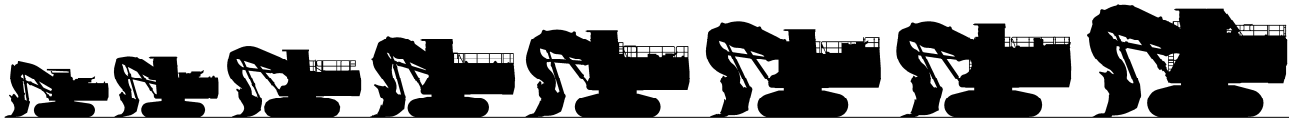
Operating Instructions

CE

Hydraulic Excavator

RH 40E No.

Bucyrus HEX GmbH



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1 INTRODUCTION

	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).

CALIFORNIA Proposition 65 Warning
Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

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.

(Fig. 2-14:)

No.	Element		Function	Symbol
1	**Clock**			
2	**Thermometer**	**Pump transfer gear-box temperature**	Indicates the oil temperature in the pump transfer gearbox.	
3	**Pressure gauge**	**Engine oil pressure**	Indicates the oil pressure in the diesel engine lubricating system.	
4	**Thermometer**	**Diesel engine temperature**	Indicates the temperature of the cooling liquid.	
5	**Warning lamp**	**PMS** (PUMP MANAGING SYSTEM)	Lamp flashes: ▪ when the electrical system is on (engine stationary) ▪ in the event of a fault (engine running) short-circuit, cable break or defective componenent (magnetic pick-up, temperature probe for load-sensing or proportional valve) Lamp is permanently lit ▪ when the programmed hydraulic oil temperature of 80°C / 176°F is exceeded.	
6	**Warning lamp**	**CELECT warning**	Lamp is lit up in the event of an HPI fault The lamp moreover indicates the fault code. **Contact Bucyrus HEX after-sales service or engine manufacturer** (see switch (52).	
7	**Warning lamp**	**CELECT warning**	Lamp is lit up in the event of an HPI fault The lamp moreover indicates the fault code. **Shut off engine** Stop working. **Contact Bucyrus HEX after-sales service or engine manufacturer** (see switch (52).	
8	**Warning lamp**	**CELECT warning**	Lamp is lit up (e. g.): ▪ when the engine oil pressure is too low ▪ when the cooling water temperature is too high **Shut off engine**	

Fig. 2-19:

No.	Element		Function	Symbol
51	**Switch**	**Preheating, cooling fluid, hydraulic oil (optional)**	Switched on the preheating system	COLD
52	**Momentary contact switch**	**Engine monitor**	Diagnose ON/OFF	DIAGNOSTIC ON | OFF
53	**Switch**	**(optional)**		
54	**Switch**	**Engine monitor**	Listing of fault codes see warning lamps (6 and 7) Increment) Decrement)	DIAGNOSTIC INCREMENT DECREMENT
55	**Switch**	**Preheating, fuel (optional)**	Switched on the preheating system	
56	**Switch**	**(optional)**		
57	**Switch**	**Speed reduction**	to the left: normal operation of automatic speed reduction of diesel engine; activated during working pauses to the right: automatic speed reduction off	↓ rpm
58	**Switch**	**Lubrivation System**	Starts an additional lubrication intervall.	
59	**Operating-hours meter**		Sums up the operating hours of the machine; servicing work must be carried out accordingly.	Bh
60	**Rotary switch**	**Fan, air conditioner**	3-stage regulation of air flow	

Switching the electrical system on and off

Switching the electrical system on and off

Key-switch (72, Fig. 2-27:) serves to switch the following functions:

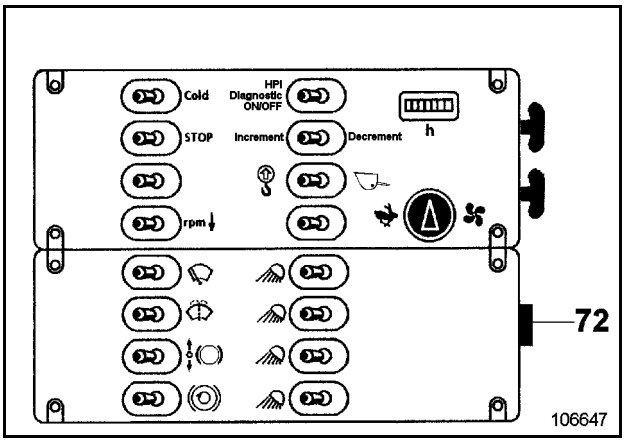

Fig. 2-27:

P = Not connected

0 = All electrical consumers without current. Engine off.

1 = Electrical system on: lamp test.

All monitoring and warning lamps are activated for 5 seconds and buzzer (36, Fig. 2-28:) is activated for 1 second. Thereafter, warning lamps (5, 9, 10, 11, 12, 21,26, 28, 30) are lit. Warning lamp (5) flashes.

2 = Not connected.

3 = Engine start. All warning and monitoring lamps

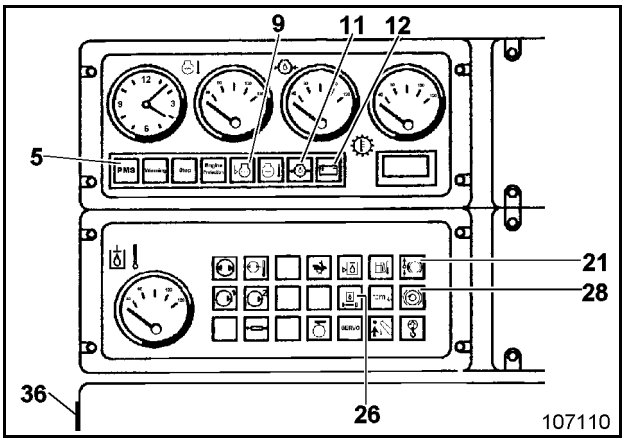

Fig. 2-28:

Note

Change the position of the undercarriage - parallel or perpendicular to the working face - only by cornering forwards/backwards (Fig. 2-50:).

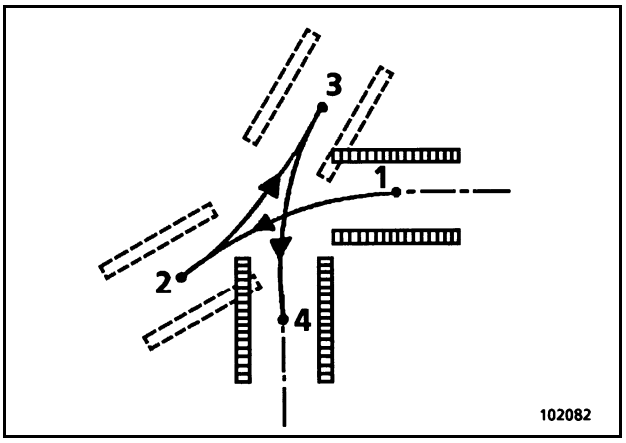

Fig. 2-50:

Cornering to the left:

forwards	from pos. 1 to pos. 2
backwards	from pos. 2 to pos. 3
forwards	from pos. 3 to pos. 4

The same procedure should be adopted if the excavator is to be driven out of depressions (Fig. 2-51:):

Cornering to the left	from pos. 1 to pos. 2
Cornering to the right	from pos. 2 to pos. 3

Never use the working equipment to raise one side of the undercarriage and then turn the undercarriage by initiating the slewing and/or the travelling function.

This way of working is contrary to the excavator's-designated use.

There is a risk of accident. Moreover, the tracks, slewing gear, roller bearing slewing ring, backhoe or bucket back-wall and the front part of the bucket are subjected to inadmissibly high stresses.

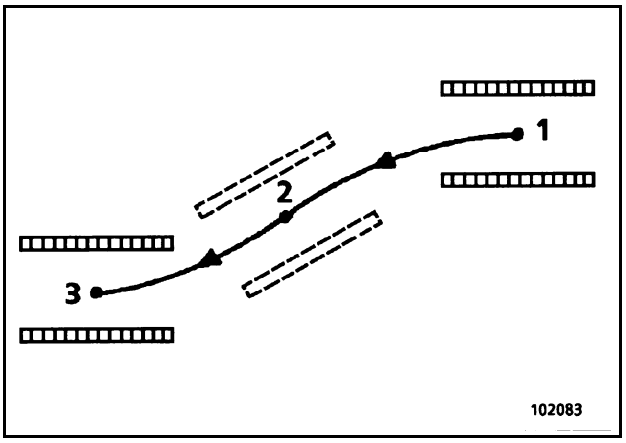

Fig. 2-51:

After daily operation

Parking the machine

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

Escaping oil pollutes the environment.

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

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

NOTES

FIRE AND EXPLOSION HAZARD

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)

Every 60 OH or every working shift (whichever comes first)

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

Inspection plan – Oil (legend))

No.	Location	Number	Lubricant properties [14]	Check oil level every ... OH	Change oil every ... OH
1	Engine	1	I.a	10	500[15]
		1	I.b	10	250[15]
2	Hydraulic system	1	II	10	10000 [16]
3	Pump transfer gearbox	1	III.a	60	1000
	- Prechambers			10	1000
4	Slewing gearbox	1	III.b	10	1000
5	Travel gearbox	2	III.c	500	5000

[14] see "LUBRICANTS" section

[15] Oil change interval depends on the quality of the engine oil filled in, see section "LUBRICANTS"

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

SERVICING WORK

Hose line for oil and cooling liquid changes

Collect escaping oil and cooling liquid and discard without polluting the environment.

Carry out oil changes when the machine is at operating temperature; warm oil drains away more easily.

The engine, hydraulic oil reservoir and the slewing gearbox are equipped with special oil drain valves (1, Fig. 3-11:).

These plugs permit to carry out oil changes in a clean and non-polluting way.

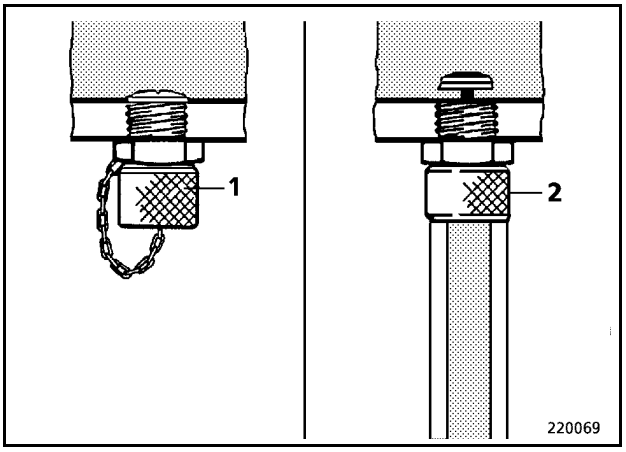

Fig. 3-11:

Carry out oil changes as follows:

- Place a recipient for waste oil under the drain opening (choose the capacity of the recipient in acc. with the "Refilling quantities - Oil" table).
- Choose the proper draining hose from the tool kit.
- Unscrew protective cap from oil drain valve.
- Screw on draining hose (2); the valve opens and the oil drains away.
- After the oil has drained away unscrew draining hose; the valve closes automatically.
- Screw protective cap back in place.

- Before installing the filter element, clean contact faces at cover (2, Fig. 3-28:) and at filter housing.
- Put on cover (2) and tighten nut (1).

During the removal of the main filter element, the safety element (5, Fig. 3-29:) must remain in the filter housing.

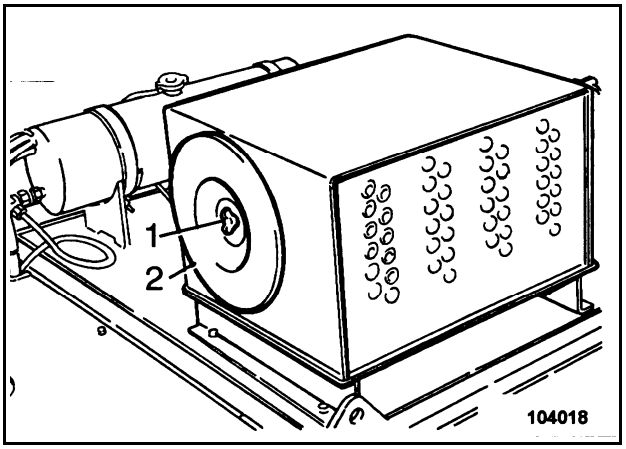

Fig. 3-28:

Checking and cleaning the main filter element

Examine the filter paper of the element with a lamp which is introduced into the element (Fig. 3-30:). Any damage is then clearly visible.

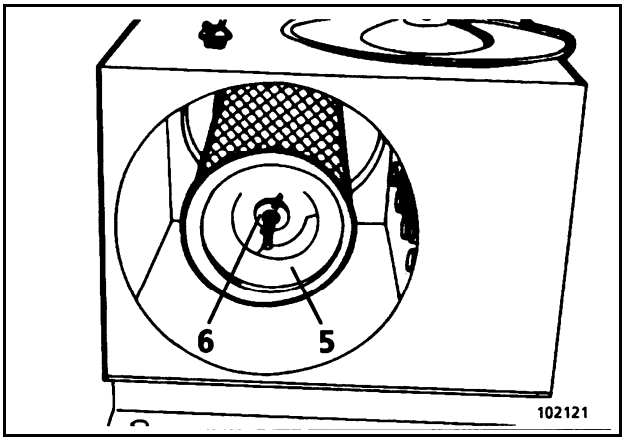

Fig. 3-29:

Replace damaged or deformed elements immediately.

Check element seal. When the seal is damaged, the filter element must be replaced, too.

Cleaning with compressed air is suitable if the filter element is to be re-used immediately.

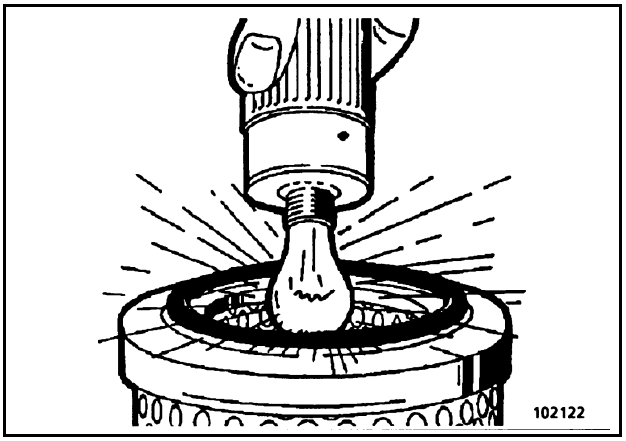

Fig. 3-30:

Blow filter element (Fig. 3-31:) clean with dry compressed air from the inside by moving the compressed-air gun up and down.

The pressure at the nozzle must not exceed 3 bars / 43psi.

Cleaning is terminated when all visible dust has been blown out of the filter element.

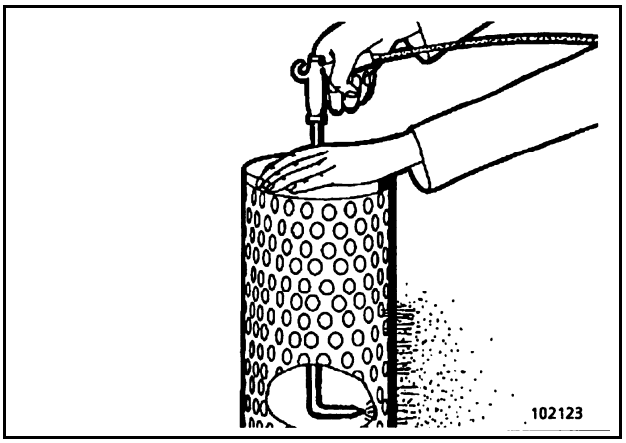

Fig. 3-31:

Never clean filter element by beating against hard objects.

Replace the main filter element after 1000 operating hours or 3 cleaning cycles; and, after one year of operation at the latest.

The batteries are located under the lockable hatch (5, Fig. 3-49:). The two 12-volt batteries are connected in series, so that the system voltage is 24 volts.

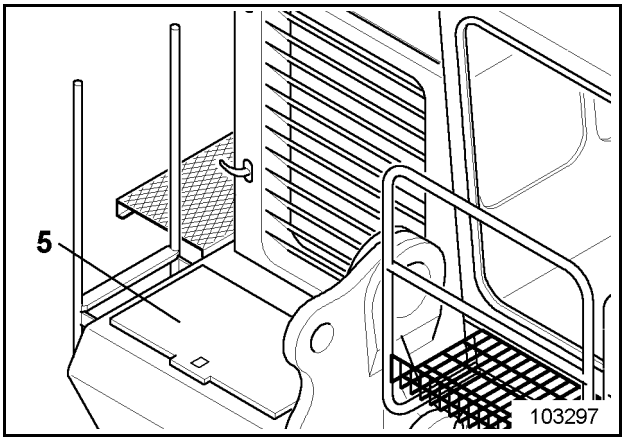

Fig. 3-49:

- ➲ Unscrew battery holder (3, Fig. 3-50:).
- ➲ 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.

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.

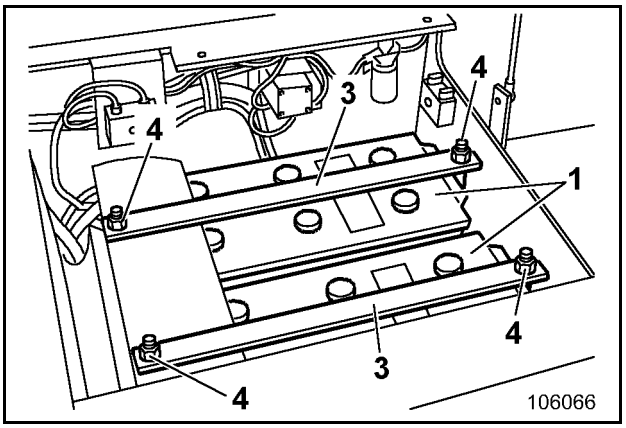

Fig. 3-50:

Install the new battery:

- ➲ 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 deformations.

- ➲ 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.
- ➲ Fasten battery holder (3).

Loose or corroded clamping lugs will lead to alternator or regulator overloading.

High-pressure filters for the servo circuit and the feeding circuit of the slewing pump

The excavator is equipped with a high-pressure filter (40, Fig. 3-65:) for the servo circuit and §another filter (41) for the feeding circuit of the slewing pump.

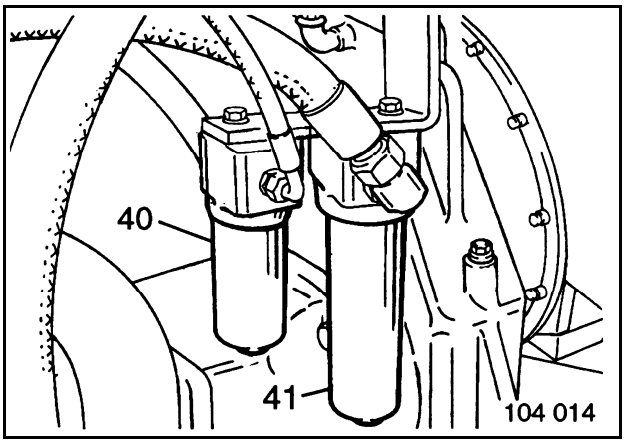

Fig. 3-65:

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

Shut off the engine.

Risk of scalding from hot hydraulic oil.

The filter housings may also be hot.

Avoid skin contact.

Skin contact with hydraulic oil may cause skin injury.

Wear protective gloves and firm protective clothing.

Collect escaping hydraulic oil and discard without polluting the environment.

Checking/cleaning the filter elements

- ➲ Unscrew filter housing (42, Fig. 3-66:) and pour out the oil.
- ➲ Withdraw filter element (43) from housing (42).
- ➲ Clean filter housing and contact faces at the filter head with white spirit or paraffin oil.
- ➲ Insert filter element into housing (42) and attach to the filter head with a new, slightly oiled sealing ring (46).
- ➲ Check the high-pressure filter for leaks after thesystem has been put into operation.

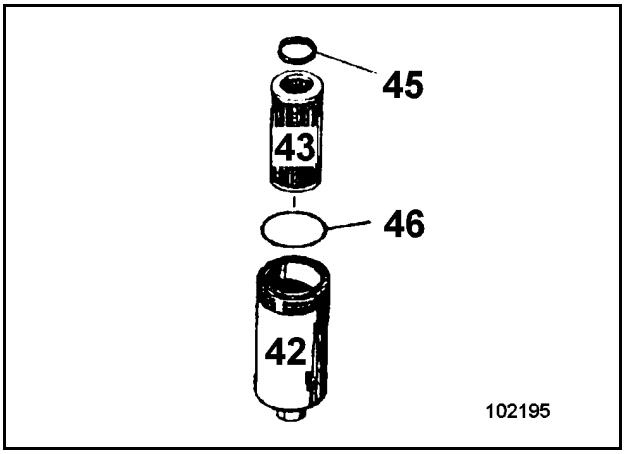

Fig. 3-66:

Replacing the filter elements

- ➲ Detach the filter elements as described under "Checking the filter elements".
- ➲ Insert new filter element (43) and re-assemble.
- ➲ Check the high-pressure filter for leaks after putting it into operation.

Filling in new oil / Topping up

➲ Unscrew plug (4, Fig. 3-82:) and fill in new oil.

➲ Check oil level with dipstick (1, Fig. 3-82:).

➲ Screw in plug (4) again.

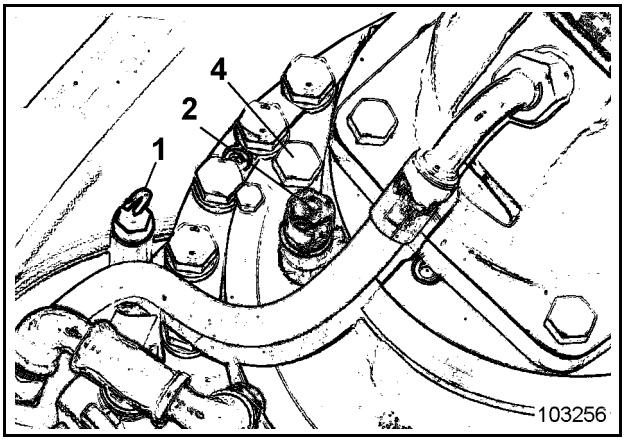

Fig. 3-82:

Gearbox venting

The gearbox is vented through breather filter (2, Fig. 3-82:).
Clean breather filter in accordance with the servicing plan.

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

➲ Screw breather filter (2) back in place.

Output pinion

Grease bearing regulary.

➲ Fill in approximate 50cm^3 / 1.7oz grease through grease nipple (5, Fig. 3-83:) by means of a hand grease pump.

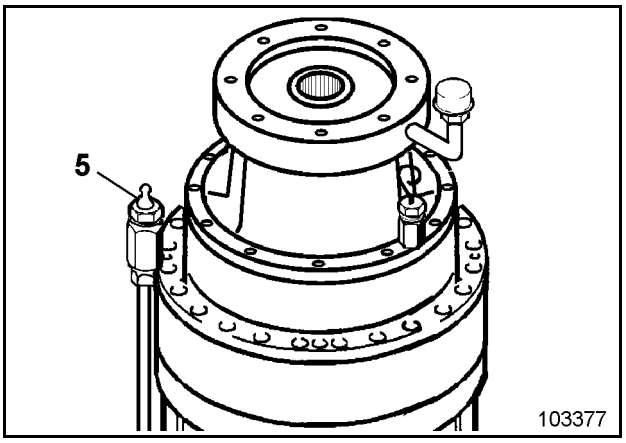

Fig. 3-83:

In the case of trouble-free operation, two control pins in the main distributors must always move up and down when the pertaining pistons in the main distributors are being switched over.

Control pin movement is monitored by means of sensors. Indicator lamp (24, Fig. 3-100:) flashes on and off in the event of a fault.

See fault indication table.

In the event of trouble, shut off engine and rectify.

Check during every working shift

- that no grease escapes from the pressure-relief valves (9, Fig. 3-101:) and
- that the grease container contains a sufficient amount of grease.

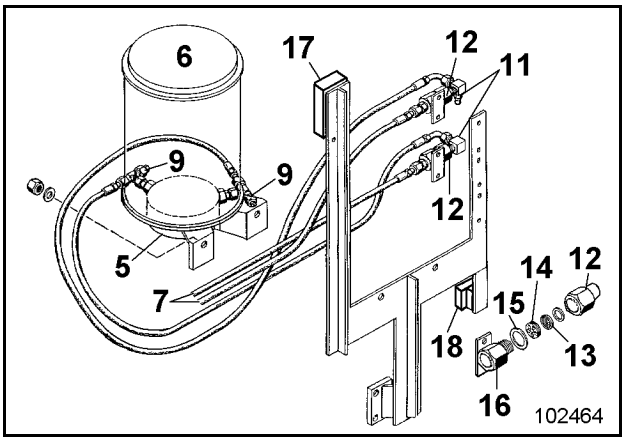

Fig. 3-100:

The level of grease in the container is visible from outside.

If grease escapes from the pressure valves (9), the line system is clogged. In this case, rectifiy the fault as described under "Unblocking a grease line".

If the amount of grease left in the container is insufficient, refill container through greasing nipple (10, Fig. 3-101:) with a manual grease gun or with a mobile service station. The filling pressure must be ca. 5 - 8 bars / 72-116psi.

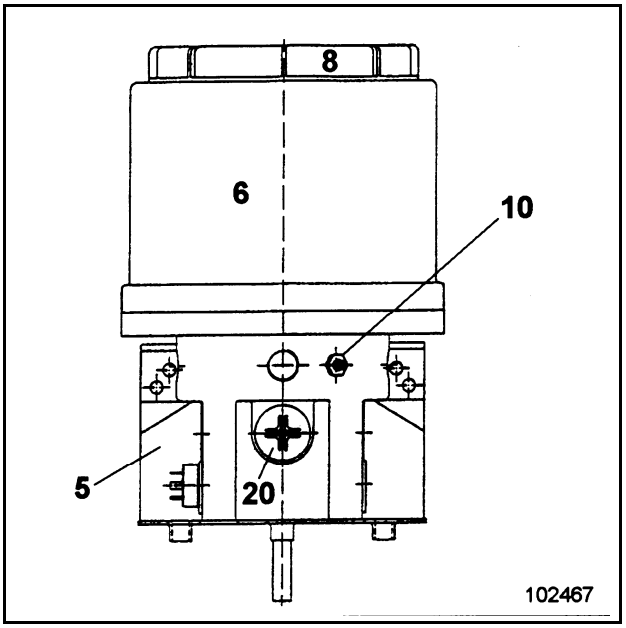

Fig. 3-101:

Always refill the grease container in time to avoid malfunctions caused by air penetrating into the lubricating system.

The grease container (6) can also be filled by hand.

Switch off the electrical system and withdraw key from the key-switch.

Unscrew cover (8)of the grease container and fill in grease manually.

Screw cover (8) back in place.

4 REPAIR WORK

	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.
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Part 6	**INDEX**	**Operating personnel + Inspection and servicing personnel + Repair personnel**

WELDING OPERATIONS - SAFETY INSTRUCTIONS

Never perform welding operations unless you are qualified to do so.

Observe the accident prevention regulations.

Wear protective clothing

- protective suit
- protective gloves
- face protection

Any work on receptacles that contain or have contained substances

- which are combustible or which encourage combustion,
- which are susceptible to explosion,
- or which may develop health-hazardous gases, vapours, mist or dust

during welding operations must be carried out only under expert supervision and only by experienced persons authorized to do such work.

Detailed information on the correct execution of welding operations is given in the technical manual "Welding for maintenance and repair".

Should you have any problems or queries, apply to the Bucyrus HEX after-sales service department.

If parts of the machine have to be dimantled, read and take note of the following sections:

Assembling attachments - safety instructions",

"Inspection and servicing - safety instructions",

"Repair - safety instructions".

Protect the disconnected terminals and plugs from short-circuiting and soiling by covering them with foil or adhesive tape.

Attach the welding-current pincers close to the welding zone (max. 2 - 3 m (6.5 - 9.8ft)).

The welding current must not flow via the ball resp. the roller bearing slewing ring, via pin couplings, articulated joints or hydraulic cylinders.

An electric current flowing over an air gap (in an articulated joint, for instance) generates sparks that damage metallic surfaces.

On completion of the welding operation, restore all electrical connections.

Slewing mechnism – Fault table

Fault					Remedial action	
No slewing possible					Check	**P**
	No righthand or lefthand slewing				Adjust	**E**
					Replace	**W**
		Slewing performance insufficient			Top up	**A**
					Reduce	**S**
			Uncontrolled slewing movement		Clean	**R**
					1) Contact the Bucyrus HEX Service	
				Cause	**Chapter ref.**	
•				Servo control not activated / defective	Working	**P**
•				Endschalter Aufstiegleiter (Option) defekt, nicht vollständig eingefahren	Operation	**P**
•				Superstructure holding brake applied		**P**
•		•		Pressure-relief valve adjusted too low level / defective		**1)**
•				Servo system pump defective		**1)**
•		•		Malfunction in feed-pressure circuit of slewing pump		**1)**
		•		Malfunction in high-pressure circuit of slewing system		**1)**
	•	•		Malfuction of moment-regulating valve		**1)**
	•		•	Malfunction in slewing pump displacement cylinder		**1)**
		•		Excessive leakage in slewing motor		**1)**

Diesel Engine

Engine features

- Microprocessed engine management
- Automatic rev. reduction
- Heavy-duty air filters, STRATA 1 with automatic dust evacuation
- Two-stage fuel filter, incl. water separator

Version 1 - Caterpillar (Tier 3)

Make and model	Caterpillar C18
Total rated net power ISO 3046/1	496 kW (665 HP) 1,800 min^{-1}
Total rated net power SAE J1349	496 kW (665 HP) 1,800 min^{-1}
Total rated gross power SAE J1995	522 kW (700 HP) 1,800 min^{-1}
No. of cylinders (each engine)	6
Bore	145 mm (5.7 in)
Stroke	183 mm (7.2 in)
Displacement	18.1 l (1.105 in^3)
Aspiration	Turbocharged and charge air cooled
Max. altitude without deration	1,500 m (4,900 ft) a.s.l.
Emission certification	US EPA/CARB Tier 3; Europe NRMM Stage III A
Fuel tank capacity	1,300 l (343 US gal)

Version 2 - Cummins (Tier 1)

Make and model	Cummins QSK 19-C (Tier 1)
Total rated net power ISO 3046/1	453 kW (607 HP) 1,800 min-1
Total rated net power SAE J1349	453 kW (607 HP) 1,800 min-1
Total rated gross power SAE J1995	477 kW (640 HP) 1,800 min-1
No. of cylinders (each engine)	6
Bore	159 mm (6.25 in)
Stroke	159 mm (6.25 in)
Displacement	19 l (1,159 in^3)
Aspiration	Turbocharged and aftercooled
Max. altitude without deration	3,100 m (10,200 ft) a.s.l.
Emission certification	US EPA Tier 1; Eurpoe NRMM Tier 1
Fuel tank capacity	1,300 l (343 US gal)

Undercarriage

Travel speed	Max. 2.34 km/h (1.45 mph)
Max. tractive force	650 kN (66 t = 146,070 lb)
Gradability of travel drives	Max. 70 %
Track pads (each side)	48
Bottom rollers (each side)	8
Support rollers (each side)	1
Travel drives (each side)	1 planetary transmission with 1 axial piston motor
Parking brake	Wet multiple disc brake, spring applied / hydraulically released

- Rolled double-grouser track pads
- All running surfaces of sprockets, idlers, rollers and track links are hardened
- Fully hydraulic self-adjusting track tensioning system with membrane accumulator
- Automatic hydraulic retarder valve to prevent overspeed on downhill travel
- Acoustic travel alarm

Swing System

Swing Drive	Compact planetary transmission with axial piston motor
Parking Brake	Wet multiple disc brake, spring loaded / hydraulically released
Max. swing speed	5.6 rpm
Swing ring	Triple race roller bearing with sealed internal gearing

- Closed-loop swing circuit with torque control
- Hydraulic braking of the swing motion by counteracting control
- All raceways of swing ring as well as grease bath for internal gearing supplied by automatic central lubrication system

Automatic Lubrication System

Capacity of grease drum	8 l (2.1 US gal)

- Single line progressive automated lubrication system, electric motor driven and electronically controlled
- Connected to the lubrication system are the swing roller bearing with internal gearing and all pivot points of attachment, bucket and cylinders except backhoe bucket and linkage
- System failures displayed on control panel

Attachments

- Booms and sticks are torsion-resistant, welded box design of high-tensile steel with massive steel castings at pivot areas
- Booms and sticks are stress-relieved after welding
- Pressure-free lowering of boom (FS) by means of a float valve
- Shovel attachment with patented TriPower kinematics ensuring the following main features:
  - Horizontal automatic constant-angle bucket guidance
  - Vertical automatic constant-angle bucket guidance
  - Automatic roll-back limiter to prevent material spillage
  - Kinematic assistance to hydraulic forces
  - Constant boom momentum throughout the whole lift arc
  - Crowd force assistance
- All buckets (FS and BH) are equipped with a universal wear package suitable for all standard applications, which consists of:
  - Lip shrouds between teeth
  - Side edge protection
  - Heel shrouds at bottom edges
  - Special liner material covering main wear areas inside and outside of bucket
- Special wear packages for highly abrasive materials on request

Operator's Cab

Operator's eye level		approx. 4.3 m (14 ft 1 in)
Internal dimensions	Length	1,800 mm (5 ft 11 in)
	Width	1,300 mm (4 ft 3 in)
	Height	1,900 mm (6 ft 3in)

- Pneumatically cushioned and multi-adjustable comfort seat with lumbar support, seat heating, safety belt, head and arm rests
- Switch in seat cushion to automatically neutralize the hydraulic controls when operator leaves the seat
- Joystick controls integrated in independently adjustable seat consoles
- Fold-away auxiliary seat with safety belt
- FOPS (rock guard; approved acc. to DIN ISO 3449) integrated into cab structure
- All-round safety glass, armored windshield and sliding side window
- Windshield with parallel intermittent wiper / washer
- Roller blind at windshield
- Robust instrument panel incl. large and easy-to-read instruments

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