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Operating manual

Hydraulic excavator
R 926 Classic

from serial number 27 976

Document identification

	ORIGINAL OPERATING MANUAL
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Product identification

Manufacturer:	Liebherr Machinery (DaLian) Co. Ltd.
Type:	R 926 Classic
Type no.:	1235 - 1302

Address

Liebherr Machinery (DaLian) Co. Ltd.
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1.1.2 Machine for transferring material

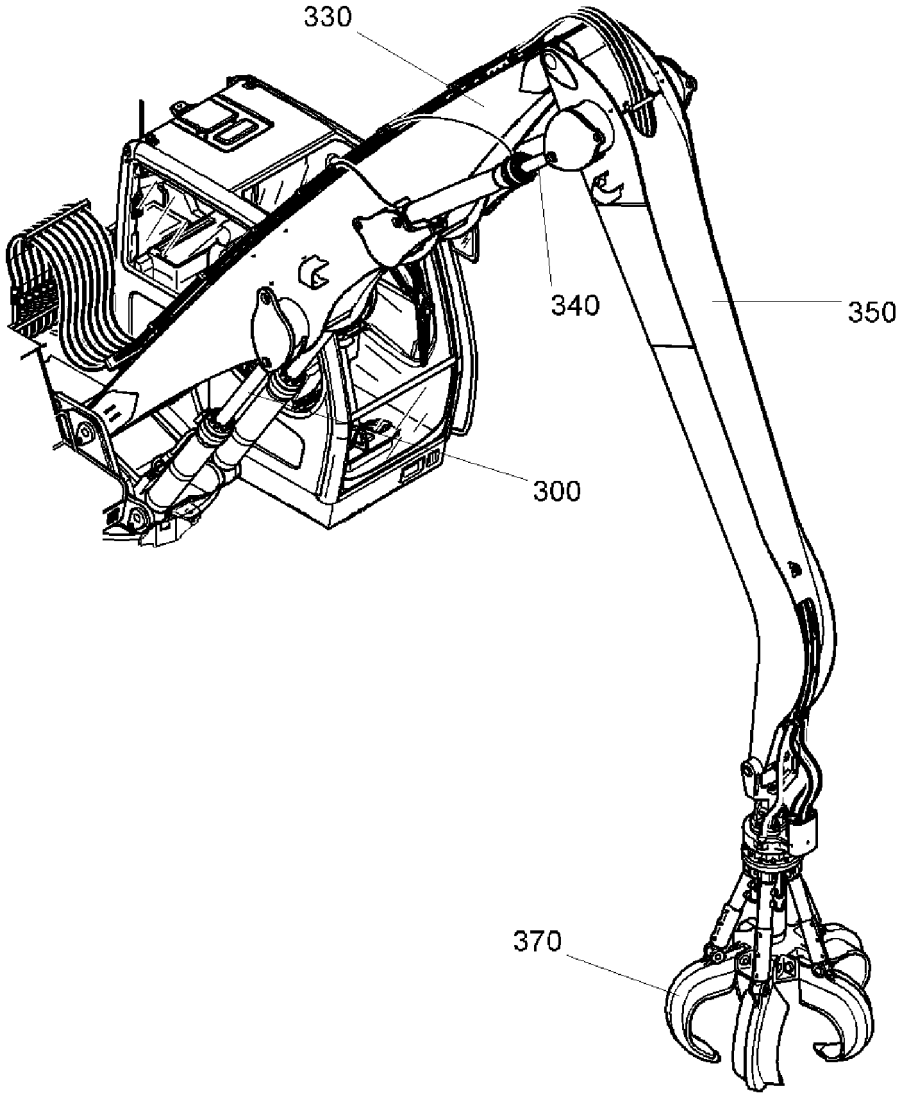

Fig. 1-3 *Machine for transferring material*

300	Hydraulic jack	**340**	Stanchion cylinder	**370**	Grab
330	Industrial boom	**350**	Industrial stanchion		

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Lift Capacities

with Gooseneck Boom 5,90 m

Stick 2,40 m

m	Under-carriage	3,0 m		4,5 m		6,0 m		7,5 m		9,0 m				m
10,5	LC													
9,0	LC													
7,5	LC					4,3*	4,3*					3,7*	3,7*	6,14
6,0	LC					6,0*	6,0*					3,5*	3,5*	7,28
4,5	LC			8,0*	8,0*	6,2	6,7*	4,4	6,0*			3,6*	3,6*	7,97
3,0	LC			9,0	10,1*	5,9	7,6*	4,2	6,4*			3,6	3,8*	8,33
1,5	LC			8,3	11,8*	5,6	8,5*	4,1	6,7			3,4	4,1*	8,41
0	LC	7,9*	7,9*	8,0	12,4*	5,3	9,0*	3,9	6,5			3,5	4,8*	8,21
-1,5	LC	13,1*	13,1*	7,9	12,1*	5,2	9,0*	3,9	6,5			3,8	6,1*	7,71
-3,0	LC	15,0*	15,0*	8,0	10,9*	5,3	8,2*					4,4	6,9*	6,84
-4,5	LC	11,4*	11,4*	8,3	8,5*							6,3	6,9*	5,44

Stick 2,70 m

m	Under-carriage	3,0 m		4,5 m		6,0 m		7,5 m		9,0 m				m
10,5	LC													
9,0	LC													
7,5	LC											3,2*	3,2*	6,53
6,0	LC					5,7*	5,7*	3,6*	3,6*			3,1*	3,1*	7,60
4,5	LC					6,3	6,4*	4,4	5,8*			3,1*	3,1*	8,27
3,0	LC	12,9*	12,9*	9,1	9,6*	5,9	7,3*	4,2	6,2*			3,3*	3,3*	8,62
1,5	LC			8,4	11,4*	5,6	8,3*	4,0	6,6			3,2	3,6*	8,69
0	LC	8,3*	8,3*	8,0	12,3*	5,3	8,9*	3,9	6,5			3,3	4,1*	8,50
-1,5	LC	12,4*	12,4*	7,9	12,2*	5,2	9,0	3,8	6,4			3,5	5,1*	8,02
-3,0	LC	15,5	15,7*	7,9	11,2*	5,2	8,4*					4,1	6,6*	7,19
-4,5	LC	12,4*	12,4*	8,1	9,1*							5,6	6,7*	5,87

Stick 3,00 m

m	Under-carriage	3,0 m		4,5 m		6,0 m		7,5 m		9,0 m				m
10,5	LC													
9,0	LC													
7,5	LC											2.9*	2.9*	
6,0	LC							4.2*	4.2*			2.7*	2.7*	8.57
4,5	LC					6.1*	6.1*	4.4	5.6*			2.8*	2.8*	8.91
3,0	LC	14.6*	14.6*	9.1*	9.1*	6.0	7.1*	4.2	6.0*			2.9*	2.9*	8.71
1,5	LC	7.1*	7.1*	8.4	11.1*	5.6	8.1*	4.0	6.5*			3.1	3.1*	8.98
0	LC	8.5*	8.5*	8.0	12.1*	5.3	8.8*	3.9	6.5			3.1	3.5*	8.79
-1,5	LC	11.9*	11.9*	7.8	12.2*	5.2	8.9	3.8	6.4			3.3	4.3*	8.33
-3,0	LC	15.4*	16.3*	7.8	11.5*	5.2	8.5*	3.8	6.3*			3.8	5.8*	7.54
-4,5	LC	13.3*	13.3*	8.0	9.6*	5.3	7.0*					5.0	6.5*	6.29

Height **Can be slewed though 360°** **In longitudinal position of undercarriage** **Max. reach** *** Limited by hydr. capacity**

The lift capacities on the load hook of the Liebherr quick change adapter 48 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Adjacent values are valid for the undercarriage when in the longitudinal position. Capacities are valid for 600mm wide triple-grouser pads. Indicated loads are based on ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity (indicated by *) or are limited through the allowed lift capacity of the load hook on the quick change adapter (12 t). Without quick change adapter the lift capacities will increase by 250 kg, without bucket cylinder, link and lever they increase by an additional 370 kg.
According to European Standard, EN 474-5: In the European Union excavators have to be equipped with an overload warning device, a load diagram and automatic check valves on the hoist cylinders, when they are used for lifting operations which require the use of lifting accessories.

– Stop the engine in accordance with the operating instructions and tilt the safety lever up before leaving the cab.
– Lock the machine, included hoods and compartments, retire every keys and secure the machine against unpermitted use and vandalism.

Safely getting down

– Proceed with the the same precautions to climb up or down onto the machine, as to instal yourself.
– Stop the machine on level, horizontal ground. The upper structure should be positioned with the undercarriage in such a way that the steps and ladders are aligned with each other.
– Open and lock the door. Be sure of it's locking. Take care of weather conditions ! Unfasten the safety belt.
– Position yourself with your face toward the machine when getting out and use three-point support, i.e. two hands and one foot or two feet and one hand must always be in contact with the access system at the same time. Climb down until you can close the doors safely. Always use your hand for control when closing the doors. Lock the door.
– Now climb down to the ground.

Working safely with the machine

– Before you start working, acquaint yourself with the special features of the job site and any special precautions and warning signals. Examples of particular work environments would be on-site or traffic obstructions, the load-carrying capacity of the ground and any requirements to make the job site safe from public use.
– Always maintain a safe distance from overhangs, edges, slopes and unsafe ground.
– Be particularly careful in conditions of reduced visibility and changeable ground conditions.
– Familiarize yourself with the location of power lines on the job site and take particular care when working near them. If necessary, inform the responsible authorities.
– Maintain a safe distance from electrical aerial lines. Do not allow the equipment to come near cables when working near electrical aerial lines. Risk of fatality! Inform yourself about required safety distances.
– The following actions must be carried out in the event of any transfer of electricity:
  • do not move the machine or its equipment,
  • do not leave the driver's cab,
  • warn any personnel in the vicinity not to come close to the excavator and not to touch it,
  • instruct or initiate that someone turns off the voltage.
  • move the machine, if possible, from the danger zone to a sufficient distance,
  • Do not leave the machine until you are absolutely sure that voltage in the line, which had been touched or damaged, has been turned off !
– Before moving the machine, always ensure that any attachments are safely secured.
– When driving onto public roads, paths and squares, observe current traffic regulations and if necessary, ensure that the machine has been made safe as per regulations beforehand.
– Always turn on the lights in conditions of poor visibility or darkness.
– Do not permit any passengers in the machine.

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components must be previously and sufficiently ventilated with pressurized air to avoid all fire or explosion hazard

– Before welding, connect the ground cable as close as possible to the welding point, so the welding current will not run through the swing ring, joints, gears, bushings, rubber parts and seals

Process materials

– When working with oils, greases and other chemical substances, observe the appropriate current safety regulations for the product.
– Ensure that process materials and replacement parts are disposed of in a safe and environmentally acceptable manner.
– Take care when handling hot process materials
(Risk of burning and scalding).

Repair work

– Do not attempt to lift heavy parts. Use devices which are suitable for this purpose and which have sufficient load capacity. When replacing single parts and larger subassemblies, carefully secure them on lifting devices them so that they do not present a risk. Only use suitable and correctly functioning lifting devices and load take-up devices with adequate load capacity.
Do not stand or work under swinging loads.
– Do not use lifting devices which are damaged or do not have sufficient load carrying capacity.
Wear work gloves when working with wire cables.
– Only permit experienced personnel to attach loads and give signals to the crane operator. The spotter must be positioned within the visual range of the operator or be in voice contact with him.
– When working above body height, use safe climbing devices and working platforms which are appropriate for the job.
Do not use machine parts as climbing devices if they are not designed for this purpose.
When working at height, wear a harness to prevent falling.
Ensure that all grips, steps, rails, platforms and ladders are free of dirt, snow and ice.
– Pneumatic cylinders do not have to be used as handles. Open doors and covers carefully, so that pneumatic cylinders do not hit their stops, because this could cause mechanical dammages.
– Be sure to support yourself safely when working on the equipment (e.g. replacing teeth). Prevent metal touching metal when doing this.
– For safety reasons, never open and remove a track chain unless having previously totally released the pretension of the chain tensioning unit.
– Never lay under the machine if it is raised with work equipment and has not been securely supported with wooden beams.
– Always jack the machine up in such a way that any weight displacement does not jeopardize stability and prevent metal touching metal while doing this.
– Work on the suspension, brake and steering systems may only be carried out by trained specialist personnel.
– If the machine has to be repaired on a slope, secure the crawler with chocks and connect the upper structure to the chassis using stop bolts.
– Only personnel with special training and experience may work on hydraulic equipment.

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2.5.4 Nameplates on the machine

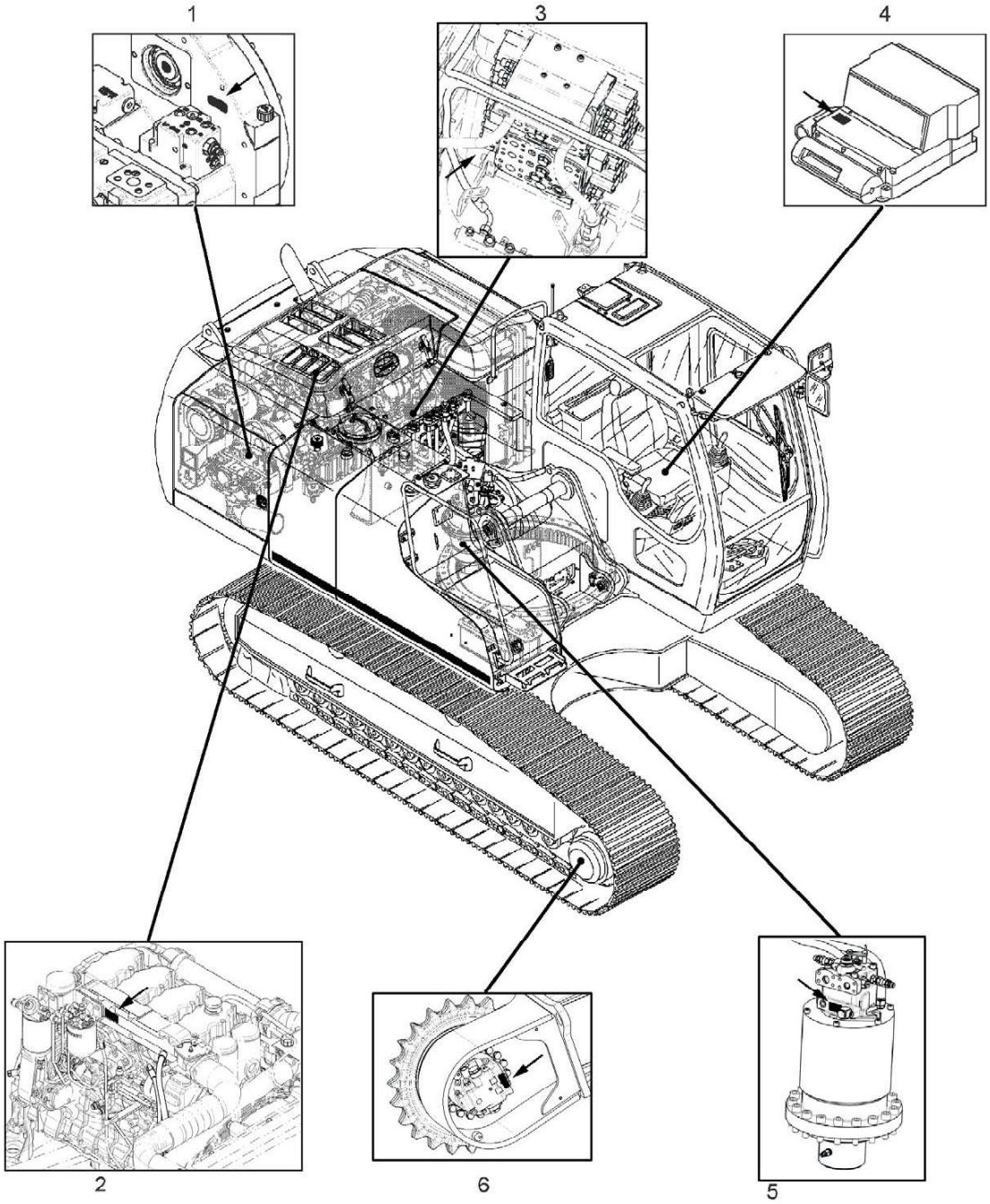

Fig. 2-2 *Important nameplates on the machine*

1 Hydraulic pump
2 Diesel engine
3 Control block
4 Heating/air conditioning device
5 Slewing gear transmission
6 Drive transmission

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S10 - **Uppercarriage headlights, equipment headlight**

- ▶ Press the **S10** key.
  - ↳ The headlights are activated.
  - ↳ The LED 1 in the **S10** key lights up.
- ▶ Press the **S10** key again.
  - ↳ The uppercarriage headlights are deactivated.
  - ↳ The LED 1 in the **S10** key goes out.
  - ↳ The equipment headlight is activated.
  - ↳ The LED 2 in the **S10** key lights up.
- ▶ Press the **S10** key again.
  - ↳ The uppercarriage headlights and equipment headlight are activated.
  - ↳ The LEDs 1 and 2 in the **S10** key illuminate.
- ▶ Press the **S10** key again.
  - ↳ The uppercarriage headlights and equipment headlight are deactivated.
  - ↳ The LEDs 1 and 2 in the **S10** key go out.

S11 – Windshield washer

- ▶ Press and hold the **S11** key.
  - ↳ The windshield washer liquid is sprayed onto the windshield.
  - ↳ The windshield wiper runs continuously.
- ▶ Release the **S11** key.
  - ↳ The windshield washer liquid spraying stops.
  - ↳ The windshield wiper stops after approximately 3 seconds.

S14 – Windshield wiper

- ▶ Press the **S14** key.
  - ↳ The windshield wiper is activated in intermittent mode.
  - ↳ The LED I in the **S14** key lights up.
- ▶ Press the **S14** key again.
  - ↳ The windshield wiper is activated in continuous mode.
  - ↳ The LED C in the **S14** key lights up.
  - ↳ The LED I in the **S14** key goes out.
- ▶ Press the **S14** key again:
  - ↳ The windshield wiper is deactivated.
  - ↳ The LED C in the **S14** key goes out.

You can adjust the pause time for the intermittent mode from 2 to 9 seconds:

- ▶ Press and hold the **S14** key to select the intermittent mode:
  - ↳ After a few seconds the LED I in the key **S14** starts blinking rapidly.
- ▶ When the blinking duration corresponds to the desired pause time: Release the **S14** key.

E 511 – Over voltage for the BBT

This symbol appears if the operating voltage for the BBT exceeds 30 volts for at least 0.5 seconds.

E 512 – Under voltage for the Diesel control system

This symbol appears if the operating voltage for the Diesel control system is lower than the minimum permissible value.

E 513 – Over voltage for the Diesel control system

This symbol appears if the operating voltage for the Diesel control system exceeds the maximum permissible value.

E 516 – Safety shut off for EDC default

This symbol appears if an EDC default is detected. The engine shut off automatically.

E 517 – Safety shut off for injector default

This symbol appears if an injector default is detected. The engine shut off automatically.

E 518 – Safety shut off for startsynchronisation default

This symbol appears if a startsynchronisation default is detected. The engine shut off automatically.

E 519 – Overspeed of Diesel engine - Warning stage

This symbol appears if the RPM of the Diesel engine is too high.

E 520 – Overspeed of Diesel engine - Safety stage

This symbol appears if the RPM of the Diesel engine is too high. The engine shut off automatically.

E 521 – Defect of both engine RPM sensors

This symbol appears if both engine RPM sensors are simultaneously defective. The engine shut off automatically.

For machine equipped with a lifting magnet, the symbol appears if one only of the both sensor is defective. In this case, the engine does not shut off automatically.

E 522 – Low engine oil pressure - Safety stage

This symbol appears if the engine oil pressure is, during at least 7 seconds, below a programmed value depending on the engine RPM. The buzzer sounds simultaneously.

E 523 – Coolant overheat - Safety stage

This symbol appears if the coolant temperature exceeds 104°C during at least 7 seconds. The buzzer sounds simultaneously and the engine power is reduced.

– the swing movements.
– the movements of the optional equipment (operated via the foot pedals)

▶ Press the **Menu** key again.
↳ the screen 4 is displayed.

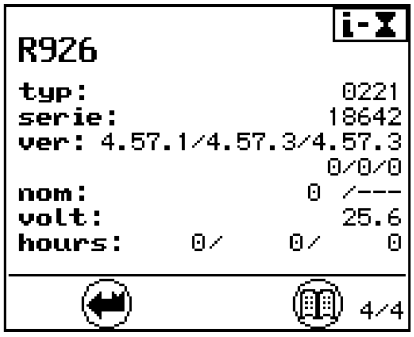


Fig. 3-17 *Menu "Info Hours" General Data*

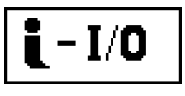
The menu General Data, provides information on:

– The model of the excavator
– "typ" : the type of the excavator
– "serie" : the serial number of the excavator
– "ver" : the installed Software-Versions for, respectively, the monitoring display, the control unit BBT, the pump regulator BST, and, on the second line, the SPF nb. (specification number) of the engine regulator unit and the engine type.
  • 1 : 6 cylinders PLD engine (Pump line nozzle injection system)
  • 2 : 4 cylinders PLD engine (Pump line nozzle injection system)
  • 3 : 6 cylinders common rail engine
  • 4 : 8 cylinders common rail engine
– Example : 6/2 : SPF 06 / 4 cylinders engine with pump line nozzle injection system
– "nom" : the both indications beside "nom" are not used
– "volt" : indication for the momentary operating voltage.
– "hours" : this last line indicates respectively:
  • the operation with the input X2.8 activated (special equipment – not used actually),
  • the operation with the input X2.14 activated (special equipment – not used actually),
  • the operation with the input X2.13 activated (special equipment – not used actually),

▶ Press the **Menu** key again.
↳ The screen 1/4 is displayed.

To exit the menu:

▶ Press the **Back** key.
↳ The sub-menu will be aborted.



Menu "Info In/Outputs"- Status of hydraulic pumps and of electrical inputs and outputs

The screens 1 to 3 provide information on the regulation parameters for the hydraulic pumps.

H38-2 – Control light / empty report of centralised greasing system

This control light lights up if the grease level into the grease container of the centralised lubrication system is located on lowest level. Refill up the grease container, see also the section "To refill a grease container" into chapter 5.

S26 – Touch / Fuel preheater

This button turns on the electrical fuel pre heating system,see the section "Starting aids" in this chapter.

S40 – Touch / Frequency commutation for hydraulic hammer

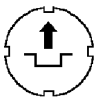
When actuating this touch a pressure signal is send to the reversing hydraulic hammer, causing the hammer to change over to the second cycle frequency.

S45 – Touch / Priority for special equipment

If an hydraulic actuator (cylinder, hydraulic motor,) of a special equipment requires a constant oil flow, the speed of the remaining attachment movements can be reduced by depressing the push button **S45** (control light inside the button must light).
The necessary oil flow for the hydraulic actuator is maintained, even in case of simultaneous actuation of other attachment movements.

S46 – Touch / Lifting magnet operation

This button turns on and off the control circuit for an optionaly mounted lifting magnet, see "Lifting magnet control system (optional equipment)" in this chapter.

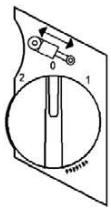


S47 – Push button / Quick change adapter

The push button turns on the control circuit for the quick change adapter for the working tool. See also the section "Hydraulic quick change adapter for working tools (optional equipment)" in this chapter.

S53 – Touch / Special control circuit supply

Actuating this touch makes alive an additional control circuit for a special equipment. The green indicator light in the touch lights up to show that the additional servo control circuit is under pressure.



S54 – Rotary switch / Unlocking of cylinder end position

On some special working attachments, or on attachment showing particular cinematic capacities (as example on industrial attachment), certain movement(s) may be stopped automatically by electrical end switches. The main purpose of this movement limitation is to prevent possible damages due to components frequently reaching their end stops.
See "Cutoff by end switches of attachment movements (option)" in this chapter.

S76 – Touch / Travel parking brake

This touch controls the travel parking brake on the machines fitted with a special undercarriage, or on machines mounted on a loading bridge, a wagon, ...
When the red indicator light in the touch lights up, the travel brake is applied.
On machines with a standard undercarriage, the travel brakes are controlled directly via the travel pedals and the touch **S76** does not exist.

S77 – Touch / Pressurized driver's cab

When the touch is depressed, the green indicator light in the touch lights up and an air fan is started to maintain a slight pressurization inside the driver's cab.
The entering of dust or not filtered air into the cab is then almost prevented.

Note!
It is the responsibility of the owner of the machine to decide if it must be fitted with a fire extinguisher or not, considering the operating conditions and the local laws and regulations applying where the machine is used.

You can order a kit for retrofit adaptation comprising a fire extinguisher and its mounting bracket at any time at the LIEBHERR customer service.

Caution!
If your machine is fitted with a fire extinguisher:

- ▶ Always comply with the operating guide on the body of the extinguisher.
- ▶ Make sure that all the necessary inspections of the fire extinguisher prescribed by local laws and safety regulations are carried out.

3.2.10 Windscreen wiper

Windscreen wiper

When the ignition is switched on, pressing switch **S14** will activate the windscreen wiper.

- ▶ Press switch.
  - ↳ Intermittent switching
  - ↳ LED I in the switch illuminates.
- ▶ Press switch again.
  - ↳ Continuous operation.
  - ↳ LED C in the switch illuminates.
  - ↳ LED I in the switch goes out.
- ▶ Press switch again.
  - ↳ Windscreen wiper is switched off.
  - ↳ LED C in the switch goes out.

Setting the interval time for the intermittent switching

The interval time can be set when the ignition is on by pressing switch **S14**.

- ❑ Press the switch until the windscreen wiper is switched off (LED I in switch goes out)
- ▶ Press and hold switch.
  - ↳ LED I in the switch flashes.
- ▶ Release the switch when the desired interval time has been reached.
  - ↳ The interval time can be set between 2 and 10 seconds.

Windscreen washing system

When the ignition is switched on, pressing button **S11** will activate the electric windscreen washing system.

- ▶ Press and hold button.
  - ↳ Washing water will be sprayed onto the windscreen through the outlet nozzles.
  - ↳ The windscreen washer runs continuously.

– Shorten cleaning intervals when working in heavy dust conditions.

To clean and change the main and safety filter element :

▶ Open the clip **5**.

▶ Remove the end cover **4**.

▶ Remove the main filter element **2**.

▶ Remove the safety filter element **3**.

Note!

▶ Never wash the filter elements with hot water or a steam jet.

▶ If damaged or in a bad condition, replace the filter elements.

▶ Blow out the filter elements **2** and **3** using compressed air or clean in cold or lukewarm water.

Notes :

In case of failures :

▶ Check out / remplace fuse **F1** (15 A) on plate A1010 into the left control panel (see chapter 0.1.2, "ESP02 board" on page 1).

▶ Check out / remplace plate A1008 into the left control panel.

3.3 Setting the machine into operation

3.3.1 Starting / stopping the machine

General information

Note!
When using the machine at a specific height above sea level and in connection with coolant and boost air temperatures, the performance and service life of the diesel engine with turbocharging is decisively affected.
Under these conditions, there is also an increased risk of the coolant circuit and the hydraulic oil overheating.

The power electronic regulator **LIDEC DC 5-00** is used for regulation, surveillance and protection of LIEBHERR diesel engines.

In the following environmental conditions (sea level and athmospheric pressure) the engine power is automaticaly reduced :

– 4.850 m and an atmospheric pressure up to 550 mbar
– 3.950 m and an atmospheric pressure up to 620 mbar
– 3.100 m and an atmospheric pressure up to 690 mbar
– 2.250 m and an atmospheric pressure up to 770 mbar
– 1.550 m and an atmospheric pressure up to 840 mbar

Pay attention to both the coolant circuit and the hydraulic oil cooling simultaneously.

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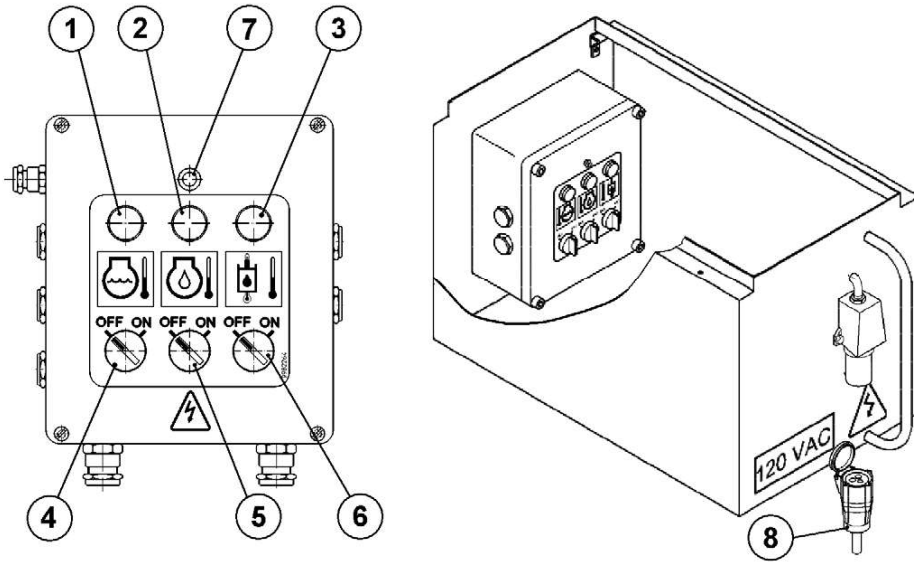

Fig. 3-53 *Coolant / motor oil / hydraulic oil preheating*

1	Coolant preheating indicator light	**5**	On / off toggle switch for engine oil preheating
2	Engine oil preheating indicator light	**6**	On / off toggle switch for hydraulic oil preheating
3	Hydraulic oil preheating indicator light	**7**	fuse
4	On / off toggle switch for coolant preheating	**8**	Power cable

The electrical box for the coolant / engine oil / hydraulic oil preheating is located behind the right-hand side door.

▶ Connect power cable **8** to stationary connection (110 - 120 V / 220 - 240 V AC).

▶ Tip toggle switch **4**, Coolant / preheating.
  ↳ The coolant preheating is switched on.
  ↳ Indicator light **1** illuminates.

▶ Tip toggle switch **5**, engine oil preheating.
  ↳ The engine oil preheating is switched on.
  ↳ Indicator light **2** illuminates.

▶ Tip toggle switch **6** hydraulic oil preheating.
  ↳ The hydraulic oil preheating is switched on.
  ↳ Indicator light **3** illuminates

▶ After starting the engine, disconnect the power cable **8** on the machine.

Note!
Drive backwards when you are working lengthwise with a backhoe bucket attachment.

3.4.6 Working attachment control

Caution!
The joystick functions described below refer to the **normal control, fitting out the machine at delivery**.and **according to ISO-standards,**
On machines equiped in addition with a special control system, and if this special control system is activated by the operator, the joystick functions correspond to the information on the label which is sticked on the side window of the cab and is specific to the installed special control system.

Control of the stick cylinder

The stick cylinder is operated using the left joystick **4**.

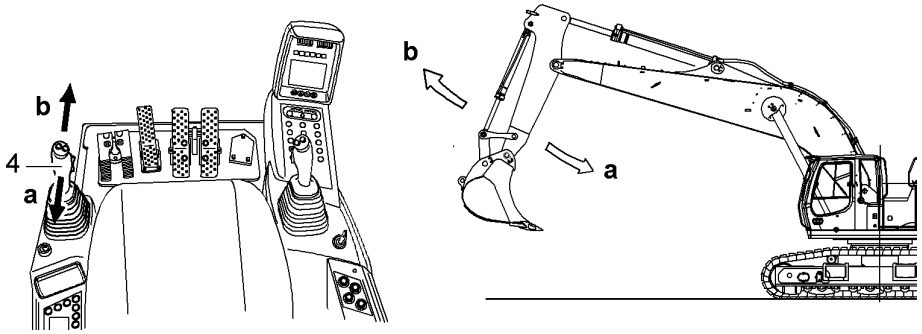

Fig. 3-63 *Stick cylinder control*

- ▶ Pull the joystick **4** back **(a)**.
  ↳ The stick is moved in.
- ▶ Push the joystick **4** forwards **(b)**.
  ↳ The stick is moved out.

Control of the boom cylinders

The boom cylinders are operated using the right joystick **3**.

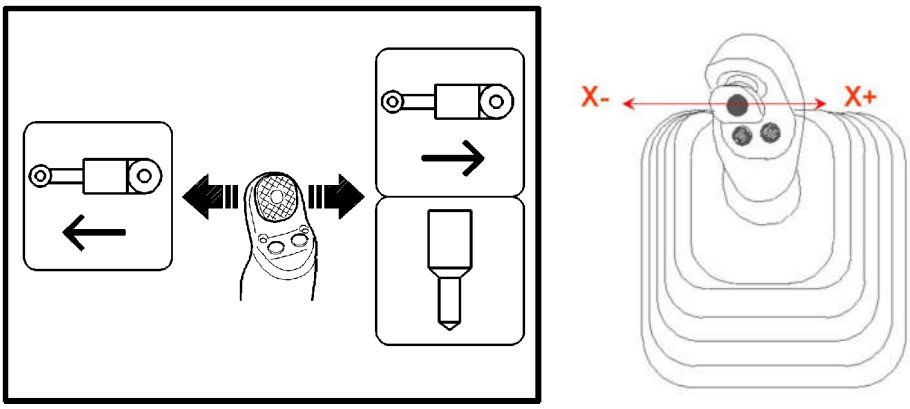

Fig. 3-73 *Mini joystick on the right joystick*

Danger!
Risk of accident due to an unintentional movement by an uninformed machine operator!
With the AHS11 proportional control turned on, the correspondence between actuated controls and triggered working movements is changed.
It is the responsibility of the owner of the machine to authorize an operator to operate the machine with the AHS11 proportional control.

- ▶ Actuate the mini joystick to **X(-)** and keep it tilted:
  - ↳ The cylinder of the additional equipment is extended and the additional equipment is moved correspondingly.
- ▶ Actuate the mini joystick to **X(+)** and keep it tilted:
  - ↳ The cylinder of the additional equipment is retracted and the additional equipment is moved correspondingly.

3.4.13 Commutation of control for an additional attachment (option)

Danger!
Risk of accident due to an unintentional movement by an uninformed machine operator!
When the commutation of the control is turned on, the correspondence between the controls and the working movements is changed.
When the key is removed from the switch or when the touch is gone out, the machine can be operated only with the usual control system, installed at machine delivery.
It is the responsibility of the owner of the machine to grant an operator authorization to operate the machine with the activated special control system.

Caution!

- ▶ Check out the functions of the additional controls when starting the machine, especially when a commutation of control is activated.

Deactivation of the overload warning system

NOTICE
There is an increased pressure in the hydraulic cylinders during earth-moving operations!
If the overload warning system is activated, it is triggered permanently.

▶ Switch off the overload warning system for earth-moving operations.

▶ Push the key **S18**.
  ↳ The overload warning system is deactivated.
  ↳ The LED of the key goes out of view.

3.5 Operating the machine in emergency mode

3.5.1 Description of the emergency mode

The emergency mode must only be used in case of a failure in the main electronic circuit. It must only be used temporarily to move the machine out of the working zone to a place where the necessary repairs can be done safely.

Specific operating conditions and restrictions apply in emergency mode:

– The following functions remain available:
  • Automatic engine power reduction in case of overheating of the engine coolant or of the charge air.
  • Memorization of the occurring engine faults into the inner error memory of the engine control unit.
– The following restrictions apply:
  • The engine works with reduced output.
  • If communication between the engine control unit and the machine main circuit is no longer possible, error codes are no longer displayed on the display.
  • Automatic engine shutdown in case of low lube oil pressure is inoperative.
  • Automatic engine shutdown in case of coolant or charging air temperature above the threshold is inoperative.

The emergency mode can be triggered manually or automatically.

Caution!
Risk of engine damage!
If a fault occurs in the circuit of the power regulator, the pumps stay at maximum angle and the engine is overloaded.

▶ Locate the fault and have it repaired as soon as possible.

3.5.2 Control board E52 for emergency mode

The control board E52 enables emergency operation of the machine in emergency mode. The control board E52 is located at the rear end of the right side control desk.

Dismounting a bucket

- ▶ Position the bucket to be attached in such a way that its entire lower part is laying on the ground.
- ▶ Remove the covers **5** and **6**.
- ▶ Remove the protection rings **8** of all the bearing points and draw the O-rings **9** up onto the bushing **1.1** on the bucket side.
- ▶ Drive out the pins **3** and **4**.
- ▶ If necessary, lift the attachment slightly to remove the pin **4**.
- ▶ Take off the O-rings **9** and if necessary replace them.

Attaching a new bucket

- ▶ Position the bucket **1** so that the flat part of the bucket rests on the ground.
- ▶ Draw the O-rings **9** up onto the bushing **1.1** of the digging bucket, as well on bearings bucket to stick as on bearings bucket to connecting link **7**.
- ▶ Start the engine and move the attachments until the stick and bucket bore holes **A** align.
- ▶ Insert pin **4** and reinstall the covers **6** with O-rings.
- ▶ Slowly extend the stick cylinder until the bore of the connecting link **7** is exactly between bore holes **B**.
- ▶ Insert pin **3** and reinstall the covers **5** with O-rings.
- ▶ Slip the O-rings **9** laterally until they are in the grooves between bushings **1.1** and **2.1** (see detail **D**) and install the two piece protection rings **8**.
- ▶ Lubricate all greasing points of pins **3** and **4** directly or with the automatic grease system (if mounted) until clean grease comes out of the greasing points.

Note!

After installation of a new digging bucket, the restrictor check valves **222** and **232** for stick, respectively bucket tilt cylinders must be eventually readjusted so to have the correct velocity of the working attachment (due to weight differences of the digging bucket).If necessary, consult a LIEBHERR mechanic.

In particular on machines, which are delivered without digging bucket or grapple, this restrictor check valves must be (if mounted) adjusted after installation of the digging tool, so to avoid uneven or jerky movements of the attachment parts.

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Locking the quick-change adapter

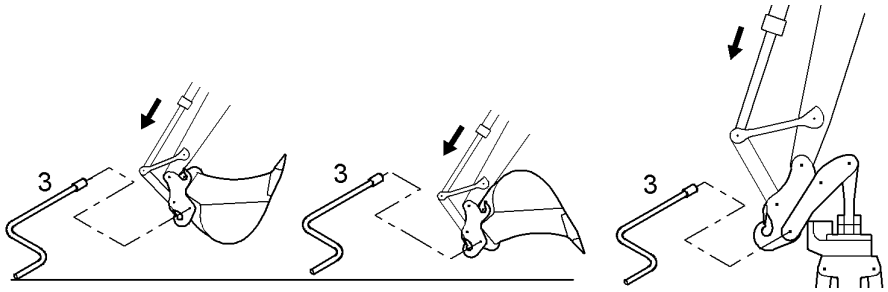

Fig. 3-93 *Locking the quick-change adapter*

Danger!
Falling tool attachment!
Crushing hazard, injuries.

- ▶ Move the safety lever to the upper position.
- ▶ Before approaching, visually check that the locking pins of the quick-change adapter are fully extended in the bore holes of the tool attachment.

- ▶ Insert the crank **3** in the locking pin **1**.
- ▶ Turn clockwise until both locking pins are extended to the stop.
  ↳ The tool attachment is attached.
- ▶ Screw the locking screw **2** into the locking pin.

Connecting hydraulic or electrical lines

Certain tool attachments have hydraulic and/or electrical lines that must be connected (examples: hammer, grapple).

- ▶ Remove the hydraulic pressure:
  - Switch off the engine.
  - Turn the ignition key into the contact position.
  - Operate the joysticks.
- ▶ Connect hydraulic lines or electrical lines.

If the machine is equipped with quick change couplings to valves:

- ▶ Open the valves.

Checking the attachment tool for correct attachment

Danger!
Falling tool attachment when operating the machine with incorrectly locked quick-change adapter!
Crushing hazard, injuries, death.

Before working with the machine :

- ▶ Make sure that the locking pins are locked on both sides:
  - by the sealing plug **4**
  - by the locking screw **2**

- ▶ Carry out a complete working cycle: completely tilt the tool attachment in and out.

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Attaching and dismounting work tools

Attaching and dismounting is carried out as described in the chapter “Hydraulic quick-change adapter”.

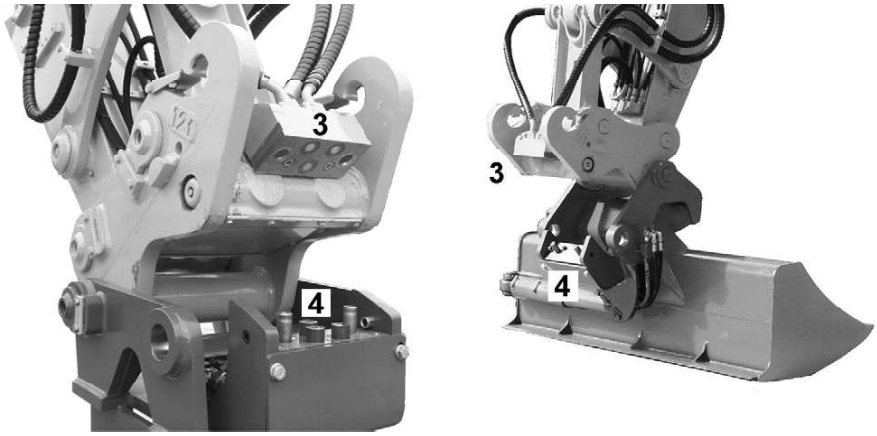

Fig. 3-107 *Connecting LIKUFIX*

Please also note:

- Before attaching, remove the protective coverings on the quick-change adapter **1** and the work tool **2**.
- Always keep hydraulic couplings **3** and **4** clean.
- Perform a visual check for cleanliness before attaching. If necessary, clean all coupling parts and the sealing surfaces with a clean, oil-soaked cloth.
- Connect or separate the hydraulic coupling slowly as with any change of work tool.
- When attaching the quick-change adapter, tilt until the coupling disks are connected as a result of the self weight of the work tool.
- Remove the locking pins.
- If the disks do not connect as a result of self weight, foreign matter (such as stones) may be the cause. In this case, clean all coupling parts to prevent damage occurring when connecting.
- Oil quantity and pressure must be adapted to suit the work device concerned.
- When the work is completed, and particularly before transportation, put the protective coverings **1** and **2** back on.

Attaching LIKUFIX work tools to a quick-change adapter without LIKUFIX

It is possible to attach a work tool with a LIKUFIX hydraulic coupling to a machine with a quick-change adapter (mechanical or hydraulic) at any time.

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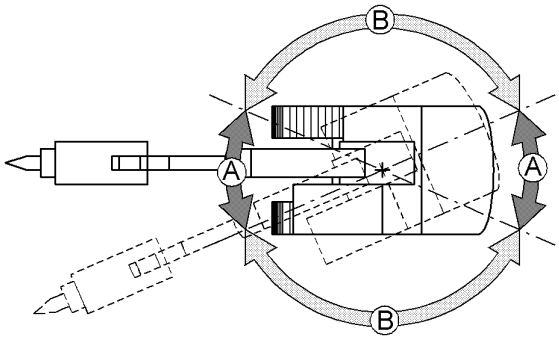

Fig. 3-123 *Permissible **A** and not permissible **B** work areas of the machine with hydraulic hammer*

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

Note!
On request, the machine can be equipe with the option "hoist cylinders security". With this option, while hydraulic hammer utilization, the pressure protection value for lowering the attachment (circuit for retraction of the hoist cylinders) is reduced, so as to limit the possible downward thrust exerted by the working attachment onto the materials to be dug out.

3.8.9 Working with large and heavy attachments

Large (heavy) attachments* put a considerably higher load onto the working equipment as the levers are longer.

To prevent damage to the machine, the following instructions must be strictly adhered to.

* Examples: concrete crusher, scrap shears, hydraulic hammer, swivel rotator, stick extension.

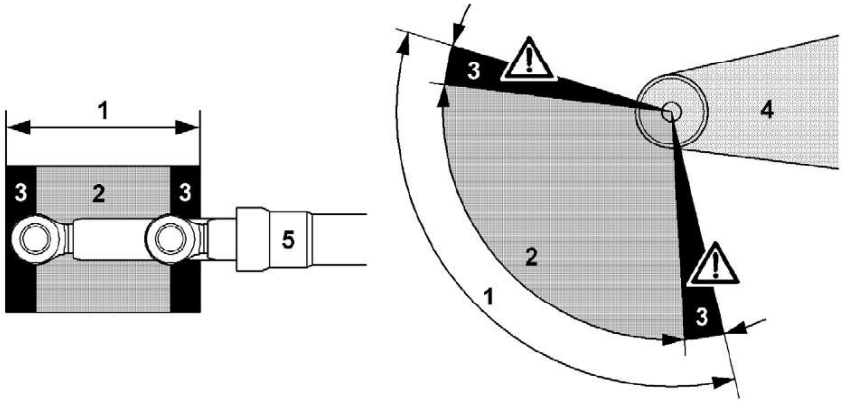

Fig. 3-124 *Permitted working range for large attachments*

Error code	Effect	Cause	Measure / remedy
E 036	Flow reduction for hydraulic equipment not being carried out.	EV 1 cable error at the output stage for flow regulation of hydraulic pump	Do not operate flow reduced equipment, consult LIEBHERR customer service.
E 039	Flow reduction for hydraulic equipment not being carried out (from R934, optional extra).	EV 2 cable error at the output stage for flow regulation of second hydraulic pump	Do not operate flow reduced equipment, consult LIEBHERR customer service.
E 042	Power reduction for swing movement not being carried out (for R934C and R944C). Attachment movements are slowed down.	EV 3 cable error at the output stage for power reduction for swing movement	Consult LIEBHERR customer service.
E 045	Pressure reduction for hydraulic equipment not being carried out.	EV6 cable error at the output stage for pressure regulation of the hydraulic circuit.	Do not operate pressure reduced equipment, consult LIEBHERR customer service.
E 063	Turbocharged air temperature not being monitored.	Short circuit to earth	Check that the radiator is not dirty, consult LIEBHERR customer service.
E 065		Short circuit + 24 V or Cable break	
E 070	Engine RPM not being monitored.	Transmitter output default	Switch to emergency control speed adjustment **S71** and **S72** and emergency operation work pumps **Y50**, consult LIEBHERR customer service.
E 072	Turbocharged air pressure not being monitored.	Short circuit + 24 V	Check the turbocharged air circuit, consult LIEBHERR customer service.
E 073		Short circuit to earth or Cable break	
E 074	Engine does not start	Start time out	Consult LIEBHERR customer service.
E 075		Short circuit to earth or Short circuit + 24 V or Cable break	
E 078		Défaut hardware	Consult LIEBHERR customer service.
E 079		Défaut software	
E 081	Engine RPM not being monitored.	Transmitter B12-1 default	Switch to emergency control speed adjustment **S71** and **S72** and emergency operation work pumps **Y50**, consult LIEBHERR customer service.
E 082		Transmitter B12-2 default	
E 084	Cold start command default	Unit 1 of cold start command over current	Consult LIEBHERR customer service.
E 085		Unit 1 of cold start command default	
E 086		Open load for Unit 1 of cold start command	
E 087	Engine RPM not being monitored.	The values registered by the transmitters B12-1 and B12-2 are different.	Switch to emergency control speed adjustment **S71** and **S72** and emergency operation work pumps **Y50**, consult LIEBHERR customer service.
E 088	Atmospheric pressure not being monitored.	Short circuit + 24 V or short circuit to earth or cable break	Consult LIEBHERR customer service.

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4.3 Fuses and relays

4.3.1 Fuse box E50

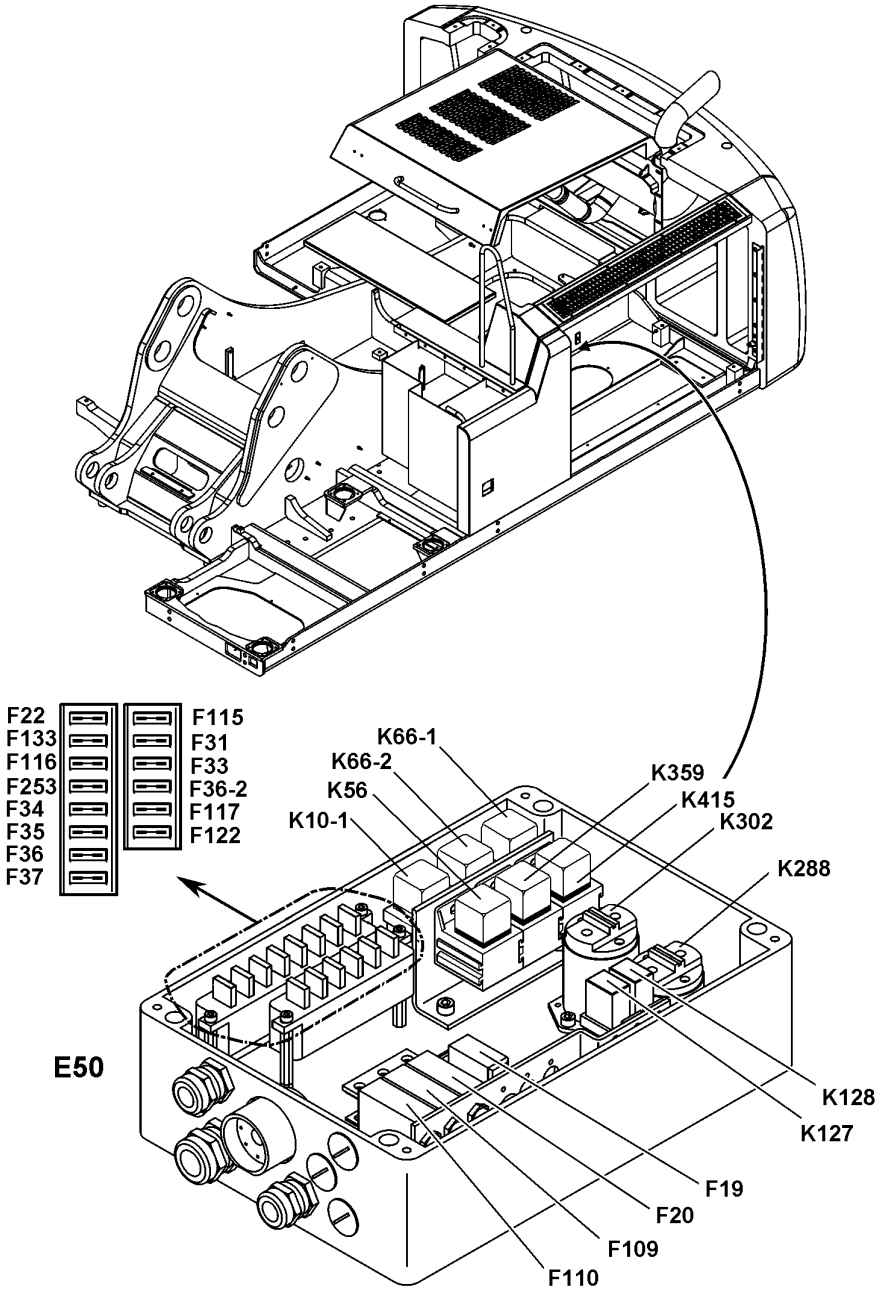

Fig. 4-2 *Fuse box E50*

Fuse box E50 is located behind the left side door, above the batteries.

5.4.2 Filling quantities and lubricating chart

Recommended lubricants

Designation	Recommended lubricant	Symbol	Volume [litre]*
Diesel engine	Liebherr Motoroil 10W-40 Liebherr Motoroil 10W-40 low ash Liebherr Motoroil 5W-30 Liebherr Motoroil 5W-30 low ash		29
Hydraulic system (system capacity / oil change volume)	Liebherr Hydraulic Basic 68 Liebherr Hydraulic Basic 100 Liebherr Hydraulic HVI Liebherr Hydraulic Plus Liebherr Hydraulic Plus Arctic		445 / 284
Slewing gear mechanism	Liebherr Gear Basic 90 LS		6,6
Travel gear mechanism	Liebherr Gear Basic 90 LS		2 x 3
Pump distributor gear	Liebherr Gear Basic 90 LS		1,9
Tracks and gearing of the slewing ring, bearing of the equipment	Liebherr Universalfett 9900		-
Hinges, joints, locks	Engine oil	-	-

* = guide values

Recommended fuels and chemicals

Designation	Recommended fuel	Symbol	Volume (litre)*
Fuel tank	Conventional diesel fuel		378
Coolant	Liebherr Antifreeze Mix Liebherr Antifreeze Concentrate Liebherr Antifreeze OS Mix Liebherr Antifreeze OS Concentrate		44,5
Windscreen washer system	Conventional windscreen cleaning agent or denatured alcohol	-	5

* = guide values

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Single-grade oils (1)	API - CD / ACEA - E1 (MB 226.0 and 227.0)
Multigrade oils (2)	API - CD, CE, CF / ACEA - E2, E3, E4 (MB 227.5, 228.1, 228.3 and 228.5)

Tab. 5-7 *Classification of products, engine oils for use as hydraulic oils*

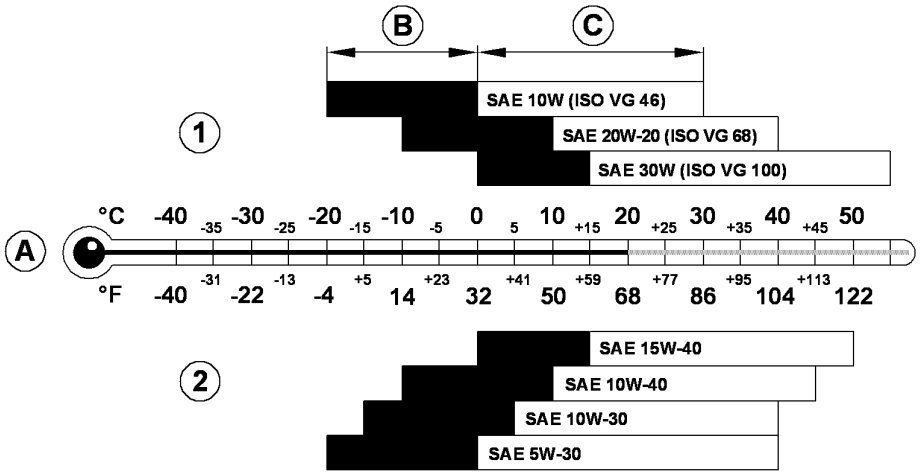

Fig. 5-8 *Engine oil for use as hydraulic oil, viscosity grade selection based on temperature**

A Ambient temperature
B Cold-start range with warm-up instruction
C Operating range
1 Single-grade oils
2 Multigrade oils

* for deviating viscosity grade, contact the Liebherr customer service.

Warm-up instructions

The black bar **B** indicates ambient temperatures that are up to 20 °C below the operating range **C**.

For cold starting at an ambient temperature below range **B**, the following warm-up instructions for the hydraulic oil apply:

- ▶ **1.** Start the Diesel engine and set it to medium speed (not exceeding 50% of maximum speed).
- ▶ **2.** Carefully activate the working hydraulics. Operate the hydraulic cylinders and move them briefly to the stop.
- ▶ **3.** After approximately 5 minutes, start the travel hydraulics. The total warm-up time is approximately 10 minutes.

For cold starting at lower ambient temperatures: Before starting the engine, warm up the hydraulic oil tank. Then follow warm-up instructions **1** to **3**.

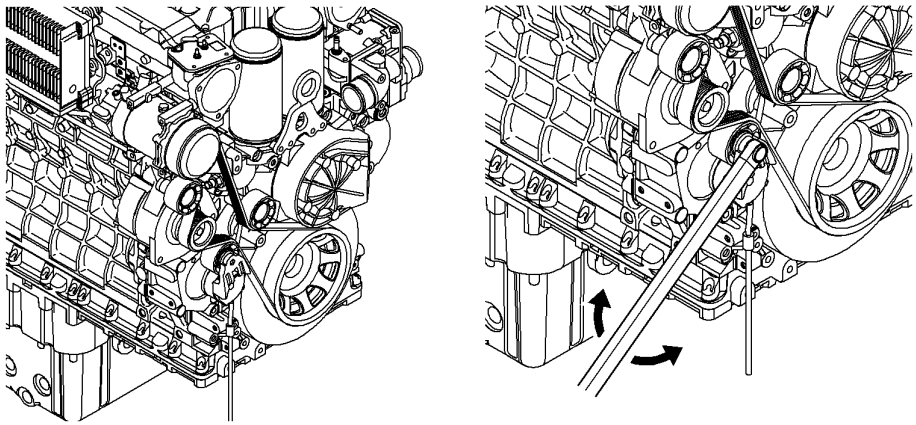

Fig. 5-13 *Replacing the belt*

To replace the belt

- ❑ To replace the belt, you will need a ratchet equivalent to DIN 3122 D12.5 (1/2").
- ▶ Rotate the tensioning device back counter-clockwise against the spring force as far as the stop.
- ▶ Remove the belt.
- ▶ Check tension pulley and belt pulley for sound condition (e.g. worn bearing of tension pulley, as well as wear of the belt pulley profile).
- ▶ If parts are damaged, replace the parts.
- ▶ Lay the new belt on the belt pulleys for the crankshaft, A/C compressor, alternator and deflection pulley with the tensioning device rotated back.
- ▶ Move the tensioning device clockwise back into the tensioned position.

5.6.4 Vibration damper

The vibration damper must be checked for leaks and distorsion following the interval given in the maintenance chart.

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2 Drain valve on the engine

❑ Shutoff valves for the heating circuit must be closed.

To drain the coolant at the cooler:

▶ Open cap **90** and unscrew the protection cap of the drain valve **9a** on the coolant cooler.

▶ Screw the drain hose supplied to the drain valve.

▶ Let the coolant drain into a suitable container.

To drain the coolant at the diesel engine:

▶ Unscrew the protection cap of the drain valve **2** on the engine's oil cooler plate.

▶ Screw the drain hose supplied to the drain valve.

▶ Let the coolant drain into a suitable container.

Refilling the coolant and bleeding the coolant circuit

❑ Shutoff valves for the heating circuit must be closed.

▶ Close drain valve **9a** on the coolant cooler.

▶ Close drain valve **2** on the engine.

▶ Add coolant up to the upper edge of the filler neck of expansion reservoir **90**.

▶ Close the cap again.

▶ Open the valve for heating circuit and adjust the heating system of the cab at maximal temperature.

▶ Let the engine run at a low idle for approx. one minute.

▶ Open the cap.

▶ If necessary, add coolant up to the upper edge of the filler neck of expansion reservoir **90**.

▶ Close the cap again.

If the coolant level sensor actuates, check the coolant level (refill if necessary).

Caution!
The engine could be damaged.

▶ If the temperature or level display for the coolant level illuminates, bring the engine to a low idle immediately.

▶ Switch off the engine.

▶ Check the coolant level and refill with coolant if necessary.

5.7.4 Check of the coolant and adjustment of the mixing ratio

Coolant with corrosion inhibitor/antifreeze agent

The mixing ratio must at all times conform to a frost protection of -37 °C.

▶ Take a coolant sample and analyse it with a suitable method for the frost protection temperature.

- ▶ Tighten the water separator reservoir **4** by hand from half a turn.
- ▶ Tighten the drain plug **5**.
- ▶ Check cleanliness of filter head **1** and ensure that the thread adapter is sitting securely in the filter head.
- ▶ Clean the filter head if necessary.
- ▶ Lubricate O-ring **10** of the new filter cartridge **3** with clean fuel.
- ▶ Fill new filter cartridge **3** with clean fuel and screw on until the O-ring **10** is resting on the filter head **1**.
- ▶ Tighten the filter cartridge **3** by hand from half a turn.
- ▶ Reconnect the electrical connections a and b and close the bleeder screw **6** (7^{+2}Nm).
- ▶ Bleed the low pressure fuel system.

Changing the fuel fine filter

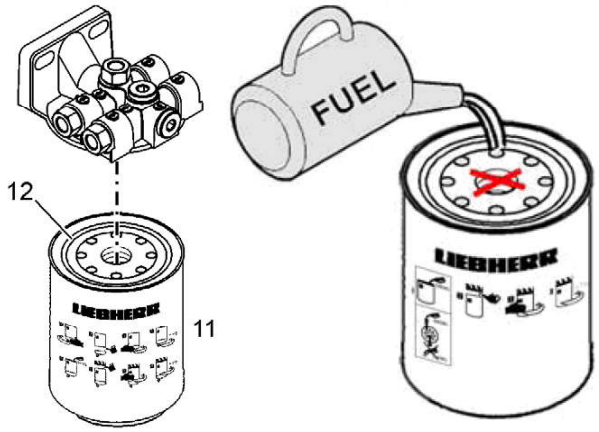

Fig. 5-34 *Changing the fuel fine filter*

11 Fuel fine filter **12** O-ring

- ▶ Position a collecting container under the fuel fine filter **11**.
- ▶ Clean fuel fine filter **11** and the surrounding area thoroughly.
- ▶ Loosen filter cartridge **11** with strap spanner or similar tool and unscrew.
- ▶ Dispose of the old filter cartridge **11**.
- ▶ Check cleanliness of filter head and ensure that the thread adapter is sitting securely in the filter head.
- ▶ Clean the filter head if necessary.
- ▶ Lubricate O-ring **12** of the new filter cartridge **11** with clean fuel.

Warning
Preventing contamination of the fuel system:
– Only fill the new filter cartridge via the small, external openings.
– Avoid dirt entering the filter cartridge via the large opening.

- ▶ Fill new filter cartridge **11** with clean fuel and screw on until the sealing ring **12** is resting on the filter head.

The upper marking **MAXI** shows the maximum oil level if all cylinders are fully drawn in.

The lower marking **MINI** shows the minimum oil level if all cylinders are fully extended.

If the oil level drops below the lower marking **MINI**, the symbol appears on screen when the lowest quantity is reached.

Emptying and refilling the hydraulic tank

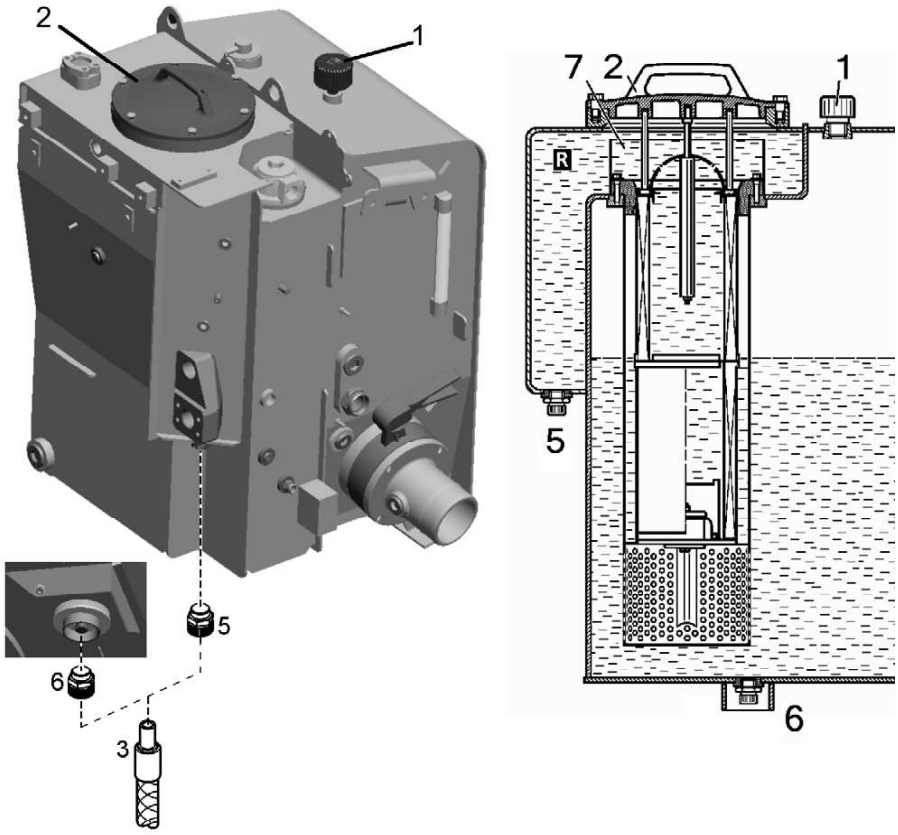

Fig. 5-43 *Draining and refilling the hydraulic oil*

1 Vent filter
2 Return-line filter
3 Drain hose
5 Drain valve on hydraulic tank
6 Drain valve on collecting compartment
7 Filter centering tube
R Collecting compartment

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

To drain the oil

❑ The hydraulic system must be depressurized.

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

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

▶ Screw the drain hose to the drain valve **5** on the hydraulic tank.

Note!
LIEBHERR insistently recommends to fit with a bypass oil filter the excavators which are operated with environmentally friendly hydraulic fluids.

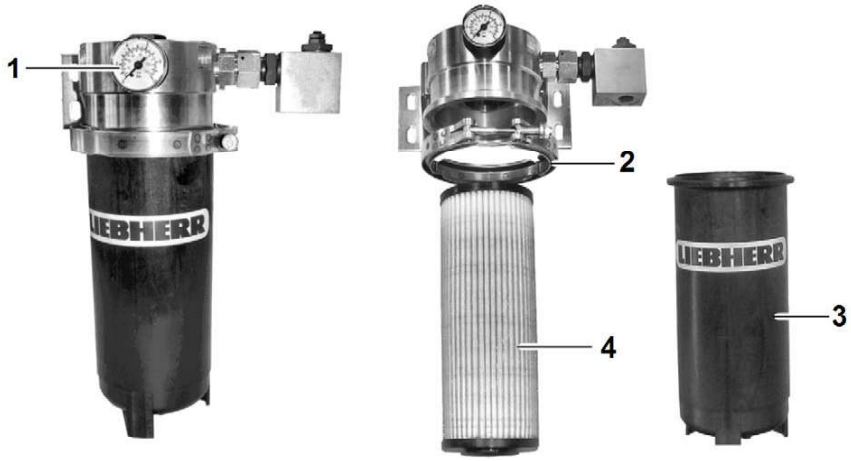

Fig. 5-52 *Bypass oil filter for hydraulic system*

1 Pressure gauge
2 Tightening clamp
3 Filter housing
4 Filter element

The more the oil is contaminated, the higher the pressure in the filter housing.

Depending on the machine applications and the dirt/water collection in the filter, the filter cartridge might need to be replaced before the standard change interval (2000 operating hours) is reached.

If the pressure gauge **1** indicates a value of more than 2.5 bar during operation, the filter element is too much contaminated to ensure sufficient filtering of the hydraulic oil.

Checking filter contamination

The contamination grade of the bypass oil filter must be checked at the regular intervall indicated in the maintenance chart

- ❑ When checking, the hydraulic oil must be at a temperature of at least 50 °C (operating temperature) and the engine must be running.
- ▶ Read the indication of the pressure gauge.
- ▶ If the pressure exceeds 2.5 bar, change or get changed the filter element at once.

Replacing filter element

- ▶ Switch off the engine.
- ▶ Release the pressure in the hydraulic tank.
- ▶ Open and remove the tightening clamp **2**.
- ▶ Remove the old filter element **4** and collect the oil leaking from the filter in a suitable container.
- ▶ Check the inlet and outlet sections of the bypass oil filter and if necessary clean the inner side of the filter head.

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5.12.3 Tighten the chain

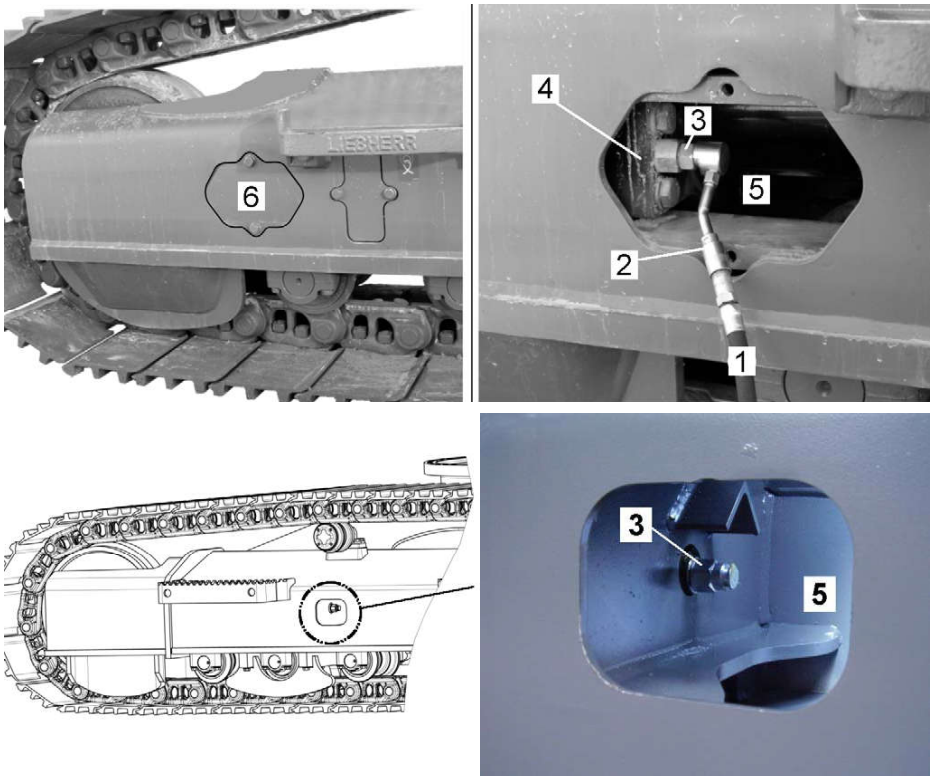

Fig. 5-63 *Retensioning the track*

- ▶ Remove the cover **6 (when existing)** on the side frame of the undercarriage.
- ▶ Clean grease fitting and high pressure hose **2**.
- ▶ Screw high pressure hose **2** onto the manual grease gun **1**.
- ▶ Through the opening **5**, connect the high pressure hose **2** to the lubricating nipple **3** of the grease tensioner **4**.
- ▶ Inject grease until the track is sufficiently tensioned.
- ▶ Check the track tension again as described above.

5.12.4 Loose the chain

Danger!
Risk of injury due to a sudden loose of the track or to a grease jet.

- ▶ Because of the risk of grease jet under preassure, always wear protective gloves and safetyglasses.
- ▶ When loosing the chain, keep away your head from the opening **5** in the track side frame. Never touch the lubricating nipple **3** with your hand but always use an appropiate tool to unscrew or screw it in.

- ▶ Before loosing the chain, remove and release every item which may be stucked in the chain. For example, drive forward and backward or see the section "Cleaning the track components".

5.15.3 Greasing the grab (optional extra)

The grab is not lubricated via the central greasing system. It must be regularly greased manually. The relevant oiling points are marked in red.

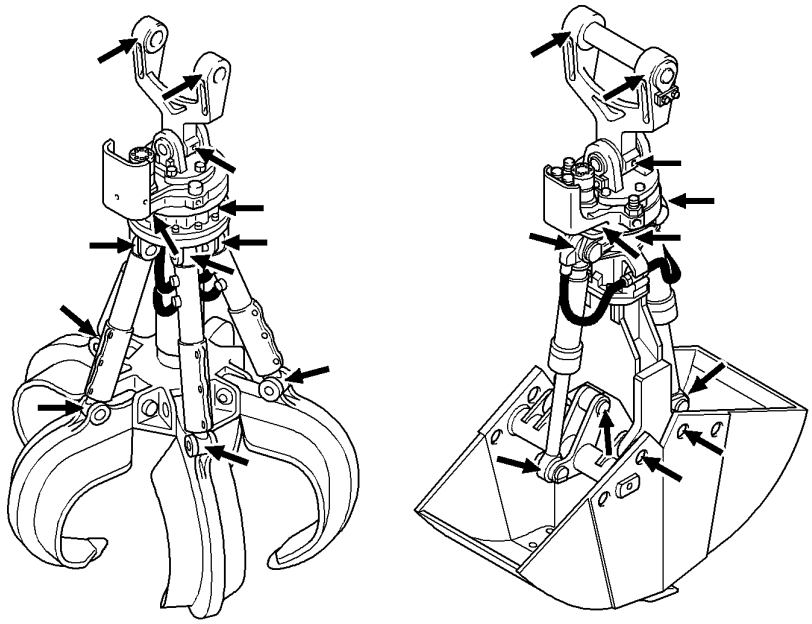

Fig. 5-74 *Greasing the grab*

In normal use, each oiling point must be greased daily or per shift until clean grease flows out at the relevant bearing point.

When the machine is working hard, the greasing interval should be shortened accordingly.

Grease quality: see lubrication chart

5.16 Automatic greasing (option)

The grease fittings of the grab and the slewing ring (model variant) have to be greased by hand. See lubrication plan and Chapter "Manual greasing of the machine".

5.16.1 Centralized lubrication system

The machine is serially fitted with a centralized lubrication system.

With this system all or nearly all of the lube points of the machine which require at least daily lubrication are lubricated via an electrical driven grease pump which is turned on during machine operation.

This grease pump stands in the battery box in the front of the upper carriage.

Construction and operation of the centralized lubrication system

The grease delivered by the pump **U4** is distributed to the different lubrication points LP in metered quantities, first via the main distributor **6** and further via the secondary

Daily visual check out

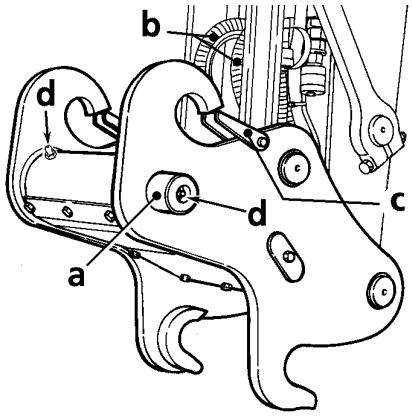

Fig. 5-85 *Functional check out of quick change adapter*

- ❑ After above described function verification,
- ▶ Control if locking pins **A** are in fully extended position, that means the tool's attachment bore holes must be flush with locking pins.
- ▶ Check also the good condition of the hydraulic hoses **B** and of the electrical supply bundle between end of stick and quick change coupler.
- ▶ Check that the safety latches **C** on the load hooks are in good working order.

5.18 Check mounting bolts for tightness

The mounting bolts listed below must be regularly checked and retighten if necessary. See maintenance chart for the checks intervals.

Caution!
The mounting bolts for all the main components (especially those listed below), and for the hydraulic hoses and pipes must be replaced after every removal.

Notice: when installing bolts of size bigger than M40 the thread of the screw must be slightly coated with a MoS2 based grease. For these bolt sizes also grease the supporting surface of the bolt head, unless hereafter otherwise specified.

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