en

Operating instructions

Hydraulic excavator
R 974 C with long reach demolition attachment

from serial number 27700

Document identification

	ORIGINAL OPERATING INSTRUCTIONS
Order number:	10069856 Demolition
Edition:	01 / 2010
Valid for:	R 974 C with long reach demolition attachment from serial number 27700
Issued by:	LFR - Department for technical documentation

Product identification

Manufacturer:	LIEBHERR France S.A.S.
Type:	R 974 C with long reach demolition attachment
Type no.:	449 / 1010 / 1011 / 1057 / 1058 / 1084 / 1124 / 1146
Conformity:	CE

Address

Liebherr France S.A.S.
2 avenue Joseph Rey
B.P 287 F - 68005 Colmar Cedex

LFR/en/Edition: 01 / 2010

1 Product description

1.1 Assembly - overview

This section comprises an overview of the machine and gives, for the shown components, the denominations currently employed in this manual.

1.1.1 Machine with backhoe attachment

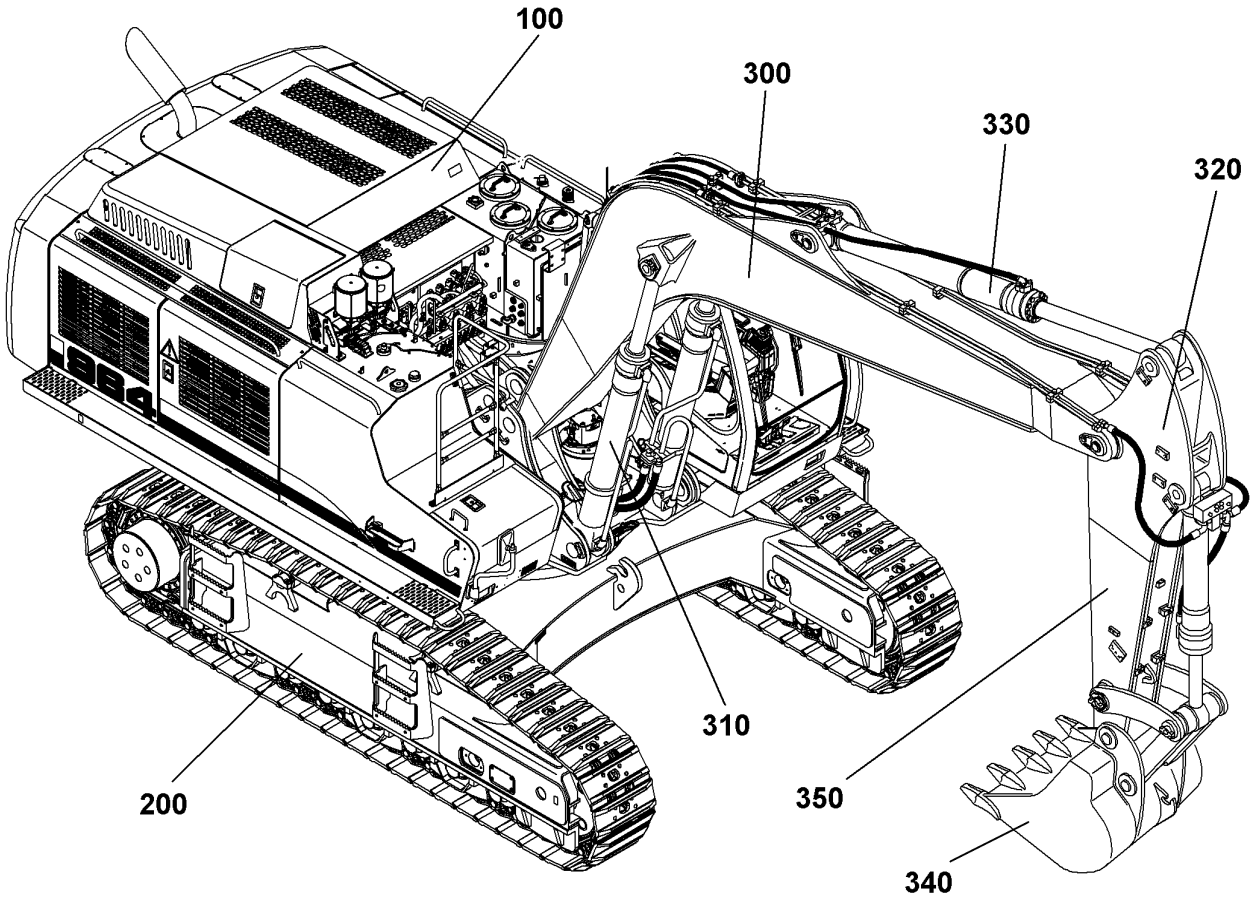


Fig. 1-1 *Machine with backhoe attachment*

100	Uppercarriage	**200**	Undercarriage	**300**	Monobloc boom
310	Boom cylinders	**320**	Stick	**330**	Stick cylinder
340	Backhoe bucket	**330**	Bucket tilt cylinder		

LFR/en/Edition: 01 / 2010

Lift Capacities

with Gooseneck Boom 7,20 m

Stick 2,90 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m)									
		3,0	4,5	6,0	7,5	9,0	10,5	12,0	13,5	15,0	16,5
13,5	HD										
	HD-SL										
12,0	HD										
	HD-SL										
10,5	HD										
	HD-SL										
9,0	HD										
	HD-SL										
7,5	HD					13,4# (13,4#)					
	HD-SL					13,4# (13,4#)					
6,0	HD				15,7# (15,7#)	14,1# (14,1#)					
	HD-SL				15,7# (15,7#)	14,1# (14,1#)					
4,5	HD		30,3# (30,3#)	21,8# (21,8#)	17,6# (17,6#)	15,1# (15,1#)	11,7 (13,5#)				
	HD-SL		30,3# (30,3#)	21,8# (21,8#)	17,6# (17,6#)	15,1# (15,1#)	11,9 (13,5#)				
3,0	HD			25,4# (25,4#)	19,6# (19,6#)	14,9 (16,2#)	11,3 (14,1#)				
	HD-SL			25,4# (25,4#)	19,6# (19,6#)	15,1 (16,2#)	11,5 (14,1#)				
1,5	HD		23,1# (23,1#)	26,8 (27,9#)	18,9 (21,2#)	14,1 (17,2#)	10,8 (14,3)				
	HD-SL		23,1# (23,1#)	27,2 (27,9#)	19,2 (21,2#)	14,4 (17,2#)	11,0 (14,5#)				
0	HD		27,0# (27,0#)	26,5 (28,9#)	18,0 (22,0#)	13,6 (17,7#)	10,5 (14,0)				
	HD-SL		27,0# (27,0#)	26,9 (28,9#)	18,3 (22,0#)	13,8 (17,7#)	10,7 (14,5#)				
- 1,5	HD	21,3# (21,3#)	35,3# (35,3#)	25,0 (28,5#)	17,6 (21,9#)	13,2 (17,5#)					
	HD-SL	21,3# (21,3#)	35,3# (35,3#)	25,4 (28,5#)	17,9 (21,9#)	13,5 (17,5#)					
- 3,0	HD	31,2# (31,2#)	35,4# (35,4#)	25,0 (26,7#)	17,5 (20,7#)	13,3 (16,1#)					
	HD-SL	31,2# (31,2#)	35,4# (35,4#)	25,5 (26,7#)	17,8 (20,7#)	13,5 (16,1#)					
- 4,5	HD	40,2# (40,2#)	29,9# (29,9#)	23,0# (23,0#)	17,5# (17,5#)						
	HD-SL	40,2# (40,2#)	29,9# (29,9#)	23,0# (23,0#)	17,5# (17,5#)						
- 6,0	HD		21,1# (21,1#)	15,9# (15,9#)							
	HD-SL		21,1# (21,1#)	15,9# (15,9#)							
- 7,5	HD										
	HD-SL										
- 9,0	HD										
	HD-SL										
- 10,5	HD										
	HD-SL										
- 12,0	HD										
	HD-SL										

Stick 3,80 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m)									
		3,0	4,5	6,0	7,5	9,0	10,5	12,0	13,5	15,0	16,5
13,5	HD										
	HD-SL										
12,0	HD										
	HD-SL										
10,5	HD										
	HD-SL										
9,0	HD					10,5# (10,5#)					
	HD-SL					10,5# (10,5#)					
7,5	HD					11,5# (11,5#)	8,7# (8,7#)				
	HD-SL					11,5# (11,5#)	8,7# (8,7#)				
6,0	HD					12,4# (12,4#)	11,2# (11,2#)				
	HD-SL					12,4# (12,4#)	11,2# (11,2#)				
4,5	HD			18,9# (18,9#)	15,6# (15,6#)	13,6# (13,6#)	11,9 (12,2#)				
	HD-SL			18,9# (18,9#)	15,6# (15,6#)	13,6# (13,6#)	12,1 (12,2#)				
3,0	HD		33,0# (33,0#)	22,9# (22,9#)	17,8# (17,8#)	14,9# (14,9#)	11,4 (13,0#)				
	HD-SL		33,0# (33,0#)	22,9# (22,9#)	17,8# (17,8#)	14,9# (14,9#)	11,6 (13,0#)				
1,5	HD		29,8# (29,8#)	26,2# (26,2#)	19,3 (19,8#)	14,2 (16,1#)	10,8 (13,7#)				
	HD-SL		29,8# (29,8#)	26,2# (26,2#)	19,6 (19,8#)	14,5 (16,1#)	11,0 (13,7#)				
0	HD		27,1# (27,1#)	26,0 (28,2#)	18,2 (21,2#)	13,5 (17,0#)	10,4 (13,9)				
	HD-SL		27,1# (27,1#)	26,4 (28,2#)	18,5 (21,2#)	13,8 (17,0#)	10,6 (14,1#)				
- 1,5	HD	17,7# (17,7#)	31,6# (31,6#)	25,0 (28,7#)	17,5 (21,8#)	13,1 (17,3#)	10,1 (13,6)				
	HD-SL	17,7# (17,7#)	31,6# (31,6#)	25,5 (28,7#)	17,8 (21,8#)	13,3 (17,3#)	10,3 (14,0#)				
- 3,0	HD	25,1# (25,1#)	38,1# (38,1#)	24,7 (27,8#)	17,2 (21,3#)	12,9 (16,7#)					
	HD-SL	25,1# (25,1#)	38,1# (38,1#)	25,1 (27,8#)	17,5 (21,3#)	13,1 (16,7#)					
- 4,5	HD	34,3# (34,3#)	34,0# (34,0#)	24,9 (25,3#)	17,3 (19,4#)	13,0 (14,7#)					
	HD-SL	34,3# (34,3#)	34,0# (34,0#)	25,3# (25,3#)	17,6 (19,4#)	13,3 (14,7#)					
- 6,0	HD	37,8# (37,8#)	27,2# (27,2#)	20,4# (20,4#)	15,1# (15,1#)						
	HD-SL	37,8# (37,8#)	27,2# (27,2#)	20,4# (20,4#)	15,1# (15,1#)						
- 7,5	HD										
	HD-SL										
- 9,0	HD										
	HD-SL										
- 10,5	HD										
	HD-SL										
- 12,0	HD										
	HD-SL										

Stick 4,70 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m)									
		3,0	4,5	6,0	7,5	9,0	10,5	12,0	13,5	15,0	16,5
13,5	HD										
	HD-SL										
12,0	HD										
	HD-SL										
10,5	HD										
	HD-SL										
9,0	HD						6,9# (6,9#)				
	HD-SL						6,9# (6,9#)				
7,5	HD						8,4# (8,4#)				
	HD-SL						8,4# (8,4#)				
6,0	HD					10,4# (10,4#)	9,6# (9,6#)	6,5# (6,5#)			
	HD-SL					10,4# (10,4#)	9,6# (9,6#)	6,5# (6,5#)			
4,5	HD					11,9# (11,9#)	10,8# (10,8#)	8,1# (8,1#)			
	HD-SL					11,9# (11,9#)	10,8# (10,8#)	8,1# (8,1#)			
3,0	HD		27,7# (27,7#)	19,9# (19,9#)	15,8# (15,8#)	13,4# (13,4#)	11,5 (11,7#)	8,6 (9,3#)			
	HD-SL		27,7# (27,7#)	19,9# (19,9#)	15,8# (15,8#)	13,4# (13,4#)	11,7 (11,7#)	8,8 (9,3#)			
1,5	HD		34,9# (34,9#)	23,8# (23,8#)	18,2# (18,2#)	14,4 (14,8#)	10,8 (12,6#)	8,3 (10,2#)			
	HD-SL		34,9# (34,9#)	23,8# (23,8#)	18,2# (18,2#)	14,7 (14,8#)	11,0 (12,6#)	8,4 (10,2#)			
0	HD		29,5# (29,5#)	26,5 (26,6#)	18,4 (20,0#)	13,6 (16,0#)	10,3 (13,3#)	7,9 (10,2#)			
	HD-SL		29,5# (29,5#)	26,6# (26,6#)	18,7 (20,0#)	13,8 (16,0#)	10,5 (13,3#)	8,1 (10,2#)			
- 1,5	HD	15,5# (15,5#)	29,9# (29,9#)	26,1 (28,0#)	17,5 (21,1#)	12,9 (16,7#)	9,9 (13,4)	7,7 (8,2#)			
	HD-SL	15,5# (15,5#)	29,9# (29,9#)	26,5 (28,0#)	17,8 (21,1#)	13,1 (16,7#)	10,1 (13,7#)	7,9 (8,2#)			
- 3,0	HD	21,1# (21,1#)	35,0# (35,0#)	24,4 (28,0#)	16,9 (21,2#)	12,5 (16,7#)	9,7 (13,1)				
	HD-SL	21,1# (21,1#)	35,0# (35,0#)	24,8 (28,0#)	17,2 (21,2#)	12,8 (16,7#)	9,9 (13,4#)				
- 4,5	HD	28,1# (28,1#)	36,6# (36,6#)	24,3 (26,5#)	16,8 (20,2#)	12,4 (15,7#)					
	HD-SL	28,1# (28,1#)	36,6# (36,6#)	24,7 (26,5#)	17,1 (20,2#)	12,7 (15,7#)					
- 6,0	HD	37,4# (37,4#)	31,6# (31,6#)	23,3# (23,3#)	17,0 (17,6#)	12,8 (12,9#)					
	HD-SL	37,4# (37,4#)	31,6# (31,6#)	23,3# (23,3#)	17,4 (17,6#)	12,9# (12,9#)					
- 7,5	HD	32,8# (32,8#)	23,2# (23,2#)	17,0# (17,0#)							
	HD-SL	32,8# (32,8#)	23,2# (23,2#)	17,0# (17,0#)							
- 9,0	HD										
	HD-SL										
- 10,5	HD										
	HD-SL										
- 12,0	HD										
	HD-SL										

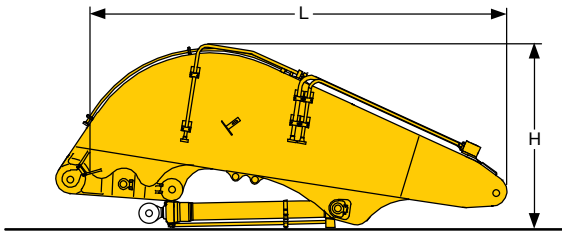
The load values are quoted in tons (t) on the backhoe bucket's load hook, and may be swung 360° on firm and even ground. Values quoted in brackets apply to the undercarriage when in longitudinal position. Capacities are valid for 600 mm wide, double-grouser pads. Indicated loads are based on ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity (indicated via #). Maximum load for the backhoe bucket's lifting eye is 27 t. Without bucket (4,30 m³), the lift capacities will increase by 3950 kg, without bucket cylinder, link and lever they increase by an additional 1250 kg. 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 must 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.

Component Dimensions and Weights

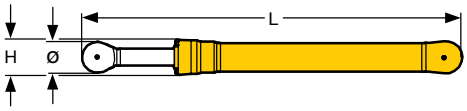
Backhoe Buckets from R 964 C

Cutting width		mm	1350	1550	1750
	Capacity	m³	2,00	2,50	3,00
L	Length	mm	2250	2250	2250
H	Height	mm	1650	1650	1650
	Width	mm	1400	1600	1800
	Weight	kg	2750	2950	3150



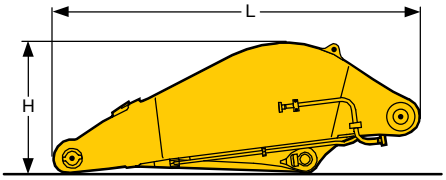
Shovel Boom

L	Length	mm	4950
H	Height	mm	2050
	Width	mm	1650
	Weight without crowd cylinder	kg	7150
	Weight crowd cylinder	kg	2 x 450



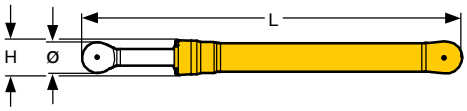
Shovel Hoist Cylinder (two)

L	Length	mm	2920
H	Height	mm	550
Ø	Diameter	mm	450
	Weight	kg	2 x 1100



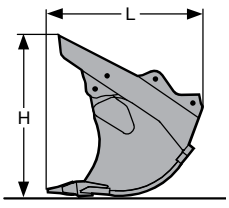
Shovel Stick

L	Length	mm	3660
H	Height	mm	1300
	Width	mm	1800
	Weight	kg	4100



Shovel Bucket Cylinders (two)

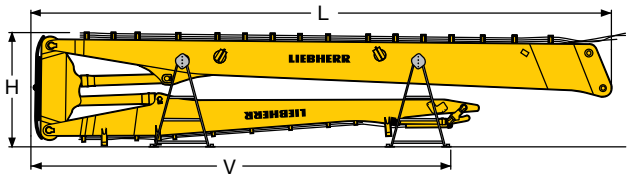
L	Length	mm	3050
H	Height	mm	450
Ø	Diameter	mm	450
	Weight	kg	2 x 625



Bottom Dump Buckets

Cutting width		mm	2300	2600	2600
	Capacity	m³	4,40	5,10	5,60
L	Length	mm	2600	2600	2800
H	Height	mm	2600	2600	2600
	Width	mm	2350	2600	2600
	Weight				
	Level I	kg	–	8450	8800
	Level II	kg	8300	9100	–
	Level III	kg	9150	–	–

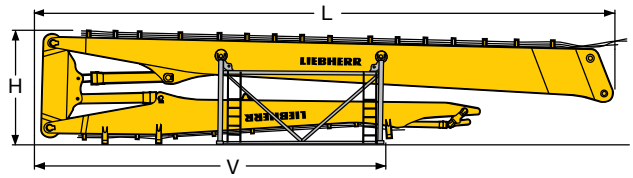
Dimensions and Weights



Demolition Attachment with Support

Demolition Boom 17,00 m

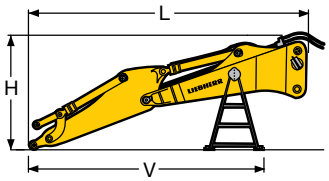
L	Length	mm	18350
H	Height	mm	3600
V		mm	13200
	Width	mm	2450
	Weight without working tool	kg	23400



Demolition Attachment with Storage Rack

Demolition Boom 17,00 m

L	Length	mm	18350
H	Height	mm	3600
V		mm	11100
	Width	mm	2450
	Weight without working tool	kg	24700



Backhoe Attachment with Supports

Main Boom 5,00 m

Stick lenghts		m	2,90	3,80	4,70
L	Length	mm	7800	8800	9700
H	Height	mm	3700	3600	3600
V		mm	6400	7400	8300
	Width	mm	2400	2400	2400
	Weight without bucket	kg	12200	12500	13000

- Stop the swinging motion of the uppercarriage when lowering the attachment into a ditch without striking the attachment on the ditch walls.
- Inspect the machine for damage if the attachment has been swung into a wall or any other obstacles.
- Applications in which the attachment is to be used to strike the material being extracted are not permitted, even when working in a longitudinal direction.
- Repeated strikes against an object leads to damage to the steel structures and machine components.
- Please refer to your LIEBHERR dealer if special teeth for heavy-duty or special applications are required.
- Do not attach too large bucket or bucket with side cutters or that are during operations with rocky material. This would prolong the work cycles and may lead to damage to the bucket as well as further machine components.
- With the 2x45° offset articulation, the offset position may only be employed if the working tool or the attachment does not touch the material.
- Operation of the offset articulation to drill into the material is not permitted.
- Do not lift the machine during operation. Should this happen, lower the machine slowly back to the ground.
- Do not let the machine fall heavily on the ground and do not hold it back with the hydraulics. This would damage the machine.
- During operation with the attachment it is forbidden to raise the machine with the dozing blade (e.g. carving at the ceiling when tunnelling).

Safe use with a hydraulic hammer

- The hydraulic hammer must be selected with particular care. When using a hydraulic hammer not permitted by LIEBHERR, steel structures or the other machine components can become damaged.
- Before beginning breaking tasks, position the machine on firm and level ground.
- Use a hydraulic hammer designed exclusively for breaking stone, concrete and other breakable materials.
- Only operate the hydraulic hammer in the longitudinal direction of the machine and with the windshield closed or with a front protective grid.
- Ensure during hammer operation that no cylinder is entirely extended or retracted and that the stick is not in the vertical position.
- In order to avoid damages to the machine, try not to break stone or concrete while performing retraction and extension motions of the hydraulic hammer.
- Do not apply the hydraulic hammer uninterrupted for more than 15 secs. at a time to the same place. Change the breaking point. Too long uninterrupted operation of the hydraulic hammer leads to an unnecessary overheating of the hydraulic oil.
- Do not use the drop force of the hydraulic hammer to break stone or other materials. Do not move obstacles with the hydraulic hammer. Misuse of this nature would damage both the hammer and the machine.
- Do not use the hydraulic hammer to lift objects

Safe use when loading and unloading (particularly when loading and unloading wood)

- According to use, it can be necessary when working with a grab to move with the equipment raised and the load lifted up; this applies, for example, when loading and unloading wood.

LFR/en/Edition: 01 / 2010

– Even with correct storage and permitted load, hoses and sheathed cables are subject to the natural aging process. This restricts their duration of use.
  • Incorrect storage, mechanical damage and unauthorized load are the most common causes of failure.
  • In relation to duration of use, current norms, regulations and guidelines pertaining to hoses and sheathed cables at place of use must be adhered to.
  • Use at the limit range of permissible load can shorten duration of use (e.g. high temperatures, frequent movement cycles, extremely high pulse frequencies, multiple shift usage).
– Hoses and sheathed cables should be replaced if the following are found during inspection:
  • Damage to the outer sheath as far as the liner (e.g. chafing, cuts and cracks);
  • Brittleness of the outer sheath (fracture formation in hose material);
  • Deformations which do not correspond to the natural form of the hose or sheathed cable, whether in a unpressurized or pressurized state or on bends e.g. sheath separation, blistering;
  • Unsealed areas;
  • Non-adherence to requirements during installation;
  • Damage or deformations to the hose fittings which reduce the tightness of the fittings or the hose / fitting connection;
  • Hoses working themselves out of the fittings;
  • Corrosion of the fittings which reduces function and tightness;
– When replacing hoses and sheathed cables, use only original replacement parts.
– Install and mount hoses and sheathed cables correctly. Do not mix up the connections.
– The following is to be noted when replacing hoses and sheathed cables:
  • Always ensure that the hoses and sheathed cables are installed free of torsion. For high-pressure hoses, the screws from the half-clamps or full flange must always be attached to both hose ends and should only be tightened afterwards.
  • When tightening the flange on high-pressure hoses and sheathed cables with bent fittings, the side with the bent fitting must always be tightened first and then the side with the straight fitting tightened afterwards.
  • Any mounting clamps which are located in the centre of the hose may only be attached and tightened subsequently.
  • Check daily to ensure that all clamps, covers and protective devices are properly fastened. Doing this will prevent vibration and damage during operation.
  • Install the hoses and sheathed cables in such a way that they cannot chafe on other hoses, sheathed cables or parts.
  • A minimum distance from other parts of approx. half the exterior diameter of the hose is recommended. The distance should not, however, be less than 10 to 15 mm.
  • When replacing the hoses or sheathed cables on moving parts (e.g. from the boom to the stay), check before initial start-up that there are no chafing areas in the entire area of movement.

2.6 Signs on the machine

2.6.1 Introduction

The excavator comprises several types of signs:

– **the safety plates** provide warnings relating to dangers of accidents which could result in serious injury or death.

LFR/en/Edition: 01 / 2010

3 Control and operation

3.1 Operating and control elements

3.1.1 Controls in the operator's cab

A3	Radio *	**E8**	Cigarette lighter
H1	Monitoring display	**H10**	Buzzer
H130	Buzzer of the reach monitoring device	**H131**	Indicator of the reach monitoring device
P5	Hourmeter		
S1	Ignition key	**S2**	Control unit
S5L	Push button for rotating device left (grapple, shear, ...), *or unlocking of cylinder cut-off (NA*	**S5R**	Push button for rotating device right (grapple, shear, ...) *or travel alarm on/off (NA)*
S5M	Horn	**S6L**	Push button for lifting magnet *or rotating device left (NA)*
S6M	Push button - reserve - Pressure-less lowering of attachment	**S6R**	Push button –travel alarm on/off *or rotating device right (A)*
S7	Safety switch- Servo control		
S41	Selector switch / Emergency lowering movements	**S42**	Push button / Emergency lowe-ring of working attachment
S55	Switch – unlocking of cylinder cut-off *or lifting magnet (NA)*	**S57**	Switch / Preselection of swing brake operating mode
S71	Diesel engine emergency start	**S72**	RPM adjustment during emer-gency operation
S73	Safety mode of the servo circuits		
S84-1	Push button / Central lubrication	**S84-2**	Push button / Swing ring teeth lubrication
S90	Potentiometer / Intermittent mode of the cab roof window wiper	**S99**	Controls for optional equiments *
S218	Push button / Cab roof windshield wiper	**S248**	Push button / Air bleeding of servo control circuits
U20	Left joystick	**U21**	Right joystick
U22	Pedal for left travel gear	**U23**	Pedal for right travel gear
U24	Double pedal for special equip-ments *	**U26**	Positioning swing brake *

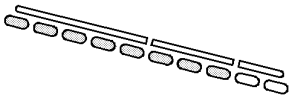
LFR/en/Edition: 01 / 2010

S86 – Operating mode preselection

Four different operating modes can be selected by pressing the touch.

- **L**: Mode LIFT (RPM stage 5)
- **F**: Mode FINE (RPM stage 10)
- **E**: Mode ECO (RPM stage 8)
- **P**: Mode POWER (RPM stage 10).

The currently active mode is displayed by the LED under the letter.



P4 – Engine RPM indicator

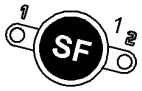
The indicator P4 displays the speed range of the Diesel engine in 10 levels.

S228 – Engine RPM increase

▶ Press the touch:
- ↳ the engine RPM will be increased by one level,
- ↳ an additional LED toward right illuminates on indicator P4.

S229 – Engine RPM decrease

▶ Press the touch:
- ↳ the engine RPM will be decreased by one level,
- ↳ the most right burning LED on indicator P4 goes out.



S354 – No function

E 538 – Low fuel pressure in Rail 2 - Warning stage

This symbol appears if the fuel pressure in the Rail 2 of the injection system passes below the **warning** limit.

E 539 – Low fuel pressure in Rail 2 - Safety stage

This symbol appears if the fuel pressure in the Rail 2 of the injection system passes below the **safety** limit.

E 597 – Boost air overheat - Warning stage

This symbol appears if the boost air temperature exceeds 75°C during at least 3 seconds. The buzzer sounds simultaneously and the engine power is reduced.

If the temperature increases some more, the symbol E524 will also be displayed.

Tab. 3-3 *Warning symbols for operating faults with corresponding error codes*

B) Warning symbols for special operating states und system errors

In addition to the above mentioned operating faults, also the symbols of the list below may appear in the SY field of the screen to warn the operator of the occurence of particular operating sequences or of some particular system errors.

Quick change adapter (optional equipment)

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 corresponding to this symbol.

One or several solenoid valves are off in the servo control circuit.

This symbol informs that the current flowing to (at least) one solenoid valve in the electro hydraulic servo control circuit is interrupted, due to the faulty connection(s) in the system.

Servo control pressure too low

This symbol shows that the servo pressure has dropped below a given limit value. The trouble free control of the excavator movements is in the case no longer guaranteed.

The symbol also lights up, even if no disturbance exists, if the safety lever S7 is tilted upward, or after several actuations of a servo control device with turned off engine and ignition key in contact position.

Internal default in Master module (U47)

This symbol appears if an internal default is recognized in the module U47 (Master module of the electronic servo control system).

Internal default in one Slave module

This symbol appears if an internal default is recognized in one of the Slave modules (printing plates U48-1, U48-2 or U46) of the electronic servo control system.

CAN communication default

This symbol appears if a communication default is recognized in the CAN networ of the electronic servo control system.

– which is the active pressure limitation for the hydraulic system and which percentage of the maximum pressure is set (solenoid valve EV6).
– graphic bars indicating the momentary electric current flowing to the different regulation solenoid valves..

On the left picture, an external limitation (Hardware input I1, option 2) is activated. The currents supplying the flow limitation solenoid valves EV1 and EV2 limit these flows to 55% of their maximal values. The current supplying the pressure limitation solenoid valve EV6 limits the pressure to 80% of its maximal value.

On the right picture, an internal limitation (Pressure increase) and an external limitation (Hardware input I1, option 1) are activated at the same time.
Due to the internal limitation, the flow of the pump P1 is limited to 50% of its maximum value via the solenoid valve EV1.
Due to the external limitation, the flow of the pump P2 is limited to 70% of its maximum value via the solenoid valve EV2 and the pressure in the hydraulic system to 60% of its maximal value via the solenoid valve EV6.

When several limitations are activated at the same time, only the one with the smallest percentage value is decisive for each regulating solenoid valve.

Note!
An external limitation becomes active for example when a pedal controlling an additional equipment is actuated.
The three internal limitations which are the most currently used are the followings:
– The internal limitation M1 is activated when travelling.
– The internal limitation M2 is activated when the pressure increase is actuated (button S56 on the control unit).
– The internal limitation M3 is activated when actuating the shovel flap on machines with shovel attachment.

▶ Press the **Menu** key again.
↳ The screen 2/... is displayed.

The screen 2 shows the instantaneous LR current (current flowing to the solenoid valve for power regulation).

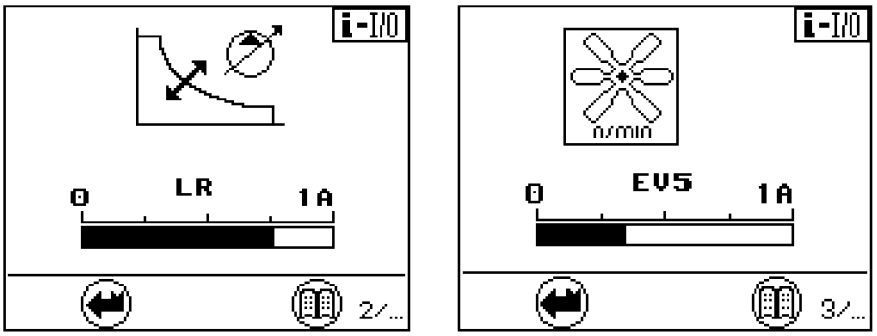


Fig. 3-19 *Menu "Info In/outputs" Currents to the solenoid valves LR and EV5*

▶ Press the **Menu** key again.
↳ The screen 3/... is displayed.

This screen shows the instantaneous current flowing to the regulation solenoid valve EV5 which determines the RPMs of the hydrostatic driven cooler fan.

▶ Press the **Menu** key again.
↳ The screens 4, 5, 6 and 7/... are successively displayed.

H90 – Control light / Rotation in opposite direction of reversible fan

On machines fitted with the special equipment "cooler fan reversible", this control light lights up to indicate that the fan has been changed over to rotation in opposite direction via the push button S160, see also the section "Reversible cooler fan (Optional equipment)" in the chapter "maintenance".

H292 – Control light / Special control system

This control light lights up to indicate that a special, non standard joystick system has been turned on via the key switch S247

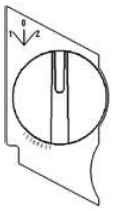
See also "Special control systems for joysticks" in this chapter.

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.

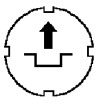


S41 – Rotary switch / Emergency lowering of attachment parts

For the function of this rotary switch, refer to the heading "Controls on side desks" previously in this manual.

S42 – Touch / Emergency lowering of working attachment

Note :This push button is mounted serially, not as an option, see previous section.



S47 – Push button / Quick change adapter

The push button S47 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.

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.

S78 - Push button / Height adjustable cab - emergency down

See the section "Height and inclination adjustable cab (optional equipment)" in this chapter.

S84-1 – Touch / Central lubrication of attachment and swing ring roller races

Note :This push button is mounted serially, not as an option, see previous section.

Setting the seat springs

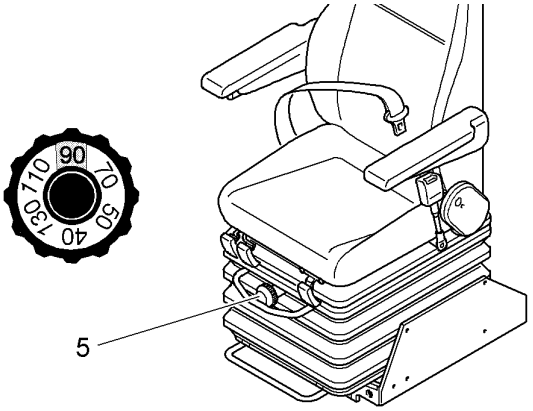


Fig. 3-43 *Setting the seat springs*

▶ Use the rotary knob **5** to set the seat springs to match the body weight.

Options setting (optional extras)

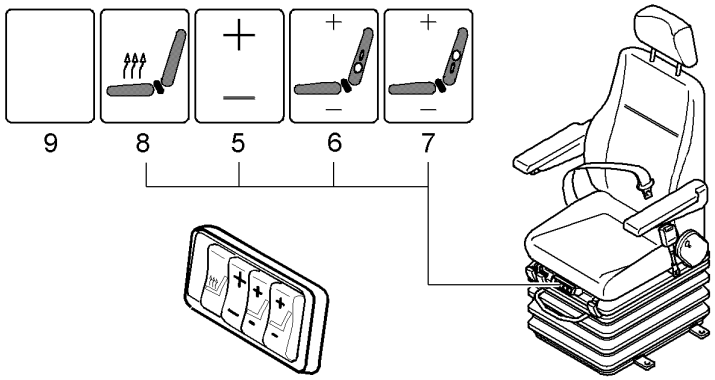


Fig. 3-44 *Switch bar on the air-cushioned operator's seat*

To set the vibration damping:

▶ Press button **5** (**+** or **-**) and set the vibration system according to body weight.

To set the lumbar support:

▶ Press button **6** (**+** or **-**) to inflate or deflate the lower lumbar chamber.

▶ Press button **7** (**+** or **-**) to inflate or deflate the upper lumbar chamber.

To set the seat heating:

▶ Use switch **8** to switch the seat heating on or off.

The seat heating switches off automatically when the temperature set is reached.

Changing the temperature from °Celsius to °Fahrenheit

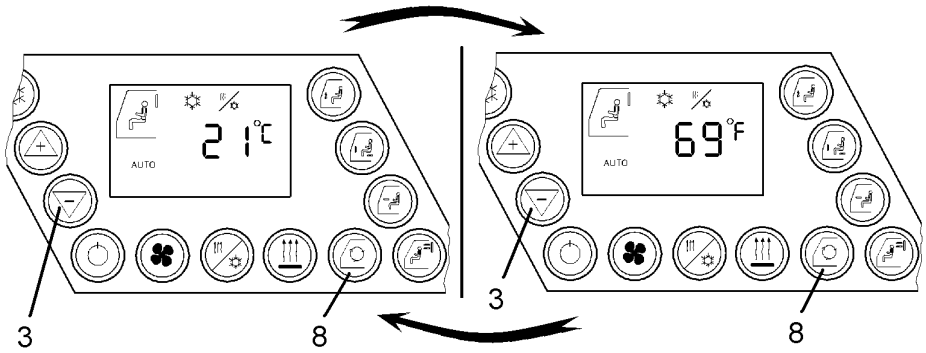


Fig. 3-57 *Switching over °Celsius - °Fahrenheit*

- ▶ Press the key **8** and keep it depressed. Press the key 3 at the same time.
  ↳ the display of the adjustet cab temperature is changed from °Celsius into °Fahrenheit.
- ▶ Pressing again the keys 8 and 3 at the same time will cause the temperature to change back into °Celsius.

3.3.9 Additional standstill heater (Option)

As an option, Your machine can be fitted with an additional heater mounted to the uppercarriage structure, out of the cabin. This heater is aimed to improve the starting ability of the Diesel engine and the working possibilities of the machine at very low temperatures.

This heater works with Diesel fuel and is used with the machine stopped to preheat the coolant circuit of the Diesel engine and thus the warm water circuit of the air conditioner serially installed in driver's cab.

In addition, and depending on the low temperature range planned for the machine operation, the additional standstill heater can also serve to heat various components on the machine via water to oil or water to air heat exchangers (such as splitterbox, fuel tank, batteries compartment, ...).

Operating the standstill heater

Notice!
The standstill heater can only be operated when the ignition of the machine is turned off.

If the ignition key is turned on during operation of the standstill heater, the message "**SH**" is displayed on the control unit on the left control console, informing that the standstill heater is on.

Engine speed adjustment using the arrow keys

To increase the speed:

▶ Press switch **S228**.
  ↳ Speed will be increased by one level.
  ↳ One more LED to the right illuminates on the indicator **P4** at the display.

To decrease the speed:

▶ Press switch **S229**.
  ↳ Speed will be decreased by one level.
  ↳ The most right LED goes out on the indicator **P4** at the display.

The following picture shows the modifications of the speed level and of the engine power by pressing the arrow keys **S228** and **S229.**

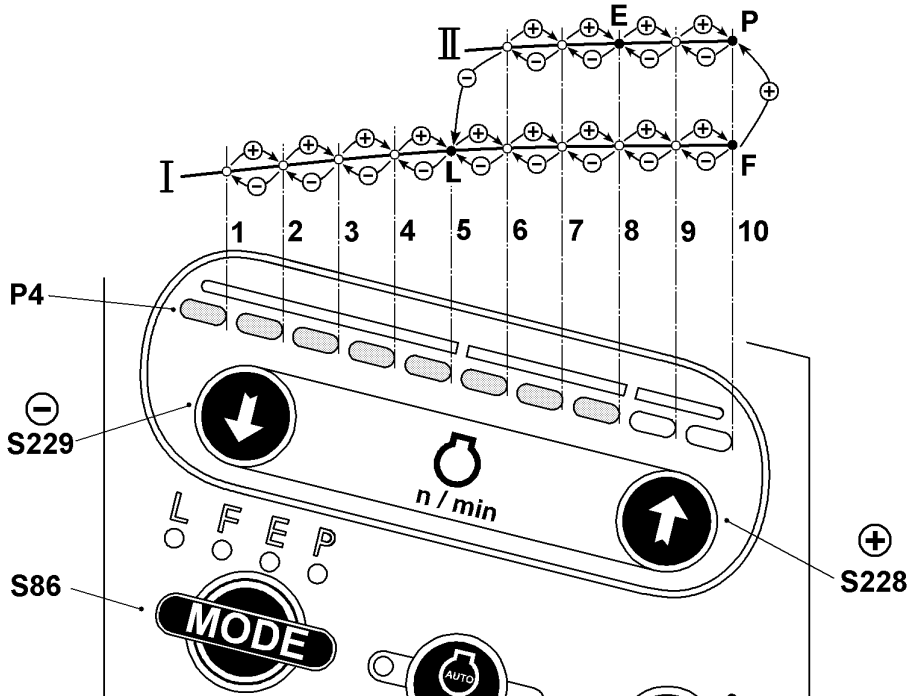


Fig. 3-62 *Engine speed adjustment via the arrow keys S228 and S229*

The lighting LED under the letters next to the mode key S86 shows which is the currently active mode. The selected mode will be memorized when the engine is switched off and will be displayed by a flashing LED above switch **S86** the next time the engine is started.

The mode indicating LED will flash also each time the engine RPM does not any more correspond to the speed lever of the currently selected operating mode (as an example if the speed has been adjusted via the arrow keys or if it has been decreased by the low idle automatic).

Immediately after the Diesel engine has been started, the speed will either be at level 1 (low idle of the Diesel engine) or at level 3, if a warm-up phase is required for the Diesel engine.

Absenken der Drehzahl über die Funktion Leerlaufautomatik

The low idle automatic is activated and deactivated via the touch **S20,** also see the heading "Control unit" before in this chapter.

- In case of a thunderstorm :
  - lower the attachment to the ground and if possible anchor the digging tool into the soil.
  - leave the cab and move away from the machine before the storm breaks out. Otherwise, you must stop the excavator, turn off the radio and keep inside the closed cab until the end of the storm.
- Auxiliary control units can have various functions. Always check their functions when starting up the machine.
- Stop the swinging motion of the uppercarriage when lowering the attachment into a ditch without striking the attachment on the ditch walls.
- Inspect the machine for damage if the attachment has been swung into a wall or any other obstacles.
- Applications in which the attachment is to be used to strike the material being extracted are not permitted, even when working in a longitudinal direction.
- Repeated strikes against an object leads to damage to the steel structures and machine components.
- Please refer to your LIEBHERR dealer if special teeth for heavy-duty or special applications are required.
- Do not attach too large bucket or bucket with side cutters or that are during operations with rocky material. This would prolong the work cycles and may lead to damage to the bucket as well as further machine components.
- With the 2x45° offset articulation, the offset position may only be employed if the working tool or the attachment does not touch the material.
- Operation of the offset articulation to drill into the material is not permitted.
- Do not lift the machine during operation. Should this happen, lower the machine slowly back to the ground.
- Do not let the machine fall heavily on the ground and do not hold it back with the hydraulics. This would damage the machine.
- During operation with the attachment it is forbidden to raise the machine with the dozing blade (e.g. carving at the ceiling when tunnelling).

Safe use with a hydraulic hammer

- The hydraulic hammer must be selected with particular care. When using a hydraulic hammer not permitted by LIEBHERR, steel structures or the other machine components can become damaged.
- Before beginning breaking tasks, position the machine on firm and level ground.
- Use a hydraulic hammer designed exclusively for breaking stone, concrete and other breakable materials.
- Only operate the hydraulic hammer in the longitudinal direction of the machine and with the windshield closed or with a front protective grid.
- Ensure during hammer operation that no cylinder is entirely extended or retracted and that the stick is not in the vertical position.
- In order to avoid damages to the machine, try not to break stone or concrete while performing retraction and extension motions of the hydraulic hammer.
- Do not apply the hydraulic hammer uninterrupted for more than 15 secs. at a time to the same place. Change the breaking point. Too long uninterrupted operation of the hydraulic hammer leads to an unnecessary overheating of the hydraulic oil.
- Do not use the drop force of the hydraulic hammer to break stone or other materials. Do not move obstacles with the hydraulic hammer. Misuse of this nature would damage both the hammer and the machine.
- Do not use the hydraulic hammer to lift objects

LFR/en/Edition: 01 / 2010

↳ An acoustic signal (warning tone) will be emitted.

Deactivating the drive warning device:

▶ Press and hold press button **S6R** on right-hand joystick **3**.
↳ The drive warning device will switch off.

Caution!
If a magnetic system LIEBHERR AMERICA (LAM) is mounted, the drive warning device is controlled by the button **S5R** on left-hand joystick **4** instead of the button **S6R**.

Note!
The drive warning device can only be switched off 10 seconds after starting to drive. If the accelerator pedal is engaged once more, the drive warning device will reactivate.

3.5.3 The uppercarriage swing movements

The swing movements of the uppercarriage are controlled by the left joystick **4**.

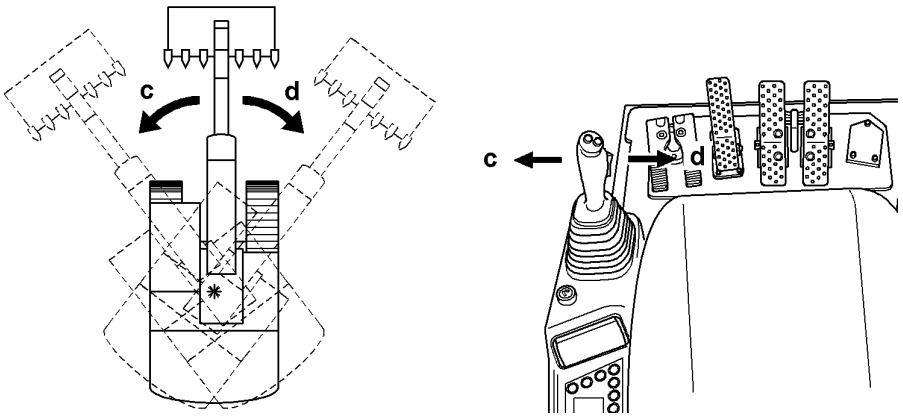


Fig. 3-75 *Rotating the uppercarriage*

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.

▶ Push the left joystick **4** to the left **c**:
↳ the uppercarriage rotates to the left.

▶ Push the joystick to the right **d**:
↳ the uppercarriage rotates to the right.

Braking the uppercarriage

The machine is equipped as well with an hydraulic as with a mechanical swing brake.

The hydraulic swing brake

Demolition works operation with the «LDC» safety device

Danger!

- Only experienced and well trained excavator drivers should be entrusted with the operation of the machine for demolition works. Exceeding the limit reach determined by the control unit with the attachment or actuating movements too brutally can cause the excavator to overturn!
- The safety device "LDC" is to be regarded first of all as an assistance permitting to lower to a minimum the upset hazards, but not as an absolute security against overturning, also when the machine is operated in the mode "Reach limited".
- The safety device does not relieve by any means the excavator driver to consider the reactions of the machine, nor to reduce the reach of the demolition tool and to lower the velocity of the attachment movements when he feels, according to his experience, that stability is no longer ensured.

With the mode «Reach limited» selected

▶ urn the key switch 1 of the LDC control unit U117 into position «locked»
  ↳ the control light 1a lights up
  ↳ the key can be taken off from the switch 1.

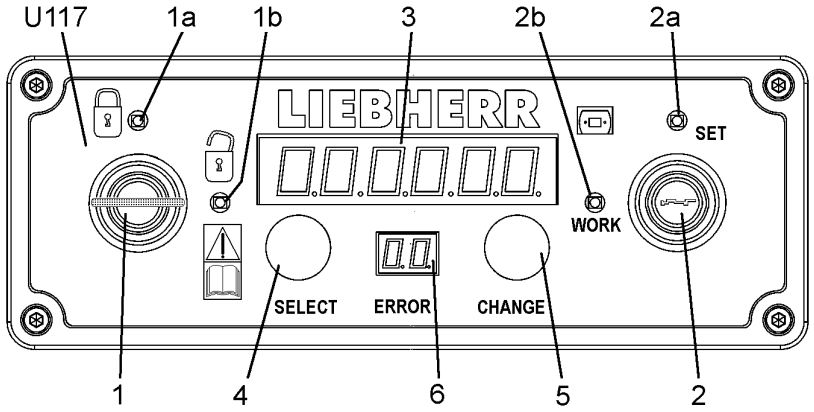


Fig. 3-85 *U 117 - Control Unit LIEBHERR Demolition Control*

1	Key switch / Reach limited - reach monitored	**1a**	Control light / reach limited
1b	Control light / reach monitored	**2**	Key switch / mode preselection (working - setting)
2a	Control light / working mode	**2b**	Control light / setting mode
3	LED / Display of excavator configuration number (ECN)	**4**	Touch / select
5	Touch / change	**6**	LED / Display of error codes

In this mode, and as soon as the reach limit that has been programmed according to the specifications of th e m achine is at tained, the co ntrol unit s witches off the servo c ircuits of all mov ements which normally le ad to an in crease o f t he instantaneous calculated reach.

On the contrary, all the movements lowering the instantaneous reach remain allowed.

Excavator Configuration Number						Reach limit (m)	Max. weight of the tool (To) *
Excavator model code		Excavator type code	Attachment code	Reach limit Code	Offset code		
4	4	4	3	2	/	10	2,5
4	4	4	3	3	/	12	2,5
4	4	4	3	4	/	14	2
4	4	4	4	1	/	8	2,5
4	4	4	4	2	/	10	2,5
4	4	4	4	3	/	12	2,2
4	4	4	4	4	/	14	1,7
4	4	4	5	1	/	8	2,5
4	4	4	5	2	/	10	2,5
4	4	4	5	3	/	12	2,5
4	4	4	5	4	/	14	2
4	4	4	6	1	/	8	2
4	4	4	6	2	/	10	2
4	4	4	6	3	/	11,5	1,5
4	4	4	6	4	/	13	1
4	4	8	8	2	/	8	4,3
4	4	8	8	3	/	9	4,3
4	4	8	8	4	/	10	4,3
4	4	9	9	4	/	9	4,3

Tab. 3-9 *Reach limit code for R944C*

Example :

A concrete breaker weighing 2,0 tons is mounted to a machine R944C – type VH-HD with demolition boom 9,30 meter, intermediate arm 2,25 meter, demolition stick 6,30 meter and a tool shifting kinematics for R922.

According to excavator type and attachment parts the ECN must be chosen in the series 4.4.4.4.

The ECN 4.4.4.4.3 is the right choice (Reach limit - Code 3, corresponding to a reach limit of 12 meter, is suitable for tool with a weight up to 2,2 tons).

The ECN 4.4.4.4.1 and 4.4.4.4.2 are also allowed for this tool, but they would lead to a too important reduction of the reach limit.

Chart of the reach limit codes for excavators R954C

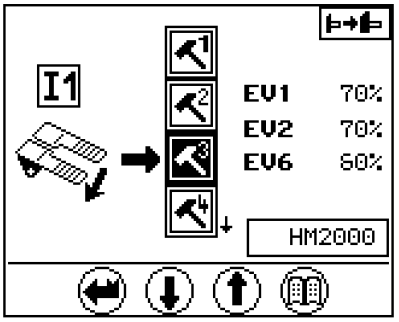
Excavator Configuration Number						Reach limit (m)	Max. weight of the tool (To) *
Excavator model code		Excavator type code	Attachment code	Reach limit Code	Offset code		
5	4	1	1	1	/	10	3
5	4	1	1	2	/	12	2,5
5	4	1	1	3	/	14	2

Notice!
The choice of an option does neither have an influence upon the allocation of the pedals, nor lead to the switching-off of pedal function.

Control of the hydraulic hammer

The hydraulic hammer is always controlled by the pedal 9m.

The operation of a hydraulic hammer requires the previous selection ofthe correct pump parameters option which has been allocated to this hammer, using the menu "Set Option" of the display.
Normally the designation appearing in the lower right corner of the screen must correspond to the definition of the installed hammer.
In case of a doubt, contact your supervisor to obtain this information.



▶ Push down the foot pedal 9**m**.
  ↳ The hydraulic hammer is activated.

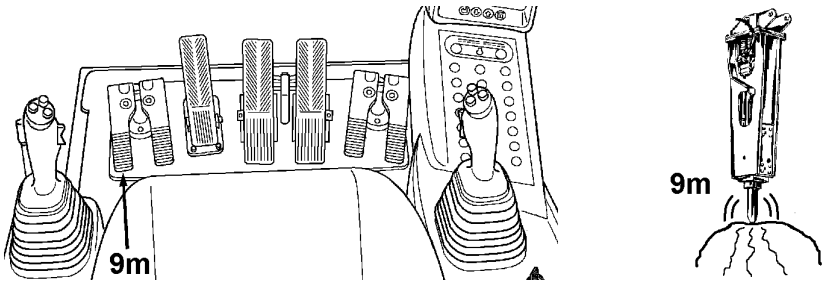


Fig. 3-95 *Control of a hydraulic hammer*

Note!
If the machine is used frequently or for long periods for hammer work, there is a risk that the hydraulic oil is contaminated more than in usual conditions.

▶ Reduce the maintenance intervals for hydraulic oil and return filter cartridges changes to suit the recommendations for working in heavy dust conditions.

Control of a bottom dump shovel

▶ Push down the foot pedal 9**n**.
  ↳ The shovel flap closes.

▶ Push down the foot pedal 9**p**.
  ↳ The shovel flap opens.

Starting the overload warning device

Danger!
No load hoisting work may be carried out if the overload warning device is defective.

▶ Have the overload warning device repaired by a professional.

▶ Press switch **S18**.
  ↳ Overload warning device is activated.
  ↳ LED in switch illuminates.

The operator must check the function of the overload warning device before each work shift.

▶ To check the overload warning device, extend the boom hydraulic cylinders to the stop.

▶ Push the joystick further in the direction Raise boom.
  ↳ The warning symbol must illuminate.
  ↳ The buzzer must sound.

Caution!
This is only a functional test of the warning system (qualitative test), but it does not mean that the adjustment is correct.
For this reason, the overload device must in addition be checked by a professional in accordance with the testing and setting information provided in the service manual (quantitative test):
- before the first use of the overload warning device,
- each time it is required by the locally applying regulation for lifting operation.

Deactivation of the overload warning device

Note!
For work using a bucket, deactivate the overload warning device, since the increased effort of the machine will cause the overload warning device to be permanently active.

▶ Press switch **S18** again.
  ↳ Overload warning device is deactivated.
  ↳ LED in the switch goes out.

3.5.16 Height adjustable cab (Option)

If equiped with the option "Height adjustable cab", Your machine is fitted with a mechanical lifting device for the cab, combined with additional hydraulic and electrical circuits, so the driver can adjust the cab to any desired height, simply actuating push buttons on the control desk.

Depending on the installed execution, the cab can be adjusted either in the height or in the inclination into any desired intermediate position.

- ▶ Carefully actuate the joystick for the boom cylinders in direction for lowering the working attachment until the attachment has reached the desired position.
- ▶ Eventually, the shutt off valve 5D can be opened (Manoeuvring lever of the valve must be lined up with the hydraulic line).

After ending the attachment movement with the external pressure source:

- ▶ Return the shutt off valves 5 immediately, in any case before disconnecting the external pressure source, to the closedposition (Manoeuvring levers of the valves must be crosswise to the hydraulic lines).
- ▶ Check the oil level in the hydraulic tank, correct the level as necessary.

3.6.5 Towing with the machine, emergency towing of the machine

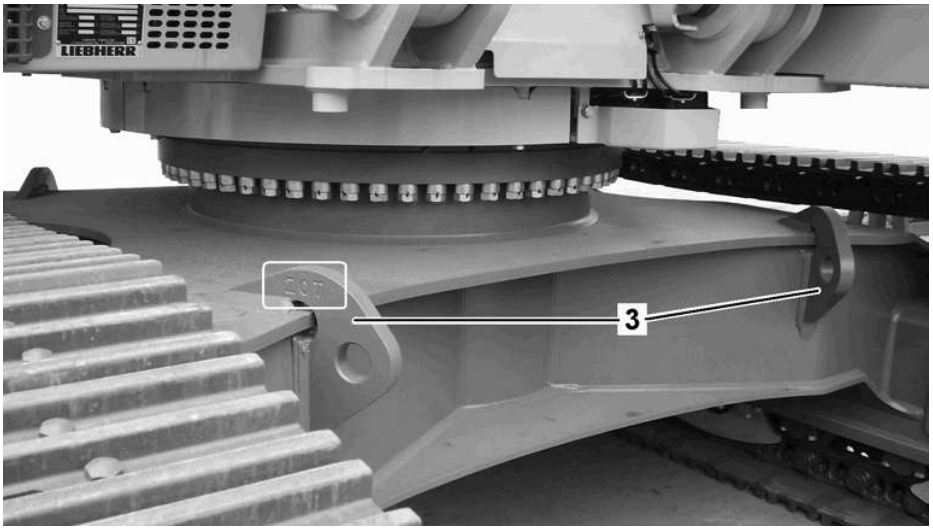
As well the towing of another machine with the excavator as the emergency towing of the excavator are difficult and problematic operations which are always realized under is the responsibility of the owner of the machine.

Damages or accidents, that could occur when towing another machine with the excavator or when emergency towing the excavator cannot be covered by the manufacturer's guarantee under any circumstances.

Towing and lashing hooks and eyes on the undercarriage

The hooks and eyes mounted to the undercarriage central piece are destined for the anchoring of the excavator during transportation, resp. for towing smaller machines or vehicles.

- ▶ Always notice the indication for the maximum authorized pulling force on the hooks 3 or on the eyes 4.



- ▶ Always expect a maximum pulling force of 10 tons for hooks which are weldedto the undercarriage central piece and which show no indication.

Dismounting the grab

- ▶ Set the grab down onto level ground with the shells fully opened.
- ▶ Turn off the engine and, with the ignition key in the contact position, push the right joystick briefly to the left and then to the right in order to remove the pressure in the hydraulic circuits.
- ▶ To relieve the grab's torsional mechanism, press the two push buttons in the left (or left and right – optional extras) joystick for "Turn grab".
- ▶ Turn the lever of each valve block **15** in position **A** (Position **A**, bucket operation) and push the right joystick briefly to the left and then to the right in order to remove the pressure in the hydraulic circuits.
- ▶ Push the safety lever up.
- ▶ Separate hydraulic hose **11**, hydraulic hose **12** and, if present, hydraulic hoses **13** and **14** from the pipes on the stick.
- ▶ Close open lines immediately to prevent any dirt entering.
- ▶ Support the grab so that it is stable.
- ▶ Remove the plate **6**. Drive out the pin **4** and remove the pin bearing sealings **25**. If necessary, start the engine and lift the attachment slightly to remove the pin **4**.

3.7.4 Attaching and dismounting the grab on the industrial stan-

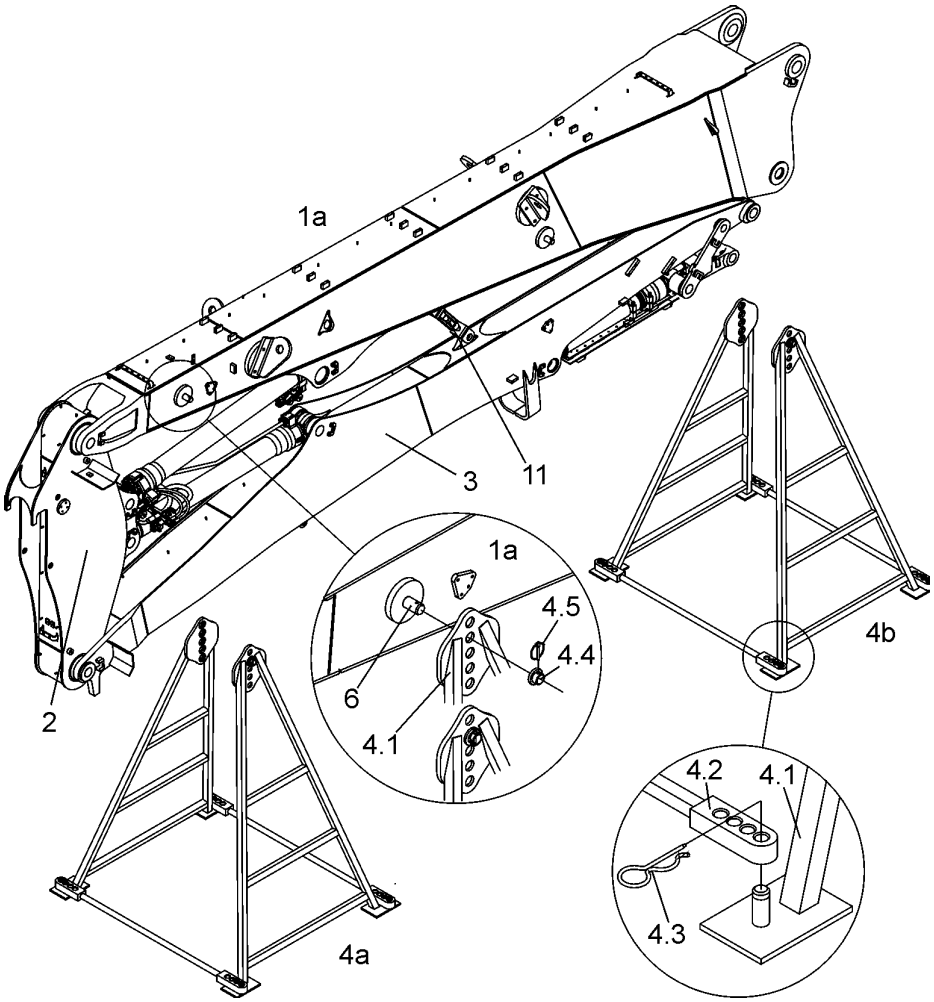


Fig. 3-124 *Storage of the demolition attachment*

1a	Boom	**4.1**	Lateral leg
2	Intermediate arm	**4.2**	Connecting traverse
3	Stick	**4.3**	Spindle
6	Support pin	**4.4**	Centering stop
4.a	Support front	**4.5**	Spindle
4.b	Support rear	**11**	Connecting rod

▶ Position the both lateral legs 4.1 and slightly move the boom 1a so to be able to insert the supporting spindles 6 in the fixing bores of the legs 4.1.

▶ Slide the centering stops 4.4 over the spindles 6 and secure using the securing pins 4.5. Connect the lateral legs 4.1 together with the both connecting traverses 4.2 and using the cotter pins 4.3.

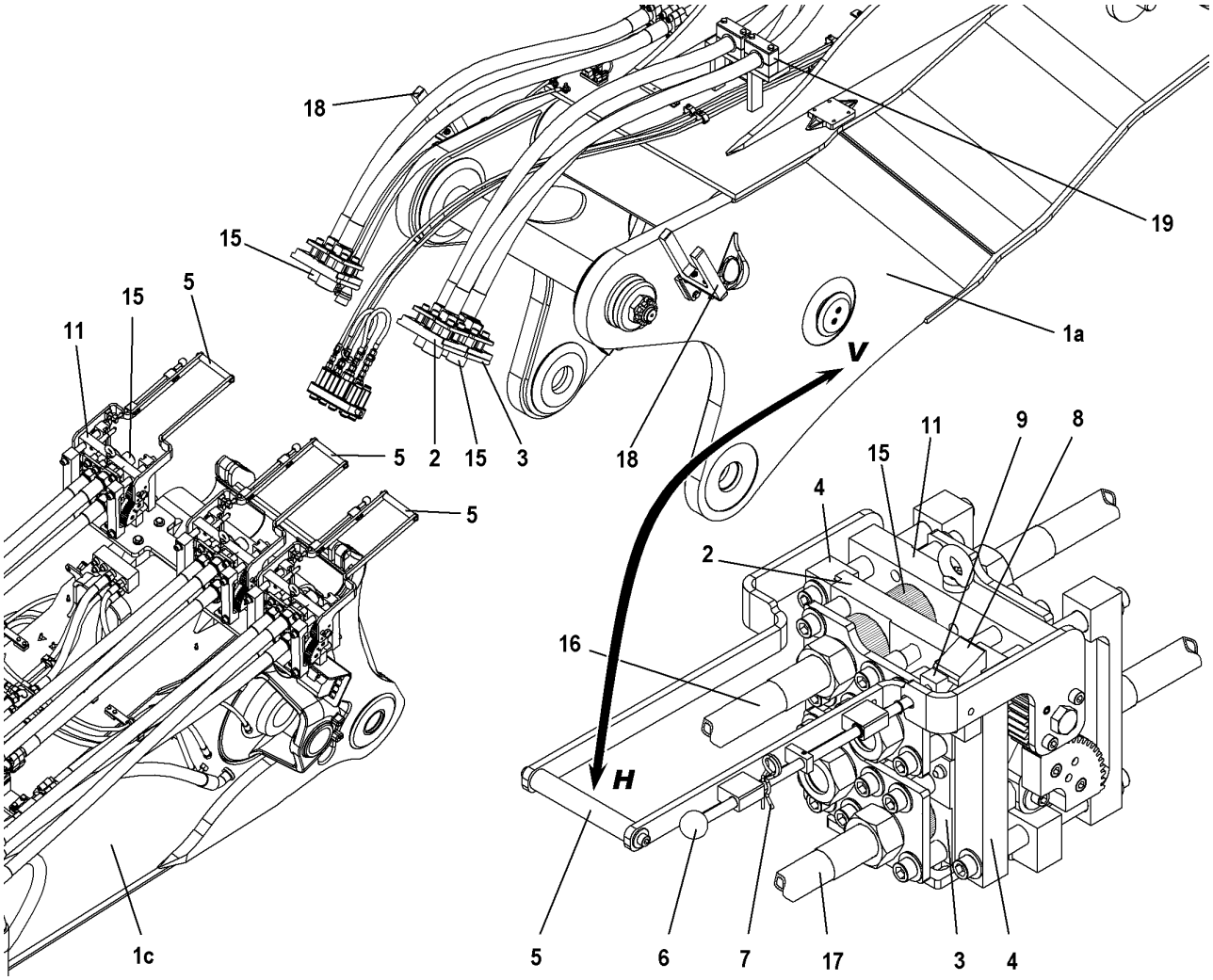


Fig. 3-135 *Multi quick change hydraulic couplings*

1a	Plug in boom	**1c**	Basic boom
2	Upper connection plate	**3**	Lower connection plate
4	Support rail	**5**	Manoeuvring lever
6	Locking rod	**7**	Pin
8	Catch	**9**	Latching piece
11	Support plate	**15**	Quick change hydraulic coupling
16	Hydraulic hose	**17**	Hydraulic hose
18	Supporting bracket	**19**	Hose clamp

Depressurization of the hydraulic circuits

The machines fitted with the option "Multi quick change couplings" offer the possibility to realize an efficient depressurization of the high pressure hydraulic circuits for the working attachment (with attachment laied down to the ground).

▶ for that, turn the ignition key S1 to contact position and,

– on machine R954C,
  • turn the key switch S140 - activation of the quick change adapter - into position 1,

Operating elements

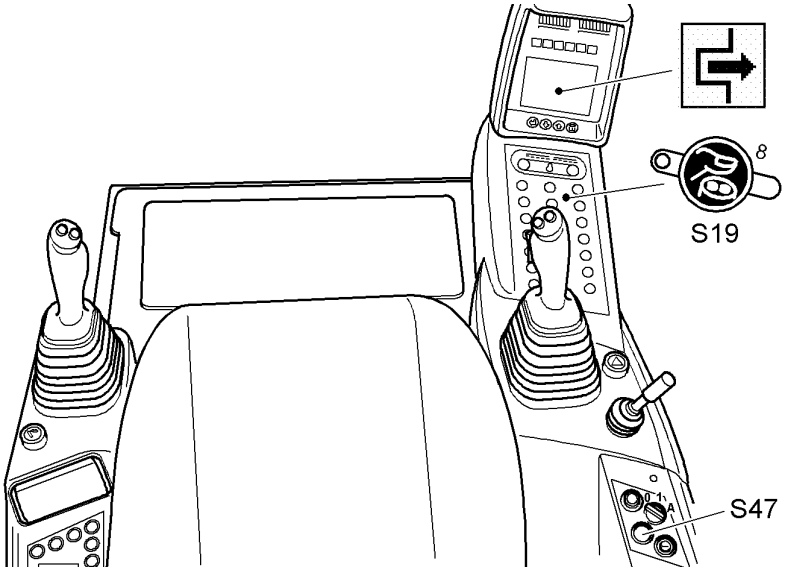
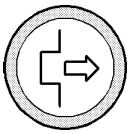


Fig. 3-147 *Operating elements for the hydraulic quick-change adapter*

Switch S19

Use switch **S19** to activate the auxiliary hydraulic device for the grab torsional mechanism and quick-change adapter.

- ▶ Press switch.
  - ↳ Auxiliary device is activated.
  - ↳ LED in switch illuminates.
- ▶ Press switch again
  - ↳ Auxiliary device is deactivated.
  - ↳ LED in the switch goes out.



Key switch S47:

Pressing the button activates the quick-change adapter – it is possible to operate the locking pins.

Pushbuttons L and R

Pushbutton **L** = extend locking pin (lock)
Pushbutton **R** = retract locking pin (unlock)

The pushbuttons are located on the left and/or right joystick (depending on the machine's equipment):

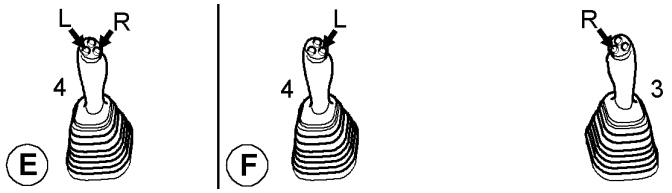


Fig. 3-148 *Pushbutton on the joystick*

E Operation with left joystick (standard) **F** Operation with left and right joystick (optional extras)

- ▶ To lift out the grab material, slowly and evenly slew in the stick and slowly and evenly slew in the backhoe bucket simultaneously.
- ▶ As soon as the stick is perpendicular to the ground, raise the boom slowly and evenly in addition to slewing in the stick and the backhoe bucket. Stopping suddenly will result in impact loads and vibrations.

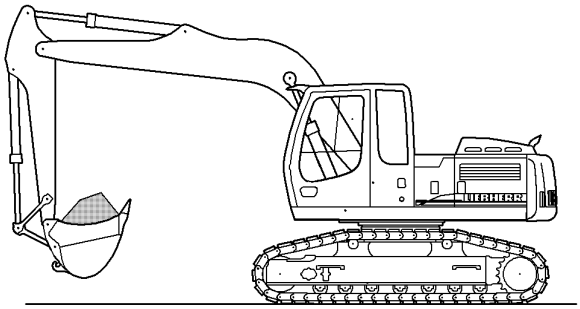


Fig. 3-160 *Raising grab material*

- ▶ When the backhoe bucket is full or the stick can no longer be slewed in, raise the boom and backhoe bucket until the filled surface is parallel to the ground.

3.8.4 Loading a transport vehicle

Danger!
Risk of fatal injury due to falling grab material.

- ▶ Do not load the transport vehicle so high that the grab material could drop out over the walls of the vehicle.
- ▶ Ensure that nobody is standing in the danger area or in the transport vehicle when loading.
- ▶ Do not slew the equipment over the driver's cab.

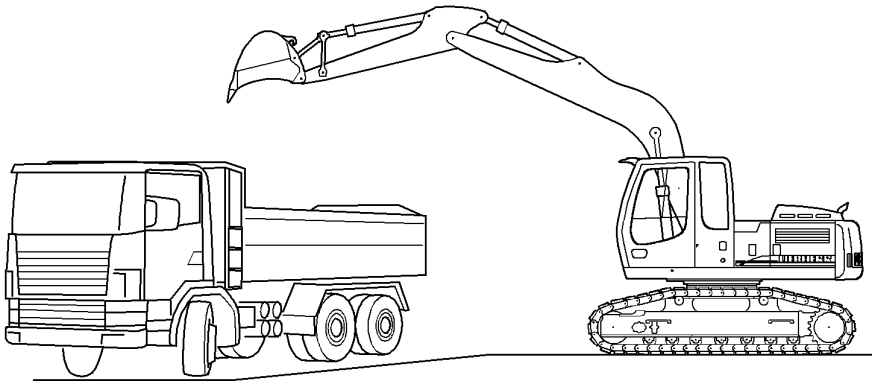


Fig. 3-161 *Emptying grab material*

- ❑ If possible, the machine should stand higher than the transport vehicle to avoid having to lift the grab material unnecessarily.
- ▶ Stop the transport vehicle in a position that allows it to be loaded from the rear or the side.
- ▶ Slew the machine's equipment above the loading area of the transport vehicle.

▶ Reinstall the cover(s) 6 at the upper face of the counterweight.

3.11 Hydraulic removable counterweight

This optional equipment makes it possible to let down and lift the counterweight of the machine quickly and without needing an additional lifting device (as an example to make the conveyance easier). This is achieved via two telescoping cylinders and using the hydraulic power of the machine.

3.11.1 Safety guidelines for lifting and lowering the counterweight

Danger!
In order to maintain the stability of the machine, a part of the working attachment is to be removed before lowering the counterweight.
As a basic rule we recommend to remove all the attachment parts with exception of the boom (gooseneck boom, main boom or shovel boom) and to lower the boom to the ground.

▶ Never stand below the counterweight during its down or up motion and as long as it is not properly secured with its fastening screws.

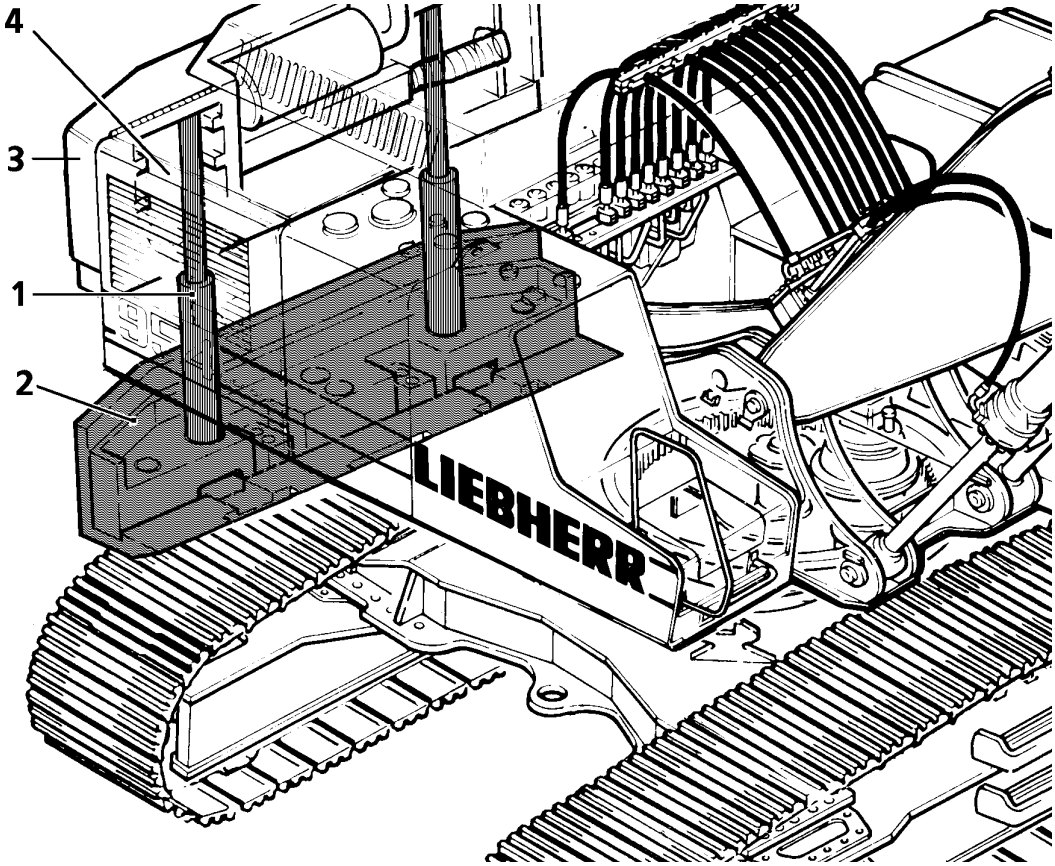


Fig. 3-174 *Removing the counterweight with uppercarriage crosswise*

Caution!
The removal and installation of the boom are only to be performed by authorized and specially trained persons!

▶ Observe all the safety regulations contained in the heading "Removal & installation of attachment parts" of this manual.

Attaching the liftling tools:

▶ Insert the both round lifting slings 20 between the main girders with the bearing bores for boom fixing.

▶ Reinstall the attachment fastening bolts 8 you have removed when dismounting the boom, taking care to catch the round slings 20. Secure the bolts 8.

▶ Draw up the both lifting tools 30 onto the rear part of the uppercarriage.

❑ **On machines R964C**

▶ Insert the securing rods 40 all the way through the openings of the lifting tools 30. Install the screws 6 to secure the rods 40.

▶ Connect the both shackles 5 to the rear lifting tools 30 and screw in the bolts of the schackles.

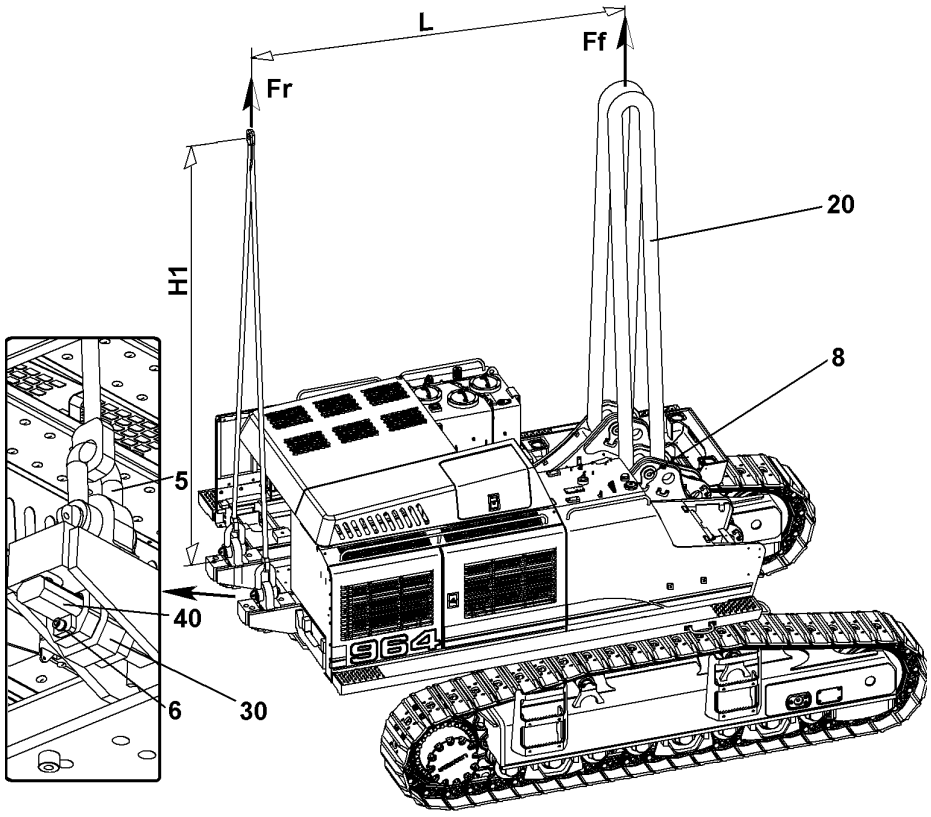


Fig. 3-183 *Installing the lifting tools to the basic machine R964C*

▶ On machines R974C

▶ Insert the fixing bolts 55 with washers 56 and nuts 57.

▶ Tighten the fixing bolts to the torque indicated further in this manual for the counterweight bolts.

Error code	Effect	Cause	Measure / remedy
E 135		Circuit 5 Volt - REF1	Consult LIEBHERR customer service.
E 136		Circuit 5 Volt - REF2	
E 137		Circuit 5 Volt - REF3	
E 138		Circuit 5 Volt - REF4	
E 139		Circuit 5 Volt - REF5	
E 140	Possible starting difficulties at low ambient temperatures	Left heater flange R51-1 is defective	Check, if necessary replace the heater flange R51-1 .
E 141	Possible starting difficulties at low ambient temperatures	Right heater flange R52-1 is defective	Check, if necessary replace the heater flange R52-1 .

4.1.2 System errors in the electrical servo control circuit

Error code	Effect	Cause	Measure / remedy
E 319	Possibly incorrect function of the travel pedals U22/U23	The sensors B40/B45 are active, even though the pedals U22/U23 are not actuated . Travel pedals U22/U23 wrong adjusted or defective	Check the pedals U22/U23 for proper function, if necessary readjust or replace pedals.
E 220	Possibly incorrect function of the pressureless lowering	Short circuit to ground or to +24V in the load circuit of Y401	Check, if necessary repair the commutation solenoid valve Y401 and its connecting circuit
E 221 bis E 223	Possibly incorrect function of the servo control for additional movement	Short circuit to ground or to +24V in the load circuit of the commutation solenoid valve	Check, if necessary repair the commutation solenoid valve for additional movement and its connecting circuit
E 224 bis E 227	Possibly incorrect function of the servo control for additional movement	Short circuit to ground or to +24V in the load circuit	Check, if necessary repair the load circuit
E 228	Possibly incorrect function of the servo control circuit	Short circuit to ground or to +24V in the load circuit of the commutation solenoid valve Y 369A	Check, if necessary repair the commutation solenoid valve Y369A and its connecting circuit
E 229	Possibly incorrect function of the servo control circuit	Short circuit to ground or to +24V in the load circuit of the commutation solenoid valve Y 370B	Check, if necessary repair the commutation solenoid valve Y370B and its connecting circuit
E 230, E 231 and E 233	Possibly incorrect function of the servo control for additional movement	Short circuit to ground or to +24V in the load circuit	Check, if necessary repair the load circuit
E 232	Possibly incorrect function of the pressureless lowering	Short circuit to ground or to +24V in the load circuit Y109	Check, if necessary repair the commutation solenoid valve Y109 and its connecting circuit
E 234	Possibly incorrect function of the servo control for swing left	Short circuit to ground or to +24V in the load circuit Y150	Check, if necessary repair the commutation solenoid valve Y150 and its connecting circuit
E 235	Possibly incorrect function of the servo control for swing right	Short circuit to ground or to +24V in the load circuit Y151	Check, if necessary repair the commutation solenoid valve Y151 and its connecting circuit

LFR/en/Edition: 01 / 2010

Fault / error	Cause	Solution
Diesel engine continually emitting while smoke (steam)	Water in combustion chamber	Consult customer service
Diesel engine does not reach full speed	Speed adjustment not set to maximum value	Set speed adjustment to maximum value
	Injection system is set incorrectly	Consult customer service
	Dry-air filter dirty	Clean or replace filter
	Bad fuel supply	Clean or change fuel filter, check lines, drain water from tank
Diesel engine becomes too hot	Too little coolant	Fill coolant, check for leaks
	Water pump defective	Repair
	Thermostats do not work	Change thermostats
	Coolant contaminated	Clean coolant
Diesel engine has insufficient oil pressure **Note!** Switch off diesel engine immediately	Oil level too low	Correct oil level
	Oil pressure display faulty	Change oil pressure switch
Diesel engine consumes too much oil	External leak on diesel engine	Retighten screws, replace seals if required
Oil in coolant or coolant in oil		Consult customer service
Unusual noise / sounddevelopment on exhaust side	Exhaust system leaking	Check exhaust system / repair

4.2.2 Hydraulic system

Fault / error	Cause	Solution
Unusual noise / sounddevelopment at hydraulic pumps **Note!** Switch off diesel engine immediately	Shutoff valve on hydraulic tank closed	Open stop cock
	Hydraulic pumps taking in air	Check oil level in hydraulic tank, check intake lines for leaks
Modes E and P showing lack of power	No power adjustment via proportional solenoid valve Y50	Unplug cable of Y50 connection, remove safety cotter pin, move lever to emergency setting
Hydraulic oil temperature too high	Radiator cores dirty	Clean radiator cores
	Fan or fan control defective	Rectify error / consult customer service
Hydraulic oil level too low	Oil loss	Repair leaks, exchange hoses, refill oil via return-line filter

		Fuses on terminal 30 (KI30)
F10	25 A	Floodlights on working attachment, uppercarriage and cab roof
F11 15	A	Reserve
F12	15 A	Control circuit for additional floodlights
F13	7,5 A	Ignition key, starting circuit, voltage transformer*, Radio*,
F14	15 A	Dome light, cigarette lighter, horn
F15	15 A	Solenoid valves for oversteering of pressure cut-off during travelling movements
		Relays on printplate A1010
K5		Relay / engine stop (not used)
K6 Relay		/ horn
K7		Relay / additional floodlights on cab roof
K8		Relay / float position of boom

* optional equipment

LFR/en/Edition: 01 / 2010

5.2.3 Opening, closing, locking the engine hood 21

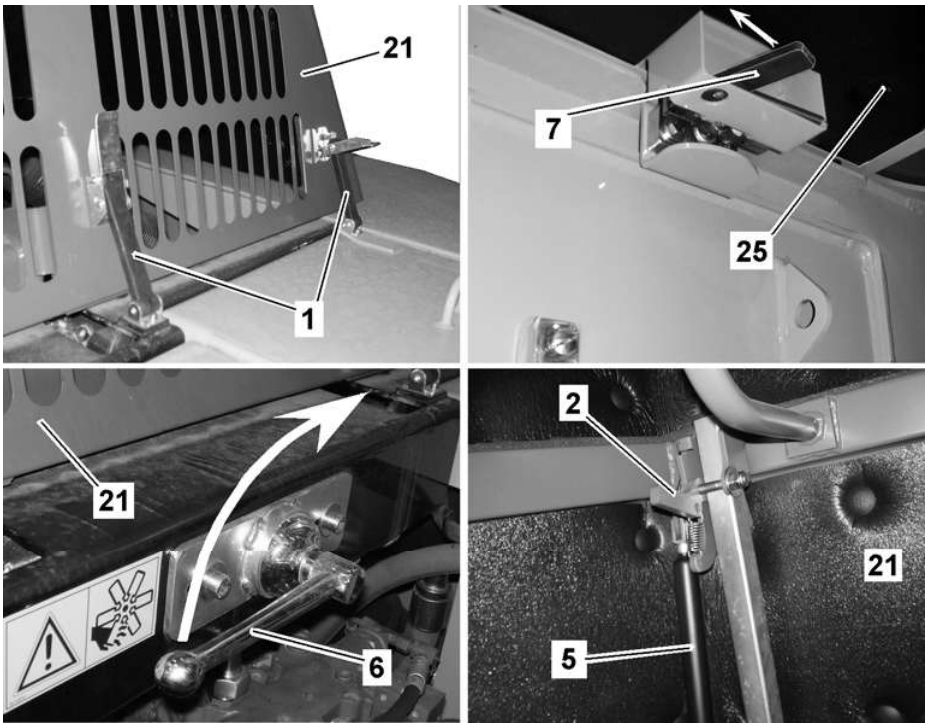


Fig. 5-3 *Locking of engine hood in opened and closed position*

- ▶ Unlock the door locks **1** of the engine hood **21**.
- ▶ Open the side door left **13**, unlatch the locking device **7** of the rear left cover **25** and tilt up the cover **25** all the way to the rear.
- ▶ Bring the handle of the locking device **6** of the engine hood **21** to the vertical.

Caution!
The engine hood moves with the assistance of two gas cylinders **5**. On older gas cylinders, the lifting force can drop, making the lifting and lowering of the engine hood more difficult.

- ▶ As soon as you notice a decrease of the efficiency of the gas cylinders **5**, make the necessary to have them replaced in the best delays.
- ▶ Wenn opening the engine hood **21**, make sure that in any case, even if the force of the gas cylinders is sufficient to maintain the hood, the mechanical retainer **2** engages so to prevent from unexpected lowering of the hood.

- ▶ Lift up the hood **21** so far the mechanical retainer **2** engages automatically

To close the engine hood 21:

- ▶ slightly lift up the hood **21** so to can disengage the mechanical retainer **2**.
- ▶ close the hood **21** and secure it while closing the lockingdevice **6** as well the door locks **1**.

Product description	Manufacturer	Country
Castrol Antifreeze NF	Castrol, London	GB
Chevron Extended Life Coolant	Chevron Texaco	*
DEUTZ Kühlerschutzmittel 0101 1490	Deutz Service International GmbH, Cologne	D
ESA Frostschutz G48	ESA Burgdorf	CH
Fuchs Fircofin Kühlerfrostschutz	Fuchs Petrolub AG, Mannheim	D
Glacelf Auto Supra (antifreeze)	Total, Paris	F
GlycoShell Longlife	Shell International Petroleum Company, London	GB
Glycoshell N	Shell International Petroleum Company, London	GB
Glysantin G 48	BASF AG, Ludwigshafen	D
Havoline Extend Life Antifreeze / réfrigérent	Chevron Texaco	*
Havoline XLC	Arteco	B
Motorex Antifreeze Protect G48	Bucher AG, Langenthal	CH
Motul Inugel Optimal Ultra	Motul SA, Aubervilliers Cedex	F
OMV Kühlerfrostschutz / Coolant Plus	OMV Refining & Marketing GmbH, Vienna	A
* = global / worldwide		

Permitted premixed coolants

Note!
The combination of different coolants might impair their properties.

▶ Do not mix different products.

Product description	Manufacturer	Country
Liebherr Antifreeze Mix	Liebherr	D
Caltex Extended Life Coolant Pre-Mixed 50/50 (ready-to-use-version)	Chevron Texaco	*
Chevron DEX-COOL Extended Life Prediluted 50/50 Anti-Freeze/Coolant	Chevron Texaco	*
Coolelf Auto Supra -37 °C	Total, Paris	F
Havoline XLC, 50/50	Arteco	B
Havoline DEX-COOL Extended Life Prediluted 50/50 Anti-Freeze/Coolant	Chevron Texaco	*
Premix = ready-mixed product (50% water and 50% corrosive inhibitor/antifreeze agent) * = global		

5.5.3 Polyvee belt for the airco compressor and alternator drive

The Diesel engine is fitted with a tensioning device for the belts. This device is self-tensioning and is therefore maintenance-free.

▶ Regularly check the belt for damage and wear and replaced it if necessary.

The following damages to the belt make its replacement necessary:

– Rib fractures
– Transversal fractures in several ribs
– Rubber nodules in between the ribs
– Deposition of dirt or stones
– Ribs becoming loosened at the base of the ribs
– Transversal fractures on the belt exterior

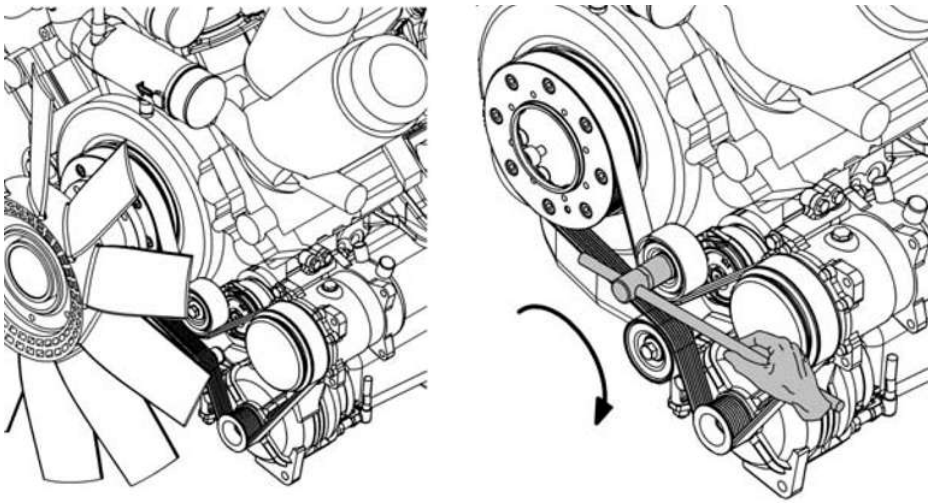


Fig. 5-15 *Replacing the belt*

To replace the belt:

❑ To replace the belt, you will need a spinner wrench with hexagon socket.

▶ Rotate the tensioning device back against the spring force clockwise as far as the stop.

▶ Remove the worn 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.

▶ With the tensioning device rotated back against the spring force, lay a new belt on the pulleys for the crankshaft, airco compressor, alternator and on tensioning and deflection pulleys.

▶ Swing the tensioning device back counterclockwise into the tensioning position.

5.5.4 Lubricating the starter ring gear

▶ Lubricate the teeth ot the starter ring gear regularly at the intervalls indicated in the maintenance chart.

5.7 Fuel system

Danger!
Risk of explosion!

- ▶ Avoid naked flame when working on the fuel system and when refuelling.
- ▶ Do not smoke.
- ▶ Only work on the diesel engine when it is switched off.

5.7.1 Refuelling

Fuel filler cap

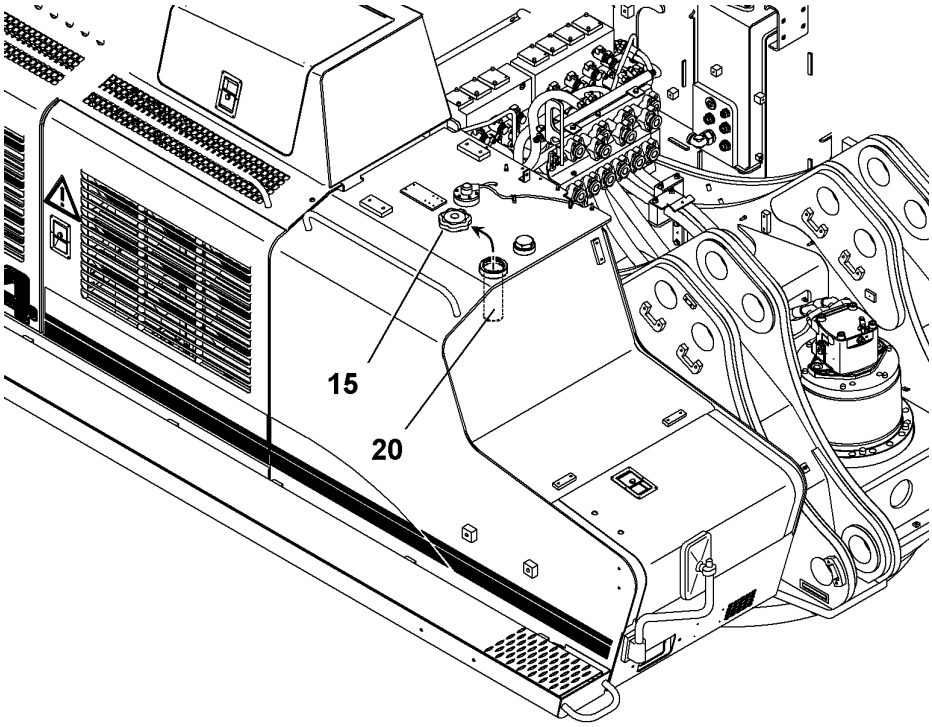


Fig. 5-29 *Fuel filler cap*

- ▶ Unscrew fuel tank cap **15**.
- ▶ Add fuel via the filler sieve **20**.

5.8.1 Changing the main element

Caution!
Only replace the main element **3** when the maximum permissible intake depression has been reached, or at least once a year.

Installing and removing the main element **3** too often could damage the seals between the filter element and the filter housing **2**.

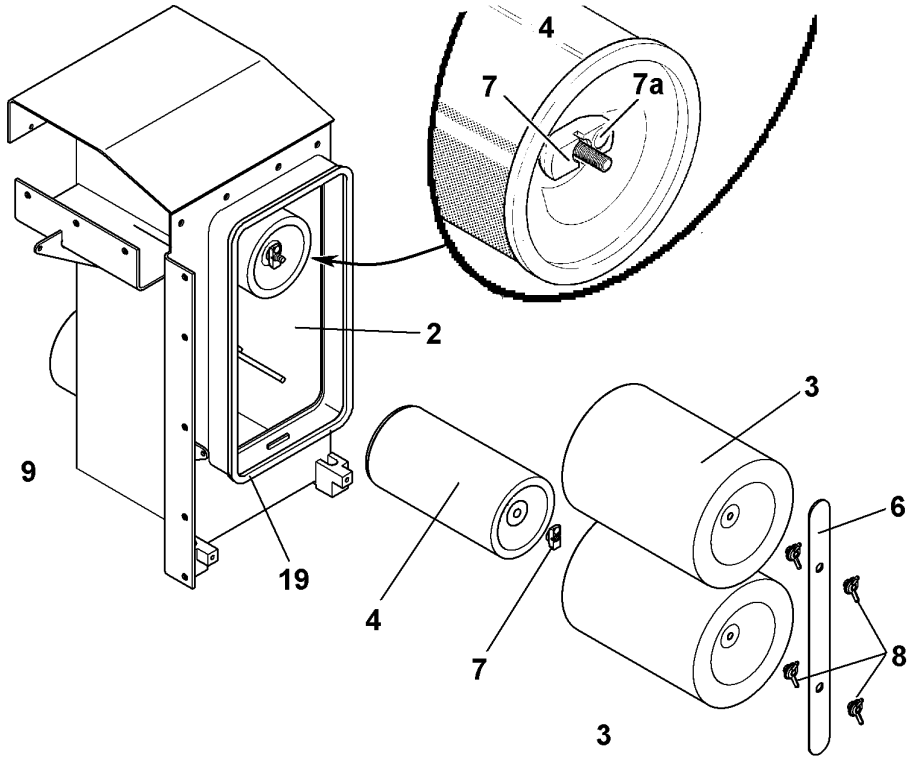


Fig. 5-41 *Changing the filter elements*

1	Filter cover	**6**	Retaining rod
2	Filter housing	**7**	Maintenance indicator (special nut)
3	Main element	**8**	Wing nuts
4	Safety element	**9**	Vacuum gauge

- ▶ Swivell up the cover **1** with the engine switched off.
- ▶ Remove the retaining rod 6 and the wing nuts 8
- ▶ Remove the contaminated main elements **3**.
- ▶ Clean the interior of the air filter housing **2** using a damp cloth.
- ▶ Insert the new main elements **3** and ensure that they are sealed and positioned correctly.
- ▶ Reinstall the wing nuts 8 and the retaining rod 6.
- ▶ Close the cover **1** of the filter, taking care that the seal 19 is positioned correctly.

▶ Screw filter housing **14** by hand to the stop and turn it back from a **1/4** turn (approx. 90°).

5.10.6 Replenishing oil filter in swing circuit

The replenishing oil filter is mounted on the swing pump.

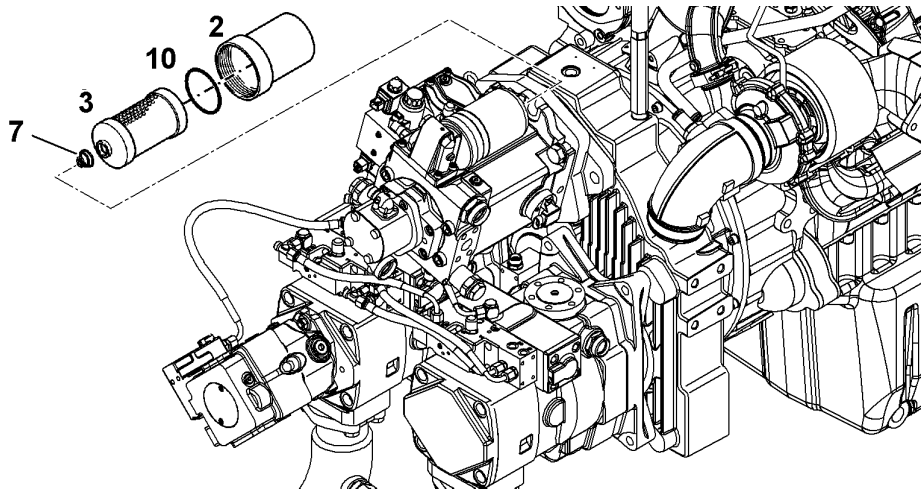


Fig. 5-50 *Replenishing oil filter of swing circuit*

2	Filter housing	**7**	Coil
3	Filter element	**10**	O-ring

▶ Unscrew filter housing **2** and remove filter element **3** and O-ring **10**.

▶ Clean the filter housing **2**.

▶ Oil the thread and sealing surfaces of filter housing **2** and of filter head on swing pump.

▶ Carefully install the coil **7** and the new filter element **3** with the a new O-ring **10**.

▶ Screw the filter housing **2**.

5.10.7 Servo control circuit

The control circuit does not require any special maintenance.

▶ Regularly inspect for leaks the pipe network and connections on all components (pressure accumulator, pressure limiting valve, pressure filter etc.) .

Danger!
The pressure accumulator **10** maintains the servo control circuit under pressure for a small number of actuations even after the Diesel engine shutdown.
Before working on the control circuit, relieve the servo pressure as follows:

▶ Lay the working attachment down to the ground.

▶ Switch the engine off.

▶ Actuate both joysticks several times (with the ignition key in contact position and the safety lever tilted down).

▶ Check the oil level.

Oil quality and quantity: see lubricant chart.

Change intervals: see lubrication and maintenance chart.

5.11.2 Swing gear - Oil level check and oil change

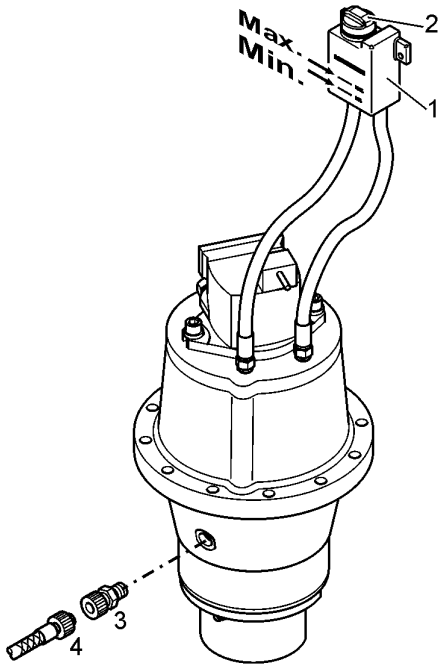


Fig. 5-61 *Checking oil level and changing oil in swing gear*

1 Oil reservoir
2 Cover
3 Drain valve
4 Drain hose

To check the oil level:

When the gear oil is cold, the level in the expansion reservoir **1** should not be below the marking **Min.**

▶ Otherwise add oil until the level reaches the marking **Max.**

To drain the oil:

▶ Remove the cover **2**.

▶ Unscrew the cover of the drain valve **3** via the opening on the upperdeck.

▶ Screw the drain hose provided **4** to the drain valve **3** and let the oil flow out into a suitable container.

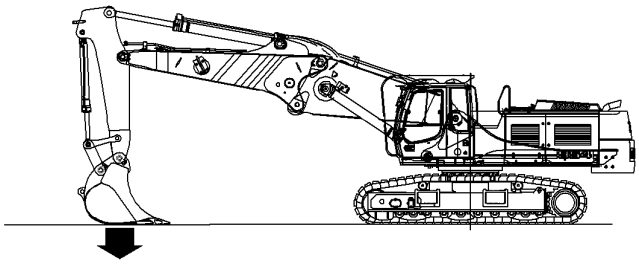
▶ Remove the hose **4**.

▶ Screw the cover of the drain valve **3** back on.

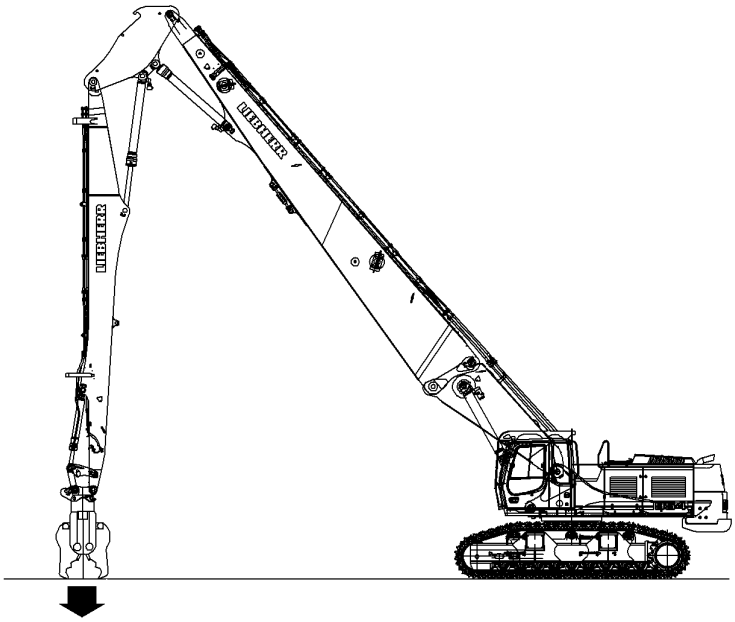
To add the oil:

▶ Add the oil in the reservoir until the level reaches the **Max.** marking.

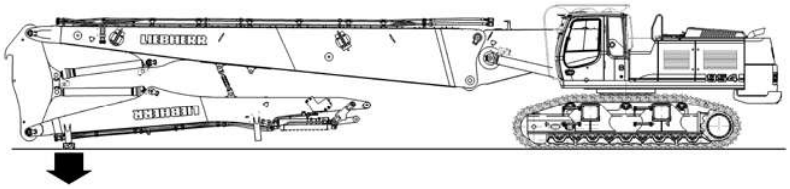
▶ Screw the cover **2** back on.



- Prop up the the demolition attachment on the upright lowered demolition stick ....



- .... or on the demolition attachment, folded and lowered to the ground in its rest position.

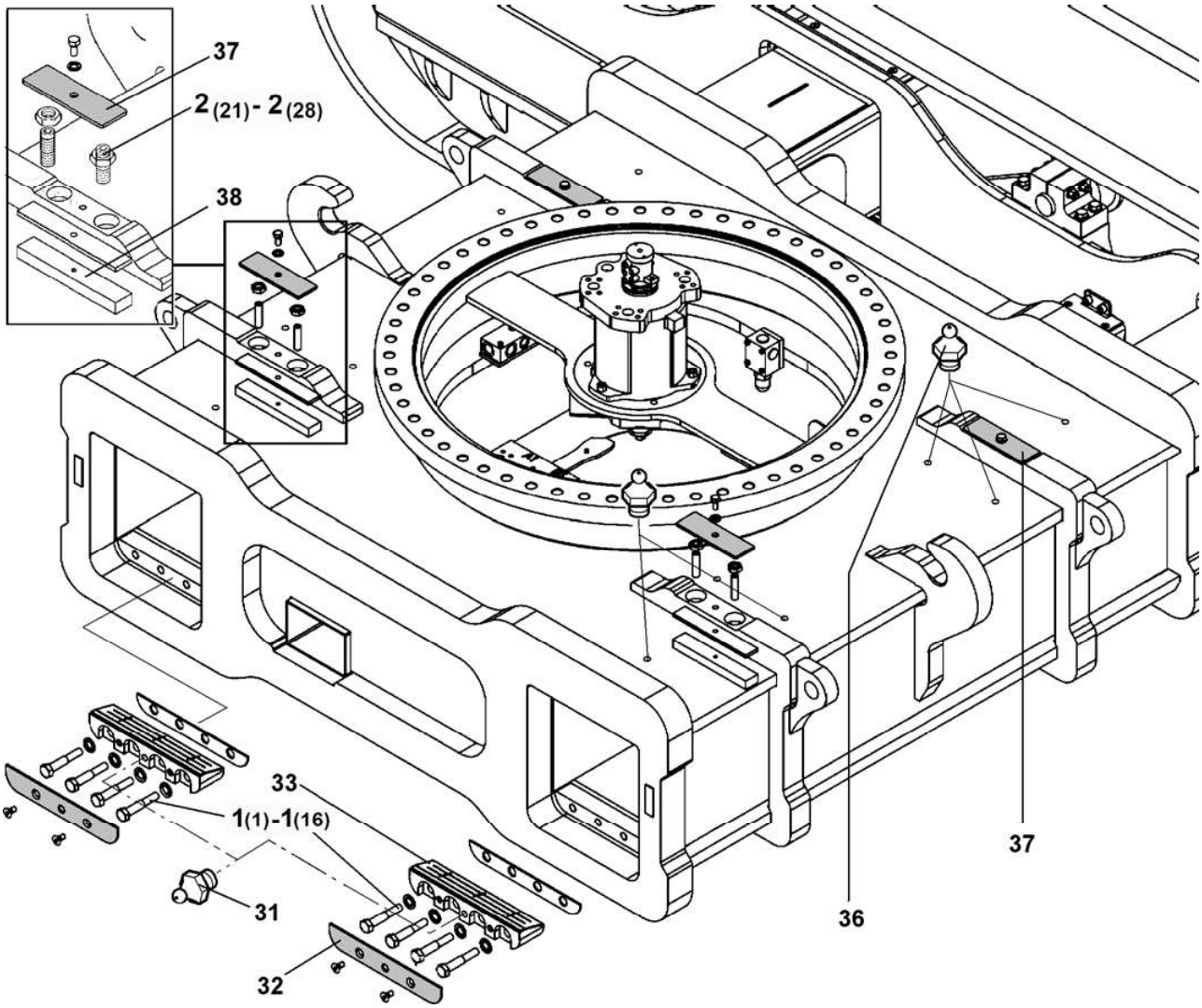


Modification of the tracks width

▶ Initiate adjustment of the track width using the operating organs in the operator's cab.

↳ The side frames begin to move (together or one after the other) in the desired direction.

▶ Observe the movements of the side frames and stop the adjustment procedure as soon as both side frames come to a halt:.



Caution !
The adjustment procedure described under this heading must be carried out regularly, first after 100 and 250 working hours and afterwards after every further 250 working hours.
The order of the check procedure described as follows must be carefully observed.

Check / re-tighten the bolts 1(1) to 1(16) at the lower wedge plates

- ▶ Completely extend the side frames.
- ▶ Retract the side frames on each side by approximately 50 mm.
- ▶ Remove the protection lids **32** of the lower wedge plates **33**.

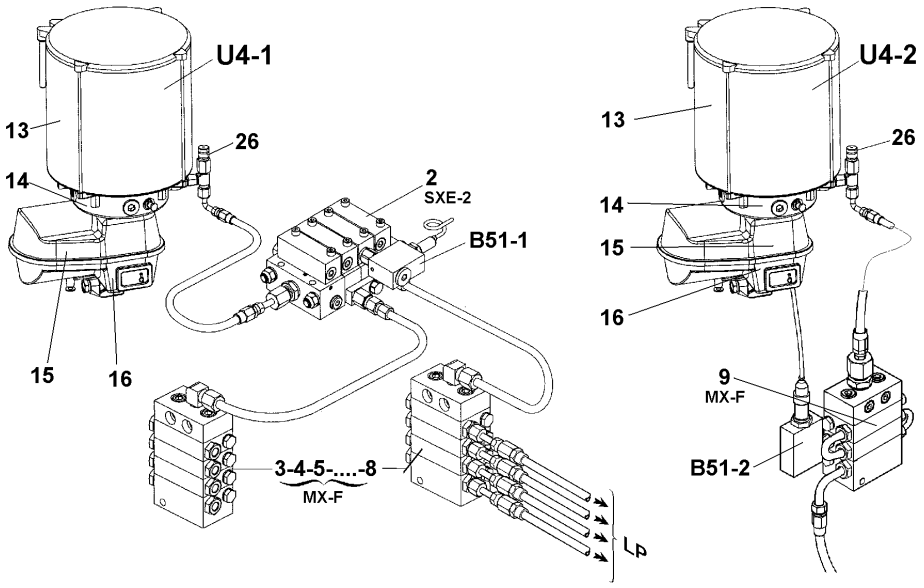


Fig. 5-89 *Centralized lubrication system*

2	Main distributor	**3**	Sercond. distrib. on uppercarriage
4	Sercondary distributor on boom	**5**	Sercondary distributor on stick
9	Distributor for swing ring teeth	**13**	Grease container
14	Electric motor	**15**	Grease pump
16	Control unit	**26**	Pressure relief valve
B51-1	Proximity switch for U4-1	**B52-1**	Proximity switch for U4-2
U4-1	Lubrication pump 1 complete	**U4-2**	Lubrication pump 2 complete
LP	Lubrication points		

Lube points connected to the lubrication plant U4-1:

- the ball bearing races of the swing ring,
- all (or the most of) the lubrication points of standard working attachments.
- the seat of the swing gear inside the uppercarriage structure.
- the roller bearing of the output shaft of the swing gear.

Lube points connected to the lubrication plant U4-2:

- the housing around the output pinion of the swing ring, which contains the grease reserves for the swing ring teeth lubrication,

Lube points which are not connected to the central lubrication system:

Caution!

When operating a machine and especially if it is fitted with a special working attachment, make sure to lubricate daily all the lubrication points which may be installed separately, i. e. which are not connected to the central lubrication system.

- On some backhoe attachments, some grease fittings may be installed separately in the area of the connector bracket and shifting lever for the digging tool.
- With special attachments (telescopic stick, hydraulic offset boom, ...) some bearing points at the attachment or at the working tool are possibly not connected to the central lubrication system.

The mounting screws 3 (M27 - 10.9) swing ring to undercarriage must be torqued to 1400 Nm (1030 ft.lbs.).

The mounting screws 4 (M27 - 10.9) swing ring to uppercarriage must be torqued to 1400 Nm (1030 ft.lbs.).

5.18.3 Mounting screws of the hydraulic oil and fuel tank

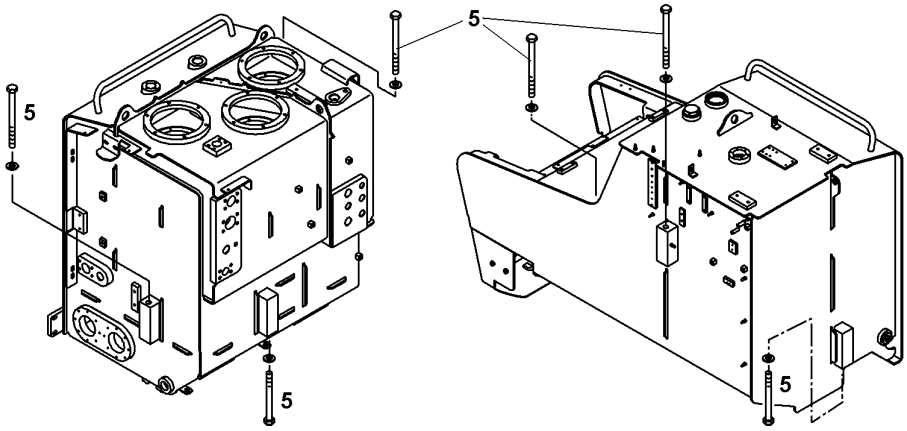


Fig. 5-101 *Hydraulic oil tank and fuel tank mounting bolts*

The mounting screws **5** (M20 - 10.9) must be torqued to 560 Nm (410 ft.lbs.)

5.18.4 Mounting bolts of the swing gear and motor

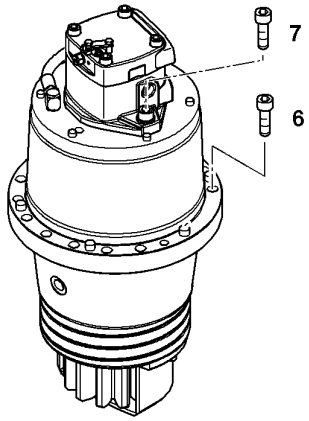


Fig. 5-102 *Swing gear and swing motor mounting bolts*

The mounting bolts **6** (M24 - 10.9) of the swing gear must be torqued to 960 Nm (710 ft.lbs).

Torque mounting bolts **7** (M24 - 10.9) of the swing motor on machines R974C to 960 Nm (710 ft.lbs).

Torque mounting bolts **7** (M20 - 10.9) of the swing motor on machines R964C to 560 Nm (410 ft.lbs).

Maintenance / inspection at operating hours						WORK TO BE CARRIED OUT R 974 C		
On delivery	Every 8 - 10	Every 10 - 50	At 500, 1500	At 1000, 3000	At 2000, 4000	**By maintenance personnel (machine owner)** ■ First and only interval ● Repeat interval ♦ Special interval every 250 hours	**By authorized specialist personnel** ❑ First and only interval ❍ Repeat interval	**Note**
					❍	Check the warm water solenoid valve for function and chocking, clean it as necessary		
						AIR-CONDITIONING SYSTEM		
		●	❍	❍	❍	Switch on air-conditioning system regularly (at least 1 x every 14 days)		
			❍	❍	❍	Check the condensor for contamination, blow it out if necessary		
			❍	❍	❍	Clean, if necessary replace both recirculated and fresh air filters in airco unit, reduce maintenance interval in very dusty conditions		
			❍	❍	❍	Check mounting screws and compressor drive belt		
			❍	❍	❍	Check the drier / receiver unit for moisture degree, coolant level and good condition (no rust), replace it if necessary		
					❍	Check the condition of evaporator unit, clean as necessary		
					❍	Check electrical wires for damage and for loose connections		
					❍	Check pressure switch for function		
					❍	Check efficiency of the air conditioner after opening the circuit, repairs or as necessary		
						Yearly replace the drier receiver unit, for the occasion check the whole circuit for leaks and replace refrigerating agent and refrigerator oil		
						Yearly have the function of the air flaps and of the defrosting thermostat checked by a refrigeration specialist.		
						UNDER / UPPERCARRIAGE, & ATTACHMENTS		
		●	❍	❍	❍	Grease all lubrication points connected to the centalized lube system (actuate switch in cab with semi-automatic system or no action required with fully automatic system)		
		●	❍	❍	❍	Manually grease all lubrication points not connected to the centalized lube system (as in digging bucket area if necessary, on special attachments or on special undercarriage)		
		●	❍	❍	❍	Check bucket teeth visually for wear		
		♦	❍	❍	❍	Check all parts for cracks		
		♦	❍	❍	❍	Check mounting screws of counterweight and tanks for tightness		
			❍	❍	❍	Check the screws of connections and the fittings on hydraulic hoses and pipes		

Tab. 5-20