en **Operating manual**

Wheel loader

L 538-433

From serial number 23816

Document ID

	ORIGINAL OPERATING MANUAL
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Contents

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1.2 Technical data

1.2.1 Information on vibrations

Hand, arm and whole-body vibrations

The driver's seat installed in the machine by the manufacturer complies with ISO 7096:2000, EM3 for wheel loaders. If the seat is replaced, the new seat must also comply with this standard.

Hand/arm vibrations

When the machine is correctly operated, the weighted (frequency-evaluated) effective value for hand/arm vibrations as per ISO 5349-1:2001 is less than 2.5 m/s^2.

Whole-body vibrations

When the machine is correctly operated, weighted (frequency-evaluated) effective values for certain example applications of the machine can be seen in the tables listed below. These values are based on the information in the technical report ISO/TR 25398:2006 “Earth-moving machinery - Guidelines for assessment of exposure to whole-body vibration of ride-on machines - Use of harmonized data measured by international institutes, organizations and manufacturers”. The measuring method corresponds to ISO 2631-1:1997. The listed effective values for typical machines are given with standard deviations. These deviations are classified according to light, normal and heavy-duty operating conditions. The operator must classify the operating conditions according to the terrain, site conditions, site organisation, material, machine equipment, mode of operation and expertise of the driver.

Because the stated values are individual effective values for certain common applications, it is only possible to approximately assess the driver's exposure to vibrations. Therefore, in order to precisely assess the driver's exposure to vibrations during an 8-hour working day, use the Liebherr brochure on whole-body vibrations and the special software. Both of these are available from Liebherr dealers or with the documentation CD (Liebherr Parts) supplied with each new machine.

(For more information see: 2.4.19 Protection against vibrations, page 60)

Machine type	Typical working cycles	Weighted effective value in m/s^2 under light, normal and heavy-duty operating conditions								
		x axis			y axis			z axis		
		Light	Normal	Heavy	Light	Normal	Heavy	Light	Normal	Heavy
Wheel loader	Load & Carry	0.44	0.60	0.76	0.44	0.58	0.72	0.38	0.52	0.66
	Transfer	0.31	0.54	0.78	0.40	0.65	0.90	0.32	0.49	0.66
	V mode	0.50	0.71	0.91	0.37	0.60	0.83	0.40	0.54	0.68
	Mining	0.57	0.91	1.24	0.47	0.69	0.91	0.34	0.81	1.28

Tab. 1: The measuring uncertainty is defined in the EN 12096:1997 standard.

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Note
Failure to do this can damage the drive system.

▶ (For more information see: 2.4.18 Attachments and accessories, page 60)

1.2.20 Tyres with foam

This equipment is optional.

When tyres with foam are used, they must be attached to all four wheels.

If the tyres are filled with foam, the ballast needs to be modified. (For more information see: 1.2.17 Ballast, page 28)

Note
Installing or changing the working attachment or tyres.

▶ (For more information see: 2.4.18 Attachments and accessories, page 60)

1.2.21 Complete machine with Z kinematics

bpik0039 

The values stated refer to the machine:

- In its standard version
- With Michelin 20.5R25 XHA2 tyres
- Including all lubricants
- With a full tank
- With ROPS/FOPS cab and driver

Tyre sizes and additional attachments affect the operating weight and tipping load.

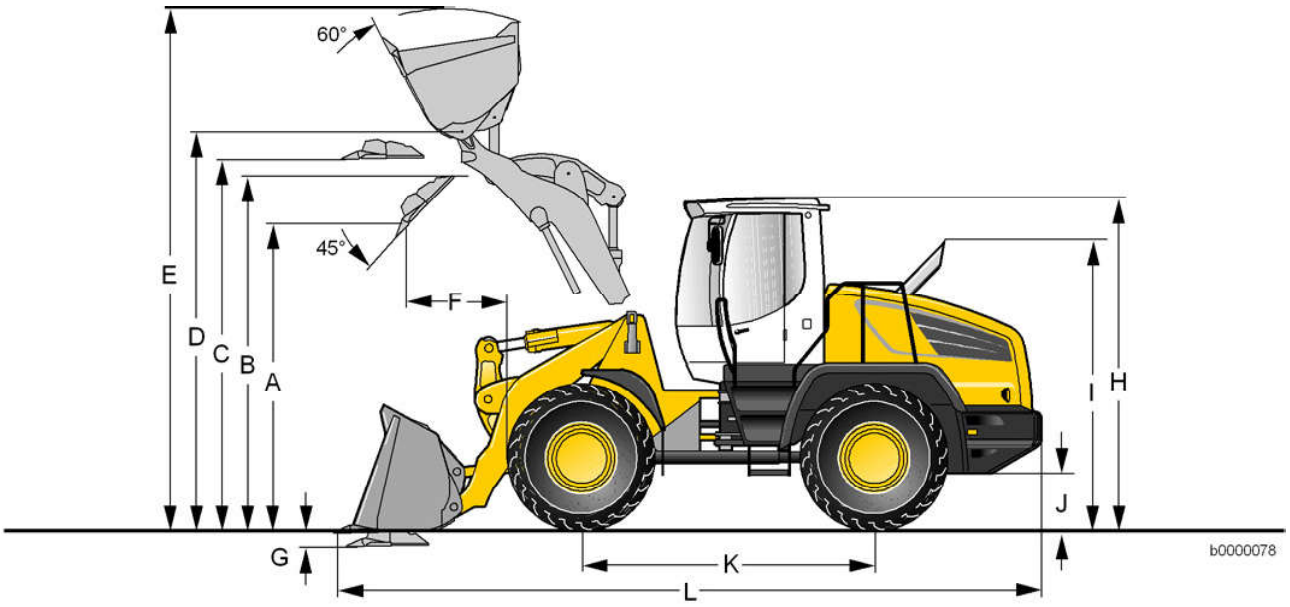

Fig. 20: Complete machine with Z kinematics

	Description	Unit	Value		
	Hydraulic quick-change device		No	Yes	Yes

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Safety belt sign

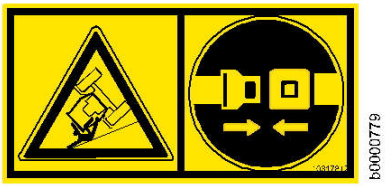

Fig. 37: Safety belt sign

Warns of the risk of accidents, possibly resulting in severe or even fatal injuries.

Meaning: **Fasten your safety belt before starting the machine.**

Coolant sign

Fig. 38: Coolant sign

Warns of the risk of scalding and severe injuries caused by spraying coolant.

Meaning: **Only open the filler cap on the filler neck once the engine has cooled down.**

Stationary engine sign

Fig. 39: Stationary engine sign

Warns of the risk of accidents, possibly resulting in severe injuries.

Meaning: **Only open when the engine is shut down**

Voltage sign

Fig. 40: Voltage sign

Refers to the battery main switch.

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Objects which fall or project into the fan will be thrown back out or destroyed and could damage the fan.

5. When the machine is near operating temperature, the engine cooler system is hot and pressurised.
   Do not touch parts carrying cooling water.
   This can lead to burns.
6. Only check the coolant level once the cap on the expansion tank has cooled down enough to touch.
   Carefully open the cap to let out excess pressure.
7. When running at or near the operating temperature, the engine oil and hydraulic oil are hot.
   Avoid touching hot oil or parts which carry oil.
8. Wear goggles and safety gloves when working on the battery.
   Avoid sparks and naked lights.
9. Never let anyone move the bucket or other working attachments into position by hand.
10. Any time you open the engine compartment, prevent the compartment doors from falling shut using the struts provided.
11. Before starting up the machine, close and lock the engine compartment doors and the battery compartment cover.
12. Never lie under the machine when it is raised using the working attachment, unless the undercarriage is securely supported using wooden beams.
13. Avoid touching hot surfaces and liquids. This can lead to burns.

2.4.3 Instructions on preventing fires and explosions

1. When refuelling, the engine must be turned off. Switch off the auxiliary heater, if installed.
2. Do not smoke. Avoid naked flames when refuelling or where batteries are being recharged.
3. Always follow the instructions in the **“operating manual”** when starting the engine.
4. Check the electrical system.
   Immediately eliminate all faults such as loose connections, worn cables or burnt out fuses and bulbs.
5. Do not carry combustible fluids on the machine outside the tanks provided.
6. Regularly check all lines, hoses and bolted connections for leaks and damage.
7. Repair the leaks immediately and replace the damaged components.
   Oil escaping from leaks can easily cause fires.
8. Make sure that all brackets and protective plates are properly installed to prevent vibrations, abrasion and heat build-up.
9. Starting agent (ether) is a particularly dangerous fire hazard.
   Never use ether starting agent near head sources, naked lights (such as cigarettes) or in poorly ventilated spaces.
10. Do not use starting agents containing ethers to start diesel engines with preglow or flame glow systems.
    Otherwise there is a risk of **“Explosion”** !
11. Familiarise yourself with the location and use of fire extinguishers and find out about fire alarm and firefighting facilities on site.

2.4.4 Safety instructions for start-up

1. Each time you start up the machine, make a thorough tour of inspection.
2. Check the machine for loose bolts, cracks, wear, leaks and deliberate damage.
3. Never start up a damaged machine.

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2. The amount of vibration depends to a large extent on the machine operator, because he determines the speed, gear ratio, working methods and distance covered.
   This results in a wide range of different vibrations for the same type of machine.
3. The machine operator can reduce overall vibration by following these recommendations:
   - Select a suitable machine, equipment and accessories for the job.
   - Use a machine equipped with a suitable seat (i.e. for earthworking machines, a seat which complies with EN ISO 7096).
   - Keep the seat in good repair and adjust the position and cushioning according to the height and weight of the driver.
   - Regularly check the suspension and adjustment mechanisms of the seat and make sure the seat is kept in the condition specified by the manufacturer.
   - Check the service condition of the machine, especially the tyre pressure, brakes, steering, mechanical connections etc.
   - Do not steer, brake, accelerate, shift gears or load the working attachment of the machine suddenly.
   - Adjust the speed of the machine to the distance to be driven in order to reduce vibrations.
     Slow down when driving over difficult terrain.
     Drive around obstacles and avoid difficult terrain.
   - Keep the area on which the machine is operated in a tidy condition.
     Remove any large rocks and obstacles.
     Fill in any trenches or holes.
     Have machines available to maintain good terrain and plan sufficient time to do so.
   - Travel over longer distances (e.g. public roads) at a suitable (medium) speed.
   - For machines which are often driven on open roads, use a special additional system (if available) to reduce vibrations during this type of use.
     If such systems are not available, control your speed to stop the machine from shaking.

2.4.20 See and be seen

Field of view

As a machine driver, you gain most of your information visually when working. To minimise risks to yourself and others while travelling and working, you must have adequate vision. Use the visual aids attached to the machine, such as mirrors and cameras. Take account of restrictions to your field of vision or blind spots.

You must follow national regulations relating to vision from the cab. For countries in the European Economic Area, standard ISO 5006:2006 describes the methods for measuring and evaluating the machine driver's field of vision. The field of vision is tested using standard equipment. Changes to the machine, e.g. from attaching or converting components, must not impair the driver's vision. If changes worsen the field of view, a test according to ISO 5006:2006, or the regulations applicable to the place of work, must be performed. Depending on the test result, appropriate measures must be taken. The machine driver must be informed of these changes.

Measures before and during operation

- Ensure that persons establish contact with the machine driver before approaching the machine.

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– The vibration acceleration values (a_{ZW}), are measured in accordance with ISO 2631, Part 1, and thus meet the standards for protection against overall body vibrations in EN 474-1.

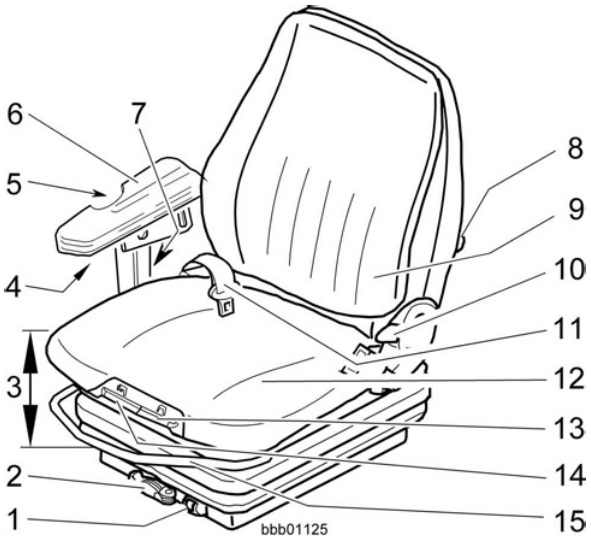

Fig. 72: Main components and adjustable elements of the driver' seat

1	Weight indicator	**9**	Back rest
2	Body weight adjustment knob	**10**	Lever for back rest inclination adjustment
3	Seat height adjuster	**11**	Seat belt
4	Locking screw for arm rest horizontal adjustment	**12**	Seat surface
5	Locking screw for arm rest inclination adjustment	**13**	Lever for seat surface inclination adjustment
6	Arm rest	**14**	Lever for seat surface horizontal adjustment
7	Locking screw for arm rest height adjustment	**15**	Lever for driver's seat horizontal adjustment
8	Lumbar support knob		

Adjusting the driver's seat

The seat can be adjusted to the driver's individual requirements to provide the highest possible degree of comfort.

WARNING
There is a risk of injuries if the driver's seat is not properly adjusted.

▶ Never adjust the driver's seat when the vehicle is moving.

Adjusting the body weight

The seat suspension can be adjusted to the driver's individual body weight.

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3.2.8 Driver's seat with active suspension

This equipment is optional.

The ergonomically designed driver's seat offers a high degree of comfort.

The adjustable seat surface, back rest, suspension and arm rest mean that the driver can adjust the seat for maximum individual comfort.

Shock absorption:
- The seat installed in the machine complies with ISO 7096.
- When the machine is used correctly, the vibrations transmitted by the driver's seat are less than or equal to the vibrations simulated in test conditions for the corresponding machine class in accordance with ISO 7096 class EM3.
- The vibration acceleration values (a_{zw}) are measured in accordance with ISO 2631, Part 1, and thus meet the standards for protection against overall body vibrations in EN 474-1.

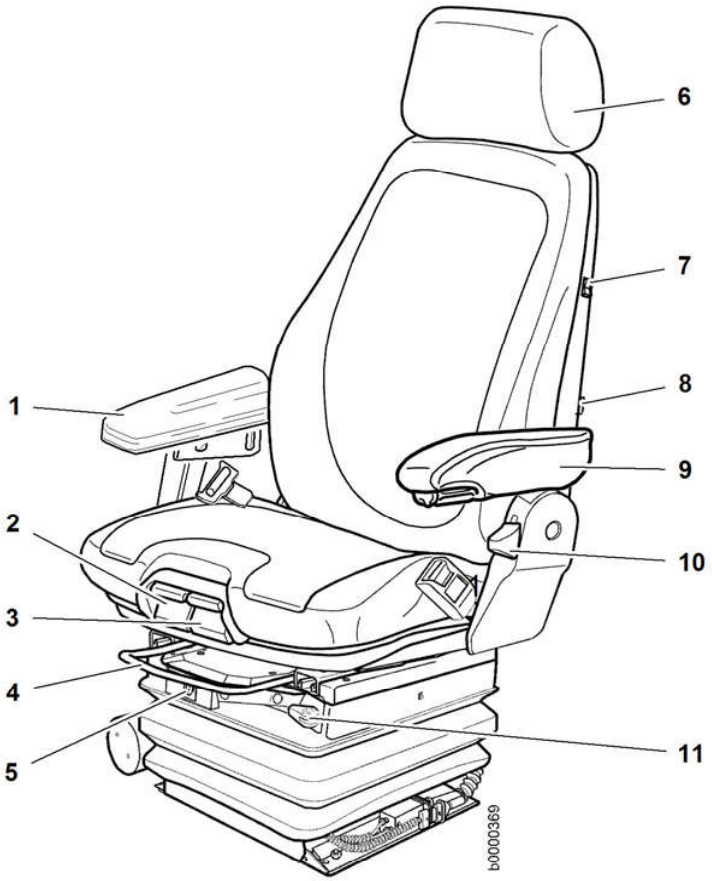

Fig. 93: Main components and adjustable elements of the driver's seat

1	Right arm rest	**7**	Seat heating and climate control switch
2	Lever for seat surface horizontal adjustment	**8**	Lumbar support adjustment switch
3	Lever for seat surface inclination adjustment	**9**	Left arm rest (optional)
4	Adjusting the driver's seat horizontally	**10**	Lever for back rest inclination adjustment

See next page for continuation of the image legend

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Adjusting the distance from the steering wheel to your body

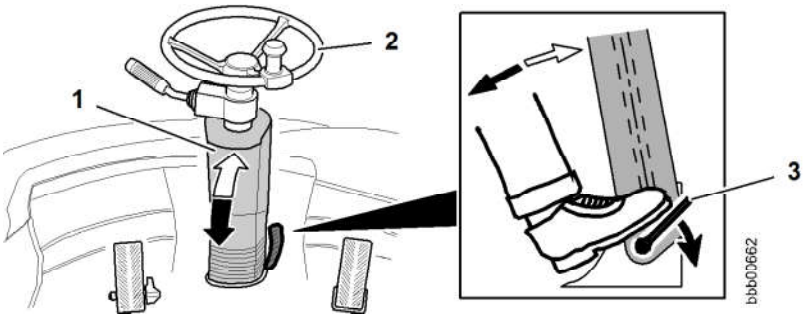

Fig. 109: Adjusting the distance from the steering wheel to your body

1 Steering column
2 Steering wheel
3 Lever

▶ Press down the lever **3** with your foot in the direction of the arrow.
▷ The steering column **1** is unlocked.

▶ Adjust the distance from the steering wheel to the driver's body.

▶ Let go of the lever **3**.
▷ The steering column **1** is locked.

Adjusting the height of the steering wheel

This equipment is optional.

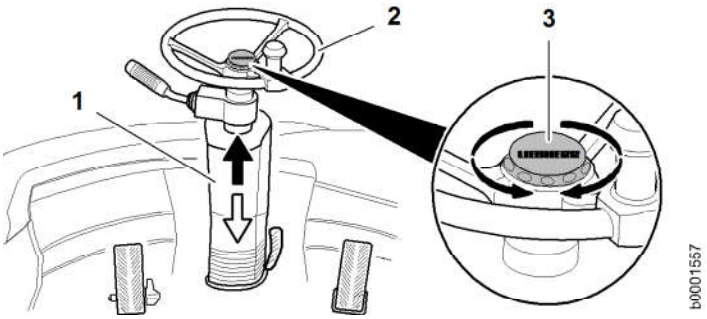

Fig. 110: Adjusting the height of the steering wheel

1 Steering column
2 Steering wheel
3 Steering wheel hub

▶ Loosen the steering wheel hub **3**.
▷ The steering column **1** is unlocked.

▶ Adjust the height of the steering wheel as required.

▶ Tighten the steering wheel hub **3**.
▷ The steering column **1** is locked.

3.2.11 Control panel

The control panel is mounted on the cab floor to the right of the driver's seat.

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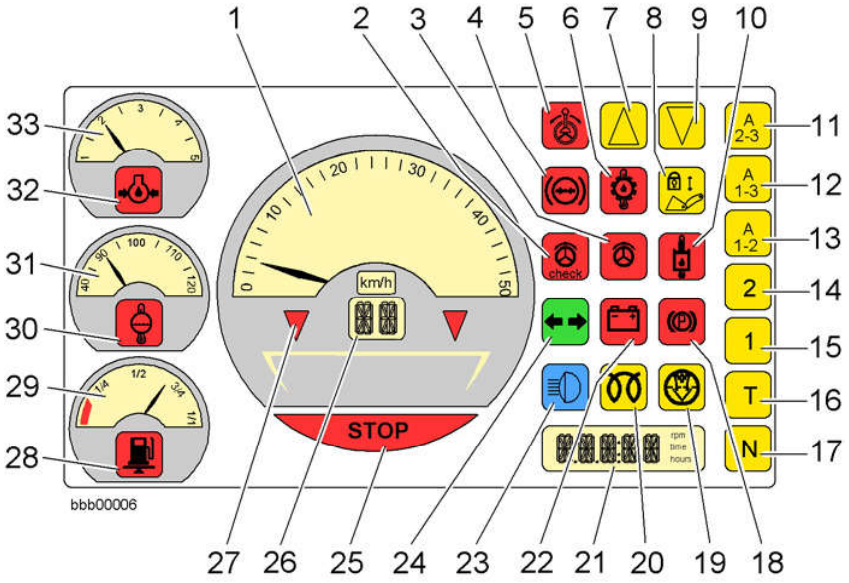

Fig. 125: Display unit

1 Travel speed indicator
2 Emergency steering check symbol field
3 Emergency steering symbol field
4 Brake system accumulator pressure symbol field
5 Joystick steering symbol field
6 Gear oil overheating symbol field (not activated)
7 Forward travel direction symbol field
8 Working hydraulics lockout symbol field
9 Reverse travel direction symbol field
10 Hydraulic oil overheating symbol field
11 Automatic travel range 2-3 symbol field (not activated)
12 Automatic travel range 1-3 symbol field
13 Automatic travel range 1-2 symbol field
14 Fixed gear 2 symbol field (not activated)
15 Fixed gear 1 symbol field
16 Tempomat T symbol field
17 Neutral position N symbol field
18 Parking brake symbol field
19 Air filter contamination symbol field
20 Preglow monitor symbol field
21 Segment display for software version, engine speed, clock, service hours, service code, LFD status
22 Battery charge (charge control) symbol field
23 High beam symbol field
24 Direction indicator symbol field
25 Stop symbol field
26 Machine type and selected gear level indicator
27 Overspeed protection indicator
28 Fuel level symbol field
29 Indicator for reserve fuel level and water level in water separator
30 Engine overheating and coolant level symbol field
31 Coolant temperature display
32 Engine oil pressure symbol field
33 Engine oil pressure indicator

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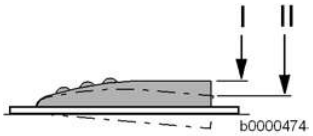


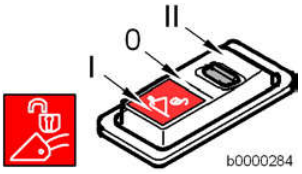
Field colour - green

Switches the visible back-up alarm on or off.

Switch functions:
- Position **I** - visible back-up alarm. (For more information see: Visible back-up alarm, page 145)
- Position **II** - flashing beacon (permanently on). The function can also be activated when the ignition key is in the 0 position or parking position.

Quick-change device

This equipment is optional.



Button- quick-change device

Field colour - red

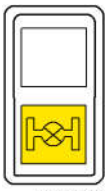
To lock/unlock the hydraulic quick-change device.

Note
This function is only available once the engine has started.

▶ The switch is secured with a lock to prevent actuation by mistake.

Switch functions:
- Position **0** - quick-change device is locked (no warning tone)
- Position **I** - to unlock the quick-change device (warning tone)
- Position **II** - to lock the quick-change device (no warning tone)

Differential lock indicator



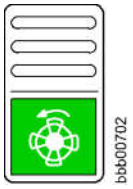
Differential lock 100% indicator lamp

Field colour - yellow

Function:
- The indicator lamp lights up once the button on the LH control lever has been pressed.

Reversible fan drive

This equipment is optional.



Reversible fan drive button

Field colour - green

Switches the fan reversal function on or off.

Note
The setting remains stored after the ignition is switched off.

▶ This means the function is active when the ignition is switched on again.

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Recirculated air

Recirculated air button

Switches the recirculated air flap on and off.

All three LEDs light up when recirculated air is activated.

When you press the button for the first time:
- Function ON
- All three LEDs on the button light up.
  No fresh air is taken in

When you press the button a second time:
- Function OFF
- All three LEDs on the button go out.

Note
The setting remains stored after the ignition is switched off.

▶ This means the function is active when the ignition is switched on again.

3.2.19 LIEBHERR control lever

This section describes the design and function of the LIEBHERR control lever.

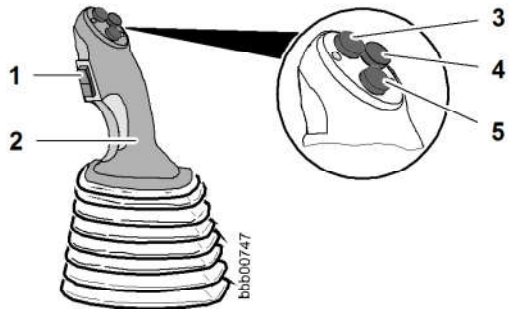

Fig. 206: LH control lever

1 LH control lever

2 Travel direction switch

3 Optional attachment button

4 Optional attachment button (third control circuit)

5 Optional attachment button (fourth control circuit)

Use the LIEBHERR control lever (LH control lever) to control the travel direction and movements of the working attachment and optional attachments.

Selecting a travel direction

The travel direction cannot be selected while the parking brake is engaged.

WARNING
Select a travel direction!

▶ When the travel direction is selected, the machine can also pull away without pressing the gas pedal.

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In air conditioning mode, the air is dried and cooled.

Note
During air conditioning operation, the shaft seal ring in the air-conditioning compressor is also lubricated. This prevents refrigerant from escaping from the compressor.

▶ To guarantee the long-term function of the air conditioning system, it is recommended to run the air conditioning system at least once every 14 days.

The air conditioning system only works when the engine is running.

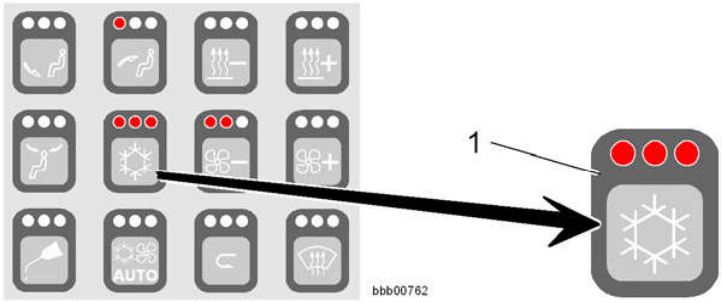

Fig. 223: Air conditioning mode

1 Air conditioning button

To activate air conditioning mode:

▶ Press the button **1**.
▷ All three LEDs on the button **1** light up.
▷ The air conditioning compressor is also activated if required.

To deactivate air conditioning mode:

▶ Press the button **1** again.
▷ All three LEDs on the button **1** go out.
▷ Heating and ventilation mode is activated.

Re-heat mode

This is only available if an air conditioning system is installed.

On cold, damp days, you can use the air-conditioning system to dehumidify the cab.

To dehumidify the cab air:

▶ Switch on the air conditioning system in addition to the heater.
▷ The windows are prevented from misting up because the damp air on the evaporator condenses, collects as water in the drip tray and is directed outside.

3.2.22 Automatic heating/ventilation/air conditioning

This equipment is optional.

The heater heats the air as required, according to the temperature setting.

The air is regulated automatically

In air conditioning mode, the air is cooled and dried.

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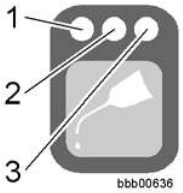
Function of the LEDs



The functions of the central lubrication system are indicated by the LEDs on the central lubrication system button.

LED 1 - light-duty operation
LED 2 - medium-duty operation
LED 3 - heavy-duty operation

LED	Function
One LED lights up	Mode 1, 2 or 3 has been set
One LED flashes	Pump is lubricated in mode 1, 2 or 3
All 3 LEDs light up	Grease reservoir is empty
All 3 LEDs flash	Fault in the central lubrication system

Tab. 17

Lubrication, cycle and idle times

The main electronics system (MASTER) controls the central lubrication system.

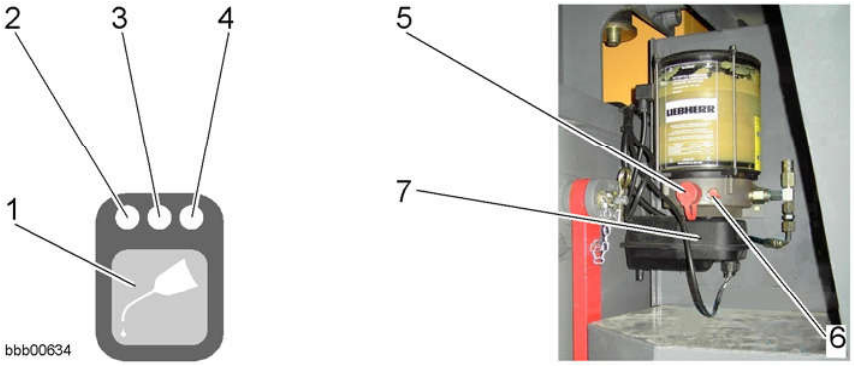


Fig. 239: Automatic central lubrication system

1 Central lubrication system button
2 Left LED - mode 1 (light-duty operation)
3 Middle LED - mode 2 (medium-duty operation)
4 Right LED - mode 3 (heavy-duty operation)
5 Filling coupling (fast filling)
6 Grease fitting
7 Central lubrication pump

All further lubrication cycles follow automatically in a pattern determined by the current setting.

During lubrication, if the ignition is switched off (engine stop) or the parking brake is engaged, the controller stops lubrication.

After starting the engine and releasing the parking brake, lubrication is continued at the point where it was interrupted.

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Fig. 254: Fuel tank

- ▶ It is essential to observe the safety regulations for refuelling. (For more information see: 2.4.3 Instructions on preventing fires and explosions, page 51)
- ▶ Only use clean diesel fuel. (For more information see: 5.3.3 Diesel fuels, page 272)
- ▶ Clean the area around the tank filler cap **1** carefully, before removing it.
- ▶ Slide the protective cap **2**.
- ▶ Release the tank lock and remove the tank cap.
- ▶ Refuel with diesel fuel as necessary.
- ▶ If possible, refuel at the end of the working day to prevent condensation from accumulating in the tank.

The machine is ready for operation.

3.3.2 Starting the engine

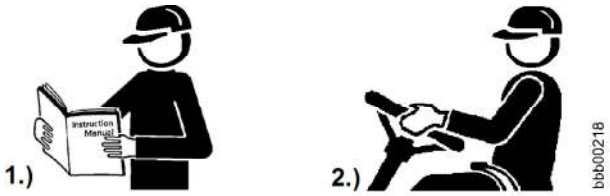

Fig. 255: Operating manual

1.) Make sure you have read and understood the operator's manual

2.) Then you are ready to use the machine

Only ever operate the machine once you have read and understood the operating manual.

Note
The machine is equipped with a hydrostatic travel drive.

- ▶ You cannot start the engine by bump-starting it or towing it.

Starting precautions

The following precautions must be taken before starting the machine.

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Driving with LFD (Liebherr ride control system)

This equipment is optional.

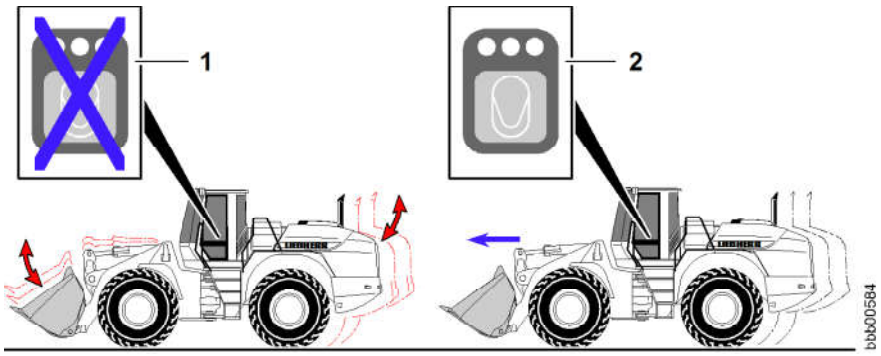

Fig. 275: Driving with or without LFD

1 Driving without LFD **2** Driving with LFD

The LFD system improves driver comfort in nearly all situations by reducing vibrations.

Therefore, the LFD system should be activated for all applications which require significant distances to be covered.

Activating the LFD system

Note
The setting remains stored after the ignition is switched off.

▶ This means the function is active when the ignition is switched on again.

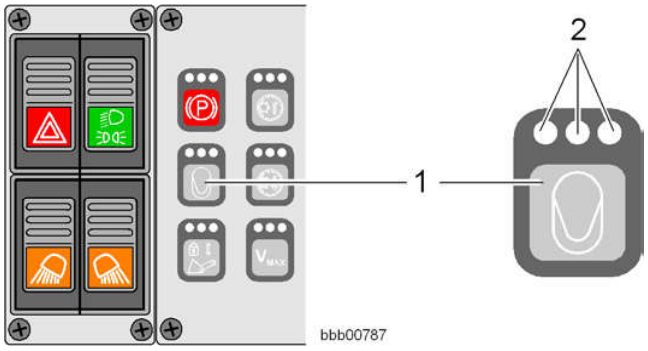

Fig. 276: Control unit

1 Ride control button **2** LEDs

▶ Press the button **1**.
▷ All the LEDs on the button you pressed light up.
▷ “LFD 1” appears in the display unit
▷ The LFD system is activated.

Deactivating the LFD system

▶ Press the button **1** again.
▷ All the LEDs on the button go out.
▷ “LFD 0” appears in the display unit
▷ The LFD system is deactivated.

Note
If you have previously engaged the working hydraulics lockout:

▶ Release the working hydraulics for operation.

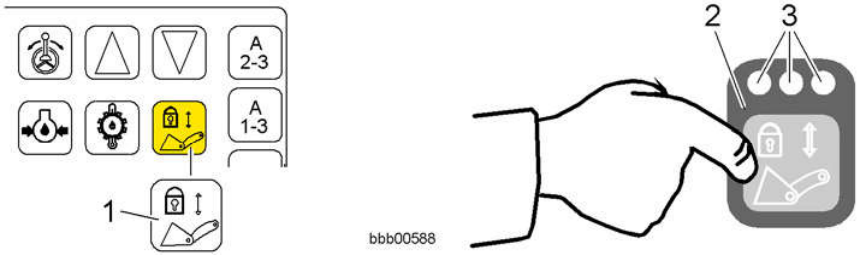

Fig. 295: Control unit

1 Working hydraulics lockout symbol field
2 Working hydraulics lockout button
3 LEDs

▶ Press the button **2** to deactivate the working hydraulics lockout.
▷ All the LEDs on the button you pressed go out.
▷ The symbol field **1** for the working hydraulics lockout goes out.
▷ The working hydraulics are now operational.
▷ You can operate the working attachment.

Operating the lift cylinders

The lift cylinders raise and lower the lift arms.

Raising or lowering the lift arms

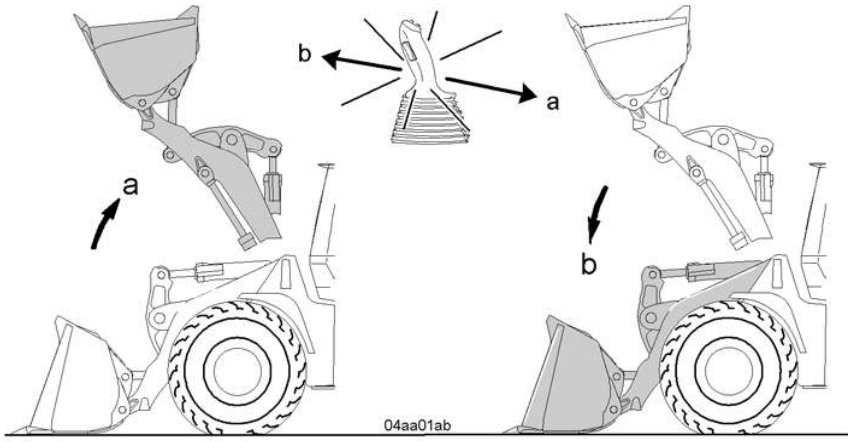

Fig. 296: Raising or lowering the lift arms

▶ Move the LH control lever in direction **a**.
▷ The lift arms are raised.

There are two ways to lower the lift arms:

Exhaust counterpressure warning: Pressure sensor defective

- ▶ The audible alarm can be deactivated by pressing the reset button **3**. The message on the display **2** remains.
- ▶ Switch off the machine securely.
- ▶ Contact Liebherr customer service.

If the error is rectified:

- ▶ The audible alarm can be deactivated by pressing the reset button **3**.

Temperature sensor defective

- ▶ The audible alarm can be deactivated by pressing the reset button **3**. The message on the display **2** remains.
- ▶ Switch off the machine securely.
- ▶ Contact Liebherr customer service.

If the error is rectified:

- ▶ The audible alarm can be deactivated by pressing the reset button **3**.

Lowering the exhaust counterpressure

Action to reduce the counterpressure from 150 mbar:

- ▶ Run the engine at high speed. In other words, drive at full load for approx. 5 minutes (for example by pushing against a wall). Gradually increase the load on the engine, do not drive at full load immediately.
  or

  With the bucket fully laden, keep raising and lowering the lift arms until the counterpressure is clearly below 150 mbar.

Troubleshooting
If the counterpressure cannot be reduced using these measures:
Excess exhaust counterpressure can also be caused by a blocked counterpressure line. If the display indicates excess counterpressure, in addition to cleaning the filter, inspect and service the counterpressure line. This inspection and service is prescribed for every 500 service hours. (For more information see: 5.1 Maintenance and inspection schedule, page 263)

- ▶ Shut down the machine immediately.
- ▶ Contact Liebherr customer service.

Note
The diesel particle filter must be cleaned once a year, or at least once every 1000 service hours.

- ▶ (For more information see: 5.1 Maintenance and inspection schedule, page 263)

For additional information:

- ▶ Contact Liebherr customer service.

Exhaust gas tests

For operation in Switzerland:

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Transporting the load on a slope

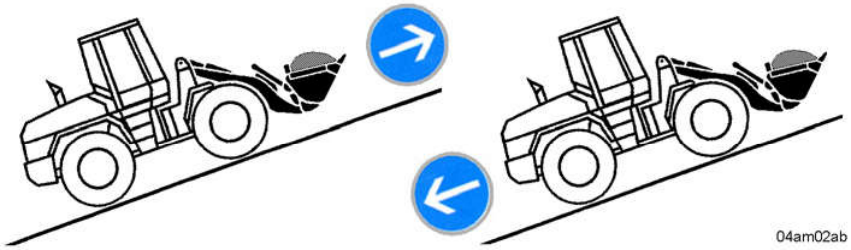

Fig. 325: Direction of travel during transport

WARNING
There is a risk of the machine tipping over.

- ▶ Hold the loaded bucket low when transporting a load on steep terrain.

- ▶ When driving on slopes, always make sure the load faces uphill.
- ▶ Never drive across slopes.
- ▶ Never turn on slopes.

Driving on slopes

You must observe the safety instructions when driving on slopes. (For more information see: 2.4.7 Safety instructions for driving on slopes, page 53)

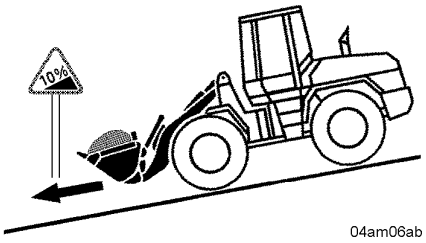

Fig. 326: Slope

WARNING
There is a risk of the machine tipping over.
The machine can tip over more easily when driving on sloping ground.

- ▶ Always keep the loaded bucket low during transport.
- ▶ Do not suddenly change direction or brake abruptly.

- ▶ Ease off the gas pedal before driving onto the slope.
- ▶ Drive downhill carefully.
- ▶ If necessary, apply the service brake.
  or

If driving on a long, steep downhill slope:
First switch to travel range **- I -**. (For more information see: Selecting travel ranges, page 157)

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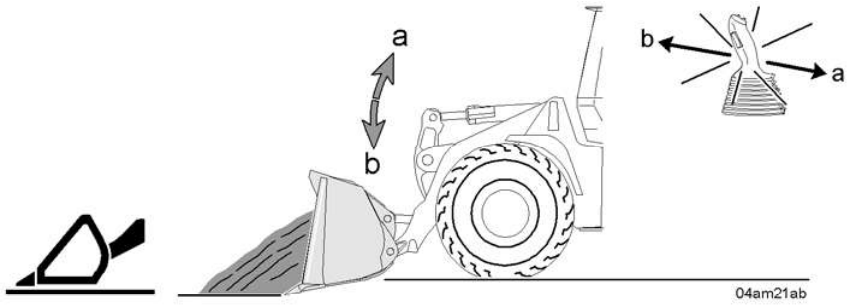

Fig. 346: Lift arm movement

- ▶ Make horizontal cuts when driving forward.
- ▶ Raise and lower the lift arms to make the work easier.

Lifting out hard material

Use a bucket with teeth for excavating hard material.

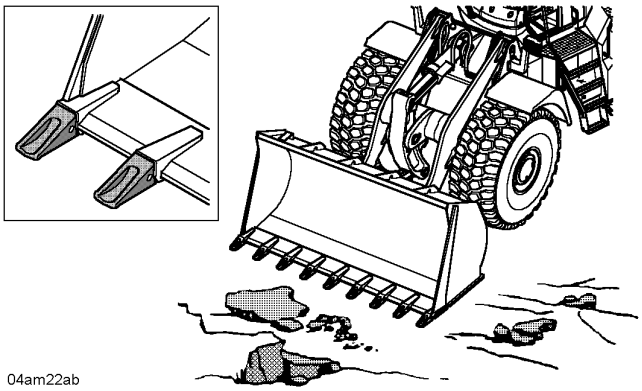

Fig. 347: Working attachment

- ▶ For the subsequent procedure: (For more information see: Lifting out soft material, page 200)

Example of foundation excavation

This is how to excavate foundations.

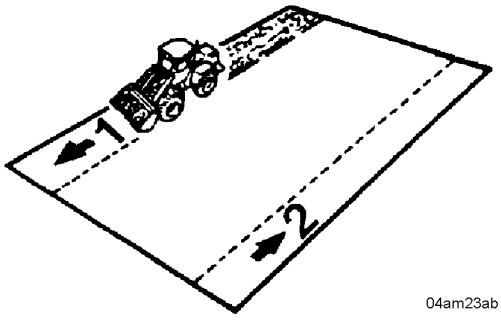

Fig. 348: Lengthways cuts

- ▶ Use the bucket to make a first trench along the side of the pit.

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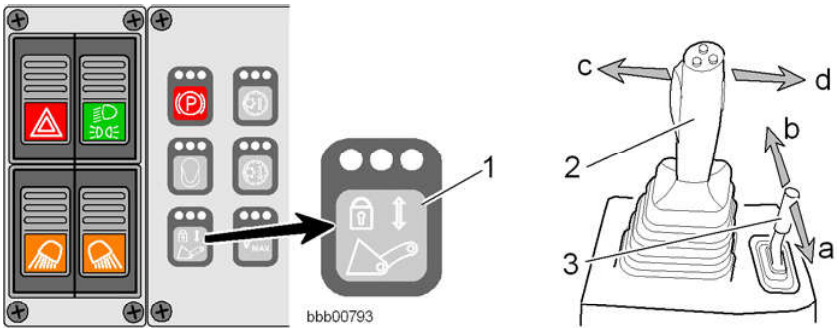

Fig. 363: Depressurising the hydraulics

1 *Working hydraulics lockout* button
2 LH control lever
3 Control lever for additional working functions

▶ Start the engine and let it run for around 10 seconds.

▶ Turn off the diesel engine.

▶ Switch on the ignition.

▶ Press the button **1** and hold it down.

At the same time, perform the following tasks:

▶ Move the LH control lever **2** in direction - **c** - and - **d** - several times.

▶ Move the control lever **3** in direction - **a** - and - **b** - several times.
▷ This reduces the hydraulic pressure of the working attachment.

Disconnecting hydraulic lines

If the working attachment has an independent hydraulic circuit, the hydraulic supply lines must be disconnected.

WARNING
There is a risk of accidents from pressurised hydraulic lines.

▶ Depressurise the hydraulic circuits before connecting or disconnecting hydraulic lines and couplings.

Make sure that:
- The lift arm is lowered to just above the ground
- Any cylinders, valves etc. on the working attachment are in the home position or closed
- The working attachment is tilted in
- The hydraulics are depressurised

Note
Hydraulic oil is a water pollutant.

▶ Make sure that no hydraulic oil leaks onto the ground. Have any contaminated soil taken away for disposal.

▶ Release the hydraulic lines and quick-release couplings from the machine.

▶ Seal the line couplings with a cap.

▶ Place the hydraulic lines in the hose retainer.

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▶ Slightly raise and tilt in the working attachment.
▷ The working attachment must be fully engaged in the quick-change device.

Locking the working attachment

Depending on the equipment unlock using either “Comfort controls” or “Control buttons”.

Make sure that:

- ❑ The working attachment is fully engaged in the quick-change device, so that the working attachment can be locked in place with the locking pins.
- ❑ The quick-change device is activated. (For more information see: Activating the quick-change device, page 218)

Comfort control

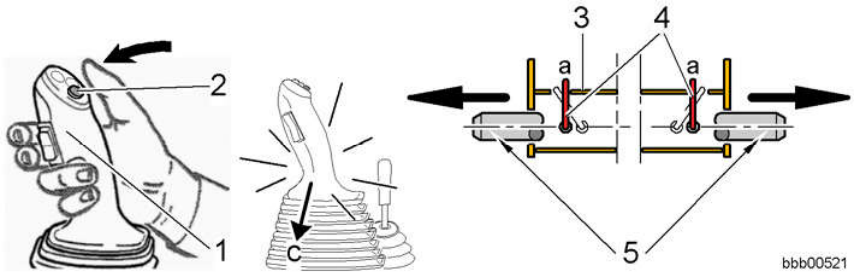

Fig. 377: Locking the working attachment

1	LH control lever	**5**	Locking pins
2	*Comfort control* button	**a**	Locked position
3	Quick-change device	**c**	Direction of movement
4	Mechanical indicator		

▶ Press and hold the button **2**.
▷ Press the button **2** to disable the function for operating the lift and tilt cylinders.

▶ Move the LH control lever **1** in direction **- c -** (to tilt in working attachment) to the stop and keep it in this position.
▷ The pins **5** for the quick-change device **3** are extended.

When the pins are completely extended:

▶ Release the button **2** and the LH control lever **1** again.
▷ Release the button **2** to enable the function for operating the lift and tilt cylinders again.
▷ The working attachment is locked.

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NOTICE
There is a risk of damage to the turbocharger.
If air blows into the exhaust pipe opening, it causes the turbocharger of the engine to rotate.
The turbocharger is not lubricated when the engine is not running.
The turbocharger can be damaged if it is not lubricated.

▶ Prevent the air stream produced during transport from entering the exhaust.

To block off the exhaust pipe opening:

▶ Climb onto the machine via the cab access, making sure that you have secure footing.

▶ Block off the exhaust pipe opening using airtight material which cannot slip.

3.6.3 Transport safety retainer

This only affects devices with P kinematics.

When transporting wheel loaders from the plant without installed attachments or a quick-change device transport safety retainers are installed at the lift arms and the control lever.

Removing the transport safety retainer

Make sure that the following requirements are fulfilled:
❑ Park the machine on level ground.
❑ Lower the lift arms.
❑ Engage the parking brake.
❑ Turn off the engine.

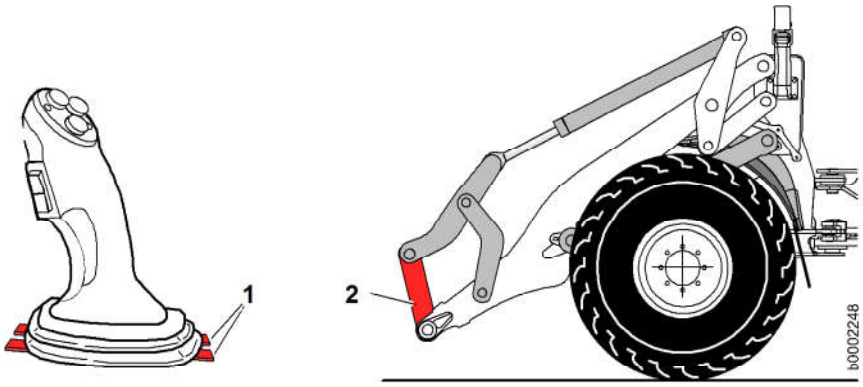

Fig. 394: Removing the transport safety retainer

1 Transport safety retainer **2** Transport safety retainer

▶ Remove the transport safety retainer **1**.

▶ Remove the transport safety retainer **2**.

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4 Malfunctions

Warning and error messages
- Various faults are indicated by the corresponding symbol fields (visually) or by display instruments on the instrument panel.
- Some warning functions are accompanied by audible warning signals.

Finding and eliminating errors and malfunctions
- Faults can often be traced back to incorrect operation or servicing of the machine.
  Therefore, carefully read the appropriate section of the operating manual each time a fault occurs.
- **Analyse the cause of the fault and correct it immediately.**
- Describe the fault and all related circumstances as accurately as possible when contacting **Liebherr customer service**.
  Precise information helps to locate and eliminate the cause of the fault. This means that the exact type and serial number of the machine need to be stated.
- Never perform any work for which you have not been trained or instructed.

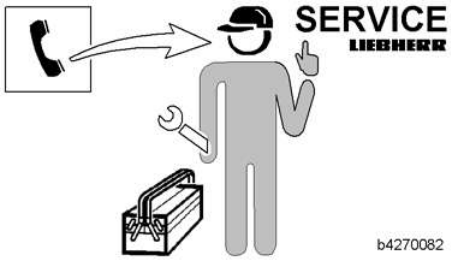

Fig. 405

Note
If you cannot recognise the cause of the fault using the service code table(s) or cannot rectify the fault:

▶ Contact Liebherr customer service.

4.1 Servicecodes

4.1.1 Service code indication on the display

The machine is monitored in many functions by the UEC3 central control system.

It monitors for short circuits, cable rupture, external voltage and incorrect input and output signals.

In addition, the controller continuously checks the program sequence and communication with the control modules.

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Service code	Effect	Cause	Remedy
E601C	STOP symbol field lights up, continuous warning buzzer	Calculation error, engine (John Deere) module has sent a CRITICAL error code This is shown in the display unit instead of the engine service code.	Contact LIEBHERR CUSTOMER SERVICE
E601D	Fault-dependent	Calculation error, engine (John Deere) module has sent a NORMAL error code This is shown in the display unit instead of the engine service code	Contact LIEBHERR CUSTOMER SERVICE
E601E	Charge control symbol field lights up, parking brake cannot be released	Alternator not supplying power	Contact LIEBHERR CUSTOMER SERVICE
E601F	Coolant temperature symbol field and STOP symbol field light up, continuous warning buzzer sounds and driving only possible in 1st gear	Coolant temperature exceeded safety threshold	Clean the cooling system, contact LIEBHERR CUSTOMER SERVICE
E6020	STOP symbol field lights up, continuous warning buzzer sounds and driving only possible in 1st gear	Charge air temperature exceeded safety threshold	Clean the cooling system, contact LIEBHERR CUSTOMER SERVICE
E6022	STOP symbol field lights up, continuous warning buzzer sounds and driving only possible in 1st gear	Fuel temperature exceeded safety threshold	Clean the cooling system, contact LIEBHERR CUSTOMER SERVICE
E6023	Calculation error - depends on the fault	Engine calculation error, analogue module has sent an internal error code. This is shown in the display unit instead of the engine service code.	Contact LIEBHERR CUSTOMER SERVICE
E6024	Calculation error - depends on the fault	Engine calculation error, digital module has sent an internal error code. This is shown in the display unit instead of the engine service code.	Contact LIEBHERR CUSTOMER SERVICE
E6025	The symbol field for engine oil pressure remains illuminated when the engine is running No detection of normal status possible.	Pressure switch for engine oil pressure does not switch after engine is started (t ≥ 5 sec). Pressure switch or wiring faulty, hardware faults in control system, no engine oil pressure at pressure switch.	Contact LIEBHERR CUSTOMER SERVICE

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Fuse	Value	Unit	Designation/function
F10	3.0	A	Display unit
F11	3.0	A	Inching angle sensor
F12	10.0	A	Spare
F13	10.0	A	Sweeper
F14	10.0	A	Separ fuel preheater
F15	10.0	A	LH control lever, info T 15 UEC3, fuel level sensor, coolant level, emergency steering and air filter contamination pressure switches
F16	40.0	A	Starter solenoid
F17	40.0	A	Engine stop
F18	10.0	A	Rear wiper/washer pump
F19	10.0	A	Heater/air conditioner
F19a	15.0	A	Heater blower / air conditioning T 30
F20	15.0	A	Front wiper/washer pump, horn
F21	15.0	A	Low beam F2 / F3 / F4 / F5,
F22	15.0	A	UEC3 VDC3
F23	15.0	A	UEC3 VDC2
F24	15.0	A	UEC3 VDC4
F25	10.0	A	Flashing beacon, rear window heater control
F26	15.0	A	Diagnostic plug, UEC3 VDC1
F27	10.0	A	Profile lights F6 / F7
F28	10.0	A	Spare
F29	25.0	A	Ignition switch
F30	15.0	A	Voltage converter supply
F31a	10.0	A	Front left working floodlight
F31b	10.0	A	Front right working floodlight
F33a	10.0	A	Rear left working floodlight
F33b	10.0	A	Rear right working floodlight
F35	10.0	A	Spare
F36	max. 40.0	A	LH_ECU VBAT spare
F37	40.0	A	LH_ECU VBAT power supply 2
F38	3.0	A	LH_ECU VBAT controller supply 2
F39	10.0	A	Engine compartment lighting, auxiliary heater clock
F40	10.0	A	Auxiliary heater control
F41	10.0	A	Spare
F43	10.0	A	Ignition ON
F44	10.0	A	Brake light
F45	10.0	A	Spare

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5.3 Lubricants and fuels

5.3.1 General information on changing lubricants and fuels

Note
The filling quantities listed in the lubricant and fuel table and the lubrication chart in the driver's cab are only guidelines.

- ▶ Each time the oil is replaced or topped up, check the level in the unit in question.

Note
Conscientious observance of the regulations for lubrication, level testing and changing fuels and operating fluids will increase the reliability and service life of the machine.
It is especially important that the oil change intervals and the specified lubricant qualities are observed.

- ▶ Note the sections on lubricants and fuels and the maintenance and inspection schedule when using and checking lubricants and fuels.

Note
Cleanliness is essential during every oil change.

- ▶ Clean all filler plugs, filler caps and drain plugs and the area around them before opening them.
- ▶ It is advisable to wait until the oil has reached operating temperature before draining it.
- ▶ Make sure used oil is collected and disposed of, along with the old oil filter cartridges, in an environmentally friendly manner.

WARNING
When checking and changing lubricants and fuels, make sure you observe the following instructions:

- ▶ Unless stated otherwise, carry out the work on the machine on firm, level ground with the engine switched off.
- ▶ Before working in the engine compartment, secure the hood and side hatches against accidentally falling down or closing.
- ▶ Only refuel the machine with the engine switched off. Do not smoke, avoid naked lights.
- ▶ Turn the battery main switch to the 0 (off) position and take out the ignition key.

5.3.2 Converting the hydraulic system from mineral oils to environmentally harmless hydraulic fluids

For the operation of Liebherr earth moving machines with environmentally harmless hydraulic fluids, we recommend **Liebherr Hydraulic Plus**.

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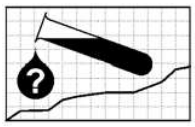
Oil analysis



Liebherr recommends having the oil analyses carried out by OELCHECK and carrying out an oil change according to the laboratory report:
- yellow set for readily biodegradable hydraulic oils
- green set for mineral oils

To take an oil sample:

See also customer service and product information.

Oil type	Oil sample	
	Not used as bio oil (oil analysis optional)	Used as bio oil (oil analysis prescribed)
Liebherr mineral oil	Every 1000 h	–[A)]
Liebherr Hydraulic Basic 68		
Liebherr Hydraulic Basic 100		
Liebherr Hydraulic HVI		
Liebherr PAO (polyalphaolefin)	Every 1000 h	First at 0 h then every 1000 h
Liebherr Hydraulic Plus		
Third-party product - mineral oil	First at 1000 h then every 500 h	–[A)]
Third-party product - fully saturated synthetic ester	–[A)]	First at 0 h then every 500 h

Tab. 42: Oil sample

A) Combination not permitted

Changing the filter

Change return filter (only Liebherr filters are permitted)
Every 1000 h

Tab. 43: Changing filters

5.3.7 Lubricating oils for transmissions

Recommended lubricant	Specification
Liebherr Hydraulic Gear ATF	GM: Dexron II D ZF: TE-ML 03D, 04D, 11A, 14A, 17C

Tab. 44: Lubricating oil specifications

If Liebherr oils cannot be purchased locally, you must use oils according to the specifications instead (after consultation with customer service).

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5.5.6 Replacing VCI capsules

This equipment is optional.

If you replace VCI capsules:

▶ See separate instruction manuals “Using salt and artificial fertiliser” or “Corrosion protection system for fittings and electrical contacts”.

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Procedure

DANGER
Beware of fire

▶ Naked flames and smoking are prohibited.

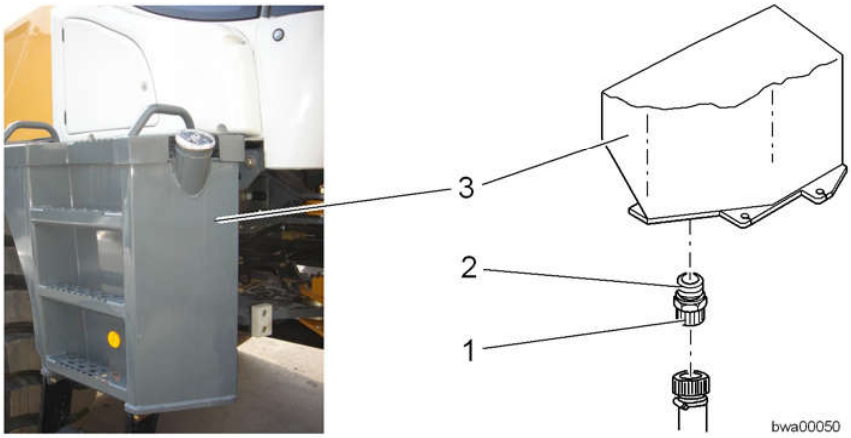

Fig. 444

▶ Unscrew the sealing cap **1** on the drain valve **2** on the bottom of the fuel tank **3**.

▶ Screw the drain hose onto the drain valve **2**.

▶ Drain the condensation and sediment into a suitable receptacle until clean fuel begins to flow.

▶ Unscrew the oil drain hose.

▶ Screw the cap **1** onto the drain valve **2** and tighten it.

5.6.10 Cleaning the air filter service cap and dust extraction valve

Note
If the valve is damaged, the dust extraction function is impaired and the filters become clogged more quickly.

▶ With the engine running at lower idle speed, you should clearly feel air pulsating at the dust extraction valve.

Make sure that:
- ❑ The machine is in maintenance position 1.
- ❑ The engine compartment hood is open.
- ❑ The battery main switch is switched off and the main switch key is removed.
- ❑ Suitable safety equipment is used.

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CAUTION
Make sure you have safe access to the coolant equalising reservoir

▶ Use the external steps

▶ Open the cap **1**.

▶ Open the drain plug **4**, screw on the drain hose and let the coolant flow into the receptacle.

Note
If the coolant is very diry or corrosive:

▶ Flush the cooling system several times.

▶ Close the drain plug **4** again.

▶ Top up the coolant in the equalizing reservoir **3** until you can see coolant in the filler neck **2**.

▶ Close the cap **1**.

▶ Start the engine and let it run at low idling speed.

▶ Set the heater to warm.

▶ Turn off the engine.

▶ Check the coolant level when the engine has cooled down and correct it if necessary.

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5.13 Machine frame and ballast weight

5.13.1 Lubricating the articulated bearing and the rear oscillating bearing

Make sure that:
- ❑ The machine is in maintenance position 1.
- ❑ The articulation lock is engaged.

Procedure

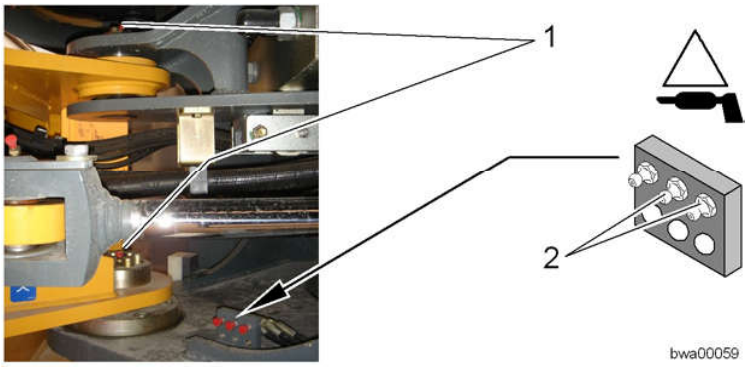

Fig. 466: Lubricating the articulated bearing and the rear oscillating bearing

1	Lubricating points on the articulated bearing	**2**	Lubricating points on the rear oscillating bearing

Lubricate the articulated bearing:

▶ Grease the lubricating points **1**.

Lubricate the rear oscillating bearing:

▶ Grease the lubricating points **2**.

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Replace the bearing bushings if:
- There is a lot of play with the bucket bearings
- Loud noise occurs

Note
Replacing the bearing bushings

▶ Contact LIEBHERR CUSTOMER SERVICE.

5.16.3 Lubricating and testing the quick-change device

Lubricating the quick-change device

Make sure that:
❑ The machine is in maintenance position 2.

If the lubricating points near the bucket coupling are poorly accessible:
❑ Make sure the working attachment is disconnected.

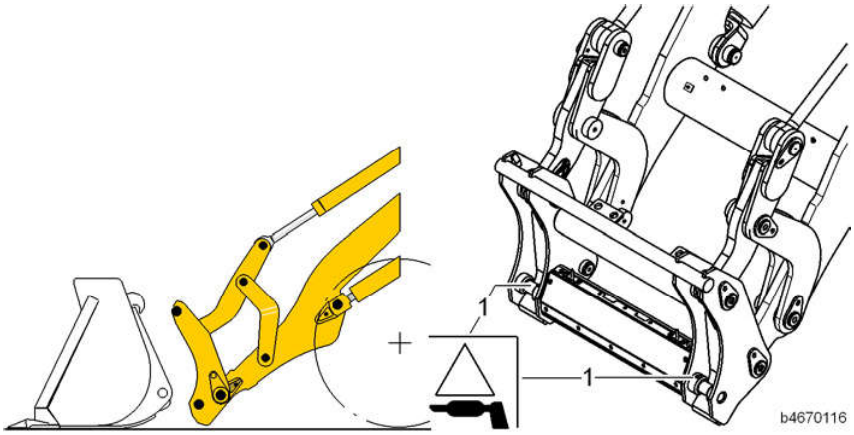

Fig. 484: Lubricating the quick-change device

▶ Lubricate the quick-change device.

Testing the quick-change device

Make sure that:
❑ The engine has been started.
❑ The lift arms have been lowered.
❑ The working attachment is tilted in.

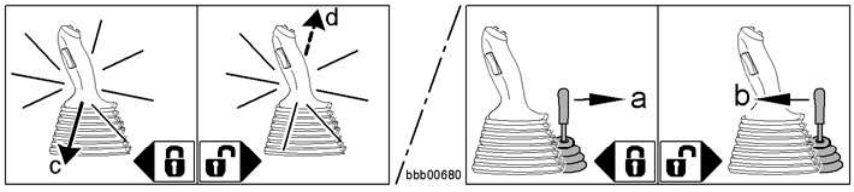

Fig. 485

The operation of the quick-change device can vary according to the version or the type of machine.

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