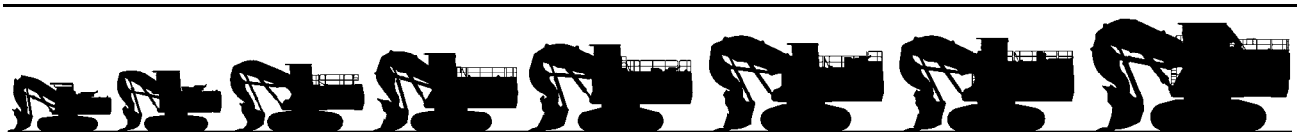
Operating Instructions

Hydraulic Excavator

RH200 Electric 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**
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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 / pneumatc 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 / pneumatic system) to be removed in accordance with the specific instructions for the unit concerned before carrying out any repair work.

Hydraulic- and pneumatic 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.

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.

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.

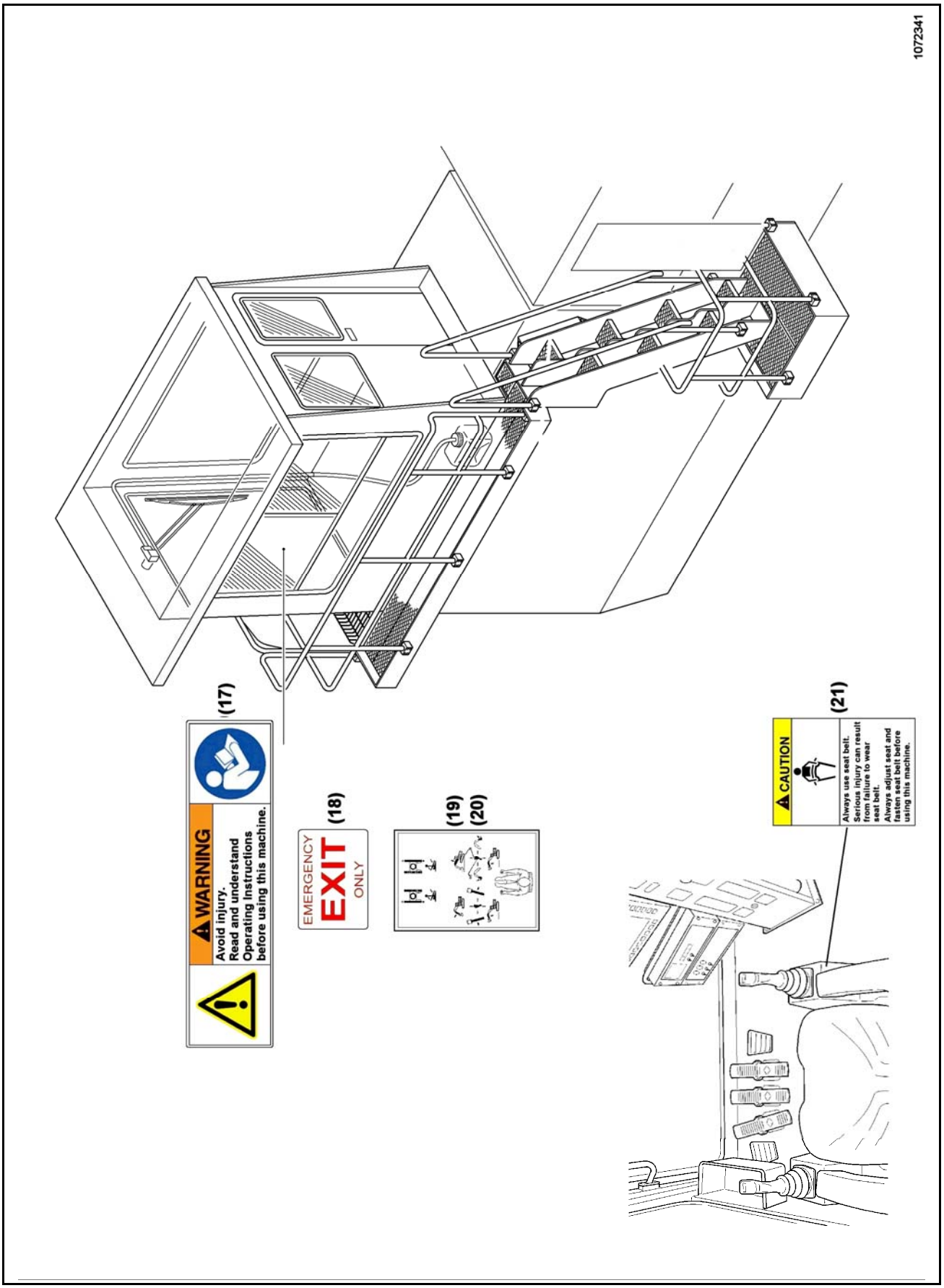
1072341
(17)
WARNING
Avoid injury.
Read and understand
Operating Instructions
before using this machine.
(18)
EMERGENCY
EXIT
ONLY
(19)
(20)
(21)
CAUTION
Always use seat belt.
Serious injury can result
from failure to wear
seat belt.
Always adjust seat and
fasten seat belt before
using this machine.

Fig. 2-9:

Machine number

The identification plate (Fig. 2-20:) with the machine number is attached to the front side of the A-frame (arrow, Fig. 2-19:).

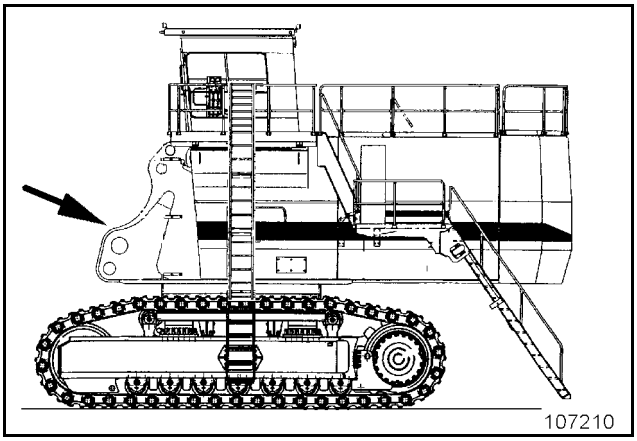

Fig. 2-19:

Fig. 2-20:

Motor number

The serial number plates (Fig. 2-21:) for the electric motor are located on the electric motor.

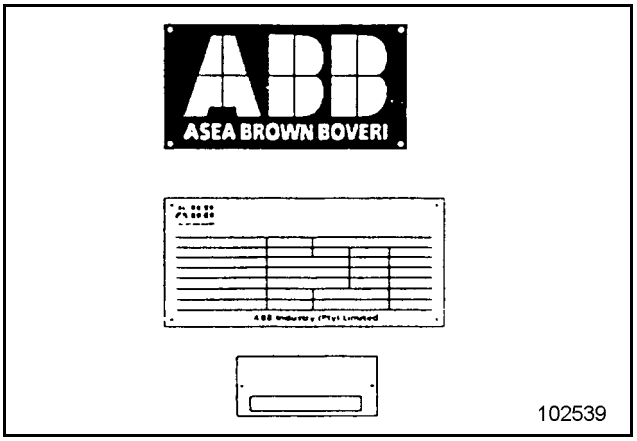

Fig. 2-21:

Component numbers

Other larger units also have identification plates indicating, among other things, their serial number.

On steel components, the Bucyrus HEX part number or the serial number may be stamped into the metal at a clearly visible place.

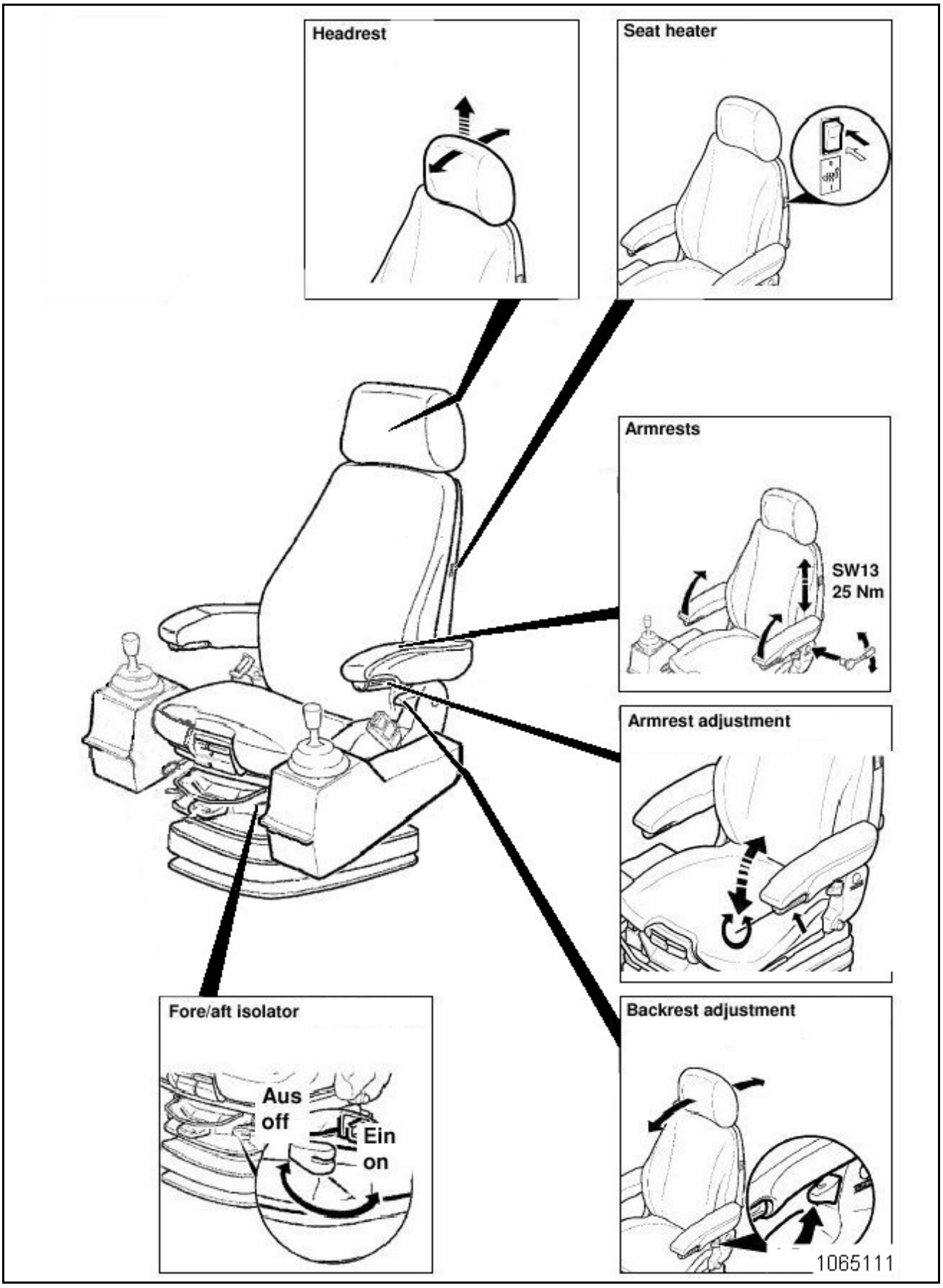
Headrest
Seat heater
Armrests
SW13
25 Nm
Armrest adjustment
Fore/aft isolator
Aus
off
Ein
on
Backrest adjustment
1065111

Fig. 2-47:

(Fig. 2-63)

No.	Element	Function	Symbol
30	**Lamp**	Illuminates the front side of the control column.	
31	**Pushswitch Emergency OFF**	The entire electrical system is interrupted in all poles by the on-board circuit breaker. ⚠ **Even after actuation of the EMERGENCY STOP switch, medium voltage (6.6 KV) is present (primarily) from the transformer station via drag cable and slip ring assembly to the circuit breaker.**	
32	**Key-switch**	Switches the low voltage system on and off.	
33	**Buzzer**	**Gives an acoustic warning signal if a fault is reported:** ▪ Electric motor – winding temperature too high – bearing temperature too high ▪ bord transformer temperature too high ▪ Hydraulic oil level too low ▪ Distributor gearbox temperature too high ▪ Swing pump temperature (1 and / or 2; too high ▪ Swing gearbox temperature (1 and / or 2) too high ▪ Fault in lubricating system ⚠ **Lower the equipment to the ground and switch off electric motor immediately if the buzzer (33) sounds and the BCS indicates a fault. The buzzer (33) continues to sound until the fault has been retified.**	

(Fig. 2-68:)

No.	Element		Function	Symbol
91	**Switch**	**Emergency Operation Boom/Stick**	Actuate and hold if boom and stick must be lowered in an emergency.	
92	**Button**	**Dumper count**	RESET	
93	**Switch**		Activates boom cylinder limit switch (optional)	
94	**Button**		When switched it is possible to swing the uppercarriage and to drive the excavator even when the hydraulic ladder or the service station is in the lower position. **Risk of damaging the ladder or the service station!** **Be careful and swing the uppercarriage and drive the excavator very slowly and only a short way.**	
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.	

Assemblies resp. reservoirs	Measuring device	Remarks
Pump transfer gearbox	Dipstick (1, Fig. 2-74:)	Stop filling when the oil reaches the "max" mark on the dipstick (see Part 3, chapter "Pump transfer gearbox - Checking the gearbox oil level / Filling in oil").
Hydraulic oil tank	BCS monitor (Fig. 2-77:), Inspection glass (1, Fig. 2-75:), signs (2, Fig. 2-75: and Fig. 2-76:)	Checking the oil level: Extend the piston rods of stick and bucket cylinders halfway (see sign). Stand working equipment on the ground. Check oil level at an oil temperature of ca. 50 °C (122°F), with the electric motor shut off. Fill in oil when the oil level in the inspection glass has-dropped below the "min" mark. Stop filling if the oil reaches the "max" mark on the inspection glass or the acoustic warning signal "Travel alarm" sounds (see chapter "Hydraulic system - Checking the hydraulic oil level / Refilling hydraulic oil").

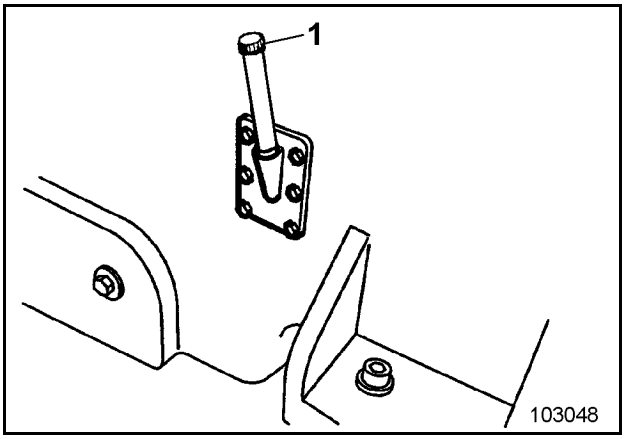

Fig. 2-74:

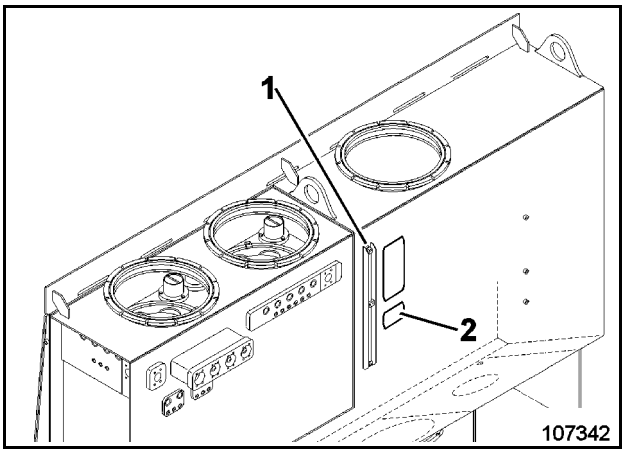

Fig. 2-75:

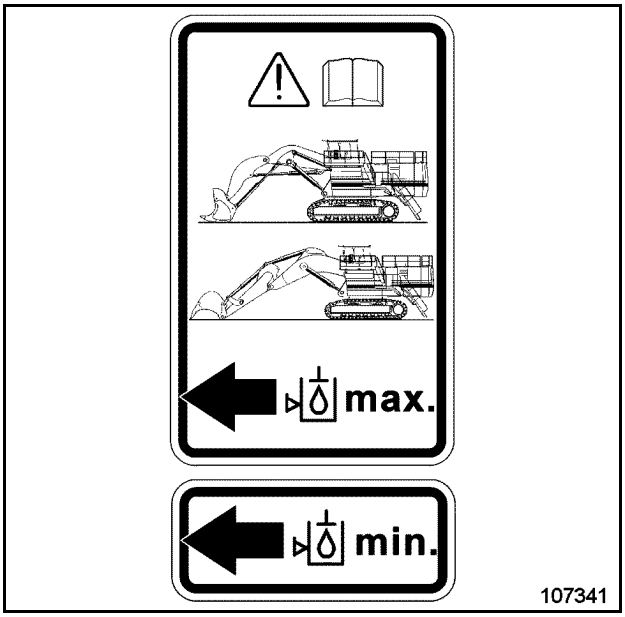

Fig. 2-76:

Warm-up procedure for electric excavators

Operator procedure during start up in extreme cold weather

- After starting the electric motor check for any faults on the BCS display.
- Make sure the “SERVO” switch (74, Fig. 2-93:) is in the OFF position.
- Use the “Boom up” (116, Fig. 2-94: backwards) or “Stick out” function (115, Fig. 2-94: forwards) to engage the hydraulic pumps.
  This will engage the pumps without moving the attachment.
- Do so until:
  - the hydraulic oil temperature reaches 10°C on the gauge and
  - the PTO temperature has reached 5°C.
- You can now turn ON the “SERVO” switch (74, Fig. 2-93:) and move the attachment in a slow function one at a time.

  Do not extend the cylinders fully.

Swing circuit warm-up before you start digging

- Make sure the attachment or bucket is on the ground.
- Turn “Swing brake” switch OFF (82, Fig. 2-93:).
- Turn “SERVO” switch ON (74).
- Use “Swing left” or “Swing right” function (115, Fig. 2-94:) slowly. This will heat the swing hydraulic circuit quickly.
- Once the swing temperature is warm you can lift the attachment and swing the excavator in a slow 360° left then right.

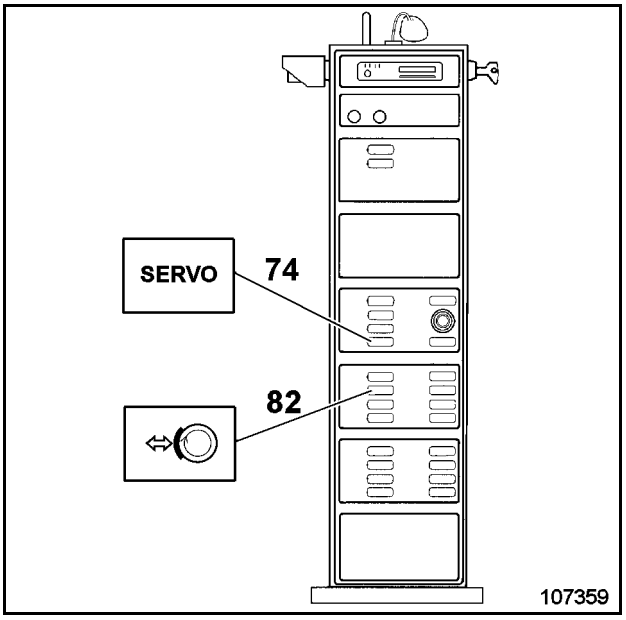

Fig. 2-93:

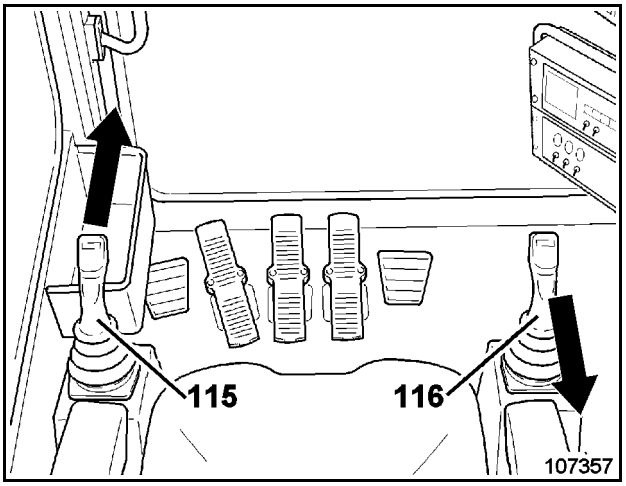

Fig. 2-94:

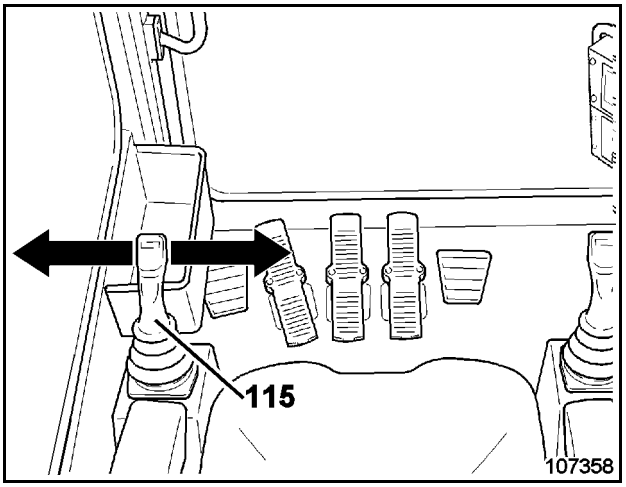

Fig. 2-95:

Avoid extreme positions of the attachment

Parts of the attachment may damage the machine if they are moved into extreme positions (see illustrations Fig. 2-112: - Fig. 2-116:).

Work carefully, avoiding extreme positions of this kind.

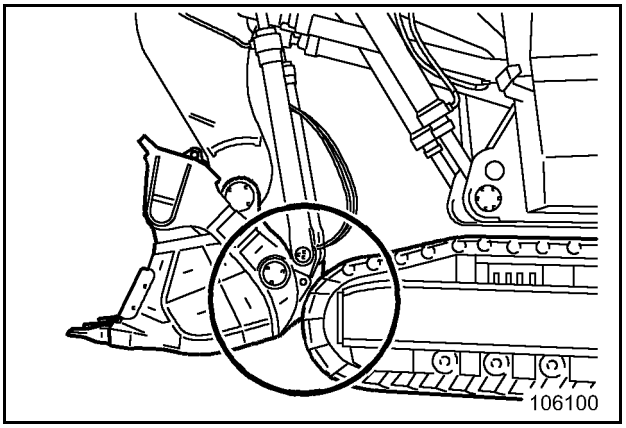

Fig. 2-112:

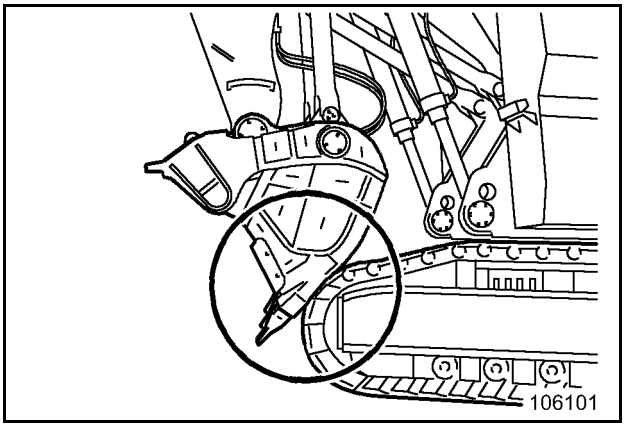

Fig. 2-113:

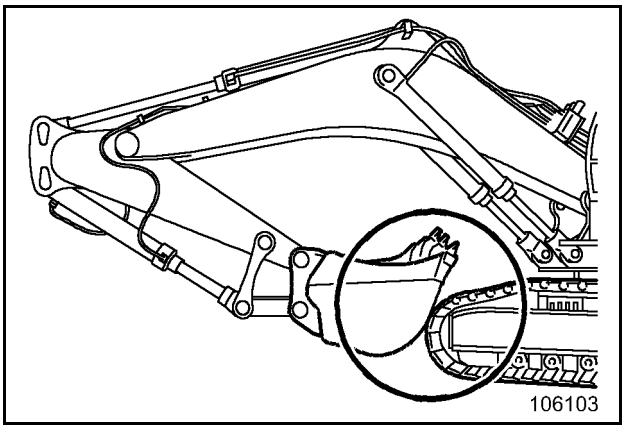

Fig. 2-114:

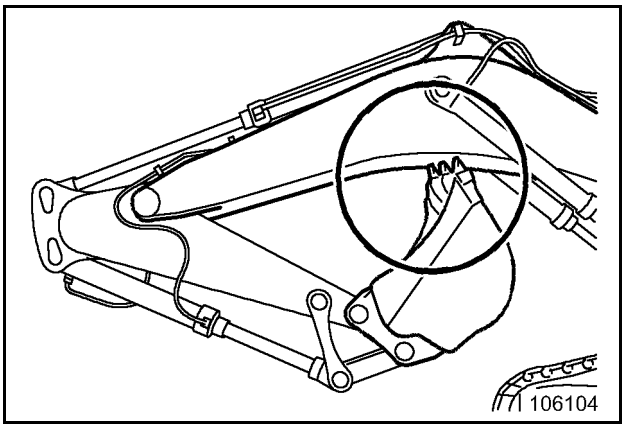

Fig. 2-115:

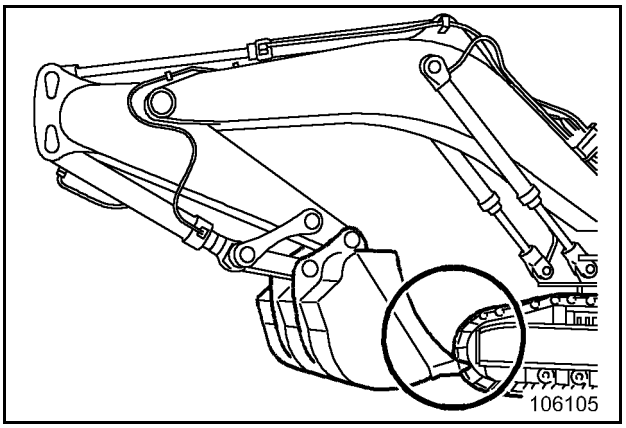

Fig. 2-116:

3 INSPECTION AND SERVICING

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FIRE AND EXPLOSION HAZARD

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Such substances may spontaneously ignite if they get into the vicinity of hot units.

Even battery gases can ignite in open flames or fire.

Avoid parking the excavator in places where

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

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

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

Plan A – E

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
Servicing in acc. with W or T			●	●	●	●	●
Monitoring, warning and control elements							
- Joysticks							
- Control spool, plate, cardan joint	Grease lightly	2 x 4 [5]			●	●	●
- Pedals							
- Control spool (machine with loading shovel)	Grease lightly	3 x 2 [5]			●	●	●
Electric motor	Grease bearings	2			●	●	●
	Check for vibration			●	●	●	●
	Visual inspect interior of machine for degree of dirt deposits				●	●	●
Rotor (inside and outside of machine)	Visual inspect all accessible places for rust						●
Terminals	Check tightness			●	●	●	●
	Check for degree of dirt deposits				●	●	●
Coupling	Check for alignment and record measurements						●
Screw connections	Check condition and tightness					●	●
	See Electric motor manufacturer´s servicing instructions for further details.			●	●	●	●

[5] apply a thin layer of low temperature grease

Inspection plan – Oil (legend)

No.	Location	Number	Lubricant properties [14]	Check oil level every ... OH	Change oil every ... OH
1	Hydraulic system	1	**II**	10	10000 [15]
2	Pump transfer gearbox	1		60	1000
2	-Pre-chambers, expansion reservoir		**III.a**	10	1000
3	Swing gearbox	4	**III.b**	10	1000
4	Travel gearbox	2		500	5000
	- Pre-chamber / spur gear section (PN 2763214 only)	2 x 1	**III.c**	500	5000
	- Brake-chambers	2 x 2		500	5000
5	On-board crane (optional)				
	- Crane drive engine	1	**I**	10	250 [16]
	- Hydraulic oil reservoir	1	**II**	10	1000 [17]

[14] see "LUBRICANTS" section

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

[16] Change oil at least once a year.

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

ELECTRIC MOTOR

Electric motor - Safety instructions

Read and observe: "Inspection and Servicing – Safety Instructions" and the electric motor operating instructions.

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

Wear protective gloves and firm working clothing.

➲ Switch off electric motor, to do so actuate switch (52, Fig. 3-17:).

➲ Set servicing switch (4, Fig. 3-18:) to locked position and secure in this position with a padlock.

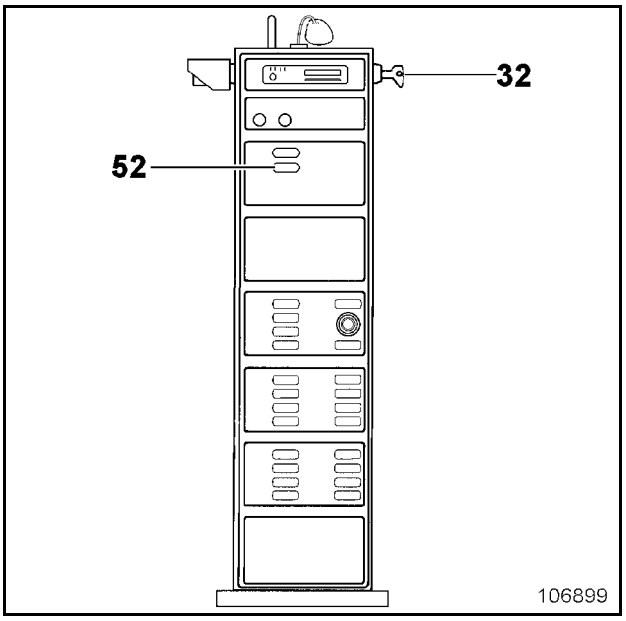


Fig. 3-17:

Cleaning the electric motor

Clean the electric motor, the cooling fins, bearing shields and ventilators from dust with compressed air, brushes and clothes only.

Remove the fan guard before cleaning the ventilator fan. Install it after cleaning.

Don't damage the protective coating while cleaning the electric-motor.

For more information see the manufacturers manual for the electric motor.

It is not permissible to clean the electric motor or any live excavator components with a steam cleaner and steam jet.

➲ After finishing work on the electric motor remove the padlock from servicing switch (4, Fig. 3-18:) and unlock.

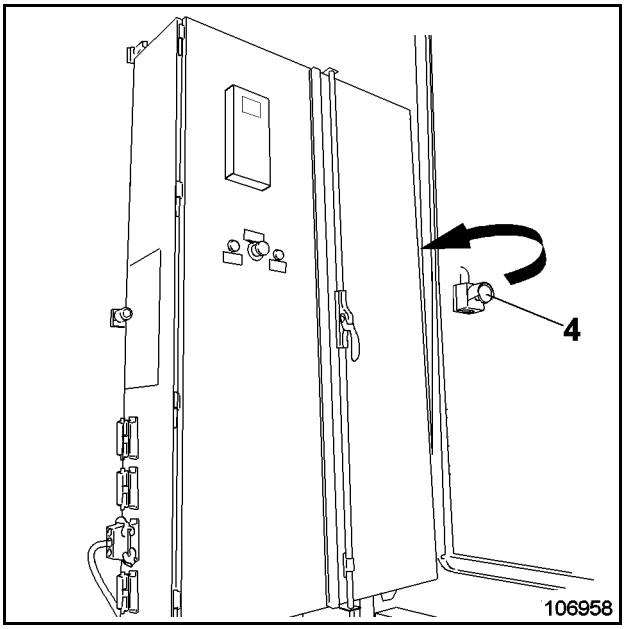


Fig. 3-18:

Replacing a defective Xenon-lamp

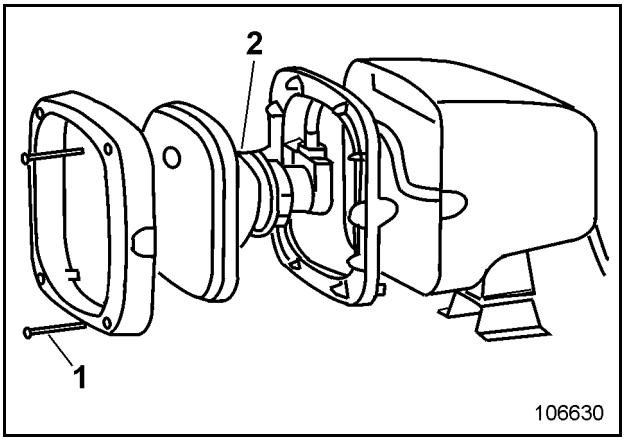


Fig. 3-31

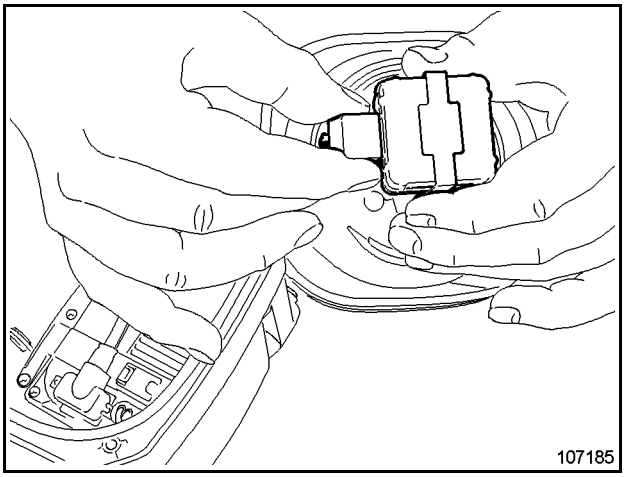


Fig. 3-32

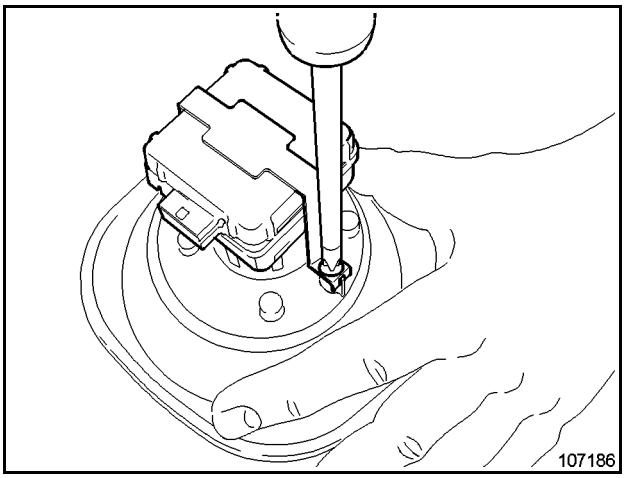


Fig. 3-33

Read and observe the:
„Floodlight projector, replacing the lamp, Safety instructions“.

- Switch off the projector, shut off the electric motor and cut out the battery main switch.
- Wait until the housing of the floodlight projector has cooled down.
- Withdraw the power supply connector from the projector.
- Remove four screws (1, Fig. 3-31) and withdraw the reflector (2) from the projector housing.
- Withdraw connector (Fig. 3-32) from Xenon lamp socket.
- Unscrew Xenon lamp holding clamp (Fig. 3-33).
- Remove the defective Xenon lamp and replace by a new one. Do not touch the glass bulb of the lamp.
- Reinstall the new lamp. Screw lamp holding clamp back in place.
- Plug the power supply connector onto the lamp.
- Re-assemble the housing.

High-pressure filters for swing circuit

The excavator has three high-pressure filters (Fig. 3-54:) for the feeding circuits of the swing pumps.

The filters are located in front of the hydraulic oil reservoir.

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

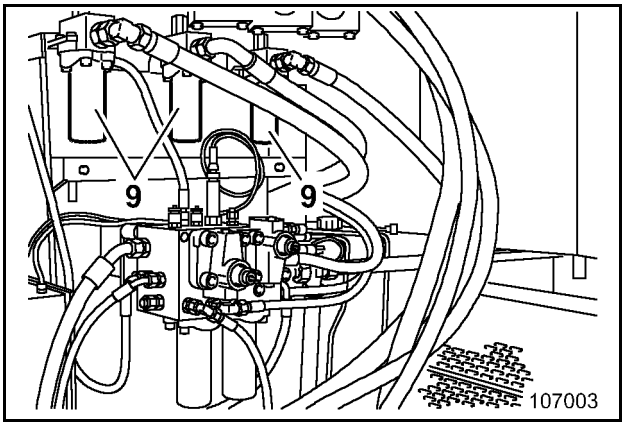


Fig. 3-54:

Switch off the electric motor.

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 element

- Detach flange (4, Fig. 3-55:).
- Remove filter housings and pour out used oil.
- Withdraw filter element (6) from filter housing (5).
- Clean filter housings and sealing faces at filter head with white spirit or paraffin oil.
- Insert new filter element into filter housing (5) and refit to filter head with a new, lightly oiled sealing ring (8).
- Check the high-pressure filter for leaks after putting it into operation.

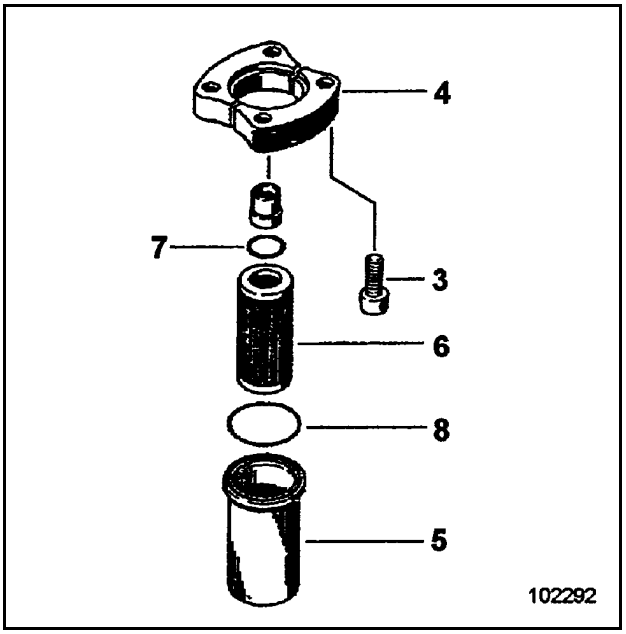


Fig. 3-55:

Replacing the filter elements

- Detach the filter elements as described under "Checking the filter elements".
- Install new filter element (6, Fig. 3-55:) and reassemble with a new, lightly oiled sealing ring (7).
- Check the high-pressure filter for leaks after putting it into operation.

Pump gearbox, pre-chambers

Checking oil level, topping up with oil

The oil level in the pre-chambers is visually at the inspection glas (3, Fig. 3-71) in expansion reservoir (1).

The oil level should reach up at least to the middle of the inspection glas (3). Top up with gearbox oil, if required.

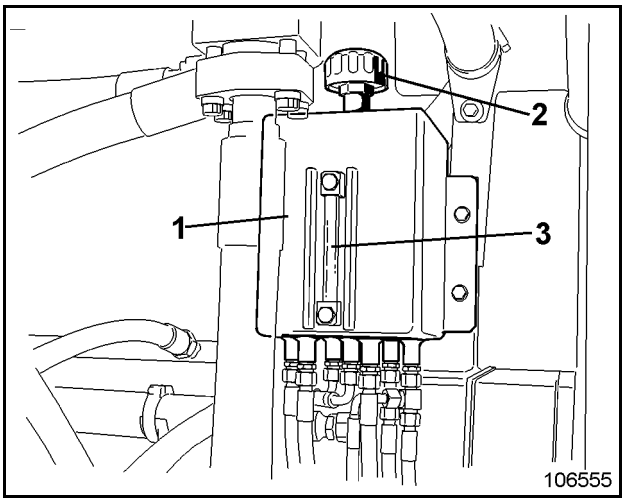


Fig. 3-71

Pump gearbox, venting

The gearbox is vented through the breather valve (arrow, Fig. 3-72).

Clean breather valve in accordance with servicing plan.

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

➲ Screw breather filter back in place.

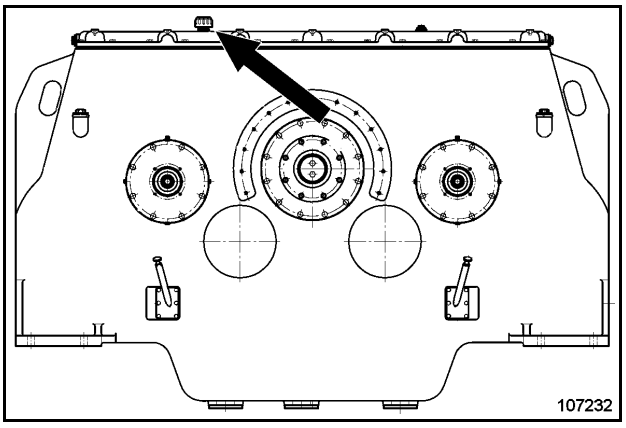


Fig. 3-72

Brake chambers - Changing oil

Draining off oil

- Place a collecting recipient for used oil under the brake-chambers.
  Choose the required capacity in accordance with the "Refilling quantities - Oil" table.
- Unscrew drain plugs (7, Fig. 3-91:) and drain off the oil completely.
  Slackening breather filter (5) allows the oil to run out more readily.
- Clean screw plugs (7).
- Screw screw plugs (7) back in place.

Filling in oil

Details for selecting the correct gearoil refer to chapter “LUBRICANTS”.

- Unscrew screw plugs (6).
- Fill in oil through opening of breather filter (5) until it flows out of opening in plugs (6).
- Screw plugs (6) and breather filters (5) back in place.

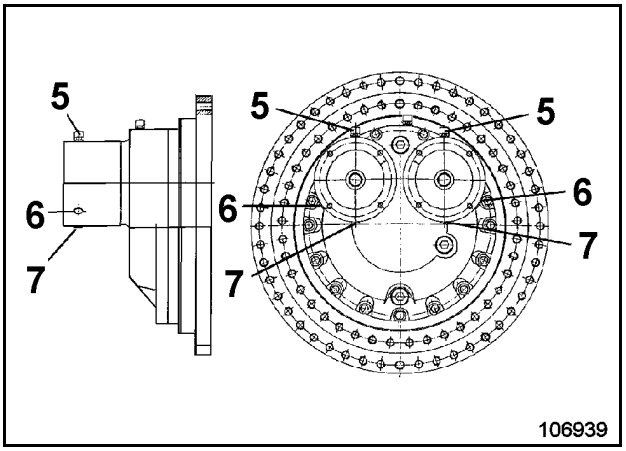


Fig. 3-91:

Breather filters

- Unscrew breather filters (1 and 5, Fig. 3-91:) and clean in white spirit or parafin.

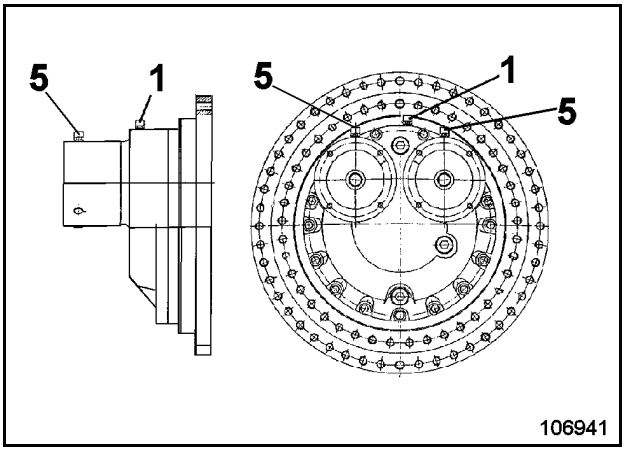


Fig. 3-92:

Checking the greasing pressure

Check every week, whether the oil pressure indicated by pressure gauge (4, Fig. 3-111:) is 60 bars / 870psi (the pressure is dependind on temperature and viscosity of the oil and may vary).

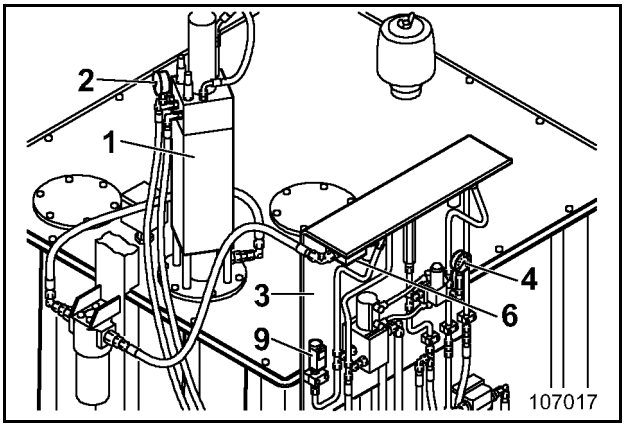


Fig. 3-111:

This oil pressure is reduced so that the pressure indicated by pressure gauge (2) is 47 – 50 bars (681-725psi).

The necessary greasing pressure of 320 bar / 4641psi for the superstructure is generated by means of a pressure translator.

The greasing pressure is indicated by pressure gauge (9).

In the event of deviating pressure values, switch off the electric motor and check the central greasing system.

Lower oil pressure means that not all of the greasing points are supplied with grease.

Higher oil pressure may cause bursting of a greasing line.

Always refill the grease container in time to avoid air from penetrating into the greasing system. Air in the greasing may cause malfunctions.

Drive unit

The drive unit comprises:

- crane engine
- hydraulic system

Crane engine

See operating instructions for the crane engine.

➲ Fill up fuel tank through filler (5, Fig. 3-129:) after each deployment.

➲ Prior to each deployment check the engine oil level with the dipstick; top up if necessary.

➲ regularly, at least once a year
- change engine oil
- replace engine oil filter
- check / replace air filter
- replace fuel filter

➲ Check batteries (7) and cable connections at regular intervals.

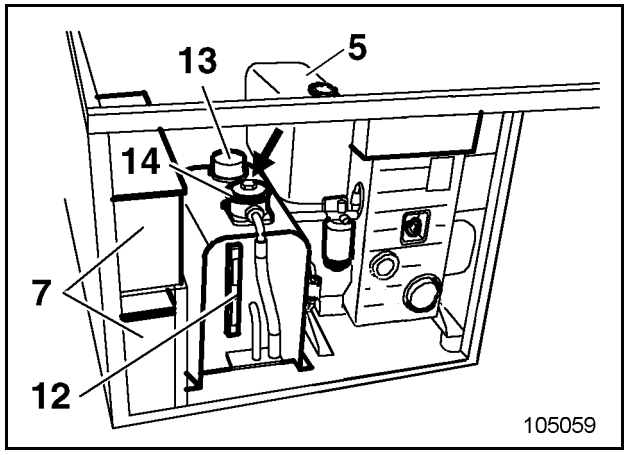


Fig. 3-129:

Air-intake system

Never start up the engine when the air filter is removed.

Hydraulic system

See crane operating instructions.

➲ Prior to each deployment, check the hydraulic oil level at the inspection glass (12, Fig. 3-129:); top up if necessary.

➲ Check contamination of hydraulic oil filter regularly at contamination indicator (arrow, Fig. 3-129:).

➲ Regularly, but at least once a year replace the hydraulic oil filter (14) and the breather filter (13).

On-board crane, servicing

➲ Lubricate all bearings regularly and as required, and spray swing ring with a graphite spray (Fig. 3-130:)

1 -	bearing	4 lube points
2 -	joint (column/boom)	2 lube points
3 -	cylinder bearing	5 lube points
4 -	swing ring	

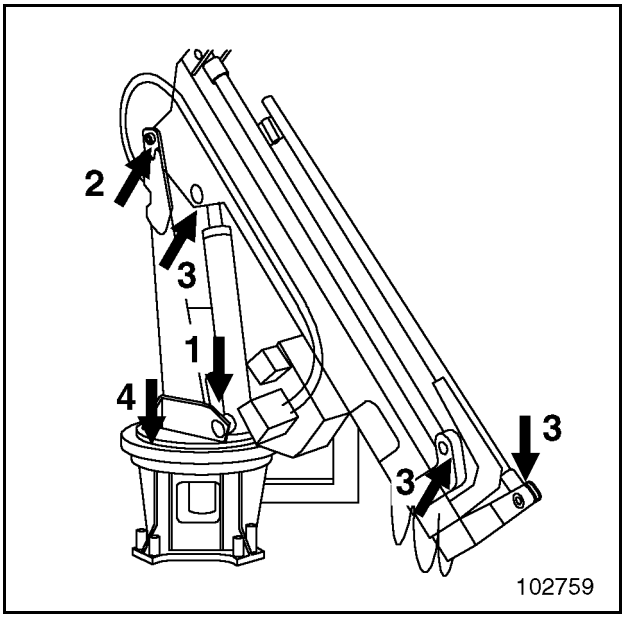


Fig. 3-130:

REPAIR WORK - SAFETY INSTRUCTIONS

Operating instructions

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

Pay special attention to: "Fundamental Safety Instructions", "Inspection and servicing - safety instructions" and all warnings and safety instructions attached to the machine.

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

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

Repair personnel

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

In the absence of such know-how, meticulous training must be given by experienced repair personnel, e.g. from Bucyrus HEX .

Working in greater heights

Always wear safety harnesses when working at greater heights.

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

Prestressed units

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

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

The operating manual contains no information on this point.

Dismantling components

Never do dismantling while the machine is at operating temperature.

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

Leave time for the machine to cool down.

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

Replace defective components in good time to prevent major damage.

Clean the defective component carefully before dismantling it.

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

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

TROUBLESHOOTING

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 Bucyrus HEX after-sales service.

Describe the fault and all accompanying circumstances as precisely as possible when calling on the Bucyrus HEX 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

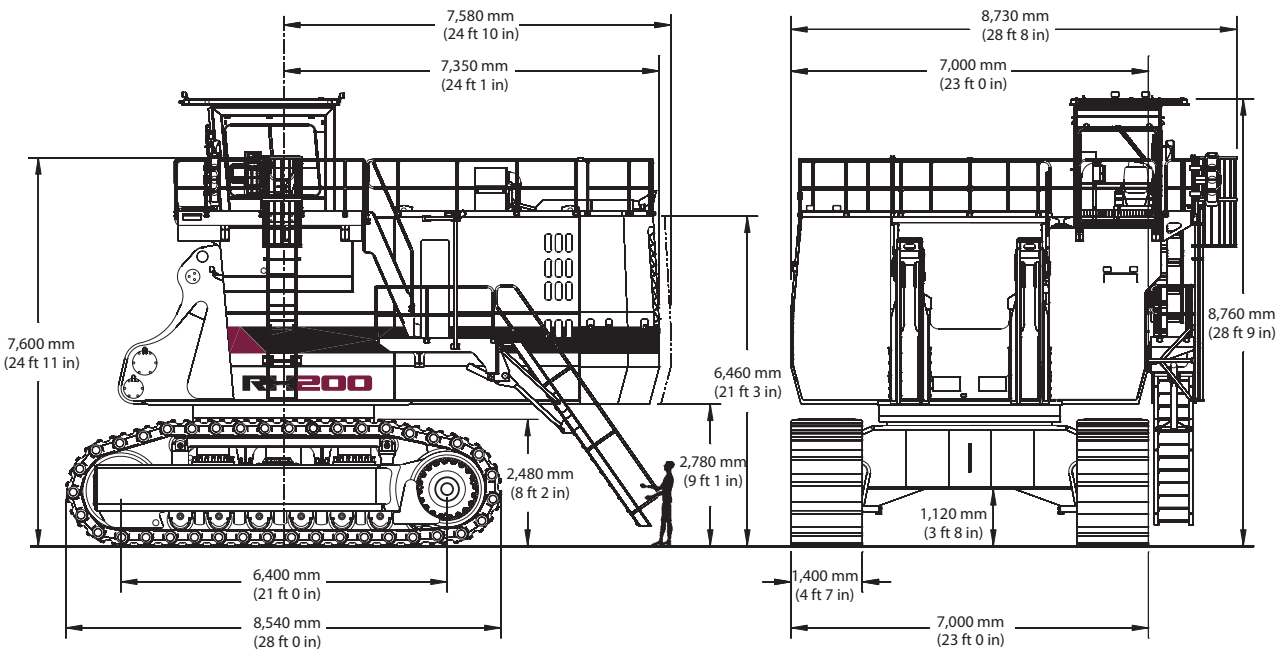
This describes the troubleshooting procedure.

Section

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

RH200

Hydraulic Mining Excavator



RH200 HYDRAULIC MINING EXCAVATOR

General Data:

Operating Weight		
Face Shovel	525 t	579 sht
Backhoe	534 t	589 sht
Engine Output		
SAE J 1995	1,880 kW	2,520 HP
Standard Bucket Capacity		
Face Shovel (SAE 2:1)	26.0 m^3	34.0 yd^3
Backhoe (SAE 1:1)	28.0 m^3	36.6 yd^3

Features

- TriPower shovel attachment
- Independent oil cooling system
- Spacious walk-through machine house
- 5-circuit hydraulic system
- Electronic-hydraulic servo control
- Board Control System (BCS)
- Torque control in closed-loop swing circuit
- Automatic central lubrication system
- Xenon working lights

Product Specification Sheet

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