en

Operating Manual

Hydraulic excavator
ER 944 C

from serial number 32 410

Document identification

	ORIGINAL MANUAL
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Product identification

Manufacturer:	Liebherr-France SAS
Type:	ER 944 C
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Address

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1.1.3 Uppercarriage

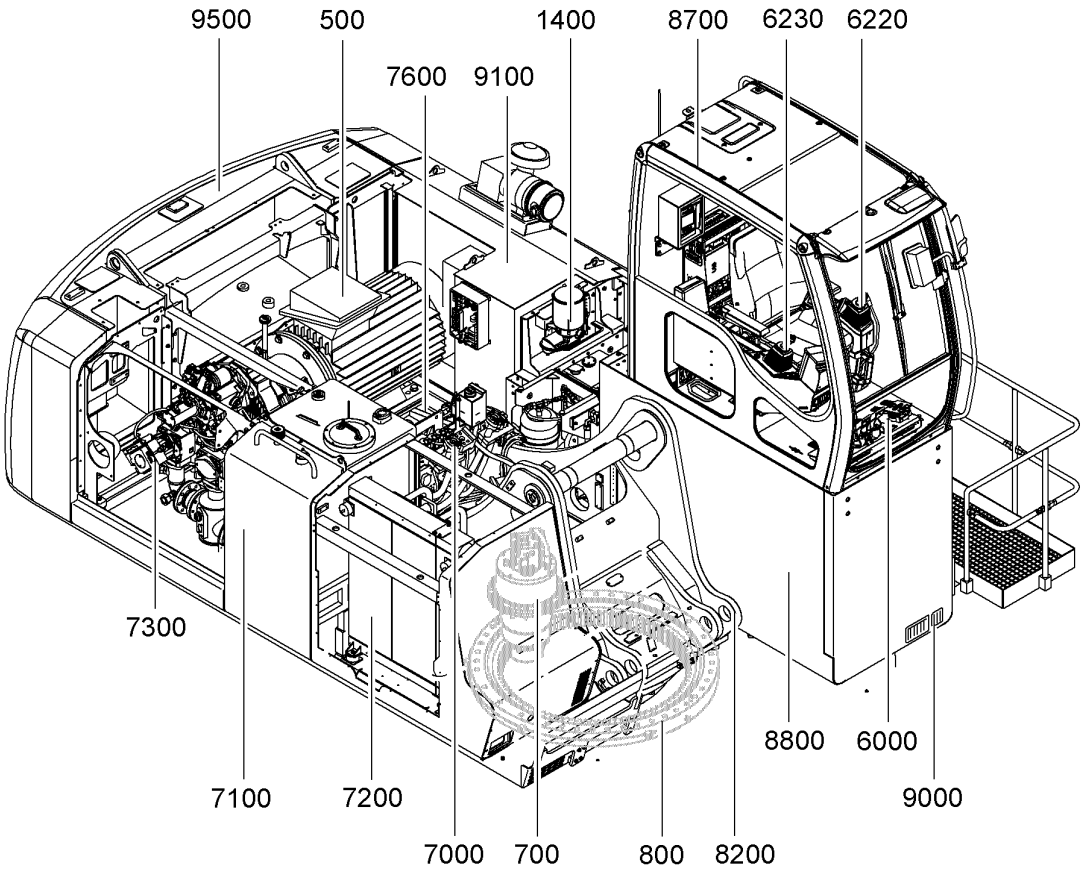

Fig. 1-3 *Uppercarriage*

500 Electrical engine
700 Swing gear installation
800 Swing ring installation
1400 Centralized lubrication system
6000 Control cab
6220 Control panel, left
6230 Control panel, right
7000 Hydraulic installation
7100 Hydraulic oil tank
7200 Radiator box
7300 Hydraulic pumps
7600 Control valve block
8200 Slewing platform
8700 Cab
8800 Cab elevation
9000 Electrical installation
9100 Electrical box
9500 Counterweight

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Performance

These new electric Material Handlers have been designed to meet the specifi c needs of industrial handling. A wide range of equipment and uppercarriages optimized for long working radius provide the ideal answer to all the demands which arise in the industry. The performance of the kinematic chain formed from components from our in-house production, combined with the power of the electric motor, maximize the performance of the machine when it comes to lifting power, precision, and speed of operation. The equipment's performance is enhanced by the mobility provided by the crawler undercarriage.

Exceptional lift capacity

Thanks to optimized kinematics and uppercarriage, the machines offer extended reach and balance with a better absorption of mechanical forces.

Excellent Working Radius

Designed for the most demanding applications, the machines offer extended reach and lift capacity in wide working radius.

Fast work cycles

The ER 934 C, ER 944 C and ER 954 C electric excavators are fitted with the Liebherr Torque Control system. The hydraulic guidance system on the excavator operates as a closed circuit, and does not affect the speed of movement of the equipment during the working cycle. The high torque and high oil delivery from the guide pump maximize the excavator swing speed.
A two-pump hydraulic system allows for operating speeds to be reached which are unequalled anywhere. Regeneration on the circuits for the equipment allows for optimization of the hydraulic power available and minimizing response time to the operator's commands.

Precision

The hydraulic control allows for exceptional precision - even at extended reach - contributing to the confidence of the operator and achieving high performance as a result.

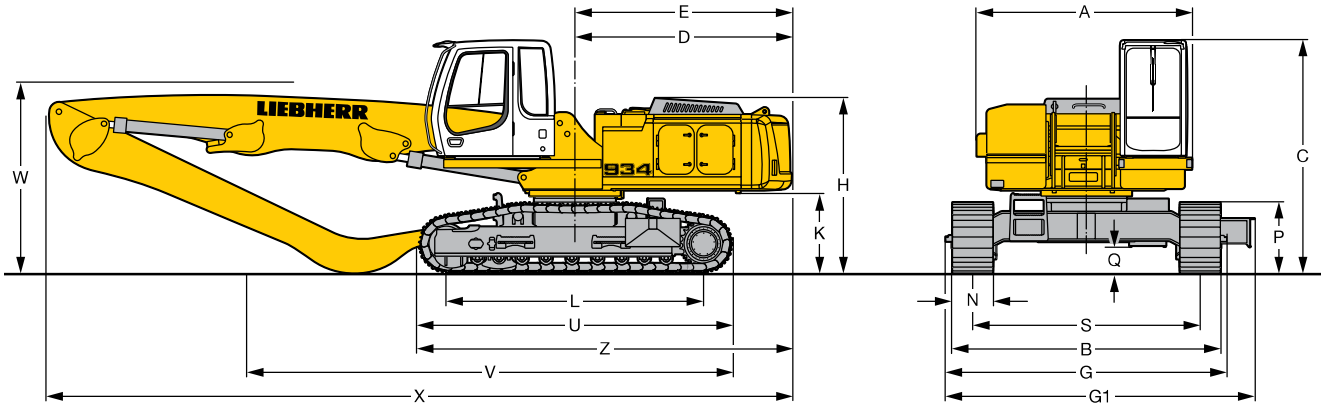
Distributor

- Fine response of hydraulic control for maximum working precision
- Immediate response to operator's commands
- Three-pump hydraulic system, one of which is a closed circuit dedicated to uppercarriage swing

High strenght structure

- High strength steel sheet at points subject to severe stress.
- Stable mounting of equipment elements
- Exceptional strength, even under intense loading

Dimensions

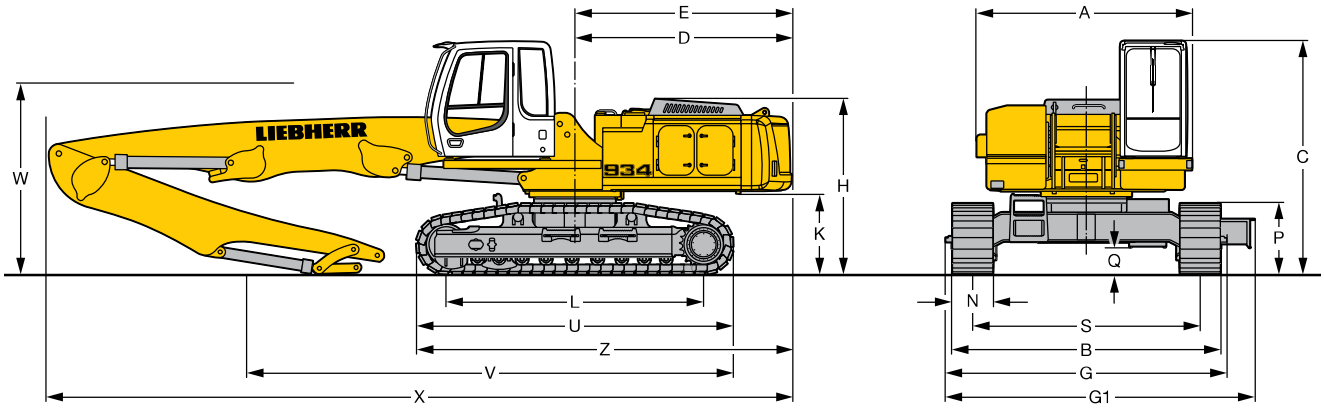


			mm
A			3,225
C			3,480
D			3,240
E			3,240
H			2,615
K			1,200
L			3,848
P			1,056
Q			400
S			3,400
U			4,720
N	500	600	750
B	3,998	4,000	4,150
G	4,195	4,195	4,195
G1	4,610	4,610	4,610
Z			5,600

E = Tail radius

Industrial-Type Straight Mono Boom 8.60 m and Industrial Stick	m	6.00	7.50
V	mm	6,700	5,600
W	mm	2,800	4,200
X	mm	12,200	12,050

Industrial-Type Straight Mono Boom 8.60 m and Stick	m	5.00	6.00
V	mm	6,200	5,500
W	mm	2,550	3,050
X	mm	11,200	11,150



Lift Capacities

with Industrial-Type Angled Mono Boom 9.50 m

Industrial Stick 7.30 m (Variant 3C)

m	Under-carriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m		10.5 m		12.0 m		13.5 m		15.0 m		16.5 m				
																								m
19.5	S-EW																							
18.0	S-EW																							
16.5	S-EW																							
15.0	S-EW																							
13.5	S-EW																					5.9*	5.9*	11.5
12.0	S-EW													5.6*	5.6*							5.7*	5.7*	12.8
10.5	S-EW													5.6*	5.6*	5.5*	5.5*					5.5*	5.5*	13.7
9.0	S-EW											5.9*	5.9*	5.7*	5.7*	5.5*	5.5*					5.5*	5.5*	14.5
7.5	S-EW											6.2*	6.2*	5.9*	5.9*	5.7*	5.7*	5.1	5.5*			5.1	5.5*	15.1
6.0	S-EW									7.3*	7.3*	6.6*	6.6*	6.2*	6.2*	5.8*	5.8*	5.0	5.6*			4.7	5.3	15.5
4.5	S-EW					11.1*	11.1*	9.2*	9.2*	8.0*	8.0*	7.2*	7.2*	6.5*	6.5*	5.9	6.1*	4.9	5.6			4.5	5.1	15.8
3.0	S-EW	4.3*	4.3*	18.5*	18.5*	13.2*	13.2*	10.5*	10.5*	8.8*	8.8*	7.7*	7.7*	6.9	6.9*	5.7	6.4*	4.8	5.4			4.3	4.9	15.9
1.5	S-EW	3.1*	3.1*	9.8*	9.8*	15.1*	15.1*	11.7*	11.7*	9.6*	9.6*	8.1	8.3*	6.6	7.3*	5.5	6.3	4.6	5.3			4.2	4.8	15.9
0	S-EW	4.2*	4.2*	8.3*	8.3*	16.4*	16.4*	12.3	12.6*	9.6	10.3*	7.7	8.7*	6.4	7.2	5.3	6.1	4.5	5.2			4.2	4.8	15.7
-1.5	S-EW	5.6*	5.6*	8.7*	8.7*	15.0*	15.0*	11.8	13.3*	9.2	10.5	7.4	8.5	6.1	7.0	5.2	5.9	4.4	5.1			4.3	4.9	15.3
-3.0	S-EW	7.0*	7.0*	9.6*	9.6*	14.6*	14.6*	11.5	13.3	8.9	10.2	7.2	8.3	6.0	6.9	5.1	5.8					4.5	5.1	14.9
-4.5	S-EW			10.6*	10.6*	15.1*	15.1*	11.4	13.2	8.8	10.1	7.1	8.2	5.9	6.8	5.1	5.8					4.8	5.5	14.2
-6.0	S-EW					16.0	16.1*	11.4	13.2*	8.8	10.1	7.1	8.2	6.0	6.8							5.2	6.0	13.3
-7.5	S-EW									8.9	10.2*											7.6	8.7	10.2

Industrial Stick 7.30 m (Variant 3D)

m	Under-carriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m		10.5 m		12.0 m		13.5 m		15.0 m		16.5 m				
																								m
19.5	S-EW																							
18.0	S-EW																							
16.5	S-EW																							
15.0	S-EW									7.6*	7.6*											7.3*	7.3*	9.8
13.5	S-EW									7.2*	7.2*	6.9*	6.9*									6.7*	6.7*	11.5
12.0	S-EW											6.7*	6.7*	6.5*	6.5*							6.4*	6.4*	12.8
10.5	S-EW									7.1*	7.1*	6.7*	6.7*	6.4*	6.4*	6.2*	6.2*					6.2*	6.2*	13.7
9.0	S-EW									7.4*	7.4*	6.9*	6.9*	6.5*	6.5*	6.2*	6.2*					5.5	6.0*	14.5
7.5	S-EW							8.7*	8.7*	7.8*	7.8*	7.2*	7.2*	6.7*	6.7*	6.3*	6.3*	5.1	5.8			5.0	5.7	15.1
6.0	S-EW					11.1*	11.1*	9.5*	9.5*	8.4*	8.4*	7.6*	7.6*	6.9*	6.9*	6.1	6.4*	5.0	5.7			4.7	5.3	15.5
4.5	S-EW	25.8*	25.8*	17.0*	17.0*	12.9*	12.9*	10.6*	10.6*	9.1*	9.1*	8.0*	8.0*	7.2*	7.2*	5.9	6.6*	4.9	5.6			4.5	5.1	15.8
3.0	S-EW	4.3*	4.3*	20.5*	20.5*	14.8*	14.8*	11.7*	11.7*	9.8*	9.8*	8.5*	8.5*	6.9	7.5*	5.7	6.5	4.8	5.4			4.3	4.9	15.9
1.5	S-EW	3.1*	3.1*	9.8*	9.8*	16.3*	16.3*	12.6*	12.6*	10.1	10.4*	8.1	8.9*	6.6	7.5	5.5	6.3	4.6	5.3			4.2	4.8	15.9
0	S-EW	4.2*	4.2*	8.3*	8.3*	17.0	17.2*	12.3	13.3*	9.6	10.9*	7.7	8.8	6.3	7.2	5.3	6.1	4.5	5.2			4.2	4.8	15.7
-1.5	S-EW	5.6*	5.6*	8.7*	8.7*	15.0*	15.0*	11.8	13.6	9.2	10.5	7.4	8.5	6.1	7.0	5.2	5.9	4.4	5.1			4.3	4.9	15.3
-3.0	S-EW			9.6*	9.6*	14.6*	14.6*	11.5	13.3	8.9	10.2	7.2	8.3	6.0	6.9	5.1	5.8					4.5	5.1	14.9
-4.5	S-EW					15.1*	15.1*	11.4	13.2	8.8	10.1	7.1	8.2	5.9	6.8	5.1	5.8					4.8	5.5	14.1
-6.0	S-EW																					7.5	8.6	10.1
-7.5	S-EW																							

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

The lift capacities are stated in metric tonnes (t) on the lifting gear's stick tip, and can be lifted 360° on firm, level supporting surface. Capacities are valid for 600 mm 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 via *). Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.

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 safety check valves on hoist cylinders and stick cylinder(s), when they are used for lifting operations which require the use of lifting accessories.

Equipment

Uppercarriage

Complete tool set	•
Engine hood with pneumatic damping and mechanical stop	•
Handrails, non-slip surfaces	•
Junction box with active protection	•
Lockable tool box	•
Maintenance-free swing brake lock, integrated in the transmission	•
Sound insulation	•
Extension of security system for access to the machine	+
Frequency of 60 Hz	+
Pedal controlled positioning swing brake	+
Special painting	+
Voltage other than 400 V	+
Wide walkways and handrails	+

Hydraulics

Electronic regulation by power limit	•
Filter with integrated fine filter area (5 µm)	•
Measuring points for hydraulic circuit pressure	•
Minimum flow at high pressure	•
Operating mode selector with continuous regulation	•
Pressure accumulator for controlled lowering of attachments with the engine turned off	•
Shut-off valve between hydraulic tank and pumps	•
Filling with bio-degradable oil	+
Filter for secondary circuit	+
Liebherr Tool Control	+
Supplementary hydraulic circuits	+

Operator's Cab

Automatic climate control with defrosting function	•
Cab front roof	•
Cigar lighter and ashtray	•
Closed storage space	•
Coat hook	•
Emergency exit through rear window	•
Floor mat	•
Interior lighting	•
Interior rear-view mirror	•
Multi-function display	•
Operating hours display, visible from the outside	•
Panoramic tinted windows	•
Pocket storage space	•
Radio pre-equipment	•
Right-hand window without central mounting	•
Roof window and windshield in laminated glass	•
Seat adjusted independently or in association with the console (6 adjustment positions)	•
Seat belt	•
Sliding window in door	•
Sun blind	•
Windshield wipers and windshield wash	•
Additional spotlights on cab roof (front/rear)	+
Armored windshield (not movable)	+
Electric cool box	+
Extinguishers	+
Extra supply heating	+
Radio unit	+
Seat with pneumatic suspension, headrest and heating	+
Stone impact protection (FOPS)	+
Warning beacon	+
Wipers for front lower window	+
Wipers for roof window	+

Attachment

Cylinders with end of run damper	•
Hydraulic connections for quick coupling system	•
Hydraulic lines for supply to clamshell/grapple in stick	•
Liebherr semi-automatic centralised lubrication	•
Operating spotlights	•
Safety device to prevent hose rupture (lifting cylinder) with regeneration	•
Safety device to prevent hose rupture (stick cylinder) with regeneration	•
Sealed pivots and bearings	•
Liebherr automatic centralised lubrication	+
Liebherr range of clamshells/grapples	+
Lifting hook	+
Overload warning	+
Special painting	+

• = 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 in order to retain warranty.

- 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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- Control the surroundings, and particularly the nearness area of the machine, during operation or when travelling.
- Mirrors are installed on the machine :
  - on the left on the cab to check the left side of the machine.
  - on the front left on the cab to check the front side of the machine.
  - on the right on the uppercarriage to check the right side of the machine.
  - above the counterweight to check the rear side of the machine; on some machines, this mirror is replaced or completed with a camera.
- At each extension, construction or change on the machine, the sight condtions must be maintained. These conditions must otherwise be checked according to ISO 5006.
- Mirrors must be cleaned at least at daily intervals.
- Damaged mirrors must be immediately replaced.
- The site has to be organised so that the dangers due to a restricted sight field are minimized, particularly for machines with an operating weight which is superior to 40 tons.

Crack testing

- Even when the machine is operated carefully, there is a possibility of individual cases of overloading occurring, which could lead to cracks or loose connections. The machine should therefore be checked regularly for cracks, loose connections or other visible damage to maintain operational safety.
- In order to be able to check for cracks, it is essential that the machine is kept clean and cleaned regularly.
- The tests should be carried out in accordance with the monitoring and maintenance plan:
  - every 250 operating hours by the machine owner's maintenance personnel.
  - every 500 operating hours by authorised specialist personnel.
- It is advisable to carry out these tests: supported, on firm, horizontal substrate, with the equipment in longitudinal and cross direction for variable loads. Current accident prevention regulations must be adhered to.
- Special care must be taken when testing load-bearing components, particularly:
  - the steel chassis members and axle and transmission mountings, the support, the lower rim bearing support and tower and ball rim bearing.
  - the steel upper structure members and bearing block for boom and boom cylinder, the upper rim bearing support, the cab mount and the mount for swing gear and ballast.
  - the steel components of the working equipment, e. g. the boom, stay, quick change adaptor, and bucket.
  - hydraulic cylinders, axles, steering, bolts and bolt connections, steps, ladders and mounting elements.
- The crack test should be carried out visually. If a crack is suspected, the dye penetration test should be carried out as a crack test on areas which do not have good visibility, such as the rim bearing support, in order to increase testing safety.
- Any damage found must be rectified immediately. Welding work on load-bearing parts of the earth-moving machinery, loading devices and transport devices may only be carried out by trained specialist personnel and only in accordance with the accepted rules of welding engineering. In case of doubt, contact the LIEBHERR customer support service to discuss suitable remedies.

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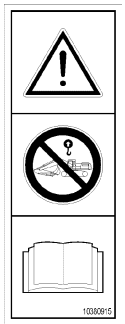
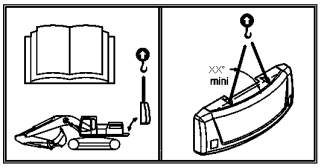
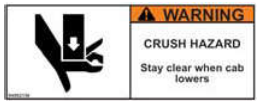
Signs (except for North America)	North America signs	
		**Plate 90: Prohibition sign - no lifting point*** This sign is situated beside a lifting point. It is forbidden to use this point for lifting the complete machine. Refer to the operator's manual and to the position of the plates **45** for lifting the complete excavator.
		**Plate 91: Counterweight removal *** Indicates the minimum angle to be respected by the loading slings when the counterweight is lifting off the machine.
		**Plate 250: Emergency exit – rear window*** The rubber weatherstrip can be loosened and removed and the rear window pushed out by pulling the clip on the inside of the rear window.

* = Depends on the excavator's model

Signage relating to optional equipments

Standard signs	America signs	
		**Plate 101: Crushing hazard** Signals of the high crushing hazard in those zones.
		**Plate 103: Hazard of thrown out objects** Signals the hazard of injuries by thrown out objects wenn the fan is activated. (On machines fitted out with reversible cooler fan).

3.1.3 Control unit

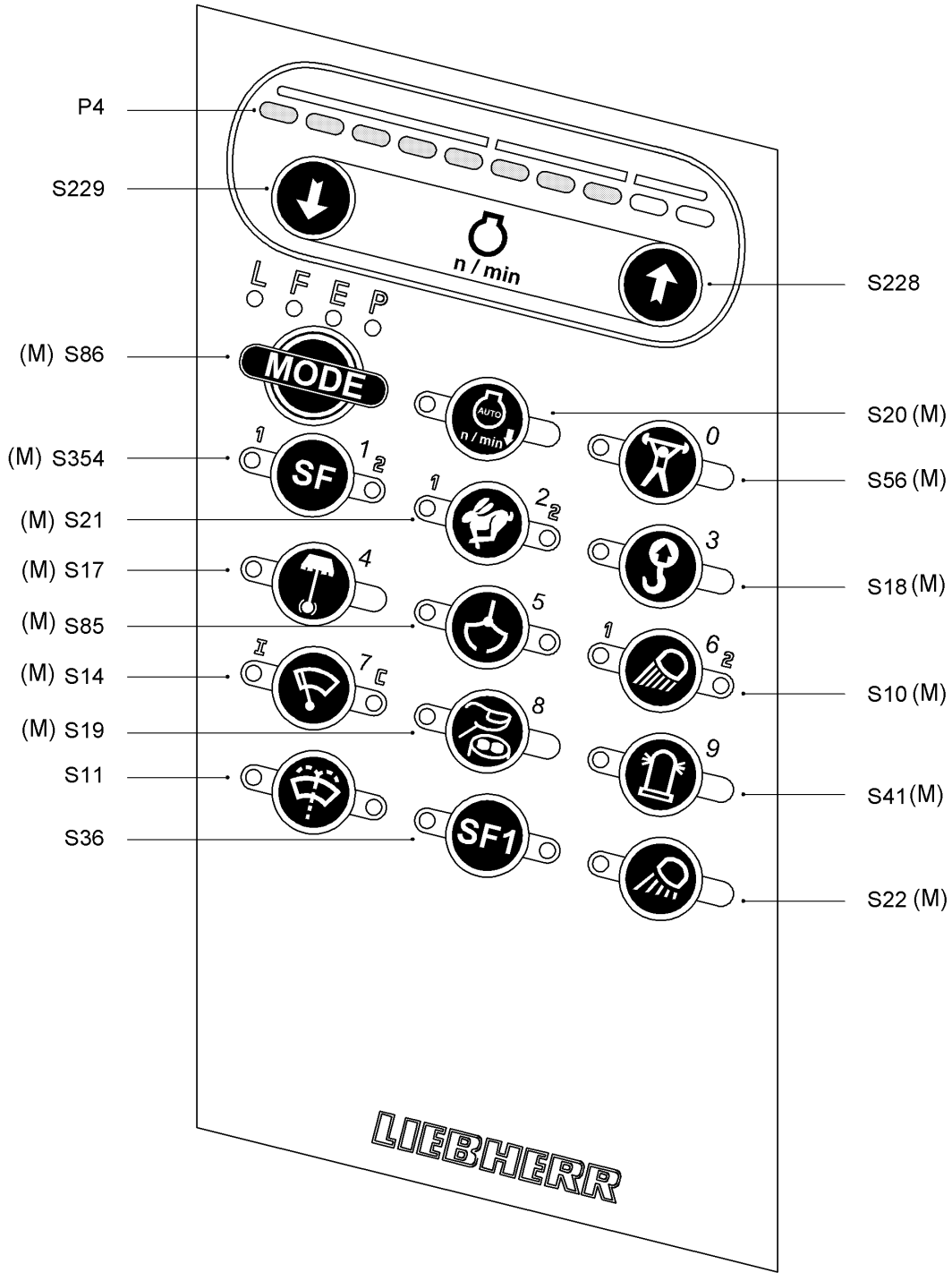


Fig. 3-5 *Excavator control unit*

M The function of the push buttons marked with (M) are memorized when the excavator is stopped.
This means that, when turning on the excavator, the controlled function recovers the previous state (on-off, 1-2, I-C, ...) before the machine had been turned off.

B) Warning symbols for special operating states and system errors

The symbols of the list below appear in the SY field of the screen to warn the operator that certain operating sequences or system errors are occurring.

Quick change adapter (option)

This symbol appears during the unlocking procedure or when the locking pins of the quick change adapter are not completely out.
No error code is linked to this symbol.

Information symbols in the INF field

Error in measurement of hydraulic pressure

This symbol informs of the emergence of a trouble in the circuit for measurement of the servo control pressures.

As a result of the incorrect pressure measurement(s), all the functions of the power regulation of the concerned movement(s) can no longer be ensured, these movements are controlled in a downgraded mode.

At the same time the related error codes will be displayed in the EC field of the main screen to specify which are the incriminated movements and pressure transmitters.

- error code E150, E151: stick movement (pressure transmitter B159)
- error code E153, E154: boom movement (pressure transmitter B160)
- error code E156, E157: swing movement (pressure transmitter B167)
- error code E159, E160: travel movement (pressure transmitter B162)
- error code E162, E163: bucket movement (pressure transmitter B163)

See also the error codes chart in chapter 4 "malfunctions".

Service due

This symbol indicates that the moment for carrying out the next recurring service work has nearly arrived. During this span of time, and each time when the electrical system of the machine is turned on, this symbol and the hours for the next service falling due will be displayed for approx. 10 seconds in place of the current operating hours.

▶ Get the the service work carried out within the prescribed delay,or report the falling due to your supervisor.

The symbol will go out after the execution of the programmed service work has been confirmed, see the menu "set service" thereafter.

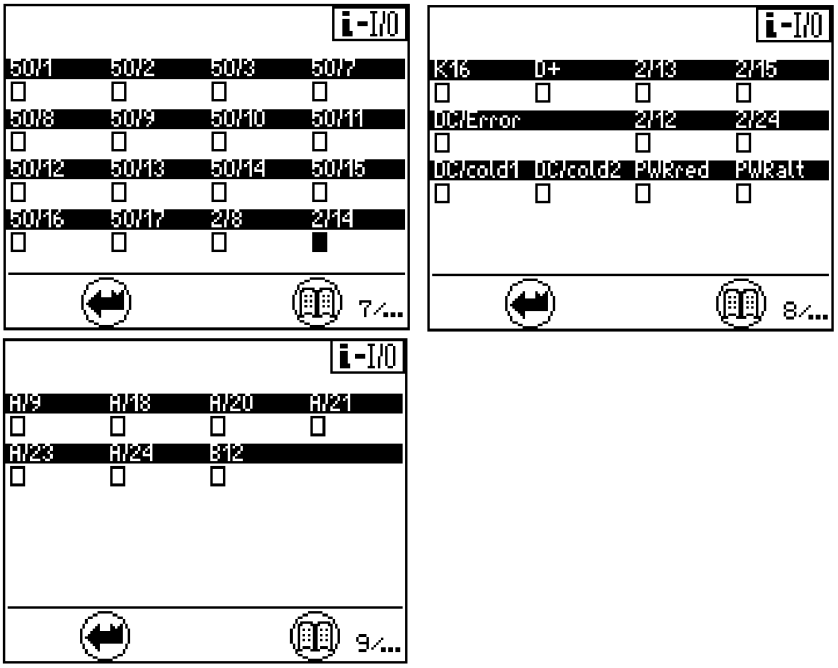
Acknowledge error

This symbol appears if an operating fault of the machine (**E5xx type error code**) has occurred and the buzzer sounds simultaneously.

It informs the operator that he can, after having recognised the occured fault, press the **back** key to stop the buzzer.

“Increased care required” - servo-control circuit in safety mode

This symbol alerts the operator that the servo-pressure circuits have been turned into safety mode (switch **S73** is tilted in safety position).

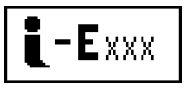


Menu "Info In/outputs" Status of electrical inputs and outputs

- Input D+ indicates if the motor is running.
- The input A9 attests that the measured servo control pressure for stick movements amounts to at least 7 bar (pressure transmitter B159).
- The input A18 attests that the measured servo control pressure for boom movements amounts to at least 7 bar (pressure transmitter B160).
- The input A20 attests that the measured servo control pressure for swing movements amounts to at least 7 bar (pressure transmitter B167).
- The input A21 attests that the measured servo control pressure for travel movements amounts to at least 7 bar (pressure transmitter B162).
- The input A23 attests that the measured servo control pressure for bucket tilt movements amounts to at least 7 bar (pressure transmitter B163).

To exit the menu:

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



Menu "i-errors" - operating faults and electrical system errors

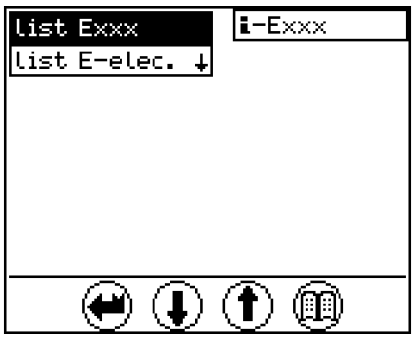


Fig. 3-23 *Menu "i-errors" Display of the memorized errors*

S84-1 – Touch / Central lubrication

This push button is mounted serially.

S90 –Potentiometer / Intermittent mode of the cab roof window wiper

The pause time of the intermittent mode of the cab roof window wiper can be adjusted by turning this button. (The window wiper is switched on and off using the touch S218).

S98 – Touch / Low pressure protection for boom cylinders

If the touch S98 is actuated, the pressure protection value for lowering the attachment (circuit for retraction of the boom cylinders) is reduced, so to limit the possible downward thrust exerted by the working attachment onto the materials to be dug out.

This safety device must be turned on, as an example, when unloading a boat or a barge, so to avoid damage to its bottom.

S114 – Key switch / Control of a special attachments with the joysticks

Thanks to this switch, the operator can control the movement of the additional user of an add on kit AHS either using the double pedal destined for this purpose (key switch in position "pedal")., or via the right joystick (key switch in position "joystick").

See also "Commutation of the control for the user of add on kit AHS" in this chapter.

S160 – Push button / Control of reversible fan in opposite direction

On machines fitted with the special equipment "cooler fan reversible", the direction of revolution of the cooler fan can be inverted while actuating the push button S160. In some particular working conditions, this inversion of the direction of the fan rotation allows an easy cleaning of the radiator core and of suction area of the fan.

See also the section "Reversible cooler fan (Optional equipment)" in the chapter "maintenance".

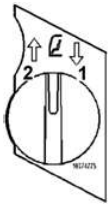
S127 – Push button / Ladder and catwalk lightening

Option on the High-Rise or High-Pedestral machines. See "Access to the cab".

S168 – Key switch / Oil flow limitation when operating a super long working attachment

When using a long reach attachment (super long working attachment with a smaller digging tool), this device allows to limit the working pumps oil flows to a value admissible for all the hydraulic cylinders of the working attachment.

Turn the key switch S168 to the right, in position „1“ to limit the velocity of all the movements of the working attachment.



S200 – Rotary switch / Hydraulically adjustable cab

See the section "Hydraulically adjustable cab (option)" in this chapter.

3.2.7 Emergency exit – rear window

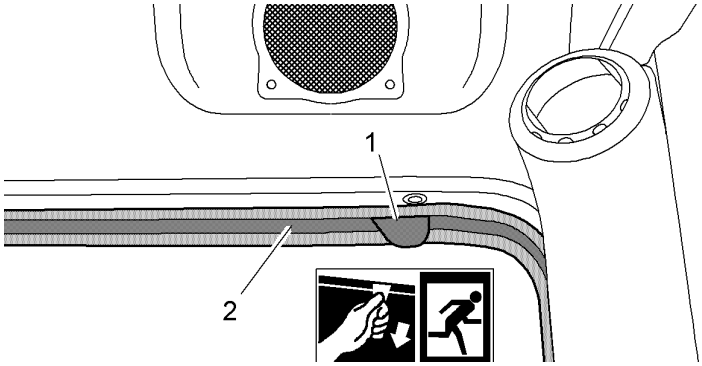


Fig. 3-40 *Emergency exit – rear window*

▶ In case of emergency, remove the rubber seal **2** from all around the rear window by pulling the clip **1** on the inner side of the rear window. Thereafter push the window out.

Note!
For the machines equipped with a cab elevation, steps, ladders and hand-rails (grips) are installed to secure the descent.

3.2.8 Interior lights

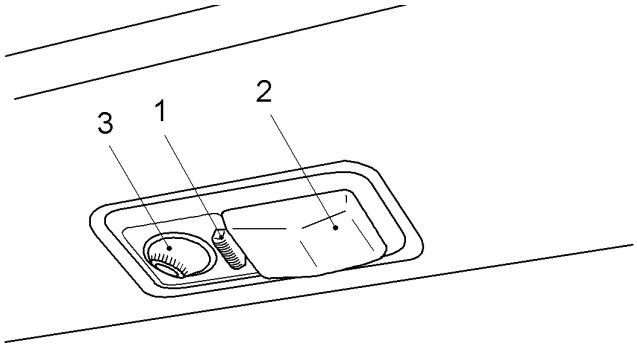


Fig. 3-41 *Dome light for cab interior lighting*

The dome light is controlled via the button **1**.

▶ Push the button **1** to the right to switch on the light **2**.

▶ Push the button **1** to the left.to switch on the spot **3**.

▶ Push the button **1** into central position to switch the dome light off.

3.2.9 Fire extinguisher

The interior of the cab of your machine is fitted with fixing points allowing the mounting of a fire extinguisher. These fixing points are on the right side wall of the cab, in the front area for machine models up to R954C, or in the rear corner for machine models R964C and above.

Preparation of heating system

Preparation of heating system

▶ Set the switch **S206a** to position **1**.

Switching off heating system

▶ Set the switch **S206a** to position **0**.

Switching heating system on/off

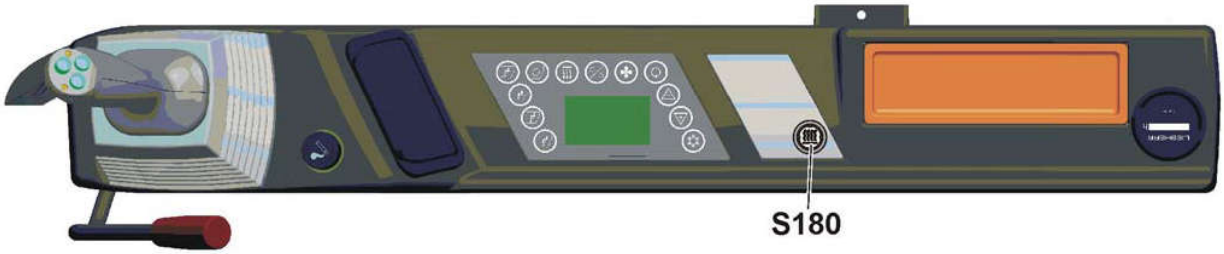


Fig. 3-58 *Left console*

Switching on heating system

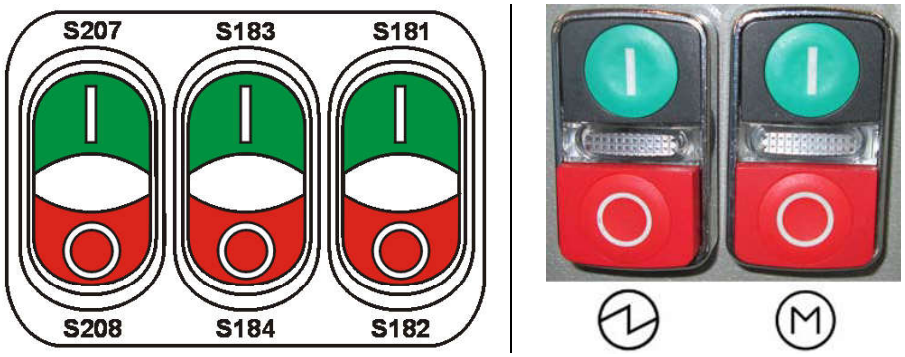


Fig. 3-59 *Buttons in right armrest (depends on the excavator's model)*

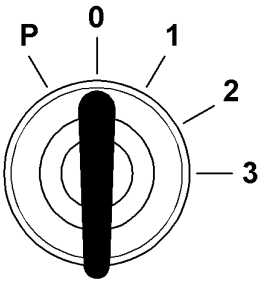
If the machine is fitted with 3 switches:

▶ Start the electric motor (see "Starting the electric motor").

If the machine is fitted with 2 switches, the heating system works when the electric motor is switched off.

▶ Press the button **S180**.
  ↳ The indicator light in the button is on.
  ↳ The heating system ist now powered on. It can be controlled by the control unit.

❑ Ensure that the doors of the main cabinet are closed.



▶ Turn the ignition key to contact position **1**.

▶ Press the button **I** of the main supply circuit.
- The indicator light in the button lights.
- The main supply circuit is switched on.
- The keyboard and the monitoring display complete a self-test.

▶ Check all indicators and instruments for proper functioning.
- All indicator lights must be briefly on, except the LED of the switch **S22**.
- The LIEBHERR logo is displayed.

After the self-test is completed, the next service task deadline is displayed for 10 seconds.

▶ Check the next service task deadline.
See chapter 3 "Main screen".

Note!
If no self-test of the keyboard and the monitoring display is performed:

▶ Check that the immobiliser has been deactivated.
See chapter 3 "Immobiliser (option)".

3 buttons

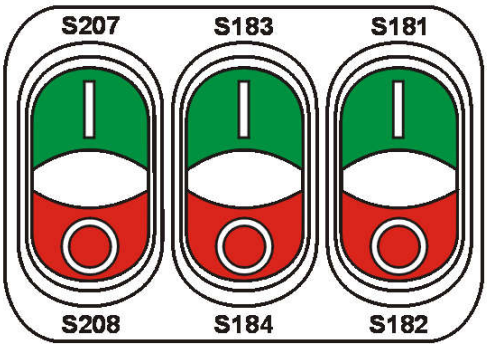
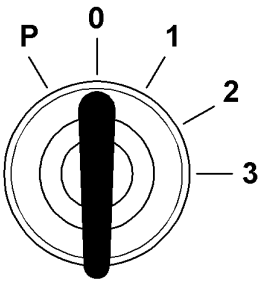


Fig. 3-69 *Buttons in right armrest*

Switching on the electrical system



The main supply circuit is automatically switched off when the main cabinet doors are opened or when the emergency switch is engaged.

❑ Ensure that the doors of the main cabinet are closed.

▶ Turn the ignition key to contact position **1**.

▶ Press the button **S207**.
- The indicator light in the button **S207** lights.
- The main supply circuit is switched on.

Counter rotating left (A):

- ▶ Push the left pedal down (**5b**).
- ▶ Push the right pedal forwards at the same time (**6a**).

Counter rotating right (B):

- ▶ Push the right pedal down (**6b**).
- ▶ Push the left pedal forwards at the same time (**5a**).

Turning over one track

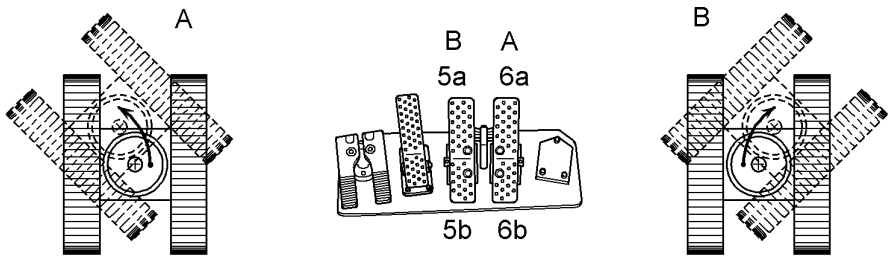


Fig. 3-79 *Turning with a crawler*

Turning ahead to the left (A):

- ▶ Push the right pedal forwards (**6a**).

Turning ahead to the right (B):

- ▶ Push the left pedal forwards (**5a**).

Note!
If possible, avoid turning over one track, and especially turning over one track backwards in order to preserve the track components from unnecessary strains.

Manual control of the travelling movements

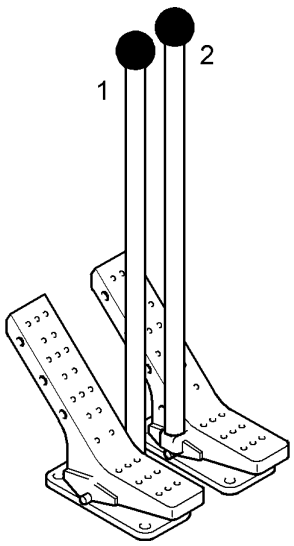


Fig. 3-80 *Hand levers for manual travel control*

Caution!
The brake only applies when the uppercarriage is near standstill and if no swing motion is actuated via the joystick!
In order to stop the uppercarriage when working on a slope, tilt the switch S57 down and reduce the uppercarriage speed by braking with joystick 4.
Move the joystick 4 back to «0» position only after the brake has applied.

Ermergency stop of the uppercarriage swing motion

The swing brake can be applied independently of the uppercarriage RPM by switching the button S17 from position «semi-automatic» into position «applied».

Caution
Perform this braking via button **S17** only exceptionaly, i. e. in emergency cases, since it causes fast abrasion of the brake discs.

To check the mechanical swing gear brake:

❑ When the uppercarriage is stationary.

▶ Press the touch **S17**.
  ↳ the swing brake is applied.
  ↳ the LED in the touch is lighting.

▶ Push the left joystick **4** to the right and then to the left as far as the stop.
  ↳ If the swing brake function is OK, the uppercarriage does not start swinging.

The positioning swing brake (option)

The positioning swing brake is used for progressive and sensitive braking of the upper carriage.

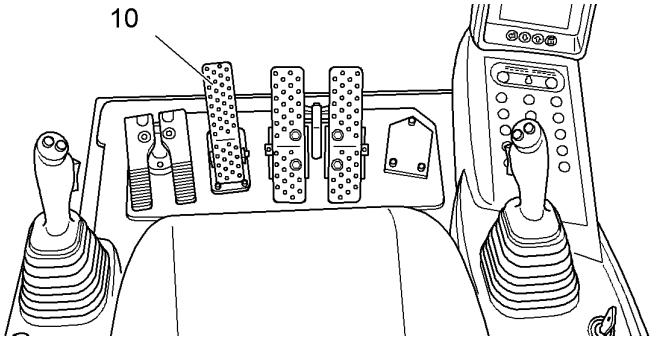


Fig. 3-89 *Positioning swing brake pedal*

Note!
Increased wear.
Do not use the positioning swing brake purely as a service brake, but only as a stop and parking brake.
Using this brake to stop the uppercarriage running at the full swing RPM is not permissible since this would result in a quick abrasion of the brake discs.

▶ In any case, first use the hydraulic braking to greatly reduce the speed of the uppercarriage

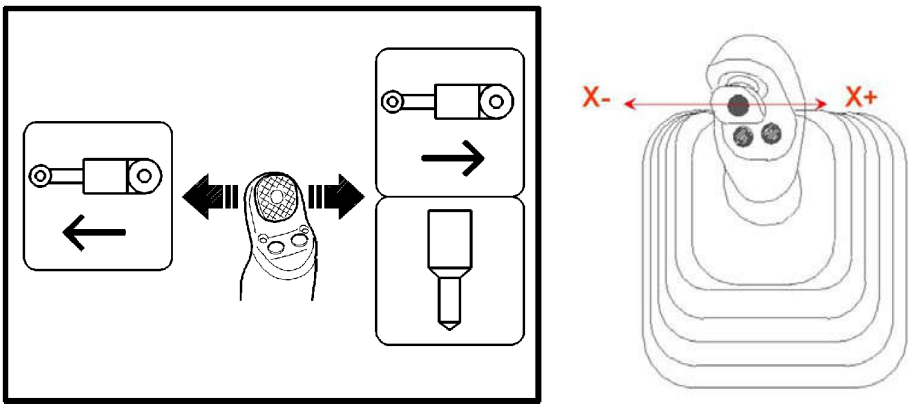


Fig. 3-100 *Mini joystick on the right joystick*

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.

▶ Reduce the reach.
or
Lower the load to the ground without increasing the reach.

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.

3.4.19 Adjustable hydraulic cab (option)

Two types of adjustable hydraulic cabs are available:
– cab with adjustable height
– cab with adjustable inclination

Adjusting the operator's cab

The hydraulic cab has a stepless height adjustment.

The hydraulic adjustment is controlled with the rotary switch **S200** on the right side control panel.

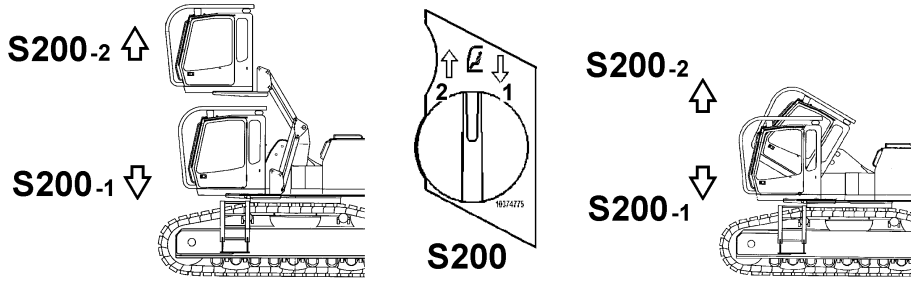


Fig. 3-109 Control of the adjustable hydraulic cab

❑ Make sure that the Diesel engine is started.

❑ Make sure that the safety lever is in the upper position.

Lifting the hydraulic cab

Danger!
Tipping over of the machine with lifted cab!
Damages, injuries, death.

▶ Make sure that no obstacle is in the path of the machine.

▶ Operate only on level and firm ground.

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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To lock the quick-change adapter:

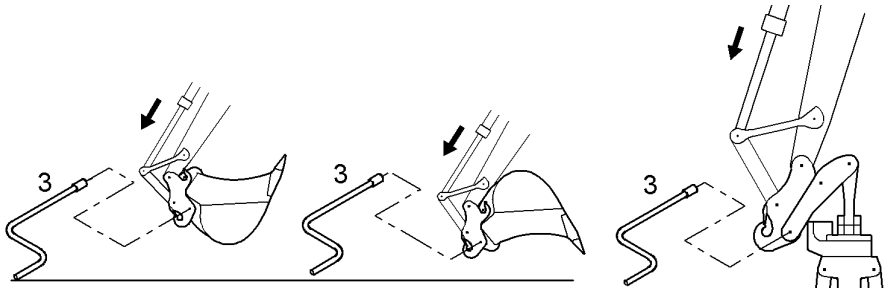

Fig. 3-125 *Locking the quick-change adapter*

Danger!
Before locking, there is no fixed connection between the work tool and the quick-change adapter. The work tool could under certain circumstances fall out and injure people.

- ▶ Approach the quick-change adapter with the utmost care.
- ▶ Push the safety lever up to secure the work equipment against unintentional movement.
  - ↳ No work movements can be carried out when pilot control devices, eg. the joystick or foot pedals, are operated.

- ▶ Insert the crank **3** in the locking pin **1** and turn to the right (clockwise), until both locking pins **1** are extended as far as the stop.
  - ↳ The work tool is bolted on when taking up normally.
- ▶ Screw the locking screw **2** into the locking pin.

Danger!
An incorrectly locked quick-change adapter could open when operating!

- ▶ Ensure that the locking pins are always locked by the sealing plug **4** on the one side and by the locking screw **2** on the other side.
- ▶ Check daily to ensure that the locking screw **2** is correctly positioned.

Caution!
Hydraulic lines are pressurized!

- ▶ Remove the pressure using the joystick before connecting the hydraulic lines (switch off the engine, turn the ignition key into the contact position, operate the joystick).

- ▶ Connect hydraulic lines or electrical lines, if necessary (eg. when attaching a grab).

Overview

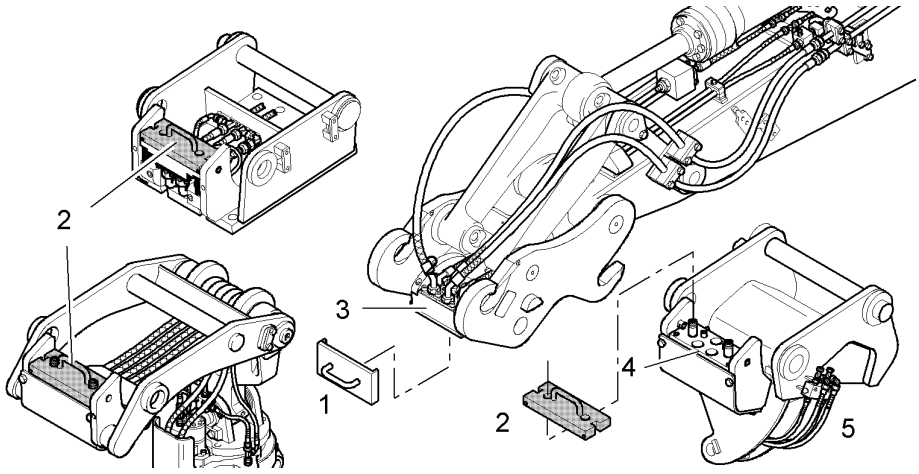

Fig. 3-138 *LIKUFIX*

1 Protective cover on quick-change adapter

2 Protective covering on work tool

3 LIKUFIX hydraulic coupling on quick-change adapter

4 LIKUFIX hydraulic coupling on work tool

5 Alternative hydraulic coupling on work tool

Attaching and dismounting work tools

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

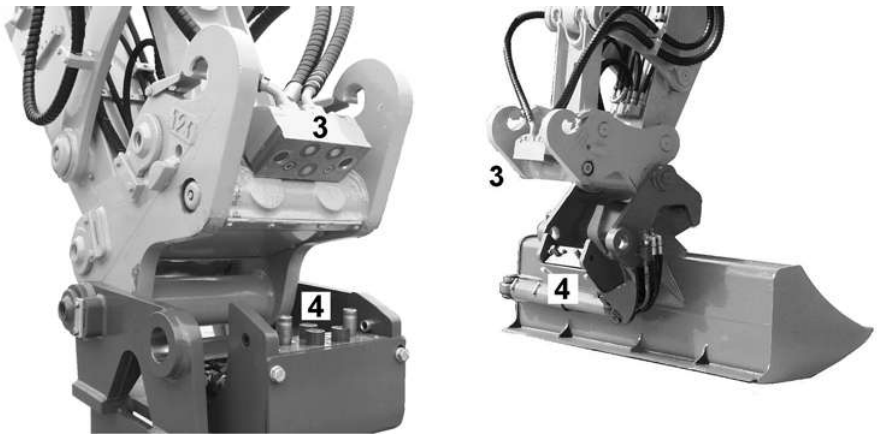

Fig. 3-139 *Connecting LIKUFIX*

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.

3.8.8 Using an hydraulic hammer

Please also refer to the operating instructions provided by the manufacturer of the hydraulic hammer.

Danger!
The hydraulic hammer must be selected very carefully. Operating requires increased care and attention.

- ▶ 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.
- ▶ Only use the hydraulic hammer 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 on the work equipment or by 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.
- ▶ Only use the hydraulic hammer in the machine's longitudinal 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 driver.
- ▶ Close all windows in the cab before working.

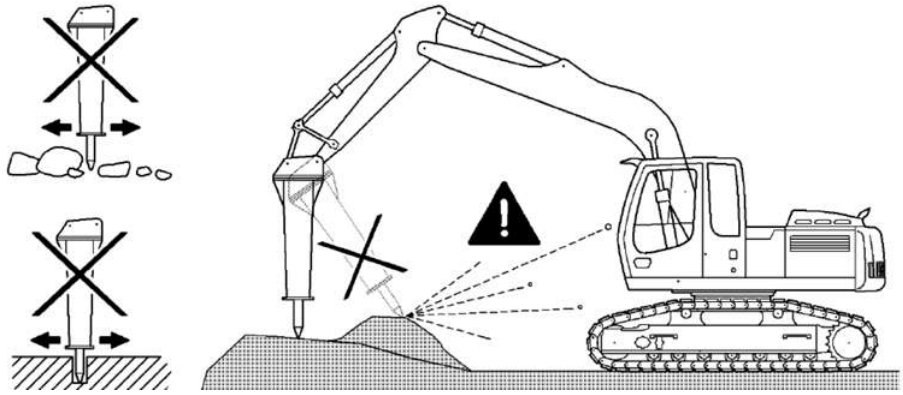

Fig. 3-154 *Hydraulic hammer*

- ❑ The machine must be positioned in the working position on level, solid ground.
- ❑ The stick may not stand vertically.
- ❑ No cylinder may be fully taken in or extended.
- ▶ Do not operate the hydraulic hammer on the same spot continually or for longer than 15 seconds.
  - ↳ Overly continual operation of the hydraulic hammer leads to the hydraulic oil overheating unnecessarily.
- ▶ Change the position of the machine and resume hammering work.

4 Troubleshooting

Warning messages and fault messages:

- Various faults are displayed on screen in the form of indicator lights or symbols (see chapter “Control and operating elements”).
- Warning functions can also be supported acoustically (buzzer).

Identifying and rectifying faults and errors:

- Faults can very often be traced back to incorrect operating or maintenance of the machine.
  For each fault, therefore, read the relevant chapter in the operating instructions carefully once more.
- Analyse the cause of the fault and rectify it immediately.
- Describe the fault and all accompanying circumstances as precisely as possible if you contact LIEBHERR customer service.
  Precise information makes it possible to find and rectify the cause of the fault quickly. Additionally, therefore, precise information on the type and serial number of the machine is also required.
- Do not carry out any work which you have not been trained to do.

Fig. 4-1 *LIEBHERR service*

If the cause of the fault cannot be recognised or rectified using the error codes and fault charts, please contact the LIEBHERR customer service.

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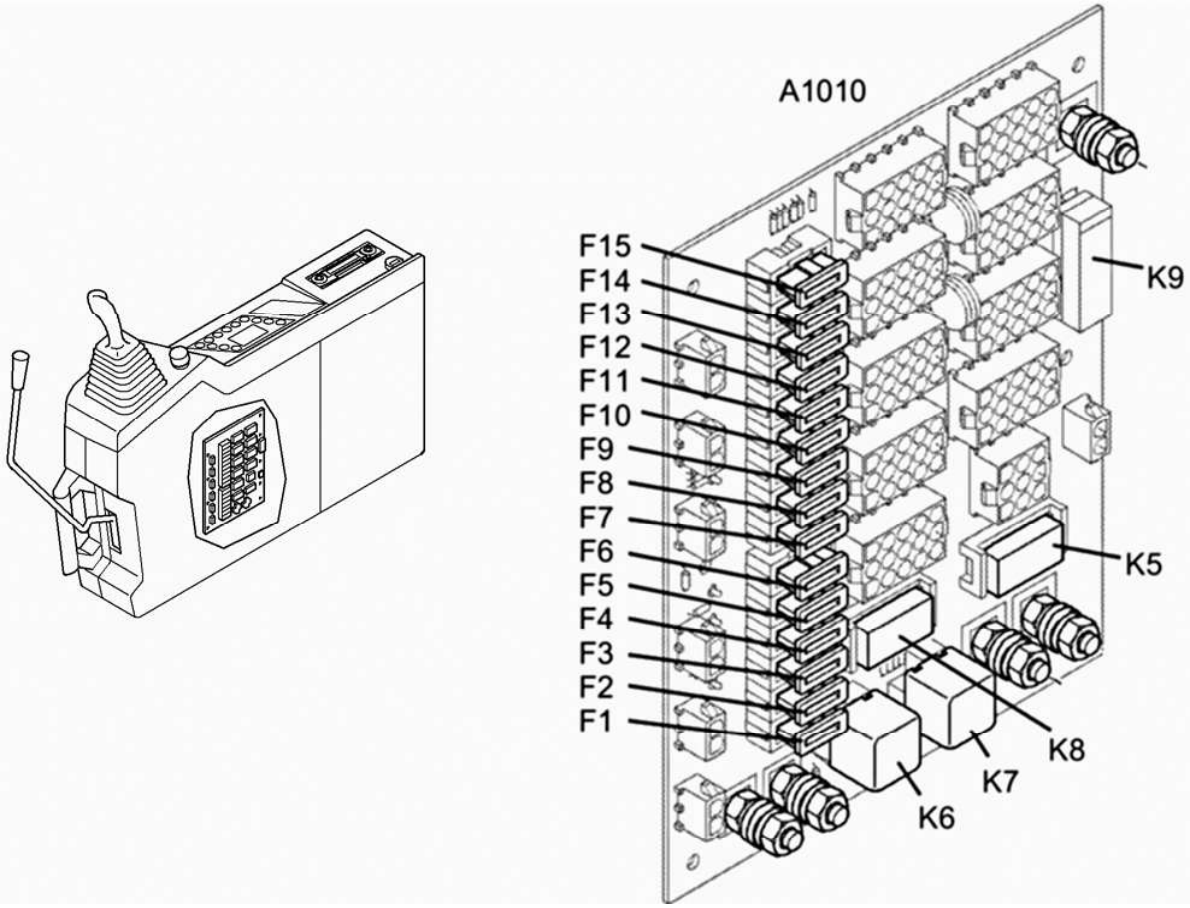


Fig. 4-3 *Fuses and relays on printed circuit board A1010*

Fuses on terminal 15

F1	15 A	Central lubrication system, screen wiper on cab roof*.
F2	15 A	Autoradio (transformer 12V).
F3	15 A	Reserve.
F4	15 A	Windscreen washer system (M3), windscreen wiper control circuit (M4), 24 V stabiliser for sensors and transducers (B19R, B19L, B21, B33-2, B40, B41, B53, B143, B145, B177, B178, B179 and B188), Qmin circuit (Y78), pressure-free lowering (Y139), beacon* (E9), rotating grapple* (Y22 and Y23).
F5	7.5 A	Windscreen wiper motor (power circuit).
F6	7.5 A	Reserve.
F7	7.5 A	Keyboard and display.
F8	15 A	Safety lever, solenoid valve for pilot control pressure (Y7), slewing gear brake (Y3), fast travel (Y24), additional pressure level (Y160).
F9	15 A	Power supply of BST.

Fuses on terminal 30

F10	25 A	Work headlight on attachment* (E1), revolving deck (E2) and cab (E5), travel light (E3 and E4).
F11	15 A	Reserve.

Designation	Value / unit
Total alkaline earth metals (water hardness)	0.6 to 3.6 mmol/l (4 to 25 °e)
pH at 20 °C	6.5 to 8.5
Chloride ion concentration	max. 80 mg/l
Sulphate ion concentration	max. 100 mg/l

Tab. 5-2 *Fresh water quality*

Designation	Value / unit
Total alkaline earth metals (water hardness)	0.6 to 2.7 mmol/l (4 to 19 °e)
pH at 20 °C	6.5 to 8.0
Chloride ion concentration	max. 80 mg/l
Sulphate ion concentration	max. 80 mg/l

Tab. 5-3 *Fresh water quality with use of DCA 4**

* = Diesel Coolant Additives

Water analysis results are available from the local authorities.

Mixing ratio for heating fluid

The heating fluid must contain min. 50% corrosion inhibitor and antifreeze agent at **all times of the year**.

Outdoor temperature to	Mixing ratio	
	Water %	Corrosion inhibitor/antifreeze agent %
-37 °C	50 %	50 %
-50 °C	40 %	60 %

Tab. 5-4 *Permissible mixing ratio (for all seasons)*

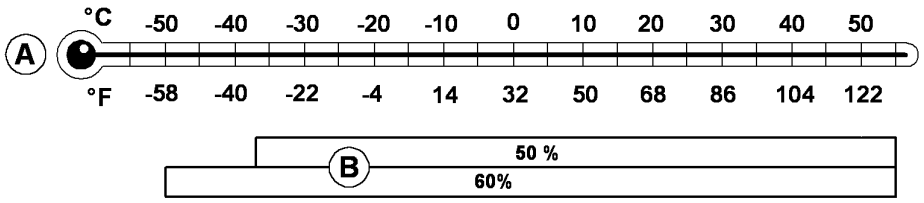


Fig. 5-5 *Temperature-based mixing ratio of water + corrosion inhibitor / antifreeze agent*

A Ambient temperature

B Corrosion inhibitor/antifreeze agent concentration in heating fluid

Machines delivered with a hydraulic hammer attachment and retrofitted hydraulic hammer kits are already equipped with 10-µm filter cartridges in the return filter. Please take this into account when ordering spare parts.

5.5.5 Lubricants for gearboxes

Quality

Recommended lubricant	Specification
Liebherr Gear Basic 90 LS	API: GL-5 MIL-L: 2105 D ZF: TE-ML 05C, 12C, 16E, 21C
Liebherr Gear Plus 20W-40	API: Niveau von GL4 ZF: TE-ML 05F, 06K, 17E
Liebherr Gear Hypoid 90 EP	API: GL 5 MIL-L: 2105 B, C, D ZF: TE-ML 05A, 12A, 16C, 17B, 19B
Liebherr Hypoid 85W-140 EP	API: GL-5 MIL-L: 2105 D, PRF-2105 E ZF: TE-ML 05A, 07A, 16D, 21A
Liebherr Hydraulic-Gear ATF	GM: Dexron II D ZF: TE-ML 03D, 04D, 11A, 14A, 17C
Liebherr Syntogear Plus 75W-90	API: GL-4, GL-5, MT-1 MIL-L: 2105 D, PRF-2105 E ZF: TE-ML 02B, 05B, 07A, 12B, 16F, 17B, 19C, 21B

Tab. 5-11 *Lubricating oil specifications*

If LIEBHERR oils are not available locally, use an oil that conforms to the specifications (before choosing an oil, contact our customer service department).

Viscosity

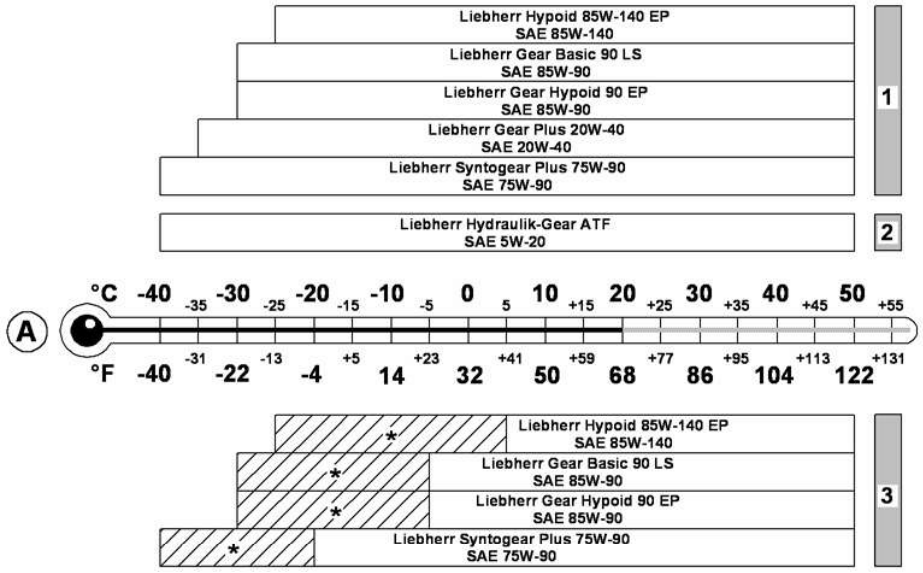


Fig. 5-10 *Temperature-based selection of the SAE class*

- ▶ Tighten the breather filter **1**.
- ▶ Fill the tank to the upper edge. When adding oil through the filter lid, ensure that the return chamber **R** around the centring tube **7** is also completely filled.
- ▶ Replace the lid of the return filter **2** or tighten the screw **4** respectively.

Caution!

- ▶ Bleed the hydraulic pumps after each hydraulic oil change.

Draining condensate:

Drain the condensate from the hydraulic tank at the intervals prescribed in the maintenance schedule.

- ▶ Place a suitable container under the machine.
- ▶ Connect the drain hose to the drain valves **5** and **6** (see Fig. 5-19) until the oil flowing into the container does not contain any water.

Interval: see maintenance schedule

Note!

When using biodegradable hydraulic fluids, we recommend draining of condensate each time the machine is started after a prolonged period of standstill (longer than 24 hours).

5.7.3 Checking and cleaning oil cooling system

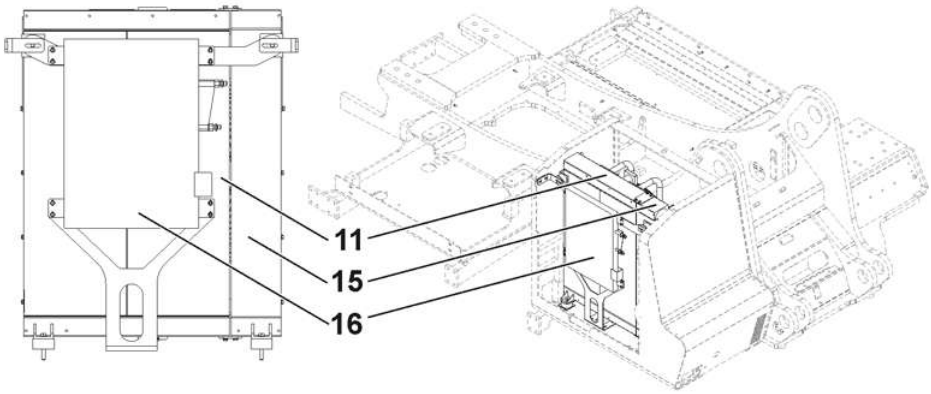


Fig. 5-20 *Oil cooler*

11 Hydraulic oil cooler
15 Transmission oil cooler
16 Condenser in a/c system

The hydraulic oil cooler is integrated into the combined cooler unit.
A clean oil cooler is a prerequisite for optimum oil cooling.

- ▶ Regularly check the fan and the cooler for damage and clean it, if necessary.
- ▶ If required, clean the cooling fins with compressed air or steam jet (from the inside out, see arrow). If necessary, the combined cooler might be in a tilted position (see Fig. 5-21).

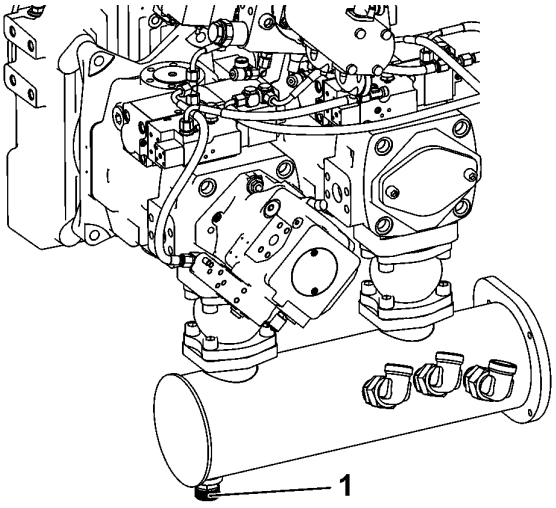


Fig. 5-29 Draining oil from the working pumps

- ▶ Loosen the screw plug **1** at the suction hose neck on the pump side.
- ▶ Drain the hydraulic oil from the pump and suction hose.
- ▶ After completion of the repair, turn the stopcock to its initial position **a** and engage it.
- ▶ Tighten the breather filter on the hydraulic tank.

5.7.12 Breather filter on hydraulic tank

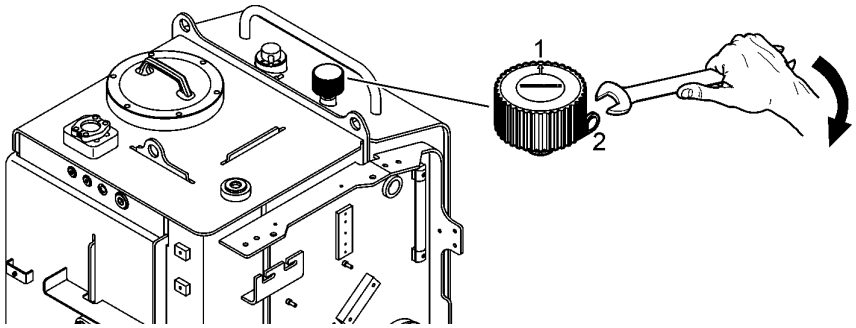


Fig. 5-30 Breather filter of hydraulic tank

- ❑ The hydraulic system is depressurised.
- ▶ Replace the filter **1** together with the safety pin **2** (see inspection and maintenance schedule).

Note!

- ▶ n areas with excessive dust, observe the special instructions for the filter change.
- ▶ The safety pin **2** (or anti-vandalism key) should always be removed from the breather filter and attached to the machine start key.

5.9.2 Checking the track chains tension

Due to normal wear of the tracks, the chain tension needs to be checked regularly, and, if necessary, the chains must be tightened.

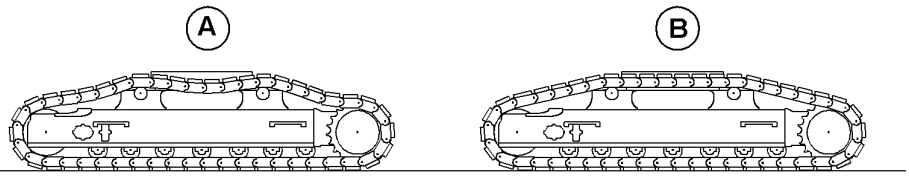


Fig. 5-40 *Track unsufficiently (**A**) and properly (**B**) tightened*

– For the machine with two carrier rollers

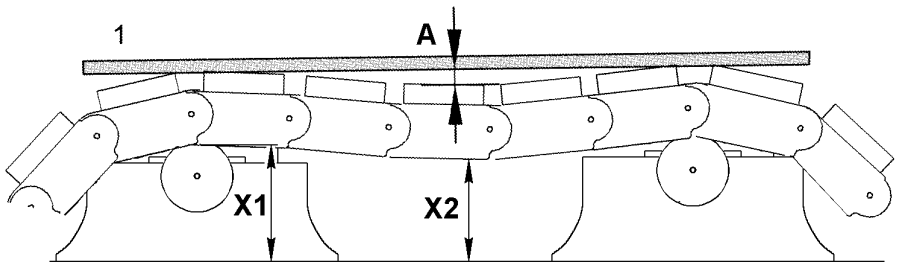


Fig. 5-41 *Monitoring the track tension (with two carrier rollers)*

▶ Relieve the track by driving the machine forwards and backwards.

▶ Place the measuring rod **1** in the area above the carrier rollers.

▶ Measure distance **A** between the measuring rod lower edge and the top of the track pads.

↳ The track should, under operating conditions, sag **15 to 20 mm** between the carrier rollers.

Note!

As an alternative, or if no correct measuring rod is available, it is possible to determine the sag A as the difference between X1 and X2 (A = X1 - X2).

X1 is the distance between lower face of a chain link and the cover sheet of the side frame measured at a carrier roller, X2 the same distance measured in the middle between two carrier rollers.

▶ Retension the track if necessary.

– For the machine with three carrier rollers:

5.10.4 Slip ring body (option)

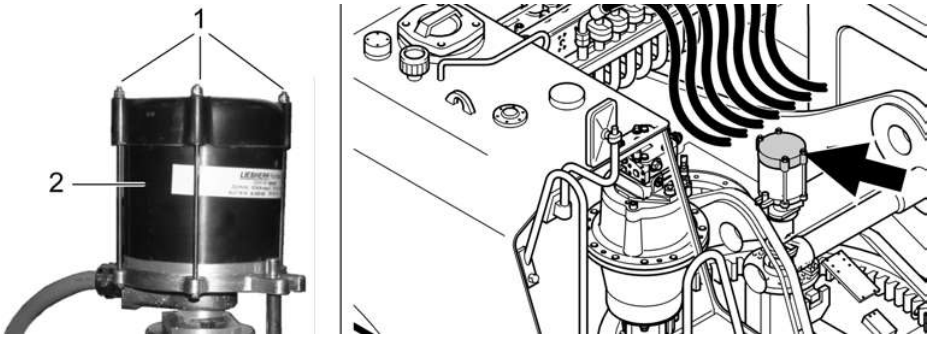


Fig. 5-51 *Slip ring body*

Slip ring bodies are easily damaged by humidity, as oxide layers might form on the conducting surfaces, impairing electrical conductivity. As a consequence, the electrical consumers in the undercarriage are not sufficiently powered, which can result in malfunctions.

To prevent this, we recommend carrying out the following tasks every 500 operating hours:

- ▶ Unscrew the lock nuts **1**.
- ▶ Remove the slip ring housing **2**.
- ▶ Remove any oxidation from the slip ring body (use cleaning spray, if necessary).
- ▶ Replace damaged (corroded) fork terminals.
- ▶ Apply Cramolin contact spray to all slip ring elements.
- ▶ Replace the housing **1**.
- ▶ Secure the housing **1** with the lock nuts **2** and tighten them all with the same torque.

5.10.5 Cabinet air pressuring system (option)

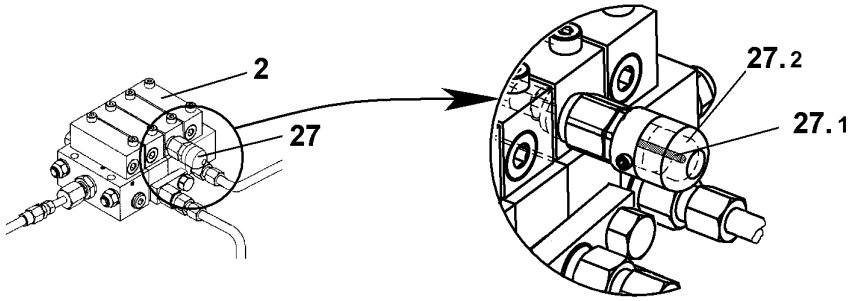
Excavators operating in heavy dust conditions should be equipped with a cabinet air pressuring system. This system create an over pressure in the cabinet, so no dust can penetrate inside.

▶ Keep the lube pump running until clean grease runs out of the bearing points boom cylinders to upper carriage, then depress the button **S84** again.
  ↳ The control light in the button turns off and the lubrication procedure is stopped

Note!

The time necessary for the lubrication is dependent on the grease viscosity and temperature and on the design and number of connected components. At very low temperatures up to 30 minutes may be necessary for sufficient lubrication.

During lubrication, the delivery of grease can be checked visually while observing, through the transparent cap **27.2** of the stroke controller **27** mounted to the top of the main distributor **2**, that the indicator stem **27.1** moves alternately in and out.



Lubrication intervals.

Under normal working conditions a semi – automatic lubrication must be performed daily.

If the machine is used under hard conditions (working under water, in very abrasive material, …) or in multi shift service, it is necessary to lubricate more often (up to once a working shift or every 4 hours).

5.12.4 Operation of the full automatic system

Function of the lubrication system

After turning on the excavator the control light inside the touch **S84** and the green LED **17** of the integrated control unit **16** light up for approx. 1,5 sec. to show that the electric pump is operative.

.A lubrication procedure will begin automatically after a "cycle time" is over and stop after all points have been lubricated, this without any action by the operator.

During a lubricating procedure, all lube points are lubricated one after the other in a certain sequence (progressive system).

After completion of a lubrication procedure, the pump is turned off by a proximity switch **B51** mounted to a distribution element of the main distributor **2**.