en

Operating manual

Hydraulic excavator
R 9150B

from serial number 38148

Document identification

	ORIGINAL MANUAL
Order number:	12269251
Edition:	03 / 2021
Valid for:	R 9150B from serial number 38148
Author:	LEC - Technical documentation department

Product identification

Manufacturer:	Liebherr-Mining Equipment Colmar SAS
Type:	R 9150B
Type no.:	1865 / 1956

LEC/en/Edition: 03 / 2021

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1 Product description

1.1 Assembly - overview

This section comprises an overview of the machine and descriptions of the components shown.

1.1.1 Machine and construction equipment

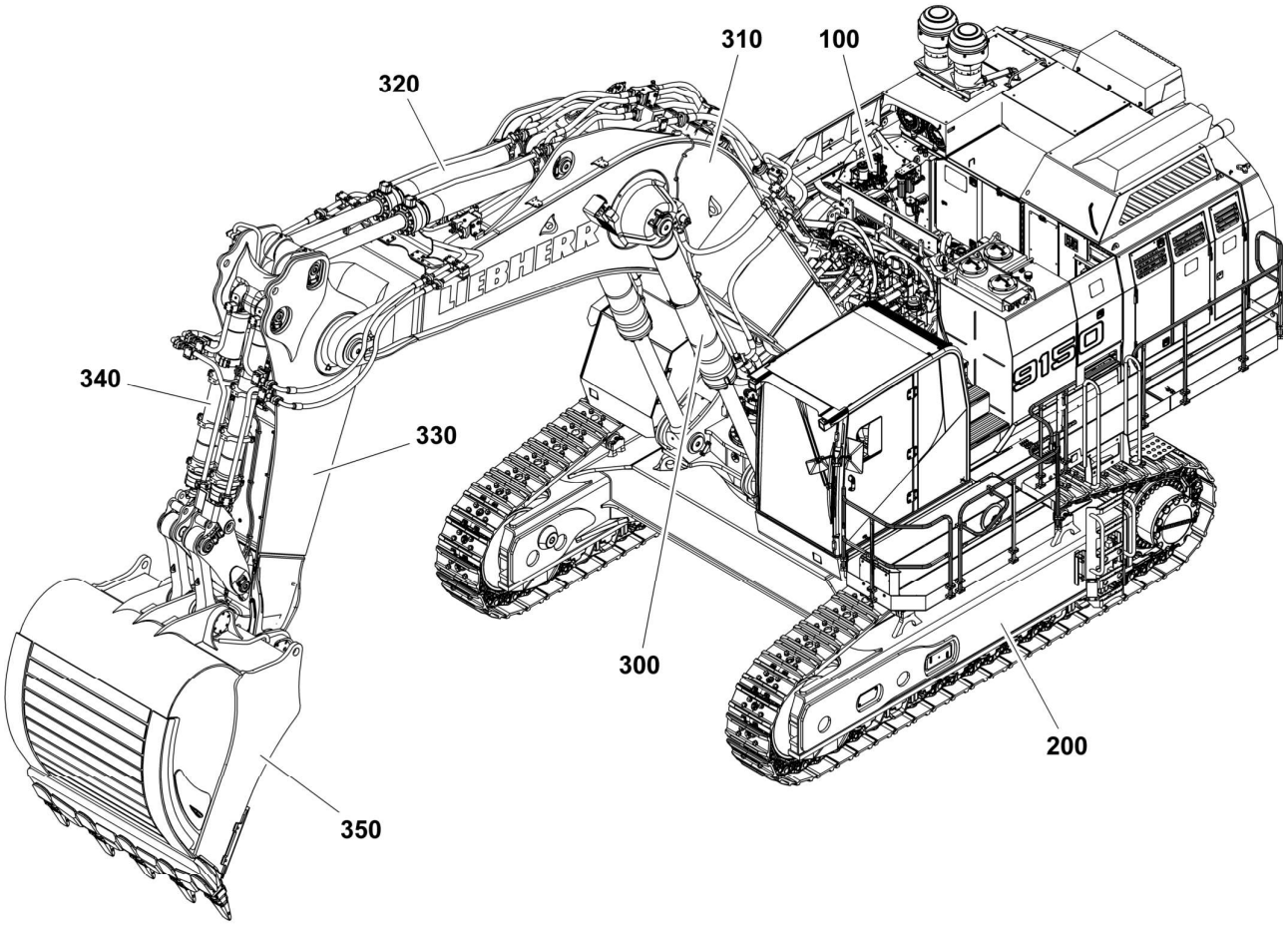

Fig. 1-1 *Machine and construction equipment - backhoe attachment*

100	Uppercarriage	**320**	Stick cylinder
200	Undercarriage	**330**	Stick
300	Boom cylinder	**340**	Bucket tilt cylinder
310	Boom	**350**	Backhoe bucket

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Customer Service
World-Class Support,
Everywhere, Every Day

Safety
Protecting Your Most
Important Assets

Environment
Mining Responsibly

Safety-First Working Conditions

Safe Service Access
The R 9150 B is fitted with ergonomic access for fast and safe maintenance. All service points are within reach from one side and at machine level. The R 9150 B's upperstructure is accessible via a robust fixed ladder and integrates one large central platform equipped with slip resistant surfaces. The wide catwalks facilitate maintenance and ensure confort during all the operations.

Secure Maintenance
All components have been located to allow for effortless inspection and replacement. Numerous service lights are perfectly located in the service areas to guaranty suitable maintenance conditions, day or night. Emergency stops have been strategically placed in the cab, engine compartment and at ground level. The R 9150 B eliminates hazards to ensure a safe environment for the service staff during maintenance.

Efficient Machine Protection

Protection Against Fire Ignition
The engine compartment integrates a bulkhead wall that separates the engine from the hydraulic pumps. This reduces the risk of hydraulic oil entering the engine compartment. The turbochargers and exhaust systems are heat shielded, and all the hydraulic hoses are made from a fire resistant material.

Automatic Fire Suppression System
The R 9150 B can be equipped with a fully integrated fire suppression, employing a dual agent solution to prevent and protect the machine. The fire suppression system has both automatic and manual release capabilities, emergency stop devices are strategically located on the machine to be easily accessible in any case by the operator.

Improved Accessibility Ease of Maintenance
- Wide walkways with slip-resistant surfaces
- Emergency ladder available outside the cab
- Wide open service access
- Reflective stripes on counterweight
- 45° hydraulic driven access stair (optional)

Working Environment Control
- Rear and side camera system
- LCD color screen to display cameras view
- 9 Long-range working LED lights located on attachment and upperstructure

Commitment to Employees Safety
- Safe and protected access to the components
- Major components centralized to be easily accessible
- E-stops located for the operator and maintenance staff
- Ground-level fluid maintenance hub

Optional Equipment

Undercarriage

- Narrow track pad width
- Large track pad width
- Removable side frames
- Rock protection for travel drive
- Protection for undercarriage center frame
- Rock protection for idler wheel
- Rock protection for sprocket
- Full length chain guide

Uppercarriage

- Hydraulically operated 45° access stair
- Electric-powered refueling pump
- Heavy counterweight (22,000 kg/48,500 lb)
- Increased fuel tank capacity (24h operation)
- Grid protection for front headlights
- Semi-automatic swing brake with joystick control
- Rock protection for swing gear and grease lines
- Wiggins fast fueling system
- Wiggins fast fueling system with Multiflo Hydrau-Flo®
- Wiggins couplings for ground level access service
- Steel grease lines on swing ring
- Swing ring scrapers
- External grease refill station (hydraulic-powered)
- Hydraulic connection with quick coupler for external grease refill station
- Right-hand bumper
- External starting device

Hydraulic System

- Oil cooler inlet screen

Operator's Cab

- 4-point seat belt
- Cab elevation (500 mm/1'6" / 1,200 mm/3'9" / 1,600 mm/5'3")
- Cab pressurization/cab pressurization with HEPA filter
- FOPS top guard with additional sun protection
- Operator comfort package
- Front protective grid
- Pre-heating system for cab
- Roof glazing
- External louvers

Attachment

- Piston rod guard for bucket cylinder (BH)
- Piston rod guard for hoist cylinder (BH/FS)
- Piston rod guard for stick cylinder (FS)
- Quick change coupling

Specific Solutions

- Arctic package (–20 °C/–4 °F, –35 °C/–31 °F, –50 °C/–58 °F)
- Sound attenuation package
- Hydraulic arrangement for special application (hammer/shear/tooth ripper/grapple/coupler)
- Arrangement for object handling operation

Safety

- Additional LED lighting with timer (for main access)
- Automatic fire suppression system
- Additional emergency stop (ground level)

General

- Maritime transport packaging

2 Safety instructions

Working with the machine holds dangers to which you as the owner, machine operator or maintenance expert could be exposed. If you regularly read and note the safety information, however, you can prevent danger and accidents. This is particularly true for those who are only occasionally in contact with the machine, e.g. for maintenance work. The following information comprises safety regulations which, if followed conscientiously, will contribute to your safety and that of other persons, as well as avoiding damage to the machine.

Following these precautions does not release you from the responsibility to take note of safety regulations which apply on site or of guidelines given by legal bodies or professional associations.

For EU countries, guideline 2009 / 104 / EC contains the minimum required safety information applicable to the owner.

2.1 Meaning of the symbols in this manual

Work processes and actions that could cause danger are accompanied by safety informations in these operating instructions. These safety informations describe various dangers which are emphasized by the terms **Danger**, **Caution** and **Note**.

These terms are identified by symbols in the operating instructions and have the following meaning:

Danger!
Warning relating to a danger that carries with it a high risk of death or serious injury if the appropriate preventative measures are not taken.

Caution!
Warning relating to dangers that could result in physical injury and/or damage to the machine if the appropriate preventative measures are not taken.

Note!
This symbol identifies user tips and operating and maintenance procedures whose use will guarantee a high degree of user-friendliness and longevity to the machine or which will considerably simplify working procedures.

– This symbol identifies a listing.
  • This symbol identifies a sub-listing.

❑ This symbol signifies the following: “The precondition must be fulfilled”.
The machine operator or the maintenance personnel must first fulfil the precondition described, i e. the machine must be brought into a particular work position in order to be able to carry out the actions subsequently described.

▶ This symbol identifies an action.
The machine operator or the maintenance personnel should be active at this location and carry out the action described.
↳ This symbol means “Carry out an activity".

Incorrect use of the machine used for demolition application

- Demolition works must be carried out only by trained specialist personnel.
- Do not operate the machine if the counterweight is not suitable for the attachment or special tool you use.
- Do not operate the machine if applicable and approved operator protective structures (e.g. FOPS, front protective grid) are not installed.
- Do not move suddenly and jerkily.
  Do not stop it suddenly.
  Always move the attachment or special tool slowly and with constant speed movements.
- Because of the possible effects on the machine stability, reduce the height and the speed of the movement.
- Do not lift the machine with the attachment or special tool.
- Make sure that there is no rubble on the attachment or special tool.
- Operate the machine in the position that follows:
  - Align the uppercarriage with the undercarriage so that the sprockets locate at the back-end.
  - Work over the idler.
- Keep a sufficient distance between the machine and the object to demolish.
- Do not use the inertia of the attachment or special tool as an additional force.
- Never leave the machine unattended while the attachment or special tool is not safely positioned on the ground.
- Lay down the attachment or special tool on the ground to park the machine.
- Obey the symbols shown on the display and the acoustic warning signals.
- Prevent unwanted lateral forces on the attachment or special tool when the uppercarriage turns.
- Do not drive at a right angle to the slope.

Incorrect use of the attachment or special tool used for demolition application

- Make sure that you use an attachment or special tool exclusively designed for the task.
- Only use attachment or special tool approved by Liebherr.
- Only operate the attachment or the special tool with closed windshield and with a front protective grid.
- Only operate the attachment or the special tool with closed door.
- Do not clean the ground with the special tool.
- Make sure that the special tool works in its specified limits. For more information, also refer to the Operator's Manual of the tool manufacturer.

Safe use of a hydraulic hammer or a hydraulic ripper

- According to the severity of the application, the use of a hydraulic hammer or a hydraulic ripper can result in vibrations, shocks or stresses which are higher than in normal use. It may reduce the expected lifetime of structures and/or components.
- The hydraulic hammer or the hydraulic ripper must be selected with particular care. When using a hydraulic hammer or a hydraulic ripper not permitted by Liebherr, warranty for steel structures and machine components will be ceased.
- Before beginning breaking tasks, position the machine on firm and level ground.
- Use a hydraulic hammer or a hydraulic ripper designed exclusively for breaking

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- When working on live parts, ensure that a second person is available to operate the emergency-off or the main switch and overvoltage release. Cordon off the working area with a red and white safety chain and a warning sign. Only use insulated tools.
- When working on neutral and high tension subassemblies, after releasing the voltage, briefly disconnect the supply cable at earth and electronic devices such as capacitors using an earthing rod.
- First test the released parts to make sure that they are off circuit, earth them and then disconnect them briefly. Insulate adjacent live parts.
- Disconnect the battery before working on the electrical system or carrying out any electric arc welding on the machine.
  First disconnect the negative, then the positive pole. When reconnecting, proceed in the reverse order.

Hydraulic accumulator

- All work on the hydraulic accumulators must be carried out by trained specialist personnel.
- Inexpert assembly and handling of hydraulic accumulators can cause serious accidents.
- Do not operate damaged hydraulic accumulators.
- Before working on a hydraulic accumulator, you must reduce the pressure in the hydraulic system (hydraulic system including hydraulic tank), as described in these operating instructions.
- Do not carry out welding or soldering or do any mechanical work on the hydraulic accumulator.
  The hydraulic accumulator can be damaged by heat penetration and can be made to rupture by mechanical working. RISK OF EXPLOSION!
- Only charge the hydraulic accumulator with nitrogen. There is a RISK OF EXPLOSION if oxygen or air is used.
- The accumulator body can become hot during operation; there is a risk of burning.
- New hydraulic accumulators must be charged with the pressure required for the purpose of use before installation.
- The operating data (minimum and maximum pressure) are marked permanently on hydraulic accumulators. Ensure that this marking remains visible.

Hydraulic lines and hoses

- It is forbidden to carry out repair work on hydraulic lines and hoses!
- All lines, hoses and bolt connections must be checked regularly for externally visible damage and any possible damage must be immediately checked for leakage.
- Never check for leaks with your bare hands, use a sheet of paper or something else.
- Any damaged parts must be removed immediately! Spurting oil can lead to injury and burns.
- Even with correct storage and permitted load, lines and hoses are subject to the natural aging process. This restricts their duration of use.
  - Incorrect storage, mechanical damage and unauthorized load are the most common causes of failure.
  - In relation to duration of use, current norms, regulations and guidelines pertaining to lines and hoses at place of use must be adhered to.
  - Use at the limit range of permissible load can shorten duration of use (e.g. high temperatures, frequent movement cycles, extremely high pulse frequencies,

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109 Crushing hazard label

Plate 107: Emergency device label for the tilting operator cab (optional equipment)

Indicates the location of the emergency devices of the optional tilting operator cab.

Plate 108: Maximum charge label for the tilting operator cab (optional equipment)

Indicates the maximum allowable charge on the optional tilting operator cab.

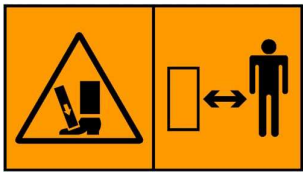
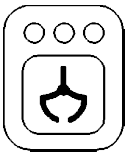


Plate 109: Crushing hazard label

Indicates:

- Risk of crushing because of the vicinity of device with closing mechanical parts.
- To keep a safe distance away from this device when it is in operation or getting started.



Turn of the grapple / shear (optional)

- ▶ Push the button.
  - ↳ The LED in the button comes on.
  - ↳ You can turn the grapple / shear with the related operating and control elements.
- ▶ Push the button again.
  - ↳ The LED in the button goes off.
  - ↳ The turn function of the grapple / shear is off.

High speed gear

- ▶ Push the button.
  - ↳ Transfer from normal drive to fast drive is activated.
  - ↳ First LED in the button comes on.
- ▶ Push the button again.
  - ↳ Transfer from normal drive to fast drive is deactivated.
  - ↳ First LED in the button goes off.

Auto idle

The auto idle function reduces automatically the engine speed, e.g. when the machine is on but you do not operate it.

- ▶ Push the "Auto idle" button.
  - ↳ The auto idle function is on, but it is not activated.
  - ↳ The LED on the button comes on.
- ▶ If you let the joysticks and pedals in neutral position during the specified auto idle interval:
  - ↳ The auto idle function is activated.
  - ↳ The engine speed is automatically reduced.
  - ↳ The E / P mode and the engine speed are stored. The related symbol flashes on the display.

You can set the auto idle interval in the submenu "Auto idle control" of the monitoring display.

- ▶ If you push on the "Increase engine speed" button while the auto idle function is activated:
  - ↳ The engine speed does not change.
  - ↳ The new step is stored.
- ▶ If you push on the "Decrease engine speed" button while the auto idle function is activated:
  - ↳ If the new step is higher than the auto idle speed, the engine speed does not change and the new step is stored.
  - ↳ If the new step is lower than the auto idle speed, the auto idle function is deactivated.
- ▶ If you operate the joysticks or the pedals:
  - ↳ The auto idle function is deactivated.
  - ↳ The engine speed is set to the stored value.
- ▶ Push the "Auto idle" button again.
  - ↳ The auto idle function is off.
  - ↳ The LED on the button goes off.

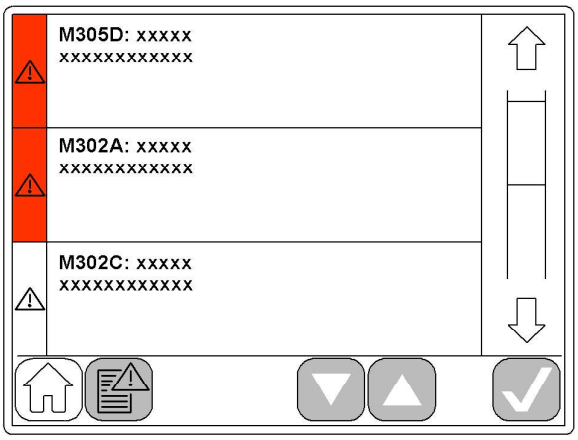


Fig. 3-14 *Menu "Diag"*

▶ Push the safety lever up to see the error messages.

A code number and a short description are shown for each error code.

▶ Push the "**Up**" and "**Down**" buttons to select an error message.

▶ Push the "**Acknowledgement**" button to acknowledge the error.

Danger!
If the error shown on the display is not rectified immediately, this could cause injuries to persons or damages to the machine.

▶ Rectify / have the error rectified immediately.

If you want to change the language of the messages:

▶ Refer to the menu "**Settings**".

Menu "Check"

This menu gives access to the submenus that follow:

– the remaining time before the next scheduled maintenance interval

Hours related to the engine

Hours related to the hydraulic system

When the necessary maintenance task is done:

▶ Push the "**Up**" and "**Down**" buttons to select the applicable symbol.

↳ The applicable symbol is shown by a white frame.

▶ Push the "**Accept**" button to confirm that the related maintenance task is done.
↳ The system records the time of this task.
↳ It calculates the next scheduled maintenance interval.

Menu "Settings"

This menu gives access to the submenus that follow:

Coolant level low

This symbol is shown if the coolant level falls below minimal level.

↳ The engine stops automatically.

If the engine does not stop automatically:

▶ Stop operation and turn the engine to off.

▶ Find and rectify the cause of the problem.

▶ Add coolant to get the correct level.

Splitterbox oil pressure low

This symbol is shown if the splitterbox oil pressure falls below minimal level.

▶ Stop operation and turn the engine to off.

▶ Find and rectify the cause of the problem.

Battery level high

This symbol is shown if the battery level is more than a maximum level.

▶ Stop operation and turn the engine to off.

▶ Find and rectify the cause of the problem.

Battery level low

This symbol is shown if the battery level falls below a minimum level.

▶ Stop operation and turn the engine to off.

▶ Find and rectify the cause of the problem.

Battery charging

When the excavator is operating, this symbol is shown if the V-belt alternators or the electrical charging system are defective.

▶ Put the engine to low idle immediately.

▶ Allow the engine to idle for approximately 5 seconds.

▶ Switch to off the engine.

▶ Rectify the error.

Hydraulic oil overheating

This symbol is shown if the hydraulic oil temperature is more than a specified operating value.

▶ Stop operation and let the engine run at high idle until the symbol disappear.

If necessary:

▶ Turn the engine to off.

▶ Find and rectify the cause of the problem.

Hydraulic oil level low

This symbol is shown if the hydraulic oil level falls below minimal level.

↳ Pumps are automatically set to minimal flow.

▶ Stop operation and turn the engine to off.

▶ Find and rectify the cause of the problem.

▶ Add hydraulic oil to get the correct level.

3.2.3 Safety lever

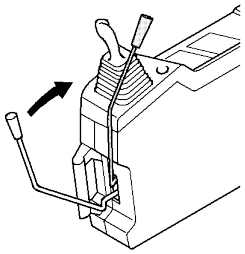


Fig. 3-26 *Safety lever*

For safety purposes, the left control panel 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 circuit is disconnected. This means that:

- No work movements can be carried out when pilot control devices, e g. the joystick or foot pedals, are operated.
- The swing gear brake is locked (LED in swing brake switch is on).
- It is not possible to release the swing gear brake using this switch.

When the safety lever is pushed (push up / push down) to its lowest position, the swing gear brake and the LED in swing brake switch will return to their original states and the pilot control devices will be active.

▶ Before the operator starts working, he must push the safety lever down into its lowest position while seated in the operator's seat.

3.2.7 Windscreen wiper

Windscreen wiper

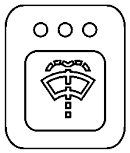
When the ignition is switched to on, you can activate the windscreen wiper when you push the button.

- ▶ Push the button.
  - ↳ Intermittent switching.
  - ↳ First LED in the button comes on.
- ▶ Push the button again.
  - ↳ Continuous operation.
  - ↳ Second LED in the button comes on.
  - ↳ First LED in the button goes off.
- ▶ Push the button again.
  - ↳ Windscreen wiper is switched to off.
  - ↳ LED in the button goes off.

Set the interval time for the intermittent switching

You can set the interval in the submenu "Wiper" of the monitoring display.

Windshield washer installation



When the ignition is switched to on, you can activate the electric windscreen washer installation when you push the button.

- ▶ Push and hold button.
  - ↳ Washing water will be sprayed onto the windscreen through the outlet nozzles.
  - ↳ The windshield washer operates continuously.
- ▶ Release the button.
  - ↳ Washing water will be stopped.
  - ↳ Windscreen wipers finish its cycle.

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▶ Press button **7** to set the heating manually.
  ↳ The heating symbol will flash for 5 seconds.

▶ While the heating symbol is flashing, use button **2** or **3** to increase or reduce the heating manually.

▶ Press button **7** to switch to automatic again.

Air-conditioning

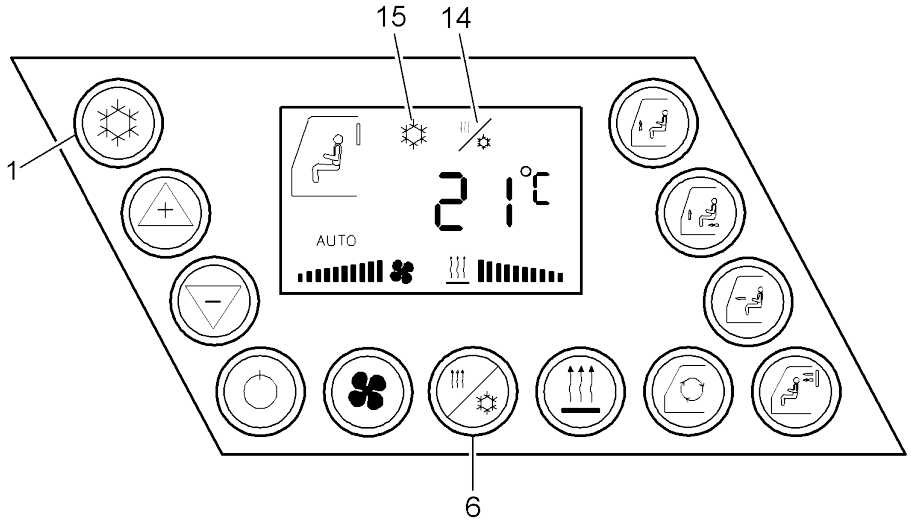

Fig. 3-48 *Air-conditioning*

▶ Switch on the air-conditioning using button **1**.
  ↳ The symbol **15** will be activated.
  ↳ The compressor will now be switched on by the control unit if required and controls the heating and cooling unit's speed automatically.

▶ To dehumidify the cab, switch on the air-conditioning system when heating the cab.

▶ Press the REHEAT button **6**.
  ↳ Symbol **14** is activated.

▶ In this case, switch on the air-conditioning unit until the windows are no longer fogged.

After 10 minutes, the REHEAT function switches off automatically.

Switch to on the electrical system

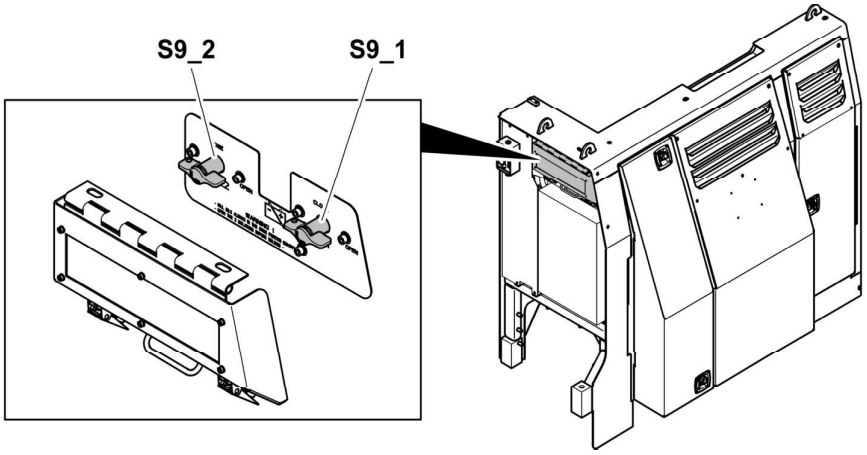

Fig. 3-54 *Principal battery switches*

S9_1 Principal battery circuit breaker
S9_2 Principal battery circuit breaker

▶ Make sure that the principal battery switches **S9_1** and **S9_2** are in position "**CLOSE**".

These are located on the inner side of the pumps box.

▶ Turn the ignition key **S1** to contact position. After a few seconds:
  - The display turns on.
  - On the keyboard, the first LED of the "Increase engine speed" button comes on, as the engine is at its minimum speed on start.
  - On the keyboard, the first LED of the "Travel brake" and "Swing brake" buttons come on.

If neither the display nor the above listed LEDs turn on when the ignition key is in the contact position:

▶ Make sure that the principal battery switches are set to "**CLOSE**".

Start the engine

Caution!
Incorrect start of the Diesel engine!
Risk of damage and/or overheating to the starter.

▶ Only operate the starter when the Diesel engine is off.

▶ Do not operate the starter more than 30 seconds.

If the Diesel engine does not start after you operate the starter the first time:

▶ Wait for a minimum of 2 minutes before you try to start again.

If the Diesel engine does not start after you operate the starter the second time:

▶ Wait for a minimum of 5 minutes before you try to start a third time.

If the Diesel engine does not start after you have tried three times:

▶ Find the problem and correct it.

1 Circuit breaker of the special preheating batteries

▶ Make sure that the circuit breaker **1** of the special preheating batteries is in position "**CLOSE**".

▶ During the machine operation, let the circuit breaker **1** in position "**CLOSE**" to charge the special preheating batteries.

Start the coolant heater (basic equipment)

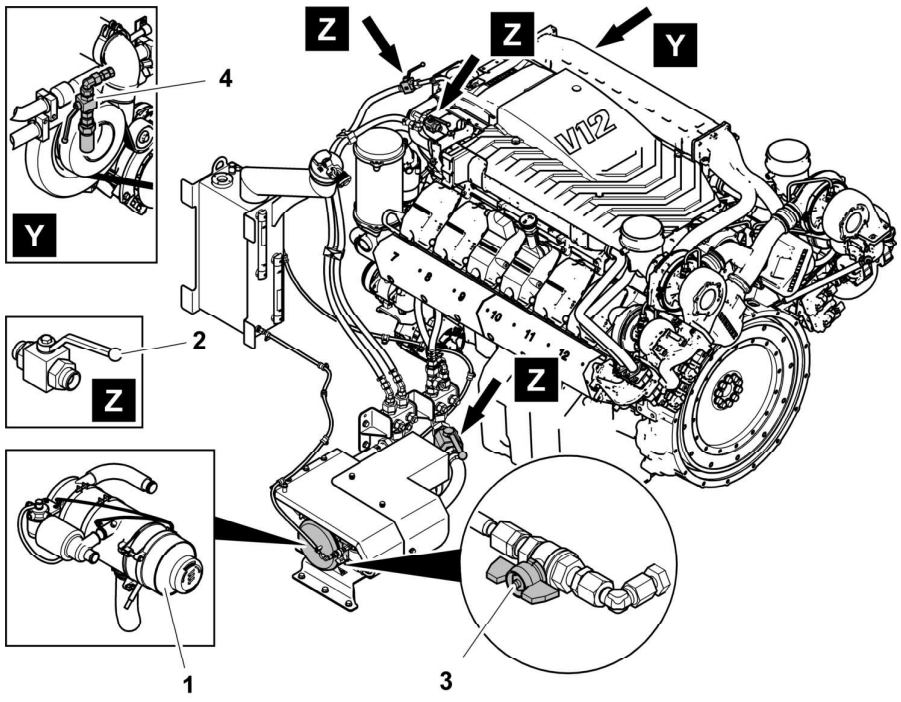

Fig. 3-61 *Devices for coolant preheating*

1 Coolant heater
2 Manual valves (3x)
3 Tap
4 Coolant shutoff valve (if installed)

▶ Make sure that the Diesel engine of the machine and the coolant heater **1** are switched to off.

▶ Make sure that all the manual valves **2** and the tap **3** are open.

▶ If installed, make sure that the coolant shutoff valve **4** is open.

▶ Start the coolant heater as given below.

Coolant heater with no special fuel tank (optional)

In option, the fuel supply of the coolant heater can directly come from the machine fuel tank. In this case, there is no special fuel tank of the coolant heater.

▶ For system configuration details, refer to the section "Starting aids" in chapter 5 of this manual.

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▶ Step 8 - Start the travel hydraulic circuits very slowly forward and backward on approximately 10 meters. Repeat 4 times.

The excavator can now be operated.

3.3.6 Jump start procedure

Start with jump start cables

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

▶ Wear protective goggles and gloves whenever jump starting, avoid naked flame and creating any sparks in the vicinity of the flat vehicle battery. RISK OF EXPLOSION!

▶ Only use jump starting cables with a sufficient cross section. Always follow the established jump starting procedure.

Connect the batteries

▶ First connect the cable to the positive terminal (+) of the flat battery and then to the positive terminal (+) of the exterior battery.

▶ Connect the second cable to the negative terminal (-) of the flat battery and then to the negative terminal (-) of the exterior battery.

▶ Start the engine as described above.

Caution!

▶ Before removing the jump start cable, be sure to place the diesel engine of the jump started machine into low idle.

▶ For safety reasons, switch on large consumers such as work headlights, upper carriage lighting etc. to avoid overvoltage. The electronics could otherwise be damaged.

Disconnect the batteries

▶ First remove the cable from the negative terminal (-) of the exterior battery and then from the negative terminal (-) of the flat battery.

▶ Remove the second cable from the positive terminal (+) of the exterior battery and then from the positive terminal (+) of the flat battery.

▶ Check the electrical function of the machine.

For battery care and maintenance, see the chapter “Battery care”.

Start with auxiliary start receptacle (optional)

In option, you can connect an external power supply to the machine through an auxiliary start receptacle.

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Tilt down the cab in an emergency from the cab

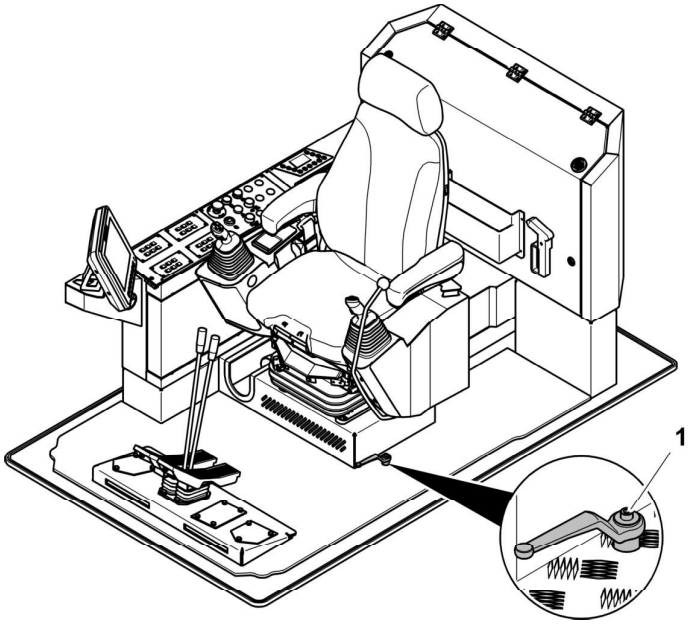

Fig. 3-77 *Inner emergency valve*

1 Inner manual valve

The inner emergency valve **1** is installed in the cab, near the operator seat.

▶ Open the valve **1** to tilt down the cab.

When the cab is in the full down position:

▶ Close the valve **1**.
↳ The cab can be tilted again.

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- Reduce your speed to prevent the need for sudden braking and steering manoeuvres.
- Avoid sudden speed changes, such as braking, accelerating and changing direction.
- Only rotate the uppercarriage when the undercarriage is stationary.
- Only rotate the uppercarriage after you have picked up the load.
- Only move the machine when you have picked up and lifted the load and rotated the upper structure to the driving position.
- There is a danger of possible swinging movement and dropping of the load when the attachment is raised.
- A protective grid (FOPS) in accordance with ISO 10262 must be attached to the cab.
- A protective roof (FOPS) in accordance with ISO 10262 must be attached if there is a risk of objects falling from above.
- Only the maximum permissible load may be taken up using the grab.

– NOTE: The weight of absorbent materials, such as logs, is dependent on length, diameter and specific weight. The influencing variables present in a natural product, such as moisture, must be noted.

– Working procedures when using machines with grabs require the machine operator to receive special instruction and training.

– Use as part of the work process is only permitted when the machine operator has sufficient training and practical experience.

Safe use of machines with tower elevation

– Due to the tower elevation, the centre of gravity of the machine will be displaced upwards in the vertical direction. The driving and work characteristics of the machine will thus be influenced persistently, e.g. through reduction of the dynamic stability.

– Due to the heightened centre of gravity, the machine must be aligned horizontally before use. In horizontal alignment, the centre of gravity of the uppercarriage is over the centre of the undercarriage, which reduces the risk of tilting.

– The machine can still sway and tilt despite being aligned!
The following instructions are therefore to be observed at all times:

When moving the machine:

- Rotate the uppercarriage parallel to the undercarriage (transport position).
- Draw the attachment as close as possible to the machine.
- Only at this point may the support feet be retracted and the machine moved.
- Moving with loads is not permitted.
- Check the terrain to be covered to ensure that the ground is solid and even. Potholes and uneven surfaces jeopardize the stability of the machine.
- Adjust vehicle handling to suit the altered machine characteristics (high centre of gravity) and environmental conditions.
- Reduce your speed to prevent the need for sudden braking and steering manoeuvres.
- Avoid sudden speed changes, such as braking, accelerating and changing direction.
- Ascending gradients and obstacles may only be approached in the longitudinal direction in order to prevent unacceptable banking of the machine.
- Special care should be taken when driving through narrow passages - drive slowly!

When loading and unloading:

- The machine must be supported and aligned horizontally before moving (swing) the uppercarriage out of the transport position.
- It is imperative that you check the contact surface of the support (load carrying

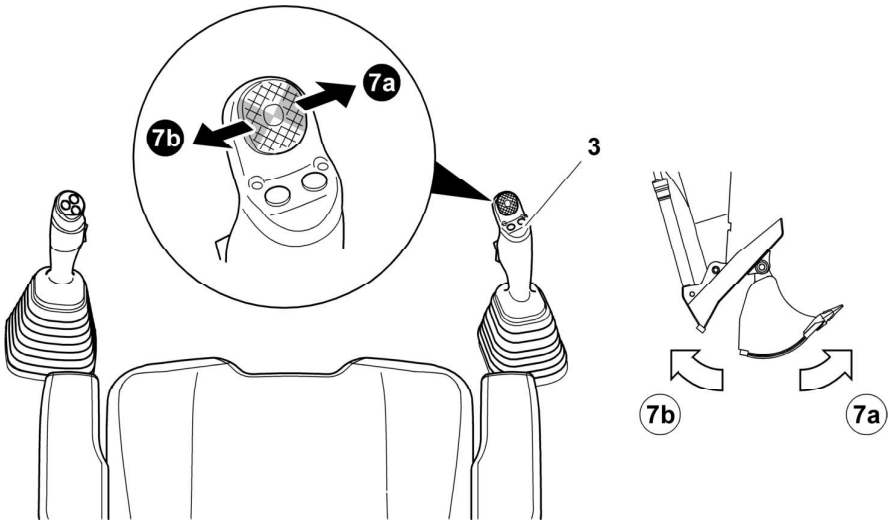


Fig. 3-93 *Flap control with the analog stick*

▶ Push the analog stick on the right joystick **3** to the right **7a**.
↳ Shovel flap will be opened.

▶ Push the analog stick on the right joystick **3** to the left **7b**.
↳ Shovel flap will be closed.

Semi-automatic flap closing (if installed)

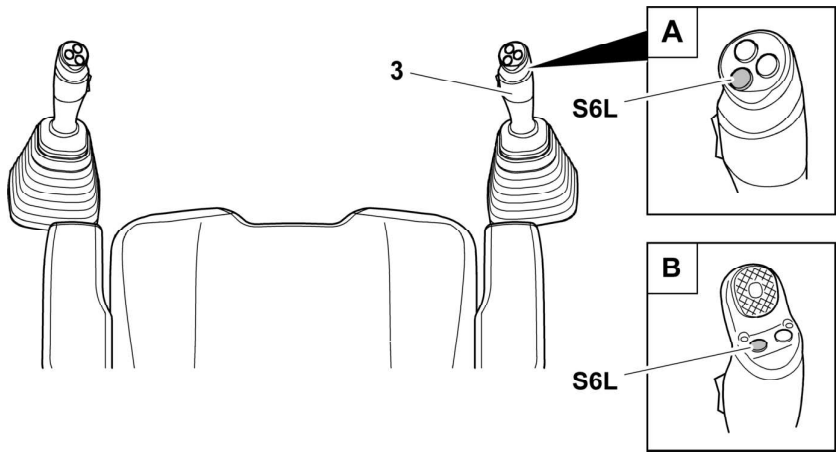


Fig. 3-94 *Semi-automatic flap closing*

A Joystick
B Joystick with analog stick (if installed)

▶ Push the button **S6L** left on the down of the right joystick **3**.
↳ Shovel flap will be closed automatically with full speed.

▶ Push the button **S6L** again during semi-automatic flap movement.
↳ Shovel flap movement will be stopped.

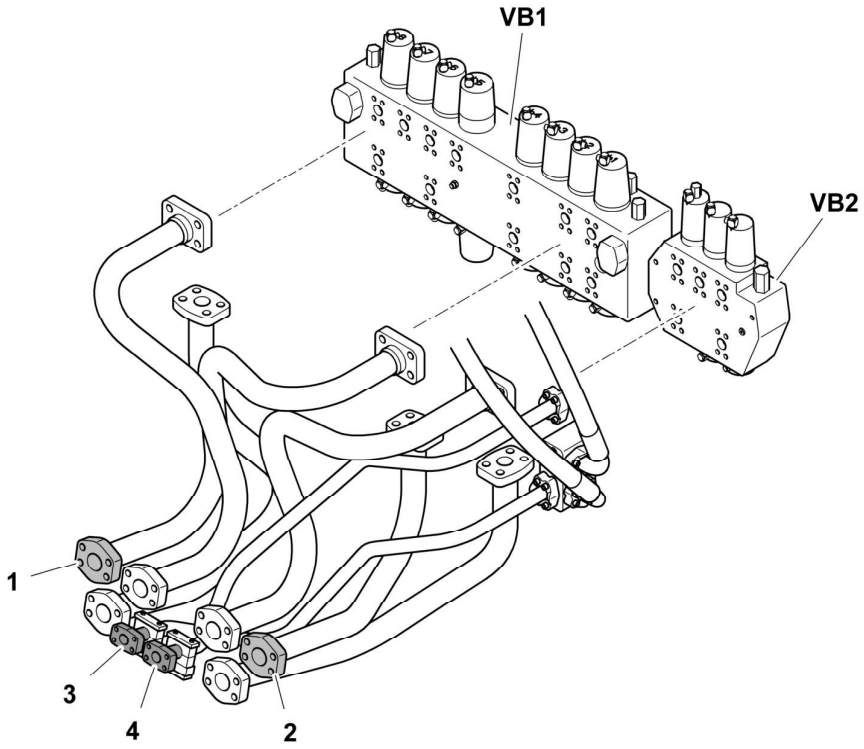


Fig. 3-105 *Set the configuration of the hydraulic supply lines*

1-4	Pressure port	**VB1**	Valve block 1
		VB2	Valve block 2

Danger!
Incorrect configuration of the hydraulic supply lines of the working tool!
Risk of death or serious injury and risk of damage.

▶ Before you operate a working tool, make sure that the related hydraulic supply lines are connected correctly.

Note!
The different configurations of the hydraulic supply lines are not applicable to all cases (for example: hydraulic hammer, special tool that replaces the second member).

If you need more information:

▶ Contact Liebherr customer service.

▶ Release hydraulic pressure as given in the dedicated section of this manual.

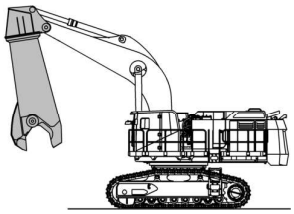
▶ Move up the safety lever.

If the necessary flow range for the tool category is less than 500 l/min:

▶ Connect pressure ports **1** and **2** to the bucket cylinder. This is the standard configuration of the machine when you use a bucket.

▶ Connect pressure ports **3** and **4** to the tool.

3.5.9 Install a shear (optional equipment) on and remove it from the boom



The following procedures are applicable when the optional special tool replaces the stick (second member).

Install the tool

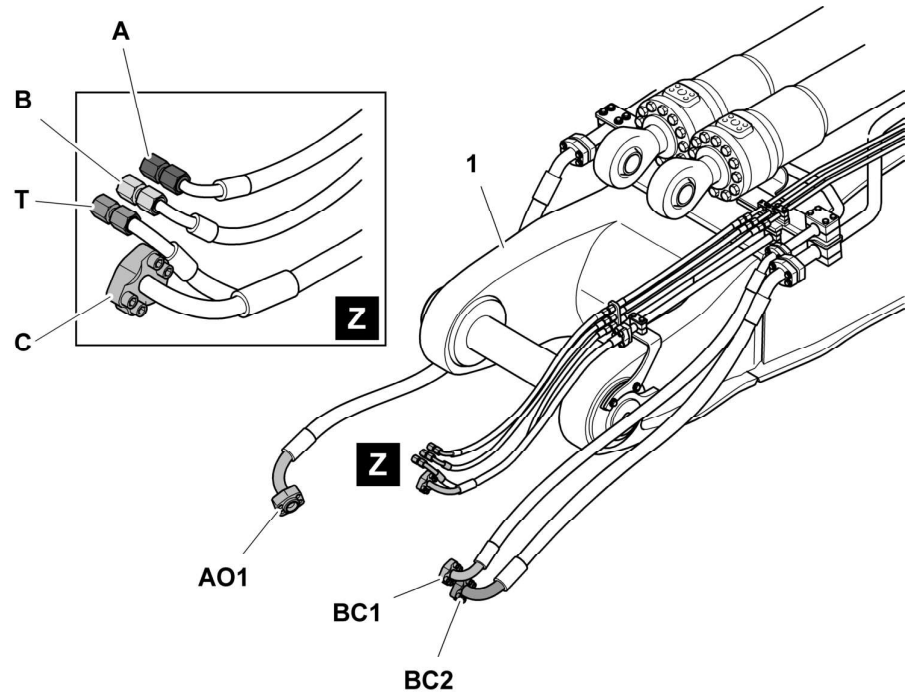


Fig. 3-114 *Hydraulic lines for the shear*

1	Boom	**AO1**	Pressure port for the shear opening
A	Pressure port for the rotary actuator of the shear	**BCx**	Pressure ports for the shear closing
B	Pressure port for the rotary actuator of the shear	**T**	Hydraulic line connected to the hydraulic tank
C	Shear greasing		

Caution!
With the stick removed, the stick cylinder operates unloaded!
Risk of damage to the stick cylinder.

▶ Operate the stick cylinder slowly and carefully.

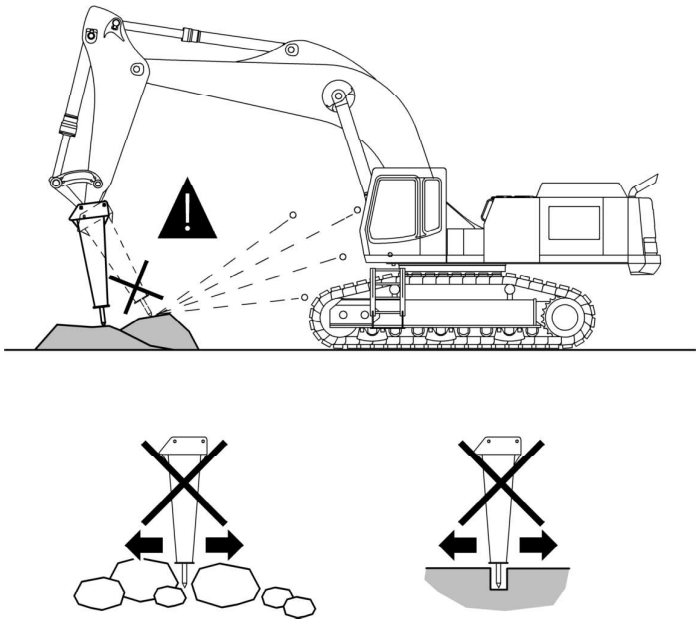


Fig. 3-127 Hydraulic hammer

- ❑ The machine must be positioned in the working position on level, solid ground.
- ❑ The stick may not stand vertically.
- ❑ No cylinder may be fully taken in or extended.
- ▶ Do not operate the hydraulic hammer on the same spot continually or for longer than 15 seconds.
  - ⬑ Overly continual operation of the hydraulic hammer leads to the hydraulic oil overheating unnecessarily.
- ▶ Change the position of the machine and resume hammering work.

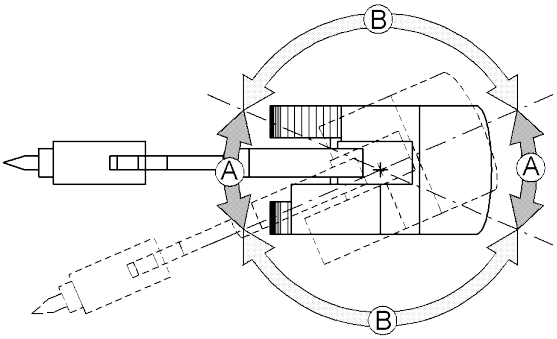


*Fig. 3-128 Permissible **A** and not permissible **B** work areas of the machine with hydraulic hammer*

Danger!
The stability of the machine could be affected.
When using a hydraulic hammer, only work with the machine in area **A**.

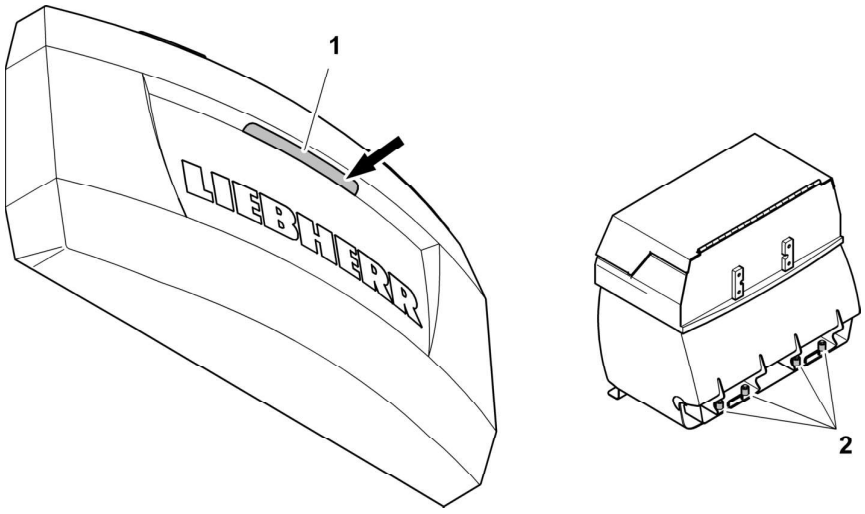


Fig. 3-140 *Rear screws of the Diesel Exhaust Fluid (DEF) tank*

1 Counterweight opening
2 Rear screws

▶ If installed, remove the protective cover from counterweight opening **1**.

▶ Through opening **1**, remove rear screws **2** from the Diesel Exhaust Fluid (DEF) tank.

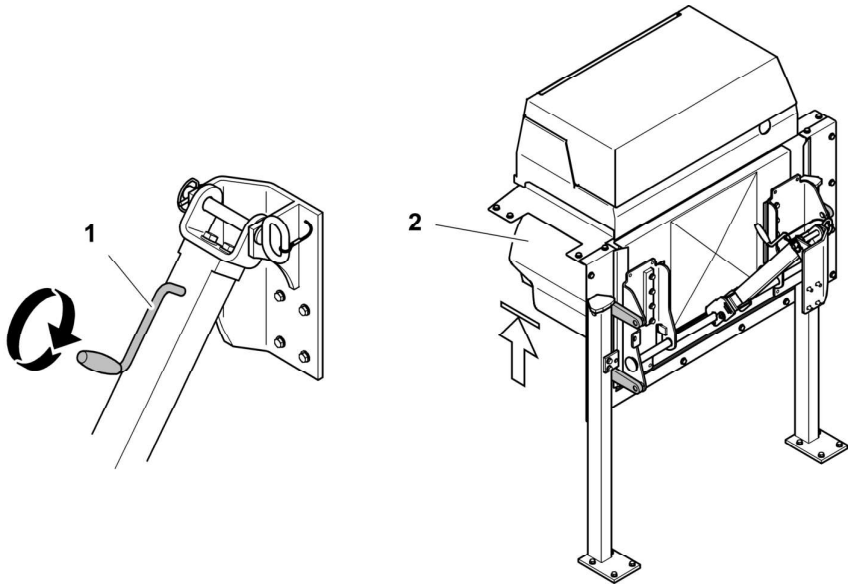


Fig. 3-141 *Lift and hold the Diesel Exhaust Fluid (DEF) tank*

1 Crank handle
2 Diesel Exhaust Fluid (DEF) tank

▶ Turn crank handle **1** of the spindle support until Diesel Exhaust Fluid (DEF) tank **2** is at its top position.

You can now remove the counterweight.

Point machine forward and rearward directions

This section tells you how to point forward **FWD** and rearward **RWD** directions of the uppercarriage and that of the undercarriage.

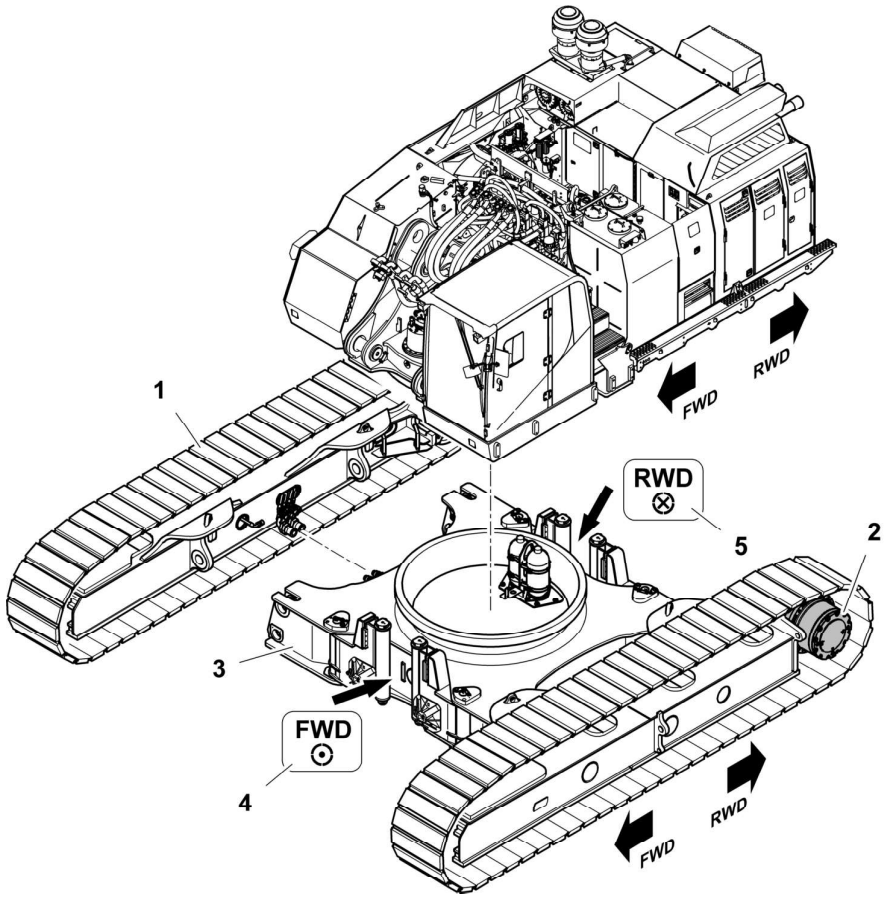


Fig. 3-144 *Point machine forward and rearward directions*

1 Side frame
2 Travel gear
3 Central part
4 Forward direction plate
5 Rearward direction plate

FWD Forward direction
RWD Rearward direction

Uppercarriage

– The cab points forward direction **FWD**.
– The counterweight and the engine compartment point rearward direction **RWD.**

Undercarriage

Dedicated direction plates are installed on central part **3**, between the jack frames:
– Plate **4** (point symbol) points forward direction **FWD**.
– Plate **5** (cross symbol) points rearward direction **RWD**.

In addition, when the undercarriage is complete with side frames **1**:
– Travel gears **2** also point rearward direction **RWD**.

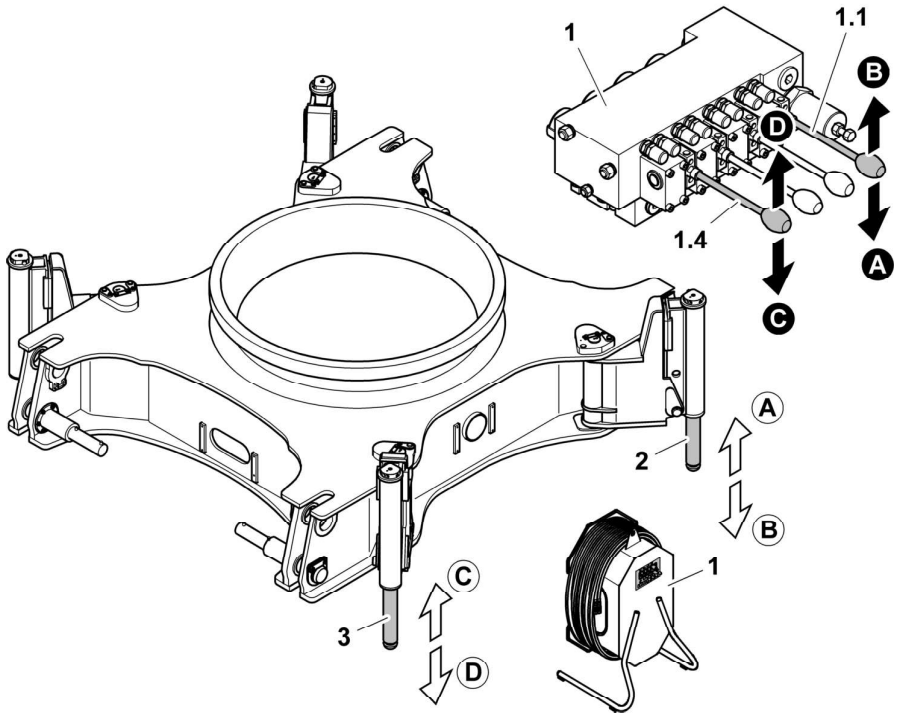


Fig. 3-150 *Control the jacks*

1	External valve block	2	Right jack (seen from the external valve block)
1.1	Right control lever	3	Left jack (seen from the external valve block)
1.4	Left control lever		

▶ When it is activated, obey the following procedures to control the related jacks with external valve block **1**:

– Move down (**A**) right control lever **1.1**.
  ↳ Right jack **2** retracts (**A**) (seen from the external valve block).
– Move up (**B**) right control lever **1.1**.
  ↳ Right jack **2** extends (**B**) (seen from the external valve block).
– Move down (**C**) left control lever **1.4**.
  ↳ Left jack **3** retracts (**C**) (seen from the external valve block).
– Move up (**D**) left control lever **1.4**.
  ↳ Left jack **3** extends (**D**) (seen from the external valve block).

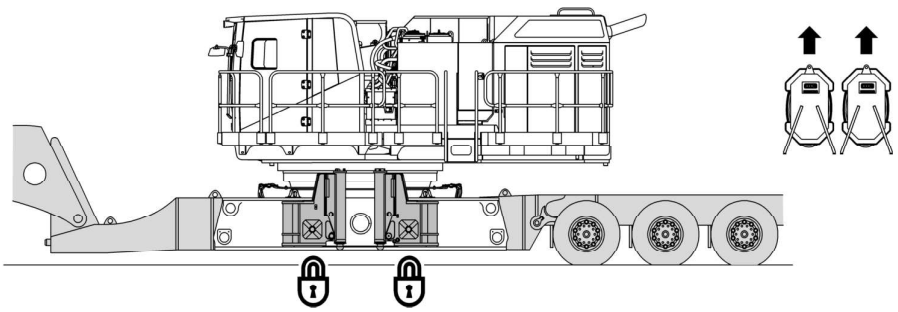


Fig. 3-164 Set the integrated jacking system for transportation

▶ Do the following procedures that are given in this section in the reverse sequence:
– "Set the pads in lifting position".
– "Set the jack frames in lifting position".
– "Remove the pads from storage position".

Remove the catwalks

For transportation, you must remove the complete catwalk (with handrails) and the movable access ladder (if installed) from the uppercarriage. The complete catwalk has a cab catwalk, a middle catwalk and a rear catwalk.

Remove cab and middle catwalks

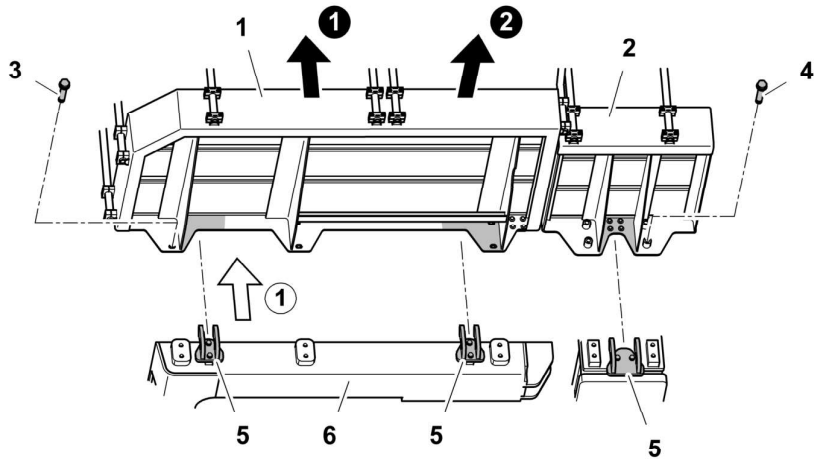


Fig. 3-165 Remove cab and middle catwalks

1	Cab catwalk	**4**	Screws of the middle catwalk
2	Middle catwalk	**5**	Centering and holding hook
3	Screws of the cab catwalk	**6**	Cab frame

▶ Attach the lifting devices to the specified lifting points of cab catwalk **1** as given in section "Technical data" and "Transport" of this manual.

▶ Attach the lifting devices to the crane.

▶ Increase the tension in the lifting devices to prevent the catwalk falls accidentally.

▶ Remove related screws **3**.

3.7.5 Travelling procedures for mining machine

The life expectancy of undercarriage components is based on standard working conditions with a maximum travel ratio of 5% per service meter unit. Working and / or travelling on uneven ground and / or abrasive material will influence the lifetime of the components and attract additional cost for the undercarriage components.

Downhill or uphill travel on a slope has also an effect on the life expectancy of undercarriage components and on their wear rate. Indeed, even if the slope angle is below the maximum permitted travelling angle, the increase of the slope angle causes the increase of the force and of the contact pressures applied on all track components (track pad assembly, sprocket, ...). On an indicative basis, the travel force applied on the track components is multiplied by two from a slope angle of 5° (8,7%) and is multiplied by 2,5 from a slope angle of 10° (17,6%).

In general travel action has to be kept to the lowest level that is possible. Minimize travelling with turning through a narrow turning circle and long distance travel.

To minimize the travel ratio, professional mine planning with longfront winning sections is preferred. If digging operations at various spots are necessary, a proper short term and long term plan of winning operations has to be employed to guarantee long term use of the excavator at one place before moving to another location.

However, if frequent machine movement is necessary, the following set of procedures defined by Liebherr to minimize possible machine damage, downtime and wear have to be taken into consideration.

General

In order to move the machine forwards: with the excavator in standard forward position, depress travel pedals all the way forward with the toes. Direction of travel is in the direction of idlers.

In order to move the machine backwards: with the excavator in standard forward position, depress travel pedals all the way down with the heels. Direction of travel is in direction of the drive sprockets.

Moving the machine during loading operations

Moving the machine during loading operations means adjustment of excavator digging and / or truck loading position of some meters.

Important procedures:

- Before moving the machine, empty the bucket and close up the attachment to a position as close as possible to the excavator undercarriage.
- The practice of placing the attachment on the ground and lifting the machine, then counter turning the undercarriage, is not allowed, because it could cause premature structural damage to the machine.
- If there is a build up of material around the tracks where the machine will not turn, you must move the machine several meters forwards and / or backwards and attempt to turn again.
- If mine safety regulations allow, the operator can use the swing function to assist in turning the tracks, i.e. if turning to the right, swing upper deck to the left and vice versa.

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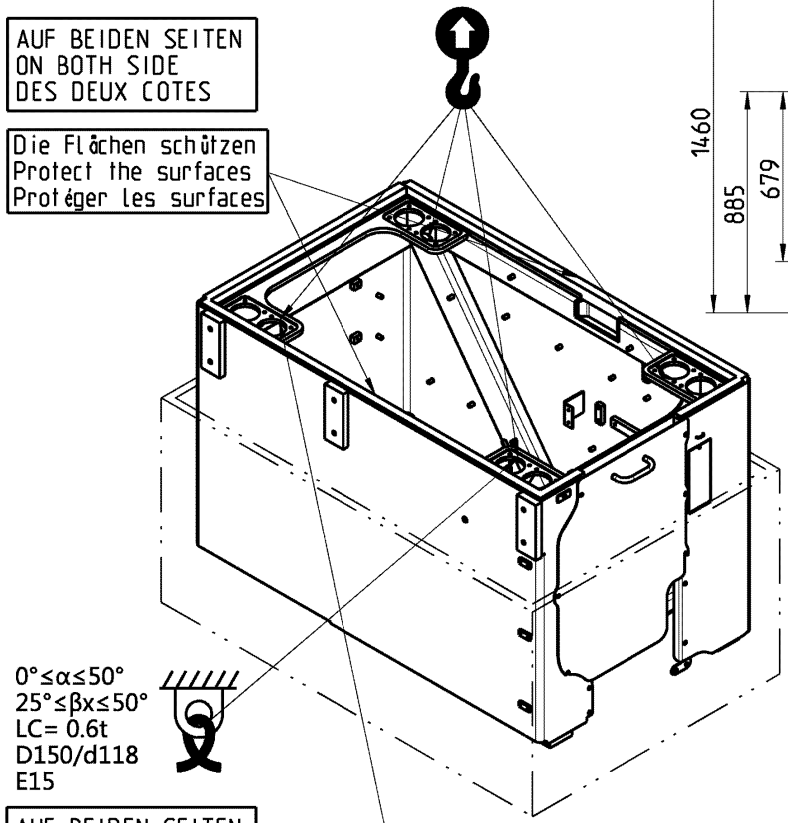
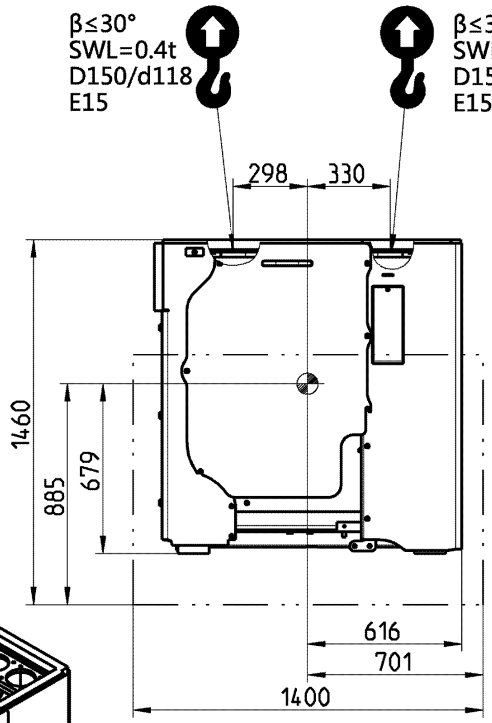
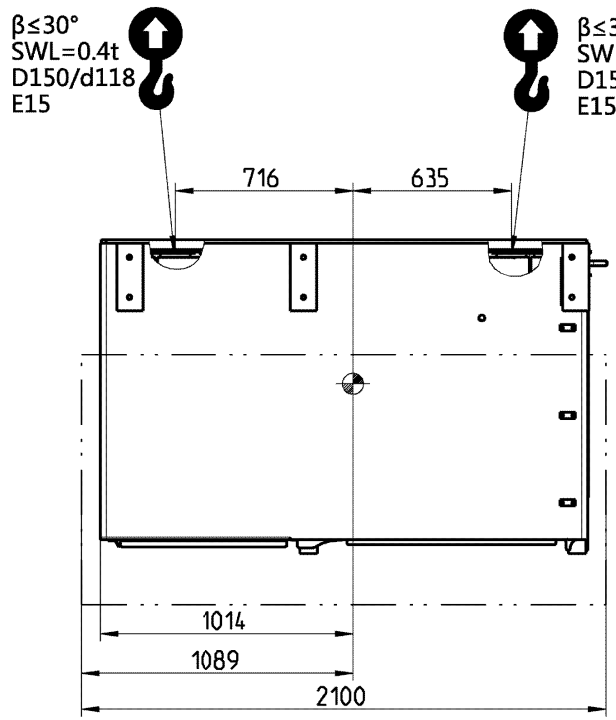
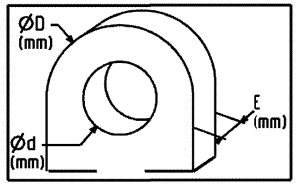






SCHWERPUNKT
CENTER OF GRAVITY
CENTRE DE GRAVITE



	Gerechnet Calculated Calculé	Gewogen Weighed Pesé
Gewicht ohne Werkzeug und Verpackung Weight without tooling and packaging Poids sans outillage et emballage	582 kg	
Gewicht mit Werkzeug und Verpackung Weight with tooling and packaging Poids avec outillage et emballage	800 kg	

LIEBHERR

Bezeichnung / Description / Dénomination	Ident-Nr. / Ident No. N° d'ident	Index / Index Index	Blatt / Page Feuille
TRANSPORTPLAN KABINENERHOEHUNG TRANSP.DRW.CAB ELEVATION R9150 PLAN DE TRANSP.REHAUSSE CABINE	11480440	000	1/1

4 Malfunctions

Warning messages and fault messages:

- Various faults are displayed on screen in the form of indicator lights or symbols (see chapter “Control and operating elements”).
- Warning functions can also be supported acoustically (buzzer).

Identifying and rectifying faults and errors:

- Faults can very often be traced back to incorrect operating or maintenance of the machine.
  For each fault, therefore, read the relevant chapter in the operating instructions carefully once more.
- Analyse the cause of the fault and rectify it immediately.
- Describe the fault and all accompanying circumstances as precisely as possible if you contact LIEBHERR customer service.
  Precise information makes it possible to find and rectify the cause of the fault quickly. Additionally, therefore, precise information on the type and serial number of the machine is also 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 fault cannot be recognised or rectified using the error codes and fault charts, please consult LIEBHERR customer service.

A1002	Electrical plate
A1004	Electrical plate
SUPP_E1005	Electrical plate

The cab connection box **E1005** is located in the cab, behind the operator seat. This box has different electrical plates with fuses and relays.

Electrical plate SUPP_E1005

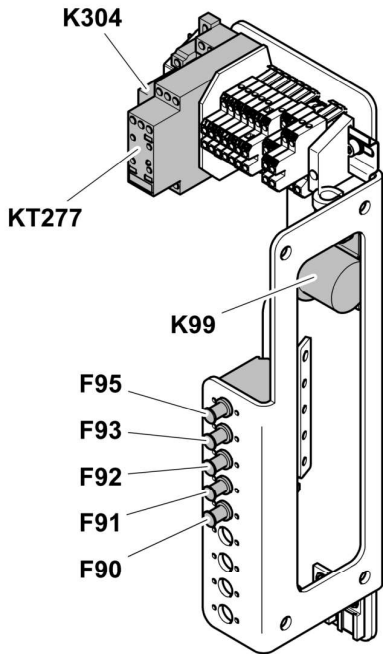


Fig. 4-5 *Fuses and relays of electrical plate SUPP_E1005*

F90	Fuse 15 A	**F95**	Fuse 15 A
F91	Fuse 15 A	**K99**	Relay
F92	Fuse 15 A	**K304**	Relay
F93	Fuse 15 A	**KT277**	Relay

- Make sure the equipment on which you will operate is securely supported before working (e.g. replacing teeth). Prevent metal touching metal when doing this.
- For safety reasons, never open and remove a track chain unless having previously totally released the pretension of the chain tensioning unit.
- Never lay under the machine if it is raised with work equipment and has not been securely supported with appropriate supports.
- Always jack the machine up in such a way that any weight displacement does not jeopardize stability and prevent metal touching metal while doing this.
- Work on the suspension, brake and steering systems may only be carried out by trained specialist personnel.
- If the machine has to be repaired on a slope, secure the crawler with chocks and connect the upper structure to the chassis using stop bolts.
- Only personnel with special training and experience may work on hydraulic equipment.
- When searching for leakage, wear protective gloves. A fine jet of liquid under pressure can penetrate the skin.
- Do not unscrew any lines or connections before you have set aside the equipment, switched off the engine and depressurized the hydraulic system. After switching off the engine, with the start key in contact position and with the safety lever down into its lowest position, you must operate all pilot control devices (joystick and pedals) in all directions in order to reduce the actuating and dynamic pressures in the work circuits. You must then reduce the internal tank pressure as described in these operating instructions.

Electrical system

- Check the electrical system regularly.
  Have all faults, such as loose connections, blown fuses and lamps and clogged or abraded cables rectified by personnel.
- Only use original fuses with approved current strength.
- For machines with electrical neutral and high tension leads:
  • switch the machine off immediately in the event of malfunctions in the power supply.
- Work on the machine's electrical equipment may only be carried out by skilled electrical personnel or by trained personnel under the supervision of an electrician in accordance with electrical regulations.
- When working on live parts, ensure that a second person is available to operate the emergency-off or the main switch and overvoltage release. Cordon off the working area with a red and white safety chain and a warning sign. Only use insulated tools.
- When working on neutral and high tension subassemblies, after releasing the voltage, briefly disconnect the supply cable at earth and electronic devices such as capacitors using an earthing rod.
- First test the released parts to make sure that they are off circuit, earth them and then disconnect them briefly. Insulate adjacent live parts.
- Disconnect the battery before working on the electrical system or carrying out any electric arc welding on the machine.
  First disconnect the negative, then the positive pole. When reconnecting, proceed in the reverse order.

Hydraulic accumulator

- All work on the hydraulic accumulators must be carried out by trained specialist

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5.4.2 Lubrication chart

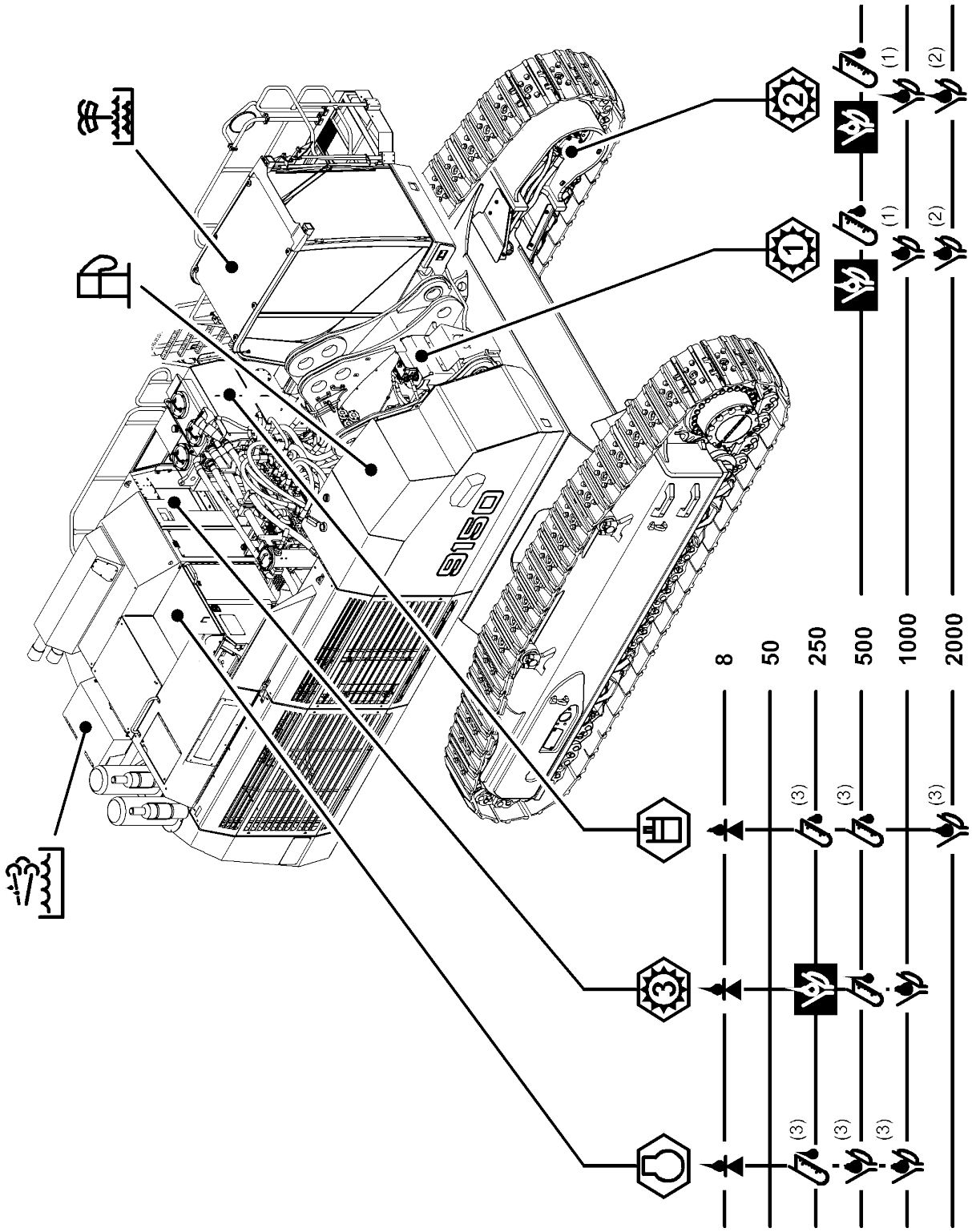

Fig. 5-6 *Lubrication chart - R9150*

Engine oil	fans speed regulation setting
SAE30 *(ISO VG100)*	"**STANDARD**"
SAE 10W *(ISO VG46)*	"**EXTRA-COLD**" or "**COLD**"

Hydraulic oils for hydraulic system

Requirements

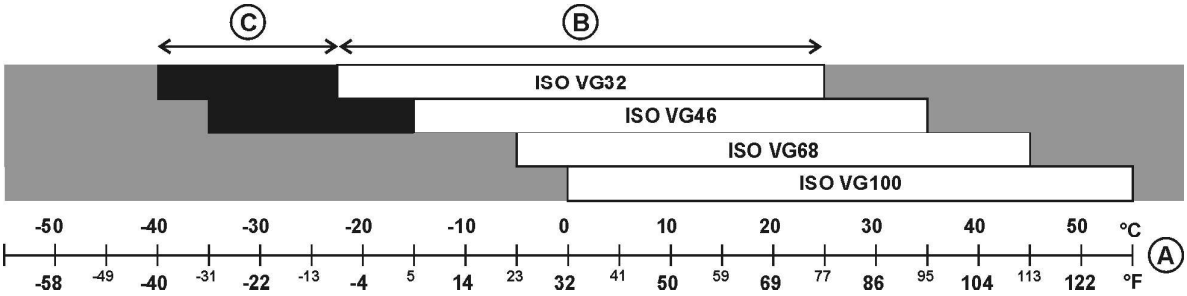

Fig. 5-12 *Hydraulic oil for hydraulic system*

A Ambient air temperature
B Operating range
C Extra-cold start range if excavator fitted with operating Liebherr arctic kit (with warm-up instruction)

Caution!
Minimum ambient air temperature for extra-cold start depends on oil type and brand and equals to oil pourpoint temperature +5 degrees K.

Hydraulic oils must contain dispersant and detergent additives and conform to one of the following specifications:

DIN	ISO
51524-2 (HLP, HLP-D)	ISO 11158 (HM)
51524-3 (HVLP, HVLP-D)	ISO 11158 (HV)

Additional requirements:

Test/Requirement	Standard/Reference	Required level/ Performance
Shear stability	DIN 51350-6 CEC L 45-A-99	KRL/C < 15%

– top-up oil quantity since last sample
– sampled oil type

▶ Send the sample in oil-proof adapted material.

▶ Check for the required sample delivery time and for sample export licence (if the laboratory is located out of the country, make sure that the export of the sample is authorized from your location to the laboratory).

▶ Do not wait before sending the sample to the laboratory.

▶ Record and save sampling operations and results.

If you get the oil sample with a sampling pump:

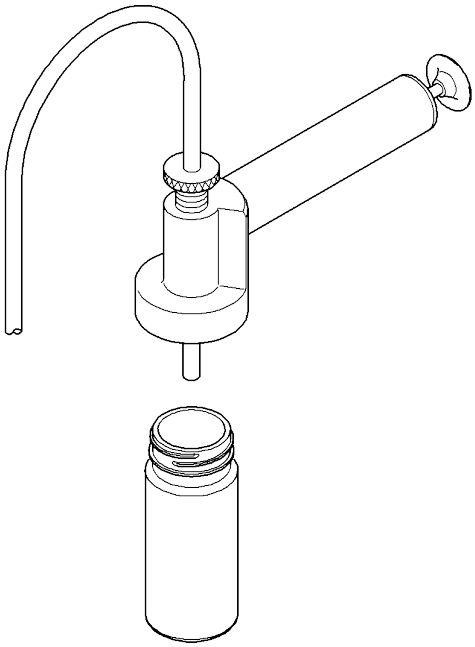

Fig. 5-17 *Sampling pump*

▶ Use a sampling pump if you get the sample directly in the tank or on the component (machine stopped).

▶ Always use a new sampling hose.

▶ Cut the sampling hose to the correct length (e.g. dipstick length plus 20 mm).

▶ First, let sufficient oil flow to flush the sampling hose.

▶ If you get the oil sample in the tank, take the sample in the middle of the tank.

If you get the oil sample through a sampling valve:

▶ Always use a new sampling hose.

▶ First, let sufficient oil flow to flush the sampling hose.

▶ Get the oil sample in the mid-stream, i.e. first let a small amount of oil flow through the valve before sampling it.

Sampling material

▶ You can order LIEBHERR approved sampling material to get the samples:

5.7 Diesel engine

- ▶ Refer to the Diesel engine Liebherr operation and maintenance manual for detailed description of maintenance to be performed.
- ▶ In addition, accurately obey the items that follow and perform all maintenance work according to the intervals given in the control and maintenance chart.

5.7.1 Check the oil level of the Diesel engine

Danger!
The Diesel engine oil is hot when it is at operating temperature!
Risk of burning.

- ▶ Avoid contact with hot oil and components containing oil as it can cause dangerous burns.

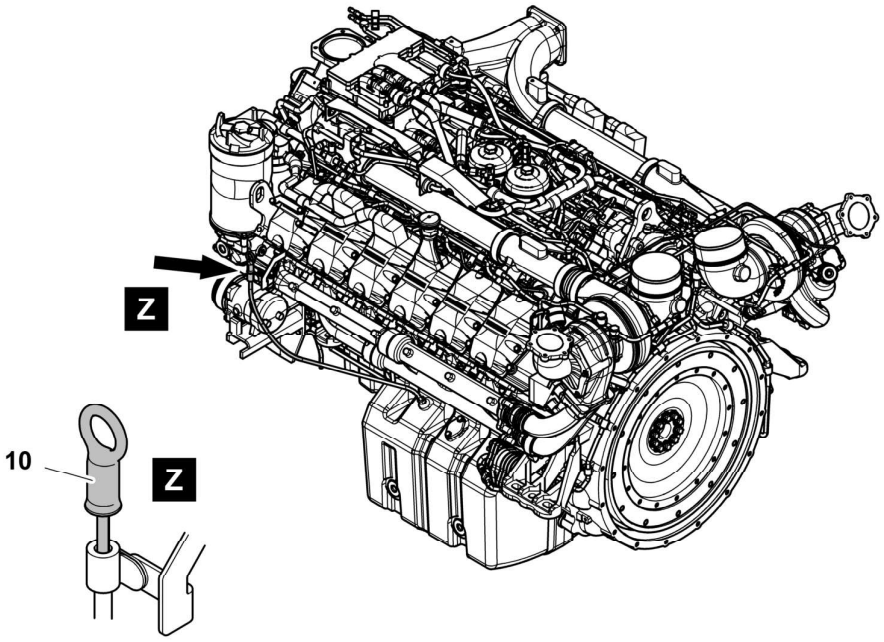

Fig. 5-24 *Dipstick*

10 Dipstick

- ▶ Park the machine on level ground.
- ▶ Make sure that the Diesel engine oil is at operating temperature.
- ▶ Stop the Diesel engine.
- ▶ Wait for 5 minutes.
- ▶ Check the oil level with the dipstick **10**.

5.8.2 Elastic bedding

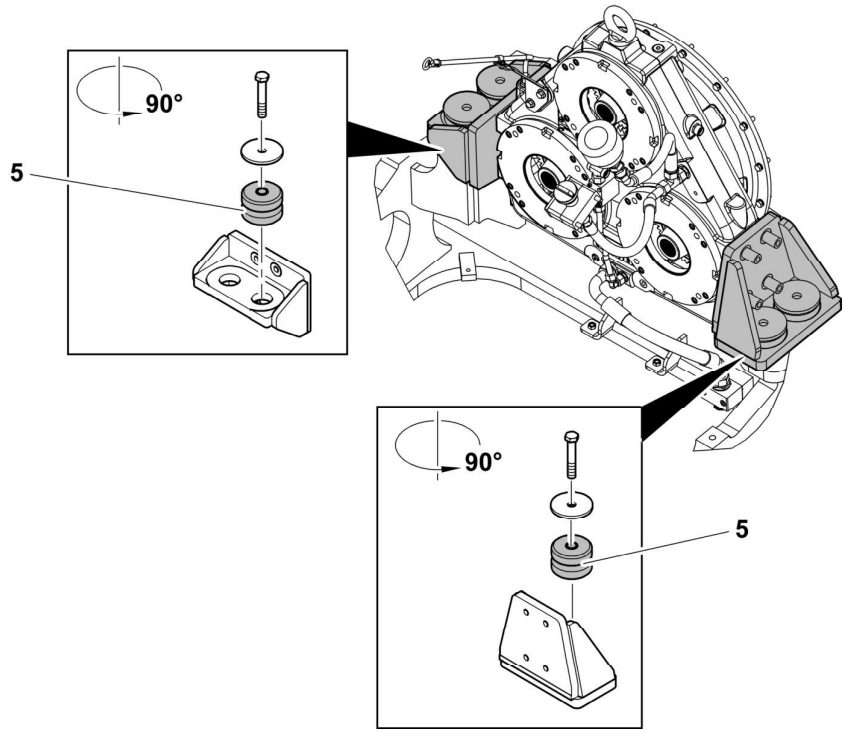

Fig. 5-34 *Splitterbox elastic bedding*

- ▶ The four rubber buffers **5** at the splitterbox side must be checked and replaced at regular intervals.
- ▶ For maintenance intervals, refer to control and maintenance chart.

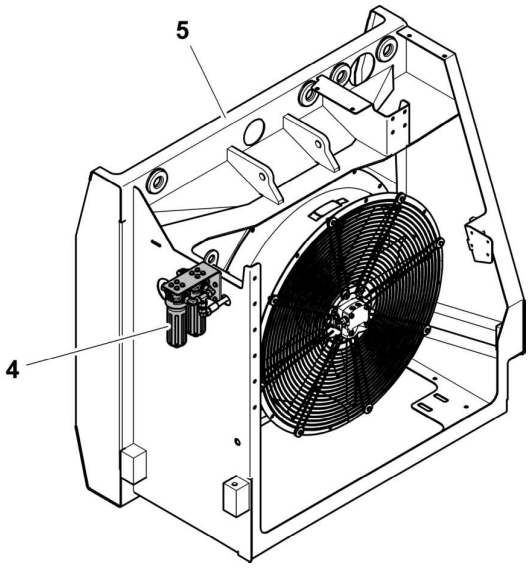

Fig. 5-44 *Fuel fine filters assembly*

4 Fuel fine filter
5 Engine cooler box

The fuel fine filters **5** are installed on the outer side of the engine cooler box **5**.

- ▶ Check the fuel prefilter **2** for water and debris each day.
- ▶ Drain the fuel-water separator on fuel prefilter **2** each day.
- ▶ For the replacement intervals of fuel prefilter and fuel fine filter, see control and maintenance chart.

Drain the fuel-water separator

The fuel-water separator is installed on the fuel prefilter.

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5.12 Pneumatic system

Compressed air is necessary to spray the Diesel Exhaust Fluid (DEF) into the exhaust gas.

5.12.1 Release the pressure from the pneumatic system

If necessary, you can isolate the Selective Catalytic Reduction (SCR) system from the compressed air supply.

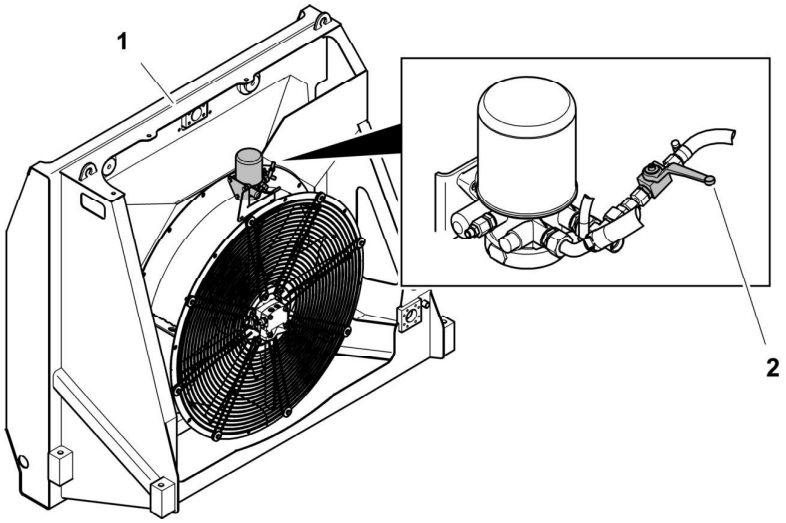

Fig. 5-54 *Manual valve*

1 Oil cooler box
2 Manual valve

The manual valve **2** is installed on the oil cooler box **1**.

▶ Open the manual valve **2** to release the pressure from the pneumatic system.

5.12.2 Air tank

Drain the air tank

Condensation in the air tank is automatically discharged through a drain valve when the pressure in the system decreases. But we recommend to also drain the air tank manually at regular intervals.

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5.13.5 Check the air intake system, hoses, elbow tubes, clamps

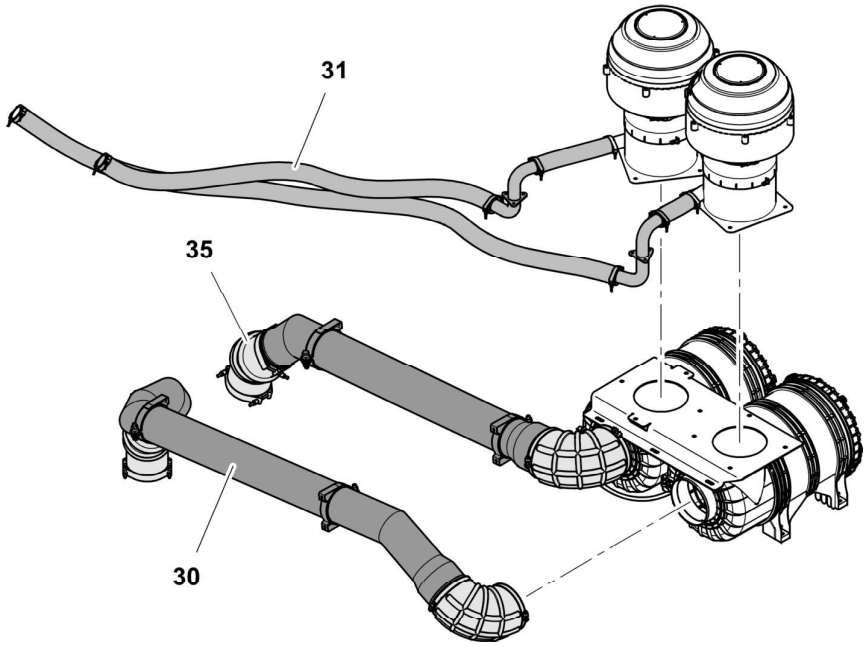

Fig. 5-65 *Air intake hoses, tubes and elbow tubes*

30 Tubes between the filters and the engine
31 Tubes between the precleaner and the exhaust system
35 Elbow tubes

The hoses and tubes **30**, **31** and the elbow tubes **35** between the filter housings and the engine must be checked for damage, wear, tightness and leaks when the filter elements are replaced.

- ▶ If necessary, retighten the screws on the clamps.
- ▶ Do a visual check of the air intake system at the intervals given in the control and maintenance chart.
- ▶ Do a sealing control of the air intake system at the intervals given in the control and maintenance chart.
- ▶ Do also a sealing control of the air intake system each time you replace a component of the air intake duct.
- ▶ Use the Liebherr special tool which is dedicated for this purpose to do the sealing control of the air intake system.

5.14 Hydraulic system

Maintenance work on the hydraulic system is restricted mainly to the hydraulic tank. All other units on the system do not require any special maintenance.

Strict cleanliness is of particular importance for the hydraulic system.

- ▶ Obey the intervals given to:

Replace the filter element

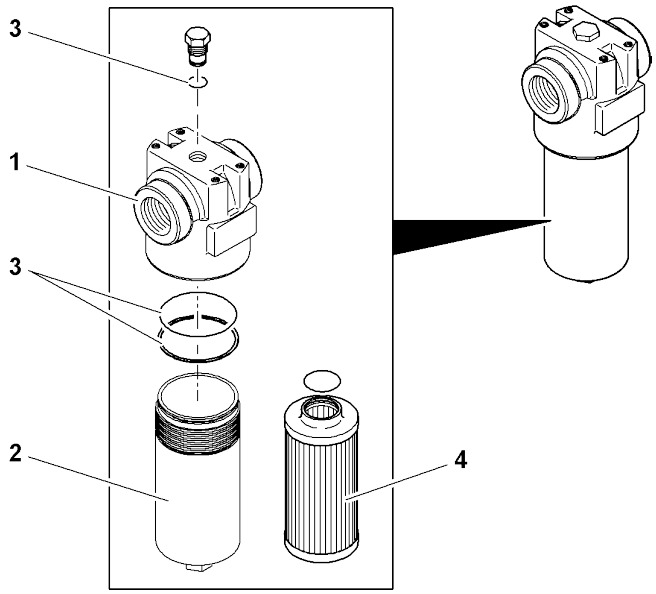

Fig. 5-73 *Piloting and replenishing oil filters parts*

1 Filter head
2 Filter housing
3 O-ring
4 Filter element

- ▶ Release the hydraulic pressure as given before.
- ▶ Make sure the filter head **1** and housing **2** are in good conditions.
- ▶ Make sure sealings and o-ring **3** are correctly installed.
- ▶ Lightly lubricate the threads of the filter housing **2**.
- ▶ Manually, fully tighten the filter housing **2** in the filter head **1**.
- ▶ Close the breather filter.

5.14.8 High pressure filters in working circuit

Three high pressure filters are installed on the inlet ports of the control valves.

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- ▶ Check condition of the seal ring **3** and change them if defective.
- ▶ Remove the used filter element **4**.
- ▶ Examine the inlet and the outlet in the filter housing **5**. Clean if necessary.
- ▶ Put a new filter element **4** vertically into the housing **5**.
- ▶ Install the seal ring **3** again.
- ▶ Install the cover **2** again.
- ▶ Tighten nuts **1** with stud screws **6**.

5.14.15 Oil cooler protection filters (optional equipment)

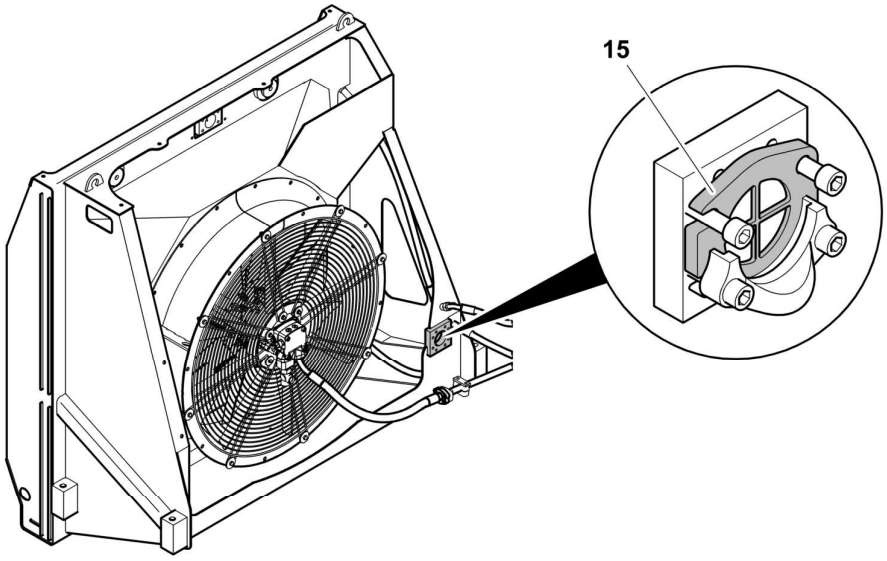

Fig. 5-84 *Oil cooler protection filter*

Protection filters **15** can be installed between the valve bank and the oil cooler in order to reduce the impact on the operating conditions of the excavator in case of possible hydraulic component failure.

- ▶ Check and clean filters regularly.
- ▶ Check filters in case of hydraulic component failure.
- ▶ Change filter in case of impact or mesh rupture.
- ▶ For maintenance intervals, see control and maintenance chart.

Caution!
If filters maintenance isn't correctly carried out, filters clogging due to regular operation of the excavator could lead to following risks:

– cooling capacity drop,
– negative impact on oil quality.

To check or change a filter:

❑ Shutoff valve between hydraulic tank and pumps must be closed.

5.15.3 Travel gear – Oil change

Caution!
The travel brakes (one for each travel gear) are filled with protective oil on delivery.

▶ Before the first start of the excavator, drain the travel brakes and fill it with the same oil as used to fill the hydraulic tank.

Danger!
When the oil is hot, the travel gear elements can be under pressure.

▶ Before you drain the oil, carefully loosen the oil filling plugs to release the internal pressure.

▶ For oil specifications and quantity, refer to the lubrication chart.

▶ For oil change intervals, refer to the control and maintenance chart.

Change the travel gear oil

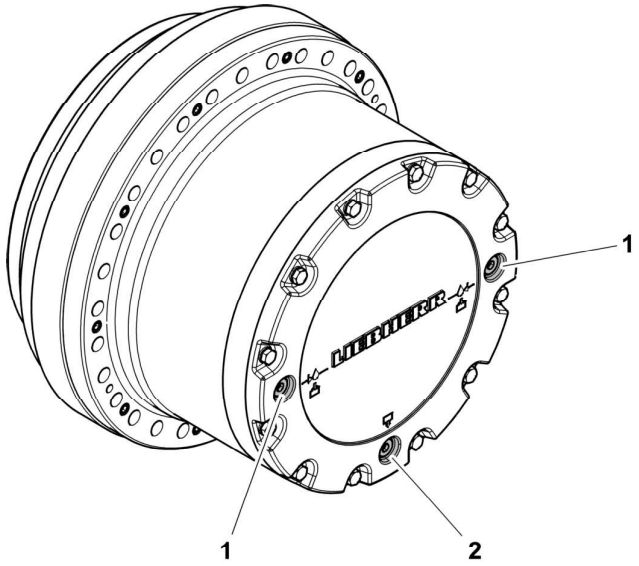

Fig. 5-94 *Oil change on travel gear*

1 Filling plugs and oil level
2 Drain plug

Each travel gear has:
– two filling plugs **1** to do a check of the oil level and add oil
– one drain plug **2**

Before you drain or fill the oil

▶ Move the excavator until the drain plug **2** is in vertical position below the gear axle.

Drain the oil

▶ Make sure that the oil is at operating temperature.

Fastening of travel motor protection

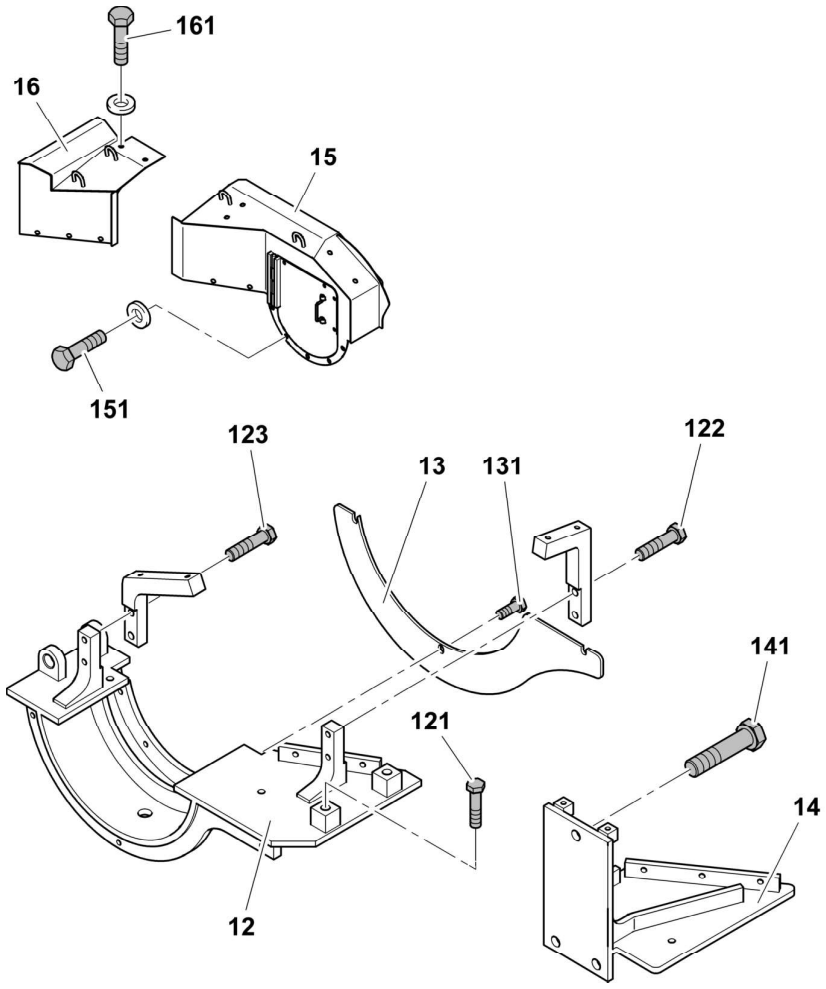

Fig. 5-105 *Fastening of travel motor protection*

		Torque
12	Support of travel motor protection **15**	-
13	Protection plate	-
14	Support of travel motor protection **16**	-
15	Travel motor protection	-
16	Travel motor protection	-
121	Screw M30x130 x quantity 2 for each side	1920 Nm
122	Screw M20x80 x quantity 2 for each side	560 Nm
123	Screw M20x80 x quantity 2 for each side	560 Nm
131	Screw M16x40 x quantity 3 for each side	270 Nm
141	Screw M30x130 x quantity 3 for each side	1920 Nm
151	Screw M16x40 x quantity 11 for each side	270 Nm
161	Screw M16x35 x quantity 5 for each side	270 Nm

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5.17.4 Electrical components location

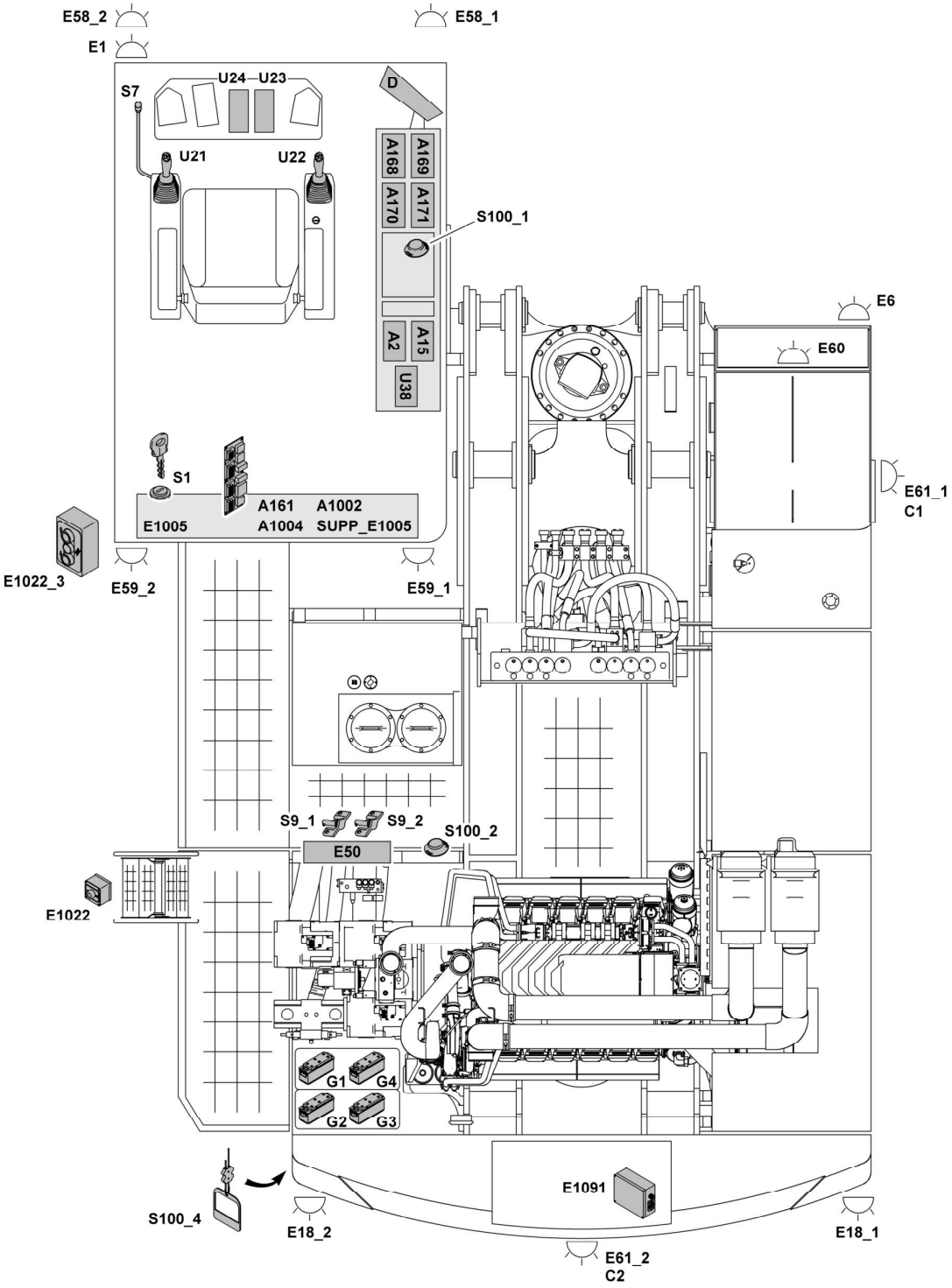

Fig. 5-114 *Electrical components location*

A2	Radio	**E61_2**	Camera lighting / Counter-weight
A15	Greasing module	**E50**	Electrical box

5.20.2 Lubrication of the integrated jacking system (if installed)

Manual lubrication

If the lubrication points that follow are installed on the machine, you must lubricate them manually.

▶ For maintenance intervals, refer to the control and maintenance chart.

▶ For grease specifications, refer to the lubricant chart.

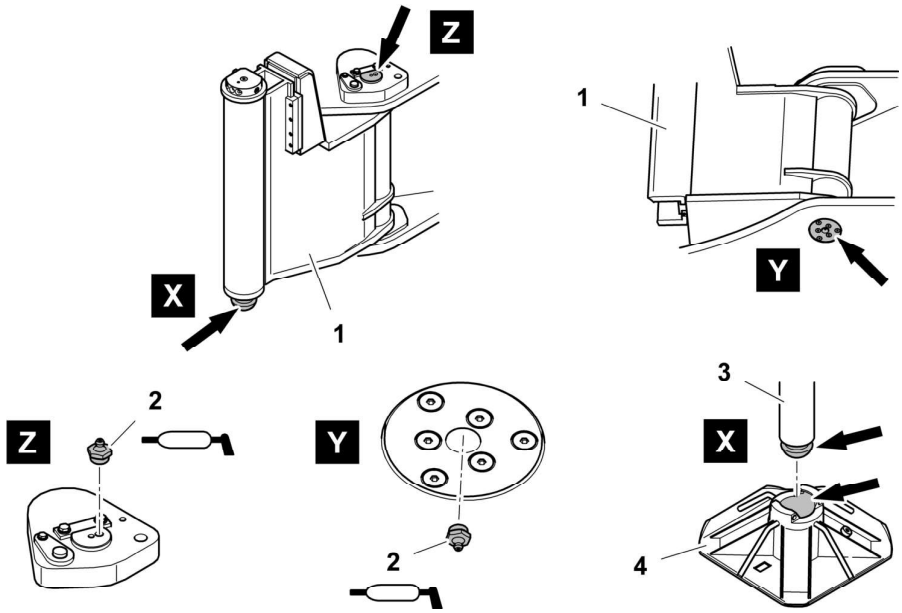

Fig. 5-125 *Lubricate the integrated jacking system*

1	Jack frame	**3**	Jack
2	Grease nipple M10x1k	**4**	Pad

▶ Use grease nipples **2.** Make sure that you use all the grease nipples.

In addition:

▶ Apply grease on the contact surfaces between jack **3** and pad **4.**

5.20.3 Lubrication of special tools (optional)

▶ Refer to the Operator's Manual of the special tool manufacturer for:

– detailed description of maintenance work to be performed on this device
– maintenance intervals
– grease specifications

5.21 Check mounting bolts for tightness

The mounting bolts listed below must be regularly checked and retightened if neces-

5.21.10 Mounting bolts of side frames

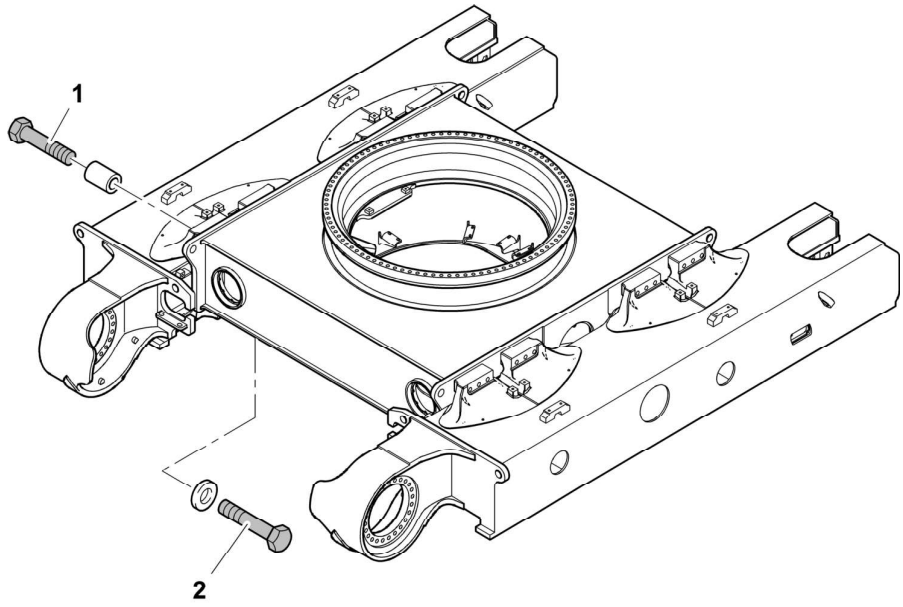

Fig. 5-135 Side frames bolts

		Torque	Quantity
1	Screw M39x260	4280 Nm	24 (2x12)
2	Screw M42x320	4810 Nm	12 (2x6)

▶ After a part replacement, grease bolts **1** and **2** with teeth grease.

5.22 Quick coupler (optional)

▶ Refer to the Operator's Manual of the quick coupler manufacturer for:
– detailed description of maintenance work to be performed on this device
– maintenance intervals

5.23 Drive unit brakes and swing gear brakes

Both the drive unit brakes and the swing gear brakes are spring-applied, pressure-released multi-plate brakes. They are ventilated hydraulically and are fully sealed and integrated in the travel gear or swing gear transmission.

Their usage purely as parking brakes makes them wear-free and therefore maintenance free.

WORK TO BE PERFORMED DAILY Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
Do a visual check of the vacuum indicators for air filters clogging, replace if necessary and reset the indicator	❍		
Check oil level in the splitterbox	❍		
Do a visual check of the splitterbox input shaft seal or engine main rear seal for leaks	❍		
Do a visual check of the starter motors, alternator and AC compressor for cables, and brackets	❍		
Do a visual check of the coolers for clogging and damage, clean or replace if necessary	❍		
Perform the complete "Daily" Maintenance Echelon given in the Diesel engine LIEBHERR Operation and Maintenance Manual	❍		
HYDRAULIC SYSTEM			
Check oil level in hydraulic tank	❍		
Clean magnetic rods of the leak oil filter (daily during the first 250 hours)	❑		
Clean magnetic rods of return-line filter for the hydraulic hammer (optional equipment, daily during the first 250 hours)	❑		
ELECTRICAL SYSTEM			
Press to open dust discharge valve on aeration devices for cabin and electrical boxes (optional equipment)	❍		
FIRE FIGHTING SYSTEM			
Do a visual check of the fire fighting system condition (optional equipment, refer to the fire fighting system documentation) - If any issue contact the fire fighting local dealer	❍		
Follow the inspection intervals recommended by the specific Health and Safety rules existing in country and/or on mine site	❍		
START THE ENGINE TO CHECK THE FOLLOWING ACTIONS			
General: Maintenance work must include the check of the correct functions of hydraulic and electric systems before starting operation	❍		
Attachment: Check function of the working attachment lubrication system during operation	❍		
Attachment: Check if the damping system on equipment is working correctly	❍		
Uppercarriage: Check position of the hydraulic shut-off valve	❍		
Uppercarriage: Check that the swing movement of the uppercarriage is locked when the access ladder is lowered (optional equipment)	❍		
Swing gear: Check function and operation of the swing brake	❍		

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WORK TO BE PERFORMED AT 500, 1500, 2500 HOURS, ... Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
Replace filter elements of bypass filter (optional equipment)	❑		
ELECTRICAL SYSTEM			
Press to open dust discharge valve on aeration devices for cabin and electrical boxes (optional equipment)	❍		
Replace main element on aeration devices for cabin and electrical boxes (at least once a year) (optional equipment)	❍		
Replace safety element on aeration devices for cabin and electrical boxes, after 3 services of main element (optional equipment)	❍		
Do a visual check of the head and floodlights, clean and adjust if necessary	❍		
Do a visual check of electric harness, sensors for damage and/or rubbing zone	❍		
Do a detailed check of fuses and circuit breakers	❍		
Do a visual check of wiring system damage	❍		
Check battery electrolyte level (refill if necessary) and clean battery terminals	❍		
AIR PRESSURE SYSTEM			
Drain air tanks	❍		
Replace filter cartridge of the compressor of the Diesel Exhaust Fluid (DEF) system	❍		
CABIN			
Do a detailed check of the V-belt tension for air conditioner	❍		
Do a visual check of the cabin for oil/fluids leaks	❍		
Operate air conditioner every week for 10 minutes	❍		
Check the condition of the condenser, blow it out if necessary	❍		
Do a visual check of the fresh air filter and the recirculated air filter	❍		
Do a visual check of the dryer / accumulator unit for moisture degree, coolant level and good condition, replace if necessary (at least once a year)	❍		
The function of the air flaps and the defrosting thermostat must be checked yearly by a refrigeration specialist	❍		
Perform maintenance for the second air-conditioning system (optional equipment)	❍		
Lubricate all doors seals with silicone or talc (before cold season)	❍		
Do a visual check of the AC for leaks or rubbing hoses or pipes	❍		
FIRE FIGHTING SYSTEM			

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WORK TO BE PERFORMED AT 1000, 3000, 5000 HOURS, ... Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
Cabin: Check if the safety lever is working properly	❍		
Cabin: Check the horn	❍		
Cabin: Check for green flash light on control module if fire fighting system is installed	❍		
Cabin: Check the heater function (before the cold season)	❍		

WORK TO BE PERFORMED AT 2000, 4000, 6000 HOURS, ... Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
Attachment: Check if the damping system on equipment is working correctly	❍		
Uppercarriage: Check position of the hydraulic shut-off valve	❍		
Uppercarriage: Check movement and locking of the access ladder (optional equipment)	❍		
Uppercarriage: Check that the swing movement of the uppercarriage is locked when the access ladder is lowered (optional equipment)	❍		
Swing gear: Check function and operation of the swing brake	❍		
Swing ring: Check function of the swing ring bearing lubrication system during operation	❍		
Swing ring: Check function of the swing ring teeth lubrication system during operation	❍		
Diesel engine: Check speed on RPM gauge	❍		
Diesel engine: Check running noises	❍		
Diesel engine: Check exhaust gas colour	❍		
Diesel engine: Check oil pressure and coolant temperature during operation	❍		
Electrical system: Clean and check LCD screen of the display for proper function when starting	❍		
Electrical system: Check indicator lights and gauges on the control panel when starting	❍		
Electrical system: Check for warning and fault messages on display (monitoring, grease, air conditioning, ...). If necessary refer to chapter 4 in the Operating Manual to identify and rectify faults and errors.	❍		
Cabin: Check if the safety lever is working properly	❍		
Cabin: Check the horn	❍		
Cabin: Check for green flash light on control module if fire fighting system is installed	❍		
Cabin: Check the heater function (before the cold season)	❍		
Cabin: Check the pressure switch function on the dryer / accumulator unit	❍		

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6.2 Cleaning procedure for hydraulic circuits

This section gives the procedures to drain and clean the different hydraulic circuits of the machine after a repair and before you put the machine back in operation.

6.2.1 Preface

Note!
These instructions have been written for the **maintenance personnel** of the machine.
The activities described in this section may only be carried out by specially trained personnel.

The instructions are to be read and used carefully by all persons who carry out work with or on the machine before putting the machine into service for the first time and later, at regular intervals or after a repair.

The instructions must be completed by information on current national regulations for accident prevention and protection. In addition, authorized specialist rules for safe and correct working procedures are also to be observed.

However, should you require any further explanations or information, LIEBHERR technical documentation, sales school and customer service departments are available for your convenience.

Danger!
Fluid injection injuries have to be treated immediately!

- Fluid under pressure can cause serious injury. It can be almost invisible when it escapes from a pinhole and it can go through the skin and contaminate the blood.
- Do not touch a pressurized hydraulic hose assembly with any part of your body.
- If a fluid-injection accident occurs, medical treatment is necessary immediately.
- Stay out of hazardous areas while testing hose assemblies under pressure. Use available safety protection.
- Refer to "Isolate machine for hydraulic repair" safe work procedure in the Service Manual.

6.2.2 General information about hydraulic oil contamination

Hydraulic oil contamination

Hydraulic oil contamination is unwanted liquid or solid material and/or particles in the hydraulic circuit. It can be caused by:

- The failure of components like pumps, hydraulic motors or cylinders
- Too much wear of a component
- Material/particles introduced during:
  - The general maintenance
  - A repair work
- Hydraulic circuit not cleaned on previous maintenance work (too much remaining contamination in the hoses and pipes).

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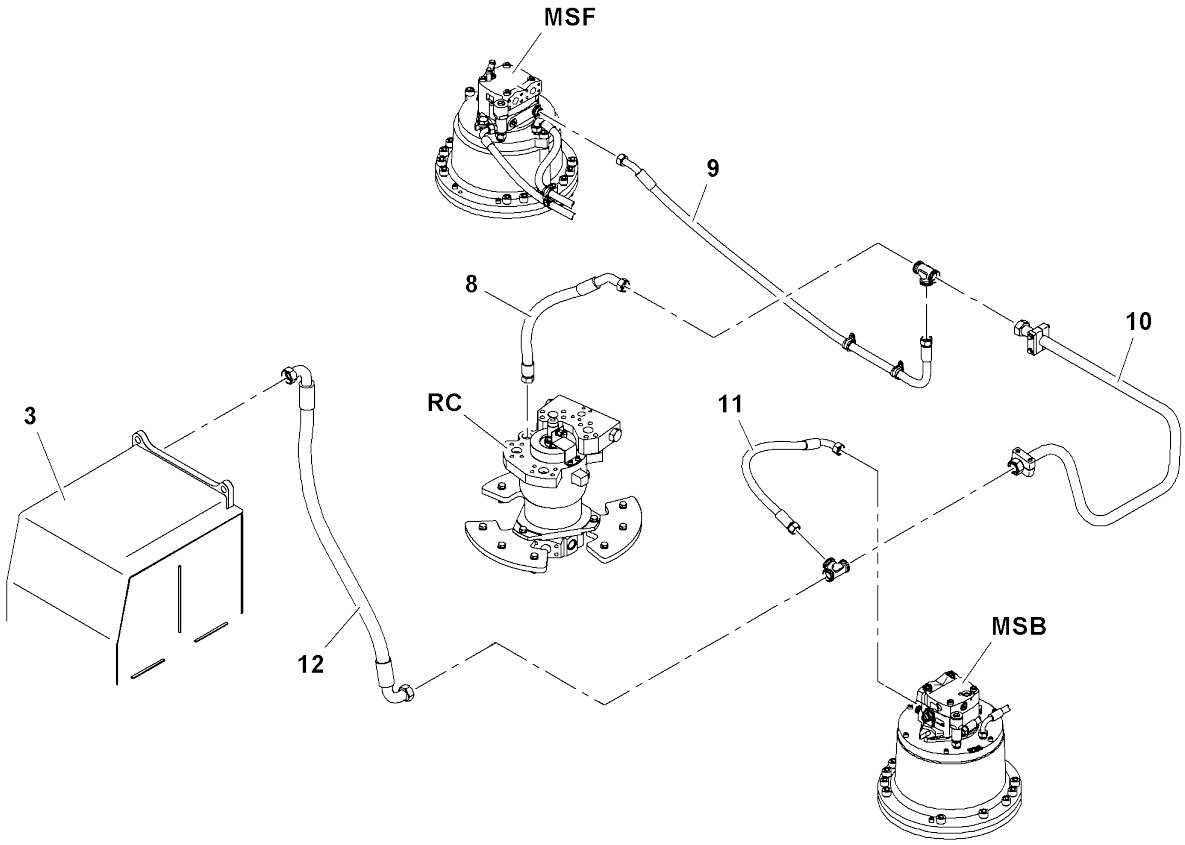

Fig. 6-14 *Leak oil hoses of swing motors*

3	Hydraulic tank	**12**	Hydraulic hose
8	Hydraulic hose	**MSB**	Rear right swing motor
9	Hydraulic hose	**MSF**	Front right swing motor
10	Hydraulic pipe	**RC**	Rotary connection
11	Hydraulic hose		

▶ Disconnect, drain and clean all the hydraulic hoses and the hydraulic pipe.

▶ Move to next section about the working pressure circuit.

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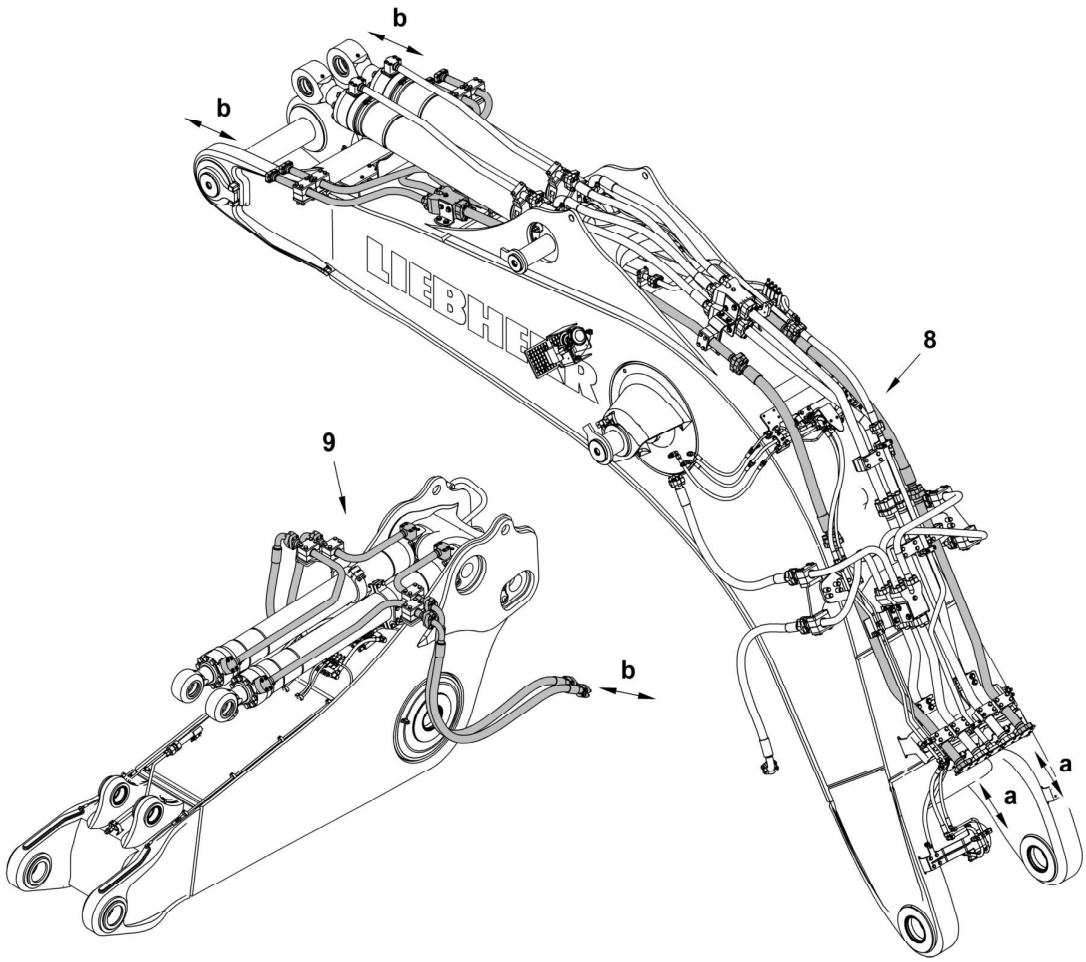

Fig. 6-25 *Hydraulic lines on the attachment*

8 Hydraulic lines installed on the boom

9 Hydraulic lines installed on the bucket cylinders

▶ Disconnect, drain and clean all the hydraulic hoses, pipes and distribution blocks.

▶ Do the restart procedure before you put the machine in operation (refer to the related section).

Crowd cylinder circuit

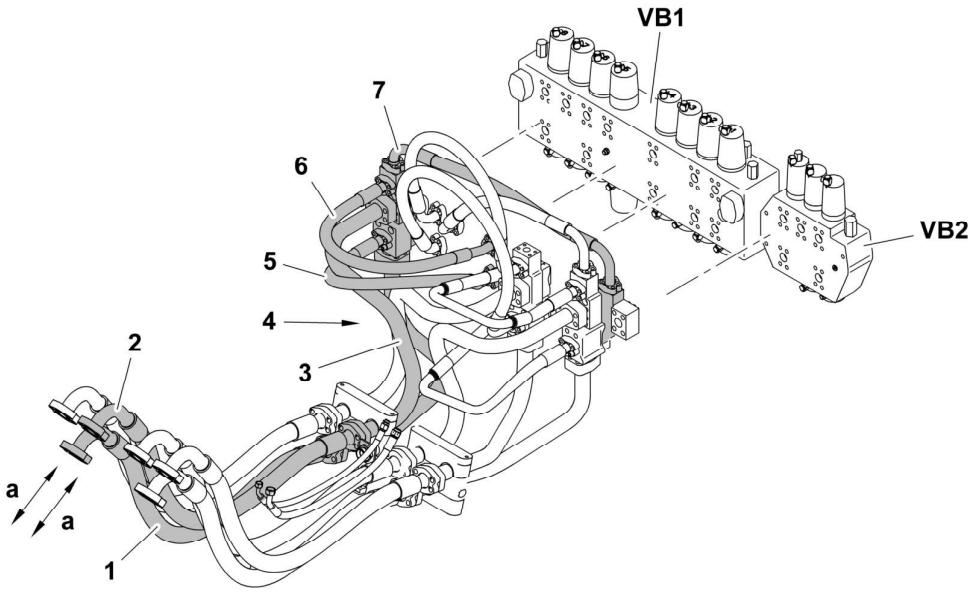

Fig. 6-35 *Hydraulic lines on the uppercarriage*

1	Hydraulic hose	**6**	Hydraulic hose
2	Hydraulic hose	**7**	Hydraulic hose
3	Hydraulic pipe	**VB1**	Valve block 1
4	Hydraulic pipe	**VB2**	Valve block 2
5	Hydraulic hose		

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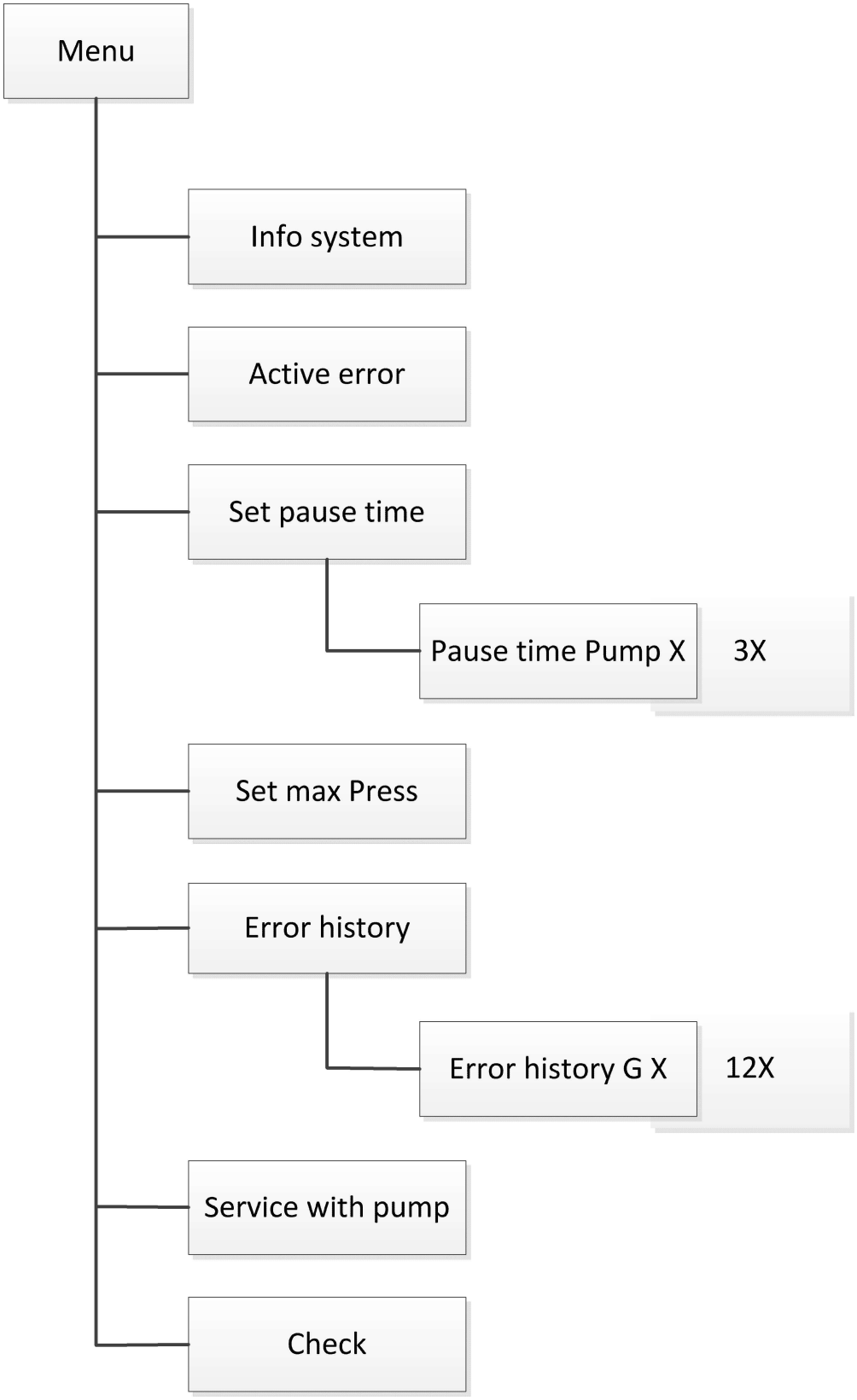
4. Architecture of Menus



Symbol	Meaning
	**General warning** Activities which generate actual hazards (to life and limb or possible damage to the material)
	**Warning of suspended load**
	**Risk of explosion** Carry out work on electrical parts only if the atmosphere is not potentially explosive. Work has to be carried out by a specialist for maintenance and repairs in potentially explosive atmospheres.
	**Electrical component hazard, electrical shock hazard** Make sure to disconnect the system or component from the power supply before carrying out works on electrical parts. Do not use steam jet or high pressure cleaners for cleaning. Otherwise electrical components may be damaged. Do not touch cables or electrical components with wet or damp hands. Cleaning work on energized components may be carried out by electrical specialists only.
	**Risk of fire** Risk of fire and explosion when using inflammable cleaning agents.
	**Health hazard** Hazard due to spouting lubricant / pressure injection due to a leakage (defective fitting, too high system pressure or other damages).
	**Crushing hazard**
	**Slipping hazard**
	**Hot surfaces**
Symbol	**Meaning**
	**Disposal** Environmentally sound disposal and recycling

Fault lifecycle	
Lubricant spraying out due to incorrect screw connection of components or lines.	Tighten all parts with appropriate tightening torques. Use suitable hydraulic screw connections and lines for the stated pressures. Check these prior to commissioning for correct connection and damage.

Disposal lifecycle	
Contamination of the environment with lubricant and wetted parts	Dispose of the parts following the valid legal and company regulations.
People slipping due to floor contamination with spilled or leaked lubricant.	Exercise caution when disconnecting the lines. Promptly apply suitable binding agents to remove the leaked or spilled lubricant. Follow the operational instructions for handling lubricants and contaminated parts.
Contamination of the environment due to used batteries on control printed circuit boards	Dispose of used batteries following the valid legal and company regulations. Until disposal, store used battery, e.g. in a closed polyethylene bag , in order to avoid any damages.

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5.1 Filling of the reservoir

WARNING

Risk of hand injuries caused by the stirring paddle or shovel foot

- Never reach into the reservoir or grease barrel while the pump is running.

- Lines are pressurized. Be careful when decoupling.
- Observe extreme cleanliness when topping up the grease reservoirs.
- Contaminated lubricant causes malfunctions and premature wear of the grease pump and other components of the system.
- Clean surroundings before exchanging or topping up
- Switch off centralized lubrication system
- Remove dust protective cap at the filling coupling and the dust protective cap at the filling nipple
- Couple the filling hose for P1 resp. P2 and switch on the filling pump
- When the reservoir is full, the sensor transmits an electric signal to the control unit. Visual control is possible by using the dipstick
- When the filling pump is switched off
  Disconnect the filling coupling and reinstall the dust protective caps

5.2 Inadvertent filling with incorrect lubricant

Should incorrect lubricant have been filled, please proceed as follows:

- Switch off the pump or centralized lubrication system and secure it against being switched on.
- Remove lubricant.
- Clean the entire centralized lubrication system (lubricant reservoir, pump housing, metering devices and line systems).
- Fill in lubricant of correct specification.
- Switch the system or pump on.
- Vent lubrication system.
- Inform your superior to ensure that the error won't occur again.

5.3 Inspections prior to initial start-up

ATTENTION

Risk of damage to the machine

Fill the feed lines and bearing housings with lubricant to specification and lubricate the lubrication points by hand. Otherwise the bearing points may become damaged due to a lack of lubricant.

Check the entire system for accordance with the intended purpose and the planning documentation. Ensure that all parameters, characteristic values and means of operation are present and have been correctly adjusted. If deviations are detected, they must be remedied without delay.

In order to warrant safety and function, a person assigned by the operator must inspect certain areas of the central lubrication system prior to initial commissioning. Report any detected deficiencies immediately to your superior and remedy them. Deficiencies may be remedied by an authorized and qualified specialist only.

T	Running time for one lubrication cycle
Y95	Pump
Y79	Dump valve
B69	Grease Pressure
A	Cycle ends with max pressure after hold time
B	Closed
C	Open
E	Max pressure – 40 bar
F	Max pressure
G	Hold time #1
H	Hold time #2
I	Continuous pumping (S144 On)

Fig. 6 Cycle: Equipment and uppercarriage

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10.2 System P1: Automatic lubrication

	**CAUTION!**
	Operation by authorized and instructed personnel only! Never exceed the admissible system pressures! Refill clean lubricant on time!

	**CAUTION!**
	Do not interrupt the power supply (main switch of battery) while the pump is operating.

When starting the excavator, the centralized lubrication systems are connected to the power supply automatically. Each lubrication pump then starts a full lubrication cycle and is stopped during the preset pause time only, etc.

The pump P1 delivers lubricant via a single-line system to the lubrication points according to Chapter 9.2 Configuration.

Regarding the control and monitoring of the system refer to: Chapter 9.2. Cabin greasing module U4-1 or Electronic Controller

If required, the operator can force the greasing cycle: for details refer to the respective data sheets.

See the characteristics of each lubrication points: Characteristics of lubrication points on the excavator.

For more details:

- Chapter 9.2 Greasing cycle