en

Operating manual

Machine for Industrial Applications
A 944 C HD Litronic Pick & Carry

from serial number 56527

Document identification

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Product identification

Manufacturer:	LIEBHERR Hydraulikbagger GmbH
Type:	A 944 C HD Litronic Pick & Carry
Type no.:	196
Conformity:	CE

Address

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1.1.3 Undercarriage

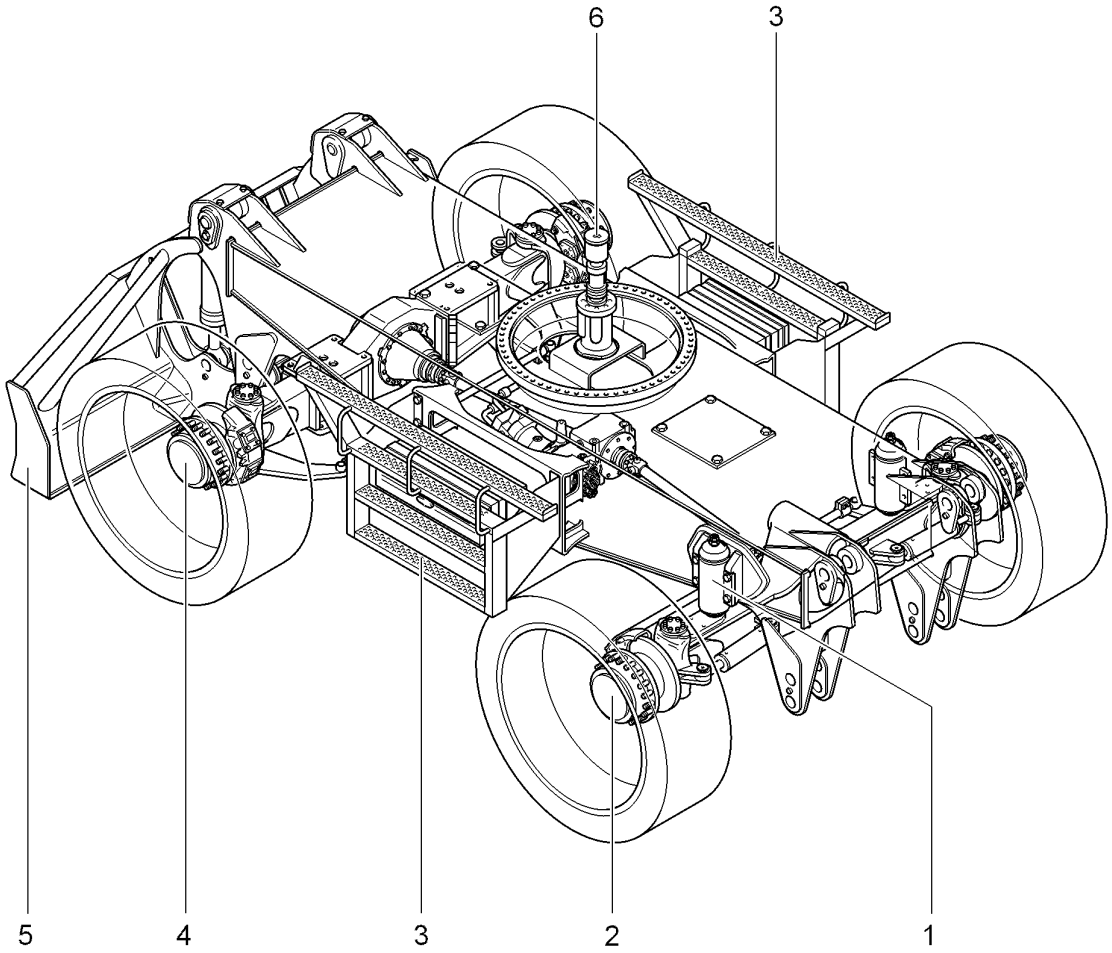

Fig. 1-3 *Undercarriage*

1 Oscillating axle locking system
2 Oscillating axle
3 Ladder with toolbox
4 Rigid axle
5 Blade support
6 Rotary connection

1.2 Vibration emissions

The operator seat built into the machine by the manufacturer conforms to ISO 7096:2000, EM 6. When replacing the seat, ensure that the new seat also conforms to this standard.

Hand-arm vibration

If the machine is operated according to the manufacturer instructions, the weighted (frequency-rated) effective hand-arm vibration is below 2.5 m/s² according to ISO 5349-1:2001.

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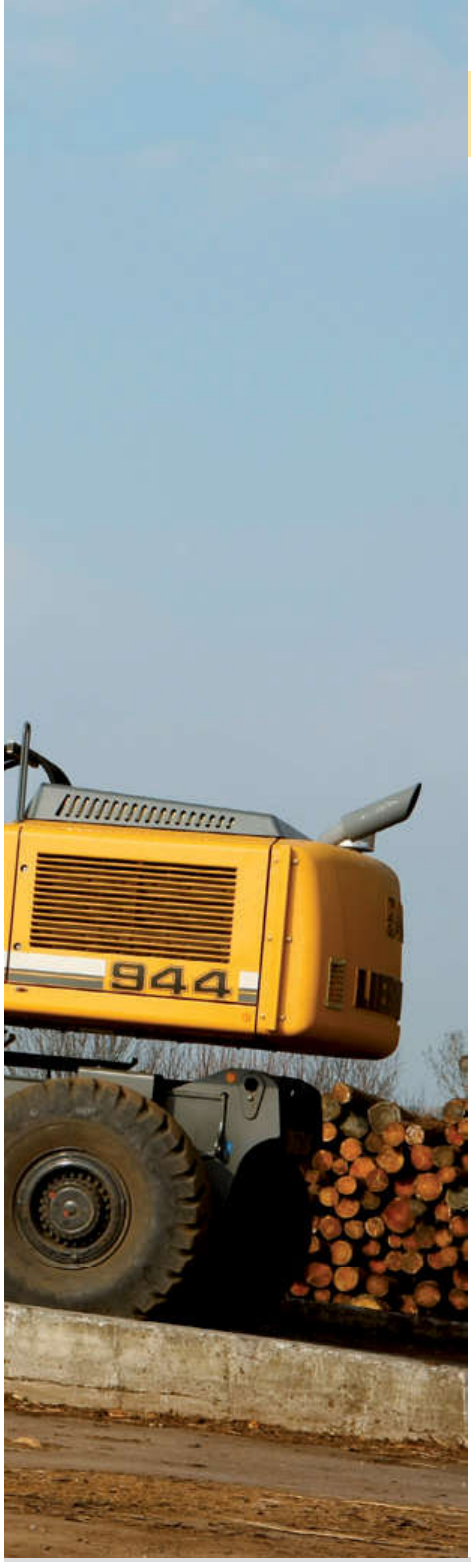


Reliability

Liebherr log loaders prove themselves day in, day out in the most varied industrial applications all over the world. Many years of experience as the world's largest manufacturer of wheeled excavator, continuous development and the introduction of the latest technology are evident in every machine, guaranteeing absolute safety during applications. With its rugged design, and featuring Liebherr components, the A 944 C HD Litronic has been designed for extremely long life expectancy.

Quality in detail

Liebherr components

Liebherr develops, tests and manufactures components such as diesel engines, slewing gear, hydraulic cylinders and electronics specifically for industrial machinery. Parts including engines and pumps for example, are already being synchronized with each other as early as the construction phase, yielding a constant standard of quality.

Functional safety

Safety components fitted as standard, such as safety check valves, allow high availability. The operator can thus concentrate fully on the task at hand, due to the integrated on-board electronics performing a constant balancing of pre-defined set data.
The magnet bar, fitted as standard in the hydraulic system, increases the operating life of the hydraulic components and serves as a service indicator.

Rugged attachments

Working attachment

The stable attachments are designed for the harshest applications and have a long service life. All components have been optimised using the FE method. Stress-reducing two-sided cylinder bearings on mono and stick connections. Integrated large diameter torsion tube for the best possible force absorption by the attachment components. Carefully planned stick design with integrated impact protection to prevent damage.

Piping

Routing the hydraulic lines in the arm offers the best protection against damage. The electric cabling is made with high-grade materials, thus guaranteeing a reliable supply to the consumer.

Liebherr hydraulic cylinders

- Specific size for each machine
- High-grade surface coating of the piston rods
- All Liebherr cylinders feature special long-life sealing systems
- Shock absorption at both sides in the working cylinders

Functional safety

- Essential operating data is stored and can be recalled at any time
- Control and monitoring functions increase functional safety of the machine
- Four fixed working modes for output discharge facilitate an effective and efficient operation:
  - ECO-Mode: High handling and loading performance coupled with low fuel consumption
  - POWER-Mode: For maximum handling and loading performance under severe conditions
  - LIFT-Mode: for precise handling of heavy loads
  - FINE-Mode: for fine control at precision work

Equipment

Undercarriage

Two circuit travel brake with accumulator	•
Four wheel steering	•
Travel motor protection	•
Outrigger zylinder rod guards	
Creeper speed electrically switchable from cab	•
Steering reversal control	•
Service free parking brake	•
Choice of tires	
Auto check valve directly on each stabilizer cylinder	•
Proportional power steering	•
Customized colors	+
Two lockable storage boxes	•
Two-speed power shift transmission	•

Uppercarriage

Electric fuel tank filler pump	+
Maintenance-free swing brake lock	•
Handrails, Non slip surfaces	•
Main switch for electric circuit	•
Engine hood with lift help	•
Pedal controlled positioning swing brake	•
Reverse travel warning system	+
Sound insulation	•
Customized colors	+
Pin lock upper/lower	
Maintenance-free HD-batteries	•
Extended tool kit	
Lockable tool box	•
Tool kit	•

Hydraulics

Hydraulic tank shut-off valve	•
Extra hydr. control for hydr. swivel	+
Pressure compensation	•
Hook up for pressure checks	•
Pressure storage for controlled lowering of attachments with engine turned off	•
Filter with partial micro filteration (5 µm)	•
Electronic pump regulation	•
Stepless mode system (ECO)	•
Flow compensation	•
Four mixed modes, can also be adjusted	•
Full flow micro filtration	+
Bio degradable hydraulic oil	+
Tool Control	+
Additional hydraulic circuits	+

Engine

Turbo charger	•
After-cooled	•
Sensor controlled engine idling	•
Unit pump system	•
Air filter with pre-cleaner main- and safety element	•

Operator's Cab

Storage tray	•
Displays for engine operating condition	•
Mechanical hour meters, readable from outside the cab	•
Roof hatch	•
All-round adjustable roof vent	
6-way adjustable seat	•
Airpressure operator seat with heating and head-rest	+
Seat and consoles independently adjustable	•
Extinguisher	+
Removable customized foot mat	•
Dome light	•
Rigid cab elevation	+
Cab heater with defroster	•
Cloth hook	•
Air conditioning	•
Electric cool box	+
Steering wheel adjustable	•
Bullet proof window (fixed installation – can not be opened)	+
Stereo radio	+
Preparation for radio installation	+
Rain hood over front window opening	•
Beacon	+
All tinted windows	•
Door with sliding window	•
Auxiliary heating	+
Sun shade	+
Sun roller blind	•
Electronic drive away lock	+
Wiper/washer	•
Cigarette lighter and ashtray	•
Additional flood lights	+

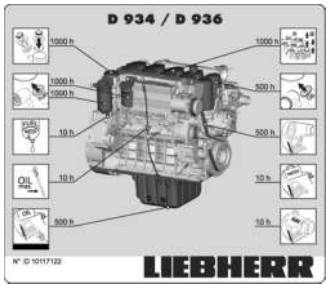
Attachment

Flood lights	•
Hydr. lines for clam operation in sticks	•
Industrial-type gooseneck sticks with remote hydraulic pin puller	+
Sealed pivots	•
Safety lift hook	+
Liebherr line of clams	+
Liebherr semi-automatic central lubrication system	•
Liebherr fully-automatic central lubrication system	+
Likufix	+
Safety check valves on hoist cylinder	•
Safety check valves on stick cylinder	•
Hose quick connection	•
Hydraulic or manual quick change tool adapter	+
Customized colors	+
Special buckets and other tools	+
Overload warning device	+
Two way valves for bucket/clam use	+
Locking of connections for clam operation	+
Cylinders with shock absorber	•

• = Standard, + = Option

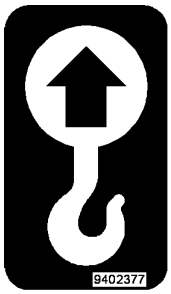
Options and/or special attachments, supplied by vendors other than Liebherr, are only to be installed with the knowledge and approval of Liebherr to retain warranty.

All illustrations and data may differ from standard equipment. Subject to change without notice.



15: Lubrication chart for diesel engine

Contains instructions regarding the maintenance of the diesel engine.



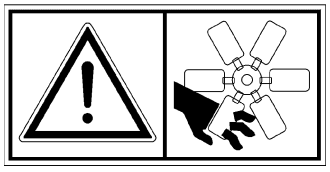
16: Attachment point for lifting

Indicates attachment points for lifting.

The use of the lifting points depends on the chosen method of transport. For more information, refer to chapter "Transport".

17: Prohibition sign

It is prohibited to access the marked area.



18: Engine shut-down

Before opening the bonnet, shut down the engine.

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S22 - **Parking light, dipped light**

The switch is assigned several functions that are operated with repeat actuation:

– 1. Parking light and rear light on
– 2. Dipped light and rear light on
– 3. The lighting system is off

S35 - **Servo steering**

The equipment and attachments can only be operated when the servo control is activated.

S36 - **Special function 1 (optional equipment)**

Assignment and activation depend on kit.

S37 - **Special function 2 (optional equipment)**

Assignment and activation depend on kit.

S38 - **Special function 3 (optional equipment)**

Assignment and activation depend on kit.

S39 - **Special function 4 (optional equipment)**

Assignment and activation depend on kit.

S41 - **Beacon (optional equipment)**

Activates the beacon.

S42 - **First gear, gear switching**

The transmission can be operated at two speeds. The first gear is selected with the switch. If the switch is not actuated, the machine is automatically operated in second gear.

S85 - **No function**

S85 - **No function**

S86 - **Power selection (mode)**

Four different modes can be selected by pressing the switch. The active mode is indicated by the letter below the LED.

– **L**: LIFT mode (sensitive lifting of loads)
– **F**: FINE mode (precision operation)
– **E**: ECO mode (economical operation)
– **P**: POWER mode

▶ Press the **Menu** button.
  ↳ The operating hours counter is reset.
  ↳ The **UP** and **DOWN** buttons and the **Menu** symbol are no longer visible.

▶ Press the **BACK** button.
  ↳ The submenu is closed.

Fine adjustment menu for rotating grapple

This menu is available in machines equipped with mini joystick control (optional equipment). On the menu page, the maximum achievable speed of the "rotate grapple" function can be adjusted.

The function is used to rotate grapples or adjust other attachment tools.

Note!
After fine adjustment: Before resuming work, check the response of the machine to the control movements. Familiarise yourself with the operation of the control devices at the modified settings.

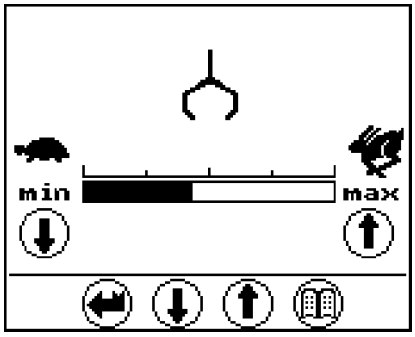

Fig. 3-10 *Fine adjustment menu for rotating grapple*

The bar indicator indicates the maximum achievable speed of the "rotate grapple" function. The speed can be set to slow (min) or fast (max).

The higher the chosen value, the faster the working tool is moved when the mini joystick is operated. If a high value (bar near "max") is selected, the attachment tool is moved at high speed, even if the mini joystick is only moved a short distance. We recommend choosing low to medium values.

The settings remain permanently activated and can only be disabled or modified in the menu.

▶ Press the **UP** or **DOWN** arrow button to select the desired speed.

▶ Press the **BACK** button.
  ↳ The submenu is closed.
  ↳ The settings are saved.

Alternatively

▶ Press the **Menu** button again.
  ↳ The menu page is displayed.
  ↳ The settings are saved.

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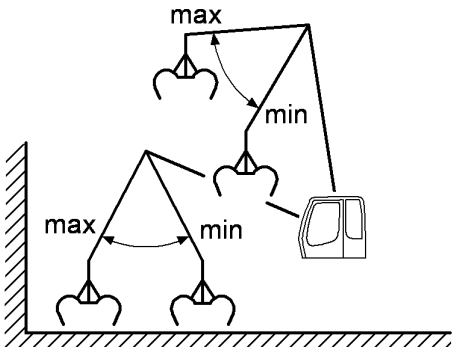

Fig. 3-27 *Shut-down points: Retracting stick (min), extending stick (max)*

Safety distance (distance between the working attachment and the operator's cab or objects in the vicinity of the machine): min. 1.5 m.

Adjust the stick cylinder shut-down function in such a way that there is a sufficient safety distance, even if the working tool is oscillating or if shut-down is delayed.

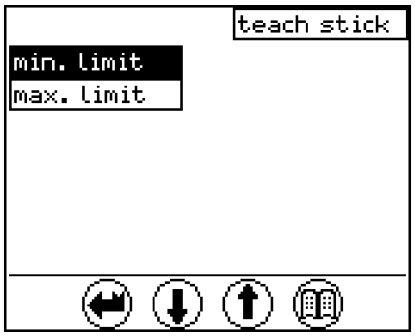

Fig. 3-28 *Menu: Stick cylinder shut-down*

Note!

▶ When adjusting the shut-down points, observe the following:

The control system determines the stick position based on decimal measurements. The menu does therefore not indicate angle values. The stick position is indicated by a value (value) that is not directly related to a real measurement.

The value increases as the stick is extended and decreases as the stick is retracted.

Setting the shut-down point for retraction:

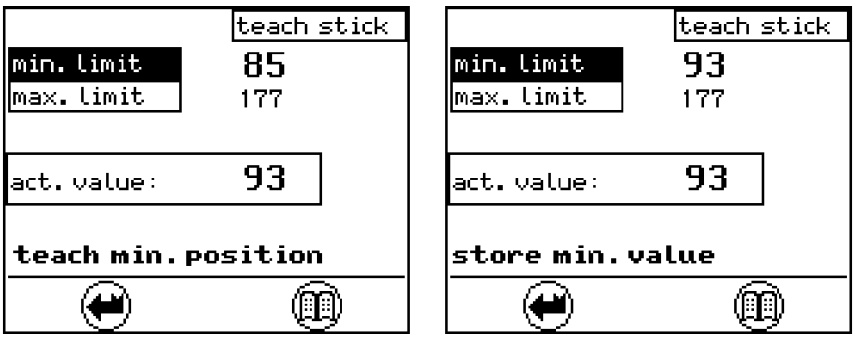

Fig. 3-29 *Menu: Shut-down point for retraction*

The windscreen can be placed to 2 positions.

– Position **a**: Windscreen closed.
– Position **b**: Windscreen is fully opened (attached to the roof of the operator's cab).

Caution!
The windscreen is very heavy.
There is a risk of injury to fingers, if they become caught between the panel and the frame when closing the windscreen.

▶ Hold the windscreen with both hands by the handle brackets **2**.

Caution!
Risk of glass break.
If the windscreen impacts with the steering wheel knob **3** or is closed without holding it, it could shatter.

▶ Before closing the windscreen, ensure that the steering column is not in a fully vertical position.

▶ Hold the windscreen with both hands by the handle brackets **2**.

▶ Ensure that the windscreen cannot collide with the steering wheel knob when closing it.

Opening windscreen:

▶ Pull the latch **1** inwards and down.
↳ The windscreen is released.

▶ Hold the windscreen by the two brackets and slide it upwards until it engages.

▶ Lock the windscreen in its position by engaging the latch **1**.

Closing windscreen:

▶ Pull the latch **1** inwards and forward.
↳ The windscreen is released.

▶ Hold the windscreen by the two handle brackets and slide it carefully down until it engages.

▶ Lock the windscreen in its position by engaging the latch **1**.

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To obtain optimum comfort:

- During **heating operation**, open the air outlets in the legroom area **a**, on right control console **b** and (if required) for windscreen **c**.
- During **a/c operation**, open the air outlets in the rear cab wall **d** and right control console **b**.

The best heating or air conditioning performance is achieved when using the recirculated air function.

The air flow is regulated by pressing keys **9** - **12** and using the rotating and lockable air outlets.

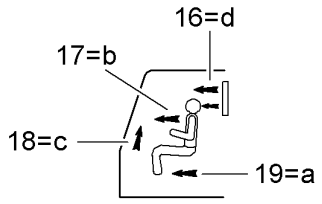


Fig. 3-53 *Air outlet symbols*

- Press key **9**.
  - Symbol **16** is displayed.
  - Air outlets **d** are opened.
- Press key **9** again to re-close the ventilation flaps.
  - Symbol **16** is no longer displayed.
  - Air outlets **d** are closed.

Open / close ventilation flap on control console:

- Press key **10**.
  - Symbol **17** is displayed.
  - Air outlet **b** is opened.
- Press key **10** again to re-close the ventilation flaps.
  - Symbol **17** is no longer displayed.
  - Air outlet **b** is closed.

Open / close the ventilation flap for the windscreen and legroom:

- Press key **11**.
  - Symbols **18** and **19** are displayed
  - Air outlets **a** and **c** are opened.
- Press key **11** again to re-close the ventilation flaps.
  - Symbols **18** and **19** are no longer displayed
  - Air outlets **a** and **c** are closed.

Open / close windscreen ventilation flap:

- Press key **12**.
  - Symbol **18** is displayed.
  - Air outlet **c** is opened.
- Press key **10** again to re-close the ventilation flaps.
  - Symbol **18** is no longer displayed.
  - Air outlets **c** are opened.

Switching the temperature display:

The displayed temperature can be switched from **° Celsius** to **° Fahrenheit**.

The vehicle is fitted with an electrical cabinet containing the electrical connections to operate and control the heating. It is located to the side of the operator cab. The electrical heating is supplied from a stationary power connection.

This will considerably shorten the diesel engine cold running phase particularly at low temperatures. This will protect the diesel engine and reduce fuel consumption.

Danger!
There is a fault current shock hazard, e. g. due to defective insulation, if the static power supply is not fitted with a fault current circuit breaker !
If no fault current cirucit breaker is fitted, the circuit between human and equipment is not interrupted when a fault current occurs. This may result in electric shocks.

- ▶ Preheating must be via a socket fitted with a residual current current breaker that has a rated current less than 30 mA.
- ▶ Otherwise do not connect the preheating system!

Danger!
The use of unsuitable electrical cables may result in injury resulting from burning cables!
Electrical cables with insufficient cross-section for the preheating current may become too hot. This represents a fire hazard.

- ▶ Use connection cables with a minimum cross-section of 1.5 mm^2.
- ▶ Extension cables must have at least the same cross-section (1.5 mm^2) as the connection cable.
- ▶ Fully unwind the cable if you are using a cable reel.

Caution!
The electrical connections are located to the side of the operator cab.

- ▶ Before driving off ensure that the connection cable is no longer attached to the hydraulic excavator.

▶ To lift (retract) the blade support, move the control lever back **b**.

Note!
To achieve maximum stability:

▶ Lift the machine with the support system only slightly and only as far as is required to reduce the weight on the rubber tyres.

▶ Ensure that the rubber tyres remain in contact with the ground when the machine is supported.

▶ Do not extend the support to the stop.
  ↳ Improved stability when placing the blade support on the ground.
  ↳ Better grip on uneven ground.

3.3.12.2 Individual support control (special equipment)

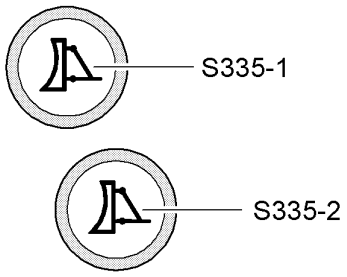


Fig. 3-68 *Individual control of the blades*

The individual blade control system is activated by means of switches **S335-1 and S335-2** located in the right control console.

With this option, you can individually control the front and rear blade supports, moving them together or separately.

– **S335-1** = front blade support
– **S335-1** = rear blade support

▶ Press the switch **S335-1** or **S335-2**.
  ↳ The indicator light in the switch is on.
  ↳ The selected blade support system is activated.

▶ Using the control lever, lower or lift the selected blade support.

▶ Press the switch again.
  ↳ The indicator light in the switch is off.
  ↳ The selected blade is deactivated.

3.4 Working with the machine

3.4.1 Safety Instructions

3.4.1.1 Working with the machine

– Before starting to work, familiarize yourself with the specific conditions of the job site and any local regulations. These include: the obstacles in the working or

Note!
The AutoLift function is an auxiliary tool designed to assist the machine operator. Even if the function is activated, the surface can still be damaged due to lack of care.

To activate the AutoLift function, actuate the switch **AutoLift**.

- ▶ Press the switch **AutoLift**.
  - ↳ The indicator light in the switch is on.
  - ↳ The AutoLift function is activated.
- ▶ Press the switch **AutoLift** again.
  - ↳ The indicator light in the switch is off.
  - ↳ The AutoLift function is deactivated.

3.4.9 Electronic stick cylinder shut-down function (optional equipment)

3.4.9.1 Function and purpose

When the boom is moved, it can reach great heights and outreaches. The stick with attached load might collide with the operator's cab or impact on other objects.

There is even a risk of collision with the operator's cab or the object, which would likely result in injury to the operator, and damage to the working attachment or the attached load.

In order to assist the machine operator, the range of movement of the stick is limited by the electronic stick cylinder shut-down system.

The movement range of the stick cylinder is determined by two shut-down points that can be adjusted through the operator's menu. The shut-down points of the stick and the boom settings determine the reach of the working attachment.

3.4.9.2 Use of stick cylinder shut-down function

The stick cylinder shut-down function remains permanently on and cannot be switched off during machine operation. If the stick is to be moved beyond a shut-down point, the stick cylinder shut-down function can be overridden.

Danger!
The stick cylinder shut-down function is an auxiliary tool designed to assist the machine operator!
For functional reasons, the stick cannot be brought to a sudden stop. The faster it is moved, the longer its braking distance. The machine might vibrate or swing! Risk of accident!

- ▶ Please note that the machine operator is responsible for the correct adjustment of the relevant settings!
- ▶ Adjust the stick cylinder shut-down function in such a way that there is a sufficient safety distance, even if the working tool is oscillating or if shut-down is delayed.
- ▶ Avoid fast movements of the stick when it is moved near the shut-down limits.

3.4.15 Changeover of joystick control (optional equipment)

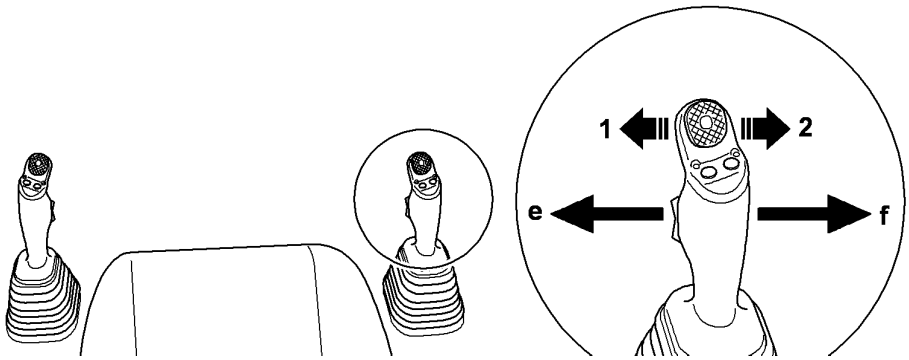
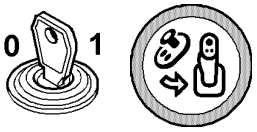


Fig. 3-83 *Changeover of control*

Depending on the selected mode, the attachment tool is operated with the mini joystick (movement **1** and **2**) or with the joystick (movement **e** and **f**).

To change from one control mode to the other, turn the key switch **S405** in the right control console.



▶ Turn the key switch **S405** to position **1**.
  ↳ The indicator light **H322** is on.
  ↳ Control changeover is activated.

▶ Turn the key switch **S405** back to position **0**.
  ↳ The indicator light **H322** is off.
  ↳ Control changeover is deactivated.

If the control is changed over, the tilting system is disabled.

Function	**Changeover**	
	off (0)	**on (1)**
Tilting system	**e + f**	**-**
Attachment tool	**1 + 2**	**e + f**

▶ Operate the attachment tool according to the current control mode.

3.4.16 Magnetic system (option)

With a magnetic system, optional equipment such as magnets for transferring scrap can be operated. The magnetic system is turned on by pressing switch **S46** on the right control panel and is operated electronically using a button in the joystick.

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3.5.4.5 Attaching working tool

- ❑ The working tool must be securely positioned on the ground or secured in a frame.
- ▶ Switch off the magnet system (if installed).

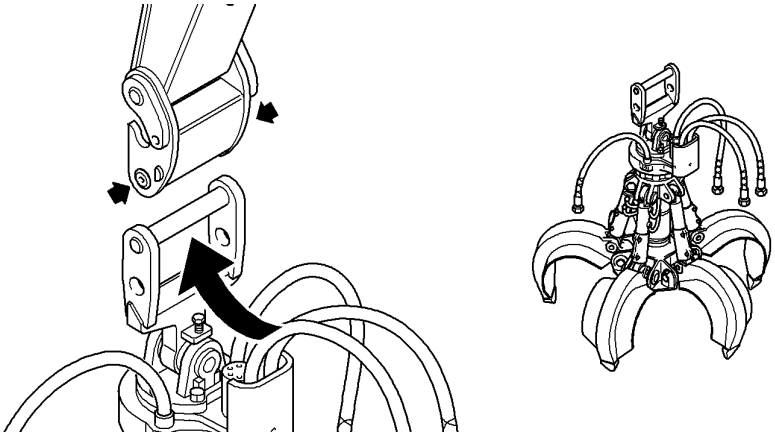

Fig. 3-95 *Releasing and attaching working tool*

- ▶ Screw out the locking screw.
- ▶ Release the quick-change adapter.
- ▶ Move the industrial stick in such a way that the load hook can be engaged at the bolts of the suspension.
- ▶ Lift the attachment a little of the ground so that it is suspended freely.
  ↳ The suspension is centred in the quick-change adapter.

Danger!
Prior to locking, there is no secured connection between the working tool and the quick-change adapter. The working tool can therefore become dislodged, causing serious injury.

- ▶ Approach the quick-change adapter with great care.
- ▶ Tilt the safety lever upwards in order to secure the working tool against inadvertent movement.

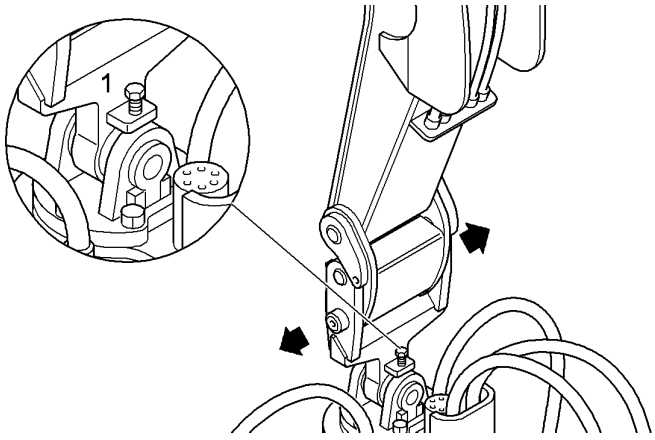

Fig. 3-96 *Locking*

– Check pin visible (extended): The quick-coupling system is released.
– Check pin retracted: The quick-coupling system is locked.

During release, the "quick-change adapter" icon is displayed on the screen. This icon, together with a buzzer warning sound, indicates that the quick-change adapter is not locked.

Releasing and locking of coupling system by means of push buttons (standard equipment):

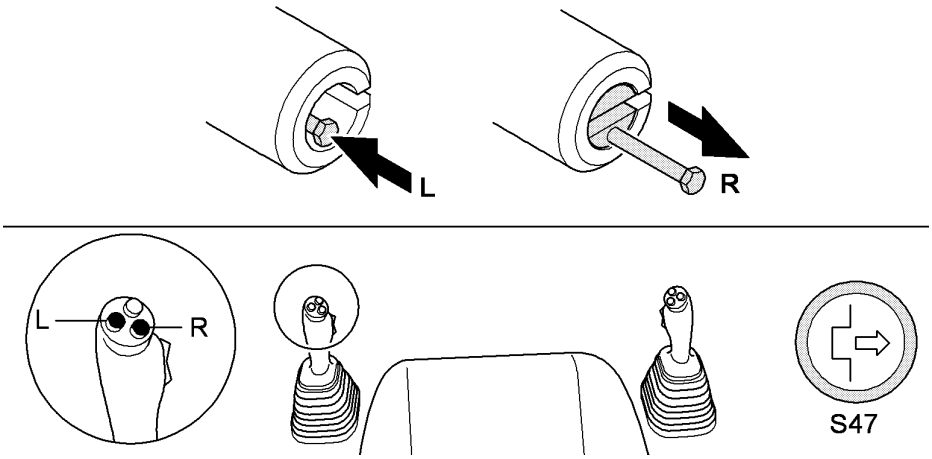

Fig. 3-109 *Releasing and locking of coupling system by means of push buttons**

* In machines with optional equipment, the quick-coupling system can be controlled by operating the left or right joystick.

❑ This is only possible, if the **auxiliary function** is activated (switch **19**, LED on).

▶ Press and hold the button **S47**.
  ↳ The quick-coupling system is activated.

▶ Press and hold the button **R** until the check pins are fully extended.
  ↳ A buzzer sound is emitted.
  ↳ The check pins are visible.
  ↳ The "quick-change adapter" icon appears on the screen.
  ↳ The quick-coupling system is released.

▶ Press and hold the button **L** until the check pins are fully retracted.
  ↳ The buzzer is off.
  ↳ The check pins are retracted.
  ↳ The "quick-change adapter" icon on the screen disappears.
  ↳ The quick-coupling system is locked.

▶ Continue moving the joystick in direction "lifting boom".
  ↳ The warning symbol must now appear on the screen.
  ↳ The buzzer must sound.

3.7 Parking and exiting machine

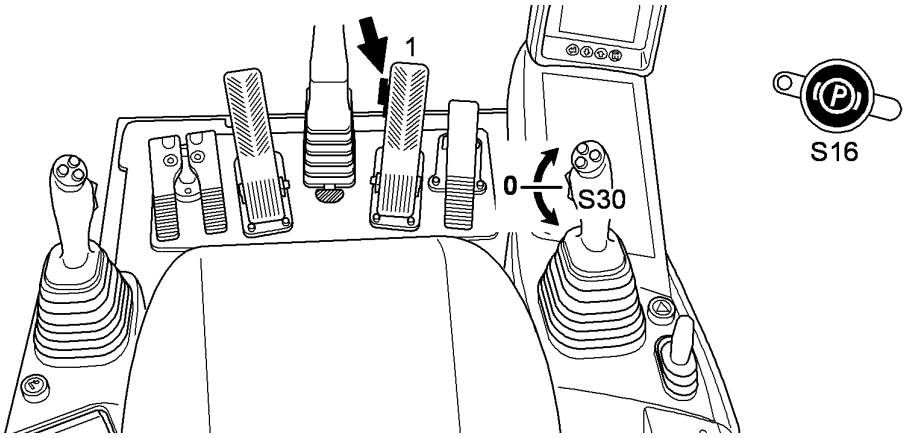

Fig. 3-118 *Parking*

1 Brake pedal (operating brake) **S30** Travelling direction switch
S16 Switch / parking brake

Before exiting the machine, apply the parking brake and release the operating brake.

▶ Set the travel direction switch **S30** to its neutral position **0**.

▶ Move the safety lever up.
  ↳ The parking brake **S16** is applied.

▶ Shut down the diesel engine.

▶ To release the operating brake **1**: Release the retainer (see arrow), using your foot.

In machines with energy recovery cylinder, you must lock the boom:

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General error codes			
Error code	**Effect**	**Cause**	**Remedy**
E 914	Boom cylinder cannot be moved	No release signal for boom cylinder to control system	Do not execute any work that requires stroke limitation; if necessary, switch stroke limitation to emergency mode; contact LIEBHERR customer service
E 916	Boom cylinder cannot be moved	No release signal for boom cylinder preliminary shut-down to control system	
E 917	Boom regulating cylinder cannot be moved	No release signal for boom regulating cylinder to control system	
E 918	Boom regulating cylinder cannot be moved	No release signal for boom regulating cylinder to control system	
E 919	Stick cylinder cannot be moved	No release signal for stick cylinder to control system	
E 929	Working attachment cannot be operated	Stroke limitation, failure in power supply to sensor	

The faults and errors listed below are indicated by symbols on the screen or by indicator lights. The respective error codes are not shown in the EC field of the operator menu. The only way to read them is the list-S-Exxx menu.

Error codes combined with symbols / indicator lights				
Error code	**Symbol ***	**Effect**	**Cause**	**What you can do**
E 501		Indicator light H2 on, acoustic warning signal	Oil pressure of diesel engine too low	Set the diesel engine to low idle speed and switch it off after 30 seconds.
E 502		Symbol is displayed, acoustic warning signal	Coolant level too low	Set the diesel engine to low idle speed and switch it off after 30 seconds; locate leak and seal it.
E 503		Symbol and P2 are on at the same time, acoustic warning signal	Coolant overheating	Set the diesel engine to low idle speed and switch it off after 30 seconds; check radiator for dirt; check coolant level; contact LIEBHERR customer service.
E 504		Symbol is displayed, acoustic warning signal	Hydraulic oil level too low	Set the diesel engine to low idle speed and switch it off after 30 seconds; locate leak and seal it; add hydraulic oil.
E 505		Symbol is displayed, acoustic warning signal	Hydraulic oil overheating	Set the diesel engine to low idle speed and switch it off after 30 seconds; check radiator for dirt; contact LIEBHERR customer service.
E 506		Symbol is displayed, acoustic warning signal	Oil temperature in pump distribution gear too high	Set the diesel engine to low idle speed and switch it off after 30 seconds; check hydraulic oil cooler for dirt; contact LIEBHERR customer service.
E 509		Indicator light H24 on, acoustic warning signal	Flow indication of steering system: no hydraulic oil or steering pump defective	Contact LIEBHERR customer service.
E 510		Indicator light H23 on, acoustic warning signal	Accumulator pressure of working brake too low (< 100 bar)	Load pressure accumulator while diesel engine is on. If problem persists: contact LIEBHERR customer service.

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4.3.2 ESP02 printed circuit board

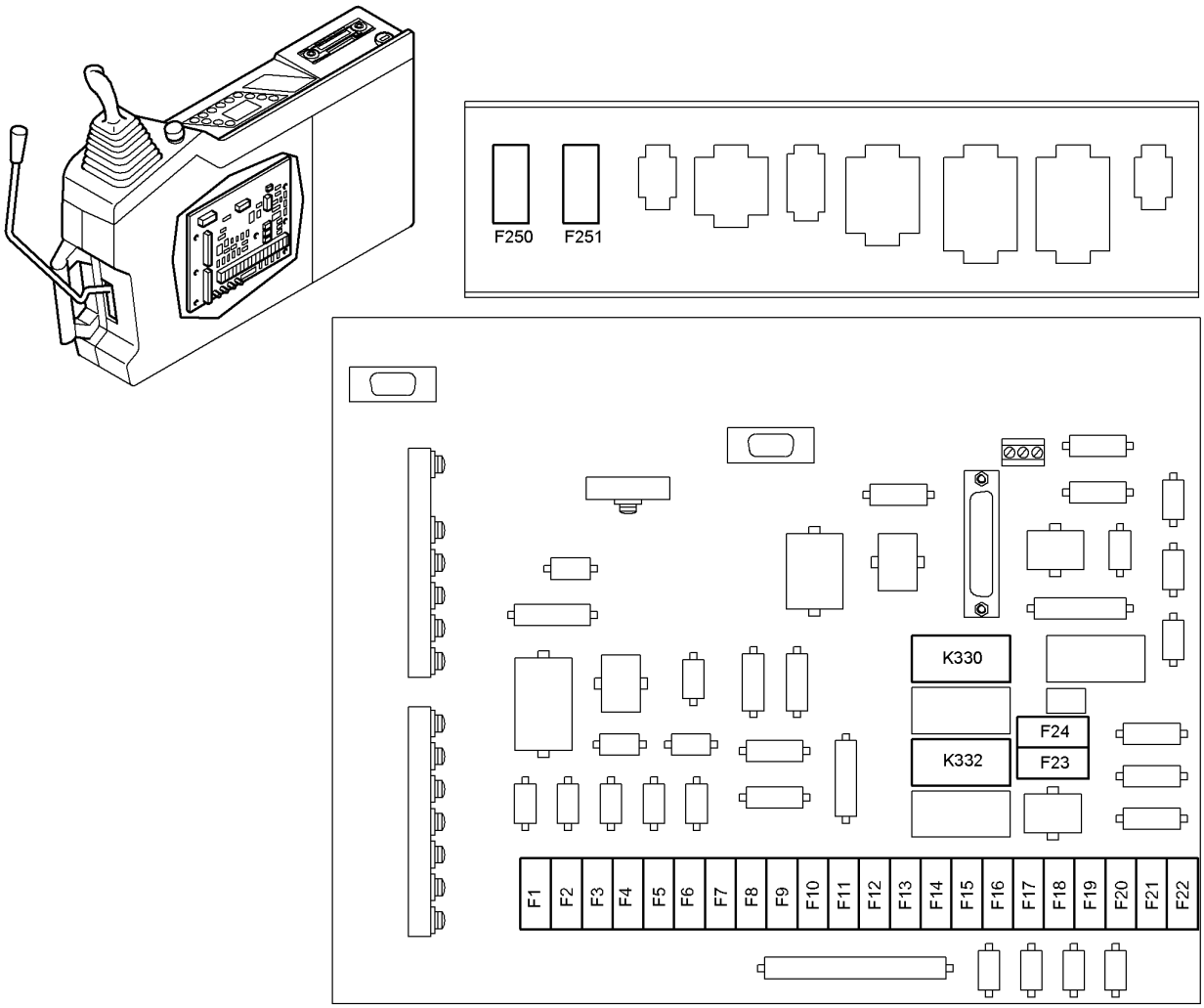

Fig. 4-2 *Fuses and ESP02 relay board*

The ESP02 board is located in the left control console and is accessible when the operator's cab door is open.

▶ Remove the cover of the control console and replace it after the fuse has been replaced.

F1	2 A	Left parking and tail light
F2	2 A	Right parking and tail light
F3	7.5 A	Reserve
F4	15 A	Servo control and safety lever for kits
F5	15 A	Special functions SF2, SF3 and SF4*, reserve
F6	15 A	Special function SF1*, 1st gear, oscillating axle locking, brake light
F7	15 A	Headlight
F8	7.5 A	Parking brake, servo control, creeper gear
F9	7.5 A	Windscreen wiper
F10	7.5 A	Pre-heating, windscreen washer system, beacon*, rotating grapple*
F11	15 A	Reserve
F12	15 A	Reserve

– When working overhead, use appropriate safe access ladders and working platforms.
  Do not use parts of the machine as climbing devices, if they are not designed for this purpose.
  Wear a harness when working at great heights.
  Keep handles, steps, railings, platforms, and ladders free of dirt, ice and snow.
– When working on the attachment (for example when replacing teeth), make sure the machine is properly supported. Never use metal-on-metal support.
– Never stand underneath a machine that has been raised with the aid of work equipment unless it has been properly and securely supported.
– Always support the machine in such a ways that any shifting weight will not endanger the stability of the machine and avoid metal to metal contact.
– Work on travel gears, brake and steering systems may only be carried out by specially trained expert personnel.
– If the machine must be repaired on an incline, block the track chains with chocks and secure the uppercarriage to the undercarriage with the locking pin.
– Only qualified, specially trained personnel may work on the hydraulic system.
– Do not check for hydraulic leaks with your hand. Use cardboard or similar material to detect leaks. Wear work gloves.
– Do not loosen any lines or bolts before lowering the equipment, turning off the diesel engine and relieving the hydraulic system. After the diesel engine has been turned off, you must move all pilot controls (right handed joystick and pedals) into all directions to reduce the control pressure and the dynamic pressure in the work cycles. Then release the pressure in the tank, as described in this operating manual.

5.1.6 Electrical system

– Check the electrical system regularly.
  All defects, such as loose connections, burnt out fuses and bulbs, burnt or damaged wires or cables must be repaired immediately by an electrician or specially trained personnel.
– Only use original fuses with the correct amperage.
– Only qualified technicians should attempt troubleshooting or repairs on high voltage systems.
– DO NOT work on energized attachments.
– When working on mid and high voltage components, shut off the voltage and connect the supply cable to the ground to discharge any stored energy.
– Check all disconnected parts if they are truly free of current, ground them and short circuit them. Insulate adjacent, current carrying parts.
– Disconnect the battery before working on the electrical system or before carrying out any arc welding work on the machine.

5.1.7 Pressure accumulator

– Pressure accumulators contain stored energy and operate at high pressures. Only specially trained personnel may work on pressure accumulators.
– Do not operate damaged pressure accumulators.
– You must reduce the pressure in the hydraulic system as described in this operating manual prior to working on a hydraulic accumulator.

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5.6.2.3 Lubricating chart

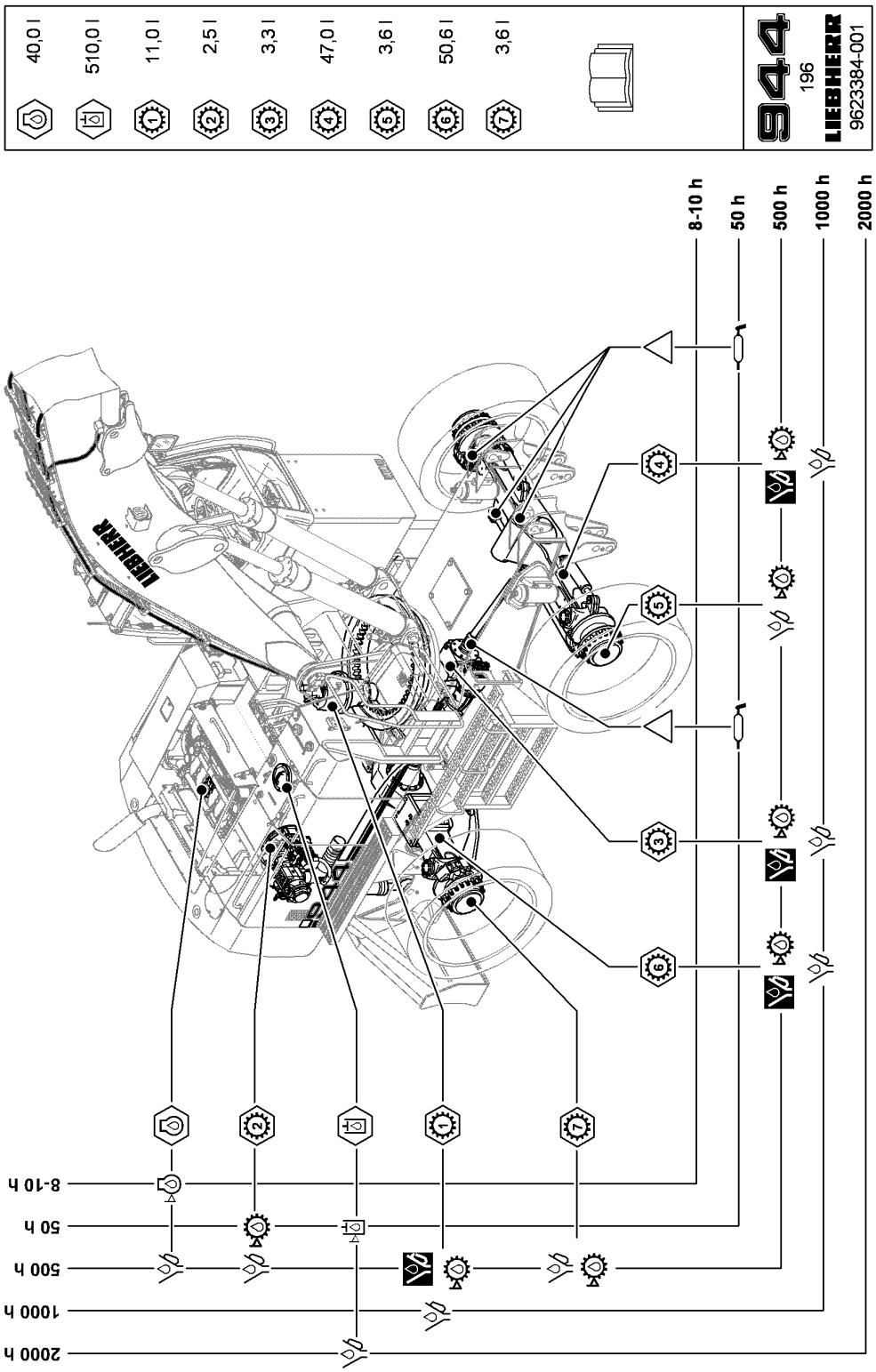


Fig. 5-6 *Lubricating chart*

Oil type	Oil change		
	Not for use in environmentally sensitive areas		For use in environmentally sensitive areas (only permissible with oil analysis*)
	without oil analysis	with oil analysis* (optional)	
LIEBHERR mineral oil Liebherr Hydraulic HVI Liebherr Hydraulic Basic 68 Liebherr Hydraulic Basic 100	every 3000 h	every 6000 h	- ***
Liebherr-PAO** Liebherr Hydraulic Plus Liebherr Hydraulic Plus Arctic	every 4000 h	every 8000 h	every 8000 h
Third-party product - mineral oil	every 2000 h	every 2000 h	- ***
Third-party product - fully saturated synthetic ester	- ***	- ***	every 2000 h

Tab. 5-9 *Oil change intervals*

* If the result of the oil analysis is satisfactory, you may continue using the oil for a longer period. If the result of the oil analysis is negative, immediately change the oil.

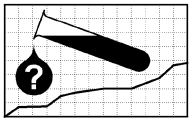
** PAO = polyalphaolefin

*** not permissible

Use in environmentally sensitive areas: machines operated in such areas must be filled with biodegradable hydraulic oil.

If the machine is operated for less than 1000 hours per year, an oil sample must be taken at least once a year. If a hydraulic oil remains in the machine for a prolonged period of time, it must be changed at least every 4 years (mineral oils and fully saturated synthetic esters) or every 6 years (Liebherr-Plus oils).

If the machine is not in use for a period of more than 6 months, carry out an oil analysis before restarting it.



Oil analysis

For regular oil analyses, LIEBHERR recommends contracting the specialist company OELCHECK and changing the oil when indicated by the test results in the lab report.

– Yellow kit for biodegradable hydraulic oils
– Green kit for mineral oils

See also customer service and product information.

Reasons for regular oil analyses:

– Reduction of costs thanks to prolonged oil change intervals
– Detailed information regarding the hydraulic system, its components and the medium
– Better protection of resources and the environment

- ▶ Unscrew maintenance cover **1**.
- ▶ Attach turning mechanism **4** to the flywheel housing.
- ▶ Turn the flywheel using turning mechanism **4** and use pinion **5** on the turning mechansim to apply grease to the starter spur gear **2**.
- ▶ Detach turning mechanism **4**.
- ▶ Screw on maintenance cover **1**.

5.9 Cooling system

5.9.1 Checking and cleaning the cooling system

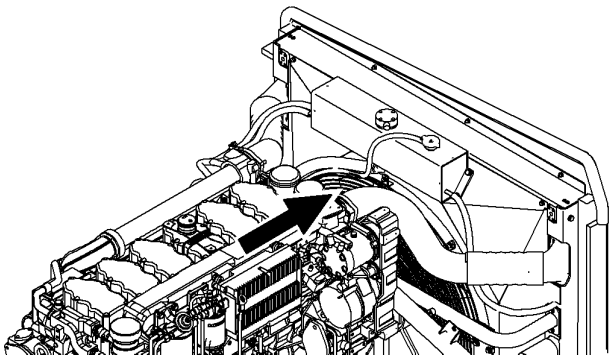


Fig. 5-18 *Cooling system*

The machine has a combined water-charge air-fuel-hydraulic oil cooler.

Optimal cooling can only be achieved when the cooler is kept clean.

- ▶ Check the engine, fan and cooler for damage and clean if necessary.
- ▶ If required, clean the cooling fins with compressed air or a steam jet (from inside out).
- ▶ In case of leaks, change the pressure relief valve (sealing cap of expansion tank).
- ▶ Regularly check the condition and seals on the connecting hoses between the coolant cooler and engine as well as on the coolant hoses.

5.9.2 Checking the coolant level

Danger!
Risk of burning due to hot coolant.
The engine cooling system is hot and pressurized when running at operating temperature.

- ▶ Avoid touching coolant or coolant-bearing parts.
- ▶ Only check the coolant level when the sealing cap on the filler neck has cooled sufficiently.

- ▶ Open the sealing cap a half turn.

5.10.4 Maintenance of fuel filter

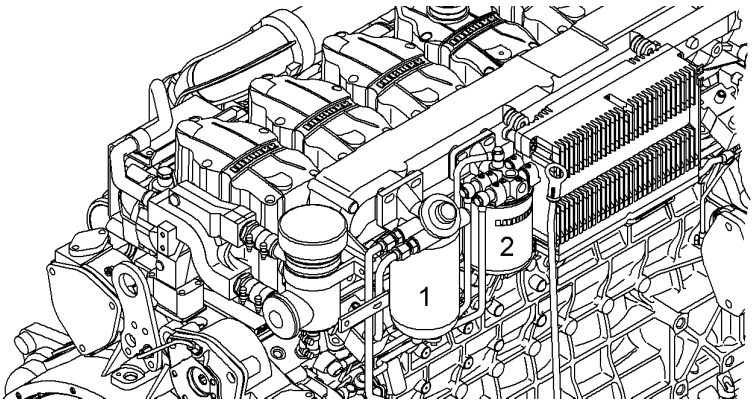


Fig. 5-29 *Overview of fuel filter*

1 Fuel pre-filter **2** Fuel fine filter

5.10.4.1 Dewatering fuel pre-filter:

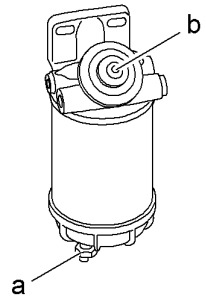


Fig. 5-30 *Fuel pre-filter*

- ▶ Place a suitable container under the filter.
- ▶ Screw out the drain plug **a**.
- ▶ Operate the hand pump **b** to drain off the water until fuel begins to escape.
- ▶ Screw in the drain plug **a**.

5.10.4.2 Replacing filter cartridges

- ▶ Switch off the diesel engine.
- ▶ Carefully clean the fuel filter and the adjacent area.
- ▶ Place a suitable container under the tank.

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5.12.5 Emptying and refilling the hydraulic tank

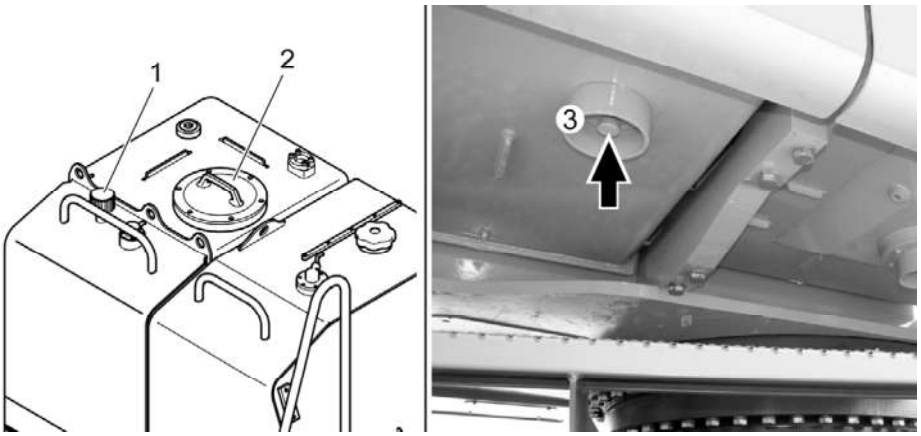

Fig. 5-43 *Draining and refilling the hydraulic oil*

1 Breather filter **2** Return filter **3** Drain valve

▶ If possible, always fill and empty the hydraulic system using a filler unit.

To drain the oil:

❑ The hydraulic system must be depressurized.

▶ Unscrew breather filter **1** by a maximum of one turn.
↳ The hydraulic system will depressurize.

▶ Remove the cover of return filter **2**.

▶ Screw the drain hose onto drain valves **3** in the tank floor and let the oil flow out into a suitable container.

To refill the hydraulic oil:

▶ Unscrew breather filter **1** by a maximum of one turn.
↳ The hydraulic system will depressurize.

▶ Remove the cover of return filter **2**.

▶ Refill the oil through the filter cartridge until the level precisely reaches the centre marking on the sight glass.

▶ Tighten breather filter **1**.

▶ Screw on the cover of return filter **2**.

Caution!
Hydraulic components may be damaged if they are not bled correctly!

▶ Bleed the hydraulic pumps after each hydraulic oil change.

To drain off condensed water (only for mineral oils):

▶ Regularly drain off the condensed water.

▶ Place a suitable container underneath.

▶ Keep the drain hose attached to drain valves **3** (see Fig. 5-43) until the oil which flows out does not contain any water.

5.13.2 Swin gear - oil change

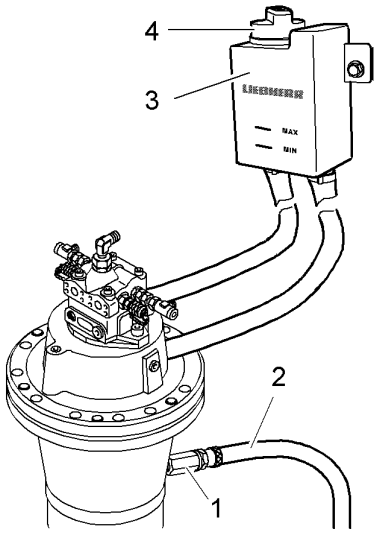

Fig. 5-54 *Changing the oil on the swing gear*

1 Drain valve
2 Drain hose
3 Oil container
4 Cap

To drain the oil:

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

To add the oil:

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

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1 Grease container
2 Adapter (refilling the grease container with a filler pump **6**)
3 Lubricating nipple – refill grease container
4 Lubricating nipple for manual intermediate greasing
5 Safety valve
6 filler pump

Starting the greasing process:

Greasing is done using switch **S84**. While the switch is pressed, the electric pump pumps grease to the connected bearing points.

The greasing process should be started once per work shift.

▶ Press switch **S84**.
  ↳ Indicator light in the switch flashes.
  ↳ Grease is delivered to the connected bearing points.

▶ Allow the switch to go on flashing until grease emerges from the bottom end of the hydraulic jacks.

Note!
The time needed for greasing depends on the temperature of the grease and of the components connected to the greasing system. In extremely low outside temperatures: up to 30 minutes.

▶ Press switch **S84** again.
  ↳ Indicator light in the switch goes out.
  ↳ The greasing process is completed.

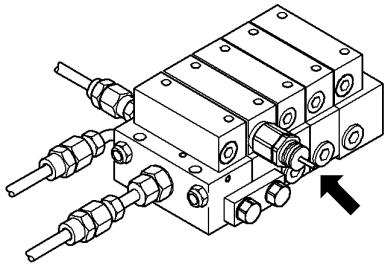

Fig. 5-66 *Monitoring pin on the main distributor*

The main distributor for the lubrication lines is built into the uppercarriage. A functional check can be carried out using the monitoring pin (see arrow).

The continual backwards and forwards movement of the monitoring pin indicates whether the greasing process is functioning correctly (grease delivery). If the monitoring pin does not move, the error diagnosis is as follows:

– Blockage or pinching of a supply line (grease flows out of safety valve **5**).
– In low outside temperatures, the use of a grease which is too viscous.
– Lack of lubricant in the grease container.
– Breakdown in drive motor's supply circuit.

▶ Find and rectify the cause of the problem immediately.

If the greasing pump is defective, the attached oiling points can be greased centrally with a greasing pump via lubricating nipple **4**.