en **Operating manual**

Wheel loader

L 580-459

From serial number 24314

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 65)

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
Installing or changing the working attachment or tyres.

▶ (For more information see: 2.4.18 Attachments and accessories, page 65)

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 27)

Note
Installing or changing the working attachment or tyres.

▶ (For more information see: 2.4.18 Attachments and accessories, page 65)

1.2.21 Complete machine with bucket (Z kinematics)

bpik0039 

The values stated refer to the machine:

- In its standard version
- With Michelin 26.5R25 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.

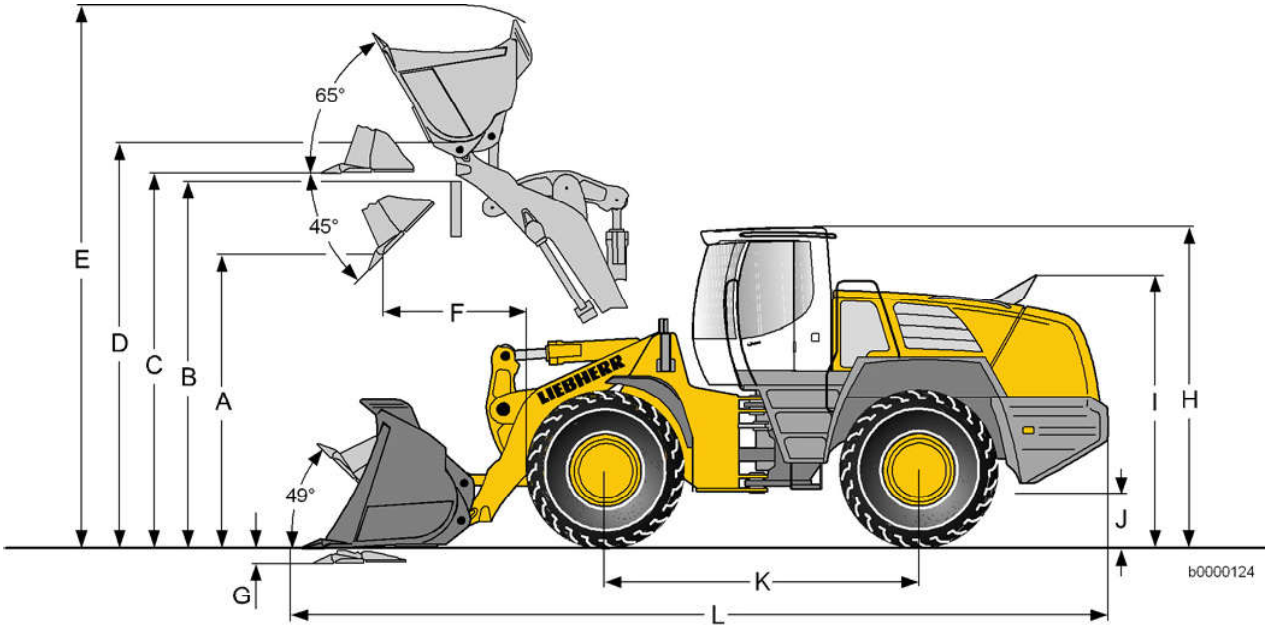

Fig. 20: Dimensions

	Description	Unit	Value	
	Hydraulic quick-change device		No	No

2 Safety warnings, signs

Working on the machine poses safety risks to the operator, driver or maintenance personnel. You can prevent risks and accidents by regularly reading and observing the various safety instructions.

This is especially important for personnel who only occasionally work on the machine, for example, carrying out rigging or maintenance work.

The safety instructions listed below, if conscientiously followed, will ensure your own safety and that of others, and will prevent the machine from being damaged.

Whenever tasks which could cause danger to personnel or damage to the machine are described, the necessary safety precautions are explained in this manual.

2.1 How the warnings are marked

	This is the warning symbol. It warns you of potential injuries. To prevent injury or death, carry out all the measures identified by this warning symbol.

Tab. 13

The warning symbol always appears together with the signal words:
DANGER, WARNING, CAUTION

	**DANGER**	indicates a hazardous situation that will immediately lead to serious or fatal injury if it is not avoided.
	**WARNING**	indicates a hazardous situation that may lead to serious or fatal injury if it is not avoided.
	**CAUTION**	indicates a hazardous situation that may lead to minor or moderate injury if it is not avoided.
	ATTENTION	indicates a hazardous situation that may lead to damage if it is not avoided.

Tab. 14

2.1.1 Further markings

	**Note**	indicates useful tips and information.

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Fire extinguisher sign

This equipment is optional.

Fig. 54: Fire extinguisher sign

Indicates that there is a fire extinguisher in the cab.

Working hydraulics sign

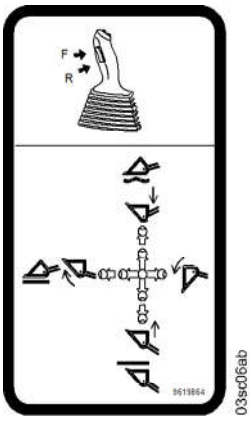

Fig. 55: Working hydraulics sign

It indicates the actuating directions of the control lever.

Bearing load table sign

This equipment is optional.

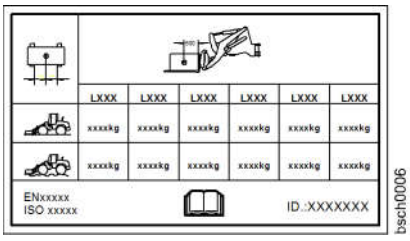

Fig. 56: Bearing load table sign

Indicates the maximum permissible load in forklift operation.

The maximum permissible loads indicated on the sign refer to a machine equipped with standard tyres.

13. Before starting maintenance or repairs, clean any oil, fuel or service fluids from the machine, especially connections and bolted joints. Do not use abrasive cleaning agents. Use fibre-free cloths.
14. Before welding, burning and sanding, clean any dust from the machine and the area around it, and ensure adequate ventilation.
    Otherwise there is a risk of **"Explosion"** !
15. Before cleaning the machine with water, steam jet (high-pressure cleaner) or other cleaning agents, cover or tape up all openings where water, steam and cleaning agent may not penetrate for safety reasons.
    Electric motors, control cabinets and battery compartments are at particular risk.

    Further procedure:
    - Make sure that during cleaning work on the machine housings, the temperature sensors for the fire alarm and extinguisher systems do not come into contact with hot cleaning agent. Otherwise the fire extinguishing system could be activated.
    - After cleaning, completely remove the covers and tape.
    - After cleaning, check all fuel, engine oil and hydraulic oil lines for leaks, loose connections, abrasion and damage.
    - Repair any defects immediately.
16. Follow the safety instructions for the product in question when handling oil, grease and other chemical substances.
17. Dispose of spare parts and consumables in a safe, environmentally sound manner.
18. Take care when handling hot operating and auxiliary materials (danger of burns and scalding).
19. Only operate combustion engines and fuel-powered heaters in sufficiently ventilated rooms. Before starting the engine inside a building, make sure the room is well ventilated. Follow the local regulations in force at the site.
20. Only carry out welding, burning and grinding work when it is expressly allowed, as otherwise you may cause fires or explosions.
21. Do not try to lift heavy parts. Only use suitable equipment with sufficient load capacity.

    Procedure:
    - When replacing individual parts and larger assemblies, carefully fasten and secure them to the lifting gear so that no danger can arise.
    - Only use suitable lifting gear in perfect order, and slinging equipment with sufficient load capacity.

    Keep out from under suspended loads.
22. Do not use ropes which are damaged or of insufficient load bearing capacity. Wear protective gloves when handling wire ropes.
23. Only allow experienced personnel to sling loads and direct crane drivers. The person giving directions must remain in sight of the operator or at least be in spoken contact with him.
24. When carrying out fitting work above head height, use the safety climbing aids and working platforms provided or equivalent. Do not use parts of the machine for climbing. Wear a safety harness when working at height. Keep all handles, steps, rails, gangways, platforms and ladders free from dirt, snow and ice.
25. When working on the attachment (for example replacing teeth), make sure it is properly supported. Avoid direct metal-to-metal contact.
26. Never lie under the machine when it is raised using the working attachment, unless the undercarriage is securely supported using wooden beams.
27. Always support the machine on blocks, so that it cannot become unbalanced by any shift in weight. Avoid metal-to-metal contact.
28. Only trained specialist staff may perform work on the chassis, brake and steering systems.

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3.2 Handling

3.2.1 Battery main switch

You must turn on the battery main switch before you can start the machine.

The battery main switch is located at the rear left of the engine compartment.

Turning on the battery main switch

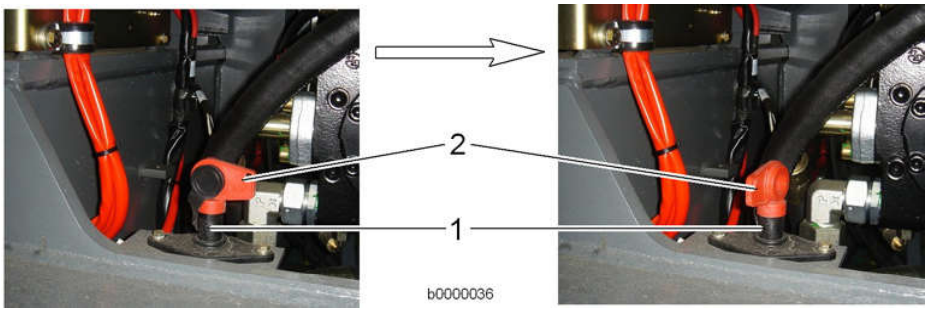

Fig. 65: Turning on the battery main switch

1 Battery main switch **2** Key

▶ Switch on the battery main switch **1** using the key **2**.

3.2.2 Articulation lock

The articulation lock creates a rigid connection between the front and rear sections. Steering is no longer possible.

WARNING
Persons can become trapped in the articulation area.

▶ Only engage or release the articulation lock when the engine is switched off.

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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.

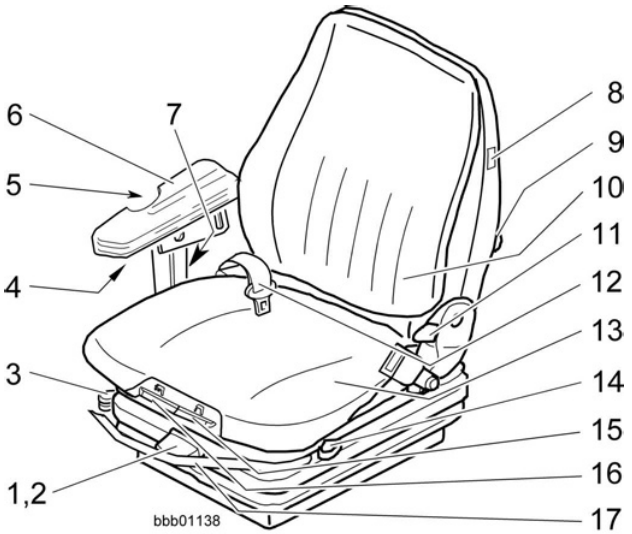

Fig. 84: Main components and adjustable elements of the driver' seat

1	Lever for adjusting body weight	**10**	Back rest
2	Lever for adjusting seat height	**11**	Lever for back rest inclination adjustment
3	Lever for adjusting suspension	**12**	Seat belt
4	Locking screw for arm rest horizontal adjustment	**13**	Seat surface
5	Locking screw for arm rest inclination adjustment	**14**	Lever for horizontal seat suspension
6	Arm rest	**15**	Lever for seat surface inclination adjustment
7	Locking screw for arm rest height adjustment	**16**	Lever for seat surface horizontal adjustment
8	Seat heating switch (optional)	**17**	Lever for driver's seat horizontal adjustment
9	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 injury 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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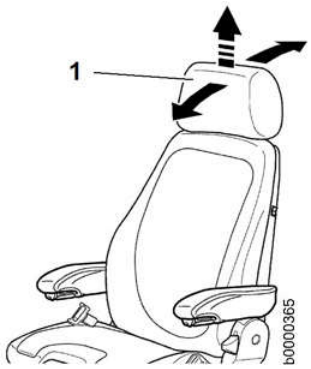

Fig. 102: Adjusting the head rest

1 Head rest

▶ Adjust the inclination and height of the head rest **1** by pulling or pushing it.

▶ To remove the head rest **1**, pull it sharply past the end limit.

Activating and deactivating the seat heating and seat climate control

The active seat climate control allows the driver to stay cool and dry.

Fig. 103: Activating and deactivating the seat heating and seat climate control

1 Seat heating ON
0 Seat heating and seat air conditioning OFF
2 Seat air conditioning ON

To activate the seat heating:

▶ Move the switch to seat heating ON **1**.
▷ The seat heating is activated.

To activate the seat climate control:

▶ Move the switch to seat air conditioning ON **2**.
▷ The seat climate control is switched on.

To deactivate the seat heating and seat climate control:

▶ Move the switch to seat heating and seat air conditioning OFF **0**.
▷ The seat heating and seat climate control is deactivated.

Adjusting the lumbar support

The lumbar support improves seat comfort and can be individually adapted by adjusting the bulge in the top and bottom of the back upholstery.

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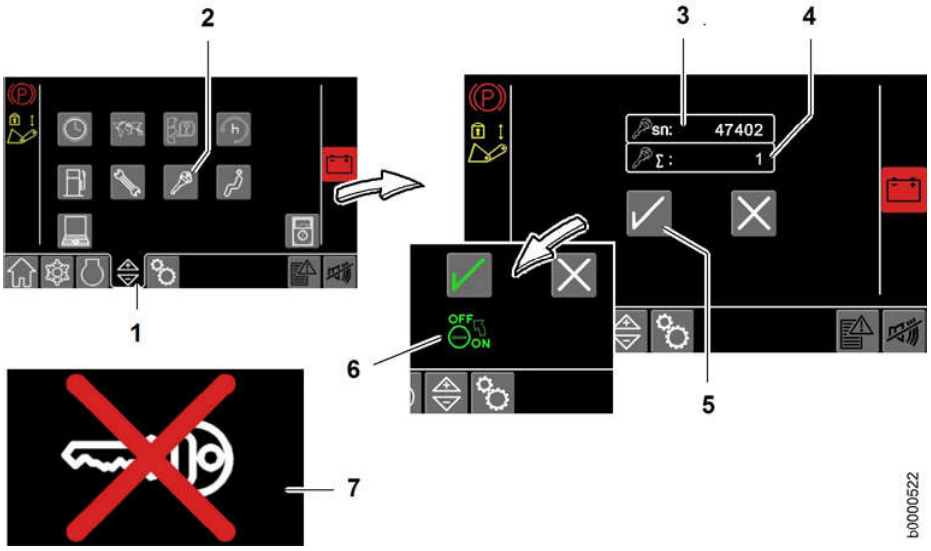

Fig. 119: Programming new starting keys

1 *Settings* switching button
2 *Electronic driver interlock* button
3 *Master key serial number* display
4 *Number of already programmed keys (incl. master key)* display
5 *Program starting key* button
6 *Switch off ignition* display
7 *Non-programmed key* display

▶ Press button **5**.
▷ Button **5** is green.
▷ The display **6** flashes green.

▶ Switch off the ignition.

▶ Remove the master key.

▶ Switch on the ignition with the new starting key that is yet to be programmed.
▷ When the display **7** disappears the starting key is programmed.

To programme further starting keys the entire process must be repeated:

▶ Switch on the ignition using the starting key.

▶ Press the *Settings* and *Electronic drive interlock* switching buttons to open the display screen.

▶ Press button **5**.
▷ Button **5** is green.
▷ The display **6** flashes green.

▶ Switch off the ignition.

▶ Remove the master key.

▶ Switch on the ignition with the new starting key that is yet to be programmed.
▷ When the display **7** disappears the starting key is programmed.

Deleting programmed starting keys

Only the master key is authorised to delete the starting keys. The delete process deletes **all** starting keys which have been programmed!

Using the master key, switch on the ignition and open the display screen using the switching buttons *Settings* and *Electronic drive interlock*.

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Switching the interior lighting on and off

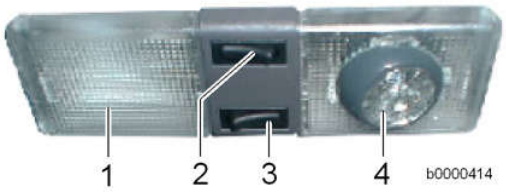

Fig. 132: Interior lighting

1	Interior lighting	**3**	Reading lamp switch
2	Interior lighting switch	**4**	Swivel reading lamp

▶ Press the switch **2.**
▷ The interior lighting is switched on or off:

▶ Press the switch **3.**
▷ The reading lamp is switched on or off.

3.2.18 Display unit

The display unit is a touch screen display.

The grey switching buttons are for changing the screens and selecting functions.

The display is divided into the following sections:
- Status symbol indicator
- Warning symbol indicator
- Buttons for switching to the display and operation screens
- Display and operation screens

Fig. 133: Touch screen display

1	*Status symbol* indicator	**3**	*Display and operation screen* switching buttons
2	*Warning symbol* indicator	**4**	Display and operation screens

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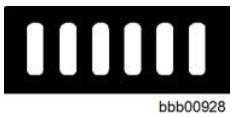
Selected blower speed indicator


bbb00928

– The blower speed is shown on a bar indicator.

Reduce the blower speed


bbb00923

Switches off the heating and air conditioning system.

Reduces the blower speed.

– 6 blower speeds
– Bar indicator on display
– The status is indicated with LEDs on the button on the control unit

Overview of units

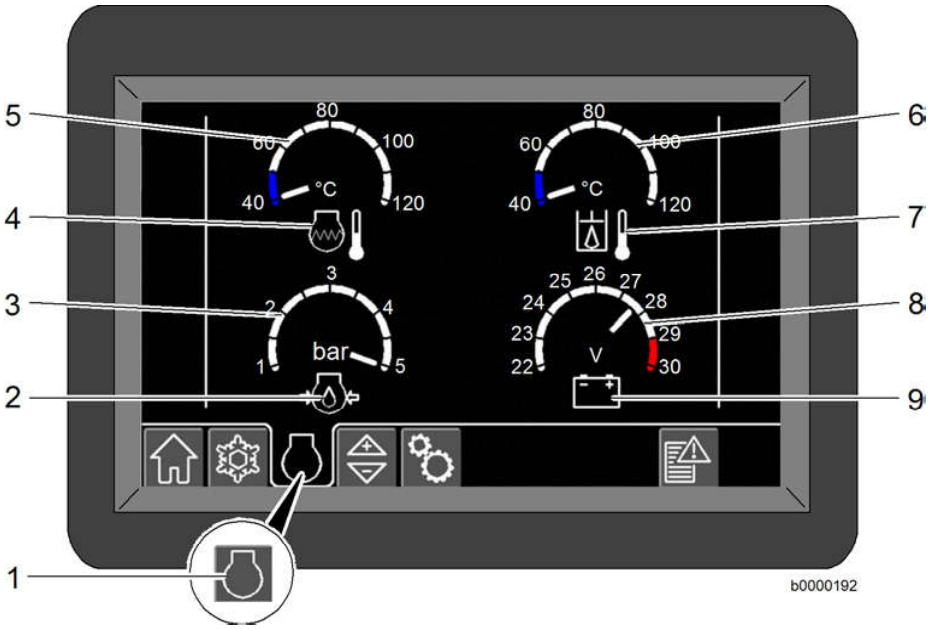


Fig. 182: Overview of units

1 *Overview of units* switching button
2 *Engine oil pressure* symbol
3 *Engine oil pressure* indicator
4 *Coolant temperature* symbol
5 *Coolant temperature* indicator
6 *Hydraulic oil temperature* indicator
7 *Hydraulic oil temperature* symbol
8 *Battery voltage* indicator
9 *Battery* symbol

Overview of units switching button


b0000177

For switching to the overview of units display

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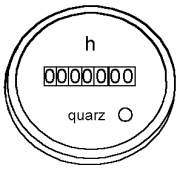
3.2.19 Mechanical hour meter

This equipment is optional.

Fig. 202: Hour meter

The mechanical hour meter **1** is in the instrument panel to the right of the driver's seat.

Machine service hours indicator



Mechanical hour meter

Shows how many hours the machine has been in operation.

The service hours are used as the basis for the maintenance intervals.

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Note
The memory function of the float position switch is optional.
The setting remains stored after the ignition is switched off.

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

Rear window heater and mirror heater (optional)

Rear window heater and mirror heater (optional) button

Switches the rear window heater and mirror heater (optional) on and off.

This function is only available when the ignition is on.

When you press the button for the first time:
– Function ON
– All three LEDs on the button light up

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

The function remains active after it is switched on:
– Until the rear window heater and mirror heater (optional) is switched off
– Or for a maximum 20 minutes (to protect the battery)

Rear windscreen wiper and washer system

Rear windscreen wiper and washer system button

Switches the windscreen wiper and washer system for the rear window on or off.

Press the button once:
– Intermittent wipe
– The LED on the left lights up

Press the button a second time:
– Constant wiping on
– The LEDs on the left and right light up

Press the button a third time:
– Function deactivated
– All the LEDs go out

Hold the button down:
– Rear windscreen washer pump ON
– Rear wiper ON
(Continues wiping for several seconds)

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Controlling the optional attachment

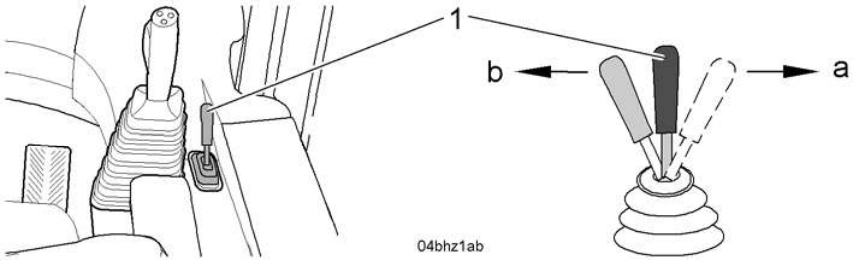

Fig. 253: Directions of movement of the additional control lever

a - Back **b** - Forward

▶ You can control the optional attachment using the additional control lever **1**. Movements of the additional control lever and associated functions:
  ▷ **a -** (function depends on the type of optional equipment attached)
  ▷ **b -** (function depends on the type of optional equipment attached)

Make sure you are familiar with the operation of the additional equipment attached.

▶ (For more information see: 3.3 Operation, page 169) or the operating manual for the additional equipment.

3.2.24 Heater/air conditioner

Switch the heater on or off using the blower speed button.

Note
The air conditioning system can only be activated or deactivated using the display unit.

▶ The full settings for the heating and air conditioning system can be configured using the display unit. (For more information see: Heater/air conditioner, page 118)

You can use the buttons on the control unit to make the following settings:
- Temperature regulation
- Blower speed
- Fresh or recirculated air
- Defrost mode

The selected settings are briefly shown in the display.

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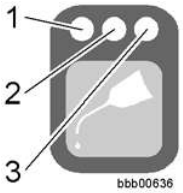
Function of the LEDs



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. 18

Lubrication, cycle and idle times

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

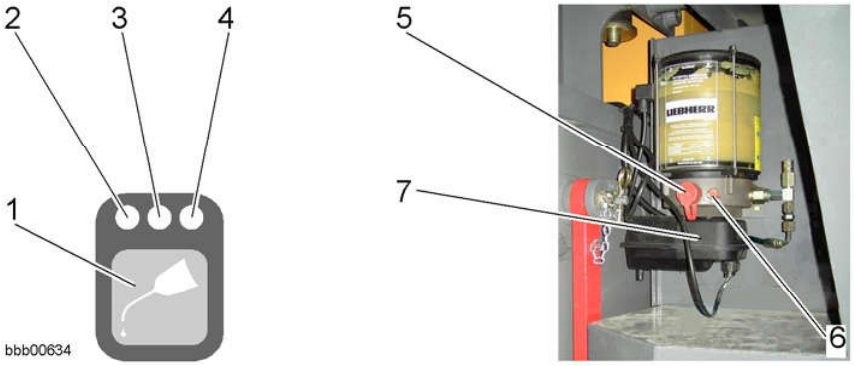


Fig. 271: Automatic central lubrication system

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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- ▶ Push off the 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

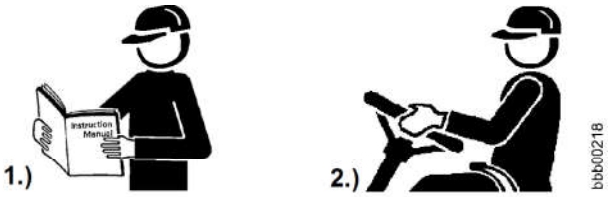

Fig. 289: Operating manual

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.

First make sure that the machine is in its operating position (For more information see: Operating position, page 169) .

Note
If the machine has an electronic immobiliser:

- ▶ Only deactivate the immobiliser using the appropriate programmed key.

Starting procedure

Make sure that the following requirements are fulfilled:
- ❑ The machine is in the operating position.
- ❑ You have fastened your safety belt.

Switch on the ignition.

- ▶ Switch on the electrical system by turning the ignition key to position **I**.
  - ▷ The master electronics are booted up.

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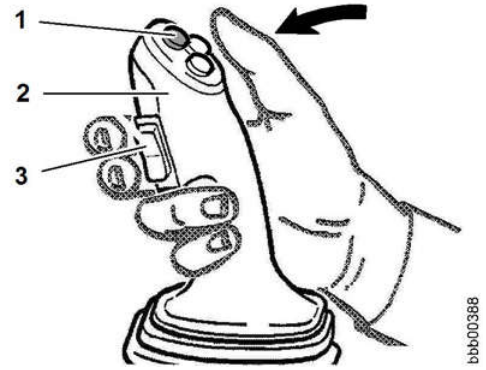

Fig. 311: LH control lever

1 LH control lever
2 Kick-down button
3 Travel direction switch

Kick-down shifting is used in the following situations:

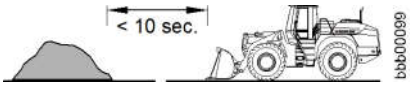

Fig. 312

a) When approaching the pile

– This allows you to work on the pile in first gear.
The kick-down function hydrostatically brakes the machine, and it switches down to first gear.
While pushing into the pile, first gear remains selected as long as the resistance is high.
Kick-down mode is deactivated when you change travel direction.

If you want to use kick-down shifting:

▶ Press the kick-down button **2** on the LH control lever **1**.

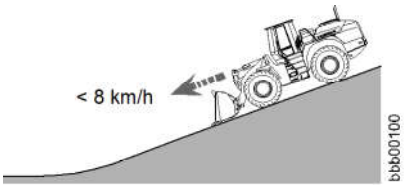

Fig. 313

b) Driving onto a steep downhill slope

– Before driving onto a steep slope, you can also use the kick-down function to shift to travel range **I** (first gear).
The machine remains in first gear until you press the gas pedal.
In kick-down mode, the maximum travel speed is 8 km/h.

If driving on a long, steep downhill slope:

▶ First activate kick-down mode.
  ▷ The machine is automatically hydrostatically braked and the main electronics (MASTER) switches to first gear.
  ▷ At high travel speeds, the machine automatically shifts from third to second gear, and then to first gear.
  ▷ The machine remains in first gear until you press the gas pedal.
  ▷ When you press the gas pedal, the main electronics (MASTER) automatically switches to second and third gear.

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DANGER
There is a risk of accidents if the machine rolls away.

▶ Set the machine down on level ground.

Lowering the working attachment

Make sure that the bucket is empty.

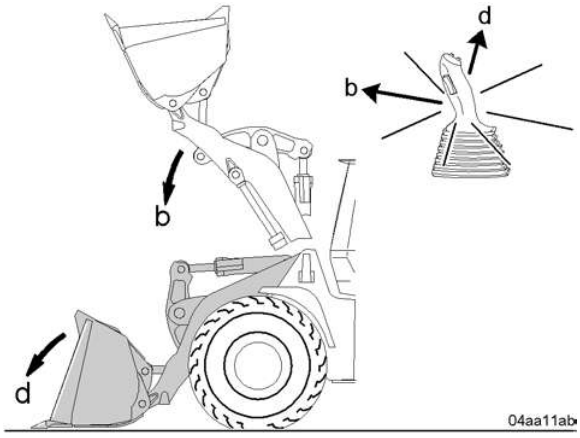

Fig. 336: Bucket arm movement

▶ Lower the lift arms by moving the control lever in direction **b**.

▶ Set down the bucket flat on the ground by moving the control lever in direction **d**.

Switching off the engine

NOTICE
There is a risk of damaging the engine
This is especially important with turbo engines.
If you suddenly switch off the motor, the turbocharger continues running for a while with no oil supply.

▶ Do not switch off the engine suddenly when it is running at full speed.

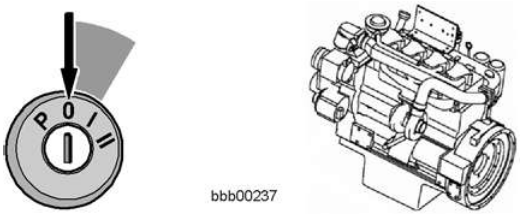

Fig. 337: Switching off the engine

▶ Reduce the engine speed to idle speed by taking your foot off the gas pedal.

▶ Let the engine continue idling briefly - for 10 to 15 seconds.

▶ Turn the ignition key to the **0** position and pull it out.
▷ All the symbol fields go out.
▷ Parking brake is engaged.

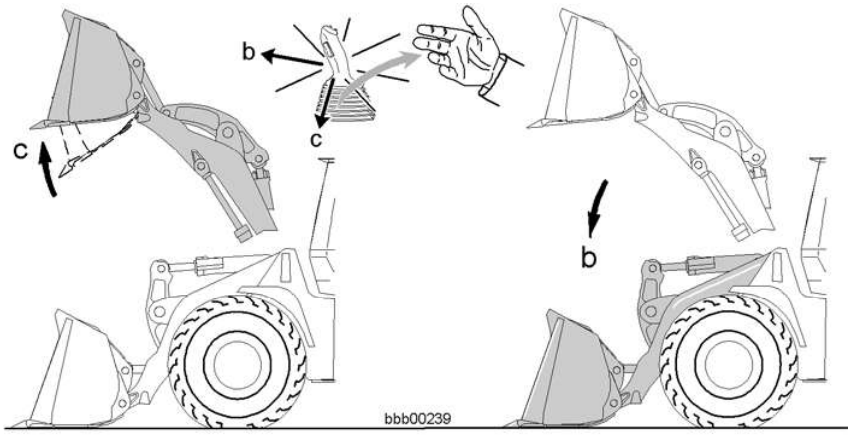

Fig. 359: Working movements

- ▶ Tilt in the loading bucket in the raised position by moving the LH control lever in direction **c** through the action point as far as it will go and releasing it.
  - ▷ The LH control lever is held in this position by magnetic force.
  - ▷ This moves the bucket into the preliminary position for the digging position.
  - ▷ As soon as the bucket reaches the preliminary position, the solenoid releases the LH control lever.
- ▶ Lower the lift arms by moving the LH control lever in direction **b**.
  - ▷ This moves the loading bucket into the digging position on the ground.

3.3.7 Diesel particulate filter

Function / operating conditions

The particulate filter integrated in the exhaust system reduces soot particles, hydrocarbons and carbon monoxide in the exhaust gas.

In normal operation the filter automatically cleans itself. The pre-requisite for this is achieving an exhaust gas temperature of above 250 °C over more than half of the operating time.

The exhaust counterpressure is recorded by the data logger. The data logger transmits the information via a data cable to the “diesel particulate filter” control unit in the driver's cab.

The following must be observed when operating at a sufficiently high exhaust temperature:

- ▶ Do not let the engine idle for a long period.
- ▶ Switch off the engine when the machine is not being used.
- ▶ Observe the control unit of the diesel particulate filter. If malfunctions are displayed the independent cleaning function of the filter is at risk. In this event take appropriate measures as quickly as possible. (For more information see: Function test, page 203)

NOTICE
Unsuitable diesel fuel can damage the particle filter!

- ▶ Only use commercially available diesel fuels to operate the machine. Additives must not be added. (For more information see: 5.3.3 Diesel fuels, page 310)

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– if lifted further, they tilt back out, but not forward.

The lever ratio of the kinematics in the topmost lifting range means that the load bearing capacity may be restricted. (For more information see: 1.2.25 Attachment - forklift, page 37)

This is how to work in forklift mode.

Make sure that the working attachment and the quick-change device are safely locked. (For more information see: 3.5 Fitting and removing the attachment, page 231)

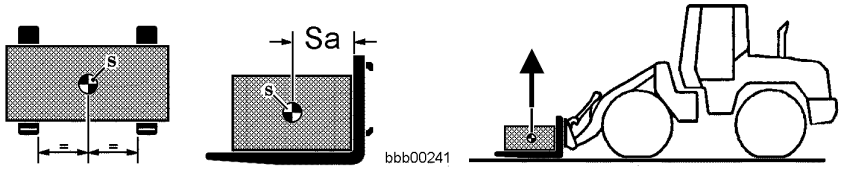

Fig. 369: Distance from centre of gravity

S Centre of gravity **Sa** Distance from centre of gravity

NOTICE
There is a risk of damage to the load and the machine.
During forklift operation, only use forks with prongs of suitable length and make sure that these do not project beyond the load. Otherwise goods or pallets lying in front of the forks could be damaged.

▶ Avoid incorrect operation during forklift operation.

When you pick up the load, make sure that the load is resting as close as possible to the vertical limb of the fork prong.

▶ Pick up the load. Make sure that the centre of gravity **Sa** of the load is correctly positioned.

WARNING
There is a risk of the machine tipping over.

▶ Avoid incorrect operation during forklift operation.

▶ Raise the lift arms to the transport position (30-40 cm above the ground).

▶ When driving unloaded, tilt the forklift slightly in and carry it low.

▶ When driving with a load, tilt the forklift slightly in and carry the load low.

▶ When driving on slopes, always keep the load uphill.

▶ Never drive across slopes.

▶ Never turn on slopes.

If a high unloading position is required:

▶ Do not raise the lift arms until just before reaching the unloading point.

If a low unloading position is required:

▶ Do not lower the lift arms until just before reaching the unloading point.

3.3.11 Timber grabber

An optional attachment is available for transferring timber.

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Scraping off material

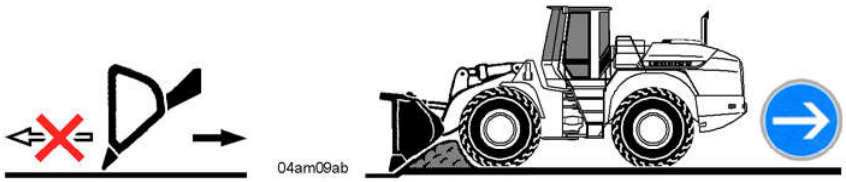

Fig. 384

▶ Tilt the bucket down and drive backwards.

3.4.4 Loading a heap

Picking up material

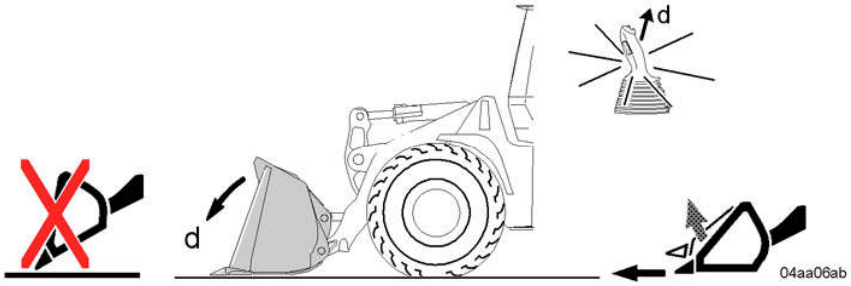

Fig. 385: Bucket position

NOTICE
There is a risk of damage to the machine.
The lift arms may be damaged if you hit a hard obstacle at speed when clearing away bulk material in the forward travel direction with the bucket tipped down.

▶ When clearing away bulk material, do not drive into the pile with the bucket tipped down.

▶ Lower the bucket horizontally to the ground.

▶ Drive into the material, slightly tipping the bucket in the process.

If you need to help the bucket penetrate the material:

▶ Gently tip the bucket up and down while driving into the material.

▶ Also press down the inch/brake pedal. (For more information see: 3.4.1 Picking up and moving material, page 217)

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3.5 Fitting and removing the attachment

3.5.1 Operating the quick-change device with the control lever for additional working functions

The quick-change device is fitted on the front of the attachment holder and is used for changing the working attachment.

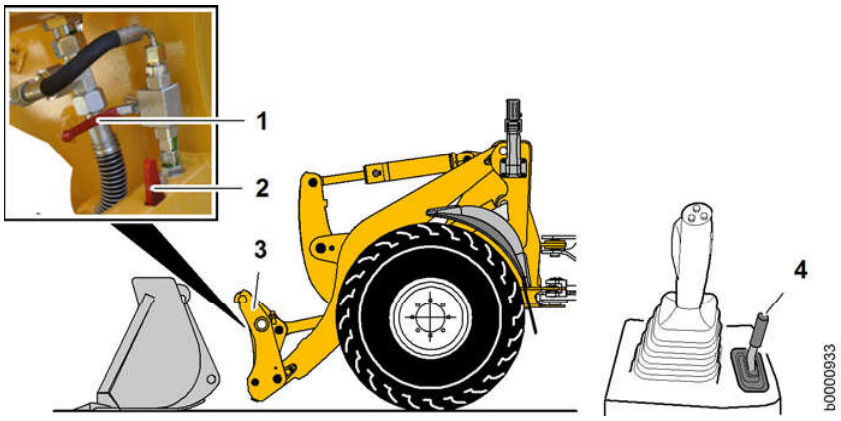

Fig. 407: Components of the quick-change device

1	*Quick-change device* switch lever	**3**	Quick-change device[37)]
2	Locking indicator	**4**	Control lever for additional working functions

Note
No equipment or attachments of other makes may be installed or attached to the machine without prior written consent from Liebherr.

▶ The appropriate technical documentation should be made available to Liebherr for this purpose.

Removing the working attachment

Carry out the following steps:

1. Depressurising the operating circuits[38)]
2. Disconnecting the hydraulic lines[38)]
3. Activating the quick-change device
4. Unlocking and disconnecting the working attachment

Depressurising the hydraulics

If the working attachment has an independent hydraulic circuit, the hydraulic operating circuits must be depressurised.

[37)] Optional for lift arms with Z kinematics
[38)] If the working attachment has an independent hydraulic supply

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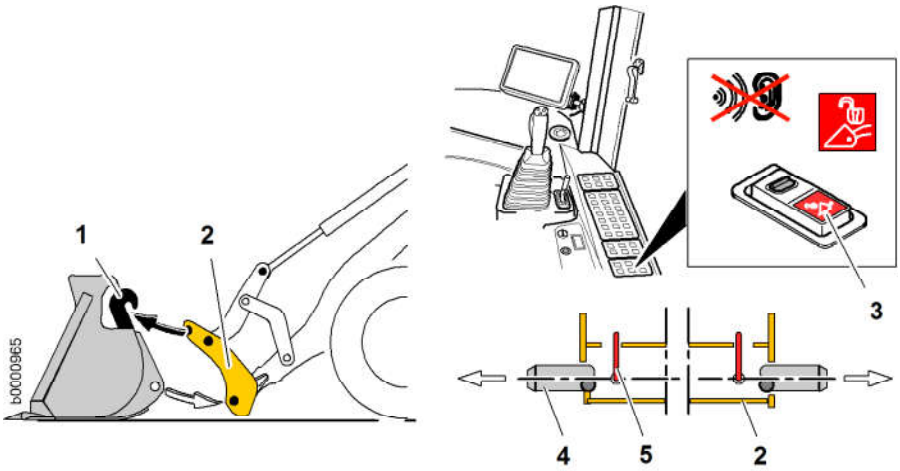

Fig. 419: Locking the working attachment

1 Working attachment holder
2 Quick-change device
3 *Quick-change device* button
4 Locking pin
5 *Locked postion indicator*

▶ Carefully move the quick-change device **2** into the working attachment holder **1**.

▶ Slightly raise and tilt in the working attachment.
▷ The working attachment latches into the quick-change device.

▶ Press the button **3** and hold it down.
▷ The warning tone stops.
▷ The locking pins **4** of the quick-change device **2** are extended.

When the pins are completely extended:

▶ Release the button **3** again.
▷ The working attachment is locked.

Checking that the working attachment is locked

The fact that you can change the attachment from the cab does not excuse you of the duty to check it afterwards. Every time you change the attachment, make a *visual inspection* and a *mechanical check* to make sure that the working attachment is correctly locked.

WARNING
Beware of the working attachment dropping.

▶ Do not carry out any working movements of the attachment before checking whether it is locked.

Visual inspection

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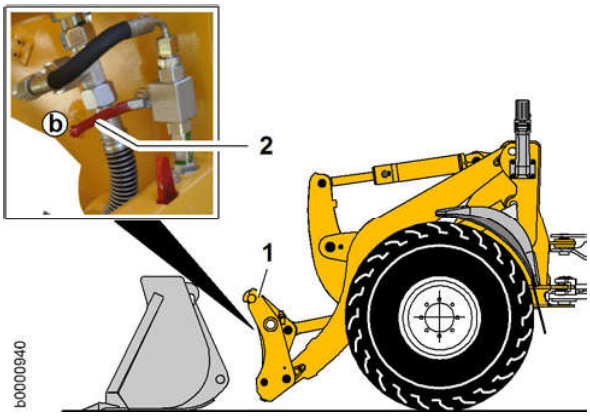

Fig. 431: Deactivating the quick-change device

1 Quick-change device

2 Switch lever

b Lever position when the quick-change device is deactivated

▶ Pull the switch lever **1** out of the twist lock, turn it to position **b** and engage it in the twist lock again.
▷ The function for unlocking the quick-change device is disabled.

Connecting the hydraulic lines

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

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

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

▶ Depressurise the hydraulics (For more information see: Depressurising the hydraulics, page 244) .

▶ Take the caps off the line couplings.

▶ Connect the hydraulic lines according to their function.

Note the following points when connecting:
– Clean the line couplings before connecting.
– Do not connect the wrong ends of the hydraulic lines.
– Lay the hydraulic lines so that they cannot become caught in the working attachment during operation.
– Use the hose retainers provided when laying the lines.

▶ Check the hydraulic lines for leaks after connecting them.

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Fig. 448: Transmission

▶ Reattach the plug **1** to the powershift section **2** of the transmission **3**.
  ▷ This connects the solenoid valve on the gearbox to the electronics.
  ▷ The machine's travel functions are operational again.

Towing with the engine not running

If the machine has suffered a serious breakdown such as engine failure, the braking and steering functions will be impaired.

Note
The brake accumulator is not filled if the engine is not running.

▶ The service brake becomes ineffective after it is applied several times.

The following precautions must be taken before towing the machine:
❑ Release the parking brake mechanically
❑ Have a suitable tow bar of sufficient strength ready

Releasing the parking brake mechanically:

Fig. 449

WARNING
There is a risk of accidents if the machine rolls away.

▶ Use the wedges to secure the machine against rolling away.

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Service code	Effect	Cause	Remedy
M3000	STOP symbol field H24 flashes, no emergency steering function available	Emergency steering pump check pressure switch: shorted to earth	Contact LIEBHERR CUSTOMER SERVICE
M3001	STOP symbol field H8 flashes, no emergency steering function available	Emergency steering pump pressure switch: shorted to earth	Contact LIEBHERR CUSTOMER SERVICE
M3002	Brake system accumulator pressure symbol field H19 lights up, condition of the service brake cannot be detected	Brake system accumulator pressure switch: shorted to earth	Contact LIEBHERR CUSTOMER SERVICE
M3003	No float position available	Float position pressure switch: shorted to earth	Contact LIEBHERR CUSTOMER SERVICE
M3004	None	Inching angle sensor: channel 1 overcurrent >20 mA	Contact LIEBHERR CUSTOMER SERVICE
M3005	None	Inching angle sensor: channel 1 undercurrent <4 mA	Contact LIEBHERR CUSTOMER SERVICE
M3006	Travel direction cannot be selected	Travel direction switch: forward signal channel 1 shorted to earth	Contact LIEBHERR CUSTOMER SERVICE
M3007	Travel direction cannot be selected	Travel direction switch: reverse signal channel 1 shorted to earth	Contact LIEBHERR CUSTOMER SERVICE
M3008	No lift kick-out available	Lift kick-out inductive switch: shorted to earth	Contact LIEBHERR CUSTOMER SERVICE
M3009	No bucket return-to-dig available	Bucket return-to-dig inductive switch: shorted to earth	Contact LIEBHERR CUSTOMER SERVICE
M300B	Fuel filling level not detected - minimum filling level displayed	Fuel level sensor: voltage below 1 V	Check fuse F44 - contact LIEBHERR CUSTOMER SERVICE
M300C	Fuel filling level not detected - minimum filling level displayed	Fuel level sensor: voltage above 4 V	Contact LIEBHERR CUSTOMER SERVICE
M300D	Engine cannot be started	Ignition switch: start signal T 50a shorted to earth	Contact LIEBHERR CUSTOMER SERVICE
M300E	None	Gas pedal angle sensor: channel 1 overcurrent >20 mA	Contact LIEBHERR CUSTOMER SERVICE
M300F	None	Gas pedal angle sensor: channel 1 undercurrent <4 mA	Check fuse F44 - contact LIEBHERR CUSTOMER SERVICE

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Service code	Effect	Cause	Remedy
M407E	Option not available	Direction 1 output signal (4th control circuit) - electrical fault at output (insufficient current)	Contact LIEBHERR CUSTOMER SERVICE
M407F	Option not available	Direction 1 output signal (4th control circuit) - electrical fault at output (excessive current)	Contact LIEBHERR CUSTOMER SERVICE
M4080	Option not available	Direction 1 output signal (4th control circuit) - electrical fault at output (deviation)	Contact LIEBHERR CUSTOMER SERVICE
M4081	Option not available	Direction 1 output signal (4th control circuit) - electrical fault at output (short circuit)	Contact LIEBHERR CUSTOMER SERVICE
M4082	Option not available	Direction 2 output signal (4th control circuit) - electrical fault at output (insufficient current)	Contact LIEBHERR CUSTOMER SERVICE
M4083	Option not available	Direction 2 output signal (4th control circuit) - electrical fault at output (excessive current)	Contact LIEBHERR CUSTOMER SERVICE
M4084	Option not available	Direction 2 output signal (4th control circuit) - electrical fault at output (deviation)	Contact LIEBHERR CUSTOMER SERVICE
M4085	Option not available	Direction 2 output signal (4th control circuit) - electrical fault at output (short circuit)	Contact LIEBHERR CUSTOMER SERVICE
M4086	Additional equipment 3 cannot be activated	Additional equipment 3: electrical fault at output (overcurrent/short circuit)	Contact LIEBHERR CUSTOMER SERVICE
M4087	Additional equipment 4 cannot be activated	Additional equipment 4: electrical fault at output (overcurrent/short circuit)	Contact LIEBHERR CUSTOMER SERVICE
M5022	Travel slow or impossible	Variable displacement motor balance failed	Contact LIEBHERR CUSTOMER SERVICE
M5026	Engine speed cannot be changed, driving not possible	Gas pedal angle sensor: values from sensors 1 and 2 are different	Check fuse F44, F45 - contact LIEBHERR CUSTOMER SERVICE
M5027	No inching function available	Inching angle sensor: values from sensors 1 and 2 are different	Check fuse F44, F45 - contact LIEBHERR CUSTOMER SERVICE
M5028	Speed limited to 20 km/h, driving only possible in 1st or 2nd gear	Gear oil temperature switch tripped: gear oil temperature above 120 °C, oil level too high or temperature switch defective	Clean cooling system, check oil level, contact LIEBHERR CUSTOMER SERVICE
M5029	No direct reaction	Rear axle brake error: rear axle brake activated for longer than 3 seconds at a time or for more than 16% intermittently	Contact LIEBHERR CUSTOMER SERVICE

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4.2 Problems - Cause - Remedy

4.2.1 Visible and audible warning signals


bsym0051

The following table contains the warning signals which have an additional audible tone or which are only displayed visually, along with their causes and remedies.

There are four different audible warning signals:
- Continuous tone
- Interval tone 1/10 (1 second tone followed by 10 second pause)
- Interval tone 2/3 (2 second tone followed by 3 second pause)
- Single 1 second beep

Warning signal	Cause	Remedy
Service code MA02A Coolant temperature symbol field flashes	Coolant temperature above 97 °C	- Clean the cooling system
Service code MA02A, M6000, M6012	Coolant temperature above 104 °C	- Clean the cooling system
Coolant temperature symbol field flashes STOP symbol field lights up, continuous warning buzzer	Fault in the cooling or electrical system	- Contact LIEBHERR CUSTOMER SERVICE
Service code M6008, M6012	Coolant level too low	- Check the coolant level
Coolant temperature symbol field lights up STOP symbol field lights up, continuous warning buzzer	Fault in the electrical system	- Contact LIEBHERR CUSTOMER SERVICE
Hydraulic oil overheating symbol field lights up	Hydraulic oil temperature above 90 °C	- Clean the cooling system
Service code MA02A	Hydraulic oil temperature above 95 °C	- Clean the cooling system
Hydraulic oil overheating symbol field lights up, 1/10 intermittent warning tone The output of the travel pump is reduced	Fault in the cooling/hydraulic/electrical system	- Contact LIEBHERR CUSTOMER SERVICE
Service code M2002	Emergency steering pump check not successfully completed	- Contact LIEBHERR CUSTOMER SERVICE
Emergency steering CHECK symbol field lights up	Error in the electrical/hydraulic system	
Service code M2001	Emergency steering function activated due to failure of steering pump	- Contact LIEBHERR CUSTOMER SERVICE
Emergency steering symbol field lights up, warning buzzer with 40 sec. tone	Error in the electrical/hydraulic system	
Service code M6004, M5034, MA02A, M6012	Insufficient engine oil pressure	- Check the oil level

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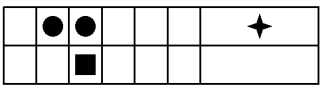
5 Maintenance

5.1 Maintenance and inspection schedule

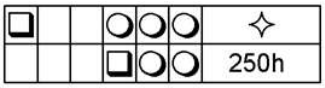
The following abbreviations are used in this section:
- h = service hours

Various symbols (solid or empty circles, boxes and stars) are used to indicate the maintenance tasks, which fall into two main types.



bsym0039

The symbols have the following meanings:
Table with solid circle, box or star
- Responsibility for carrying out the maintenance work lies with the machine operator or his maintenance personnel.
  This affects the maintenance intervals every 10 and 50 service hours (h) and non-scheduled intervals.



bsym0040

The symbols have the following meanings:
Table with empty circle, box or star, or service hours (h)
- The maintenance and inspection work must be performed or supervised by authorised engineers from Liebherr or its authorised dealers.
  This affects the maintenance interval: on delivery and every 500, 1000, 2000, 3000 service hours (h), and at unscheduled times.

A list of the spare parts needed for maintenance and inspection work is contained in the service package of the spare parts list.

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Diesel fuel at low temperatures (winter operation)

Paraffin crystals form in diesel fuel as the temperature falls; these increase the flow resistance in the fuel filter to such an extent that the fuel supply to the engine is no longer guaranteed.

NOTICE
Danger of damage to the injection system if incorrect fuel is used.
Adding petroleum or normal petrol will damage the injection system.

▶ Do not add petroleum, normal petrol or any additives to the diesel fuel.

If the outside temperature falls below -20 °C:
▶ Use an ignition-starting device such as a fuel filter heater.

When using the machine in arctic climates:
▶ Use special diesel fuels with suitable flow characteristics.

5.3.4 Lubricating oils for diesel engines

Lubricating oil quality

Only high-alloy lubricating oils are used in modern diesel engines.

They are comprised of base oils which feature combined admixtures (additives).

The lubricating oil regulation for Liebherr diesel engines is based on the following specifications and regulations.

Description	Specification
ACEA classification (Association des Constructeurs Européens de l'Automobile)	E4, E6, E7 Notice: only E6 particle filter operation is permitted
API classification (American Petroleum Institute)	CH-4, CI-4 Notice: observe the reduced oil-change intervals

Tab. 30: Lubricating oil specifications

Lubricating oil viscosity

Select the lubricating oil viscosity in accordance with the SAE classification (Society of Automotive Engineers).

The ambient temperature determines the right choice of SAE class.

The selection of the SAE classification gives no indication of the quality of a lubricating oil.

Oil that is too viscous can cause starting problems, while insufficient viscosity impairs lubricating efficiency.

The temperature ranges detailed in the following diagram are guidelines; short-term deviations are permissible.

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Recommended lubricant	Specification
	ZF: TE-ML 05C or 05D
LS = Gear oil with limited slip additives for disc brakes and self-locking differentials.	

Tab. 44: Lubricating oil specifications

For the viscosity class SAE 90 LS, an oil of the viscosity class SAE 80 W 90 LS can also be used.

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

NOTICE
Oil quality

- ▶ Mixing various types of oil is not permitted.
- ▶ A minimum phosphorus content of 1900 mg/kg is required.

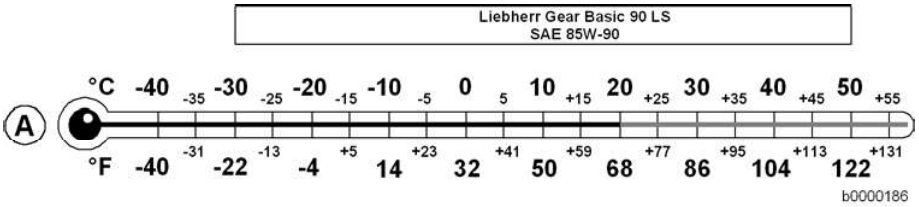

Fig. 477: Selection of the SAE class according to temperature

A Ambient temperature

The temperature ranges specified in the diagram are guidelines and can be briefly exceeded or fallen short of.

5.3.10 Lubrication grease and other lubricants

Lubrication grease is used for the automatic or manual lubrication of the machine. The lubrication grease reaches the lubrication points via the central lubrication system or lubrication nipples.

Examples:
- Articulated joint
- Ring gears, gearwheels
- Pins, axles and bolts
- Attachment tools

Note
The lubrication grease must be capable of being easily delivered throughout the entire ambient temperature range.

- ▶ Only use approved lubrication greases.
- ▶ In retrofitted central lubrication systems, pay attention to the specifications for the consistency of the lubrication grease.

Minimum quality requirements

Lubrication greases must fulfil the following minimum quality requirements.

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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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▶ Operate the hand pump **2**.

When fuel flows out of the bleeder screw without bubbles:

▶ Tighten the bleeder screw **1**.

▶ Continue to operate the hand pump until you feel strong resistance.

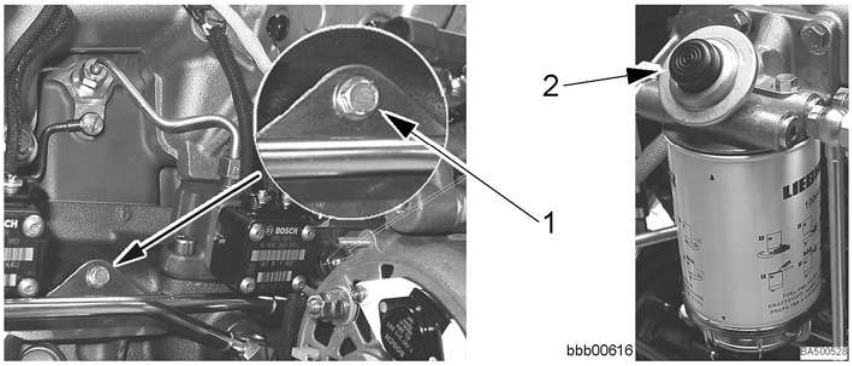

Fig. 504: Bleeder screw on the crankcase

▶ Unscrew the bleeder screw **1** on the crankcase (if present) by 2 to 3 revolutions.

▶ Operate the hand pump **2**.

When fuel flows out of the bleeder screw without bubbles:

▶ Tighten the bleeder screw **1**.

▶ Continue to operate the hand pump until you feel strong resistance.

Bleeding the fuel filter with the engine bleeding function

It is necessary when the fuel tank has run completely empty.

When the fuel tank is empty there is air in the fuel system.

You can remove some of the air from the fuel system by bleeding the fuel filter.

You can bleed the air between the injection pump and the injection nozzle by activating engine bleeding mode.

or

Procedure

DANGER
There is a risk of fire and explosions.

▶ Do not smoke.

▶ Avoid naked flames.

▶ Only work with the engine switched off and cooled down.

▶ Bleed the fuel filter (For more information see: Bleeding the fuel filter, page 340)

▶ Activate the engine bleeding function on the control unit or the display unit.

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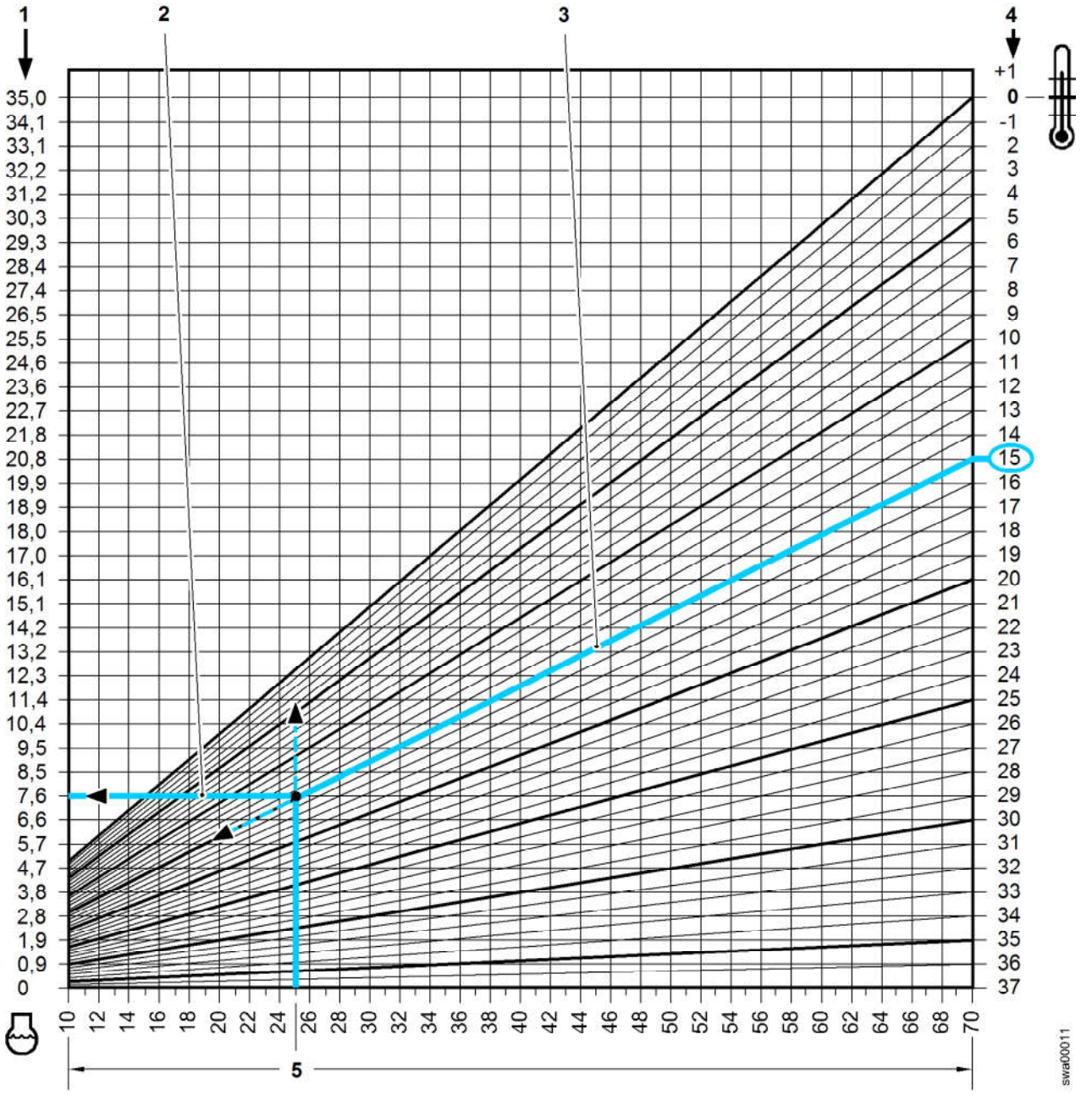

Fig. 516: Selection for antifreeze concentration

1 Amount of pure antifreeze to be added in litres

2 Identified line - top-up quantity

3 Guide line(s) - example -15 °C

4 Measured coolant freezing point in °C

5 Total capacity of cooling system in litres (example 25 litres)

Example procedure

Assumption:
25 litres total filling quantity of the cooling system
-15 °C coolant temperature, measured in the cooling system

▶ In the diagram, go to the line showing the overall cooling system capacity **5** at 25 litres and follow it upwards.

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5.11 Steering system

5.11.1 Testing the steering

Make sure that:
- ❑ The working attachment is in the transport position
- ❑ The articulation lock is open
- ❑ There is enough space to test the steering

Procedure

CAUTION
Beware of accidents

- ▶ Do not allow anyone into the danger area while the test is being conducted.
- ▶ Perform the test on level ground with no obstacles.

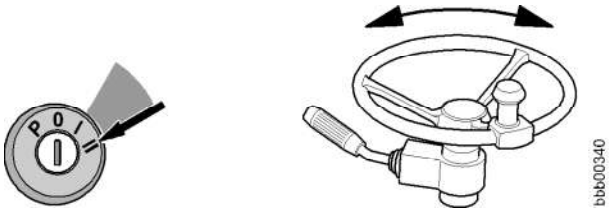

Fig. 529

- ▶ Start the engine.
- ▶ Without moving the machine, turn the steering in both directions and check that it is functioning properly.

5.11.2 Lubricating the bearing points on the steering cylinders

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

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5.16 Machine frame and ballast weight

5.16.1 Lubricating the articulated bearing and the rear oscillating bearing

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

Lubricating the articulation bearing

Procedure

Articulation bearing lubrication points

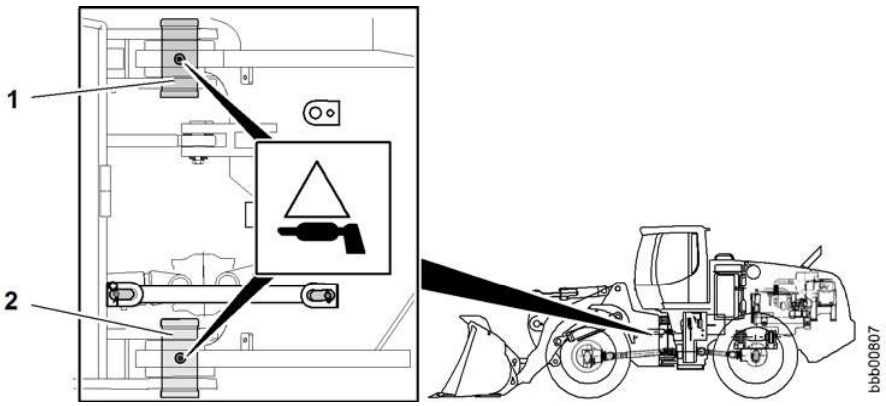

Fig. 540: Articulation bearing lubrication points

1 Top articulation bearing **2** Bottom articulation bearing

▶ Lubricate the articulation bearing lubrication points.

Lubricating the rear oscillating bearing

Procedure

Lubricating points on the rear oscillating bearing

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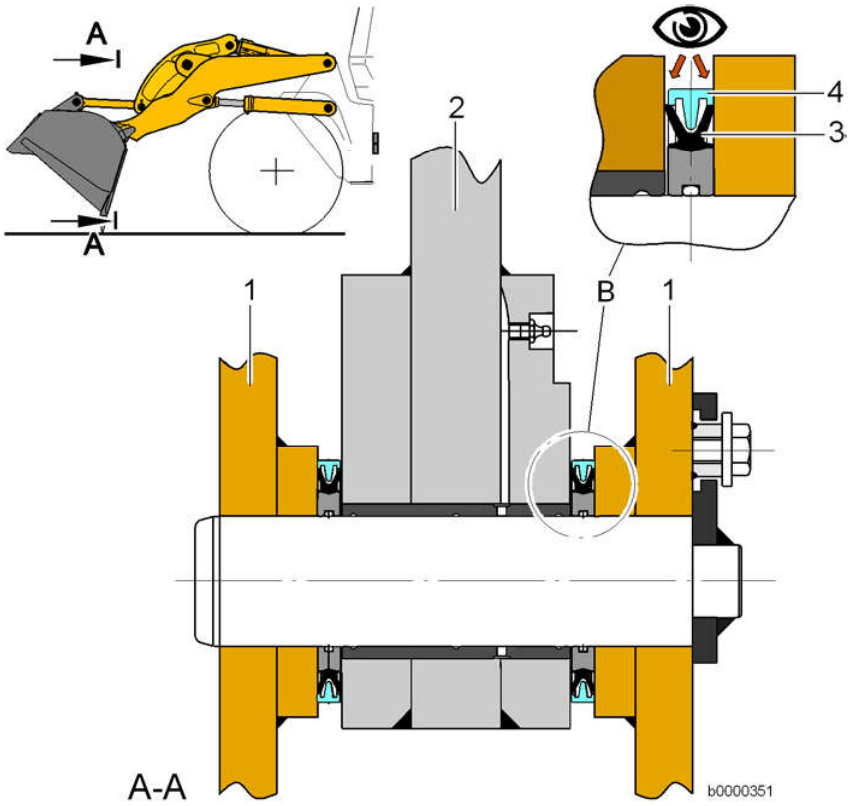

Fig. 559: Checking the bucket bearing seal

1 Bucket bearing plate
2 Bucket arm
3 Sealing lips
4 Dirt guard
B Bucket bearing seal

▶ Clean the bucket bearing seal **B** using a steam jet.

▶ Visually check whether the sealing lips **3** touch the sides of the bucket arm **2** and bucket bearing plate **1**.

Replace the bucket bearing seal if:
– The bucket bearing seal **B** is damaged
– The sealing lips **3** do not touch the bucket bearing plate **1**
– The sealing lips **3** do not touch the bucket arm **2**

Note
Replace the bucket bearing seal.

▶ Contact LIEBHERR CUSTOMER SERVICE.

Checking the bearing bushings for wear

Dirt or insufficient lubrication causes wear on the bearing bushings. Wear is recognisable through increased play between the pin and bearing bushing or through loud noises. Replace the bearing bushings in good time to prevent damage to the bucket arms.

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