

Operating instructions

Hydraulic excavator
A 316 Litronic Industrie

from serial number 28062

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Conformity: CE

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1.1.3 Chassis

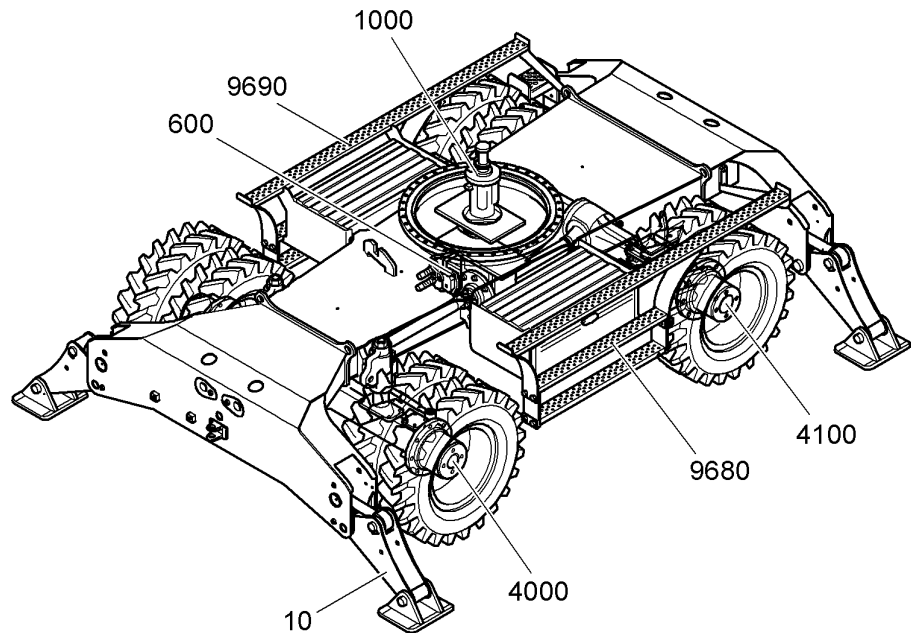


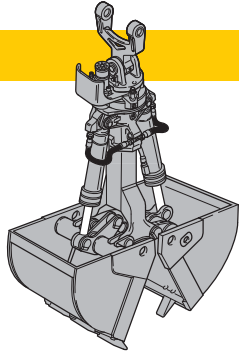
Fig. 1-3 Chassis

- | | |
|-------------------------------|---|
| 10 Claw support | 4100 Rigid axle |
| 600 Axle transfer box | 9680 Access ladder with toolbox to the left |
| 1000 Rotary connection | 9690 Access ladder with toolbox to the right |
| 4000 Steering axle | |

1.2 Technical data

for technical data see the accompanying technical description.

Variety of Tools

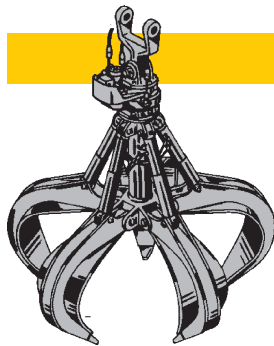


Shells for Loose Material

Clamshell Model 10 B

Shells for loose material with cutting edge (without teeth)

Cutting width of shells	mm	1000	1500	1800
Capacity	m³	1,00	1,50	1,80
For loose material, specific weight up to	t/m³	1,5	1,5	1,5
Total weight	kg	1000	1130	1250



Multiple Tine Grapples

open tines

semi-closed tines

closed tines

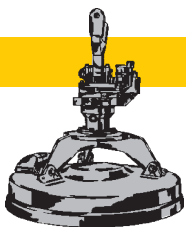
Grapple Model GM 55 (5 tines)

Capacity	m³	0,40	0,40	0,40
Weight	kg	955	1030	1080



Crane Hook with Suspension

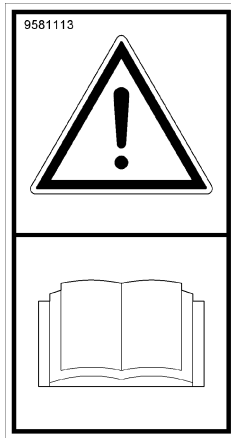
Max. load	t	12,5
Height with suspension	mm	1000
Total weight	kg	130



Electro Magnet with Suspension

Generator	kW	10
Dia of magnet	mm	1100
Height with suspension	mm	1470
Total weight	kg	1330

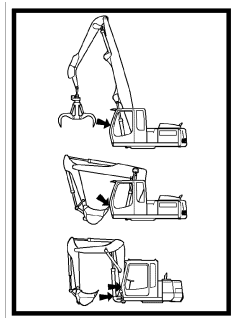
For further information see "Attachment-Information – Liebherr Hydraulic Clamshells and Grapples".

**66, Part 1: Accident prevention**

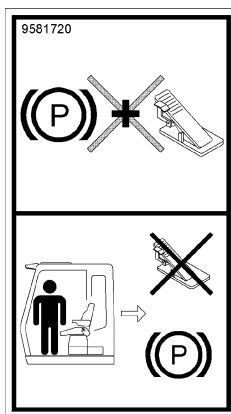
The accident prevention regulations given in the operating instructions must be carefully noted when operating the machine.

**66, Part 2: Safety lever**

Pull safety lever up fully before leaving the operator's seat.

**66, Part 3: Equipment**

Work equipment reaches as far as the cab! Caution – work equipment retracted.

**67: Service brake / parking brake**

It is not permitted to engage the service and parking brakes simultaneously when the machine is operating.

The service brake may only be locked when the machine is operating. The service brake must not be used as a parking brake when leaving the machine.

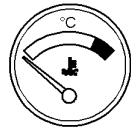
3.1.4 Control console functions

3.1.4.1 Display instruments

**P5 - Operating hours counter display**

Displays the operating hours.

Serves as the basis for timely adherence to the maintenance chart.

**P6 - Engine coolant temperature display**

Displays the engine coolant temperature.

**P7 - Fuel supply display**

Displays the available quantity of fuel in the fuel tank.

To reduce the formation of condensate, always keep the fuel level as high as possible.

**P50 - Clock**

Displays the current time.

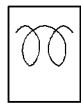
3.1.4.2 Indicator lights

**H7 - Low engine oil pressure (red)**

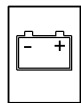
The indicator light illuminates if the engine oil pressure drops below 0.5 bar while the machine is operating.

The buzzer in the cab sounds simultaneously.

- Bring the diesel engine to low idle immediately.
- Allow the engine to idle for approximately 5 seconds.
- Shut down the diesel engine.

**H11 - Preheating (yellow)**

The indicator light is illuminated while a preheating procedure is underway. When the preheating procedure is completed, the indicator light turns off and the diesel engine can be started.

**H12 - Battery charge (orange)**

The indicator light illuminates if the ignition key is placed in the contact position.

The indicator light turns off as soon as the diesel engine is started.

While the machine is operating, this indicator light illuminates if the V-belt alternator or the electrical charging system is defective.

- Bring the diesel engine to low idle immediately.
- Allow the engine to idle for approximately 5 seconds.
- Shut down the diesel engine.
- Rectify the error.

3.2.3 Lowering the cab in emergencies

An emergency cab lowering function is provided in case the controls of the height-adjustable cab fail as a result of a fault in the diesel engine or due to another defect.

There are two ways to lower the cab in an emergency:



Emergency cab lowering control inside the cab:

- ▶ Press and hold button **S78**.
 - ↳ The cab will be lowered as long as the button is pressed.

Emergency cab lowering control outside the cab:

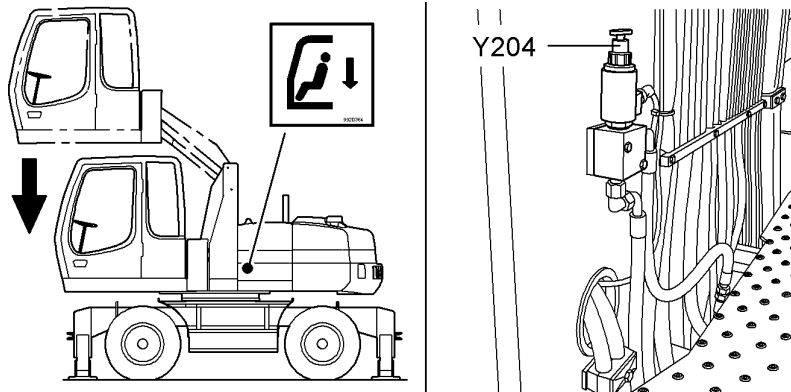


Fig. 3-11 Emergency lowering valve

There is a facility to lower the cab on the outside using emergency lowering valve **Y204**. It is accessed by opening the side doors on the lifting frame.

- ▶ Screw in the handle of emergency lowering valve **Y204** until the cab sinks down.



Note!

- ▶ After the cab has been lowered, make sure that the handle of the emergency lowering valve is turned back to the starting position.

3.2.4 Safety lever

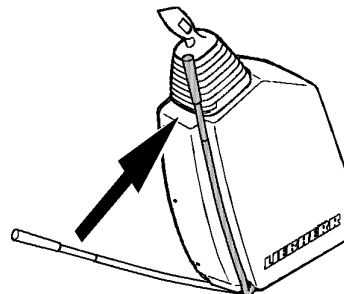


Fig. 3-12 Safety lever

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

3.2.13 Lighting

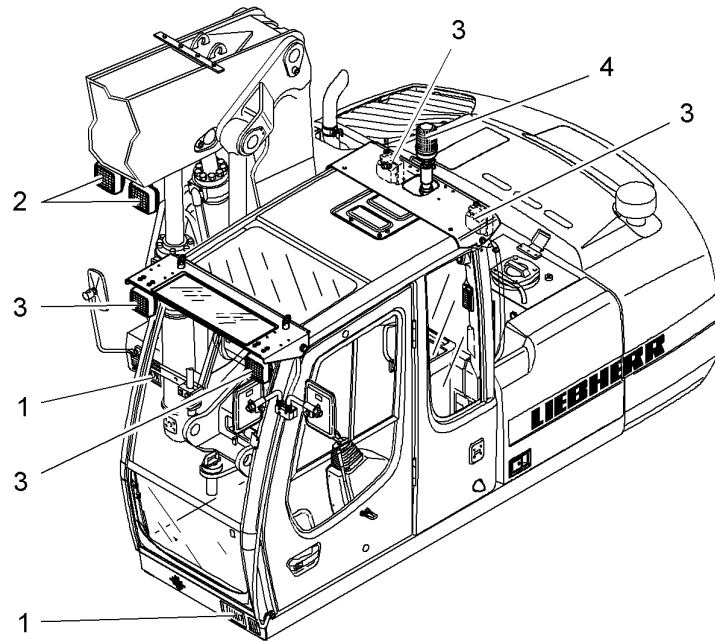


Fig. 3-28 Arrangement of lights

- | | |
|-------------------------|----------------------------|
| 1 Parking and headlight | 3 Roof headlight (option) |
| 2 Attachment headlights | 4 Rotating beacon (option) |

The switches for the lights are located on control panel C.

3.2.13.1 Parking light and low beam light



With the ignition turned on and off, the parking light or low beam light is turned on by pressing switch **S22**.

This switch has two settings:

- ▶ Push the switch in position 1 down (center position).
↪ The parking light is activated.
- ▶ Push the switch in position 2 down (final position).
↪ The headlight is activated.

3.2.13.2 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.

**Caution!**

At low oil temperatures, increased wear occurs in the Diesel engine and the hydraulic system and the controls will react sluggishly.

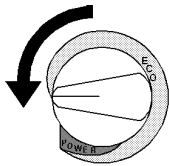
- ▶ Bring the engine and hydraulic oil to operating temperature. The control operates sluggishly at low oil temperatures.
- ▶ Carefully move the machine to an open area to check the function of the travel and swing gear brake.
- ▶ Check that all attachment functions are operating properly.

3.3.2.7 Shutting the Diesel engine down

**Caution!**

The engine could be damaged.

- ▶ Do not shut down the engine suddenly from full throttle.



- ▶ Reduce the engine RPM via the throttle control **R75** to low idle.
- ▶ Allow the Diesel engine to run in low idle for another 2-3 minutes to even out the temperature.
- ▶ Now turn the ignition key to position **0** to shut down the engine.
- ▶ Remove the ignition key.

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.

3.4.1.1 Safe application in material handling operation (especially when handling timber)

- Particularly when working with a grapple it can be necessary to move the machine with a raised attachment and picked up load, for example when handling wood or timber.
- This will shift the center of gravity of the machine upward in vertical direction. The travel behaviour of the machine will be strongly influenced, for example reduction of dynamic stability.
For that reason, the following rules must be strictly observed:
 - Match your travel behaviour to the changed machine characteristics and surrounding conditions.
 - Reduce the travel speed to avoid sudden braking or steering manoeuvres.
 - Avoid sudden speed changes, such as braking, acceleration, changes in travel direction.
 - Turn the uppercarriage only if the undercarriage is stationary.
 - Turn the uppercarriage only after taking on the load.
 - Move the machine only after you have taken on the load, lifted it and turned the uppercarriage in travel position.
 - If the attachment is raised, there is a danger due to possible oscillating movements and falling of the picked up load.
 - A protective screen (FOPS) according to ISO 10262 must be attached on the front on the cab.
 - The protective screen (FOPS) according to ISO 10262 must be installed if there is a danger of falling objects from overhead.
 - Only the maximum permissible load may be picked up with the grapple.
- NOTE: The weight of absorbent material, such as wooden logs, depends on the length, the diameter and the specific weight. The existing influencing factors for a natural product, such as moisture, must be considered.
- The working sequences when working with machines with grapples require special instruction and training of the machine operator.
- The work application is only permitted after the machine operator has received sufficient training and practical experience.

3.4.1.2 Safe application of machines with tower elevation

- Due to the tower elevation, the center of gravity of the machine will shift upward in vertical direction. The travel and work behaviour of the machine will thereby be strongly influenced, for example reduction of dynamic stability.
- Due to the elevated center of gravity, the machine must be aligned in horizontal direction before starting to work. In horizontal direction, the center of gravity of the uppercarriage is above the center of the undercarriage, which reduces the danger of tipping over.
- The machine can rock despite leveling and tip over!
For that reason, the following rules must be strictly observed:

When driving the machine:

- Swing the uppercarriage parallel to the undercarriage (transport position).
- Pull the attachment as close as possible to the machine.
- Only then may the outriggers be retracted and the machine be driven.
- Driving with loads is not permitted.
- Check the roadway to ensure the ground is solid and even! Pot holes and uneven road surfaces endanger the stability of the machine.
- Match your travel behaviour to the changed machine characteristics (higher center of gravity) and surrounding conditions.
- Reduce the travel speed to avoid sudden braking or steering manoeuvres.
- Avoid sudden speed changes, such as braking, acceleration, changes in travel

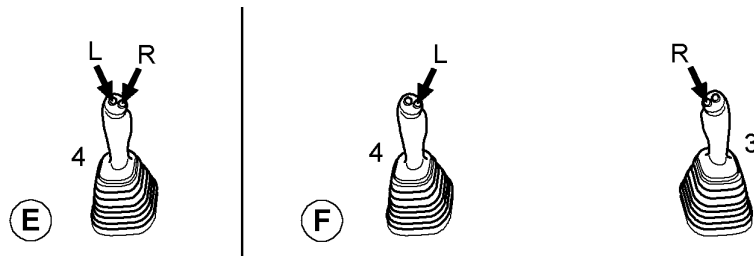


Fig. 3-56 Push button on the joystick

E Operation with left joystick (standard)

F Operation with left and right joystick (option)



Danger!

Never allow anyone to guide the grapple by hand!



- ▶ Press switch **S19** down.
 - ↳ Additional function (e.g. rotating grapple) is activated.
 - ↳ The indicator light in the switch lights up.
- ▶ Press and hold left push button **L**.
 - ↳ Grapple will rotate to the left (counterclockwise).
 - or -
 - ↳ The rotating bucket is turned to the left (counterclockwise), i. e. it moves down to the left.
 - or -
 - ↳ Locking pins will be extended.
- ▶ Press and hold right push button **R**.
 - ↳ Grapple will rotate to the right (clockwise).
 - or -
 - ↳ The rotating bucket is turned to the right (clockwise), i. e. it moves down to the right.
 - or -
 - ↳ Locking pins will be retracted.

3.4.10 Activating attachment unit (AHS, option)

The machine can move attachments (auxiliary users) with different pressure and flow settings.



Caution!

Incorrect preselection of the pressure and flow setting can result in damage to the work tool (e.g. hydraulic hammer) or in limited function.



Danger!

If a large or wide work tool (eg. grab) is made to vibrate in the vicinity of the cab, the cab could be knocked or buckled, which would expose the operator of the machine to danger.

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- ▶ Grease all lube points on pins **3** and **4** until clean grease emerges on the corresponding bearing points.

3.5.3.3 Bucket cylinder operation

Two hydraulic lines on the stick are used either for bucket cylinder operation or grapple operation.

The lines are switchable via a valve block **15**:

- **a** - Bucket cylinder operation (for digging tools)
 - **b** - Grapple operation (for grapple, scrap cutter etc.)
- ▶ Turn the both square head bolts on valve block **15** in such a way that the markings are positioned transverse to the travel direction (position **a**, bucket cylinder operation).



Note!

If the machine is equipped with a hydraulic quick change adapter and **LIKUFIX**, it is not necessary to switch between bucket cylinder operation and grapple operation. There is no valve block **15**.

3.5.6.5 Attaching the working tool

Bring the equipment into position:

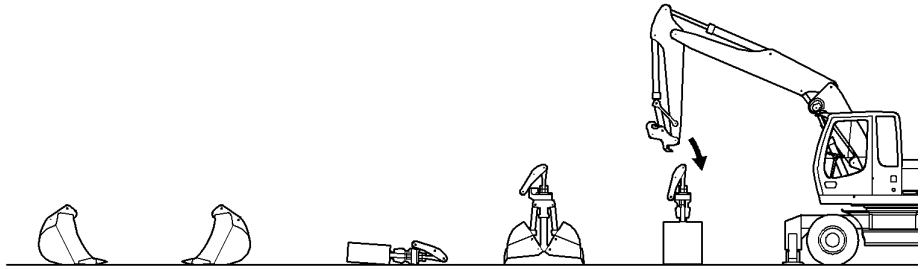


Fig. 3-74 Bringing the equipment into position

- ❑ The working tool must be in stable position or lying loosely on the ground.
- ▶ Bring the stick and working tool into position.
- ▶ Retract the bucket cylinder fully.

To unlock the quick change adapter:

- ▶ Press switch **S19** down.
 - ↪ The auxiliary hydraulic device is activated.
 - ↪ The indicator light in the switch lights up.
- ▶ Press and hold button **S47** down.
 - ↪ The hydraulic quick change adapter is activated.
 - ↪ The indicator light in the switch lights up.
- ▶ On the left joystick **4**, press and hold the right push button **R** down until the locking pins are fully retracted.
 - ↪ The buzzer sounds.
 - ↪ The indicator light **H26** lights up.
 - ↪ The quick change adapter is unlocked.

To pick up the working tool:

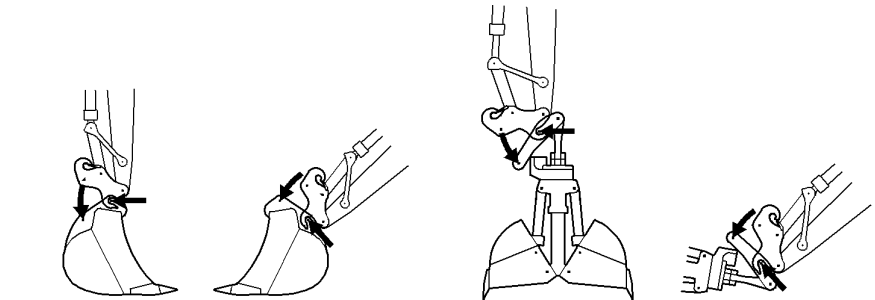


Fig. 3-75 Picking up the working tool

- ▶ Move the quick change adapter into a position that allows the working tool to be picked up with the pick-up hook.
- ▶ Lift the working tool off the ground and fully extend the bucket cylinder until the bearing plate for the working tool is resting on the quick change adapter stop.
 - ↪ The bore holes of the working tool and the locking pins of the quick change adapter must align.

**Danger!**

Misuse of the hydraulic hammer can injure people or damage the machine. The use of an unapproved hydraulic hammer could damage steel parts or other machine components.

- ▶ Only use hydraulic hammers approved by LIEBHERR.
- ▶ Close all windows in the cab before working.
- ▶ Use the hydraulic hammer only to break up rocks, concrete and other breakable materials.
- ▶ Do not try to break up rocks or concrete by moving the lever on the work equipment or by the hydraulic hammer.
- ▶ Do not use the drop power of the hydraulic hammer to break up rocks or other materials.
- ▶ Do not move any objects with the hydraulic hammer, and do not lift to the machine with the hydraulic hammer.
- ▶ Only use the hydraulic hammer in the machine's longitudinal direction.
- ▶ Do not operate the hydraulic hammer pointing in the direction of the machine, since exploding rocks or concrete could damage the machine and / or injure the driver.

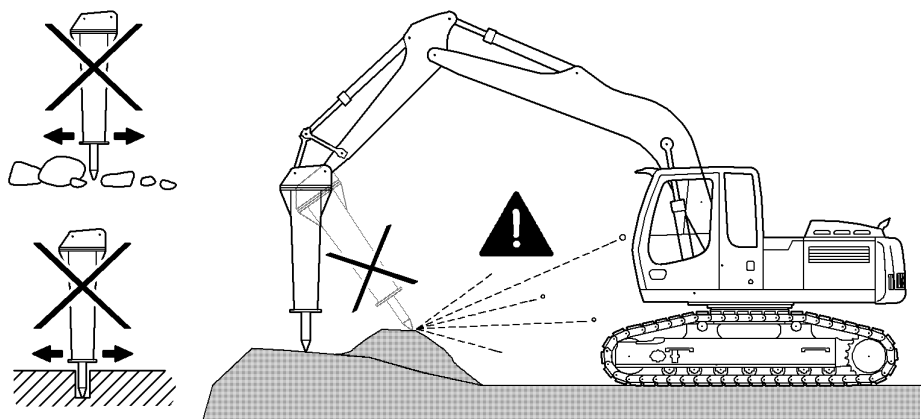


Fig. 3-85 Hydraulic hammer

- ☐ The machine must be positioned in the working position on level, solid ground.
- ☐ The stick may not be positioned vertically.
- ☐ No cylinder may be fully retracted or extended.
- ▶ Do not operate the hydraulic hammer on the same spot continually or for longer than 15 seconds.
 - ↳ Excessive continuous operation of the hydraulic hammer causes unnecessary overheating of the hydraulic oil.
- ▶ Change the position of the machine and resume hammer operations.

4 Malfunctions

Warning and error messages:

- Various errors are displayed on screen by corresponding indicator lights or symbols (see chapter "Control and operating elements").
- Warning functions can also be issued acoustically (buzzer).

Identification and remedy of problems and errors:

- Problems can very often be traced back to incorrect machine operation or maintenance.

For that reason, in case of a problem, carefully read the corresponding chapter in the operating instructions again.

- Analyse the cause of the problem and remedy it immediately.
- Describe the problem and all accompanying circumstances as precisely as possible if you contact LIEBHERR Service.
Precise information makes it possible to find and remedy cause of the problem quickly. To do so, precise information about the type and serial number of the machine is required.
- Do not carry out any work which you have not been trained to do.

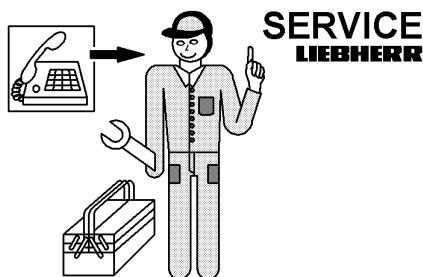


Fig. 4-1 LIEBHERR Service

If the cause of the problem cannot be determined or remedied by using the error codes and problem charts, please consult LIEBHERR Service.

5.1.4 Welding

- Carry out welding, torching and grinding work on the machine only if this is explicitly permitted. Before any welding, torching and grinding tasks, clean the machine and the surrounding area to remove dust and flammable materials. Ensure sufficient ventilation. There is a danger of fire and / or explosion.
- Disconnect the battery before working on the electrical system or before carrying out any arc welding work on the machine. Disconnect the negative pole first, then the positive pole. Proceed in reverse order when reconnecting.
- For arc welding on the machine, bring the ground point in immediate vicinity of the welding location.

5.1.5 Operating and service fluids

- When handling oils, greases and other chemical substances, always observe the applicable safety regulations for the corresponding product.
- Ensure safe and environmentally friendly disposal of operating and service fluids as well as exchange parts.
- Handle hot operating and service fluids carefully. (Danger of burning and scalding).

5.1.6 Repair

- Do not attempt to lift heavy parts. Use suitable lifting devices with sufficient load carrying capacity. When replacing individual parts and larger components, attach and secure them carefully to the lifting tackle, to avoid any danger. Use only suitable and technically sound lifting devices as well as load tackle with sufficient load carrying capacity. Do not stand or work under suspended loads.
- Do not use damaged or insufficiently sized lifting devices. Always wear work gloves when handling wire ropes.
- Only permit experienced personnel to secure loads and signal the crane operator. The guide must position himself within view of the operator or be in voice contact with him.
- When working overhead, use appropriate safe access ladders and working platforms. Do not use parts of the machine as climbing devices, if they are not designed for this purpose. Wear a harness when working in great heights. Keep handles, steps, railings, platforms, and ladders free of dirt, ice and snow.
- When working on the attachment (for example when replacing teeth), make sure the machine is properly supported. Never use metal on metal support.
- Never work underneath the machine if it is raised with the attachment, without being properly supported from below with hardwood beams.
- Always support the machine in such a way that any shifting weight will not endanger the stability of the machine and avoid metal to metal contact.
- Work on travel gears, brake and steering systems may only be carried out by especially trained expert personnel.
- If the machine must be repaired on a grade, block the chains with wedges and secure the uppercarriage to the undercarriage with the locking pin.
- Only qualified, especially trained personnel may work on the hydraulic system.

Symbol	Meaning
	Diesel engine
	Hydraulic tank
	Swing gear
	Transmission
	Rigid axle
	Rigid axle wheel hub
	Steering axle
	Steering axle wheel hub
	General grease nipples
	Checking the oil level
	Oil change
	First oil change
	Greasing
	Follow the operator's manual

Tab. 5-3 Legend

5.4.3 Lubricant chart

Description	Medium	Symbol	Classification	Viscosity	Quantity (litres)*
Diesel engine	Engine oil		Observe the instructions provided by the engine manufacturer (see Deutz operator's manual).		15,5
Hydraulic tank	Engine oil		API-CD, API-CD+SF, CCMC-D4, CCMC-D5, ACEA-E1, ACEA-E3	SAE 10W SAE 10W-30 SAE 10W-40 SAE 15W-40 SAE 20W-20 SAE 30W	290.0

Product description	Manufacturer	Country
Organifreeze	Total Deutschland GmbH, Düsseldorf	D
OZO Frostschutz S	Total Deutschland GmbH, Düsseldorf	D
Total Antigel S-MB 486	Total Deutschland GmbH, Düsseldorf	D
Total Frostfrei	Total Deutschland GmbH, Düsseldorf	D
Veedol Anti-Freeze O	Deutsche Veedol GmbH, Düsseldorf	D
Wintershall Kühlerschutz	Wintershall Mineralöl GmbH, Düsseldorf	D

Tab. 5-13 Approved anti-corrosion fluid / antifreeze (concentrate, undiluted)

50:50 premix (water: anti-corrosion fluid / antifreeze)

Product description	Manufacturer	Country
Liebherr Anti-Freeze APN Mix Ident-Nr. 8611045	Liebherr	D
Caltex Extended Life Coolant Pre-Mixed 50/50 (ready-to-use-version)	Caltex UK Ltd, London	GB
Chevron DEX-COOL Extended Life Prediluted 50/50 Anti-Freeze/Coolant	Chevron Texaco, San Ramon, CA	USA
Havoline XLC, 50/50	Arteco, Gent	B
Havoline DEX-COOL Extended Life Prediluted 50/50 Anti-Freeze/Coolant	Chevron Texaco, San Ramon, CA	USA
Organicool 50/50	Total Deutschland GmbH, Düsseldorf	D

Tab. 5-14 Approved anti-corrosion fluid / antifreeze / 50:50 premix

5.6 Diesel engine

5.6.1 Check oil level



Danger!

Danger of burning.

The engine oil is hot when at or near operating temperature.

- ▶ Do not allow your skin to come into contact with hot oil or components containing hot oil.

- ☐ The machine must be in level position.

- ▶ Shut down the engine.

- ▶ Wait for a short time until the oil has collected in the oil pan.

- ▶ Remove the cover **1** with the engine shut down.
- ▶ Remove the contaminated main element **3**.
- ▶ Clean the interior of the air filter housing and the sealing surface in the housing with a damp cloth.

**Caution!**

Dirt could enter the engine air intake!

- ▶ Do not clean the housing by blowing it out with compressed air.
- ▶ Insert the new main element and ensure that it seals and is positioned correctly.
- ▶ Close the filter housing **2** with cover **1**.

5.9.2 Changing the safety element

**Note!**

Replace the safety element after replacing the main filter cartridge three times or at least once a year.

Replace the safety element immediately if a visual inspection has shown that the safety element is very dirty.

- ▶ Remove the main element **3**.
- ▶ Remove the safety element **4**.
- ▶ Clean the interior of the air filter housing carefully with a damp cloth.
- ▶ Clean sealing surfaces in the housing and inspect for any damage.
- ▶ Insert the new safety element **4** carefully.
- ▶ Insert the main filter cartridge **3** and ensure that it seals and is positioned correctly.
- ▶ Close the filter housing **2** with cover **1**.

5.9.3 Checking the filtered air line

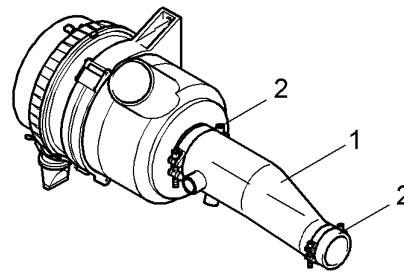


Fig. 5-23 Filtered air line

- ▶ Check the filtered air line **1** between the filter outlet and the engine suction pipe for damage and leaks each time the filter element is replaced.
- ▶ If necessary, retighten the tension clamp screws **2**.

5.11.2 Swin gear - oil change

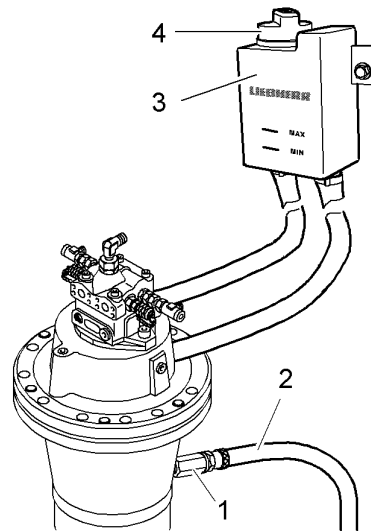


Fig. 5-34 Changing the oil on the swing gear

- | | |
|---------------|-----------------|
| 1 Drain valve | 3 Oil container |
| 2 Drain hose | 4 Cap |

To drain the oil:

- ▶ Remove the cap **4**.
- ▶ Unscrew the cover of the drain valve **1** via the opening on the base plate of the swing platform.
- ▶ Screw the provided drain hose **2** on the drain valve and allow the oil to flow into a suitable container.
- ▶ Remove the hose **2**.
- ▶ Reinstall the cover of the drain valve **1**.

To add the oil:

- ▶ Add the oil via the tank **3** until the level reaches the **MAX** mark.
- ▶ Reinstall cover **4**.

Additional maintenance work:

The following maintenance work must also be carried out at least once a year by a technician trained in air conditioning systems:

- ▶ Check the function of the fan motor **M65**.
- ▶ Check the function of the air flaps in the heating / air-conditioning system.
- ▶ Check the electrical connections for tight seating (good contact).
- ▶ Check the electrical lines for abrasions.
- ▶ Check the defrost thermostat **B295** (for function, correct positioning and for damage).
- ▶ Check the function of the pressure switch **B294** on the dryer-accumulator unit **9** (see Fig. 5-46).

5.14.4 Height adjustable cab**Danger!**

Repair and maintenance work on the cab, lifting frame or on the related hydraulics system should be carried out – as far as possible – with the cab lowered.

- ▶ For repair and maintenance work which can only be carried out when the cab is raised, the cab should be supported by equipment which is suitable for this purpose.

5.15 Lubricating the machine**Note!**

When lubricating the machine with a manual grease gun, the required effort is reduced significantly if the grease is pumped in slowly.

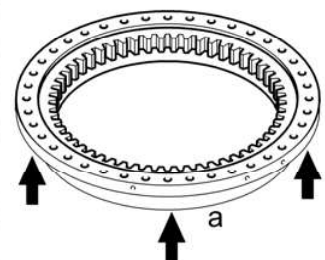
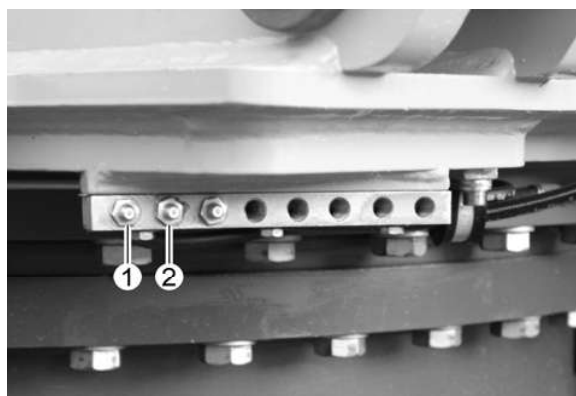
5.15.1 Lubricating the swing gear

Fig. 5-48 Central lubrication, swing race / gears

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