en

Operating instructions

Hydraulic excavator
A 314 Litronic

from serial number 25600

Document identification

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Product identification

Manufacturer:	LIEBHERR Hydraulikbagger GmbH
Type:	A 314 Litronic
Type no.:	635
Conformity:	CE

Address

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1.1.3 Undercarriage

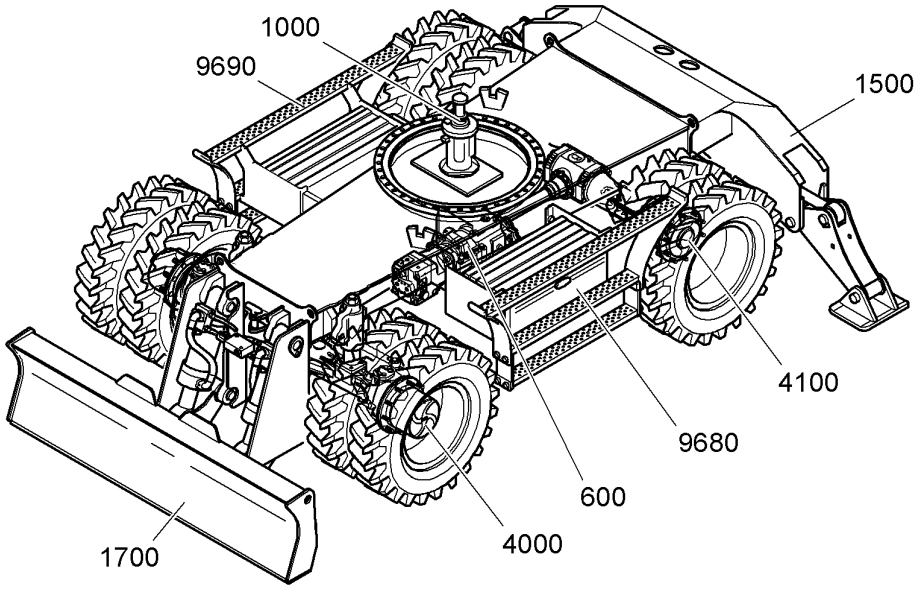

Fig. 1-3 *Undercarriage*

600 Transmission
1000 Rotary connection
1500 Outriggers
1700 Blade support
4000 Steering axle
4100 Fixed axle
9680 Step with toolbox
9690 Step

1.2 Technical data

Please refer to the accompanying technical description.

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Comfort

A 312 Litronic and A 314 Litronic compact excavators offer the operator a generous workplace with state-of-the-art ergonomic design. The generously laid out window surfaces and sloping edges provide a safe overview of the entire construction area. In addition, free access to all service points allows quick und easy maintenance.

Mobile comfort

Excellent visibility
The carefully designed uppercarriage with lower height, large window surfaces and rounded edges increase visibility and ensure a safe view over the entire working area.

Easy climb
Wide steps, ergonomically designed handles und an adjustable steering column provide an easy and comfortable climb into the Liebherr operator cab.

Pleasant environment
The low engine speed, in conjunction with high-quality noise reduction and optimised hydraulic components, ensure pleasant levels of internal and external noise. Noise levels are similar to those of modern diesel passenger cars.

Spacious
Additional storage areas in the uppercarriage and undercarriage provide easy and generous storage of everyday tools.

Maintenance benefits as standard

Easy accessibility
Working on the engine is made easy due to the large engine compartment flap.

Ease of servicing
Delivered as standard, the hydraulic tank shut-off valve disconnects the system and guarantees easy servicing work on the hydraulic system.

Spacious cab

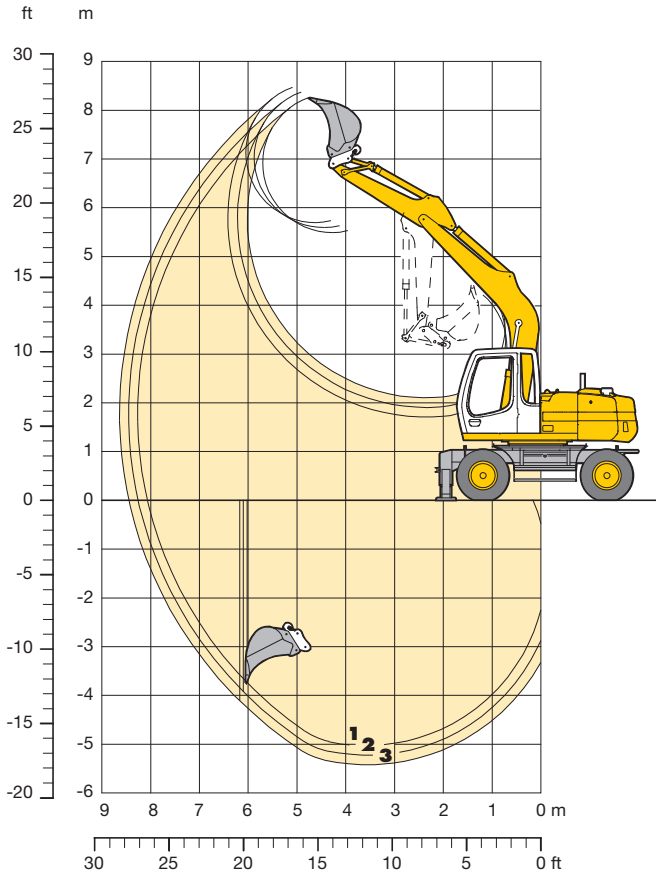
- Operator's seat adjustable to operator's weight and with height adjustment. Horizontally adjustable with or without console
- Adjustable steering column
- Large roof window
- Sunblind

Foot room

- Ergonomically laid-out foot pedals for relaxing and non-tiring operation
- Steering column adjustment via a handy foot lever
- Non-slip foot mat with horizontal Strips for easy cleaning of cab

Backhoe Attachment A 314 Litronic®

with Gooseneck Boom 4,50 m



Digging Envelope
with Quick Change Adapter

		1	2	3
Stick length	m	2,25	2,45	2,65
Max. digging depth	m	5,05	5,25	5,45
Max. reach at ground level	m	8,10	8,30	8,50
Max. dumping height	m	5,50	5,60	5,70
Max. teeth height	m	8,30	8,40	8,50

Digging Forces

		1	2	3
Max. digging force	kN	66,1	62,2	58,7
	t	6,7	6,3	6,0
Max. breakout force	kN	79,1	79,1	79,1
	t	8,1	8,1	8,1

Max. breakout force with ripper bucket	111,3 kN (11,3 t)
Max. possible digging force (stick 1,70 m)	79,2 kN (8,1 t)

Operating Weight

The operating weight includes the basic machine with 8 tires plus spacer rings, gooseneck boom 4,50 m, stick 2,25 m, quick change adapter 33 and bucket 850 mm/0,46 m³.

Undercarriage versions	Weight
A 314 Litronic® with stabilizer blade	14000 kg
A 314 Litronic® with 2 pt. outriggers	14100 kg
A 314 Litronic® with stabilizer blade + 2 pt. outriggers	14800 kg

Buckets

Cutting width	mm	230[1]	330[1]	390[1]	500[1]	550[2]	650	850	1050	1250
Capacity ISO 7451*	m³	0,14	0,20	0,25	0,35	0,25	0,33	0,46	0,60	0,75
Max. material weight	t/m³	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8
Weights										
Standard bucket with UNI-Z teeth	kg	–	–	–	–	–	280	330	380	430
Ripper bucket with Liebherr teeth Z 13 P	kg	–	–	–	–	550	–	–	–	–
Bucket with ejector and Bofors teeth	kg	320	350	360	390	–	–	–	–	–
For machine stability per ISO 10567 the max. stick length is:										
Stabilizers raised	m	2,65	2,65	2,65	2,65	2,65	2,65	2,65	2,25	–
Stabilizer blade down	m	2,65	2,65	2,65	2,65	2,65	2,65	2,65	2,65	2,25
2 pt. outriggers down	m	2,65	2,65	2,65	2,65	2,65	2,65	2,65	2,65	2,45
Stabilizer blade + 2 pt. outriggers down	m	2,65	2,65	2,65	2,65	2,65	2,65	2,65	2,65	2,45

* comparable with SAE (heaped)
[1] Bucket with ejector (limited digging depth)
[2] Ripper bucket

Equipment

Undercarriage

	312	314
Two circuit travel brake with accumulator	•	•
Wide tires	+	+
Travel motor protection	+	+
Clam travel bracket with outriggers/prop-up blade down on one side only	•	•
Creeper speed electrically switchable from cab	•	•
New tires	•	•
Service free parking brake inside transmission	•	•
Independent outrigger control	+	+
Choice of tires	+	+
Auto check valve directly on each stabilizer cylinder	•	•
Proportional power steering with mechanical back up	•	•
Customized colors	+	+
Lockable storage box	–	–
Two lockable storage boxes	•	•
Lockable storage box additional	–	–
Two-speed power shift transmission	•	•

Uppercarriage

	312	314
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

	312	314
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	+	+
Pressure compensation	–	–
Flow summation	–	–
Additional hydraulic circuits	+	+

Engine

	312	314
Turbo charger	•	•
Direct injection	•	•
Cold start aid	+	+
Sensor controlled engine idling	•	•
TopAir	•	•
Air filter with pre-cleaner main- and safety element	•	•

Operator's Cab

	312	314
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	•	•
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	+	+

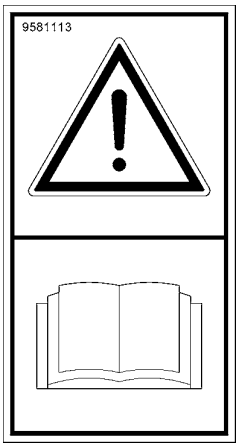
Attachment

	312	314
2 Flood lights on boom	•	•
Offset feature for complete attachment	–	–
Hydr. lines for clam operation on stick	•	•
Sealed pivots	•	•
Safety lift hook on hoe buckets	•	•
Liebherr line of clams	+	+
Safety check valves on hoist cylinder	•	•
Safety check valves on stick cylinder	+	+
Hose quick connection	•	•
Centralized lube points	•	•
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	•	•
Y-flange seals at bucket/stick pivot	–	–
Cylinders with shock absorber	•	•

• = Standard, + = Option, – = not available

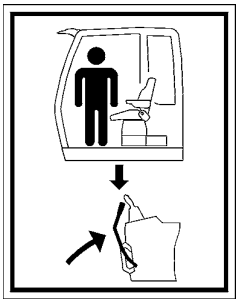
Options and/or special attachments, supplied by vendors other than Liebherr, are only to be installed with the knowledge and approval of Liebherr to retain warranty.

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



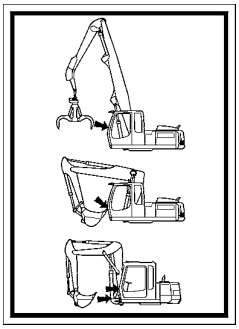
Sign 66, Part 1: Accident prevention

The accident prevention regulations given in the operating instructions must be strictly observed when operating the machine.



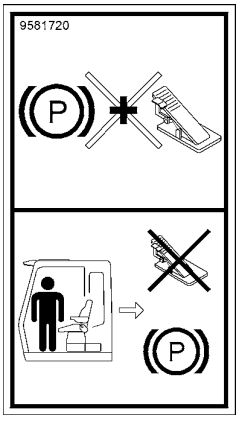
Sign 66, Part 2: Safety lever

Before leaving the operator's seat, raise the safety lever all the way.



Sign 66, Part 3: Attachments

The attachment reaches as far as the cab! Caution when attachment is retracted.



Sign 67: Operating brake / parking brake

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

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

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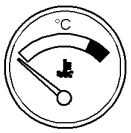
3.1.4 Control panel functions

3.1.4.1 Display instruments

P5 - Indicator - Operating hourmeter

Displays the operating hours.

Serves as the basis for adhering to the maintenance schedule.



P6 - Display - Engine coolant temperature

Displays the engine coolant temperature.

P7 - Display - Fuel reserves

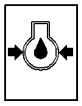
Shows the available amount of fuel in the fuel tank.

To reduce the condensation, always keep the fuel level as high as possible.

P50 - Clock

Displays the current time.

3.1.4.2 Indicator lights

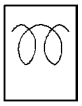


H7 - Indicator light - Low engine oil pressure (red)

The indicator light lights up if the engine oil pressure drops below 0.5 bar during machine operation.

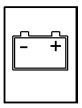
The buzzer in the cab sounds simultaneously.

- ▶ Bring the Diesel engine to low idle immediately.
- ▶ Continue to let the engine run in low idle for approx. 5 seconds.
- ▶ Shut down the Diesel engine.



H11 - Indicator light - Preheating (yellow)

The indicator light lights up as long as the preheating procedure is actuated. When the preheating procedure is completed, the indicator light turns off and the Diesel engine can be started.



H12 - Indicator light - Battery charge (orange)

The indicator light lights up if the ignition key is moved to contact position.

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

During operation, this indicator light lights up if the alternator V-belt or the electrical charging system are defective.

- ▶ Bring the Diesel engine to low idle immediately.
- ▶ Continue to let the engine run in low idle for approx. 5 seconds.
- ▶ Shut down the Diesel engine.
- ▶ Remedy the error.

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3.2.3.1 Adjusting the armrests

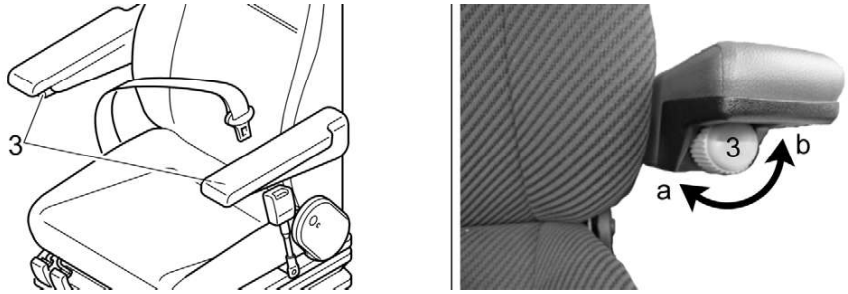

Fig. 3-12 *Adjusting the armrests*

- ▶ Turn the knurled screw **3** on the armrest in direction **a**.
  ↳ The armrests incline upwards.
- ▶ Turn the knurled screw **3** on the armrest in direction **b**.
  ↳ The armrests incline downward.

3.2.3.2 Adjusting the seat and backrest

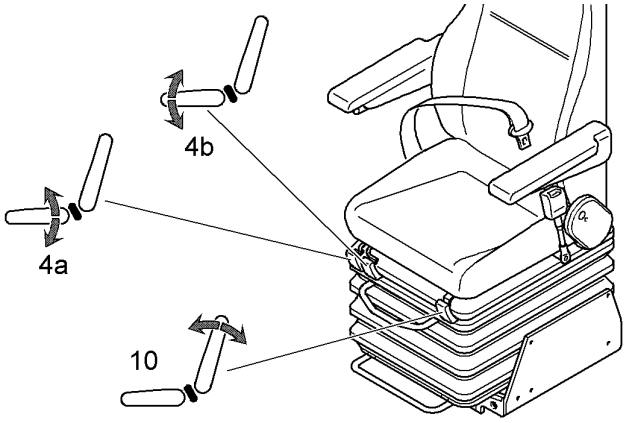

Fig. 3-13 *Adjusting the seat and backrest*

- ▶ Rear seat incline: Pull lever **4a** up, set the incline and release the lever.
- ▶ Front seat incline: Pull lever **4b** up, set the incline and release the lever.
- ▶ Backrest: Pull lever **10** up, set the incline and release the lever.

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S92 Control - Air vent
S93 Heat output control
S284 Blower control
S318 Air conditioning system (option)
S398 Reversing switch

3.2.12.2 Blower control

The blower output is regulated via rotary switch **S284**.

Position **0**: The blower is turned off.

Positions **1** to **4**: The fan motor runs in four different output stages.

3.2.12.3 Air duct

The air flow is regulated via rotary switch **S92** and via turnable and closeable air vents.

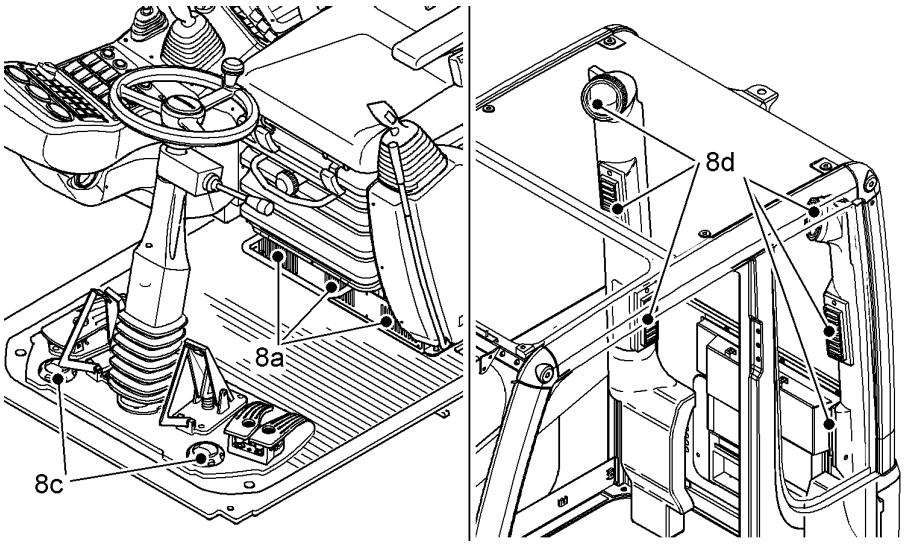
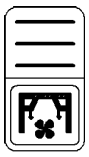


Fig. 3-28 *Position of front air vents (left view) and vents on the rear cab wall (right view)*

The air flow is either directed via nozzles **8a** (foot area) and **8c** (front windshield) or via air vents **8d** (overhead area).

By pressing the reversing switch **S398**, the air flow will be reversed.



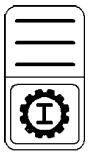
- ▶ Press switch **S398** down.
  - ↳ The air flow will be changed from nozzles **8d** to nozzles **8a** and **8c**.
  - ↳ The indicator light in the switch lights up.
- ▶ Push switch **S398** upward.
  - ↳ The air flow will be changed from nozzles **8a** and **8c** to nozzles **8d**.
  - ↳ The indicator light in the switch turns off.

When the reversing switch **S398** is turned off, the air flow between nozzles **8a** (foot area) and **8c** (front windshield) is regulated via the knob **S92**.

- ▶ Turn the knob **S92** to the left.
  - ↳ The air flow will be changed from nozzles **8a** to nozzles **8c**.
- ▶ Turn the knob **S92** to the right.
  - ↳ The air flow will be changed from nozzles **8c** to nozzles **8a**.

Note
Maximum travel performance is only obtained when the servo control **S35** is turned off.

3.3.4.2 Changing gear when stationary



- ▶ Press switch **S42** down.
  - ↳ The 1st gear is engaged.
- ▶ Press switch **S42** again.
  - ↳ The 2nd gear is engaged.

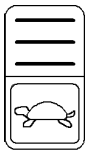
3.3.4.3 Changing gear during travel

Since the transmission can be shifted under load, the gears can also be changed during travel.

- ▶ During travel in 2nd gear: Press switch **S42** down.
  - ↳ The 1st gear is preselected.
  - ↳ The shifting procedure is carried out automatically when the corresponding low travel speed has been reached.
- ▶ During travel in 1st gear: Press switch **S42** again.
  - ↳ The shifting procedure is carried out immediately. The 2nd gear is engaged.

3.3.4.4 Creeper gear

Note!
The creeper gear should be selected when stationary or for slow driving to prevent a jerky braking action of the machine.



To obtain better traction on inclines and difficult terrain, the creeper gear can be shifted with switch **S21**.

- ▶ Press switch **S21** before or during travel to turn on the creeper gear.
- ▶ To turn the creeper gear off, press switch **S21** again.

3.3.4.5 Travel movement

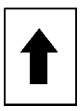
The selection of the travel direction is made via the rocker switch **S263** on the left joystick. An infinitely variable regulation of the travel speed is possible with the accelerator pedal **7**.

Danger!

- ▶ Before driving in reverse, make sure that the area behind you can be entered safely.
- ▶ After completing the travel movements, bring the travel selector switch to the 0 position.

If the uppercarriage is rotated by 180° to the undercarriage, the travel and steering directions are reversed.

Travelling forward



- ▶ Press rocker switch **S263** down **a**.
  - ↳ The indicator light **H167** lights up.

- If possible, always work downhill or uphill, never sideways on a slope.
- Only travel downhill at the permitted speed or you could loose control over the machine.
- Before travelling downhill, always shift to a lower gear. When doing this, the Diesel engine must run at maximum RPM and the speed may only be reduced using the accelerator pedals.
- When loading a truck, make sure that the truck driver leaves the cab, even if a rock protection is present.
- For demolition work, land clearing, crane operation, etc. always use protective devices specifically designed for this purpose.
- For terrain which is difficult to gain an overview of and whenever necessary, ask for assistance of a guide. Have only one person signal you.
- Only permit experienced personnel to secure loads and signal the machine operator. The guide must position himself within view of the operator or be in voice contact with him.
- Depending on the attachment combination, there can be a danger of collision between the working tool and the operator's cab, the cab protection or the boom cylinders. To avoid damage, utmost attention is required when the bucket teeth enter this range.

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

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

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3.4.9 Turning, rotating, locking and unlocking the attachments

Switch **S19** is used to activate an additional function:
- rotating grapple (A)
- rotating ditch cleaning bucket (B)
- locking pin for hydraulic quick change adapter (C)

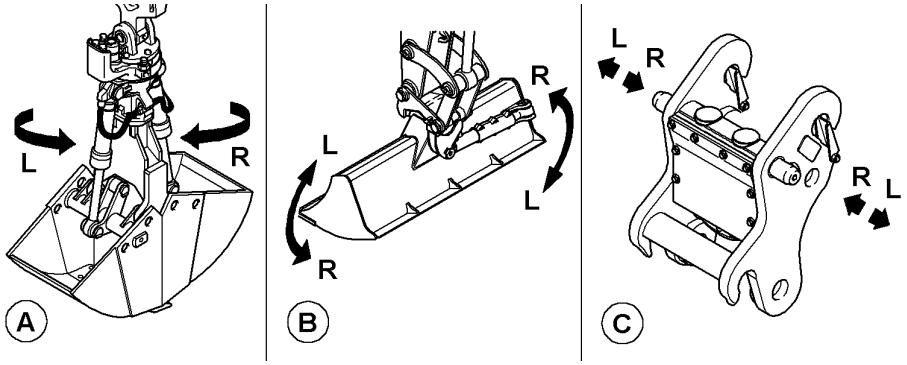

Fig. 3-60 *Attachment examples*

To operate, press the push button. The push buttons are located on the left and /or right joystick (depending on the machine configuration):

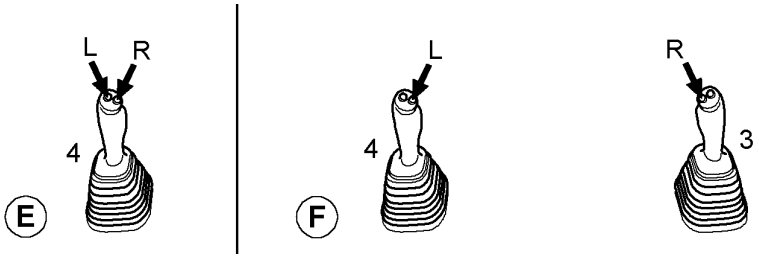

Fig. 3-61 *Push button on the joystick*

E Operation with left joystick (standard)

F Operation with left and right joystick (option)

Danger!
Never allow anyone to guide the grapple by hand!

▶ Press switch **S19** down.
  ↳ Additional function (e.g. rotating grapple) is activated.
  ↳ The indicator light in the switch lights up.

▶ Press and hold left push button **L**.
  ↳ Grapple will rotate to the left (counterclockwise).
  - or -
  ↳ The rotating bucket is turned to the left (counterclockwise), i. e. it moves down to the left.
  - or -
  ↳ Locking pins will be extended.

The following is a description of the installation and removal of digging tools. Digging tools include backhoe bucket, ditch cleaning buckets or ripper.

3.5.3.1 Removing the digging tool

- ▶ Position the attachment in such a way that the entire bottom part of the digging tool is laying on the ground.
- ▶ Unscrew the locking plate **5** and remove the locking plate **6** and knock out pin **3** and pin **4**.
- ▶ If necessary, raise the attachment slightly when knocking out pin **4** to relieve it.

3.5.3.2 Installing a new digging tool

- ▶ Position the digging tool to be installed in such a way that its entire flat bottom is laying on the ground.
- ▶ Start the engine and move the attachment until the bucket stick bearing and the bearing points **1** of the digging tool are aligned.
- ▶ Guide in pin **4** and secure it with plate **6**.
- ▶ Extend the bucket cylinder slowly until the bore hole in the connecting link **7** is located precisely between the bearing points **2**.
- ▶ Guide in pin **3** and secure it with plate **5**.
- ▶ Grease all lube points on pins **3** and **4** until clean grease emerges on the corresponding bearing points.

3.5.3.3 Bucket cylinder operation

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

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

- **a** - Bucket cylinder operation (for digging tools)
- **b** - Grapple operation (for grapple, scrap cutter etc.)

- ▶ Turn the both square head bolts on valve block **15** in such a way that the markings are positioned transverse to the travel direction (position **a**, bucket cylinder operation).

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

3.5.6.5 Attaching the working tool

Bring the equipment into position:

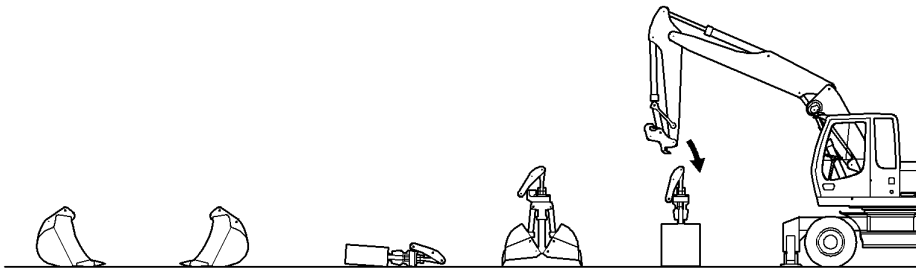

Fig. 3-80 *Bringing the equipment into position*

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

To unlock the quick change adapter:

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

To pick up the working tool:

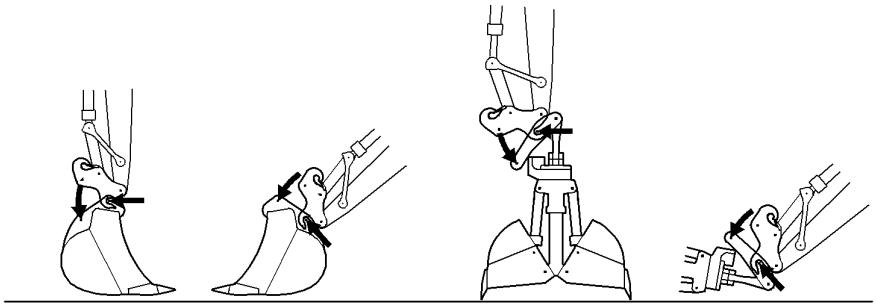

Fig. 3-81 *Picking up the working tool*

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

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Danger!
The hydraulic hammer must be selected very carefully. The operation requires increased attention and caution.

- ▶ Only use hydraulic hammers approved by LIEBHERR.
  - ↳ The use of a hydraulic hammer not approved by LIEBHERR could damage steel parts or other machine components.
- ▶ Use the hydraulic hammer only to break up rocks, concrete and other breakable objects.
- ▶ To avoid damaging the machine, do not try to break up rocks or concrete by moving the lever for the attachment or the hydraulic hammer.
- ▶ Do not use the drop power of the hydraulic hammer to break up rocks or other objects. Do not move objects with the hydraulic hammer. Do not lift the machine when using the hydraulic hammer.
  - ↳ This could damage both the hydraulic hammer and the machine.
- ▶ Do not use the hydraulic hammer to lift objects.
- ▶ Use the hydraulic hammer only with the machine in travel direction.
- ▶ Do not operate the hydraulic hammer in the direction of the machine, since exploding rocks or concrete could damage the machine and / or injure the operator.
- ▶ Close all windows in the cab before working.

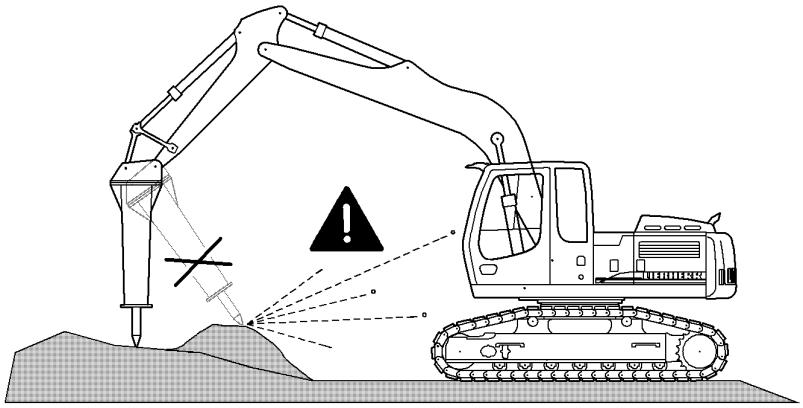

Fig. 3-91 *Hydraulic hammer*

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

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- ▶ Proceed only according to the operating instructions when putting the machine back in service.

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5 Maintenance

5.1 Maintaining the machine safely

5.1.1 General Safety instructions

- Maintenance and repairs may only be carried out by trained expert technicians.
- Observe the stated intervals or time periods for repeat checks / inspections as outlined in the Operating manual. Always use appropriate tools to carry out maintenance work.
- Refer to the Inspection and maintenance schedule at the end of this operating manual to see who is authorized or required to perform certain work.
  The tasks listed under daily / weekly may be carried out by the machine operator or maintenance personnel after having received appropriate instructions.
  The remaining tasks may only be carried out by expert technicians with appropriate training.
- Spare parts must meet the technical requirements set forth by the manufacturer. This is always ensured with Original spare parts.
- Always wear safe work clothing when maintaining the machine. For certain work, safety glasses and protective gloves are required, in addition to a hard hat and safety boots.
- Keep unauthorized personnel away from the machine during maintenance.
- Secure a wide-ranging area for maintenance, as necessary.
- Inform the operator before starting to carry out special tasks and maintenance work. Make sure he knows the person who is in charge of the work.
- If not otherwise noted in the operating manual, make sure to perform all maintenance work on the machine on firm and level ground, with the attachment placed down and the engine shut off.
- Pull the ignition key and close the battery master switch.
- During maintenance and repairs, make sure you always tighten any loosened screw connections.
- If it was necessary to disconnect or remove any safety devices for set up, maintenance and repairs, make sure that after completion of work, the safety devices are reinstalled and checked for proper function.
- Before maintenance work, especially when working under the machine, make sure a “Do not operate” sign is clearly visible and attached to the starter switch. Pull the ignition key and close the battery master switch.

5.1.2 Cleaning

- Before any maintenance and repairs, clean the machine, especially connections and fittings to remove oil, fuel or cleaning substances.
  Do not use harsh cleaning products and use only lint-free cleaning cloths.
- To clean the machine, do not use harsh cleaning products or steam within the first two months after delivery (or after repainting).
- Use only non-flammable cleaning fluids to clean the machine.
- Before cleaning the machine with water or steam (pressure cleaner) or other cleaning products,

5.4.2 Lubrication chart

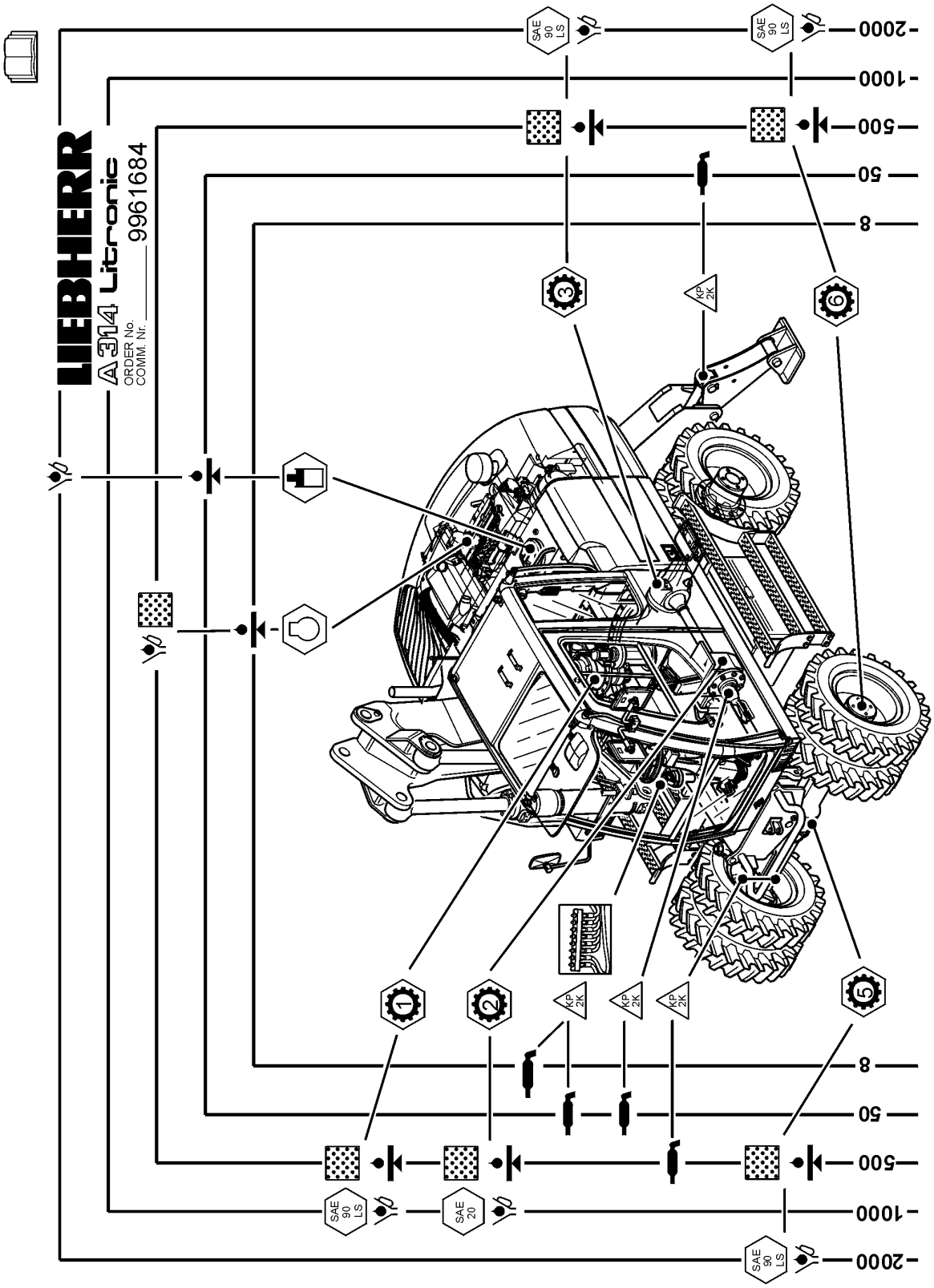

Fig. 5-5 Lubrication chart

5.5.6.2 Approved anti-corrosion fluid and antifreeze

Concentrate, undiluted

Product description	Manufacturer	Country
Agip Antifreeze Plus	Agip Petrol S.p.A., Rome	I
Agip Langzeit-Frostschutz	Autol-Werke GmbH, Würzburg	D
Antigel DB 486	Sotragal S.A., St. Priest	F
Aral Kühlerfrostschutz A	Aral AG, Bochum	D
Avia Frostschutz APN (G48-00)	Deutsche Avia-Mineralöl GmbH, Munich	D
BP Antifrost X 2270 A	Deutsche BP AG, Hamburg	D
BP Napgel C 2270 / 1	BP Chemicals LTD., London	GB
Caltex Engine Coolant DB	Caltex UK Ltd, London	GB
Caltex Extended Life Coolant	Caltex UK Ltd, London	GB
Castrol Anti-Freeze O	Deutsche Castrol Vertriebs GmbH, Hamburg	D
Century F.L. Anti-Freeze	Century Oils, Hanley, Stoke-on-Tent	GB
Chevron DEX-COOL Extended Life Anti-Freeze / Coolant	Chevron Texaco, San Ramon, CA	USA
DEUTZ Kühlschutzmittel 0101 1490	Deutz Service International GmbH, Cologne	D
Esso Kühlerfrostschutz	Esso AG, Hamburg	D
Fircofin	Fuchs Mineralölwerke GmbH, Mannheim	D
Frostschutz Motorex (G48-00)	Bucher & Cie, Langenthal	CH
Frostschutz 500	Mobil Oil AG, Hamburg	D
Glacelf Auto Supra	Total Nederland N.V., Den Haag	NL
Glycoshell AF 405	Shell Deutschland GmbH, Hamburg	D
Glycoshell N	Shell Deutschland GmbH, Hamburg	D
Glysantin (G 48-00)	BASF AG, Ludwigshafen	D
Havoline XLC	Arteco, Gent	B
Havoline DEX-COOL Extended Life Anti-Freeze/ Coolant	Chevron Texaco, San Ramon, CA	USA
Igol Antigel Type DB	Igol France, Paris	F
Labo FP 100	Labo Industrie, Nanterre	F
Motul Anti-Freeze	Motul SA, Aubervilles	F
OMV Kühlerfrostschutzmittel	OMV AG, Schwechat	A

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Note
The filter cartridge can be damaged by tightening too tightly.

▶ Do not use tools to tighten the filter.

5.8.6 Replacing the fuel filter cartridge (fine filter)

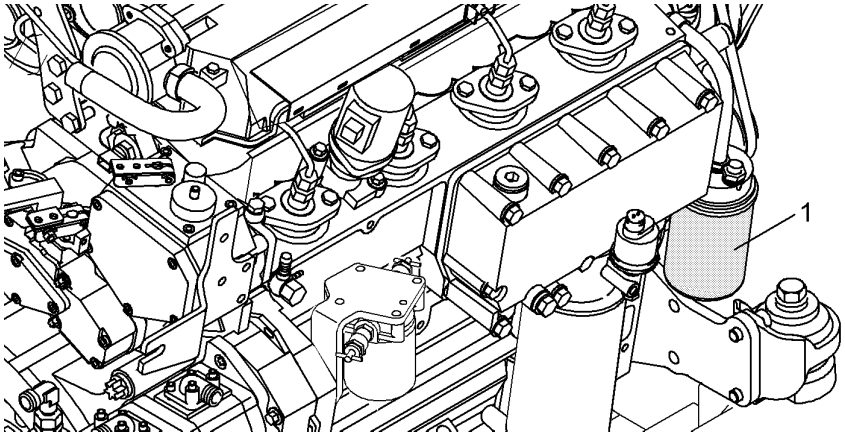

Fig. 5-21 *Fuel fine filter*

▶ Unscrew fuel filter cartridge **1**.

▶ Lubricate the rubber seal ring on the new filter cartridge lightly.

Note
The filter cartridge could be damaged if it is tightened too much!

▶ Do not use any tools to tighten the filter.

▶ Screw on the new filter cartridge and tighten by hand.

It is not necessary to bleed the fuel system after changing the fine filter.

5.9 Dry air filter

Maximum engine protection against premature wear due to dust is only possible if the air filter is serviced at regular intervals.

The dry air filter is designed in such a way that it offers maximum protection at long maintenance intervals.

For safety reasons, we do not recommend to wash out filter elements.

5.10.8 Servicing the hydraulic cylinder

5.10.8.1 Checking the piston rod bearing

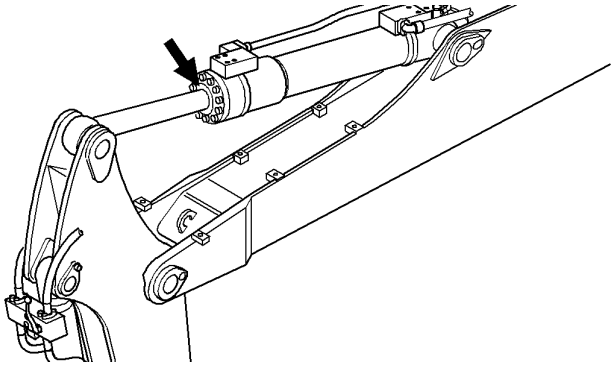

Fig. 5-32 *Piston rod bearing*

Note
When a leak occurs on the piston rod bearing of a hydraulic cylinder (arrow), then the seal kit must be replaced by a LIEBHERR mechanic.

5.10.8.2 Protecting the piston rods

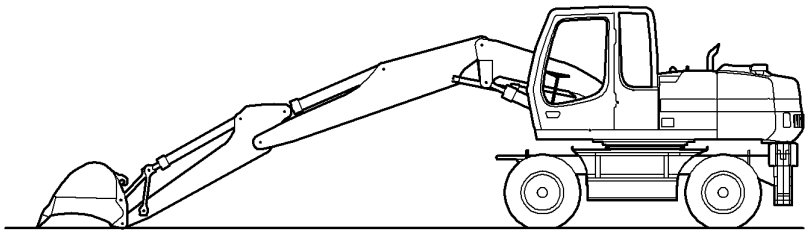

Fig. 5-33 *Machine with piston rods retracted*

When the machine is out of service for more than 4 weeks and particularly for transport by sea, the following measures must be taken:

- ▶ Position or transport the machine in such a way that the piston rods are fully retracted.
- ▶ Cover any exposed piston rods with a thick layer of acid free anti-corrosion grease.
- ▶ For sea transport, check the preservation of the piston rods again after loading.
- ▶ Cover piston rods with anti-corrosion grease also if a cylinder is used with a low stroke for certain applications, and the piston rod is not regularly covered with hydraulic oil (e.g. cylinder on basic boom when working above ground).
- ▶ Regularly check the condition of little moved hydraulic cylinders.

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During the operating period, the following maintenance work must be carried out every 500 operating hours:

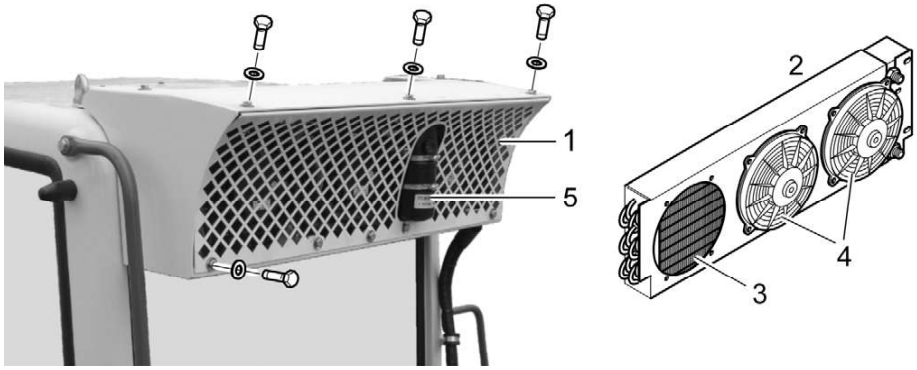

Fig. 5-45 *Condenser*

To check the condenser:

If heavily contaminated, overpressure forms in the air conditioning circuit and the air conditioning system turns off automatically.

- ▶ Remove cover **1**.
- ▶ Check the condenser **2** for contamination.
- ▶ If necessary, blow out the condensor **3** with compressed air from the front through the mesh guard **4** of the fan motors. Remove the fan motors, if necessary.
- ▶ Make sure that the condenser fins are clean.

To check the A/C compressor:

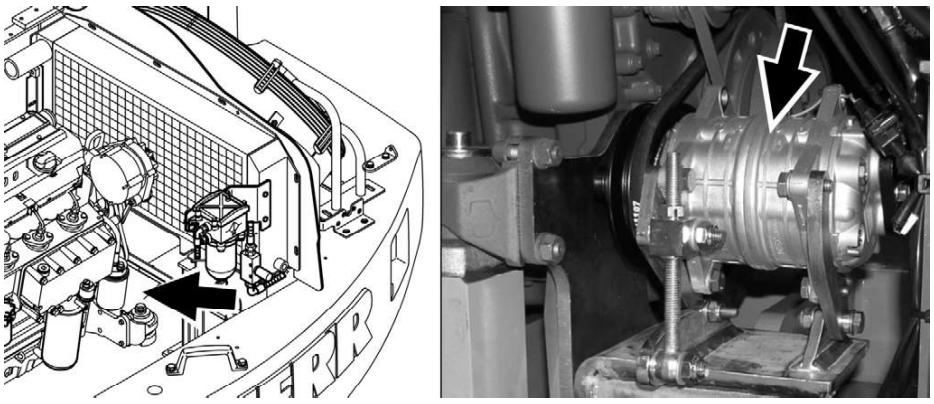

Fig. 5-46 *A/C compressor*

- ▶ Tighten the mounting screws of the A/C compressor (see arrow) and retainer on the Diesel engine.
- ▶ Check the condition of the compressor V-belt.