en

Operating instructions

Hydraulic excavator
A 309 Litronic

from serial number 26392

Document identification

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Product identification

Manufacturer:	LIEBHERR Hydraulikbagger GmbH
Type:	A 309 Litronic
Type no.:	717
Conformity:	CE

Address

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1.1.3 Undercarriage

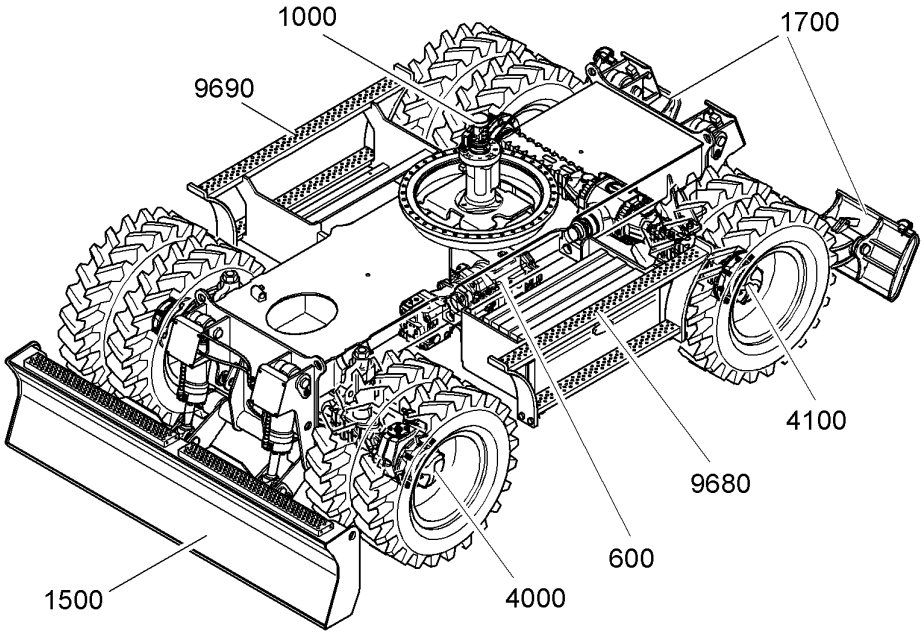

Fig. 1-3 *Undercarriage*

600	Transmission	**4000**	Steering axle
1000	Rotary connection	**4100**	Rigid axle
1500	Outrigger support	**9680**	Step with toolbox
1700	Dozer blade	**9690**	Step

1.2 Technical data

Please refer to the accompanying technical description.

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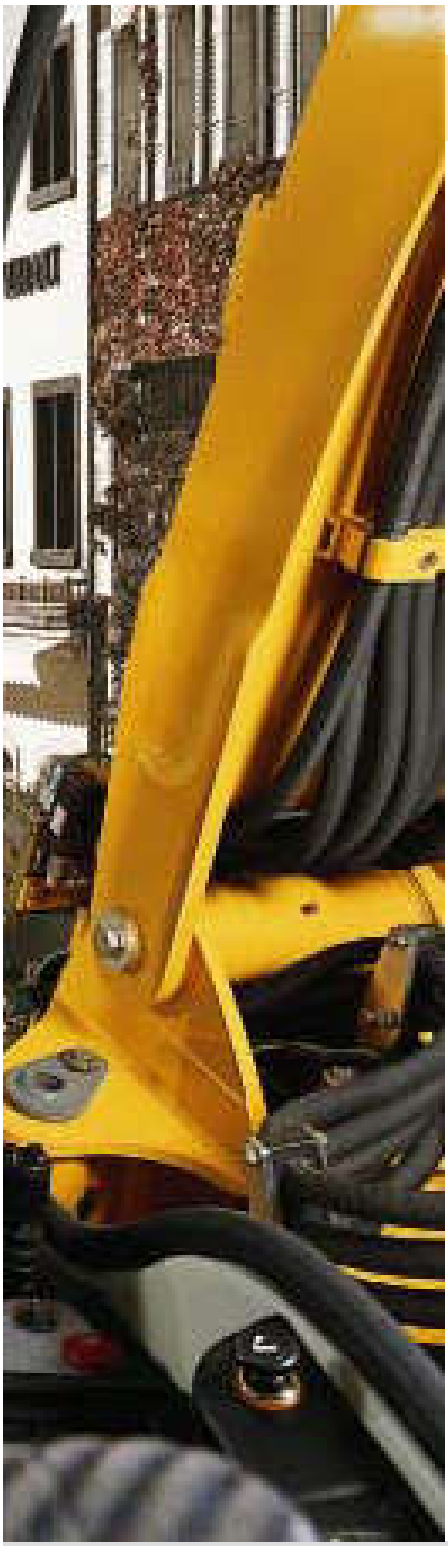


Comfort

The operator's cab interior also reflects the compact excavator series' attractive design. Practical and clear arrangement of the switches, non-reflecting instruments, as well as convenient storage compartments have been sensibly and functionally arranged. The ergonomic operator's seat can be adjusted in multiple directions, relieving stress to the operator's back and assuring a pleasurable working environment. Large window surface areas and rounded edges provide an excellent all-round view for the operators of the Litronic A 309 and Litronic A 311.

Mobile comfort

Easy access

Wide steps, ergonomic handles and an adjustable steering column ensure easy and comfortable access to the Liebherr operator's cab.

Excellent overview

Thorough uppercarriage design concept combined with reduced upper-carriage height, largely glazed windows and rounded edges ensure excellent view to the entire working area.

Pleasant environment

Noise emissions in and outside the cab are reduced due to low engine speed, complex noise insulation and optimized hydraulic components. The noise level is equivalent to a modern diesel automobile.

Maintenance friendly

Easy access

Large engine compartment cover guarantees free and easy access to engine.

Maintenance tasks with ease of operation

A standard stop-valve on the hydraulic tank disconnects the system in order to ease maintenance on the hydraulic system.

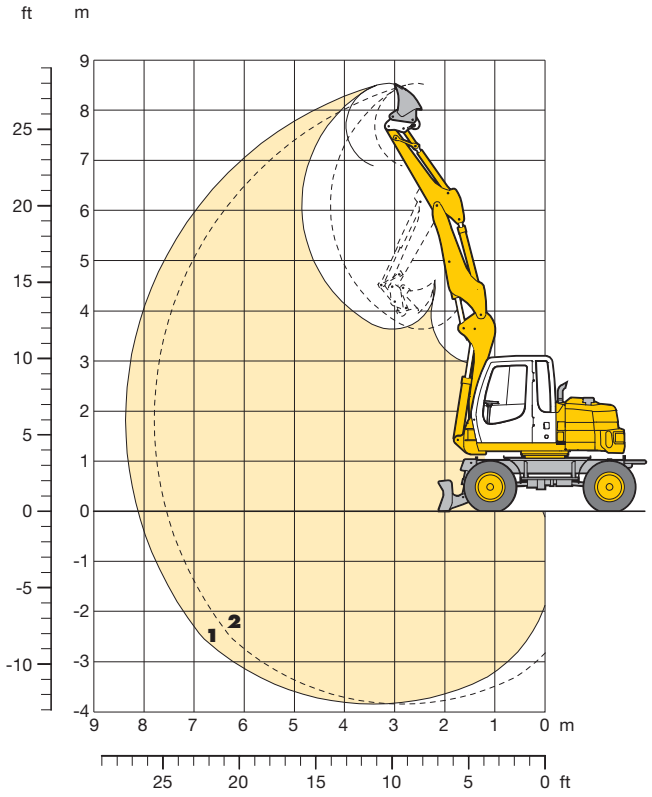
Operator's control position

- ErgoPlus automatic seat adjustment in accordance with operator's height
- Combined or independent adjustment of operator's seat and consoles
- Operator's seat adjustment in accordance with operators height and weight
- Additional beverage holders and document storage compartment in the left-hand console

Leg-room

- Ergonomic foot pedals for relaxed and stress-free operation
- Steering column freely adjustable via functional foot lever
- Anti-slip foot-mat with horizontal strips for easy cleaning of the cab

Ditchcleaning Attachment
A 309 Litronic®
with Hydr. Adjustable Boom 2,35 m



Digging Envelope
with Quick Change Adapter **1**

Stick length	m	1,85
Max. digging depth	m	3,85
Max. reach at ground level	m	8,10
Max. dumping height	m	6,90
Max. teeth height	m	8,55

2 with stick 1,85 m at max. attachment offset

Operating Weight

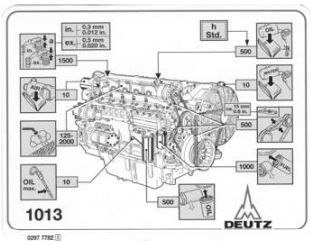
The operating weight includes the basic machine with 8 tires plus spacer rings, hydr. adjustable boom 2,35 m, stick 1,85 m, quick change adapter 22 and ditchcleaning bucket 1500 mm/0,33 m³.

Undercarriage versions	Weight
A 309 Litronic® with stabilizer blade	10600 kg
A 309 Litronic® with divided blade	10800 kg
A 309 Litronic® with stabilizer blade + divided blade	11400 kg

Ditchcleaning Buckets

				with 2 x 45° rotator	
Cutting width	mm	1300	1500	1300	1500
Capacity ISO 7451*	m³	0,28	0,33	0,27	0,33
Max. material weight	t/m³	1,8	1,8	1,8	1,8
Weight of bucket	kg	180	200	280	310
For machine stability per ISO 10567 the max. stick length is:					
Stabilizers raised	m	–	–	–	–
Divided blade down	m	1,85	–	1,85	–
Stabilizer blade + divided blade down	m	1,85	1,85	1,85	1,85

* comparable with SAE (heaped)

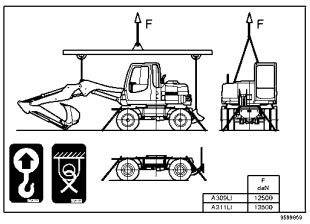


Sign 30: Lubrication chart, engine

Refers to the maintenance intervals for the Diesel engine.

Sign 32/62: Speed sign 16, 20 km/hr. (only for Germany)

Displays the construction-dependent top speed of the machine.

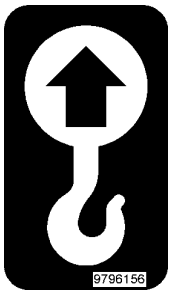


Sign 35: Loading and anchoring points

Identifies the positions of the loading and anchoring points, as well as the relevant weight of the machine.

Sign 40: Latch point

Indicates the machine's latching points.



Sign 45: Tackle lifting point

Indicates the machine's tackle lifting points.

Indicator lights

H7 Engine oil pressure
H11 Preheat
H12 Battery charging
H13 Air filter contamination
H15 Hydraulic oil temperature
H16 Overload warning device*
H18 Coolant level
H19 Turn signals
H20 Indicator light, parking brake
H23 Accumulator charge pressure (Operating brake)
H26 Quick-change adapter*
H167 Direction of travel forwards
H168 Direction of travel backwards
H175 Engine overheating
H176 Automatic full floating axle
H186 Drag bearing
H196 Scrap cutter / sorting grab*
H311 Full floating axle locking
H336 Water in fuel filter

* Optional extras

Operation

R75 Speed adjustment
S18 Overload warning device*
S19 Rotary grab actuator
S21 Crawling speed
S42 First gear
S47 Quick-change adapter*
S241 Hydraulic hammer*
S335 Switching supports
S360 Acknowledge quick-change adapter buzzer*
S422 Radio mute

* Optional extras

3.1.3.2 Control panel B

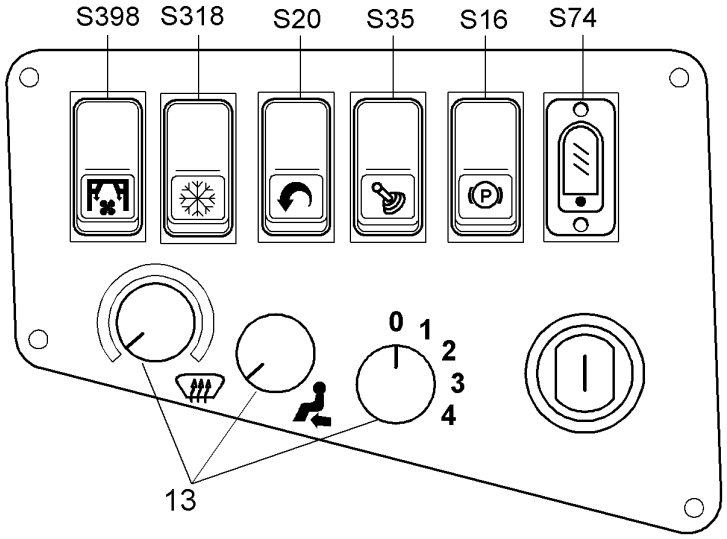


Fig. 3-5 Control panel B

S20 Automatic idling
S74 Immobilizer*
13 Heating system / heating and air conditioning system*
S16 Parking brake

To release the door latch:

❑ The door is secured in latch 2.

▶ Move the lever **4** next to the cab frame outward.
↳ The door is now unlocked.

▶ Close the door.

3.2.2 Safety lever

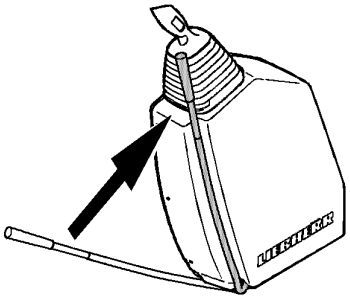


Fig. 3-10 *Safety lever*

For safety purposes, the left-hand control desk is provided with a safety lever.

Caution!
The safety lever must always be pushed up into its highest position (see arrow) when entering or exiting the cab.

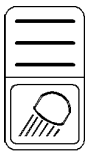
When the safety lever is pushed up, the pilot control pressure is interrupted. This means that:

– No work movements can be carried out when pilot control devices, e. g. the joystick or foot pedals, are operated.
– The slewing gear brake will engage (indicator light in switch **S17** illuminates).
– It is not possible to release the slewing gear brake using switch **S17**.

By moving the safety lever to its lowest position, the original switching states of the slewing gear brake and its switch **S17** will be recreated and the pilot control devices are active.

▶ Before starting work from the operator's seat, the safety lever must be pushed to its lowest position.

3.2.11.2 Attachment headlight, front Front roof headlight (option)

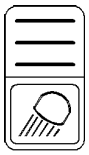


With the ignition turned on, the roof and attachment headlights are turned on by pressing switch **S22**.

This switch has two settings:

- ▶ Push the switch in position 1 down (center position).
  - ↳ The front work headlight is turned on.
- ▶ Push the switch in position 2 down (final position).
  - ↳ The front work headlight is turned on.
  - ↳ The front roof headlight is turned on.

3.2.11.3 Rear roof headlight (option)

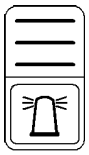


With the ignition turned on, the rear roof headlight is turned on by pressing switch **S22-1**.

This switch has two settings:

- ▶ Push the switch in position 1 down (center position).
  - ↳ No function.
- ▶ Push the switch in position 2 down (final position).
  - ↳ The rear work headlight is switched on.
  - ↳ The rear roof headlight is turned on.

3.2.11.4 Rotating beacon (option)



With the ignition turned on, press switch **S8** to turn the rotating beacon on.

- ▶ Press switch down.
  - ↳ The rotating beacon blinks.
  - ↳ The indicator light in the switch lights up.
- ▶ Press switch up.
  - ↳ The rotating beacon is turned off.
  - ↳ The indicator light in the switch turns off.

3.2.12 Heating system / heating and air conditioning system (option)

3.2.12.1 Overview

The cab is equipped with a heating system as standard. The heating system can be used to heat and ventilate the cab. The switches for heater operation are located on control panel B.

On request, the machine can be equipped with an air conditioning system.

3.3.3 Jump start procedure

Danger!
When connecting to jump start batteries, old batteries can be subject to increased gas formation.

- ▶ Wear safety glasses and protective gloves during the jump start procedure and avoid open flames and creating any sparks in the vicinity of the discharged vehicle battery. DANGER OF EXPLOSION!
- ▶ Only use jump start cables with a sufficient cross section. Always follow the established jump starting procedure.

3.3.3.1 Connecting the batteries

- ▶ First connect the cable to the positive terminal (+) of the discharged battery and then to the positive terminal (+) of the jump start battery.
- ▶ Connect the second cable to the negative terminal (-) of the discharged battery and then to the negative terminal (-) of the jump start battery.
- ▶ Start the engine as described above.

Caution!

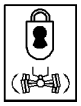
- ▶ Before removing the jump start cable, be sure to bring the Diesel engine of the jump started machine into low idle.
- ▶ For safety reasons, turn on a large user, such as work headlights, uppercarriage lighting etc. to avoid overvoltage. The electronics could otherwise be damaged.

3.3.3.2 Disconnecting the batteries

- ▶ First remove the cable from the negative terminal (-) of the jump start battery and then from the negative terminal (-) of the discharged battery.
- ▶ Remove the second cable from the positive terminal (+) of the jump start battery and then from the positive terminal (+) of the discharged battery.
- ▶ Check the electrical functions of the machine.

For battery care and maintenance, see the chapter "Battery care".

Locking the oscillating axle

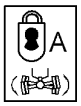


- ▶ Turn switch **S75** to position **1**.
  - ↳ The indicator light **H311** lights up.
  - ↳ The oscillating axle is permanently locked.
  - ↳ The stability of the machine is increased.

Turn on the oscillating axle automatic

Danger!
When the automatic oscillating axle lock automatic is turned on (switch **S75** in position **A**), releasing the operating brake will release the oscillating axle lock.
This results in a reduction of the stability of the machine and can cause the machine to tip over when a load is lifted and the uppercarriage is turned.

- ▶ For safety reasons, the oscillating axle cannot be unlocked when the system is overloaded.
- ▶ If the machine has to be moved with a raised load (e.g. filled bucket, load suspended on safety hook), you must turn off the automatic oscillating axle lock and permanently lock the oscillating axle (switch **S75** in position **1**) before taking on the load.



- ▶ Turn switch **S75** to position **A**.
  - ↳ The indicator light **H176** lights up.
  - ↳ When the operating brake is applied, the oscillating axle is automatically locked in the current position and is automatically unlocked again when the operating brake is released.

Note!

- ▶ When working with the excavator, we recommend to lock the oscillating axle.
- ▶ If possible, unlock the oscillating axle before travelling (without a load): Turn switch **S75** to position **0**.

3.3.9 Support

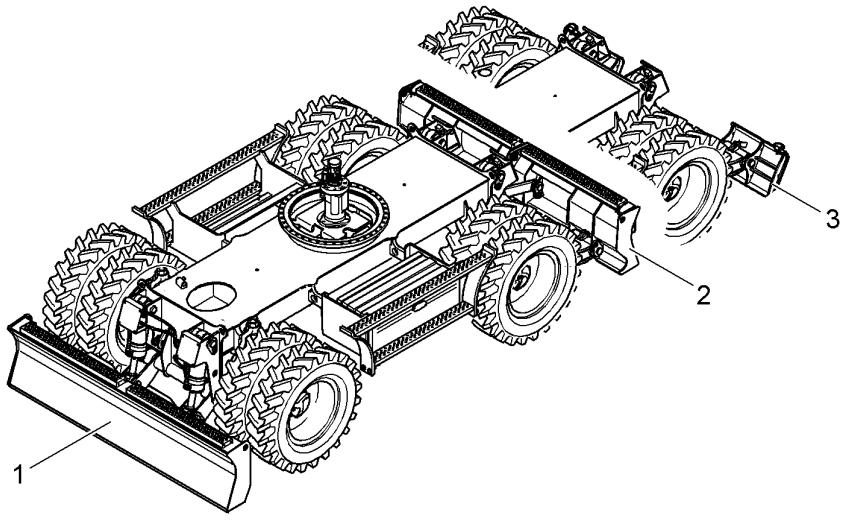


Fig. 3-46 *Support variants*

3.4.6 Joystick functions

Caution!
The machine is delivered in series with **PCSA controls**.
On request, the machine can be equipped with a control system that deviates from the PCSA controls (e.g. LIEBHERR control). In this case, the additional operating instructions for this control system must be observed.

The joystick functions described here refer exclusively to **PCSA controls**.

3.4.6.1 Operating the stick cylinder

The stick cylinder is operated using the left joystick **4**.

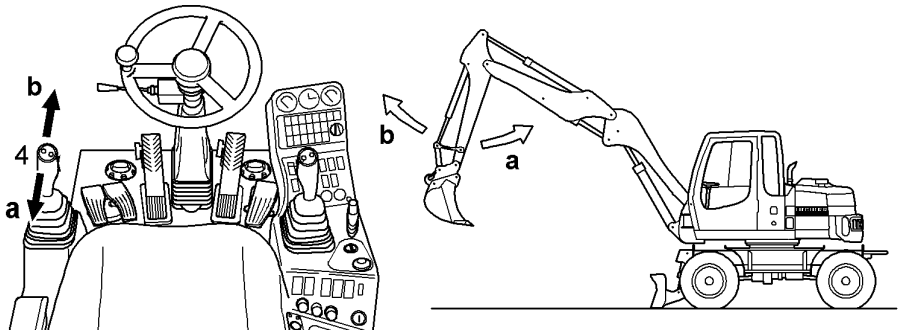


Fig. 3-54 *Operating the stick cylinder*

- ▶ Pull the joystick back **a**.
  - ↳ The stick will be retracted.
- ▶ Push the joystick forwards **b**.
  - ↳ The stick will be extended.

3.4.6.2 Operating the boom cylinder

The boom cylinder is operated using the right joystick **3**.

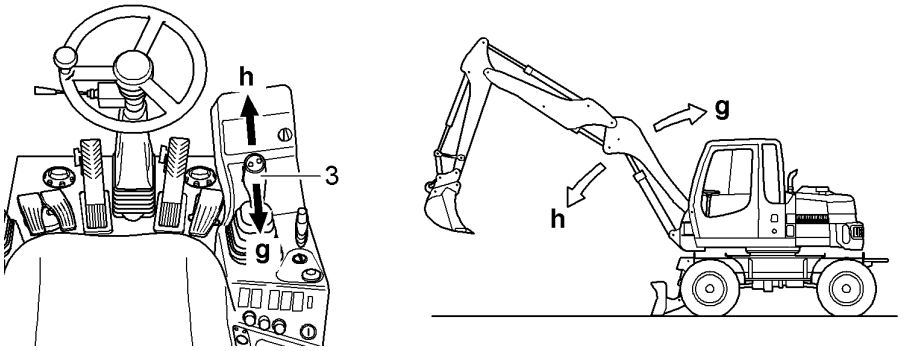


Fig. 3-55 *Operating the boom cylinder*

- ▶ Pull the joystick back **g**.
  - ↳ The attachment will be raised.
- ▶ Push the joystick forward **h**.
  - ↳ The attachment will be lowered.

3.5.4 Installation and removal of grapple on stick

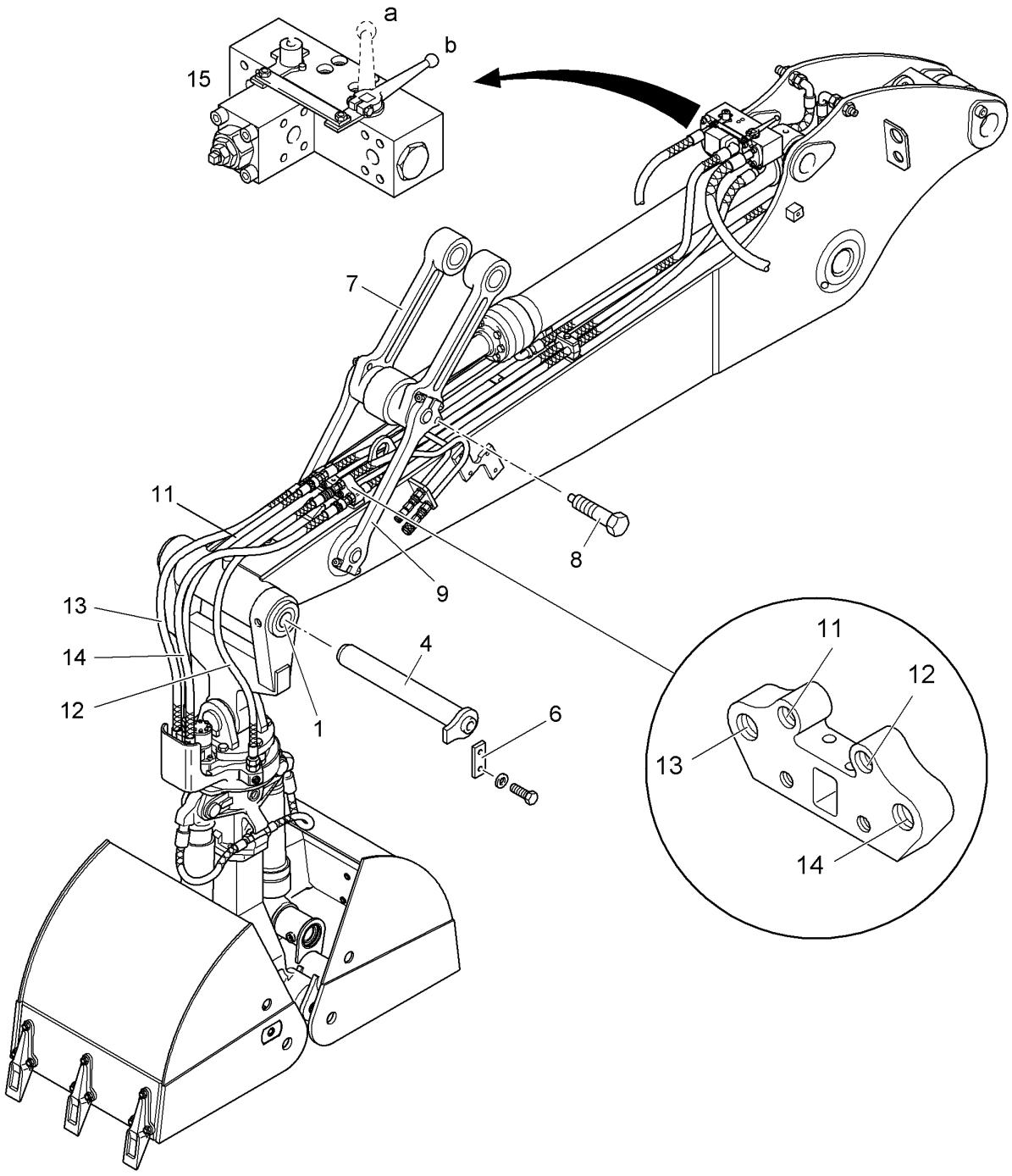


Fig. 3-64 *Installation and removal of grapple on stick*

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3.5.7.3 Operating elements

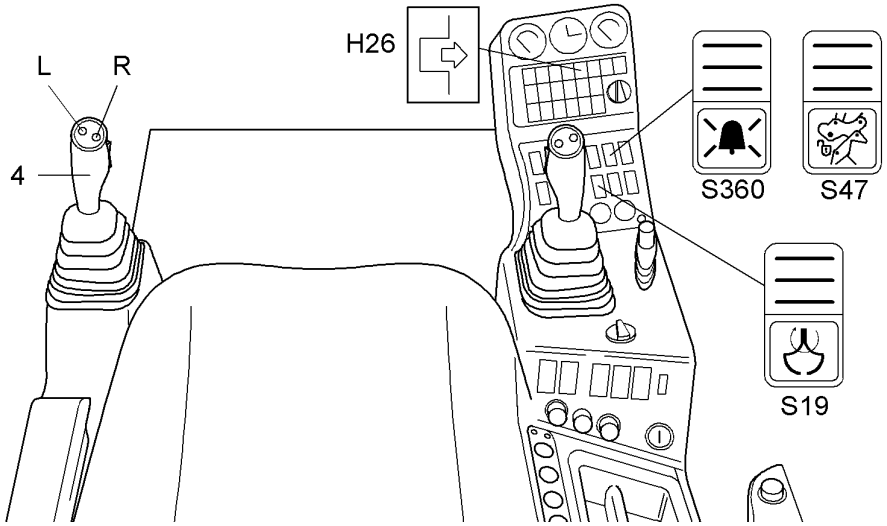
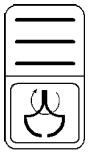
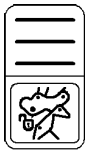


Fig. 3-75 *Operating elements for the hydraulic quick change adapter*



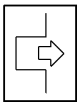
Use switch **S19** to activate the auxiliary hydraulic device for the grapple rotator and quick change adapter.

- ▶ Press switch down.
  - ↳ The auxiliary hydraulic device is activated.
  - ↳ The indicator light in the switch lights up.
- ▶ Press switch up
  - ↳ The auxiliary hydraulic device is deactivated.
  - ↳ The indicator light in the switch turns off.



Press button **S47** to activate the quick change adapter function.

- ▶ Press the button down and hold.
  - ↳ The quick change adapter is activated.
  - ↳ The indicator light in the button lights up.
  - ↳ Press push buttons **L** and **R** to lock and unlock the work tool.



The indicator light **H26** lights up during the unlocking procedure or when the locking pins are retracted. The buzzer in the cab sounds simultaneously.

3.5.7.4 Two-hand operation

The quick change adapter is activated via a two-hand control. The locking pins can only be moved at first if button **S47** is pressed and held down and one of the push buttons **L** or **R** are pressed simultaneously.

The control is equipped with a retaining function, allows both joysticks to be operated simultaneously for the installation or removal of working tools. If one of the push buttons, **L** or **R** is continually pressed, then button **S47** can be released and the direction of movement of the locking pins is retained.

If the direction of movement is to be changed, the key switch **S47** must be pressed down again and the corresponding push button **L** or **R** must be pressed.

3.6.4 Loading the transport vehicle

Danger!
Risk of fatal injury due to falling digging material.

- ▶ Do not load the transport vehicle so high that the digging material falls over the walls of the vehicle.
- ▶ Make sure that there is no-one within the danger zone or in the transport vehicle when loading.
- ▶ Do not move the attachment over the driver's cab.

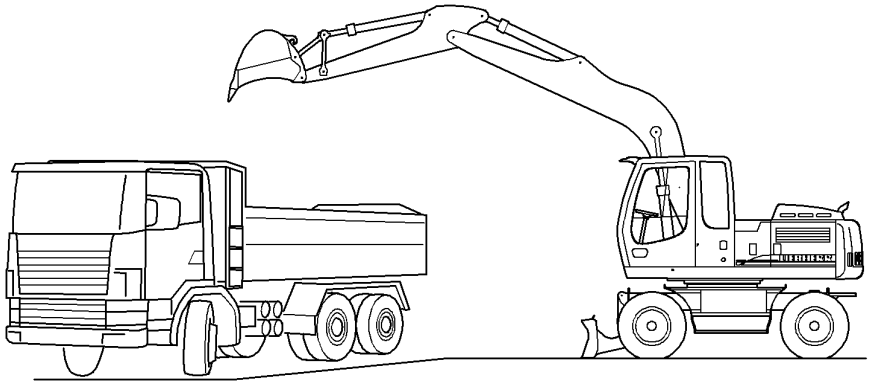


Fig. 3-86 *Emptying digging material*

- ❑ If possible, the machine should be positioned higher than the transport vehicle to avoid having to lift the digging material unnecessarily.
- ▶ Position the transport vehicle in such a way that it can be loaded from the rear or from the side.
- ▶ Move the attachment of the machine over the loading surface of the transport vehicle.
- ▶ Distribute the digging material evenly over the loading area of the transport vehicle by moving the backhoe bucket and stick out, turning the superstructure and possibly also moving the boom.
- ▶ If the backhoe bucket is not sufficiently emptied or there is still digging material in the backhoe bucket, curl the backhoe bucket in and out several times to loosen the digging material.

3.6.5 Working with the hydraulic hammer

Please also refer to the operating instructions provided by the manufacturer of the hydraulic hammer.

Danger!
Standing under the raised machine is not permitted!

- ▶ Raise the machine carefully with the crane and load.
- ▶ When putting the machine back into service, proceed as outlined in the operating and maintenance instructions.

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5 Maintenance

5.1 Maintaining the machine safely

5.1.1 General Safety instructions

- Maintenance and repairs may only be carried out by trained expert technicians.
- Observe the stated intervals or time periods for repeat checks / inspections as outlined in the Operating manual. Always use appropriate tools to carry out maintenance work.
- Refer to the Inspection and maintenance schedule at the end of this operating manual to see who is authorized or required to perform certain work.
  The tasks listed under daily / weekly may be carried out by the machine operator or maintenance personnel after having received appropriate instructions.
  The remaining tasks may only be carried out by expert technicians with appropriate training.
- Spare parts must meet the technical requirements set forth by the manufacturer. This is always ensured with Original spare parts.
- Always wear safe work clothing when maintaining the machine. For certain work, safety glasses and protective gloves are required, in addition to a hard hat and safety boots.
- Keep unauthorized personnel away from the machine during maintenance.
- Secure a wide-ranging area for maintenance, as necessary.
- Inform the operator before starting to carry out special tasks and maintenance work. Make sure he knows the person who is in charge of the work.
- If not otherwise noted in the operating manual, make sure to perform all maintenance work on the machine on firm and level ground, with the attachment placed down and the engine shut off.
- Pull the ignition key and close the battery master switch.
- During maintenance and repairs, make sure you always tighten any loosened screw connections.
- If it was necessary to disconnect or remove any safety devices for set up, maintenance and repairs, make sure that after completion of work, the safety devices are reinstalled and checked for proper function.
- Before maintenance work, especially when working under the machine, make sure a “Do not operate” sign is clearly visible and attached to the starter switch. Pull the ignition key and close the battery master switch.

5.1.2 Cleaning

- Before any maintenance and repairs, clean the machine, especially connections and fittings to remove oil, fuel or cleaning substances.
  Do not use harsh cleaning products and use only lint-free cleaning cloths.
- To clean the machine, do not use harsh cleaning products or steam within the first two months after delivery (or after repainting).
- Use only non-flammable cleaning fluids to clean the machine.
- Before cleaning the machine with water or steam (pressure cleaner) or other cleaning products,

Danger!
When checking and changing lubricants and operating fluids, ensure that the following precautions are adhered to:

- Unless otherwise indicated, carry out all work on the machine on level, solid ground and with the engine shut down.
- Whenever you access the engine compartment, always secure the cover and side doors to prevent them from accidentally falling back or closing.
- Only refuel the machine when the engine is shut down, do not smoke and avoid open flames.
- Turn the battery master switch to position **0** (off) and remove the ignition key.

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5.5.5 Lubricating grease and other lubricants

Grease	Description / manufacturer
Lubricating grease for the swing ring / general lube points 	The grease must correspond to specification **KP2k**, consistency 2 or NLGI grade according to DIN 51818 and DIN 51825 or EP 2 according to NF-T-60 132. The grease must consist of a lithium complex and have a VKA value of at least 2300 N according to DIN 51350 and ASTM D 2596.
Contact spray for slip rings	Cramolin
Lubricant for pistons, piston nuts and piston bearing installations on hydraulic cylinders	Gleitmo 800
Special anti corrosion fluid for installation areas of sealing-elements on hydraulic cylinders	Castrol-Tarp
Anti-corrosion grease for exposed piston rods (for cylinders that are not moved often or during transport)	-

Tab. 5-9 *Lubricating grease and other lubricants*

5.5.6 Coolant

To improve coolant quality, water filter attachments are used for LIEBHERR Diesel engines.

Due to this measure, the coolant is filtered again in the bypass flow and is cleaned of dirt and rust particles, which could result in leaks on the coolant pumps.

Ambient temperature to	Part water in %	Part anti-corrosion fluid / antifreeze in %
-37 °C / -36.67 °C	50	50
-50 °C / -58 °F	40	60

Tab. 5-10 *Mixture ratio water / anti-corrosion fluid / antifreeze*

The coolant must contain a minimum of 50 percent by volume of anti-corrosion fluid/ antifreeze all year. This corresponds to an antifreeze protection up to -37 °C and ensures sufficient protection from corrosion.

In case of coolant loss, it must be ensured, when adding coolant, that this amount does not fall short of 50 % by volume.

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▶ Drain off water until fuel emerges, close the plug again.

5.8.3 Emptying and cleaning the fuel tank

▶ To empty, remove the tank cap **1** and the drain plug **3** and allow the fuel to flow into a suitable container.

▶ Clean the tank.

▶ Check the tank and strainer**2** regularly for contamination.

5.8.4 Draining off water at the preliminary fuel filter

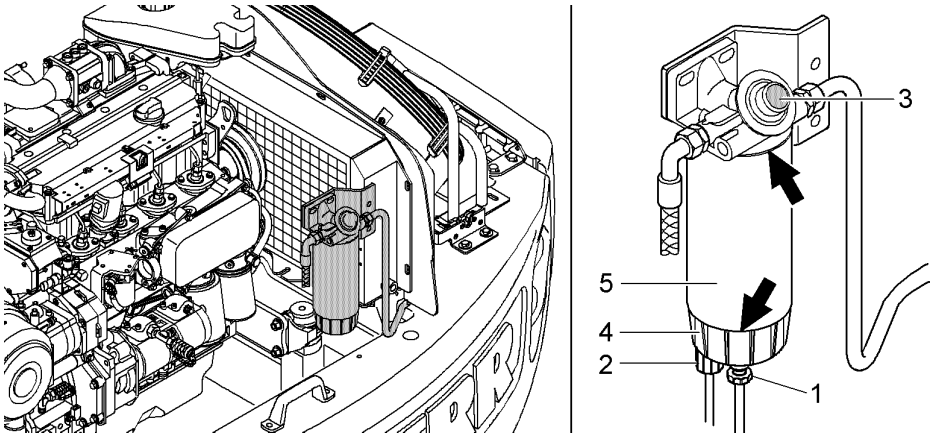

Fig. 5-18 *Fuel pre-filter*

▶ Turn in the shut off valve **1** slightly until the water flows off via the hose.

▶ Drain the water visible in the glass container into a suitable container.

▶ Close shut off valve **1**.

5.8.5 Replacing the fuel prefilter cartridge

▶ Unscrew electrical cable **2**.

▶ Turn in shut off valve **1** slightly until fuel flows off.

▶ Drain the fuel into a suitable container.

▶ Remove sight gauge **4**, unscrew filter cartridge **5**.

▶ Lubricate the seals on the filter head and the sight gauge (see arrows) lightly with oil.

▶ Screw on new filter cartridge **5** and sight gauge **4**.

▶ Close shut off valve **1**.

▶ Install electrical cable **2**.

▶ Operate hand pump **3** until the sight gauge **4** is filled with fuel.

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Note!

▶ When replacing the filter element **4**, also replace the filter element seal ring **5**.

5.10.6 Servo circuit

The joysticks do not require special maintenance.

▶ Inspect the pipe network as well as connections on all components (pressure accumulator, pressure limiting valve, pressure filter etc.) regularly for leaks.

Danger!
The pressure accumulator **8** (see Fig. 5-29) ensures that the servo circuit has enough pressure for a few movements, even after the Diesel engine has been shut down.
Before working on the servo circuit, the control pressure must be relieved as follows:

▶ Place the attachment on the ground.

▶ Shut down the engine.

▶ Operate both joysticks (with ignition key in contact position).

5.10.7 Bleeding the hydraulic pump

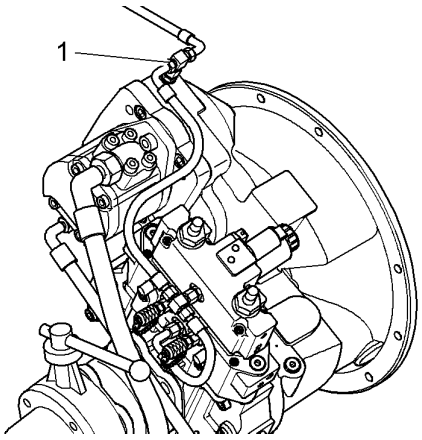

Fig. 5-30 *Hydraulic pump*

After working on the pump or after changing oil in the hydraulic system, the hydraulic pump must be bled.

▶ Loosen the fitting of the leak oil hose **1** slightly and allow the air to escape.

▶ When hydraulic oil flows out, retighten the fitting.

Before using the pump for the first time or after repairs or replacement, the pump housing must be filled with hydraulic oil via the same connection.

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5.14.2 Heating system

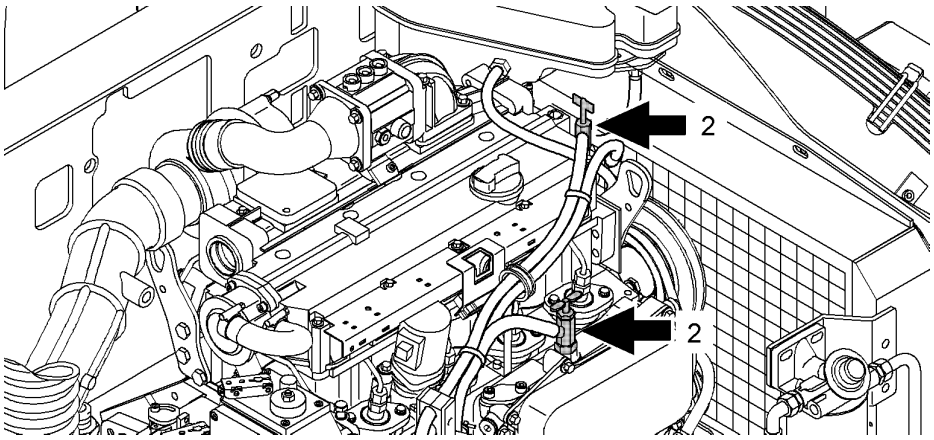

Fig. 5-42 *Water taps on the Diesel engine*

If the heater remains off for an extended period of time (e.g. in summer), close the water taps **2** on the Diesel engine.

Carry out the following maintenance work on the heating system annually before the start of the heating period:

- Check the entire coolant circuit for leaks.
- Retighten the connection points for the coolant circuit, the hose connections on the heat exchanger, the seals on the shut off valves and the hose clamps.
- Only operate the system with anti corrosion fluid and antifreeze in the coolant.

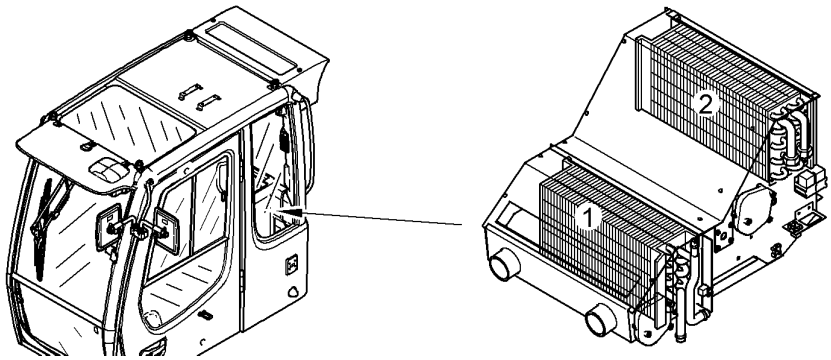

Fig. 5-43 *Heating / air conditioning unit*

To check the heat exchanger / evaporator:

- ▶ Check the fins on the heat exchanger **1** and evaporator **2** (air conditioning system) annually for damage.
- ▶ Blow out with compressed air if dirty.
- ▶ Align the fins, if necessary.

5.14.3 Air conditioning system (option)

Switch on the air conditioning system for approx. 10 minutes every 2 or 3 weeks, regardless of the season.

During the operating period, the following maintenance work must be carried out every 500 operating hours: