Shut off the engines.

Draw off the engine oil through

- express coupling (8, Fig. 3-15:) for the lefthand engine
- express coupling (9) for the righthand engine.

- ➲ Unscrew cap of express coupling and connect hose line of the service vehicle.

The hose line and its use are described in the "hose line for oil and cooling liquid change" section.

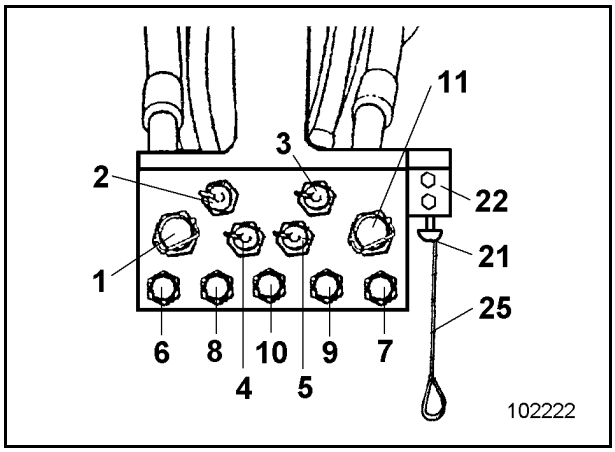

Fig. 3-15:

After the engine oil has been drawn off:

- ➲ Remove the hose line. The express coupling closes automatically.
- ➲ Screw on protective cap.

Topping up cooling liquid

The cooling liquid can also be filled in with the service station (Fig. 3-31:) through

- express coupling (2) for the lefthand engine
- express coupling (3) for the righthand engine

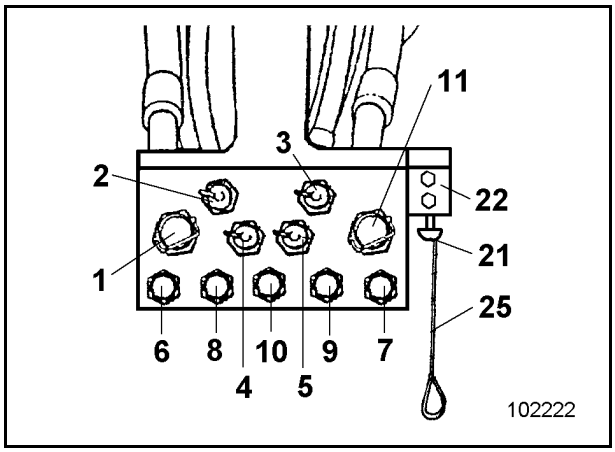

Fig. 3-31:

➲ Unscrew cap of express coupling. Connect the filling hose of the service vehicle.

The hose line and its use are described in the "hose line for oil and cooling liquid change" section.

➲ Remove hose.
The express coupling closes automatically.

➲ Screw on protective cap.

Cooling liquid

Read and observe: Inspection and servicing – Safety instructions.

Risk of scalding from hot cooling liquid.The radiators may also be hot. Wear protective gloves and firm working clothing.

Collect escaping cooling liquid and discard without polluting the environment.

The cooling liquid must be changed regularly and after two years at the latest.

Water trap (option)

Water contained in the fuel is removed by the water trap (Fig. 3-50:).

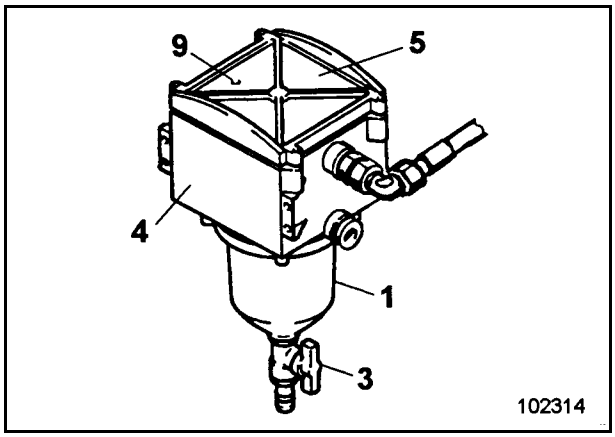

Fig. 3-50:

Servicing

Draining off water

Carry out the following works in accordance with the servicing schedule and at regular intervals:

➲ Loosen venting plug (9, Fig. 3-51:) and leave drain valve (3) open until there is no more water in the diesel fuel flowing out of the valve.

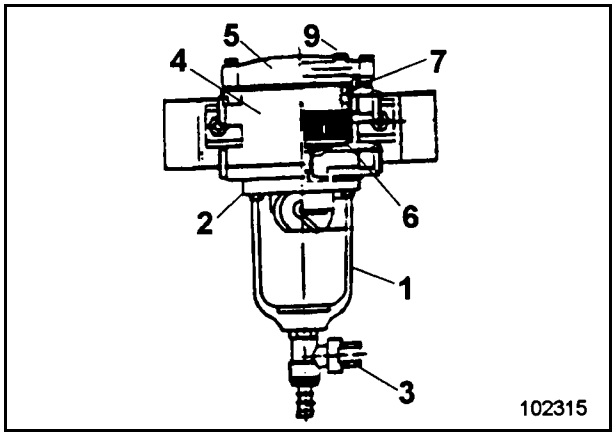

Fig. 3-51:

Collect escaping liquid in a recipient suitable for diesel fuel and discard without polluting the environment.

The liquid flowing out of the valve flushes and cleans the filter element(6) von from top to bottom.

➲ Close drain valve (3) and tighten venting plug (9).

Hydraulic oil can also be filled in by means of the service station (Fig. 3-69:).

➲ Unscrew cap of express coupling (10). Connect filling hose express coupling of the service vehicle.

The use of the hose line is described in the "Hose line for oil and cooling liquid changes" section.

➲ Fill in hydraulic oil until the oil level lies between the ½ and the ¾ marks of the inspection glass (1, Fig. 3-67:) (oil grade cf. "Refilling quantities - Oil").

➲ Unscrew the hose line; the express coupling closes automatically.

➲ Screw protective cap back in place

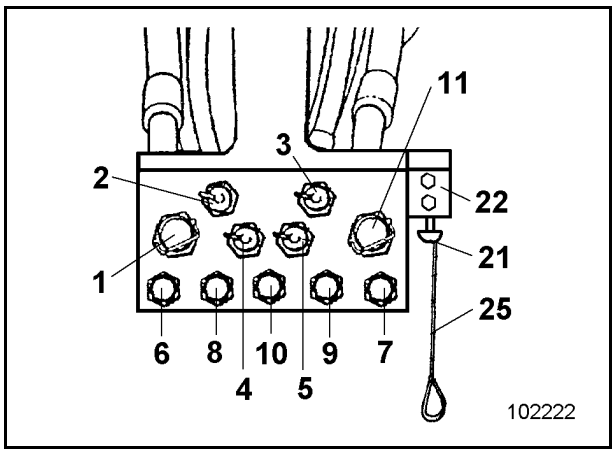

Fig. 3-69:

Changing the hydraulic oil

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

Shut off the engines.

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.

Collect escaping oil and discard without polluting the environment.

Do not start up the drive engines when the hydraulic oil reservoir is empty. The hydraulic pumps may be destroyed if they are allowed to run dry.

Drawing off hydaulic oil

- ➲ Bring the hydraulic oil to operating temperature (abt. 50 ° C).
- ➲ Retract the hydraulic cylinders as far as possible and stand the working equipment on the ground.
- ➲ Shut off the engines.

Drain the hydraulic oil at express coupling (1, Fig. 3-85:).

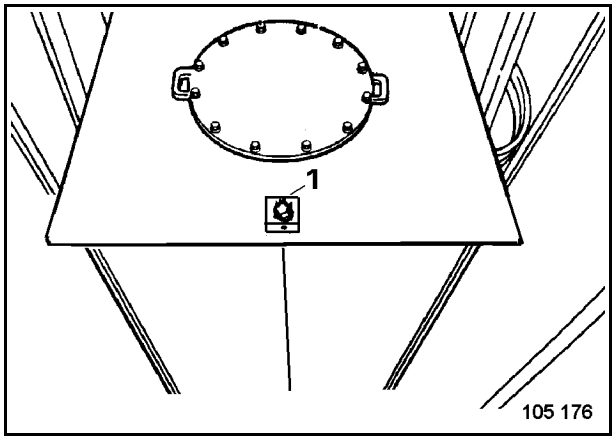

Fig. 3-85:

- ➲ Place suitable recipients under the drain valve (1) of the hydraulic oil reservoir. For the required capacity refer to the "Refilling quantities - Oil" table.

The use of the hose line is described in the "Hose line for oil and cooling-liquid changes" section.

- ➲ Unscrew the hose line; the oil drain valve closes automatically.
- ➲ Screw protective cap back in place.

Gearbox venting

The gearbox is vented through breather valve (2, Fig. 3-103:).

Clean breather valve (2) in accordance with the servicing plan.

- ➲ Unscrew breather filter (2), clean with white spirit or paraffin oil and blow dry with compressed air.
- ➲ Screw breather filter (2) back in place.

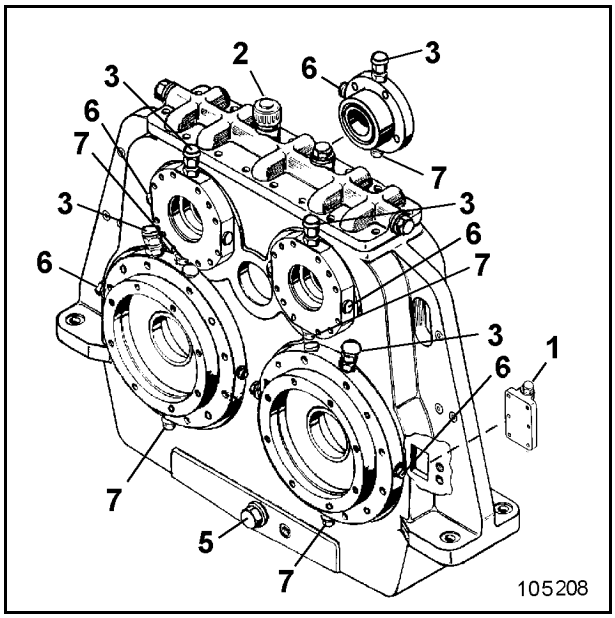

Fig. 3-103:

Pre-chamber

The pre-chambers are vented through breather valves (2, Fig. 3-103:).

Clean breather valve (2) in accordance with the servicing plan.

- ➲ Unscrew breather filter (2), clean with white spirit or paraffin oil and blow dry with compressed air.
- ➲ Screw breather filter (2) back in place.

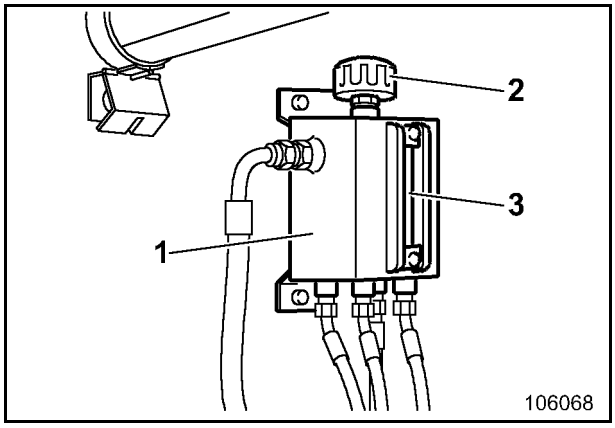

Fig. 3-104:

Track rollers

The track rollers (2, Fig. 3-120:) have a permanent grease filling.

Nevertheless press in grease filling at regular intervals.

It is necessary to be sure that always sufficient grease in the roller bearings.

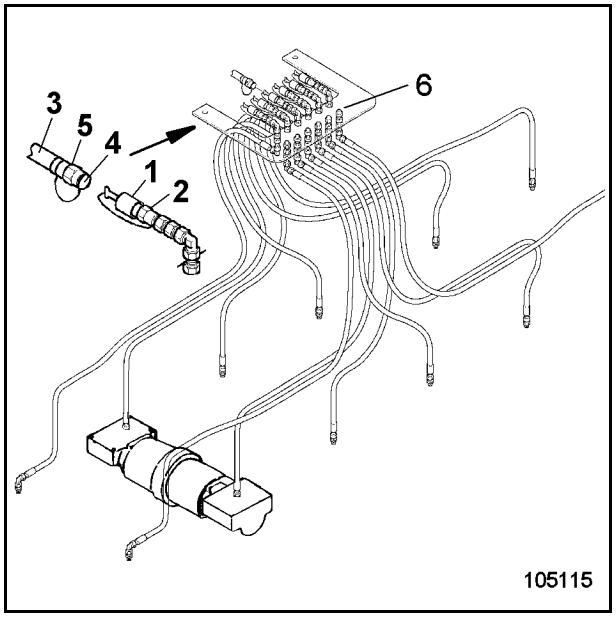

Fig. 3-120:

- ➲ Unscrew plug (6, Fig. 3) from breather line.
- ➲ Remove dust cap (1) from coupling (2).
- ➲ Remove dust cap (4) from plug (5).
- ➲ Connect grease hose (3) to couling (2).
- ➲ Press in grease as long as used grease emerges from breather line.
- ➲ Screw on plug (6) to breather line.
- ➲ Disconnect the grease hose (3).
- ➲ Fix dust caps (1 and 4) back in place.

Track roller fastening

Check fastening screws (4 Fig. 3-121:) regularly for tightness:

- ➲ Tighten screws with a torque wrench to the prescribed tightening torque (cf. table "Tightening torques").

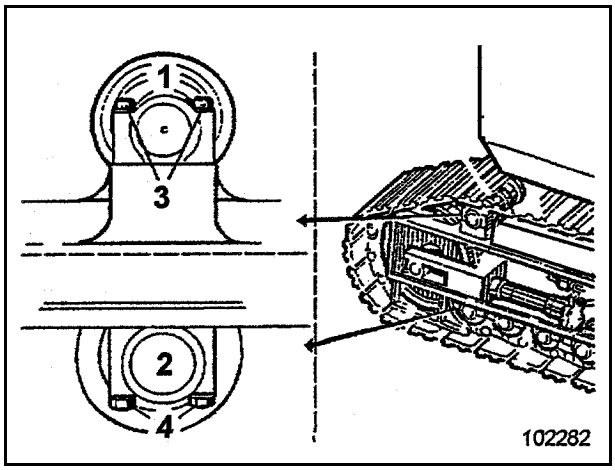

Fig. 3-121:

Support roller fastening

Check fastening screws (3, Fig. 3-121:) regularly for tightness

Tighten screws with a torque wrench to the prescribed tightening torque (cf. table "Tightening torques").

Unblocking a grease line.

Put the excavator back into operation only after the lubricating system works properly and after having actuated the unloaded working equipment for abt. 5 minutes. This is necessary in order to supply sufficient amounts of grease to the cylinder bearings.

Check the grease sieve regularly for contamination and clean, if required. The grease sieve must also be cleaned after an obstruction in one of the grease lines.

Cleaning

- Loosen nut (6, Fig. 3-140:).
- Withdraw sieve and clean with white spirit or paraffin oil.
- Re-insert sieve and fasten with nut (6).

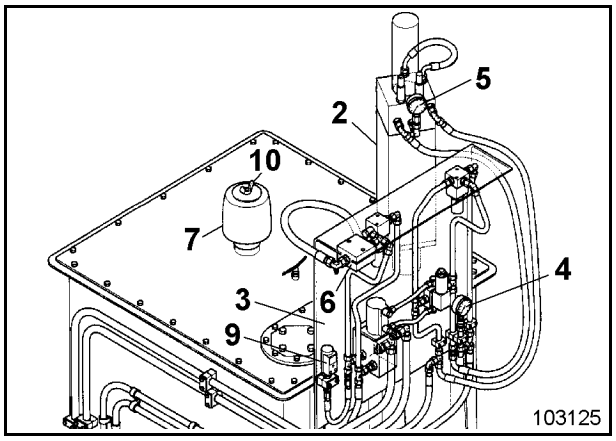

Fig. 3-140:

Unblocking a grease line.

(for machnes with automatic greasing of the track rollers, optional)

Put the excavator back into operation only after the lubricating system works properly and after having actuated the unloaded working equipment for abt. 5 minutes. This is necessary in order to supply sufficient amounts of grease to the cylinder bearings.

Check the grease sieve regularly for contamination and clean, if required. The grease sieve must also be cleaned after an obstruction in one of the grease lines.

Cleaning

- Loosen nut (6, Fig. 3-141:).
- Withdraw sieve and clean with white spirit or paraffin oil.
- Re-insert sieve and fasten with nut (6).

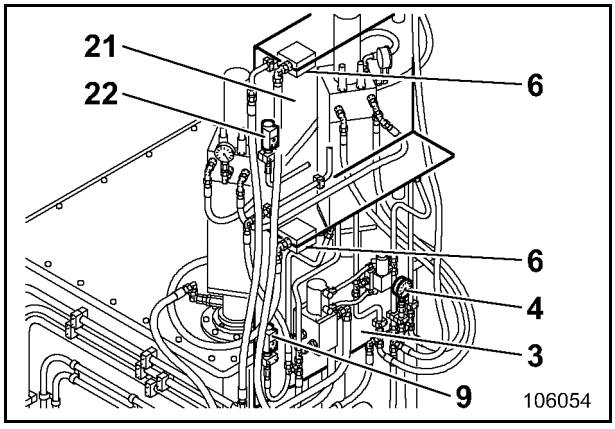

Fig. 3-141:

Recommissioning

- Remove the covers.
- Degrease / clean all protected components.
- Remove engines preservation in acc. with the engine operationg anstructions
- Check the fuel level in tanks
- Check track tension (visual inspection)
- Check level and condition of the cooling liquid in the cooling system.
- Check grease filling in grease container.
- Oil level
  - drive engines
  - slewing gearboxes
  - pump transfer gearboxes
  - travel gearboxes
- Check oil level in hydraulic oil reservoir.
- Check battery acid density and level.
- Install batteries and reconnect.
- Function checks:
  - superstructure holding brake
  - track brake
  - lighting system
  - signalling equipment

Vent the hydraulic system.

ELECTRICAL SYSTEM

2441955

Assisted starting (with jumper cables) – Safety instructions

Keep any potential ignition sources, such as unshielded lights or burning cigarettes, away from the batteries. Battery gases are highly flammable. Explosion hazard.

Do not lean over the batteries when starting the machine from another vehicle.

Risk of injury from acid splashes and battery gases.

Never use assisted starting when the batteries are defective or frozen.

Never connect batteries (battery assemblies) unless they have the same voltage.

Use only tested jumper cables with insulated terminal clips and an adequate lead diameter.

Ensure that the bodies of the supplying and receiving machines are not in contact. Otherwise a current flow could result from connecting the positive poles. Risk of short-circuiting.

Never use welding generators or welding transformers as a source of current.

Position the jumper cables in such a way that they cannot be caught by rotating engine components.

Read and observe: "Inspection and servicing – Safety instructions", paying particular attention to the section "Handling batteries".

Assisted starting (with jumper cables)

Prior to assisted starting

Read and observe the section: "Assisted starting – Safety instructions".

Starting the engine with jumper cables (external batteries

Before connecting the jumper cables (external bateries) check the own batteries for proper operation. Checking is done by switching on the excavator's electrical system.

Do not switch on electrical consumers (e.g. floodlamps) when checking the batteries. In case of doubt, remove the batteries and have them tested.

Assisted starting with batteries installed

- Connect first the positive terminal of the jumper cable to the batteries and then to the supplying unit.
- Connect the negative terminals in the same order.
- After starting, disconnect the jumper cable in reverse order,

i.e. first the negative terminal and then the positive terminal.

TROUBLESHOOTING

2804216

Instructions on troubleshooting

Faults are often due to the machine not being correctly operated or serviced.

For this reason, it is vital to read through the relevant section of the operating instructions once again before rectifying any faults.

If you are unable to detect the cause of the fault or to rectify it, apply to the Terex Germany after-sales service.

Describe the fault and all accompanying circumstances as precisely as possible when calling on the Terex Germany after-sales service. Exact data allow for fast troubleshooting.

Never do any jobs for which you are not qualified.

The fault table lists all faults which have been reported to date and outlines their possible causes and rectifying measures. In exceptional cases, a described fault may also have a different cause.

Layout of the fault table

Fault

The fault is described here as the outcome of an observation or a previous activity.

Therefore make careful observations.

Study the problem carefully. First think, then act.

Ask yourself the following questions:

- Which warning signals preceded the fault?
- What repair and servicing work was carried out previously?
- Has this defect already occurred?
- Is it one or several simultaneously occurring faults?

Possible causes

The possible causes of the observed fault are outlined in this group. They are arranged in order of probability, i.e. the possible cause occurring in most cases heads the list.

Measures

This describes the troubleshooting procedure.

Section

This specifies where information on troubleshooting is given in the operating instructions. If there is no entry, the Terex Germany after-sales service should be consulted

2804493

ABBREVIATIONS

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

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